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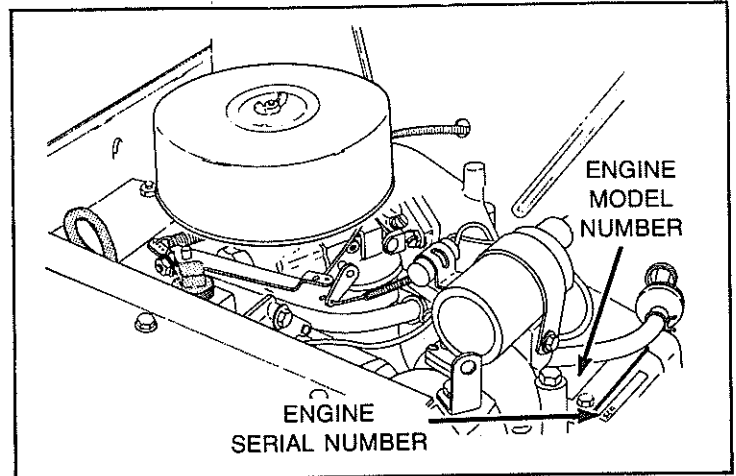
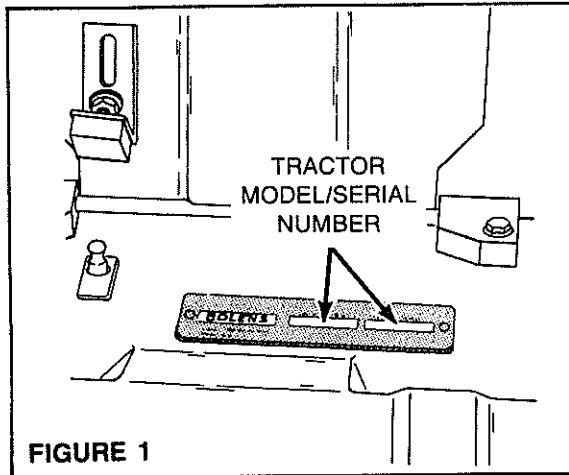
***Bolens***<sup>®</sup>

**5000 SERIES  
TRACTORS**

**SERVICE MANUAL**

**SERIAL NUMBER INFORMATION**

**1**



**SPECIFICATIONS**

| <b>ENGINE</b>     | <b>MODEL 5017G &amp; 5017H</b>             |
|-------------------|--|
| Manufacturer      | Kohler                                     |
| Model/Spec        | KT 17 Spec. 24218, 24314 & 24351           |
| Type              | Horz. shaft, air cooled<br>2 cyl., 4 cycle |
| Bore and Stroke   | 3-1/8" (79 mm) x<br>2-3/4" (70 mm)         |
| Piston            |  |
| Displacement      | 42.18 cu. In. (690 cc)                     |
| Mfr's H.P. Rating | 17 H.P. at 3600 RPM                        |
| Air Cleaner       | Paper Element Kohler 4508302               |
| Oil Capacity      | 1.5 U.S. Qt. (1.4 liter)                   |
| Governor          | Mechanical                                 |
| Speed Control     | Remote, cable operated                     |
| Starter           | Bendix Type                                |
| Charging System   | 15 Amp. flywheel Alternator                |
| Spark Plug Size   | 14 mm                                      |
| Spark Plug        | Champion RV15YC                            |
| Spark Plug Gap    | .025 (0.63 mm)                             |
| Breaker Point Gap | .020 (0.5 mm)                              |
| Timing            | SP Mark in Timing Hole                     |

| <b>ENGINE</b>     | <b>MODEL 5018H</b>                         |
|-------------------|--|
| Manufacturer      | Kohler                                     |
| Model/Spec        | M18QS Spec. 24512                          |
| Type              | Horz. shaft, air cooled 2 cyl.,<br>4 cycle |
| Bore and Stroke   | 3-1/8" (79 mm) x<br>2-3/4" (70 mm)         |
| Piston            |  |
| Displacement      | 42.18 cu. In. (690 cc)                     |
| Mfr's H.P. Rating | 18 H.P. at 3600 RPM                        |
| Air Cleaner       | Paper Element Kohler 4508302               |
| Oil Capacity      | 1.5 U.S. Qt. (1.4 liter)                   |
| Governor          | Mechanical                                 |
| Speed Control     | Remote, cable operated                     |
| Starter           | Bendix Type                                |
| Charging System   | 15 Amp. flywheel Alternator                |
| Spark Plug Size   | 14 mm                                      |
| Spark Plug        | Champion RV15YC                            |
| Spark Plug Cap    | .035 (0.89 mm)                             |




**SPECIFICATIONS**

| <b>ENGINE</b>     | <b>MODEL 5019H</b>                     | <b>ENGINE</b>     | <b>MODEL 5020H</b>                      |
|-------------------|--|-------------------|---|
| Manufacturer      | Kohler                                 | Manufacturer      | Kohler                                  |
| Model/Spec        | KT 19 Spec. 49226                      | Model/Spec        | M20QS Spec. 49508                       |
| Type              | Horz. shaft, air cooled 2 cy., 4 cycle | Type              | Horz. shaft, air cooled 2 cyl., 4 cycle |
| Bore and Stroke   | 3 - 1/8" (79 mm) x 3 - 1/16 (78 mm)    | Bore and Stroke   | 3-1/8" (79 mm) x 3-1/16 (78 mm)         |
| Piston            |  | Piston            |   |
| Displacement      | 46.98 cu. In. (770 cc)                 | Displacement      | 46.98 cu. In. (770 cc)                  |
| Mfr's H.P. Rating | 19 H.P. at 3600 RPM                    | Mfr's H.P. Rating | 20 H.P. at 3600 RPM                     |
| Air Cleaner       | Paper Element Kohler 4508301           | Air Cleaner       | Paper Element 4508301                   |
| Oil Capacity      | 1.5 U.S. Qt. (1.4 liter)               | Oil Capacity      | 1.5 U.S. Qt. (1.4 liter)                |
| Governor          | Mechanical                             | Governor          | Mechanical                              |
| Speed Control     | Remote, cable operated                 | Speed Control     | Remote, cable operated                  |
| Starter           | Bendix Type                            | Starter           | Bendix Type                             |
| Charging System   | 15 Amp. flywheel Alternator            | Charging System   | 15 Amp. flywheel Alternator             |
| Spark Plug Size   | 14 mm                                  | Spark Plug Size   | 14 mm                                   |
| Spark Plug        | Champion RV15YC                        | Spark Plug        | Champion RV15YC                         |
| Spark Plug Gap    | .025 (0.63 mm)                         | Spark Plug Cap    | .035 (0.89 mm)                          |
| Breaker Point     |  | Breaker Point     |   |
| Gap               | .020 (0.5 mm)                          |                   |   |
| Timing            | SP Mark in Timing Hole                 |                   |   |

**CHASSIS SPECIFICATIONS**

|                           |   |                      |   |
|---------------------------|---|----------------------|---|
| Type                      | Steel, Formed Frame   | Speeds 5017H & 5018H | Infinitely variable<br>Forward: 0-6.8 mph<br>(0-10.0 km/hr)<br>Reverse: 0-3.4 mph<br>(0-5.5 km/hr)  |
| Length                    | 70-1/2 in. (179 cm)   | Speeds 5019H & 5020H | Infinitely variable<br>Forward: 0-9.0 mph<br>(0-14.5 km/hr)<br>Reverse: 0-4.8 mph<br>(0-7.3 km/hr)  |
| Width                     | 40-1/2 in. (103 cm)   | Speeds 5017G         | Forward 1st-.7 mph<br>(1.13 km/hr)<br>2nd-1.9 mph (3.1 km/hr)<br>3rd-3.5 mph (5.6 km/hr)<br>4th-5.2 mph (8.4 km/hr)<br>Reverse: 2.7 mph (4.4 km/hr) |
| Height                    | 45 in. (114 cm)   | Brake                | Transmission Mounted Disc   |
| Wheel Base                | 47 in. (119 cm)   | Tires                | Front: 16/6.60-8<br>Rear: 23/10.50-12   |
| Turning Radius            | 35 in. (89 cm)  | Hydraulics           | 5017H & 5018H Single Spool<br>5019H & 5020H Dual Spool  |
| Ground Clearance          | 9 in. (22 cm)   |                      |   |
| Shipping Weight           | 5017G 745 lbs./ (339 kg.)<br>5017H 800 lbs./ (364 kgs.)<br>5018H 888 lbs./ (402 kgs.)<br>5019H & 5020H 982 lbs./ (422 kgs.)   |                      |   |
| PTO Type                  | Electric Clutch   |                      |   |
| Transmission              | 5017H & 5018H-Model 11<br>Eaton w/one speed rear axle<br>5019H & 5020H-Model 11<br>Eaton w/two speed rear axle<br>5017G Model 2355 Peerless<br>(All gear; 4 speed & reverse<br>w/transaxle & limited slip<br>differential |                      |   |
| Transmission Oil Capacity | 5018H, 5019H & 5020H 8 Qts.<br>(7.6 liter)<br>5017G 4 Pts. (1.9 liter)  |                      |   |

TORQUE VALUE FOR CAP SCREWS

| SIZE      | <br>SAE GRADE 2 |       |      | <br>SAE GRADE 5 |       |      | <br>SAE GRADE 8 |        |       |
|-----------|--|-------|------|--|-------|------|--|--------|-------|
|           | Lb. In.  | Nm    | Kgm  | Lb. In.  | Nm    | Kgm  | Lb. In.  | NM     | Kgm   |
| 1/4 - 20  | 49   | 5.5   | 0.6  | 75   | 8.5   | 0.9  | 108  | 12.2   | 1.2   |
| 1/4 - 28  | 56   | 6.3   | 0.6  | 86   | 9.7   | 1.0  | 120  | 13.6   | 1.4   |
|           | Lb. Ft.  |       |      | Lb. Ft.  |       |      | Lb. Ft.  |        |       |
| 5/16 - 18 | 8  | 10.8  | 1.1  | 13   | 17.6  | 1.8  | 18   | 24.4   | 2.4   |
| 5/16 - 24 | 9  | 12.2  | 1.2  | 14   | 18.9  | 1.9  | 20   | 27.1   | 2.7   |
| 3/8 - 16  | 15   | 20.3  | 2.0  | 23   | 31.2  | 3.1  | 35   | 47.4   | 4.8   |
| 3/8 - 24  | 17   | 23.0  | 2.3  | 25   | 33.9  | 3.4  | 35   | 47.4   | 4.8   |
| 7/16 - 14 | 24   | 32.5  | 3.3  | 35   | 47.4  | 4.8  | 55   | 74.5   | 7.6   |
| 7/16 - 20 | 25   | 33.9  | 3.4  | 40   | 54.2  | 5.5  | 60   | 81.3   | 8.3   |
| 1/2 - 13  | 35   | 47.4  | 4.8  | 55   | 74.5  | 7.6  | 80   | 108.4  | 11.0  |
| 1/2 - 20  | 40   | 54.2  | 5.5  | 65   | 88.1  | 9.0  | 90   | 122.0  | 12.4  |
| 9/16 - 12 | 55   | 74.5  | 7.6  | 80   | 108.4 | 11.0 | 110  | 149.1  | 15.2  |
| 9/16 - 18 | 60   | 81.3  | 8.3  | 90   | 122.0 | 12.4 | 130  | 176.2  | 18.0  |
| 5/8 - 11  | 75   | 101.6 | 10.3 | 110  | 149.1 | 15.2 | 170  | 230.4  | 23.5  |
| 5/8 - 18  | 85   | 115.2 | 11.7 | 130  | 176.2 | 18.0 | 180  | 243.9  | 24.9  |
| 3/4 - 10  | 130  | 176.2 | 18.0 | 200  | 271.0 | 27.7 | 280  | 379.4  | 38.7  |
| 3/4 - 16  | 145  | 196.5 | 20.0 | 220  | 298.1 | 30.4 | 320  | 433.6  | 44.3  |
| 7/8 - 9   | 125  | 169.4 | 17.3 | 320  | 433.6 | 44.3 | 460  | 623.3  | 63.7  |
| 7/8 - 14  | 140  | 189.7 | 19.3 | 350  | 474.3 | 48.4 | 500  | 677.5  | 69.2  |
| 1 - 8     | 190  | 257.5 | 26.3 | 480  | 650.4 | 66.5 | 680  | 921.4  | 94.2  |
| 1 - 12    | 200  | 271.0 | 27.7 | 530  | 718.2 | 73.4 | 740  | 1002.7 | 102.5 |

Conversion Formula: To obtain Nm multiply ft. lbs by 1.355.  
To obtain Kgm multiply ft. lbs by 0.138

All torques ± 10% unless otherwise specified.  
All torque values are for capscrews that have been lubricated with engine oil or grease.

Multiply standard assembly torque by the following factors:

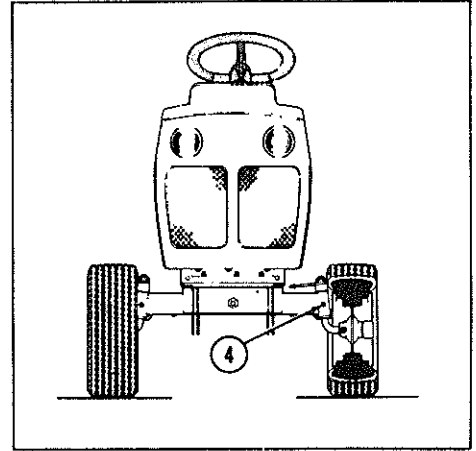
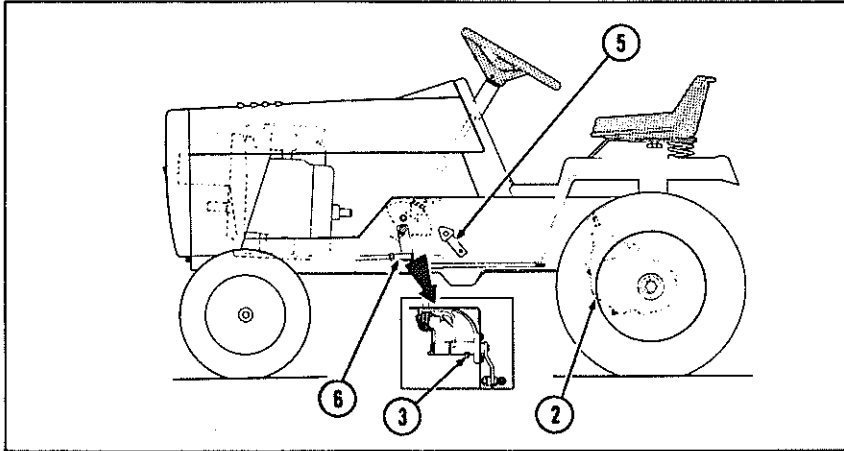
- A. 1.25 when threads are dry
- B. 0.85 when parts are plated
- C. 0.75 when parts are parkerized
- D. 0.70 when parts are coated with Molykote
- E. 0.65 for jam nuts

# GENERAL (Continued)

## MAINTENANCE CHART

| MAINTENANCE REQUIRED        | Length of Operation                            | Type of Maintenance   |
|-----------------------------|--|---|
| Engine Cooling Air Screen — | Daily or 10 Hrs.*                              | Brush Clean   |
| Engine Air Cleaner —        | 25 Hrs.  | Clean Precleaner  |
|                             | 50 Hrs.*                                       | Shake Out Dirt  |
|                             | 100 Hrs.*                                      | Replace Element   |
| Cooling Fins — (Engine) —   | Daily or 50 Hrs.                               | Clean — Use Air Hose if Available                                       |
| Spark Plugs —               | 100 Hrs.                                       | Service or Replace  |
| Breaker Points —            | 500 Hrs.                                       | Service or Replace  |
| Ignition Timing —           | 500 Hrs.                                       | Adjust  |
| Engine Valve Tappets —      | 500 Hrs.                                       | Adjust  |
| Power-Take-Off —            | 100 Hrs.*                                      | Check and Adjust Brake  |
| Fuel Filter —               | 100 Hrs.                                       | Clean if two piece, replace if one piece                                |
| Battery —                   | Daily  | Check electrolyte level - Add water as Necessary                        |
| Hydrostatic Transmission —  | 50 Hrs.*                                       | Clean — Use Air Hose if Available                                       |
| Belts —                     | 50 Hrs.*                                       | Check for Wear and Adjust   |
| Tires —                     | 25 Hrs.  | Check for Damage and Air Pressure                                       |
| Transmission Filter —       | After First 5 Hours then After Every 100 Hrs.* | Change and Add oil to Bring to Operating Level (Use only Bolens Filter) |
| Brakes —                    | 50 Hrs.*                                       | Check for Wear and Adjust   |

LUBRICATION CHART  
GEAR DRIVE



LUBRICATION CHART

| LUBRICATION REQUIRED                       |  | LENGTH OF OPERATION | TYPE OF LUBRICATION                          | AMOUNT REQUIRED                    |
|--|--|---------------------|--|------------------------------------|
| 1. Engine Crankcase —                      |  | First 5 Hrs.        | SC, SD or SE Engine Oil                      | Replace<br>1.5 Qts.<br>(1.4 liter) |
| Average Temperature                        | (Spring, Summer, Autumn)<br>(+ 100°F to 20°F)<br>(+ 38°C to - 6°C) | 25 Hrs.*            | SC, SD or SE<br>SAE 30 10-W30,<br>10W-40 Oil |                                    |
|  | (Winter)<br>(+ 20° to Below Zero)<br>(100°C to Below Zero)         | 25 Hrs.*            | SC, SD or SE<br>SAE 5W-30 or<br>5W-20 Oil    |                                    |
| 2. Transmission —                          |  | Check Once a Year   | EP90 gear lube or equivalent                 | Add to plug level                  |
| 3. Steering Shaft —                        |  | 10 Hrs.             | Grease with Multi-Purpose                    | 1-2 Strokes                        |
| 4. Front Wheel Spindles —                  |  | 10 Hrs.             | Grease with Multi-Purpose                    | 1-2 Strokes                        |
| 5. Clutch/Brake Pedal Shaft and Bushings — |  | 10 Hrs.             | Oil  | Small Amount                       |
| 6. Tie Rod Ends and Drag Links —           |  | 10 Hrs.             | Oil  | Small Amount                       |

\* More often under extreme conditions.

NOTE

A hand type grease gun is recommended when greasing your unit. Hi-pressure type grease guns could

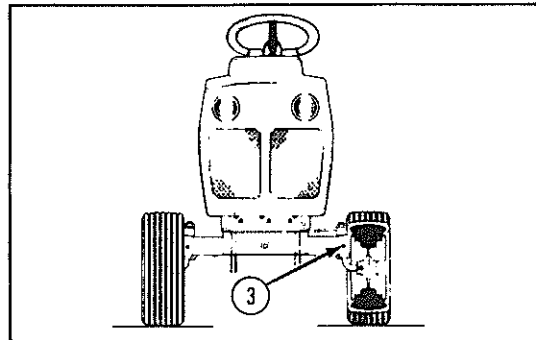
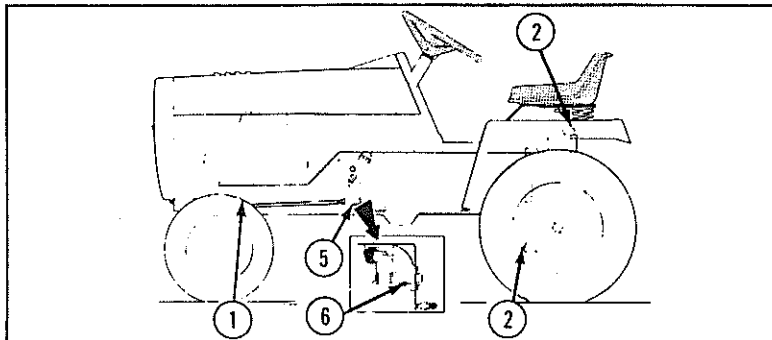
cause damage to the fittings and bearing seals. The proper grease gun can be purchased from your Bolens dealer. Lubricate all linkages, levers and pins not equip-

ped with grease fittings with an oil can once a week, or more often depending on operating conditions.

1

# GENERAL (Continued)

## LUBRICATION CHART HYDROSTATIC DRIVE



| LUBRICATION REQUIRED  | LENGTH OF OPERATION                                     | MODEL 5017<br>TYPE OF LUBRICATION   | MODEL 5019<br>TYPE OF LUBRICATION  | AMOUNT REQUIRED   |
|---|---|---|--|---|
| 1. Engine Crankcase ---   | First 5 Hrs.  | SC, SD or SE<br>Engine Oil  | SC, SD or SE<br>Engine Oil   | Replace<br>1.5 Qts.<br>(1.4 liter)                            |
| (Spring, Summer, Autumn)<br>(+100°F to 20°F)<br>(+38°C to -6°C) | mer. A<br>0°F;<br>6°C)                                  | SC, SD or SE<br>SAE 30 OIL<br>10W-30, 10W-40  | SC, SD or SE<br>SAE 30 OIL<br>10W-30, 10W-40   |   |
| (Winter)<br>(+20°F to Below Zero)<br>(-6°C to Below Zero)       | low Zer<br>ow Zer                                       | SC, SD, or SE<br>SAE 5W-30 or<br>5W-20 Oil  | SC, SD, or SE<br>SAE 5W-30 or<br>5W-20 Oil   |   |
| 2. Hydrostatic Transmission —<br>(Shipped with SAE 20 oil)      | Check Weekly<br>or 10 Hrs.                              | 20°F (-6°C) - Above-<br>SAE 20 Oil, Type<br>SC, SD or SE  | Fill with Bolens Oil<br>1738157 (Benzoil THL 19),<br>or Mobil 423 or Texaco TDH                | Add to<br>"FULL" Mark<br>on Dipstick<br>8 Qts. (7.6<br>liter) |
|   |   | 20°F (-6°C) - Below-<br>Drain and refill with<br>Type "F" Automatic<br>Transmission Fluid   |  |   |
|   | When Oil is<br>Discolored<br>Dirty or<br>after 100 Hrs. | Drain and refill as<br>follows 20°F (-6°C)-<br>Above SAE 20 Oil<br>Type SC, SD or SE<br>20°F (-6°C) - Below-<br>Drain and refill with<br>Type "F" Automatic<br>Transmission Fluid | Drain and refill with Bolens<br>Oil 1738157 (Benzoil THL<br>19), or Mobil 423 or<br>Texaco TDH |   |
| 3. Front Wheel Spindles —                                       | 10 Hrs.   | Grease with<br>Multi-Purpose  | Grease with<br>Multi-Purpose   | 1-2 Strokes   |
| 4. Foot Pedal Shaft (Not Shown) —                               | 10 Hrs  | Oil   | Oil  | Small Amount  |
| 5. Tie Rod Ends and Drag Links —                                | 10 Hrs  | Oil   | Oil  | Small Amount  |
| 6. Steering Shaft —   | 10 Hrs.   | Grease with<br>Multi-Purpose  | Grease with<br>Multi-Purpose   | 1-2 Strokes   |
| 7. Brake Pedal Bushings (Not Shown) —                           | 10 Hrs.   | Oil   | Oil  | Small Amount  |

\*More often under extreme conditions.

**NOTE**

A hand type grease gun is recommended when greasing your unit. Hi-

pressure type grease guns could cause damage to the fittings and bearing seals. Lubricate all linkages, levers and pins not equipped with

grease fittings with an oil can once a week or more often depending on operating conditions.

## TROUBLE SHOOTING GUIDE

| PROBLEM  | PROBABLE CAUSE  | REMEDY  |
|--|---|---|
| Starter Motor does not energize and solenoid does not click. | <ol style="list-style-type: none"> <li>1. Attachment drive engaged.</li> <li>2. Brake pedal not depressed.</li> <li>3. Corroded or loose electrical solenoid connections.</li> <li>4. Inoperative switches - Attachment drive, brake and key switch.</li> <li>5. Inoperative solenoid.</li> <li>6. Defective key switch.</li> </ol> | <ol style="list-style-type: none"> <li>1. Disengage PTO.</li> <li>2. Depress brake pedal.</li> <li>3. Clean and tighten Red/White wire at solenoid.</li> <li>4. Check and replace if necessary. (Refer to switch testing.)</li> <li>5. Check and replace if necessary. (Refer to solenoid testing.)</li> <li>6. Check and replace if necessary. (Refer to ignition switch test.)</li> </ol> |
| Starter Motor does not energize but solenoid clicks.         | <ol style="list-style-type: none"> <li>1. Discharged battery.</li> <li>2. Corroded or loose electrical connections on solenoid, or starter.</li> <li>3. Defective solenoid.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Charge battery.</li> <li>2. Check solenoid or starter.</li> <li>3. Check and replace if necessary.</li> </ol>   |
| Engine cranks slowly.  | <ol style="list-style-type: none"> <li>1. Weak or discharged battery.</li> <li>2. Corroded or loose electrical connections at battery.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check battery, charge or replace if necessary.</li> <li>2. Clean and tighten.</li> </ol>  |
| Battery discharges rapidly.                                  | <ol style="list-style-type: none"> <li>1. Low water level.</li> <li>2. Defective battery.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check and refill.</li> <li>2. Check and replace if necessary.</li> </ol>  |
| Battery will not charge.                                     | <ol style="list-style-type: none"> <li>1. Corroded or loose battery cables.</li> <li>2. Defective battery.</li> <li>3. Inoperative diode or rectifier/regulator.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Clean and tighten.</li> <li>2. Replace battery.</li> <li>3. Check diode and replace if necessary. Check rectifier/regulator by substitutions.</li> </ol>  |

**2**



**ELECTRICAL SYSTEM (Continued)****TROUBLE SHOOTING GUIDE**

| PROBLEM   | PROBABLE CAUSE   | REMEDY   |
|---|--|--|
| Lights not operating.   | <ol style="list-style-type: none"> <li>1. Bulbs burned out.</li> <li>2. Loose or poorly connected white wires or poor black ground wire.</li> <li>3. Bad light switch.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. Install properly and tighten.</li> <li>3. Check.</li> </ol>   |
| Attachment drive inoperative (Attachment drive light works).    | <ol style="list-style-type: none"> <li>1. Broken or loose wires.</li> <li>2. Defective electric clutch.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check purple wire between PTO switch and electric clutch.</li> <li>2. Replace.</li> </ol>  |
| Attachment drive inoperative (Attachment light inoperative).    | <ol style="list-style-type: none"> <li>1. Defective Attachment drive switch.</li> <li>2. Broken red wire between Attachment drive switch and key switch.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check and replace of necessary. Refer to Attachment switch test.</li> <li>2. Check and replace of necessary.</li> </ol>  |
| Engine kills when Attachment drive switch in turned on.         | <ol style="list-style-type: none"> <li>1. No operator in seat.</li> <li>2. Seat switch is not adjusted properly.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Seat switch must be activated either by operator in seat or the interlock switch button pulled up.</li> <li>2. Adjust so switch is engaged when operator is seated.</li> </ol>   |
| Continued operation of attachments when operator is not seated. | <ol style="list-style-type: none"> <li>1. Seat switch is not adjusted correctly.</li> <li>2. Defective seat switch.</li> <li>3. Broken wires.</li> <li>4. Defective Attachment drive switch.</li> <li>5. Defective condensor.</li> </ol> | <ol style="list-style-type: none"> <li>1. Adjust so switch is disengaged when operator is not seated.</li> <li>2. Check and replace if necessary. Refer to seat switch test.</li> <li>3. Connect or repair blue wires between seat switch and Attachment drive switch.</li> <li>4. Check and replace if necessary. Refer to Attachment drive switch test.</li> <li>5. Check and replace if necessary.</li> </ol> |

**ELECTRICAL SYSTEM WIRE COLOR CODE**

| <u>COLOR</u> | <u>FUNCTION</u>         | <u>EXPLANATION</u>                      |
|--------------|-------------------------|---|
| Black        | Ground                  | —                                       |
| Black/Yellow | Solenoid Ground         | Lead between solenoid and ground switch |
| Red          | Switched 12 Volts       | “Run” or “On” Key Position              |
| Red/White    | Amp Meter Pos. Terminal | For Amp Meter polarity indication       |
| Red/Black    | Amp Meter Neg. Terminal | Amp Meter polarity indication           |
| Red/Yellow   | Start Circuit           | 12 Volts start position only            |
| Orange       | Ignition Circuit        | 12 Volts during run and start position  |
| Yellow       | Stator Leads            | —                                       |
| Yellow/Red   | Stator Leads            | To indicate polarity on 2nd wire        |
| Blue         | Stop Circuit            | From engine kill circuit                |
| Blue/Black   | Safety Interlock        | Accessory Stop Circuit                  |
| White        | Lights                  | —                                       |
| White/Green  | Hi Beam                 | Function of light circuit               |
| White/Blue   | Lo Beam                 | Function of light circuit               |
| White/Red    | Brake Light             | Function of light circuit               |
| White/Black  | Back Up Light           | Function of light circuit               |
| Brown        | Tach                    | —                                       |
| Brown/Orange | Tach Signal             | Obtained from 12 volt ignition coil     |
| Brown/Yellow | Tach Signal             | Obtained from stator                    |
| Purple       | P.T.O. Clutch           | —                                       |
| Green        | Temperature             | Lead used between sender and indicator  |
| Gray         | Oil Pressure            | Lead used between sender and indicator  |

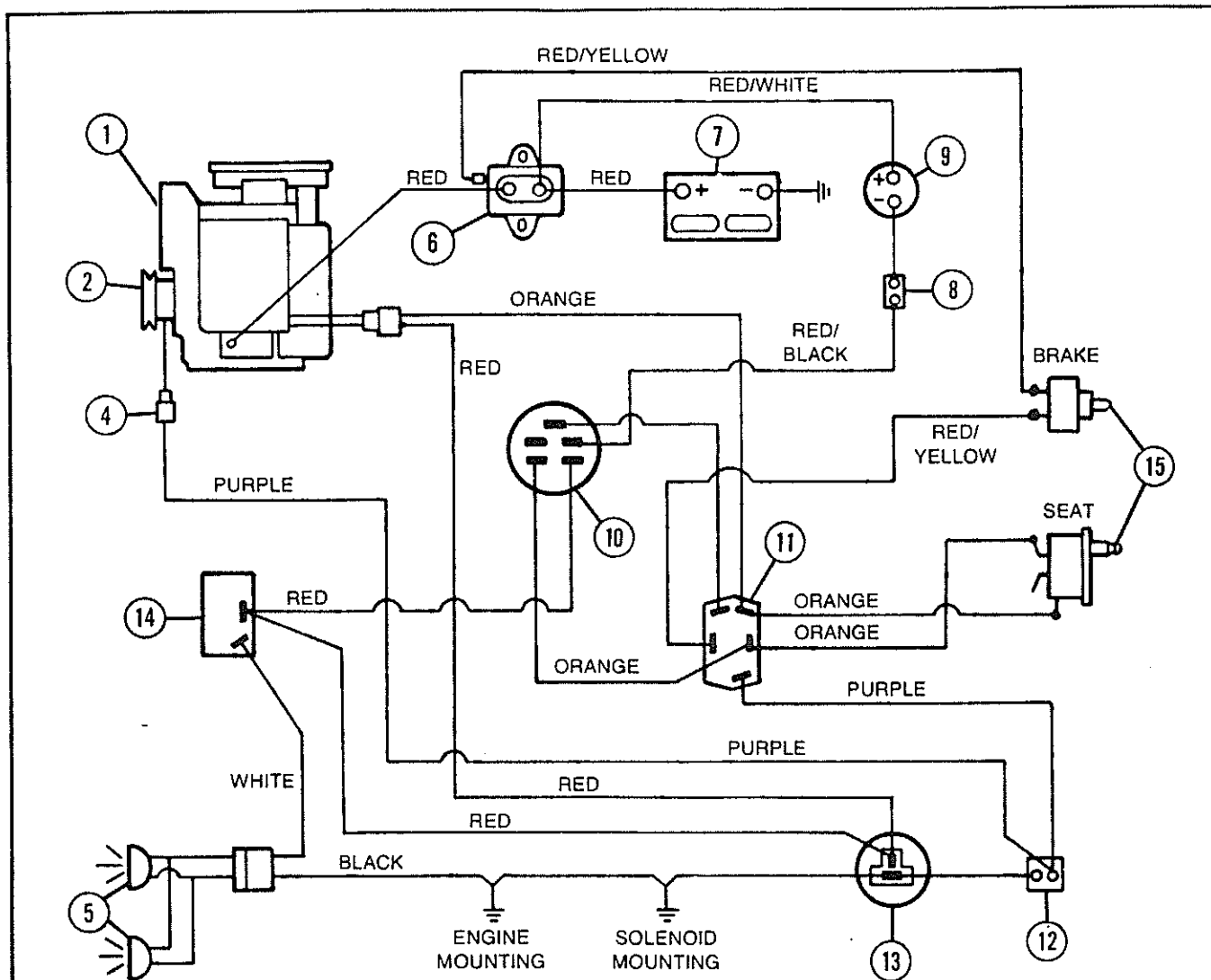
Some of the products from Vendors will not match our color system. Generally the Vendor uses black wire; however, we will try to interrupt this difference by using a connector located near the Vendor item.



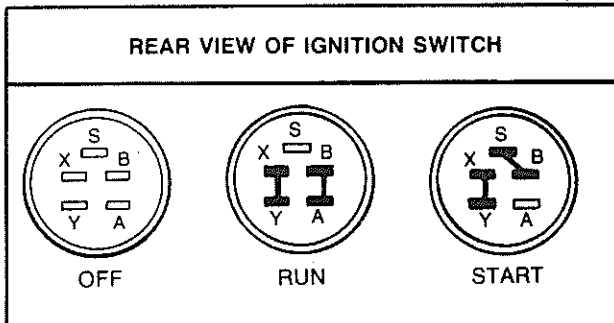
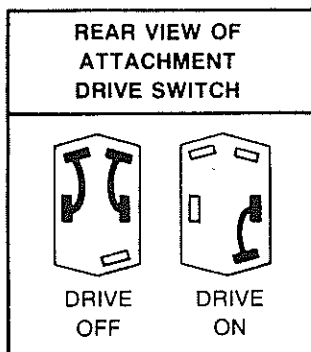
COMPLETE WIRING DIAGRAM

5017G (Serial Number 0100101 thru 0299999)

5017H (Serial Number 0100101 thru 0299999)



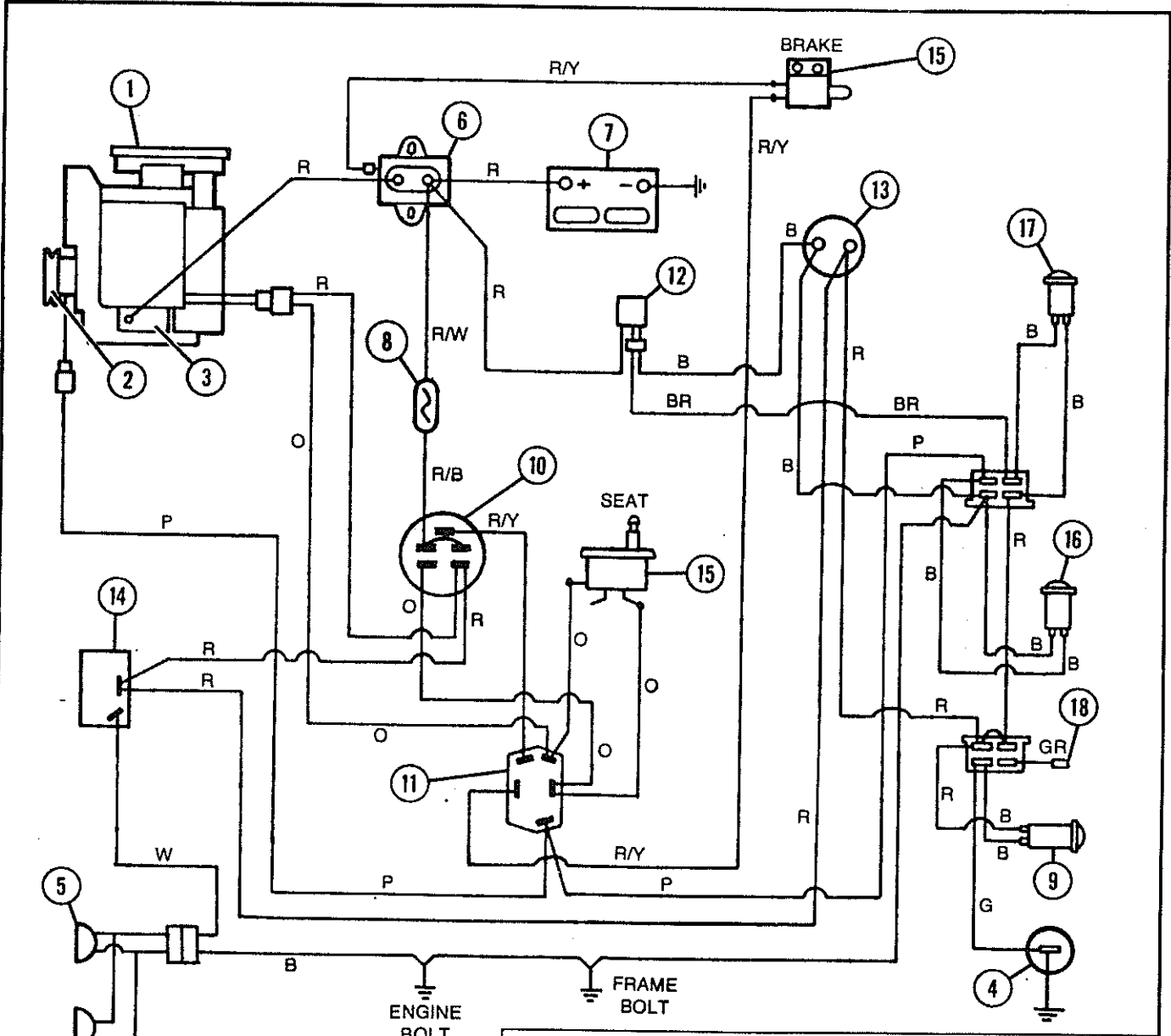
1. ENGINE
2. ATTACHMENT DRIVE
3. STARTER
4. CONNECTOR
5. HEADLIGHTS
6. SOLENOID
7. BATTERY
8. CIRCUIT BREAKER - 20 AMP
9. AMMETER
10. IGNITION SWITCH
11. ATTACHMENT DRIVE SWITCH
12. P.T.O. INDICATOR LIGHT
13. OPTIONAL HOURMETER
14. LIGHT SWITCH
15. INTERLOCK SWITCH



## WIRING DIAGRAMS

5017G (Serial Number 0300101 and later)  
5017H (Serial Number 0300101 and later)

2



- 1. ENGINE
- 2. PTO - ELECTRIC CLUTCH
- 3. STARTER
- 4. OIL PRESSURE SWITCH
- 5. HEADLIGHTS
- 6. SOLENOID
- 7. BATTERY
- 8. FUSE - 25 AMP
- 9. OIL PRESSURE LIGHT
- 10. IGNITION SWITCH
- 11. ATTACHMENT DRIVE SWITCH
- 12. VOLTAGE SENSOR
- 13. HOURMETER
- 14. LIGHT SWITCH
- 15. INTERLOCK SWITCH
- 16. PTO LIGHT
- 17. BATTERY LIGHT
- 18. PLUG NOT USED

| COLOR CODE |            |                  |
|------------|------------|------------------|
| R - RED    | O - ORANGE | R/Y - RED/YELLOW |
| B - BLACK  | P - PURPLE | R/W - RED/WHITE  |
| W - WHITE  | BR - BROWN | R/B - RED/BLACK  |
| G - GREEN  | GR - GRAY  |                  |

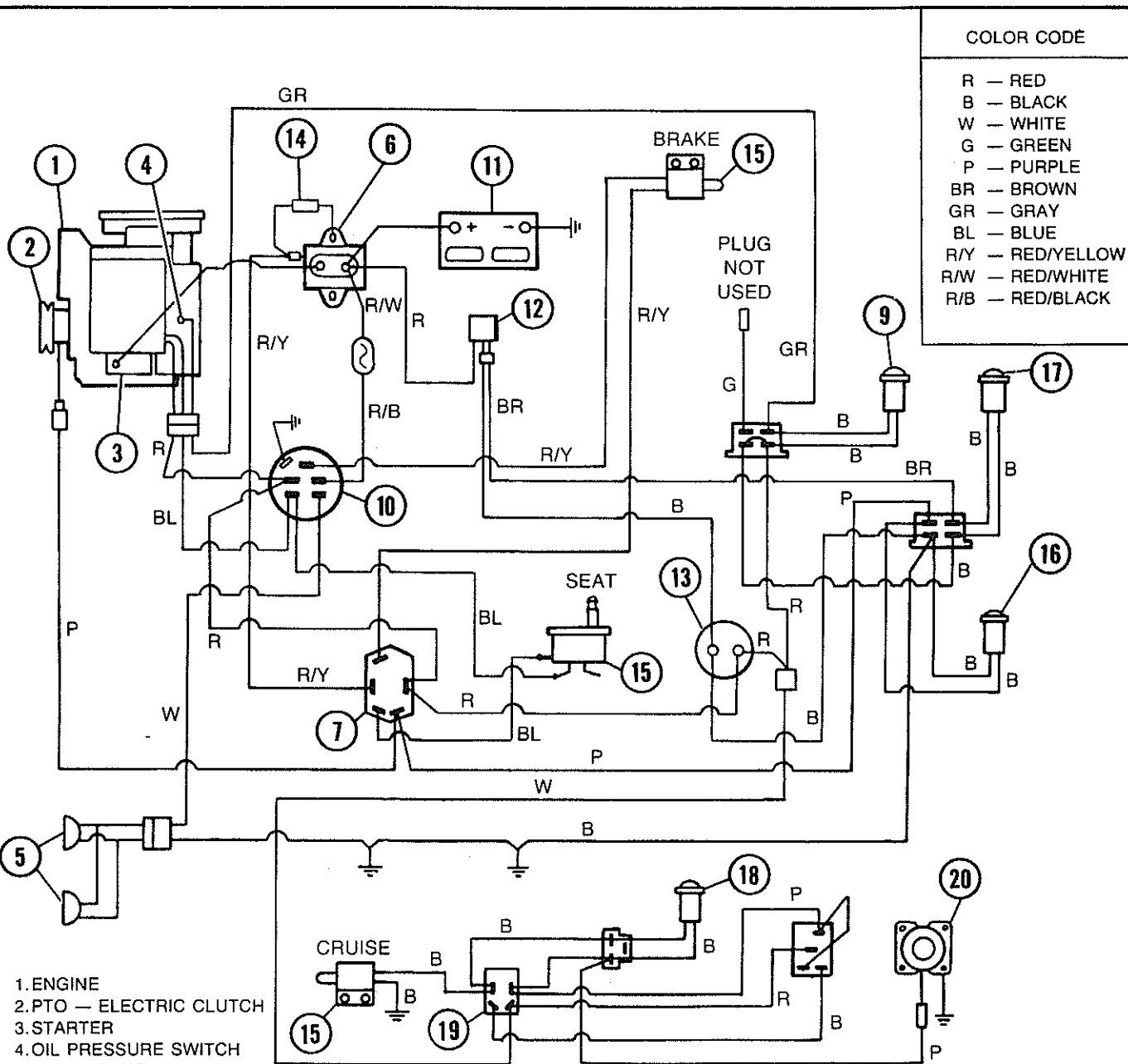
  

| REAR VIEW OF ATTACHMENT DRIVE SWITCH |          | REAR VIEW OF IGNITION SWITCH |     |       |
|--------------------------------------|----------|------------------------------|-----|-------|
|                                      |          |                              |     |       |
| DRIVE OFF                            | DRIVE ON | OFF                          | RUN | START |

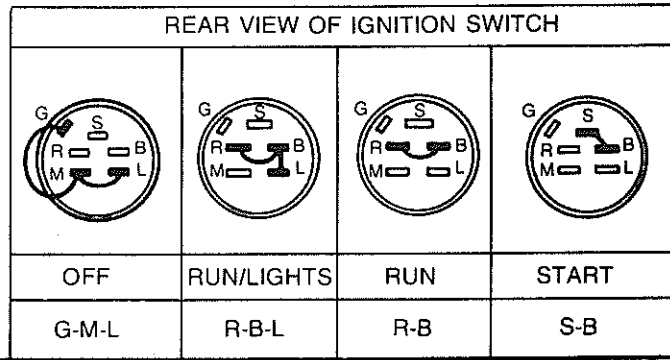
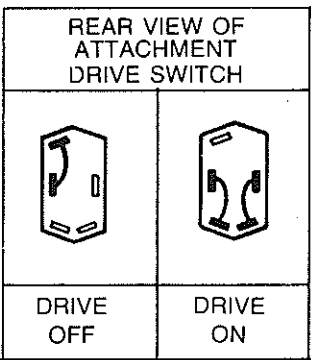
WIRING DIAGRAM (Model 5018H)

COLOR CODE

- R — RED
- B — BLACK
- W — WHITE
- G — GREEN
- P — PURPLE
- BR — BROWN
- GR — GRAY
- BL — BLUE
- R/Y — RED/YELLOW
- R/W — RED/WHITE
- R/B — RED/BLACK

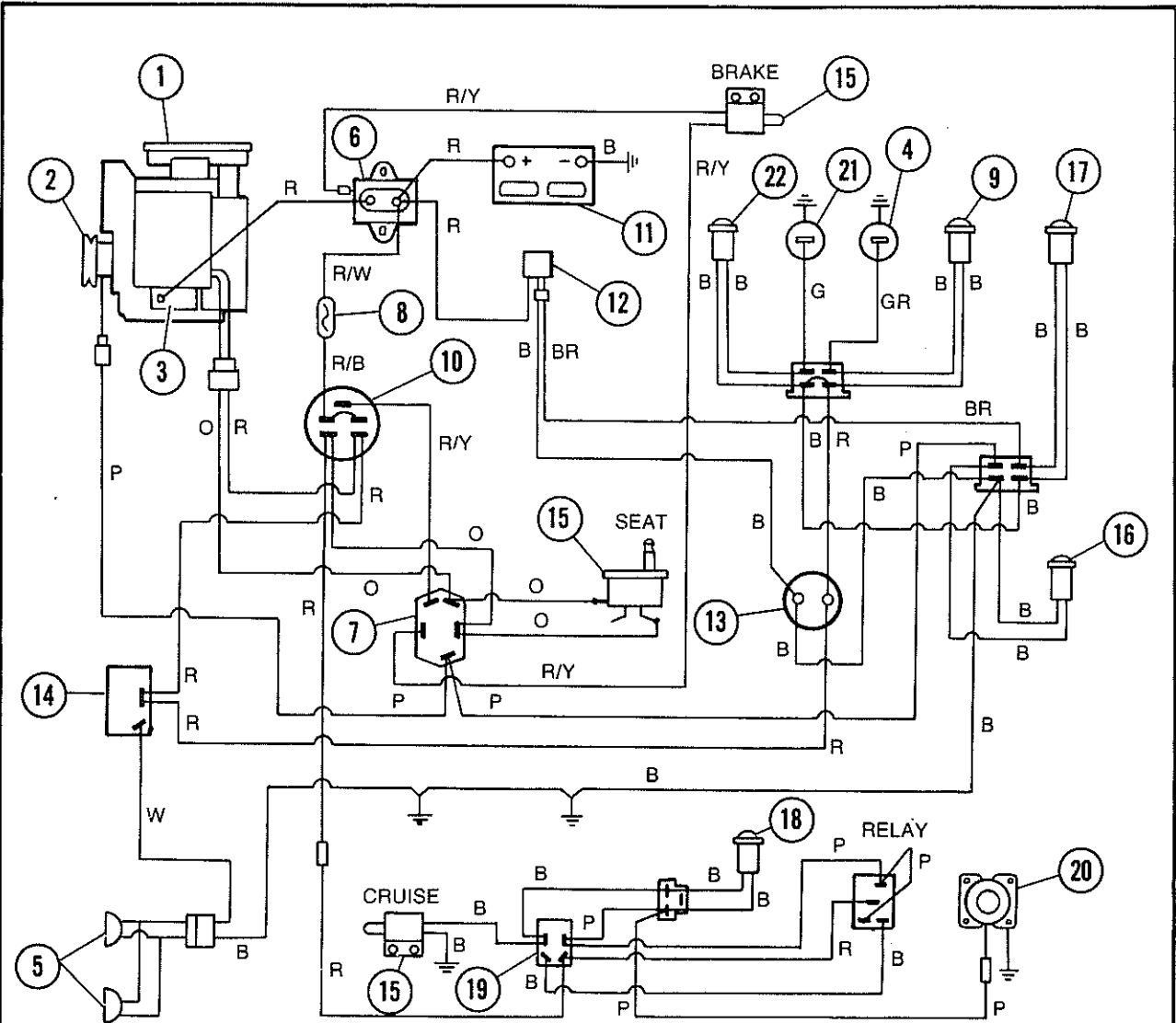


- 1. ENGINE
- 2. PTO — ELECTRIC CLUTCH
- 3. STARTER
- 4. OIL PRESSURE SWITCH
- 5. HEADLIGHTS
- 6. SOLENOID
- 7. ATTACHMENT DRIVE SWITCH
- 8. FUSE — 25 AMP
- 9. OIL PRESSURE LIGHT
- 10. IGNITION SWITCH
- 11. BATTERY
- 12. VOLTAGE SENSOR
- 13. HOURMETER
- 14. CAPACITOR
- 15. INTERLOCK SWITCH
- 16. PTO LIGHT
- 17. BATTERY LIGHT
- 18. CRUISE LIGHT
- 19. CRUISE SWITCH
- 20. CRUISE CLUTCH



## WIRING DIAGRAMS

5019H (S/N 0100101 AND LATER)

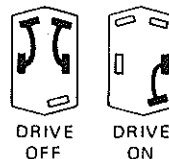


- |                            |                      |
|----------------------------|----------------------|
| 1. ENGINE                  | 12. VOLTAGE SENSOR   |
| 2. PTO — ELECTRIC CLUTCH   | 13. HOURMETER        |
| 3. STARTER                 | 14. LIGHT SWITCH     |
| 4. OIL PRESSURE SWITCH     | 15. INTERLOCK SWITCH |
| 5. HEADLIGHTS              | 16. PTO LIGHT        |
| 6. SOLENOID                | 17. BATTERY LIGHT    |
| 7. ATTACHMENT DRIVE SWITCH | 18. CRUISE LIGHT     |
| 8. FUSE — 25 AMP           | 19. CRUISE SWITCH    |
| 9. OIL PRESSURE LIGHT      | 20. CRUISE CLUTCH    |
| 10. IGNITION SWITCH        | 21. OIL TEMP. SWITCH |
| 11. BATTERY                | 22. OIL TEMP. LIGHT  |

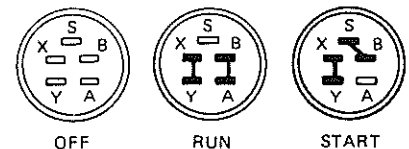
### COLOR CODE

|           |            |                  |
|-----------|------------|------------------|
| R — RED   | O — ORANGE | R/Y — RED/YELLOW |
| B — BLACK | P — PURPLE | R/W — RED/WHITE  |
| W — WHITE | BR — BROWN | R/B — RED/BLACK  |
| G — GREEN | GR — GRAY  |                  |

REAR VIEW OF  
ATTACHMENT  
DRIVE SWITCH

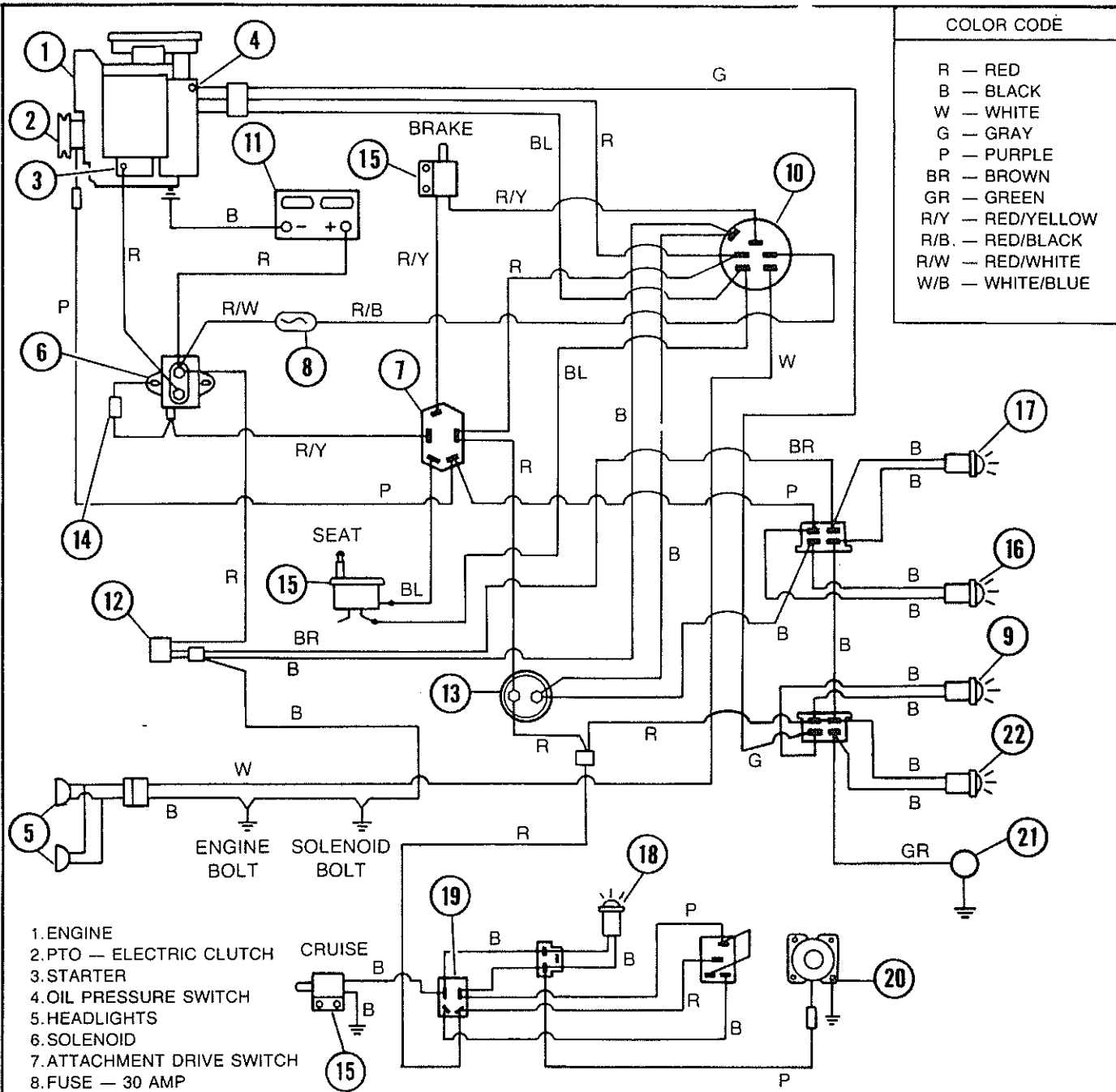


REAR VIEW OF IGNITION SWITCH



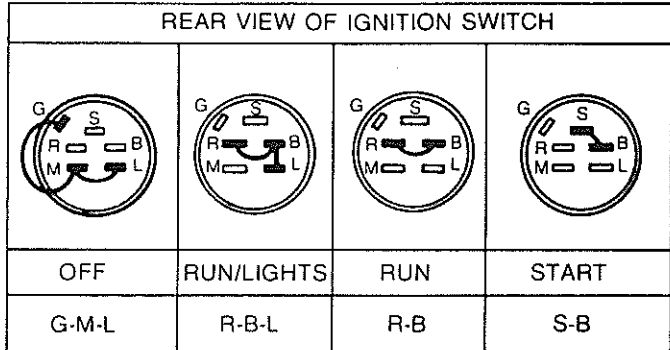
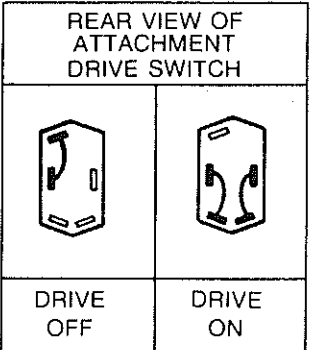
2

WIRING DIAGRAM (Model 5020H)

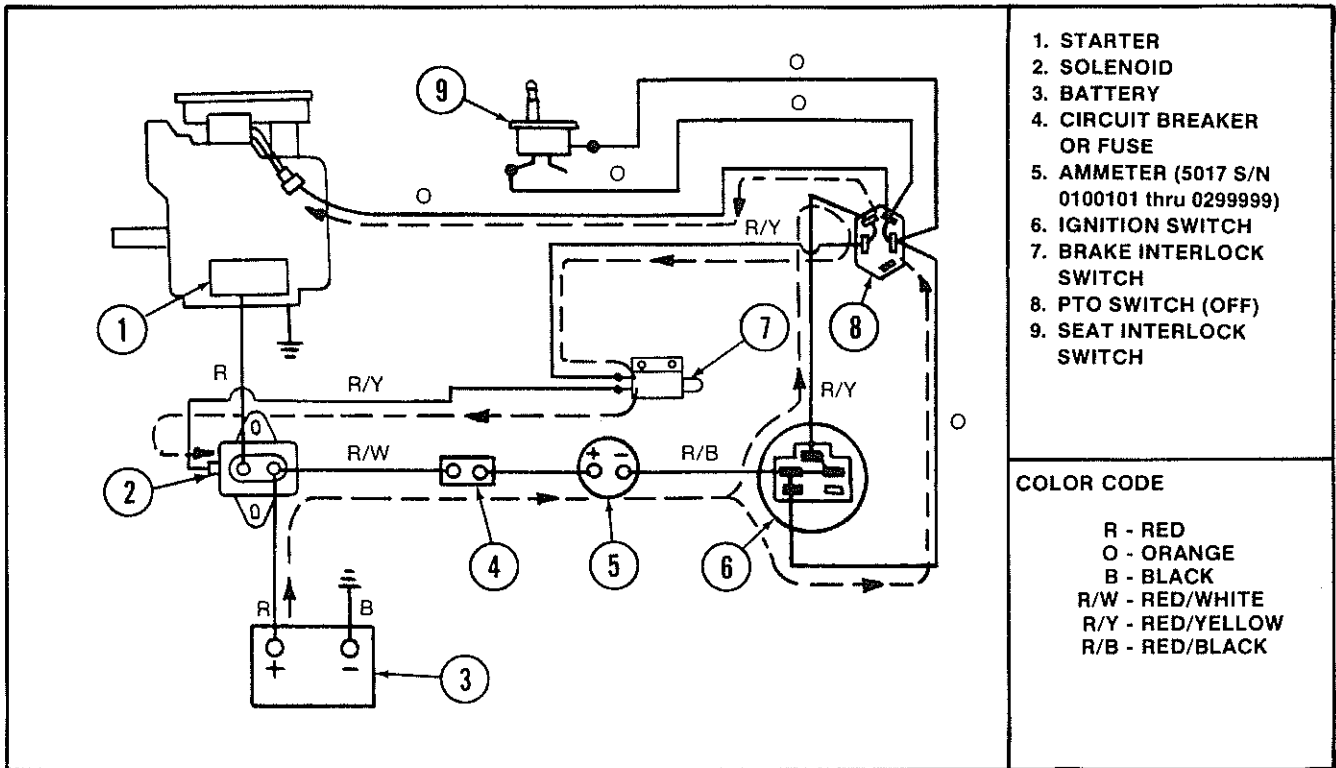


| COLOR CODE |            |
|------------|------------|
| R          | RED        |
| B          | BLACK      |
| W          | WHITE      |
| G          | GRAY       |
| P          | PURPLE     |
| BR         | BROWN      |
| GR         | GREEN      |
| R/Y        | RED/YELLOW |
| R/B        | RED/BLACK  |
| R/W        | RED/WHITE  |
| W/B        | WHITE/BLUE |

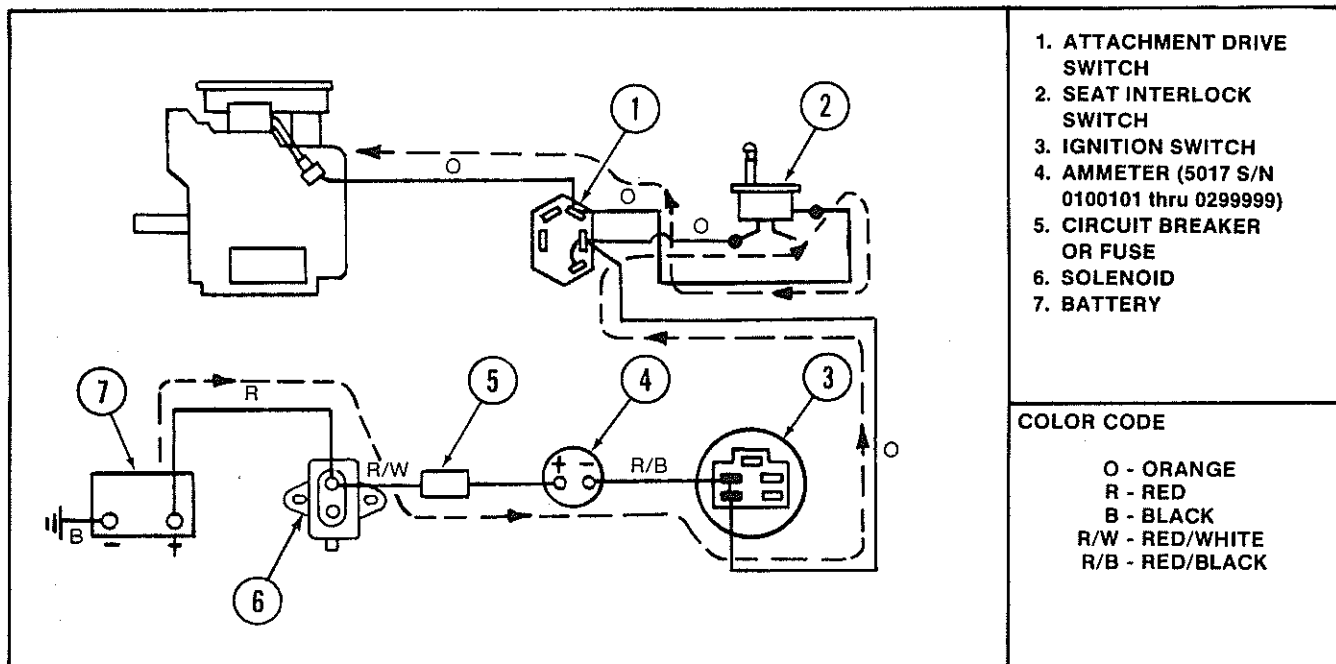
- 1. ENGINE
- 2. PTO — ELECTRIC CLUTCH
- 3. STARTER
- 4. OIL PRESSURE SWITCH
- 5. HEADLIGHTS
- 6. SOLENOID
- 7. ATTACHMENT DRIVE SWITCH
- 8. FUSE — 30 AMP
- 9. OIL PRESSURE LIGHT
- 10. IGNITION SWITCH
- 11. BATTERY
- 12. VOLTAGE SENSOR
- 13. HORN
- 14. CAPACITOR
- 15. INTERLOCK SWITCH
- 16. PTO LIGHT
- 17. BATTERY LIGHT
- 18. CRUISE LIGHT
- 19. CRUISE SWITCH
- 20. CRUISE CLUTCH
- 21. OIL TEMP. SWITCH
- 22. OIL TEMP. LIGHT



## CIRCUIT DIAGRAM START-RUN CIRCUIT



## SEAT SWITCH CIRCUIT

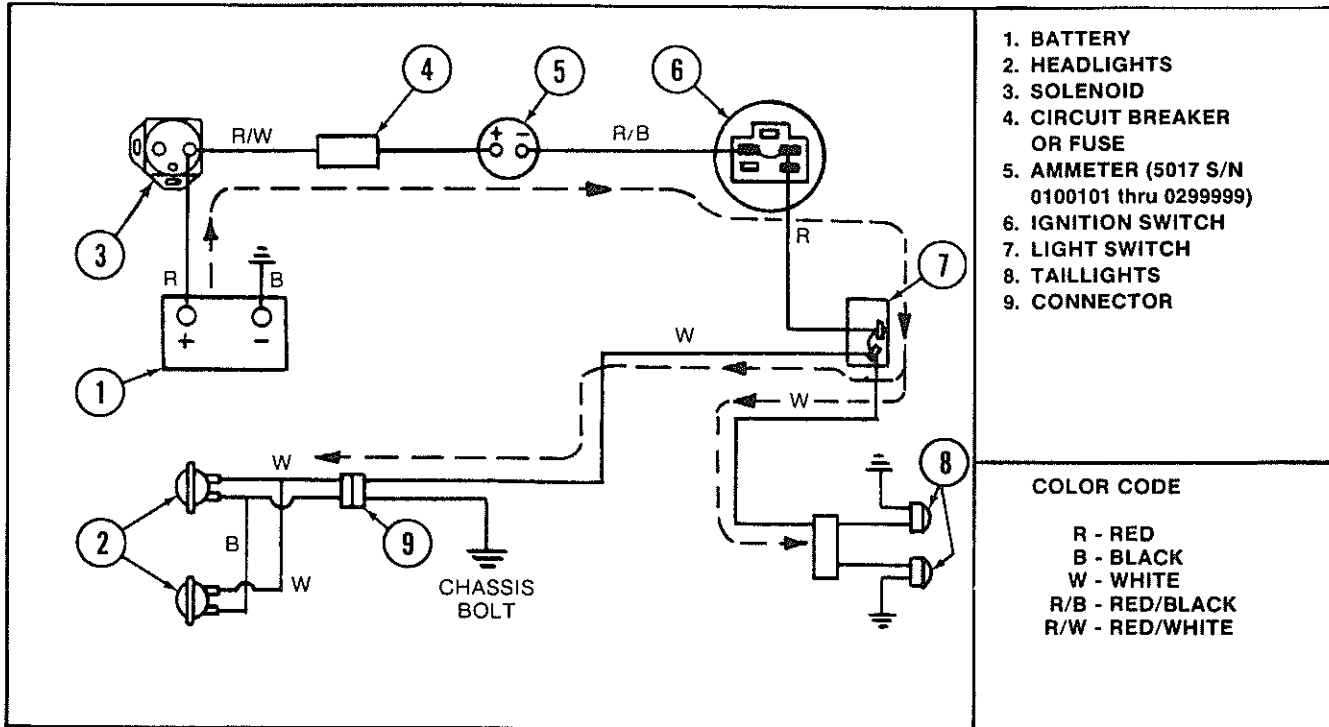




# ELECTRICAL SYSTEM (Continued)

## CIRCUIT DIAGRAM

### LIGHT CIRCUIT

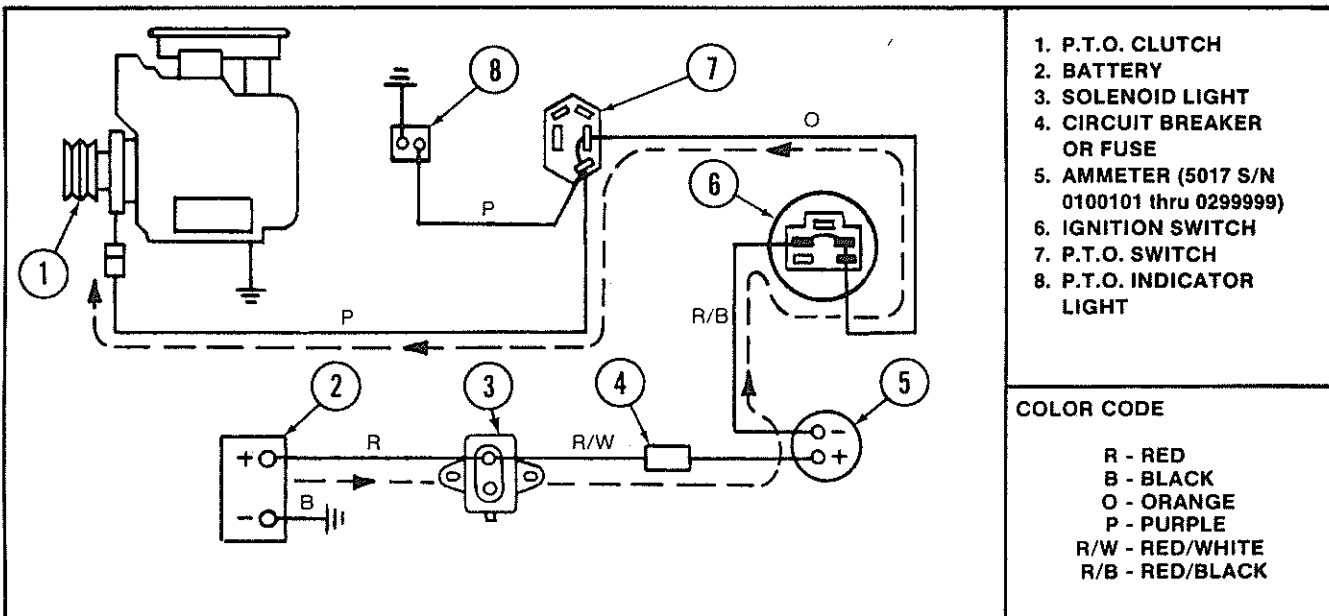


1. BATTERY
2. HEADLIGHTS
3. SOLENOID
4. CIRCUIT BREAKER OR FUSE
5. AMMETER (5017 S/N 0100101 thru 0299999)
6. IGNITION SWITCH
7. LIGHT SWITCH
8. TAILLIGHTS
9. CONNECTOR

#### COLOR CODE

- R - RED
- B - BLACK
- W - WHITE
- R/B - RED/BLACK
- R/W - RED/WHITE

### P.T.O. CLUTCH CIRCUIT



1. P.T.O. CLUTCH
2. BATTERY
3. SOLENOID LIGHT
4. CIRCUIT BREAKER OR FUSE
5. AMMETER (5017 S/N 0100101 thru 0299999)
6. IGNITION SWITCH
7. P.T.O. SWITCH
8. P.T.O. INDICATOR LIGHT

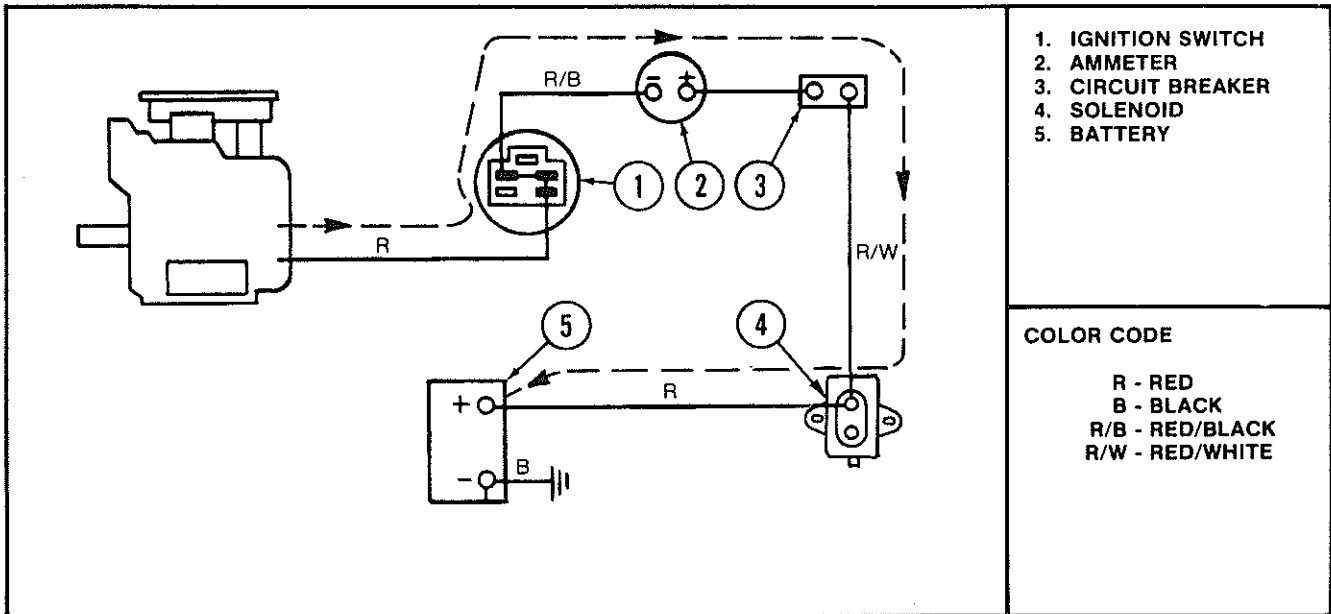
#### COLOR CODE

- R - RED
- B - BLACK
- O - ORANGE
- P - PURPLE
- R/W - RED/WHITE
- R/B - RED/BLACK

**CIRCUIT DIAGRAM**

**CHARGING CIRCUIT**

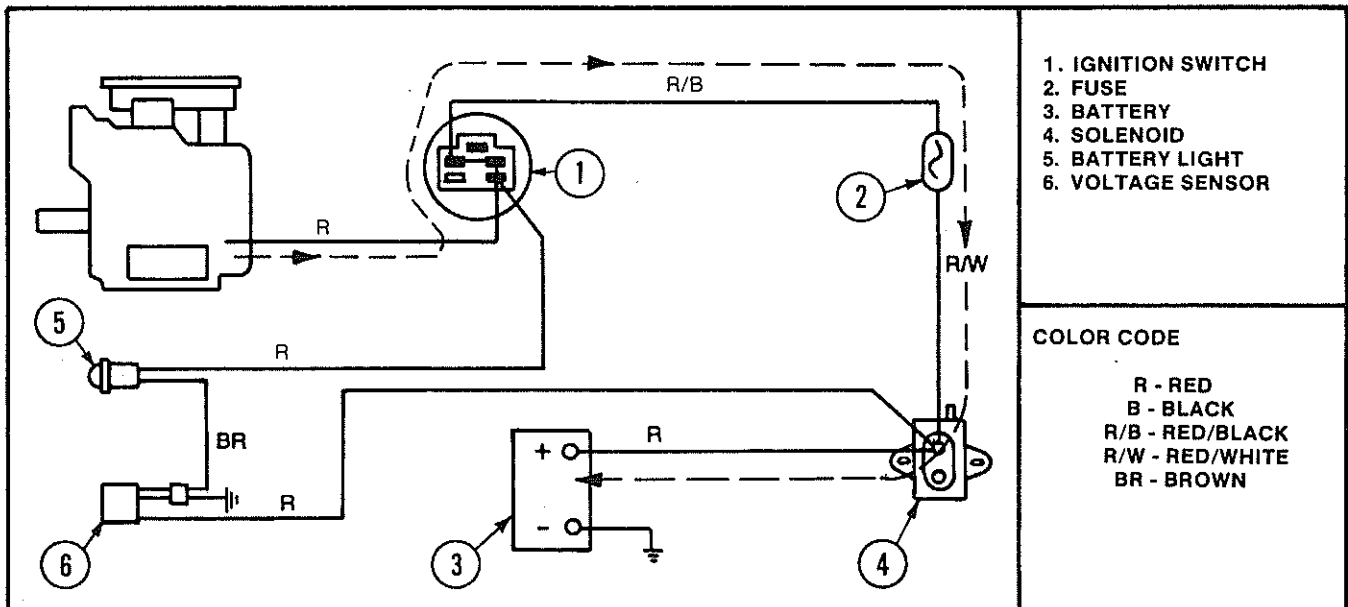
5017G, 5017H S/N 0100101 thru 0299999



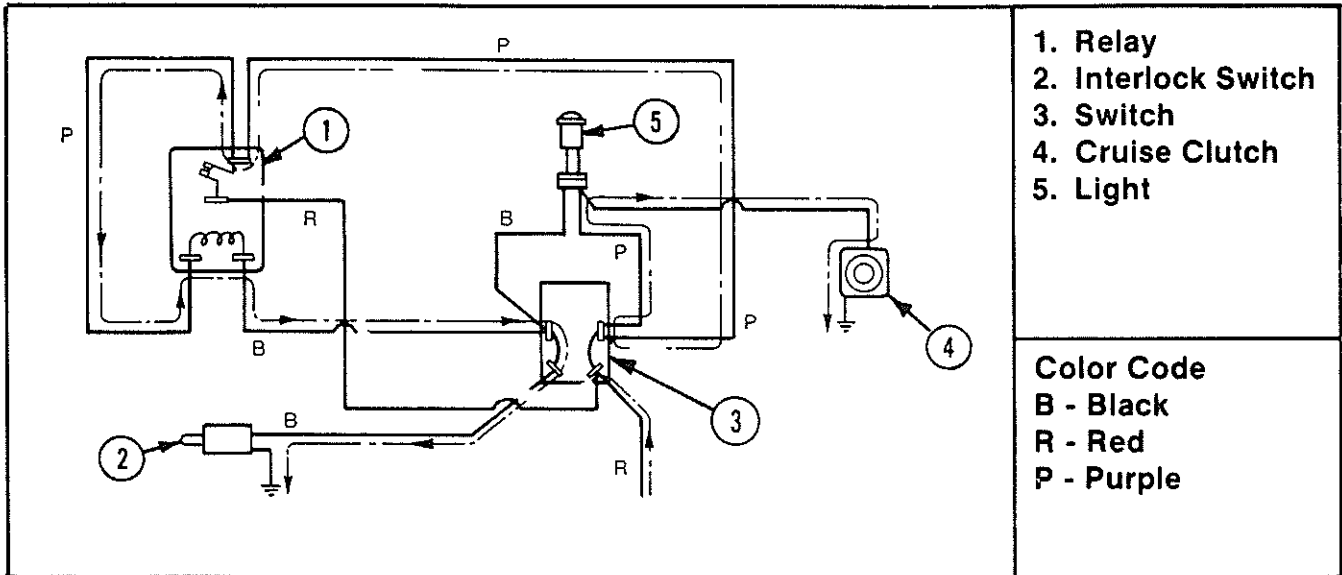
**2**

**CHARGING CIRCUIT**

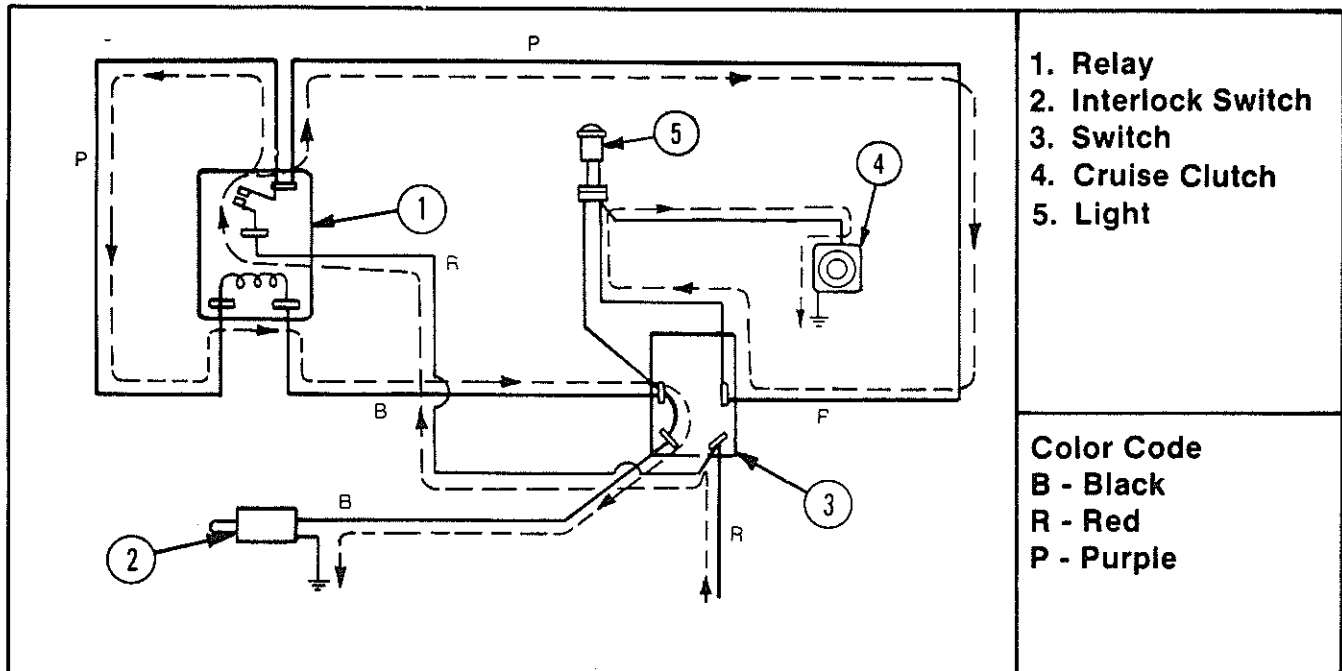
5018H, 5019H & 5020H S/N 0100101 and LATER  
 5017G/5017H S/N 0300101 and LATER



**CIRCUIT DIAGRAMS**  
**ELECTRIC CRUISE CIRCUIT**  
CIRCUIT WITH RELAY IN "RESET" POSITION



**ELECTRIC CRUISE CIRCUIT**  
CIRCUIT WITH RELAY IN "ON" POSITION (AFTER RESET)



## TESTING ELECTRICAL COMPONENTS

### TESTING BATTERY

#### CHECKING SPECIFIC GRAVITY

To determine whether the battery is capable of meeting the requirements of the starting motor, it is necessary to subject the battery to a load test. The battery must be at least 75% charged for this test. To determine the percentage of charge a hydrometer reading should be taken.

The following table illustrates ranges of specific gravity for each cell in various states of charge at 80°F.

#### SPECIFIC GRAVITY

|                | PERCENTAGE CHARGED |
|----------------|--------------------|
| 1.250 TO 1.280 | 100%               |
| 1.230 TO 1.250 | 75%                |
| 1.200 TO 1.220 | 50%                |
| 1.170 TO 1.190 | 25%                |
| 1.140 TO 1.160 | 10%                |
| 1.110 TO 1.130 | DISCHARGED         |

#### CHECKING BATTERY VOLTAGE

Battery voltage can be checked with a volt-ohm meter and should be between 11.5 and 12.5 volts.

#### BATTERY CRANKING TEST

For this test the battery should be approximately 80°F.

1. Check battery electrolyte level, add water if necessary. Battery must be fully charged.
2. Check battery voltage. It should be between 11.5 and 12.5 volts.

3. Crank the engine using the starter motor for 15 seconds. Battery voltage should not drop below 9.0 volts at the end of this 15 second test.

4. If voltage is less than 9.0 volts, repeat steps 1 through 4. If same results are obtained, replace battery.

#### SOLENOID TEST

The solenoid is a sealed unit and must be replaced if found inoperative.

To test the solenoid connect 12 volts between the solenoid case and the small solenoid terminal. **CAUTION:** If battery is the 12 volt power source a spark may ignite battery gases.

When contact is made the plunger should be activated. If test does not activate the plunger, replacement is necessary.

#### SWITCH TEST

Before electrical tests of the switches are made, make sure mechanical adjustments of the actuating mechanisms are correct.

#### SEAT SWITCH

The seat switch is wired normally closed (NC). For Magneto Ignition systems and (NO) for 12V ignition systems.

zero resistance. At normally-open position the meter should indicate a infinite reading.

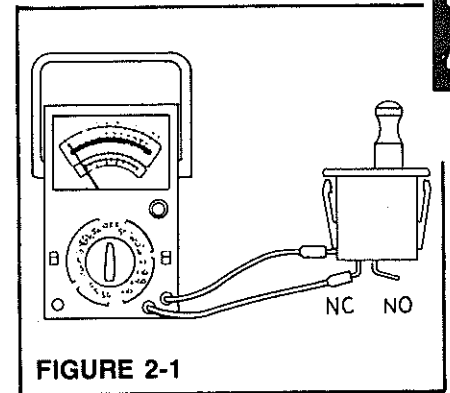


FIGURE 2-1

To test connect ohm meter as shown in Figure 2-1 and depress plunger. Meter should indicate zero resistance. At normally-open position the meter should indicate a infinite reading.

TESTING ELECTRICAL SYSTEM

**BRAKE/START AND BRAKE/-CRUISE (Figure 2-2)**

These switches are wired normally open (NO).

To test switch connect a ohm meter and depress plunger. Meter should indicate zero resistance.

At normally open (NO) position the meter should indicate a infinite reading.

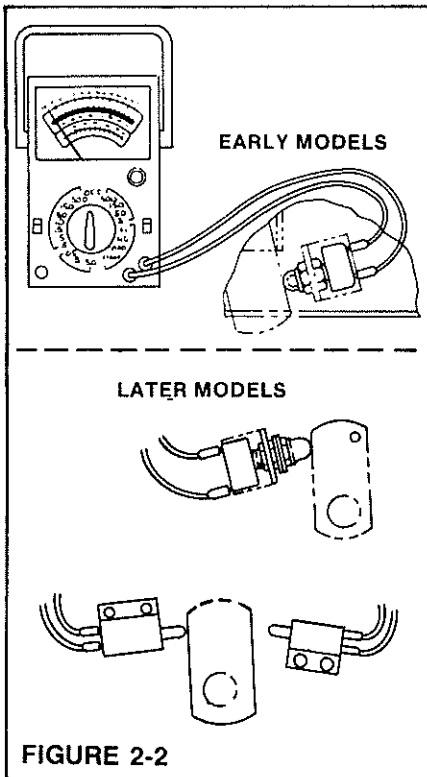
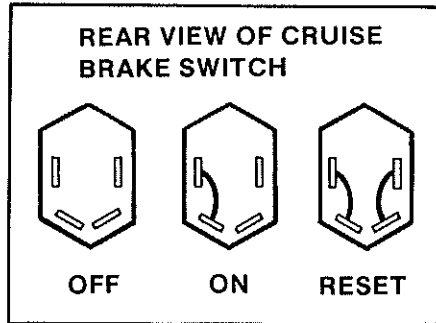


FIGURE 2-2



**ATTACHMENT DRIVE SWITCH**

When switch is in down position check continuity between the middle terminal and top terminal on same side. (Check both sides) See Figure 2-3. Resistance should be zero.

When switch is in top position check continuity between the right middle terminal and right bottom terminal. See Figure 2-3. Resistance should be zero.

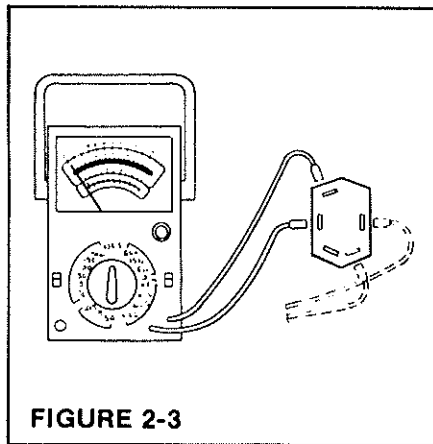


FIGURE 2-3

**TESTING IGNITION SWITCH**

Test the ignition switch for proper internal connections using an ohm meter or continuity light. Terminals should be closed only in positions indicated in Figure 2-4.

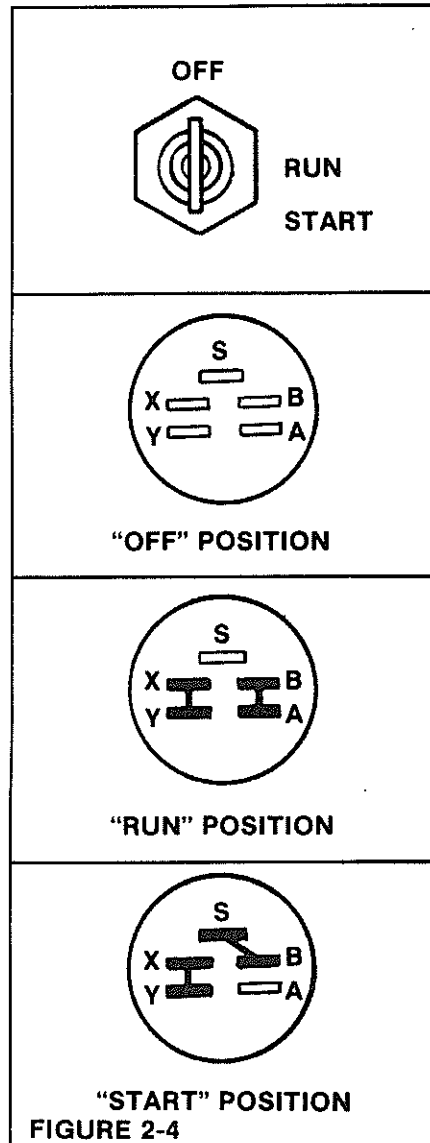
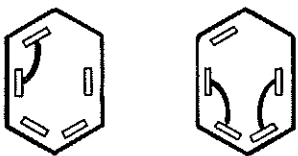


FIGURE 2-4

**REAR VIEW OF BRAKE/START SWITCH**



DRIVE OFF DRIVE ON

## TROUBLE SHOOTING GUIDE

| PROBLEM  | PROBABLE CAUSE  | REMEDY  |
|--|---|---|
| <p>No forward or reverse with engine running.</p> <p>(gear models)</p> <p>(hydro models)</p> | <ol style="list-style-type: none"> <li>1. Broken drive belt.</li> <li>2. Drive belt off gear box or transmission drive line.</li> <li>3. Drive idler spring broken.</li> <li>4. Clutch not functioning properly.</li> <li>5. Transmission not functioning.</li> <li>6. System low on oil.</li> <li>7. Plugged oil filter.</li> <li>8. Control linkage binding.</li> <li>9. Hydro unit not functioning.</li> </ol> | <ol style="list-style-type: none"> <li>1. Replace belt.</li> <li>2. Reinstall belt replace belt if badly worn-check belt guides.</li> <li>3. Replace spring.</li> <li>4. Check and adjust linkage.</li> <li>5. Repair transmission.</li> <li>6. Refill to proper level.</li> <li>7. Replace filter.</li> <li>8. Check linkage, correct problem.</li> <li>9. Replace hydro package.</li> </ol> |
| <p>Loss of power.</p> <p>(hydro models)</p>  | <ol style="list-style-type: none"> <li>1. Filter or suction line clogged.</li> <li>2. Low on oil.</li> <li>3. Worn or loose hydro linkage.</li> <li>4. Air in system.</li> <li>5. Engine lugs down.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Replace filter, clean and refill system.</li> <li>2. Check and add as necessary.</li> <li>3. Replace or adjust.</li> <li>4. Refill and check for leaks.</li> <li>5. Check engine for proper RPM adjustments.</li> </ol>   |
| <p>Unit operating hot.</p> <p>(hydro models)</p>   | <ol style="list-style-type: none"> <li>1. Oil level low.</li> <li>2. Dirt on transmission fins.</li> <li>3. Excessive load or high drawbar loading.</li> <li>4. Partially plugged filter.</li> <li>5. Internal damage to hydro.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check for leaks and refill to proper level.</li> <li>2. Clean external surface.</li> <li>3. Reduce load.</li> <li>4. Replace filter and oil.</li> <li>5. Replace hydro.</li> </ol>  |
| <p>Brake does not function properly.</p>   | <ol style="list-style-type: none"> <li>1. Brake pucks or band worn.</li> <li>2. Brake out of adjustment.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace brake pucks or band.</li> <li>2. Tighten brake adjusting nut as required.</li> </ol>  |

## HYDROSTATIC INTRODUCTION & REPAIR

The Eaton Model 11 hydrostatic transmission is composed of four (4) major components; a charge pump; a variable displacement, radial ball-piston pump; a fixed displacement, radial ball-piston motor; and a system of valves located between the pump and motor.

The transmission converts mechanical energy at its input shaft into fluid flow under pressure

from its pump, transfers this fluid energy to its motor which in turn converts it back to mechanical energy at its output shaft. The purpose of this transformation is to provide a means of having an infinitely variable output speed, with easy reversing, all with a constant input speed. In operation, the pressure of the fluid in the hydrostatic transmission closed loop varies as the "load" increases or decreases.

If the load increases, so does the pressure of the fluid in the transmission. This change in load and pressure automatically changes the torque output of the transmission. The greater the load (pressure), the more torque the transmission produces to match the load requirements. If the load is lessened, pressure decreases and torque output drops.

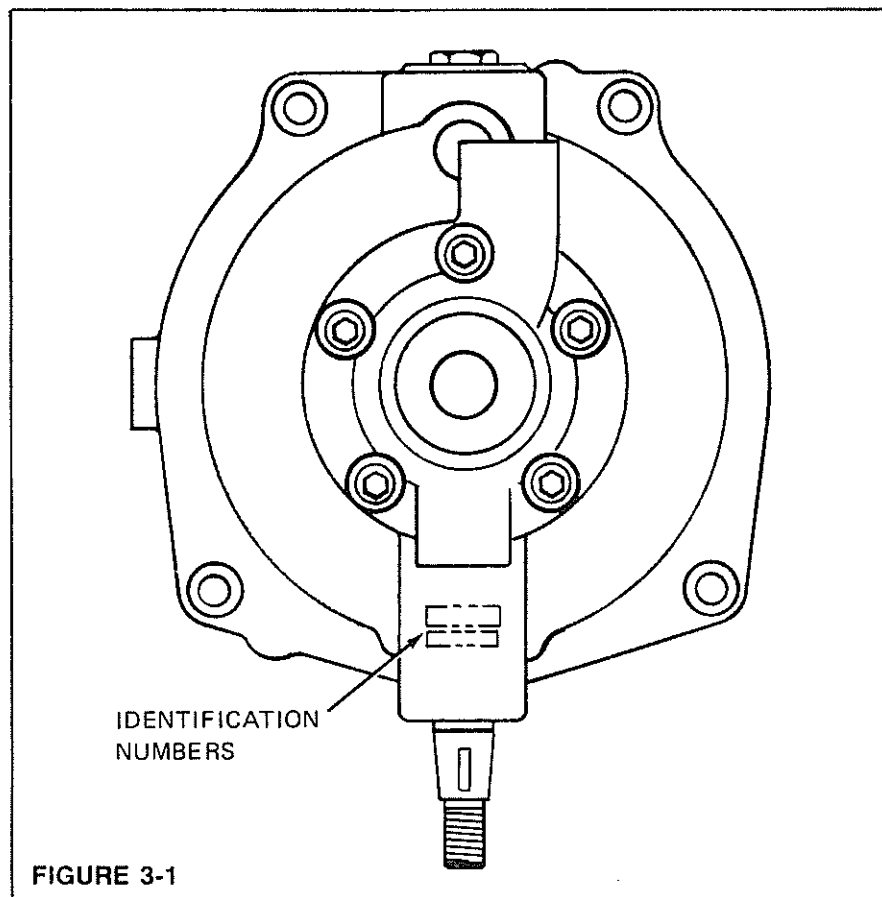
### IDENTIFICATION

A counter clockwise drive, Model 11 hydrostatic is used in the 5000 Series tractor.

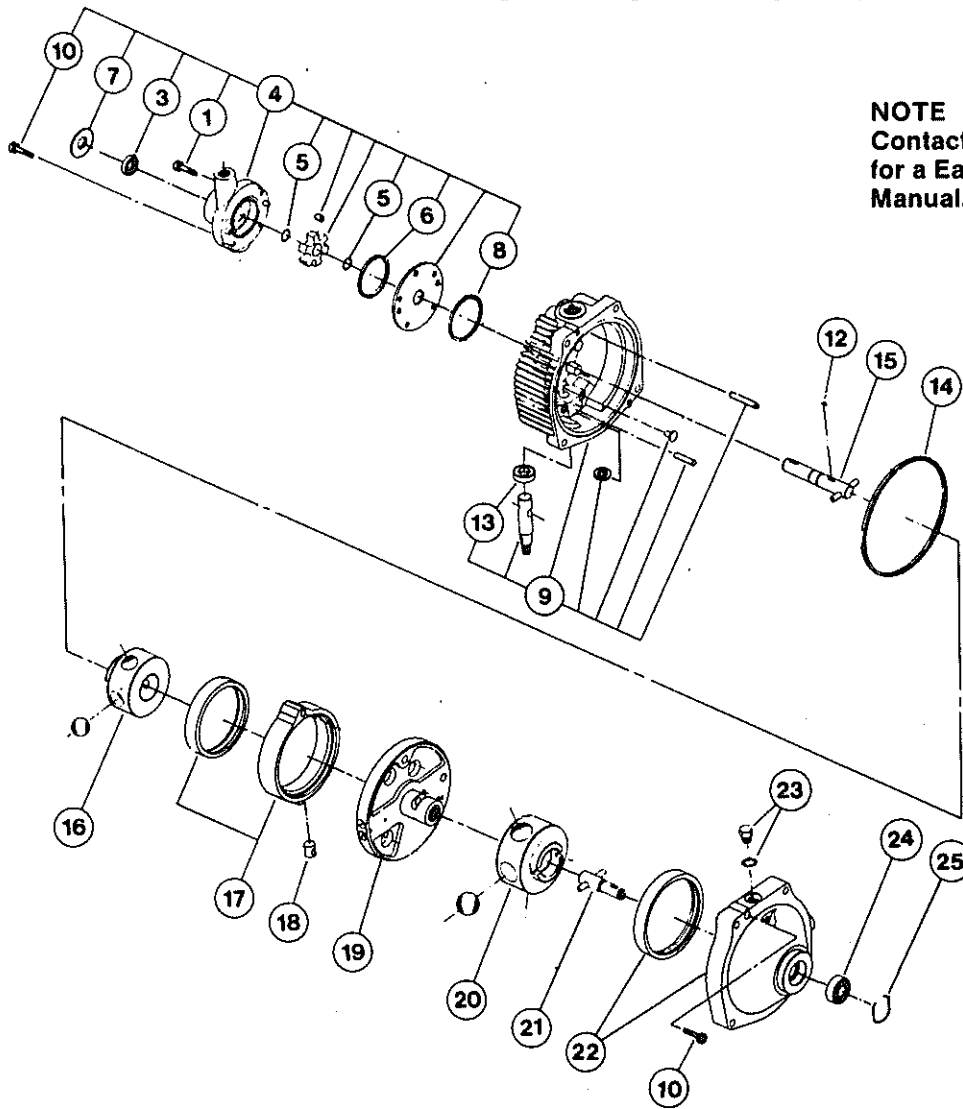
To identify, locate the Serial Number stamped in area specified.

### REPAIR

If the hydrostatic transmission is in need of repair, refer to the Eaton Service and Repair Manual. This manual is available at the factory.



## HYDROSTATIC BREAKDOWN



**NOTE**  
Contact Bolens Corp.  
for a Eaton Repair  
Manual.

**3**

|    |  |   |    |   |   |
|----|--|---|----|---|---|
| 1  | Socket Screw 5/16 - 18 x 1 - 3/4<br>(Incl. w/Ref. 4) .....     | 1 | 14 | Square Seal Ring .....                    | 1 |
| 3  | Oil Seal (Incl. w/Ref. 4) .....                                | 1 | 15 | Input Shaft Sub Ass'y .....               | 1 |
| 4  | Charge Pump Kit (Incl. Ref. 1, 3, 5, 6,<br>7, 8, 10, 12) ..... | 1 | 16 | Pump Rotor & Ball Ass'y.....              | 1 |
| 5  | Snap Ring (Incl. w/Ref. 4) .....                               | 1 | 17 | Cam Ring Ass'y .....                      | 1 |
| 6  | Sq. Seal Ring (Incl. w/Ref. 4) .....                           | 1 | 18 | Cam Ring Insert .....                     | 1 |
| 7  | Grass Shield (Incl. w/Ref. 4) .....                            | 1 | 19 | Pintle Ass'y (Incl. Internal Parts) ..... | 1 |
| 8  | Sq. Seal Ring (Incl. w/Ref. 4) .....                           | 1 | 20 | Motor Rotor & Ball Sub Ass'y .....        | 1 |
| 9  | Cover Sub Ass'y(Incl. w/Ref. 13) .....                         | 1 | 21 | Output Shaft Sub Ass'y.....               | 1 |
| 10 | Socket Hd Screw 5/16 - 18 x 1 -1/4<br>(Incl. w/Ref. 4) .....   | 1 | 22 | Body Ass'y (Incl. Ref. 21, 24 & 25) ..... | 1 |
| 12 | Drive Pin (Incl. w/Ref. 4).....                                | 1 | 23 | O-Ring Plug Sub Ass'y .....               | 1 |
| 13 | Oil Seal (Incl. w/Ref. 9) .....                                | 1 | 24 | Ball Bearing (Output) .....               | 1 |
|    |  |   | 25 | Retaining Ring.....                       | 1 |



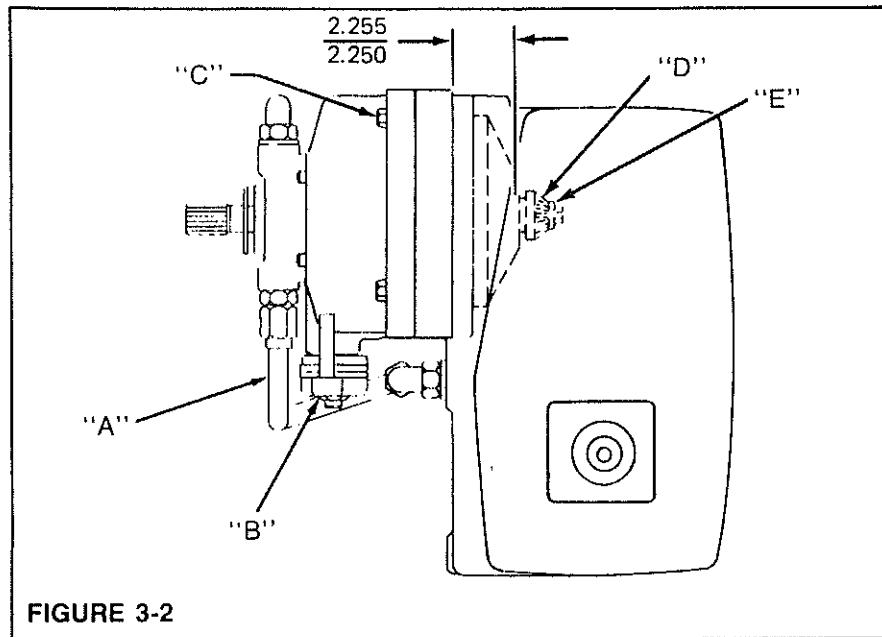
## HYDROSTATIC REMOVAL AND INSTALLATION

### HYDROSTATIC REMOVAL

1. Remove the transaxle from the frame. See transaxle removal.
2. Tip the transaxle back and rest on a 6" block.
3. Remove any dirt or grease from hydraulic suction line (A) fittings.
4. Disconnect hydraulic suction line (A) and save.
5. Remove nut and washer on control shaft and slide control arm assembly (B) off and save.

**NOTE:** A puller may have to be used when removing the control arm.

6. Remove the four (4) mounting screws (C) securing the hydrostatic and save.
7. If replacing complete hydro, remove the three (3) hydraulic tube fittings and install them into the new hydrostatic. Do not tighten.
8. If replacing complete hydro, remove bevel gear (D) on output shaft. To disassemble, hold spacer (E) in place when loosening nut. Position bevel gear onto new hydrostatic and fasten. Torque nut to 24 ft. lbs. (32.5 N·m).



### INSTALLATION

1. Before reinstalling the hydrostatic, clean the mounting surface of all oil, dirt or grease. Run a bead of silicon rubber around mounting surface and inside of bolt holes and secure with the four capscrews and lock washers removed earlier. Torque four mounting screws (C) Figure 3-2 to 24 ft. lbs. (32.5 N·m) when fastening.
2. Reinstall hydraulic line (A) removed earlier and tighten fittings.
3. If replacing hydrostatic, install a new woodruff key into the control shaft.

4. Slide on control shaft arm (B) and secure with washer and lock nut removed earlier. Torque to 75 in. lbs. (6.2 N·m).
5. When installing driveshaft check that two piece driveshaft is together properly. Align arrows on the two parts.

### HYDROSTATIC REFERENCE

Adjustment of bevel gear "E" is normally not required, but if the dimension shown in Figure 3-2 is not the same as the hydrostatic in your tractor shim as required.

## TRANSAXLE REMOVAL

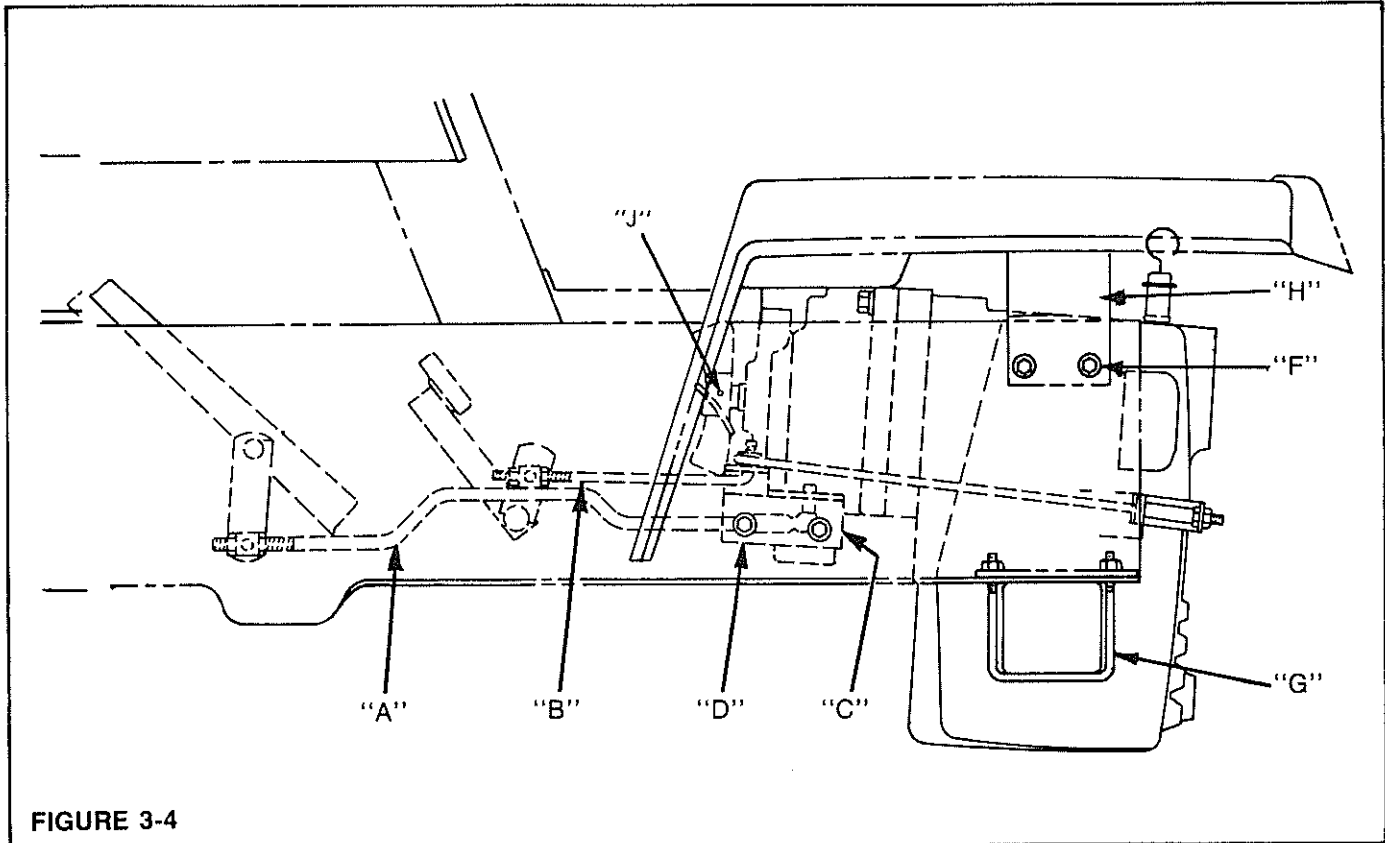


FIGURE 3-4

1. Remove seat and fender assemblies. Be careful to disconnect the seat switch wires before removing.
2. If transaxle is to be worked on, drain fluid and dispose.
3. Remove seat switch wires from hydraulic tubes by cutting nylon ties.
4. Remove cotter pin from pivot and disassemble brake rod (A) from front cross shaft.
5. Remove cotter pin and washer from pivot and disassemble control rod (B) from the foot pedal shaft.
6. Unfasten both hydraulic tube lines at the hydrostatic end.
7. Scribe a line (C) on the inside L.H. frame along the rear of quadrant support plate (D).  
**NOTE:** This support must be removed and the scribed line will help in reassembly later.
8. Remove the quadrant support plate with assembly links.
9. Block up the tractor at mid frame till the rear wheels are just off the floor surface.
10. Loosen set screws (J) holding driveshaft to hydro input shaft. Slide drive shaft off.
11. Remove the eight (8) screws and nuts securing the transaxle to the frame.
12. Place one foot on the rear hitch or use a bar in rear hitch hole to balance the transaxle while removing.
13. Slowly roll the complete transaxle and hydro back and out of the frame.
14. After the transaxle assembly has cleared the frame, tip the transaxle backward to rest on a 6" block.

## TRANSAXLE REINSTALLATION

1. Position quadrant support plate (D) and linkage into place before assembly.

2. Tip the quadrant up and walk the transaxle into the frame.

3. Stabilize the transaxle by temporarily installing a mounting screw and nut into one of the top left hand transaxle support holes (F) Figure 3-4 in the frame.

4. Position the quadrant support plate in place using the scribed line (D) Figure 3-4 and tighten. Plate must be parallel with frame after assembly.

**NOTE:** Make sure all rods are in the right position for later assembly.

5. Position the two (2) axle U-bolts (G) in place with the flat support spacer and turn the nuts on a short ways.

6. Remove the blocks from beneath the frame.

7. Remove mounting screw (F) and nut assembled earlier.

8. Position seat support bracket (H) over the frame and fasten the 4 remaining mounting screws and two (2) nuts into the frame.

9. Tighten the four (4) U-bolt nuts.

10. Slide driveshaft onto input shaft and secure driveshaft hub with set screws.

**NOTE**

Provide 1/8" clearance between hydro and driveshaft hub. Make sure that the two piece driveshaft is installed properly. Arrows on the two mating parts must line up with one another.

11. Secure the brake rod (A) in the lower hole of the cross shaft arm with the cotter pin removed earlier.

12. Secure hydrostatic control rod (B) Figure 3-4 in place with the washer and cotter pin removed earlier.

13. Reconnect and tighten the two (2) hydraulic tubes to the hydro. Refasten the two (2) seat switch wires in place. **NOTE:** Keep wires clear of fan.

14. Fill the transaxle with approximately 8 qts. (7.5L) of new transmission fluid. If necessary change oil filter.

15. Remove spark plug from engine and crank for approximately 15 seconds to fill hydro with fluid. Reinstall spark plug.

16. Start unit and operate at a low engine RPM. Actuate hydraulic lift lever, if equipped, to fill rest of system with fluid. Stop tractor.

17. Block up rear of tractor carefully. Place travel pedal into the neutral position. Start the engine and release the brakes. If the wheels move in forward direction move quadrant support plate (D) Figure 3-4 toward front of tractor. If the wheels move in reverse direction move the support plate towards rear of tractor.

18. Stop unit and check fluid level. Add fluid if necessary.

19. Position the fender in place and connect the two wires to the seat switch and secure fender. See Figure 3-5 for seat switch connection.

20. Reinstall the seat.

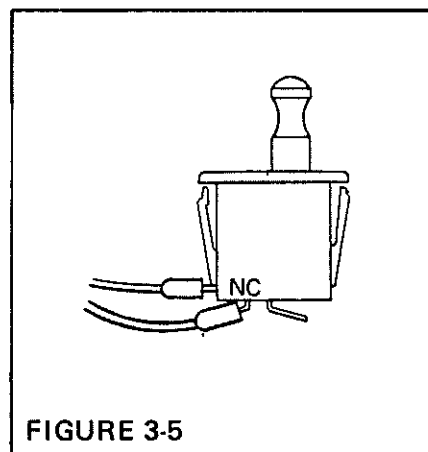


FIGURE 3-5

## MODEL 5017H & 5018H TRANSAXLE ASSEMBLY

- |                              |                                 |                              |
|------------------------------|---------------------------------|------------------------------|
| 1. Dipstick                  | 15. Hex Hd Screw 3/8-16 x 1-1/2 | 29. Axle Gear 47T            |
| 2. Tube                      | 16. Needle Bearing              | 30. Flange Screw 5/16-18 x 4 |
| 3. Transaxle Housing         | 17. Gear Ass'y 50T - 16T        | 31. Shim                     |
| 4. Oil Seal                  | 18. Dowel Pin                   | 32. Tubular Spacer           |
| 5. Needle Bearing            | 19. Hex Lock Nut 3/8            | 33. Thrust Race              |
| 6. Gear 56T                  | 20. Differential Cover          | 34. Thrust Bearing           |
| 7. Woodruff Key              | 21. Gear 22T                    | 35. Needle Bearing           |
| 8. Woodruff Key              | 22. Retaining Ring              | 36. R.H. Axle                |
| 9. Pinion Shaft Assembly 24T | 23. Pipe Plug                   | 37. Woodruff Key             |
| 10. Thrust Race              | 24. Dowel Pin                   | 38. L.H. Axle                |
| 11. Thrust Bearing           | 25. Pinion 10T                  | 39. L.H. Transaxle Cover     |
| 12. Needle Bearing           | 26. Retaining Ring              | 40. Oil Seal                 |
| 13. R.H. Transaxle Cover     | 27. Pinion Shaft                |                              |
| 14. Lock Washer 3/8          | 28. Differential Carrier        |                              |

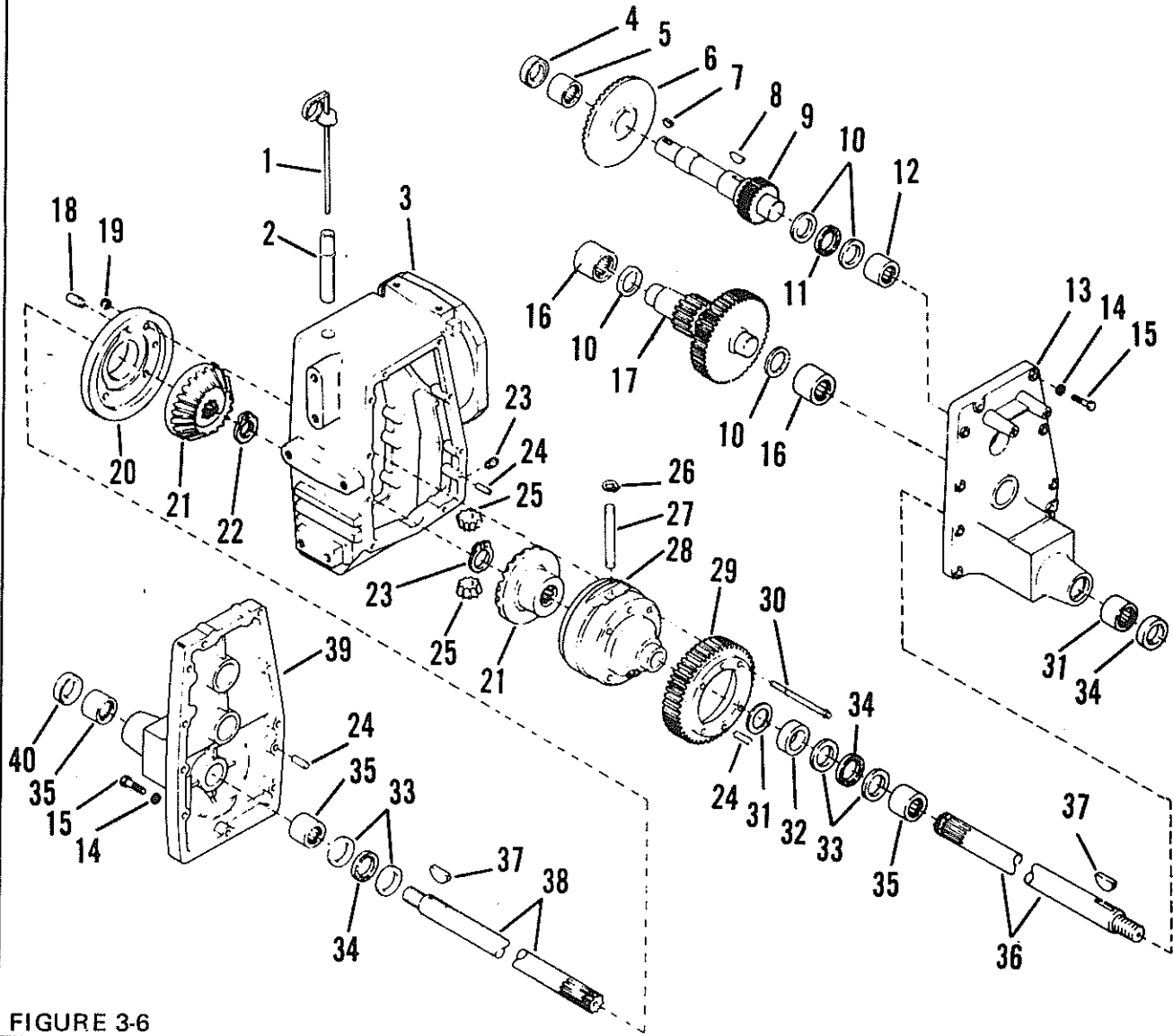


FIGURE 3-6

# DRIVE TRAIN (Continued)

## MODEL 5019H & 5020H TRANSAXLE ASSEMBLY

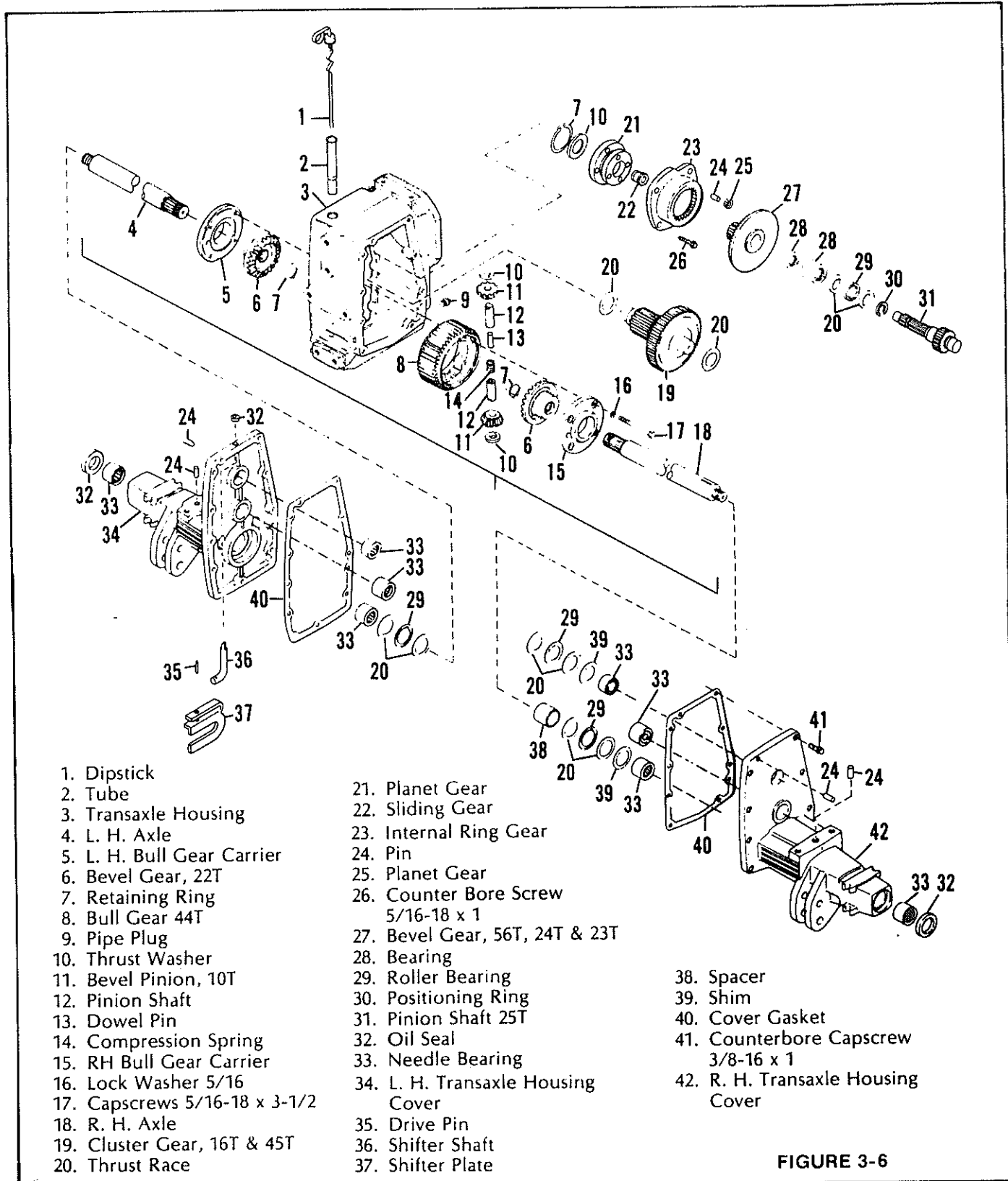
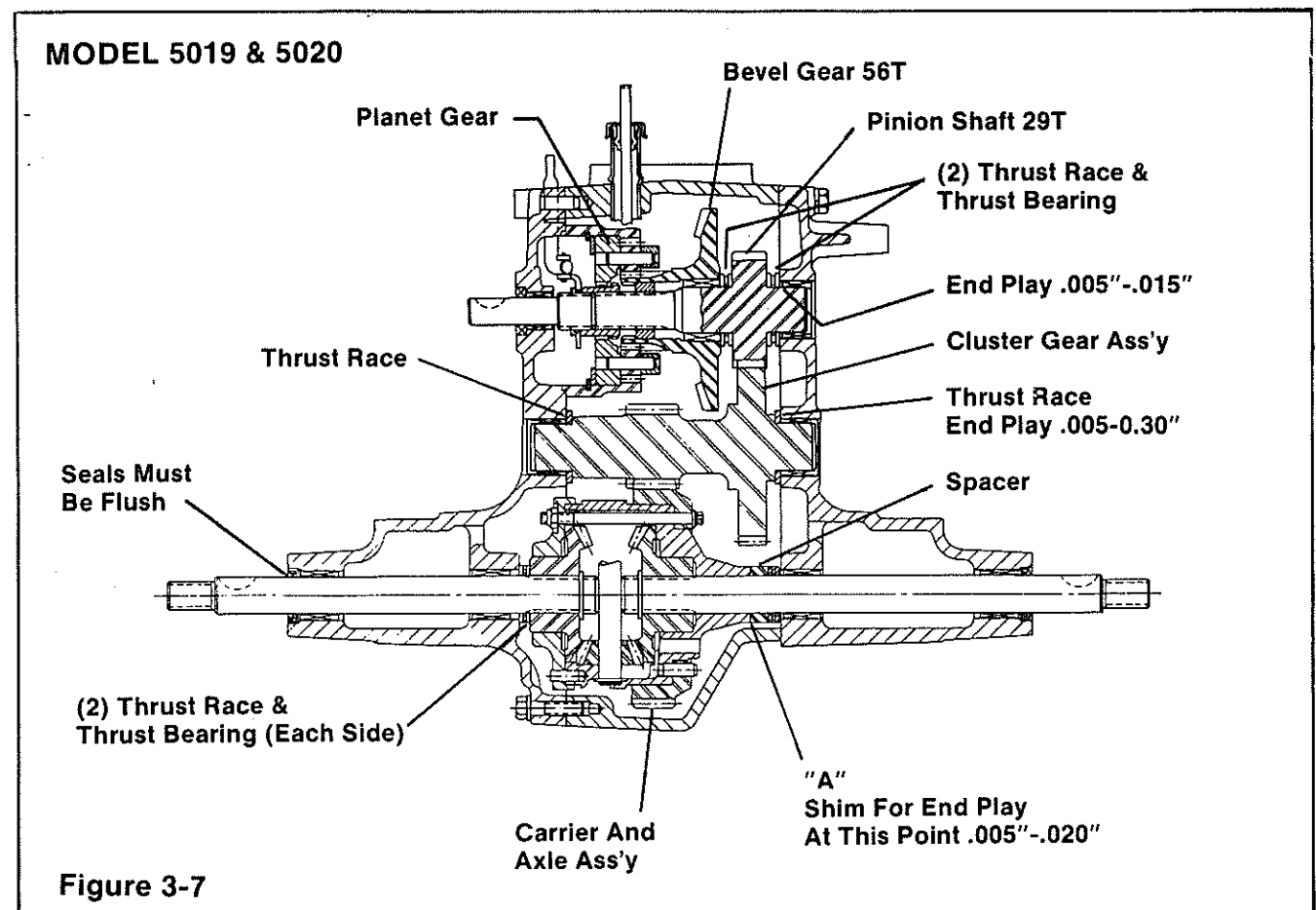
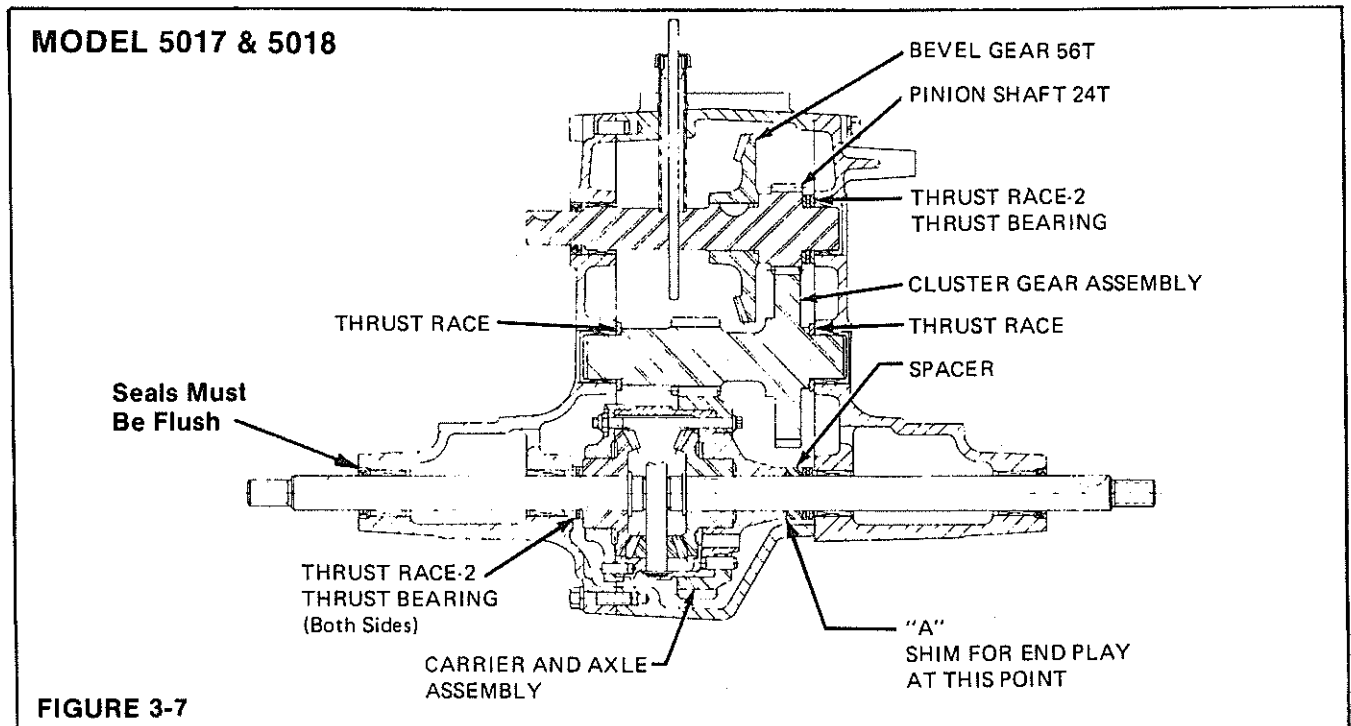


FIGURE 3-6

## TRANSAXLE ASSEMBLY PROCEDURE



## TRANSAXLE ASSEMBLY PROCEDURE

### ASSEMBLY PROCEDURE OF THE CARRIER AND AXLE

The cover and carrier hold the assembly together and are bolted with four 5/16-18 x 3-1/2 ferry head or socket head screws. These four bolts should be torqued to 25 to 30 ft. lbs. (33 to 40 N·m). See Figure 3-9.

With axles fully extended shim as required for Min. end play of .005 to .020 (0.12-0.51 mm). Shim at point (A) Figure 3-7 and 3-8.

The two pinion gears slide on the pinion shaft and are held in position by the side gears when the carrier is assembled. See Fig. 3-9

The pinion shaft is a slip fit into the machined holes in the differential carrier and held by two retaining rings. See Fig. 3-10

A snap ring is used to hold the side gears on the splined axle shafts.

**CAUTION:**  
MAKE SURE THE SNAP RING IS SEATED PROPERLY IN THE GROOVE. SHARP EDGE OUT AWAY FROM GEAR.

### ASSEMBLY PROCEDURE OF TRANSAXLE

Needle bearings in end of axle housing should be seated 1/32" to 1/16" (0.78 - 1.57 mm) below counter bore for the axle seal.

Axle seals should be replaced whenever unit is repaired. Use a seal driver and drive seals until they bottom in axle housing counter bore.

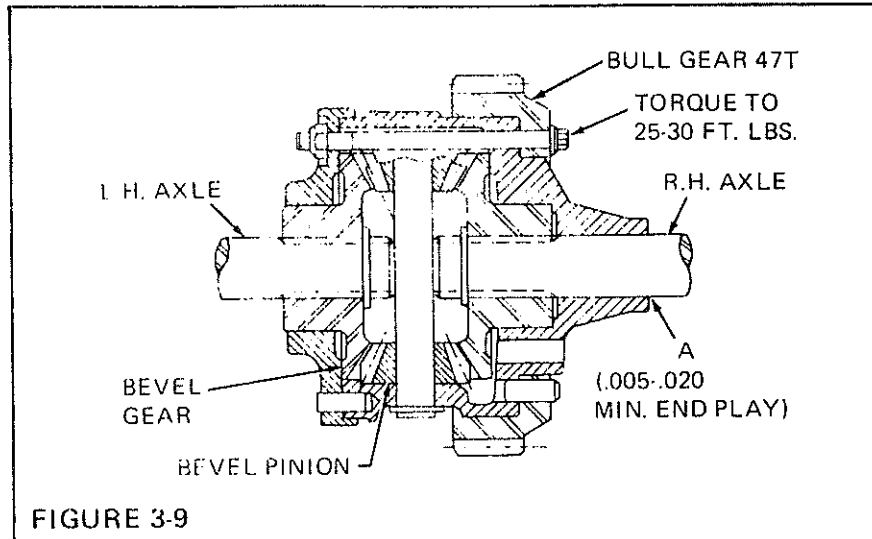


FIGURE 3-9

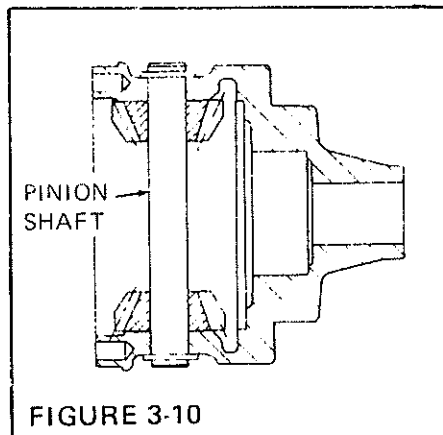


FIGURE 3-10

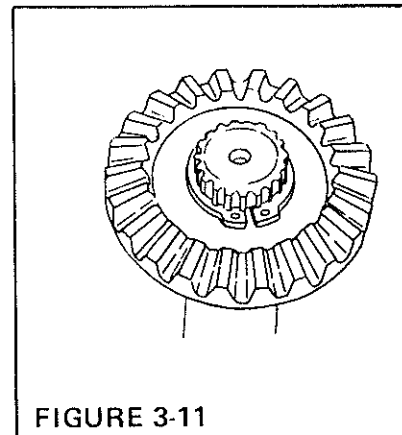


FIGURE 3-11

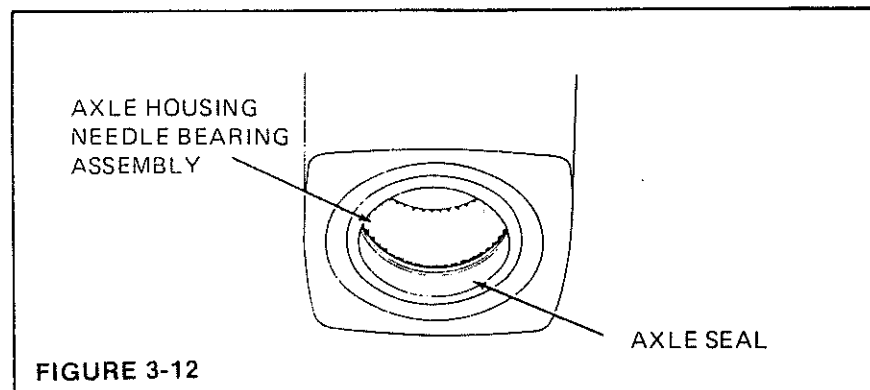


FIGURE 3-12

## TRANSAXLE ASSEMBLY PROCEDURE

### TWO SPEED TRANSAXLE ASSEMBLY - MODEL 5019 & 5020

1. Speed thrust race, thrust bearing and another thrust race (A) Fig. 3-13 onto pinion shaft (B).
2. Place pinion shaft through roller and needle bearings (C) in bevel gear (D).
3. Carefully place positioning ring (E) in groove of pinion shaft. Be careful of over-stretching the ring.
4. Slide sliding gear (F) over the positioning ring into first detent. The groove for the shifter arm fork must be towards the end of the pinion shaft.
5. Place planetary gears (G) Fig. 3-14 into planetary carrier (H) and secure in place with roll pins. Place the planet carrier assembly into internal ring gear (I). Install the large thrust washer behind the planet carrier and secure the assembly with large retaining ring (J).
6. Install the pinion shaft assembly, Figure 3-13, into the planet gear assembly, Figure 3-14.
7. Before assembling, install roll pin into shifting arm (A), Figure 3-15 and fork.
8. Slide fork into groove of sliding gear (B). (Gently tap with a hammer until fork is completely in the groove.)
9. Install planetary carrier assembly & pinion shaft assembly into left axle housing by sliding shifting fork into hole in cover and rotating into position. Install four screws (C). Do not tighten until cluster gear is properly installed with proper washers, torque four screws on planetary carrier to 18 ft. lbs. (24 Nm).

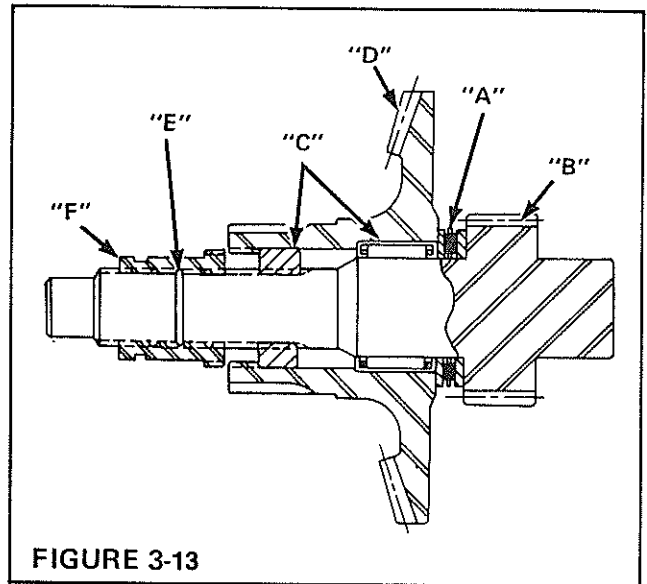


FIGURE 3-13

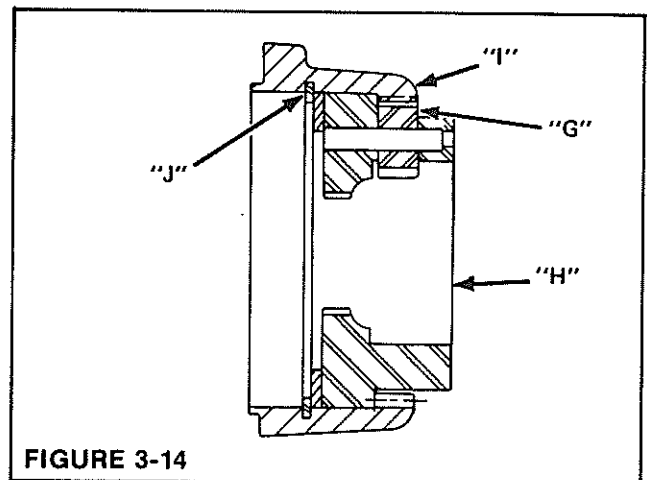


FIGURE 3-14

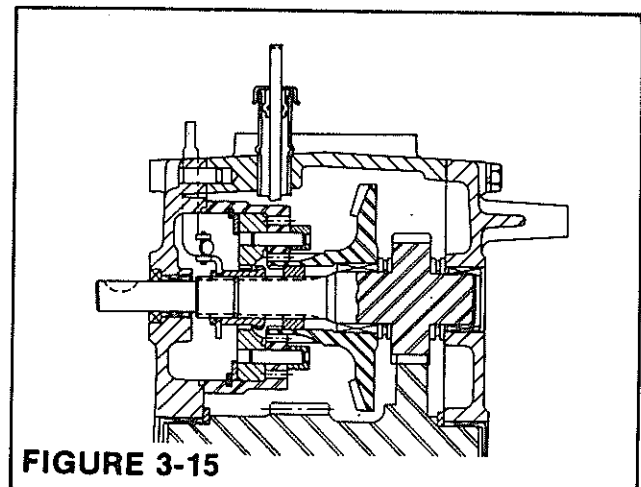


FIGURE 3-15



## TRANSAXLE ASSEMBLY PROCEDURE

Check needle bearings in side housings. If needles show signs of pitting or any other damage replace them. Use a needle bearing driver and seat bearing to a depth of  $1/32''$  to  $1/16''$  (0.78 - 1.57 mm) below the machined surface of the upper two bearings. The axle bearing must be seated to a depth of  $1/4''$  (6.4 mm) below the machined surface.

**NOTE:** ALWAYS INSTALL THE NEEDLE BEARINGS WITH THE STAMPED END (THE END WITH IDENTIFICATION MARKINGS) AGAINST THE BEARING DRIVING TOOL.

Install carrier and axle assembly Figure 3-17 into the left side housing. Be careful not to damage axle seal in end of housing. Apply a  $1/32''$  (0.8 mm) bead of sealant around cover flange. Keep bead to the inside of bolt holes.

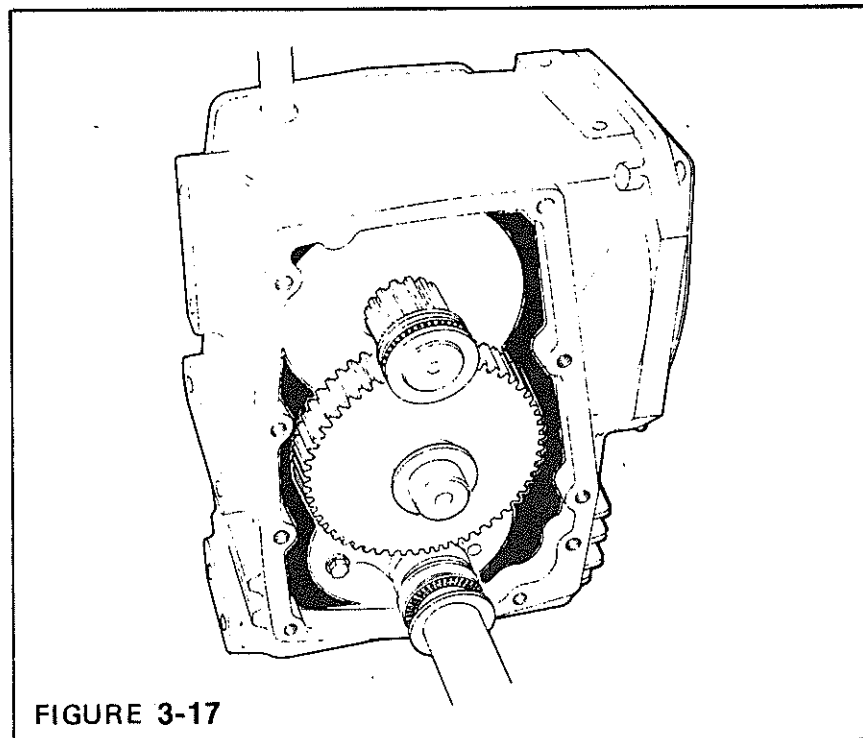
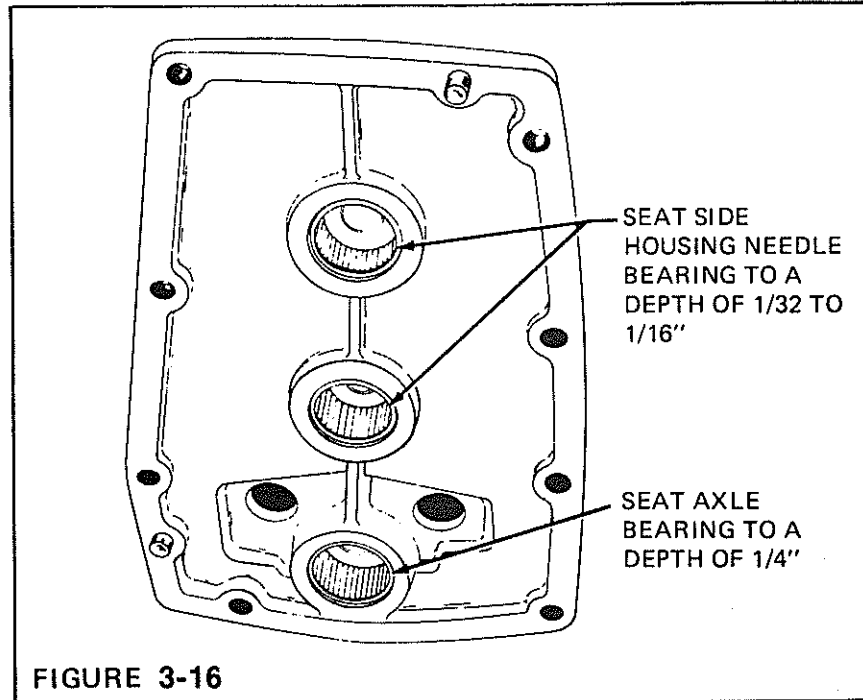
Bolt left side housing with axle assembly to the center housing. Torque housing cap screws to 30 ft. lbs. (40 N·m).

On some models the 56T bevel gear Figure 3-7 can be removed from the shaft if replacement is necessary. A woodruff key is used to prevent the bevel gear from turning on the pinion shaft.

To install the assembled bevel gear and pinion shaft into the transaxle, mesh the cluster gear and the above assembly together.

Make sure thrust washer is installed on cluster gear, and slide shafts into the needle bearings.

The right side of the bevel gear must have a thrust bearing assembly. The cluster gear must have a thrust washer and the axle shaft a spacer and torrrington bearing assembly. Refer to Figure 3-13. After the bearings and spacers are



installed, the right side housing can be bolted in place. Apply a  $1/32''$  (0.8 mm) bead of sealant around cover flange. Keep bead to

the inside of bolt holes. Be careful not to damage axle seat. Slide cover on and torque capscrews to 30 ft. lbs. (40 N·m).

## SERVICING GEAR DRIVE

### TRANSAXLE & RIGHT ANGLE GEAR BOX

Repair work needed on the Peerless transaxle or Right Angle Gear Box should be done by an authorized Power Products Tecumseh Dealer.

### TRANSAXLE

The transaxle assembly is filled at the factory with SAE EP90 transmission fluid. Check transmission fluid level once a year. With tractor on flat surface remove plug (A), on front of transmission. If oil is not to plug level add to filler plug (B) till correct level is reached. Oil capacity is 3 pints (1.4 liter).

### TRANSAXLE REMOVAL

1. Remove seat and fender.
2. Prop up tractor frame at mid frame.
3. Disconnect brake rod (C) and clutch rod (D) by removing washers and cotter pins.
4. Loosen two (2) belt guides (E) in frame.
5. Push idler (F) down and remove drive belt.
6. Remove the shift lever knob.
7. Remove center transaxle screw mounting screw (G).
8. Remove the four (4) mounting screws (H) from frame.
9. Slowly remove the transaxle from under the frame.

### TRANSAXLE REINSTALLATION

1. Reverse the removal instructions above when installing.
2. When securing belt guides (E) in place, provide a gap of  $\frac{3}{32}$  (2 mm) between the guides and belt.

### RIGHT ANGLE DRIVE REMOVAL

1. Remove the two mounting bolts and belt guides (I) and (J) from the support bracket.
2. Slide the right angle gear box to the rear and remove.

### RIGHT ANGLE DRIVE INSTALLATION

1. Position drive belt around right angle drive pulley.

2. Slide hub of drive shaft onto gearbox input shaft.
3. Position drive in support bracket and secure bolt (I) and (J) with belt guides. When fastening bolts, provide a  $\frac{1}{16}$  in. (1.5 mm) clearance between belt guide and belt when drive is in engaged position.

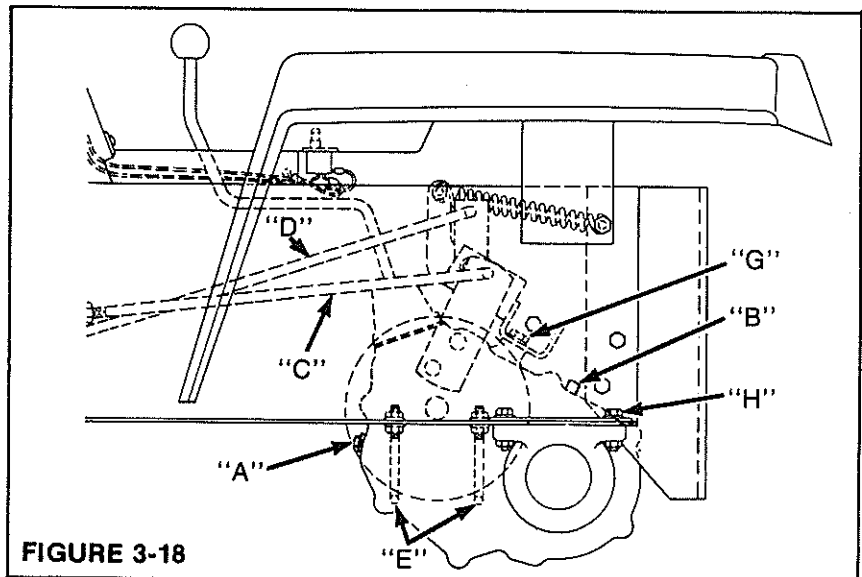


FIGURE 3-18

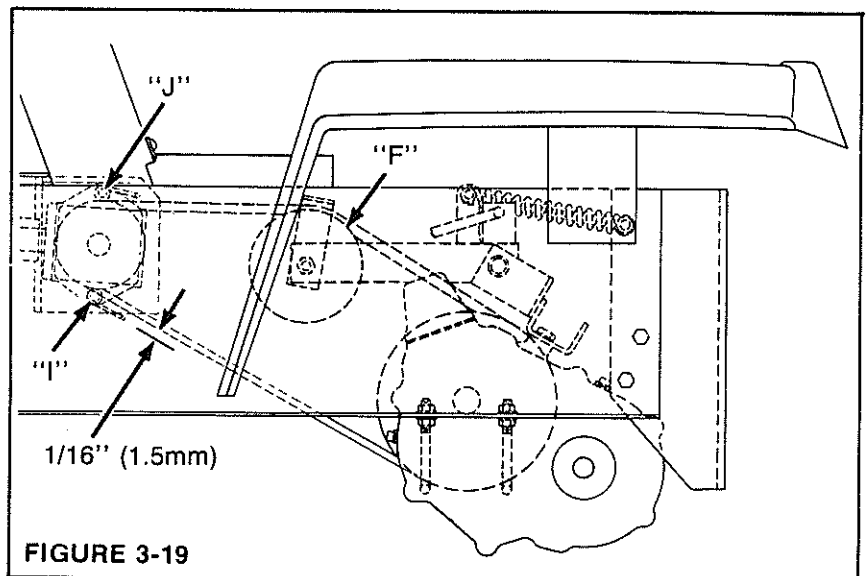


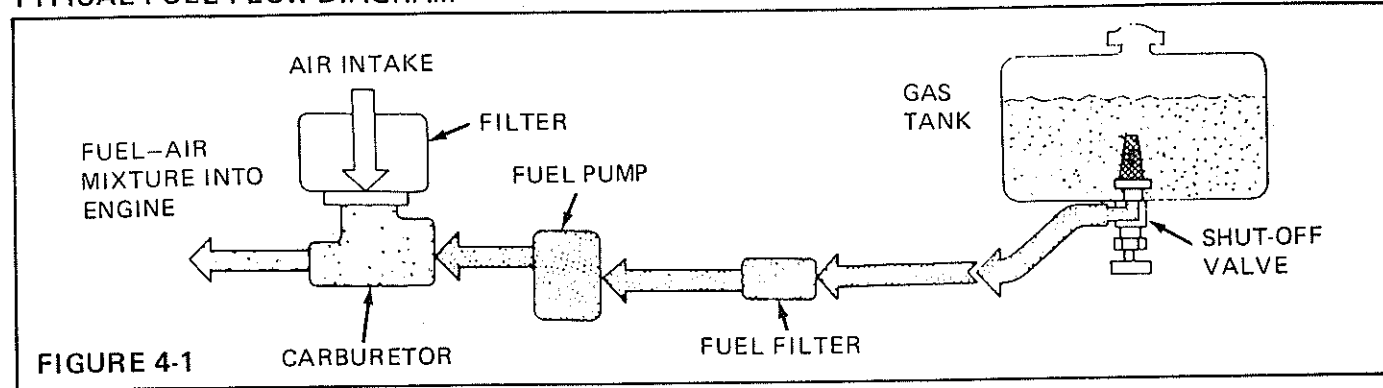
FIGURE 3-19

**TROUBLE SHOOTING GUIDE**

| <b>PROBLEM</b>                                      | <b>PROBABLE CAUSE</b>   | <b>REMEDY</b>  |
|---|---|--|
| Hard starting.                                      | <ol style="list-style-type: none"><li>1. Fuel shut off valve closed.</li><li>2. Choke linkage not working properly.</li><li>3. Dirt in fuel system.</li><li>4. Engine flooded.</li><li>5. Carburetor out of adjustment.</li><li>6. Water in fuel system.</li><li>7. Dirty air filter.</li></ol> | <ol style="list-style-type: none"><li>1. Open valve.</li><li>2. Check linkage and repair.</li><li>3. Clean fuel lines, carburetor, and install new fuel filter.</li><li>4. Check linkage, carburetor float setting etc.</li><li>5. Adjust carburetor.</li><li>6. Clean system and refill with clean fuel.</li><li>7. Install new air filter.</li></ol> |
| No fuel reaches carburetor.                         | <ol style="list-style-type: none"><li>1. Empty fuel tank.</li><li>2. Fuel filter plugged.</li><li>3. Shut off valve closed.</li><li>4. Gas tank vent plugged.</li></ol>   | <ol style="list-style-type: none"><li>1. Refill tank.</li><li>2. Clean or replace fuel filter.</li><li>3. Open.</li><li>4. Clean out vent.</li></ol>   |
| Carburetor leaks.                                   | <ol style="list-style-type: none"><li>1. Loose fuel line fitting.</li><li>2. Carb float setting set too high.</li></ol>   | <ol style="list-style-type: none"><li>1. Tighten fuel line.</li><li>2. Adjust float.</li></ol>   |
| Engine starts but runs rough with low power output. | <ol style="list-style-type: none"><li>1. High or low speed mixture adjustments off.</li><li>2. Incorrect float setting.</li><li>3. Dirty air filter.</li><li>4. Carburetor loose on engine block.</li></ol>   | <ol style="list-style-type: none"><li>1. Readjust carburetor.</li><li>2. Adjust float.</li><li>3. Install new air filter.</li><li>4. Tighten carburetor mounting screws.</li></ol>   |

## SERVICING

### TYPICAL FUEL FLOW DIAGRAM



### FUEL TANK

Fill with a clean fresh good grade of regular or unleaded gasoline. (For cold weather operation use winter blend gasoline.) **DO NOT MIX OIL WITH GASOLINE.** REFUEL OUTDOORS WITH ENGINE STOPPED AND COOL.

Check to see that vent hole in fuel tank cap is not plugged.

### FUEL VALVE

The fuel valve is located under the fuel tank. This valve must be fully open for proper operation of the tractor.

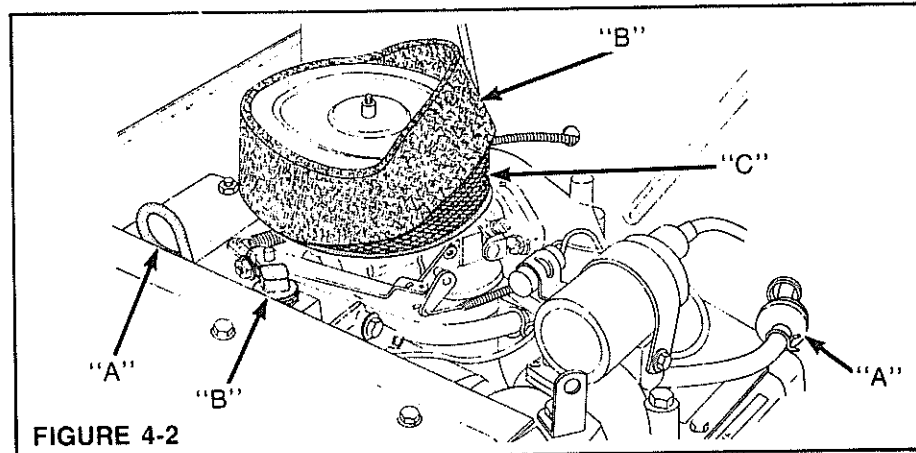
### FUEL FILTER ("A" FIGURE 4-2)

The fuel filter is a disposable type in-line filter, that should be replaced when dirty. To replace, shut off the valve under the fuel tank. Remove the filter from the fuel line and replace with a new one. Part 1727491.

### AIR CLEANER

The importance of maintaining an air cleaner in proper condition cannot be over-emphasized!

Improper air cleaner maintenance can create engine damage which the engine manufacturer will not warrant.



### AIR CLEANER DISASSEMBLY

1. Clean off any dirt or debris from around the air cleaner.
2. Remove cover of air filter.
3. Remove Precleaner (B) Figure 4-2 and Paper element (C).

### PRECLEANER

Service Precleaner every 25 hours or more often under extreme dirty dusty conditions.

Remove foam pre-cleaner by sliding it off the paper cartridge.

Wash foam pre-cleaner in liquid detergent and water.

Wrap foam pre-cleaner in cloth and squeeze dry.

Saturate foam pre-cleaner in engine oil. Squeeze to distribute and remove excess oil.

Install foam pre-cleaner over paper cartridge. Reassemble cover and screw down tight.

### AIR FILTER CLEANING

Under normal operating conditions, disassemble and service air cleaner components every 25 hours of operation. Do this more frequently if extremely dusty or dirty conditions prevail.

### PAPER ELEMENT

Use care to avoid dirt falling into engine. The dry type element is cleaned by gently tapping on a flat surface — when doing this, be careful not to damage gasket surfaces on element.

Wipe dirt or dust accumulation from cover, including base plate. Dry type elements should be replaced when no longer serviceable.

## SERVICING



### CAUTION

PETROLEUM SOLVENTS ARE NOT TO BE USED TO CLEAN ELEMENT. THEY MAY CAUSE DETERIORATION OF THE ELEMENT. DO NOT OIL ELEMENT. DO NOT USE PRESSURIZED AIR.

DO NOT OIL ELEMENT. THE PAPER ELEMENT WILL BE MATERIALLY AFFECTED BY THEIR USE. USE ONLY A KOHLER ELEMENT.

### CARBURETOR

The carburetor is designed to deliver the correct mixture of fuel and air to the engine for all operating conditions. Carburetors are set at the factory and normally should not have to be adjusted. If your engine exhibits conditions similar to those found in the table below, it may be necessary to adjust your carburetor.

Turning adjusting screws clockwise decreases the supply of fuel to the carburetor giving a leaner fuel-air mixture. Turning adjusting screws counterclockwise increases the supply of fuel to the carburetor giving a richer fuel-air mixture.

An incorrect setting can lead to fouled spark plugs, overheating, excessive valve wear, or other problems. See your Kohler Engine Service Dealer for assistance.

#### To Adjust Carburetor:

1. Stop engine, turn main fuel and idle fuel adjusting screws clockwise, until they bottom lightly.

CAUTION: Main fuel and idle fuel adjusting screws are screw-type needle valves which taper

to critical dimensions. Damage to these screws will result if they are turned in forcefully.

2. **Preliminary Setting - Main Fuel** - For Models KT17 and KT19 - turn main fuel adjusting screw counterclockwise 2-1/2 turns from bottom. For Model KT21 - turn main fuel adjusting screw counterclockwise 3 turns from bottom. **Idle Fuel** - For all KT models - turn idle fuel adjusting screw counterclockwise 1 to 1-1/4 turns from bottom.
3. **Final Setting - Main Fuel** - start engine and run at maximum governed no-load speed, let warm up for 5-10 minutes. Turn main fuel adjusting screw clockwise from the preliminary setting until speed decreases and note position of the adjusting screw. Now turn adjusting screw counterclockwise - the engine speed may first increase, then it will decrease as the adjusting screw is turned. Note the position of the adjusting screw when engine speed starts to decrease. Set the adjusting screw midway between the two points noted.
4. **Final Setting - Idle Fuel** - run engine at maximum governed no-load speed, let engine warm up for 5-10 minutes. Allow engine speed to fall to idle, or put throttle into idle position. Make adjustment using the same procedure as Final Setting - Main Fuel (Step 3).

5. **Idle Speed Setting** - run engine at maximum governed no-load speed for 5-10 minutes, allow engine speed to fall to idle, or put throttle into idle position. Set engine speed to 1200 RPM ( $\pm$  75 RPM) by turning the idle speed adjusting screw clockwise or counterclockwise.

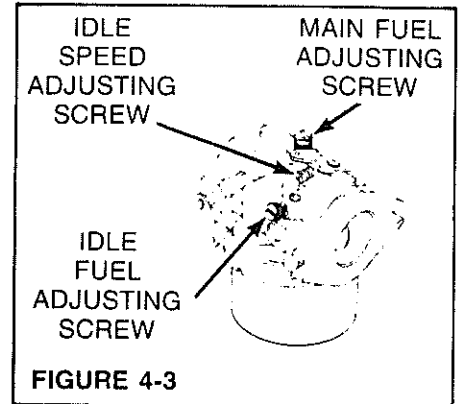


FIGURE 4-3

### SPARK PLUG (Fig. 4-4)

Every 100 hours remove plug, check condition and reset at .025 inch (0.65 mm) or replace plug if needed. Good operating conditions are indicated if plug has light coating of gray or tan deposit. A dead white, blistered coating could indicate overheating. A black (carbon) coating may indicate an "overrich" fuel mixture caused by clogged air cleaner or improper carburetor adjustment. Do not service plug in poor condition — best results are obtained with a new plug.

### NOTE

CLEANING OF SPARK PLUGS IN CLEANING MACHINES THAT USE ABRASIVE GRIT IS NOT RECOMMENDED. SPARK PLUGS SHOULD BE CLEANED BY SCRAPING OR WIRE BRUSHING AND WASHING WITH A COMMERCIAL SOLVENT.

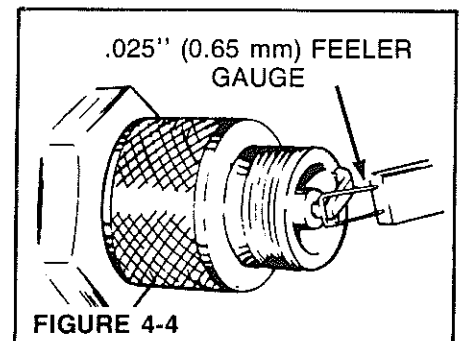


FIGURE 4-4

4

## GENERAL TRACTOR ADJUSTMENTS

### FRONT WHEEL ALIGNMENT (Fig. REASSEMBLY 5-1)

1. Loosen locknuts (A). Adjust tie rod (B) until wheels are parallel to each other.
2. With arm (C) positioned approximately 15° to the rear, adjust drag link (D) till wheels are parallel to the centerline of the tractor.

### FRONT AXLE ADJUSTMENT

An adjustment has been provided on the front axle to cut down on excessive engine vibration. By adjusting screws (E) Figure 5-1, pressure can be applied to the front axle. Raise front of tractor and adjust as required. Front axle should pivot with a small amount of drag.

### STEERING ASSEMBLY

If any repair work is needed on the Steering Assembly follow the instructions below.

#### Disassembly

1. Remove retaining ring (A) Figure 5-2 and slide the steering arm shaft out.
- NOTE:** Keep track of all shims and their locations when disassembling.
2. Disassemble the steering wheel by removing hex nut (B) and washer.
  3. Remove the steering shaft assembly from the steering column.

**NOTE:** It may be necessary to tap the steering shaft down until flange bushing (C) is pushed out of the steering support casting.

1. With flange bushing (C) slid on to the pinion shaft assembly, route it through the casting and through the steering column bearing. Slide on any needed shims at point (D) and secure the steering wheel with the nut and washer removed earlier.
2. With the steering wheel emblem right side up position steering gear (E) in steering casting.
3. With the steering arm pointed about 15° to the rear, (See Figure 5-1), slide it through the steering casting, any shims removed earlier and steering gear (F).
4. If for some reason the two gears do not have maximum engagement, shim at point (G) and secure with retaining ring removed earlier.
5. Turn steering wheel to check for binding.

### PNEUMATIC TIRES

Keep both front and rear tires inflated evenly. Under no circumstances should tire inflation be less than 8 PSI (55 kPa). Max. 14 PSI (96 kPa) Front; 10 PSI (69 kPa) Rear. Check air pressure regularly with a low pressure gauge. Operating with incorrect pressures may damage tires.

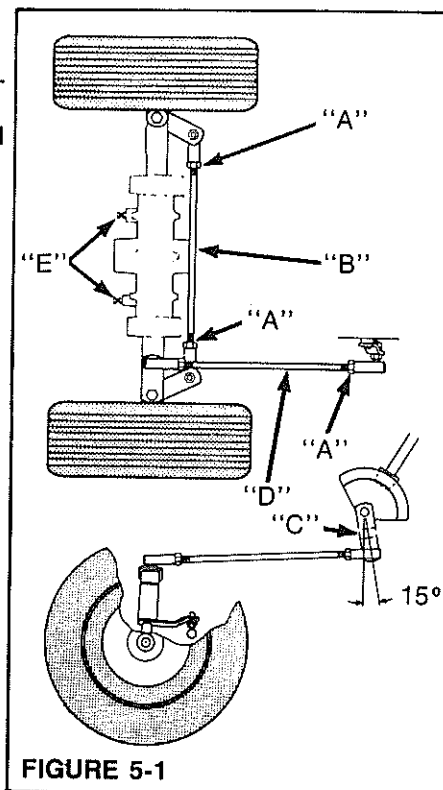


FIGURE 5-1

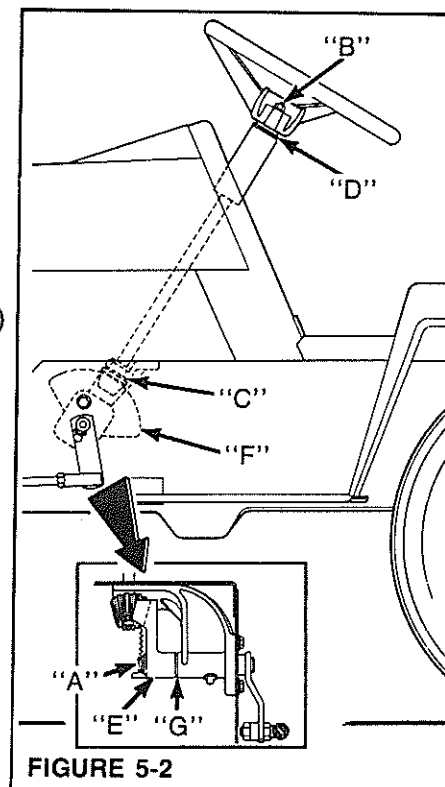


FIGURE 5-2

## HYDROSTATIC DRIVE ADJUSTMENTS

### BRAKE ADJUSTMENT (Fig. 5-3)

If it only requires light foot pressure to latch the parking brake, or if the parking brake does not hold the tractor when the brake pedal is latched, the brake system requires adjustment.

With the parking brake released, proceed as follows:

1. On early models turn brake rod "E" and on later models turn hex nut "A" on outside of bracket and nut on the inside of bracket until a gap of .010 (.25 mm) is achieved between brake disc and brake pad.

With brake pedal fully released, brake disc must rotate freely.

The tractor should not move when the brake is locked in the FIRST position.

### HYDROSTATIC PEDAL ADJUSTMENT

The Pedal was adjusted at the factory with tip of pedal approximately 45° forward of the vertical center line. If the operator would prefer to either increase or decrease this angle for his personal comfort, the pedal can be adjusted as follows: (See Figure 5-4)

1. Loosen hex nuts (A).
2. Adjust hex nuts until desired angle is reached.
3. Retighten hex nuts (A) against pivot (B).

### HYDROSTATIC NEUTRAL ADJUSTMENT

The Hydrostatic neutral is adjusted at the factory. If the transmission should need adjustment, the following procedure should be used.

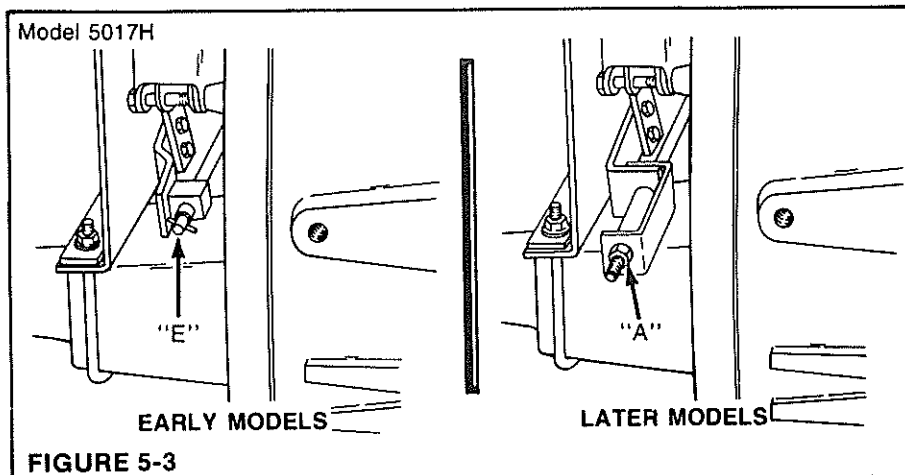


FIGURE 5-3

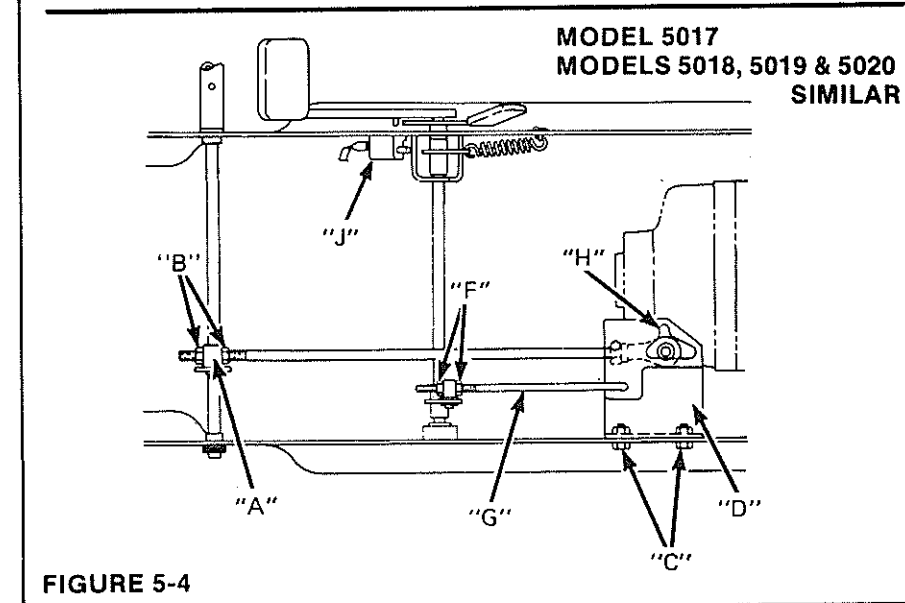
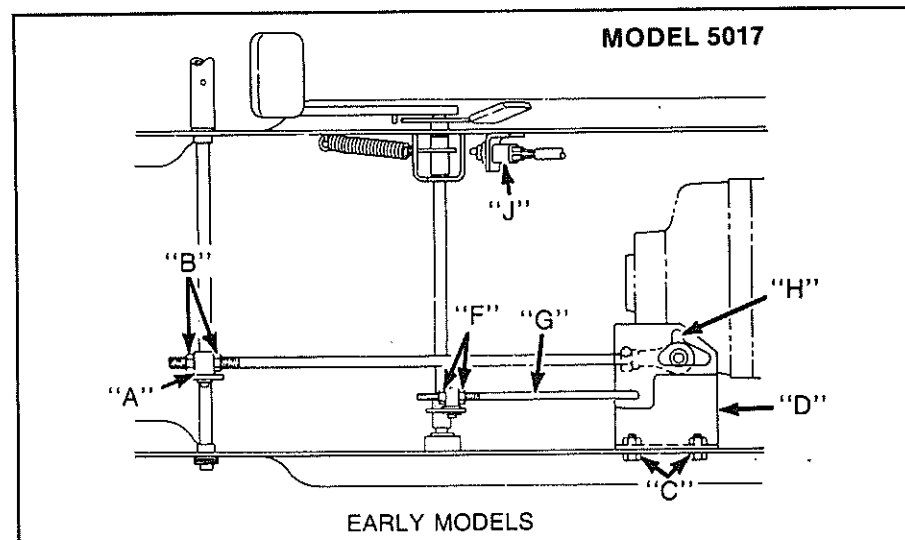


FIGURE 5-4

## HYDROSTATIC DRIVE ADJUSTMENTS

With the transmission cold and engine off, check the fluid in transmission reservoir. It should be to the level indicated on dipstick.

Start engine and release parking brake. If the tractor creeps Forward or Backward, the Neutral position needs adjustment.

Adjust Neutral as follows:

1. Securely block up rear of tractor so the rear wheels clear the ground.
2. Start the engine and release the brake.
3. Loosen capscrews (C), Figure 5-4 and move support plate (D) Forward if wheels rotate in Forward direction, or toward rear if wheels rotate in reverse.
4. Tighten capscrews securing support plate when wheels no longer rotate.
5. Stop engine and lock brake arm against the stop (E).
6. Loosen jam nuts (F) and turn rod (G) until pin lightly contacts slot (H) of neutral plate.
7. Tighten jam nuts (F).

### NOTE

EXCESSIVE ADJUSTMENT MAY CAUSE PIN BREAKAGE.



## GEAR DRIVE ADJUSTMENTS

### CLUTCH ADJUSTMENT

The clutch generally should not require any adjustment. If for any reason the clutch is not disengaging or engaging correctly, adjust as follows:

When foot pedal has fully returned to its upper position, screw on lock nut (C), Figure 5-5 till there is a gap of 1/8 inch (3 mm) between pivot (D) and lock nut (C).

With the foot pedal depressed and the engine at full speed the drive belt should not rotate. If it does, adjust lock nut (C) or check belt guides.

### BRAKE ADJUSTMENT

When the brake will not longer hold the tractor with brake lock set in the third or lowest notch, the brakes should be adjusted. To adjust, loosen nut (E) on brake rod.

With the foot pedal returned to its uppermost position, adjust lock nut (A) till there is a gap of 1/16" (1.5 mm) between lock nut and pivot block (B). Retighten nut (E) till it touches pivot block.

### BELT GUIDES ADJUSTMENT

With the foot pedal in its uppermost position check belt guides as follows:

1. Belt guides (F) Figure 5-6 on right angle drive support should be 1/16 in. (1.5 mm) away from belt.
2. Guide (G) at idler should be in approximate position shown in Figure 5-6 and 1/8 in. (3 mm) away from belt.
3. Belt guides (H) should be adjusted 3/32" (2 mm) away from drive belt.

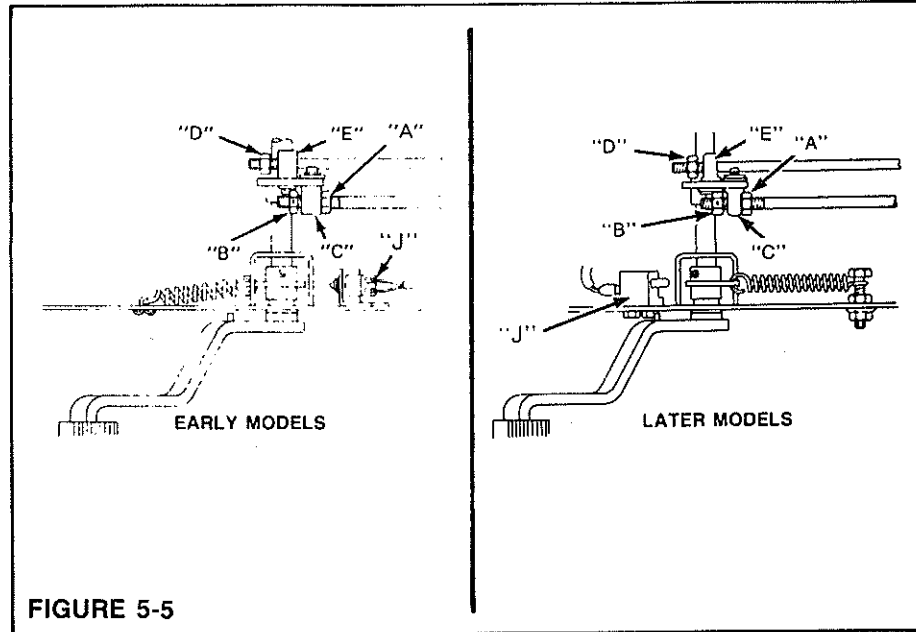


FIGURE 5-5

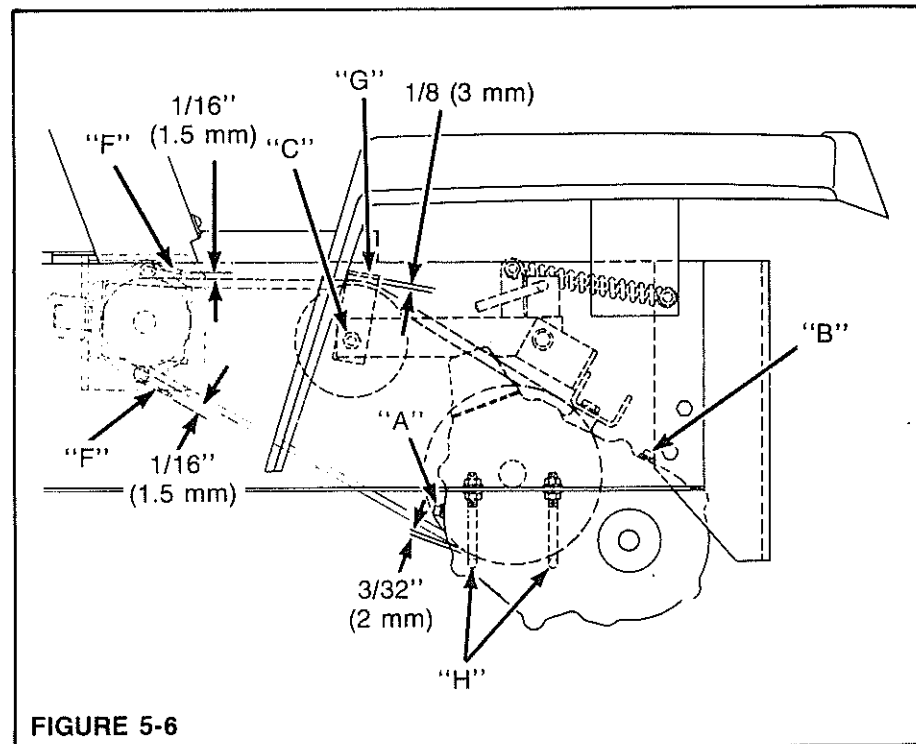


FIGURE 5-6

## POWER TAKE-OFF (P.T.O.)

### INTERLOCK SWITCHES

This unit is equipped with INTERLOCK SAFETY SWITCHES. The function of these safety switches is to insure SAFE START-UP of the unit.

1. One interlock switch is incorporated into the Attachment Drive Switch.
2. The second switch is below the seat, (A), Figure 5-7. This switch should be activated when back edge of seat support (B) is depressed 5/8" (16 mm). If not, loosen bracket (C) and move to correct location. The switch can also be activated by raising the seat and lifting the interlock button UP.
3. The third switch (J), Figures 5-4 and 5-8, is on the brake linkage. The switch button should depress approximately 3/32" (2 mm) when the brake is applied. If not, adjust by loosening nuts on switch and moving switch forward or back. Retighten nuts.

(MODELS 5019 & 5020 ONLY)

4. The fourth switch (C) Figure 5-8 is also on the brake linkage. When the pedal is released the button of the switch should be depressed approximately 3/32" (2 mm). When the pedal is depressed, the button of the switch is released and all power to the cruise control is shut off. If not, adjust by loosening nuts on switch and move switch forward or back. Retighten nuts.

### ELECTRIC CLUTCH

#### REMOVAL

**NOTE: DO NOT USE WHEEL PULLER TO REMOVE CLUTCH/BRAKE.**

Remove the hood and disconnect polarized plug from clutch.

Remove four locknuts (A) Figure 5-9.

Remove mounting bolt, lockwasher and large washer (B) from center of crankshaft.

Remove sheave and armature/brake assembly (C). (See Figure 5-9)

Remove rotor assembly.

Remove four springs (D) and clutch mounting studs (E) securing coil assembly to crankcase.

Remove coil assembly from engine.

hub bottoms on crankshaft shoulder.

Place large washer and lockwasher on clutch mounting capscrew.

Install capscrew into tapped hole in center of crankshaft. Hold clutch from rotating, while tightening capscrew. Torque to 30-35 ft. lbs. (40-47 Nm).

Adjust brake as described under maintenance.

Reconnect plug lead to lead from switch making certain connection is secure and wire is not rubbing against rotating parts.

### INSTALLATION

Position coil assembly on engine piloting in crankshaft seal bore. Secure with four mounting studs (E).

Place compression springs (D) Figure 5-9 on brake mounting studs.

Remove rust, burrs and dirt from engine shaft with sandpaper.

Apply light coat of grease or oil to shaft.

Insert key into keyway in shaft.

Push rotor and armature assembly with pulley onto engine shaft until

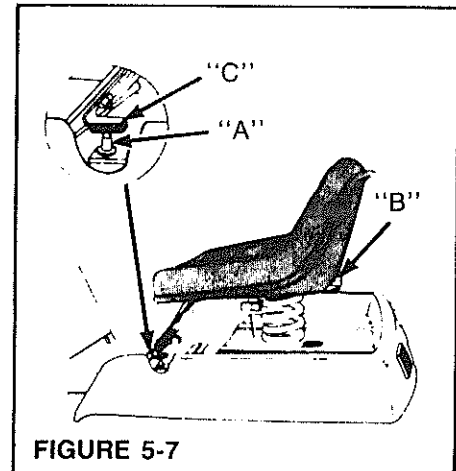


FIGURE 5-7

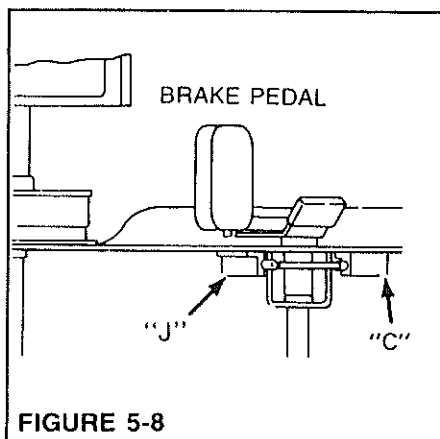


FIGURE 5-8

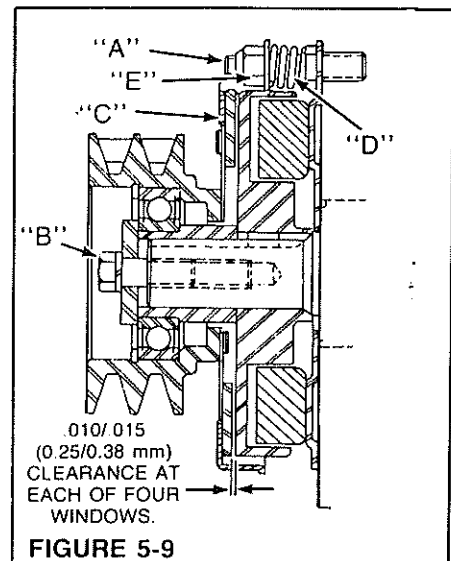


FIGURE 5-9

## POWER TAKE-OFF (P.T.O.)

### MAINTENANCE

Once the clutch/brake has been installed, the clutch portion requires no further maintenance. The unit is self-adjusting for wear and never requires lubrication.

The brake portion may require readjustment periodically depending upon unit usage. This can be accomplished as follows:

Position a .015" (0.38 mm) thick shim in each slot Figure 5-10 (4) in brake flange and turn on clutch/brake. Tighten the (4) locknuts until they just contact brake flange. (**CAUTION:** Do not over torque locknuts as damage to brake flange may result.)

Turn clutch/brake off and remove (4) shims. Recheck gap through the slots provided. A minimum of .010" (0.25 mm) and a maximum of .015" (0.38 mm) should be maintained.

If oil or grease contaminate clutch working surfaces, remove with a cleaning fluid such as barcothene alcohol or ammonia are acceptable substitutes. With engine off, pour a generous quantity of cleaning fluid between working surfaces.

If the clutch/brake has not been used over a long period of time, the following procedure is recommended prior to its use.

- a. Position tractor in neutral position.
- b. Start tractor engine, and put throttle in fast position.
- c. Turn clutch/brake switch on and off six times, engaging and disengaging driven attachments.

**NOTE: ALLOW ENGINE DRIVEN ATTACHMENTS TO COME TO A COMPLETE STOP BETWEEN ON-OFF CYCLES.**

The clutch/brake is now ready for continuous, trouble-free duty.

### ELECTRIC P.T.O. CLUTCH SPECIFICATIONS

Voltage . . . . . 12 VDC  
Resistance . . . . . 2.8 Ohms  
Current . . . . . Draw 4.17 Amps

### TROUBLESHOOTING

Electrical Data —

See wiring diagram in the electrical section of this manual.

- a. Clutch does not engage — Check electrical system for broken wires or bad connections. Check voltage at clutch lead. Voltmeter should read more than 10 volts. If voltmeter does not register a reading, look for broken wires or connect clutch lead and

check resistance reading of clutch coil. A normal resistance reading should be between 3.0 and 2.3 ohms. A reading outside these values indicates a faulty coil. The field assembly should then be replaced. Check armature/rotor air gap. This is done by inserting a feeler gauge in the (4) slots provided in the brake flange. The gap should be between .010" - .015" (0.25 - 0.38 mm) with the clutch/brake switch in the "off" position. If the gap is greater, readjust brake as described under maintenance.

- b. If engine driven attachment rotates slower than normal, check for loose belt. Inspect engine driven attachment with PTO belt removed. Attachment should turn freely. Check clutch/brake pulley grooves for grease or oil. Check clutch/brake working surfaces for grease or oil.

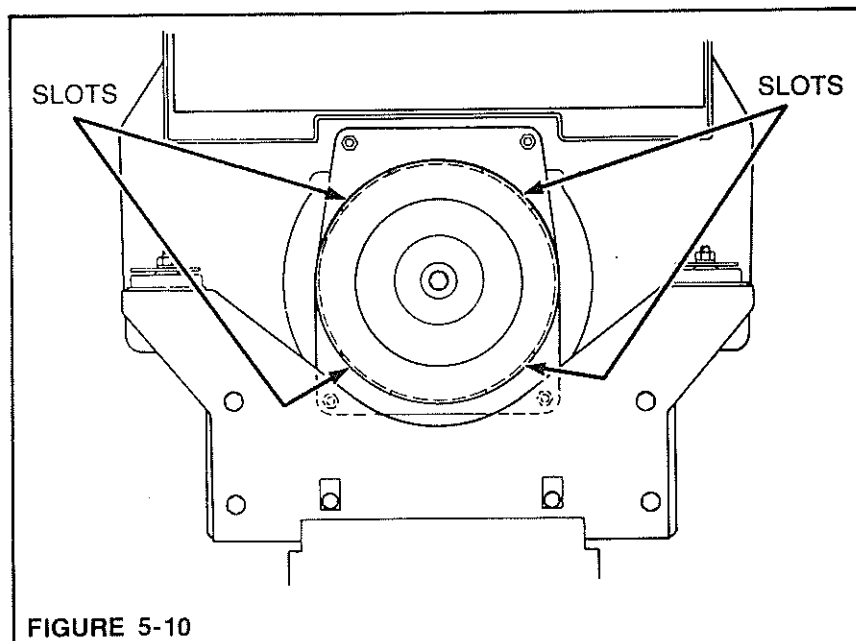


FIGURE 5-10

**TROUBLE SHOOTING GUIDE**

| <b>PROBLEM</b>  | <b>PROBABLE CAUSE</b>   | <b>REMEDY</b>  |
|---|---|--|
| Hydraulic lift inoperative.                           | <ol style="list-style-type: none"><li>1. System low on oil.</li><li>2. Oil line leaking.</li><li>3. Malfunctioning lift valve.</li><li>4. Malfunctioning lift cylinder.</li></ol>     | <ol style="list-style-type: none"><li>1. Check level and refill.</li><li>2. Replace line.</li><li>3. Repair or replace valve.</li><li>4. Repair or replace cylinder.</li></ol> |
| Load drops when control valve is in neutral position. | <ol style="list-style-type: none"><li>1. Leaking hose from valve to cylinder.</li><li>2. Oil leaking past lift cylinder "O" rings.</li><li>3. Lift valve "O" rings leaking.</li></ol> | <ol style="list-style-type: none"><li>1. Replace hose.</li><li>2. Repair lift cylinder.</li><li>3. Repair lift valve.</li></ol>  |
| Lift valve or lift cylinder leaking.                  | <ol style="list-style-type: none"><li>1. Leaking "O" rings.</li></ol>   | <ol style="list-style-type: none"><li>1. Replace "O" rings.</li></ol>  |
| Hydraulic filter blowing off.                         | <ol style="list-style-type: none"><li>1. Plugged filter.</li><li>2. Malfunctioning lift valve.</li></ol>  | <ol style="list-style-type: none"><li>1. Replace filter.</li><li>2. Replace valve.</li></ol>   |

PRINCIPLE OF OPERATION

The hydraulic system uses the hydrostatic charge pump as its power source. Its oil supply is also that of the transaxle and hydrostatic transmission. The oil is pumped by the hydrostatic to the

hydraulic control valve. When the control is actuated the oil flow can be directed to the hydraulic cylinder or auxiliary hydraulic connections in either direction.

MODEL 5017H & 5018H

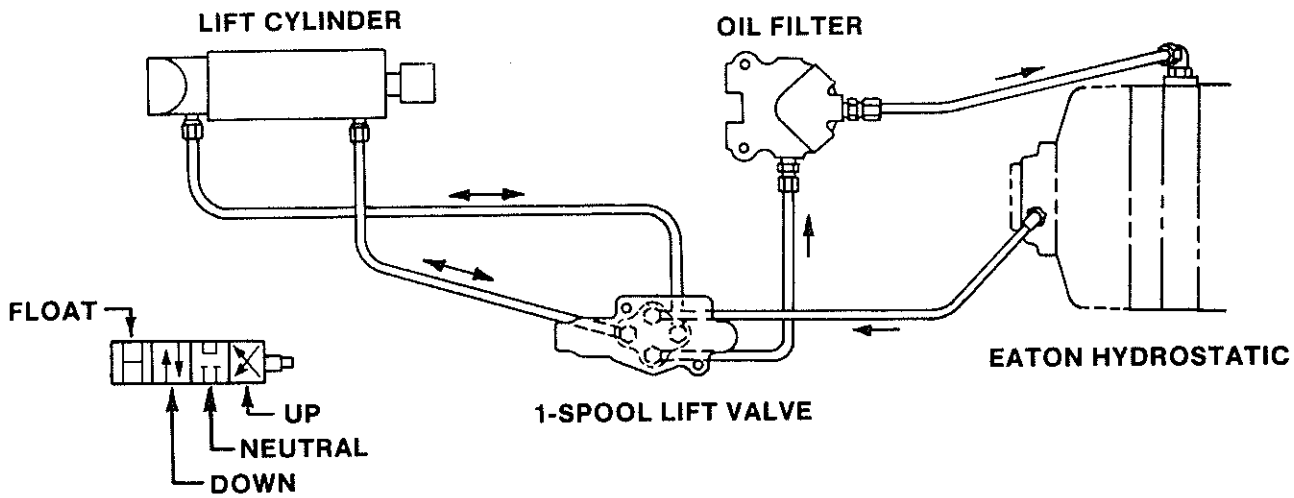


FIGURE 6-1

MODEL 5019H & 5020H

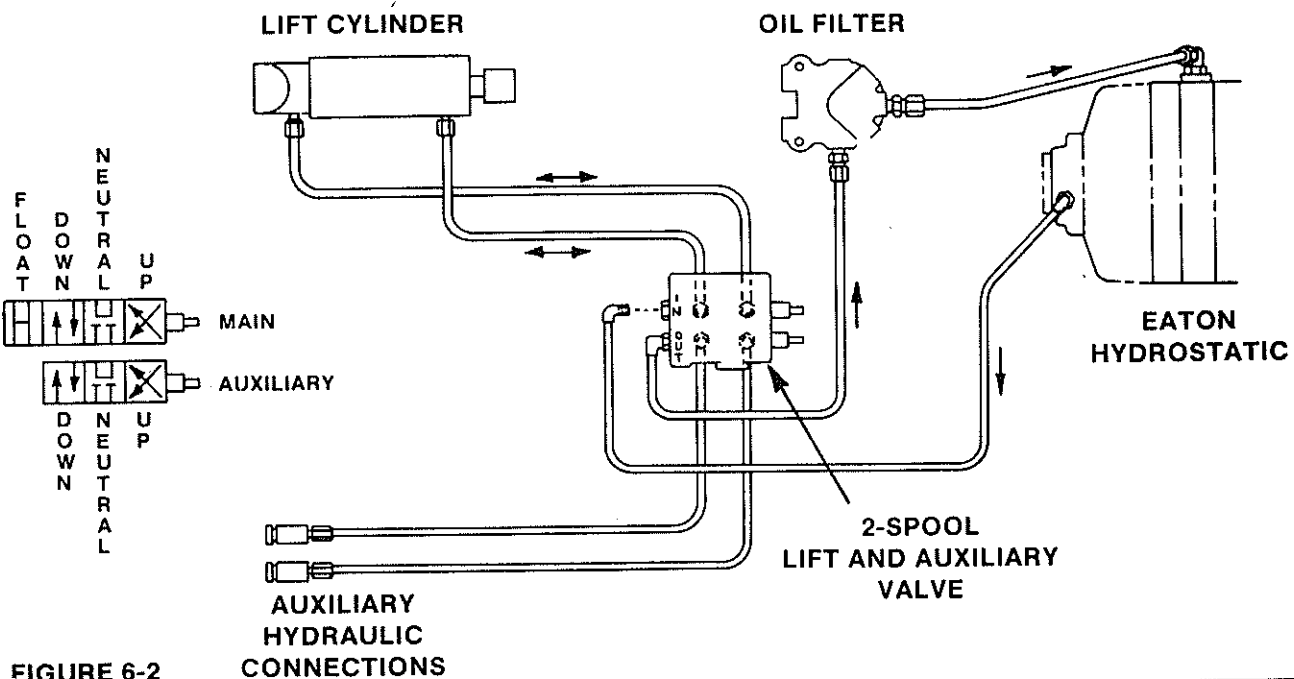


FIGURE 6-2

## TESTING HYDRAULIC SYSTEM

The hydrostatic pressure can be checked using a pressure gauge which reads at least 1000 P.S.I. Hydrostatic Pressure Gauge Kit 1737386 is available at the factory. To check the hydrostatic pressure, install a hydraulic tee between hydro and hydraulic tube at point (A) Figure 6-3. Connect pressure gauge to tee. Start the engine and run for 5-10 minutes. At full RPM the pressure reading should be 140 P.S.I.  $\pm$  20 (964 kPa).

To check the lift pressure move the hydraulic control valve lever to

the lift position until the hydraulic cylinder reaches the end of its travel. The pressure reading should be no less than 450 P.S.I. (3100 kPa).

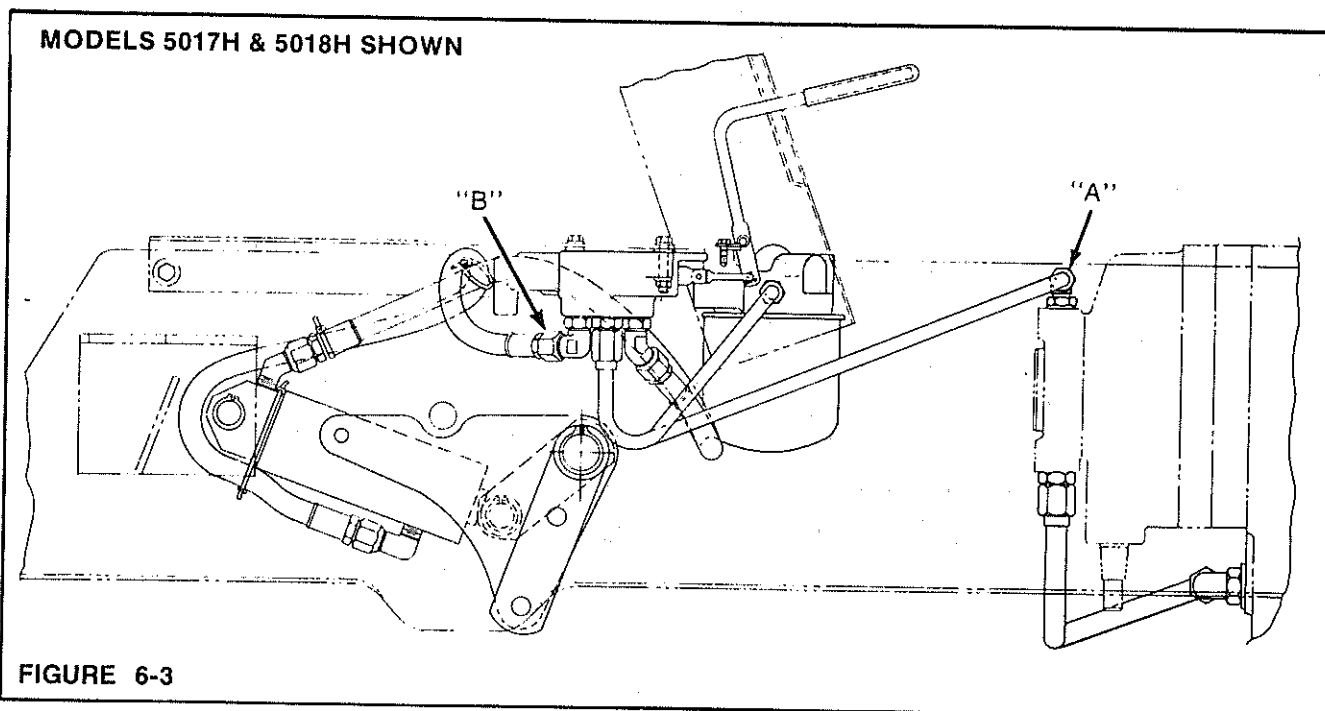
If the pressure reading is 450 to 550 P.S.I. (3100 - 3790 kPa) and the hydraulic cylinder does not operate properly, check the following:

1. Load too heavy.
2. Restriction in line from hydro to hydraulic cylinder.

3. Malfunctioning cylinder or valve.

If the pressure reading is below 450 to 500 P.S.I. (3100 - 3790 kPa) and the hydraulic cylinder does not operate, check the following:

1. System low on oil.
2. Plugged oil filter or pickup tube line.
3. Hydraulic oil line leaking.
4. Hydraulic valve or cylinder leaking.



## HYDRAULIC POWER LIFT

### REPAIRING THE HYDRAULIC CYLINDER

To remove the piston rod assembly (A) from the cylinder, the internal snap ring (B) and the hose fitting, which goes through hole (C) in the cylinder tube, must be removed.

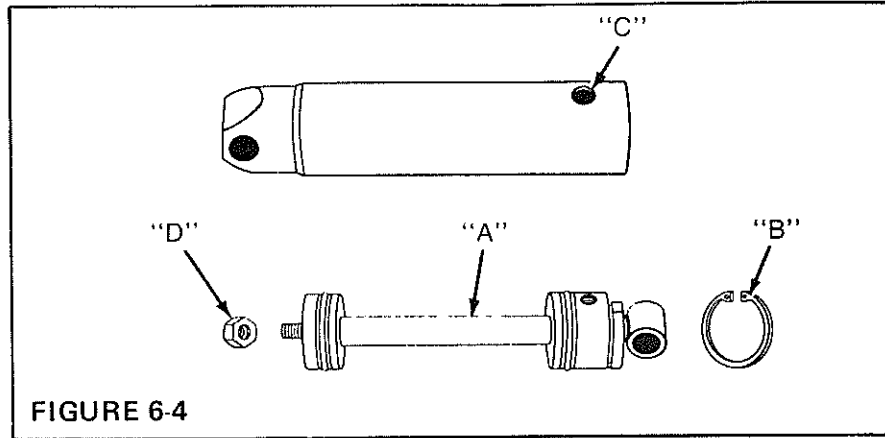
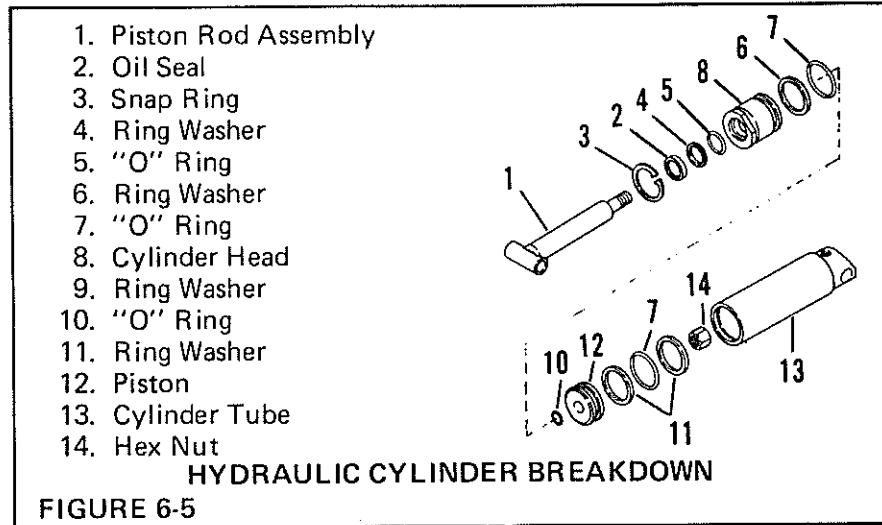


FIGURE 6-4

### PISTON ROD REMOVAL

1. Remove 90° elbow from cylinder tube.
2. Pull the piston rod out until it is fully extended.
3. Pinch snap ring together and pull on piston rod until the assembly slides out of the cylinder housing.

When the piston rod assembly is removed from the cylinder tube hex nut (D) can be loosened and the piston, cylinder head, and related "O" rings and ring washers removed. All parts should be inspected and new "O" rings installed. **IMPORTANT:** Grease "O" rings to prevent damage during assembly.



1. Piston Rod Assembly
2. Oil Seal
3. Snap Ring
4. Ring Washer
5. "O" Ring
6. Ring Washer
7. "O" Ring
8. Cylinder Head
9. Ring Washer
10. "O" Ring
11. Ring Washer
12. Piston
13. Cylinder Tube
14. Hex Nut

HYDRAULIC CYLINDER BREAKDOWN

FIGURE 6-5

## HYDRAULIC FILTER

### HYDRAULIC FILTER

The spin on type filter (A) Figure 6-6 is located under battery and fuel tank support.

When replacing filter apply a small amount of oil to the filter gasket. Hand tighten the filter.

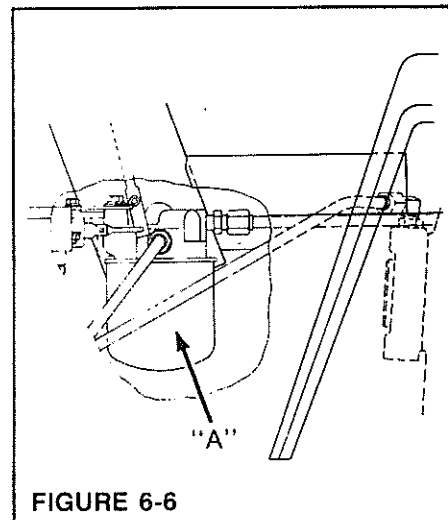
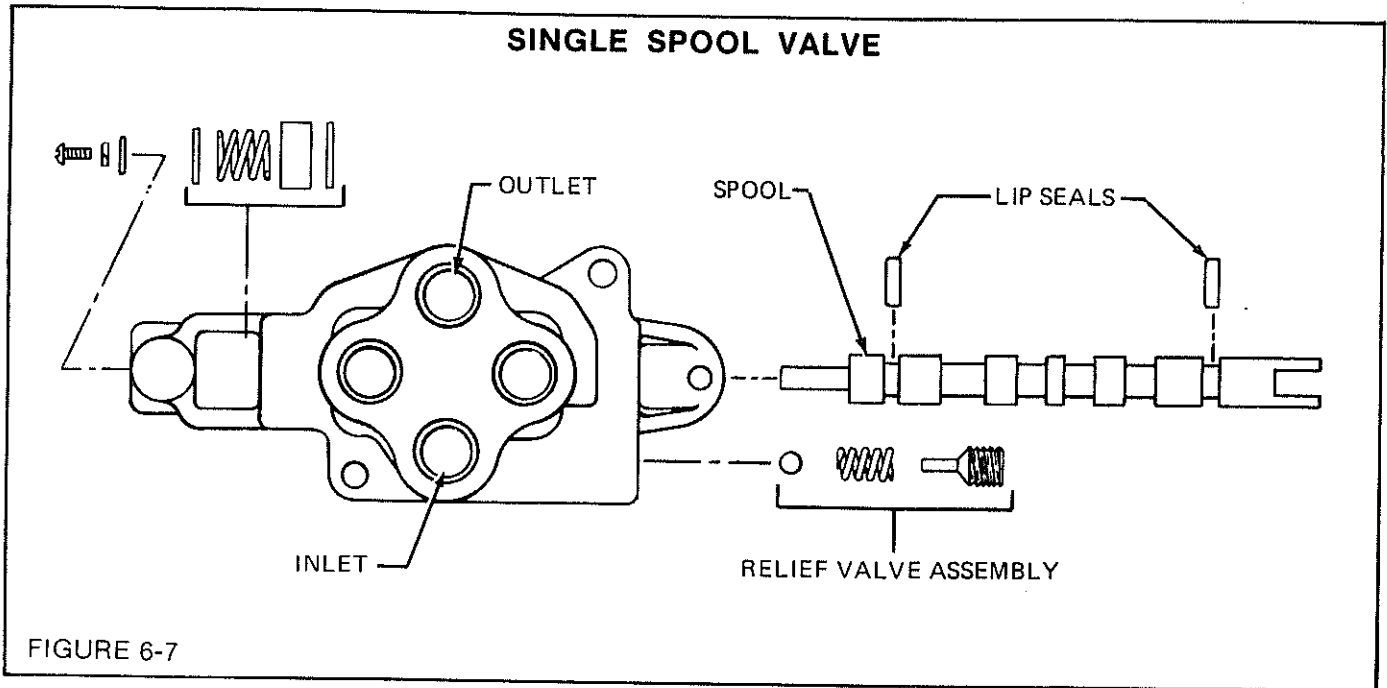


FIGURE 6-6

## HYDRAULIC POWER LIFT



### REPAIRING THE HYDRAULIC CONTROL VALVE

The hydraulic control valve regulates and changes the direction of air flow to the hydraulic cylinder when the control lever is actuated. "Lip Seals" are used on the spool to provide a seal in the bore.

Repair lip seals are available for the control valve.

### DISASSEMBLY

The spool is matched to the bore in the valve body. If the spool or valve body, is damaged the complete valve assembly must be replaced.

To remove the spool from the valve remove the capscrew in the end of the spool, and flat washer. Remove the spool by pulling it out of the lever end of the valve body.

Small burrs and scratches can be removed from the spool with fine emery cloth. Clean all parts before assembly.

### ASSEMBLY

1. Install new lip seal rings onto the spool with the opening towards the inside of spool.
2. Lubricate seals and insert spool with seals into valve body. Be careful not to damage seals. Install the spool into the valve body from the lever end. This end has a chamfer in the bore which is a lead for the packings.
3. Secure spool with round head screw, lock washer and flat washer.



HYDRAULIC POWER LIFT

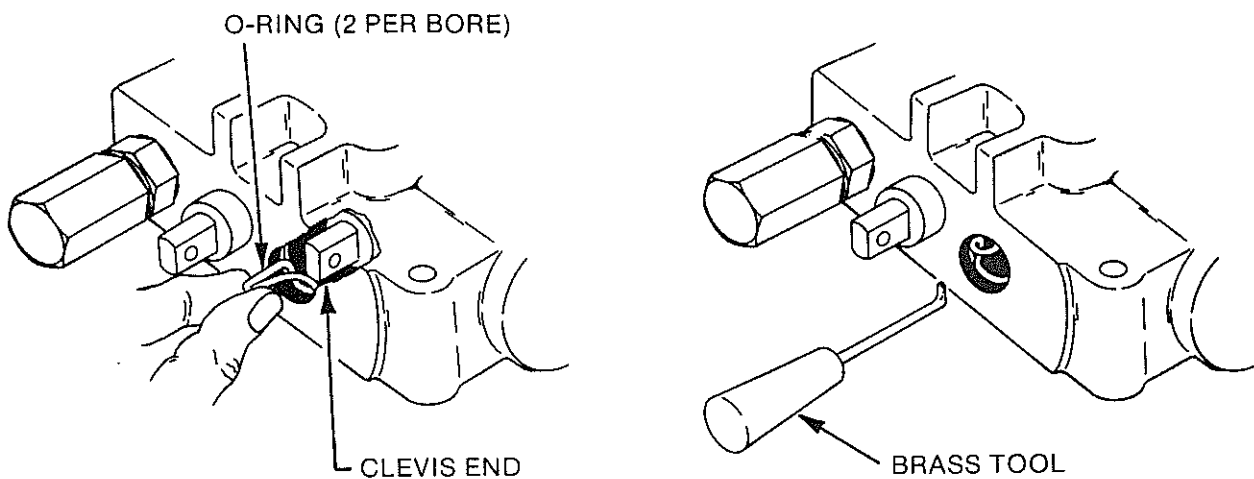


FIGURE 6-6

REPAIRING THE HYDRAULIC CONTROL VALVE

The hydraulic control valve regulates and changes the direction of air flow to the hydraulic cylinder when the control lever is actuated. "Lip Seals" are used on the spool to provide a seal in the bore.

A repair lip seal kit is available for the control valve. Order part number 1742239.

DISASSEMBLY

The spool is matched to the bore in the valve body. If the spool or valve body, is damaged the complete valve assembly must be replaced.

Remove end cap assembly.  
Remove valve spool from valve body.

Using a brass tool, Fig. 6-6, remove O-rings from valve body. Care must be taken not to scratch the bore and not to contaminate the bore with any foreign matter. Now clean and dry spool with a suitable solvent.

ASSEMBLY

Insert clevis end Fig. 6-6, into back end of valve body until even with back end of O-ring groove on front of valve body. Now pinch lubricated O-ring so it can be inserted into body as shown in Figure. Take

care to not cut or nick O-rings during installation. Insert part of O-ring into groove and let loose. Now with a brass tool help force O-ring into groove.

Now rotating spool push and pull spool until back edge of spool is in line with back edge of O-ring groove on cap end of valve. Repeat same procedure for installing O-ring as above. After the O-ring is installed, push and rotate spool until edge of spool is aligned with back surface of casting. Reassemble end cap assembly.

## TROUBLE SHOOTING GUIDE

| PROBLEM                         | PROBABLE CAUSE  | REMEDY   |
|---------------------------------|---|--|
| Hard starting or loss of power. | <ol style="list-style-type: none"> <li>1. Engine overchoked.</li> <li>2. Carburetor dirty or improperly adjusted.</li> <li>3. Faulty spark plug or improper gap.</li> <li>4. Clogged fuel line or filter.</li> <li>5. Loose or grounded high tension wire.</li> <li>6. Worn or burnt breaker points.</li> <li>7. Faulty condenser.</li> <li>8. Faulty fuel pump.</li> <li>9. Loose or grounded break point wire leads.</li> </ol> | <ol style="list-style-type: none"> <li>1. Close fuel petcock and engage starter until engine fires. Reopen fuel petcock.</li> <li>2. Readjust or clean carburetor.</li> <li>3. Adjust gap or replace plug.</li> <li>4. Check fuel line or filter.</li> <li>5. Check and repair wire lead.</li> <li>6. Replace breaker points.</li> <li>7. Replace condenser.</li> <li>8. Replace pump.</li> <li>9. Check and replace.</li> </ol> |
| Overheating.                    | <ol style="list-style-type: none"> <li>1. Insufficient available cool air.</li> <li>2. Dirty air intake screen, shroud or cooling fins.</li> <li>3. Improper fuel.</li> <li>4. Fuel mixture too lean.</li> <li>5. Engine overloaded.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Make sure area in front of flywheel is open.</li> <li>2. Clean intake screen, shroud and cooling fins.</li> <li>3. Clean and refill tank with proper fuel.</li> <li>4. Adjust carburetor.</li> <li>5. Reduce load.</li> </ol>  |
| Backfiring.                     | <ol style="list-style-type: none"> <li>1. Fuel mixture too lean.</li> <li>2. Hot spot in muffler.</li> <li>3. Valve "sticking".</li> </ol>  | <ol style="list-style-type: none"> <li>1. Adjust carburetor.</li> <li>2. Replace muffler.</li> <li>3. Free up valve.</li> </ol>  |
| Skip at high speed.             | <ol style="list-style-type: none"> <li>1. Spark plug gap too wide or wrong spark plug.</li> <li>2. Improper carburetor setting or lack of fuel.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Adjust spark plug gap or install correct plug.</li> <li>2. Refill tank and adjust carburetor.</li> </ol>   |

## ENGINE (Continued)

### TROUBLE SHOOTING GUIDE (Continued)

| PROBLEM                | PROBABLE CAUSE  | REMEDY  |
|------------------------|---|---|
| Operating erratically. | <ol style="list-style-type: none"><li>1. Clogged fuel line.</li><li>2. Water in fuel.</li><li>3. Improper carburetor adjustment.</li><li>4. Vent in gas cap plugged.</li><li>5. Faulty fuel pump.</li><li>6. Faulty choke control.</li><li>7. Loose ignition connections.</li><li>8. Air leaks in manifold or carburetor connections.</li></ol> | <ol style="list-style-type: none"><li>1. Clean fuel line.</li><li>2. Clean fuel system.</li><li>3. Adjust carburetor.</li><li>4. Clean gas cap vent.</li><li>5. Replace fuel pump.</li><li>6. Replace choke control.</li><li>7. Clean and tighten ignition connections.</li><li>8. Tighten manifold and carburetor.</li></ol> |
| Engine will not idle.  | <ol style="list-style-type: none"><li>1. Improper carburetor idling adjustment.</li><li>2. Carburetor clogged.</li><li>3. Spark plug gap set too close.</li><li>4. Leaking carburetor or manifold gaskets.</li></ol>  | <ol style="list-style-type: none"><li>1. Adjust idle speed.</li><li>2. Clean carburetor.</li><li>3. Adjust spark plug gap.</li><li>4. Replace gaskets.</li></ol>  |

## ENGINE REMOVAL AND REINSTALLATION

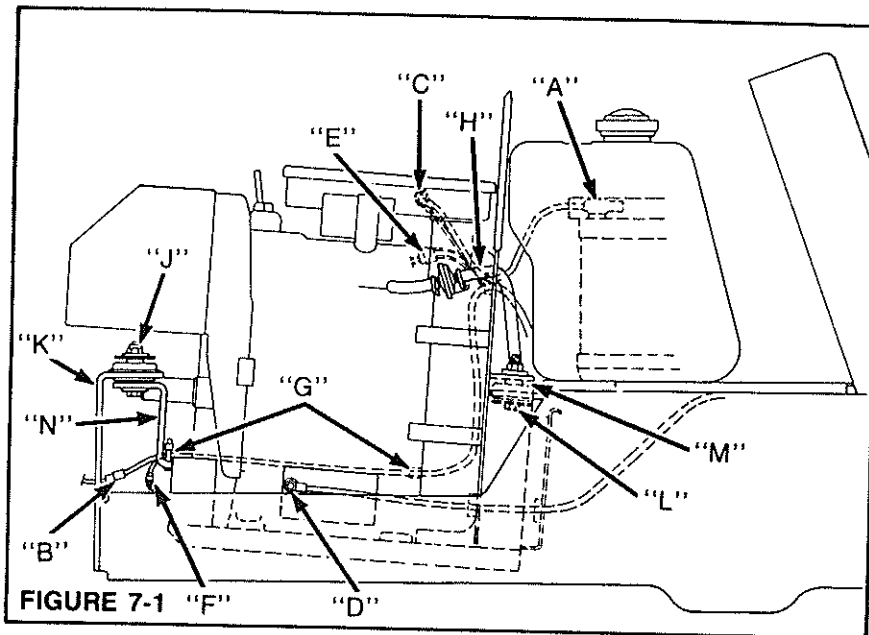


FIGURE 7-1 "F" "D"

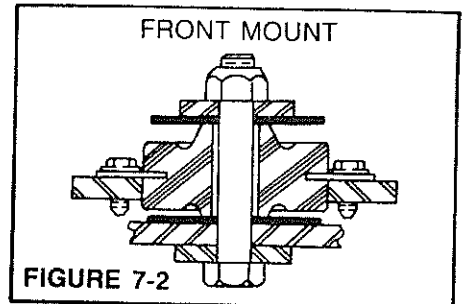


FIGURE 7-2

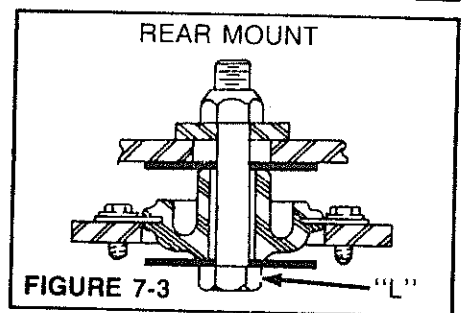


FIGURE 7-3 "L"

### ENGINE REMOVAL

1. Disconnect Negative battery cable (A) at battery.
2. Disconnect headlight wiring harness (B) and remove hood.
3. Disconnect (black) ground leads (C) from top of engine.
4. Disconnect (red) wire (D) at starter.
5. Unplug main harness plug (E) at top of engine.
6. Unplug electric clutch (F).
7. Loosen harness from secured areas (G) and pull harness through heat shield.
8. Close fuel tank petcock under tank and disconnect fuel line at fuel filter (H).
9. Disconnect and remove choke and throttle cable.
10. Remove front engine support screws (J), nuts and washers. Note placement of washers.
11. Remove front engine support plate (K).
12. Remove PTO belts from engine sheave.
13. Remove rear engine support screws (L), nuts and washers. Note placement of washers.
14. Disconnect driveshaft at engine.
15. Engine should now be free to remove.

### ENGINE REINSTALLATION

6. Connect rear of engine support as shown in Figure 7-3.
7. Reinstall front PTO belts.
8. Pull Choke and Throttle cables through heat shield and secure at proper locations.
9. Route fuel line through heat shield and secure to fuel line (H).
10. Pull harness through heat shield and connect at electric clutch (F) and main harness plug (E). Secure harness to engine or engine mount with cable ties.
11. Connect (red) lead (D) from solenoid to engine starter.
12. Connect (black) lead of harness and (Neg) lead of battery (C) to engine.
13. Install hood and plug (B) in headlight harness.
14. Recheck all screws and nuts for tightness.
15. Install (black) battery lead (A) to battery.

## MOWER DECKS

### MOWER LEVELING

For best cutting results, it is important that the mower be leveled correctly.

1. Check tractor tire pressure.  
Front - 8-14 PSI (55-96 kPa)  
Rear - 10 PSI (69 kPa)
2. Place mower on a level, flat surface.
3. Lower mower to the ground.

(42" and 48" MOWERS)

4. Check front to rear level by measuring distance from front top edge of deck (A), Figure 8-1 and the back top edge (B) to the floor. The distance should be at least 7/8" (2.2 cm) higher in the front. If not, adjust rod length of front links (C).

(60" MOWER)

4. Check front to rear leveling by measuring the distance from the bottom of the mower deck - to the working surface. This distance should be the same in the front and rear. If not, adjust rod length of front links (D) Figure 8-2.
5. Turn both adjusting links the same to maintain side to side level.

### SIDE TO SIDE LEVELING (42" and 48" MOWERS)

If side to side leveling is required, an adjustment is provided at the rear left gage wheel. Adjust by loosening screws (A), Figure 8-3 and either lowering or raising "L" rod (B).

### LUBRICATION

There are three grease fittings on the mower; one on top of each blade spindle. Lubricate the grease fittings after every 100 hours of operation with multi-purpose grease.

42" & 48" MOWERS

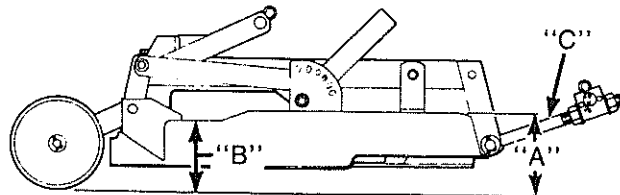


FIGURE 8-1

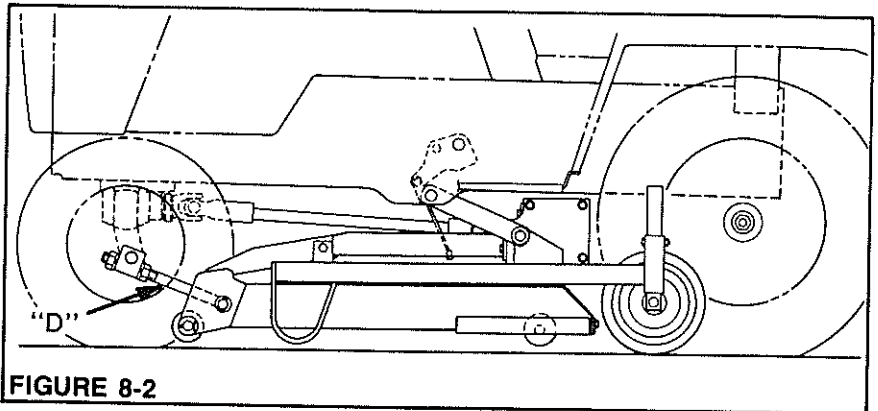


FIGURE 8-2

Frequently lubricate the linkage, rollers and other pivot points with a few drops of lubricating oil, especially on mower after washing out.

(42" and 48" MOWERS)

The gear case is filled at the factory with 11 oz. of EP 90 gear lube. Remove plug at rear of gear case, check oil level. Oil should be to the level of the plug opening. Check oil every 25 hours of operation.

(60" MOWER)

The gear case is filled at the factory with 16 oz. of EP 90 gear lube. Remove plug (A) at rear of gear case, Figure 6, to fill. Oil should not have to be added unless a leak is noticed. Check oil for leakage every 25 hours.

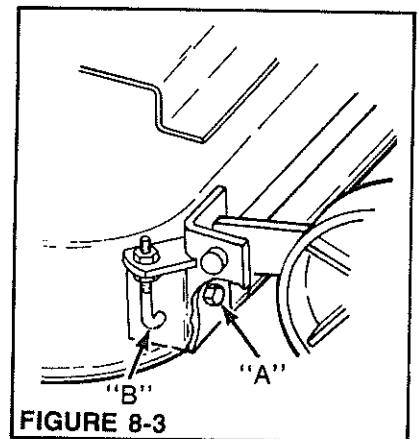


FIGURE 8-3

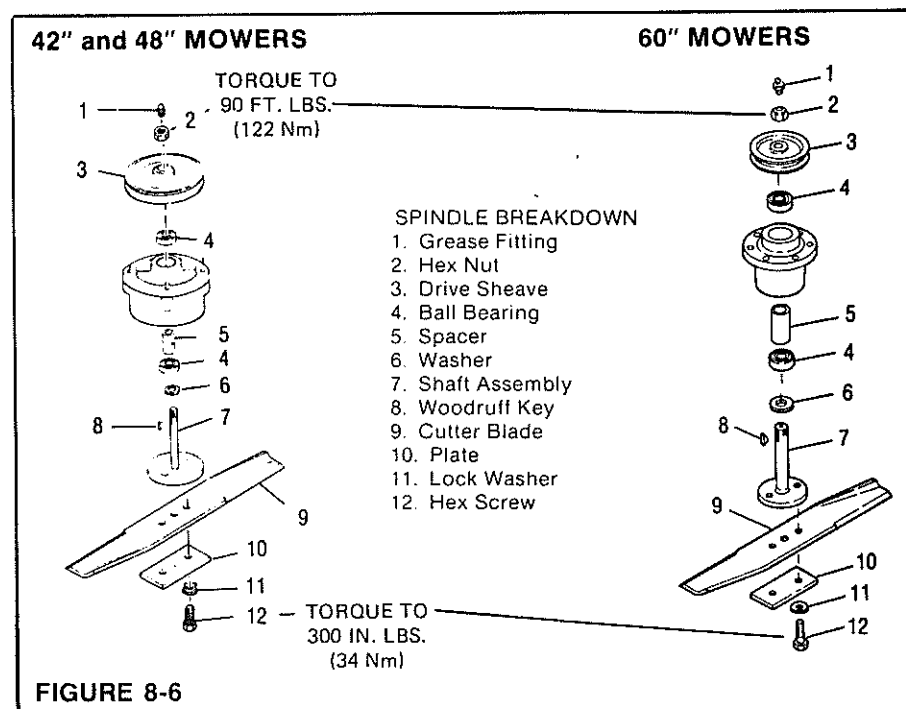
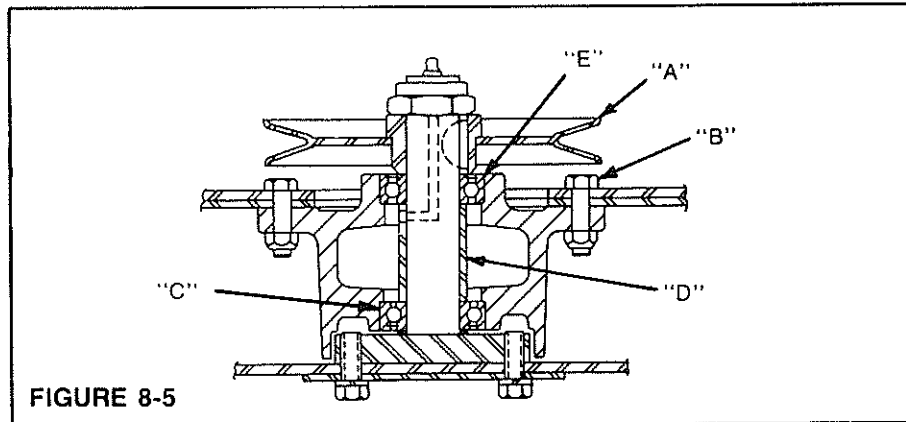
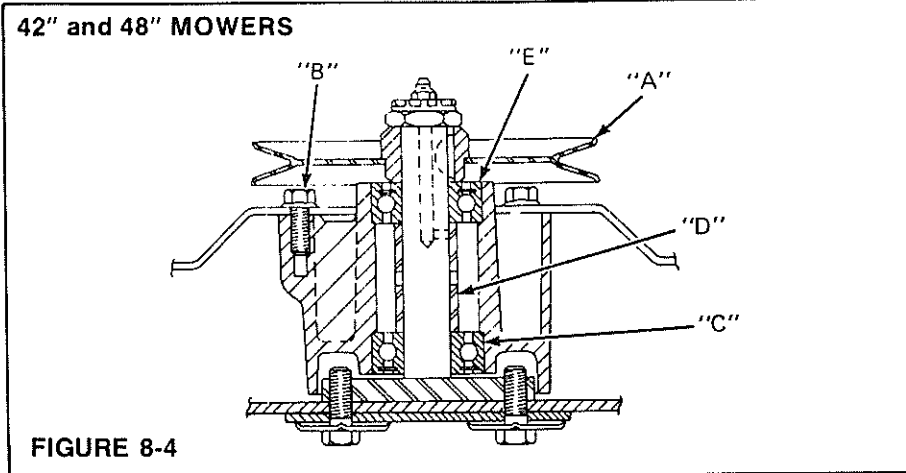
MOWER DECKS

**SPINDLE REMOVAL AND DISASSEMBLY (Figure 8-4, 8-5 & 8-6)**

1. Remove belt covers.
2. Remove belt from spindle.
3. Remove top pulley (A).
4. Remove two bolts securing cutting blade.
5. Remove 4 or 6 bolts (B) holding spindle assembly and remove spindle assembly from mower deck.
6. Remove shaft assembly from spindle housing.

**SPINDLE ASSEMBLY**

1. Place bearing (C) on shaft assembly.
2. Place spacer (D) on shaft assembly.
3. Place shaft assembly in spindle housing.
4. Place other bearing (E) on shaft assembly.
5. Place spindle housing assembly on mower deck and secure. Torque bolts (B) to 250 in. lbs. (28 Nm).
6. Assemble spindle sheave (A). Secure nut and torque to 90 ft. lbs. (122 Nm).
7. Assemble blade, plate and secure bolts with lockwashers.
8. Torque bolts to 300 in. lbs. (34 Nm).



## MOWER DECKS

### GEAR CASE REMOVAL AND DISASSEMBLY (42" and 48" MOWERS)

1. Remove universal joint.
2. Remove the mower R.H. cover and disassemble the belt from the drive pulley.
3. Lift front of mower up and drain oil from case.
4. Remove gear case assembly from mower mounting bracket.
5. Remove output shaft (A), Figure 8-2, as follows:
  - a. Remove drive sheave (B) and woodruff key.
  - b. Remove plug (C) and outside snap ring (D).
  - c. Slide shaft (A), gear and bearing out of gear case.
6. Remove input shaft (E) by removing oil seal (F) and snap ring (G). Pull shaft out.

### GEAR CASE ASSEMBLY AND RE-INSTALLATION

1. If necessary, remove and replace all bearings and oil seals.
2. Insert input shaft (E) in case.
3. Assemble snap ring to secure shaft. The input shaft should have a maximum of .005" (0.12 mm) end play. To achieve correct end play, shim at point (H). See parts list for shim numbers.
4. Insert output shaft (A) with gear and bearing in place and assemble outer snap ring (D). If the bearing has any end play, shim as required at point (J) to achieve a maximum of .005" (0.12 mm) clearance.
5. Check mesh of gears. If gears are loose shim as required at points (H), (J) or (K) to remove gap. See parts list for shim numbers.
6. Assemble expansion plug (C) and oil seal (F).

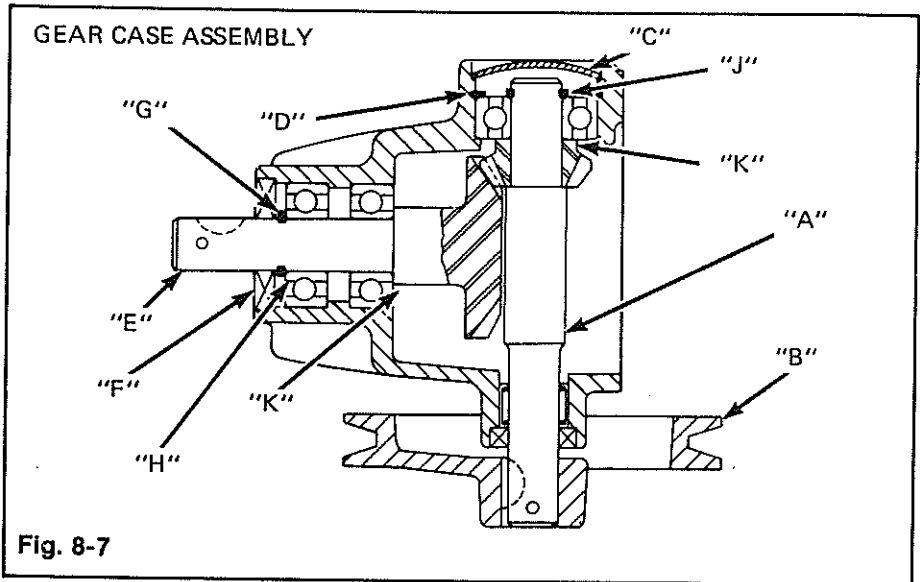


Fig. 8-7

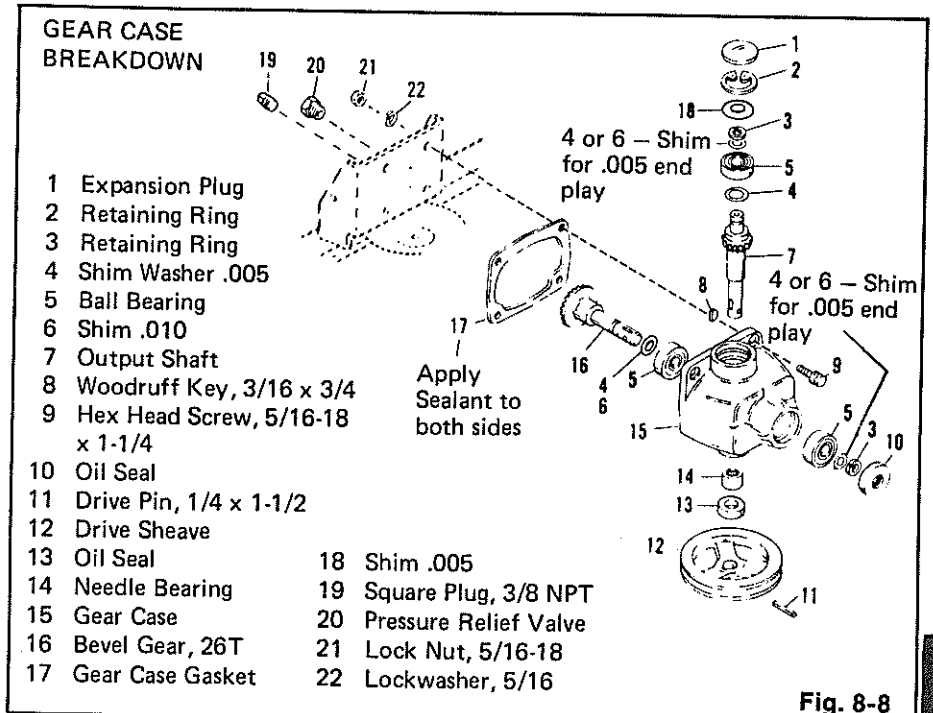


Fig. 8-8

7. Install drive pulley to output shaft.
8. Remount gear case assembly with gasket to mower base. Apply sealant to both side of gasket before assembly. Fill gear case with 11 oz. (0.32 liter) of EP90 gear lube.
9. Install belt and belt cover to mower.

MOWER DECKS

GEAR CASE REMOVAL AND DISASSEMBLY (60" MOWER)

1. Remove the universal joint, and idler arm spring.
2. Disassemble the gear box from the mower support and remove.
3. Remove the rear plug and drain the oil.
4. Remove drive pulley snap rings and woodruff key from output shaft (A). Remove any burrs on end of shaft.
5. Remove cover (B) and output shaft Ass'y from case.
6. If assembly is to be disassembled, note any shim washers at point (G).

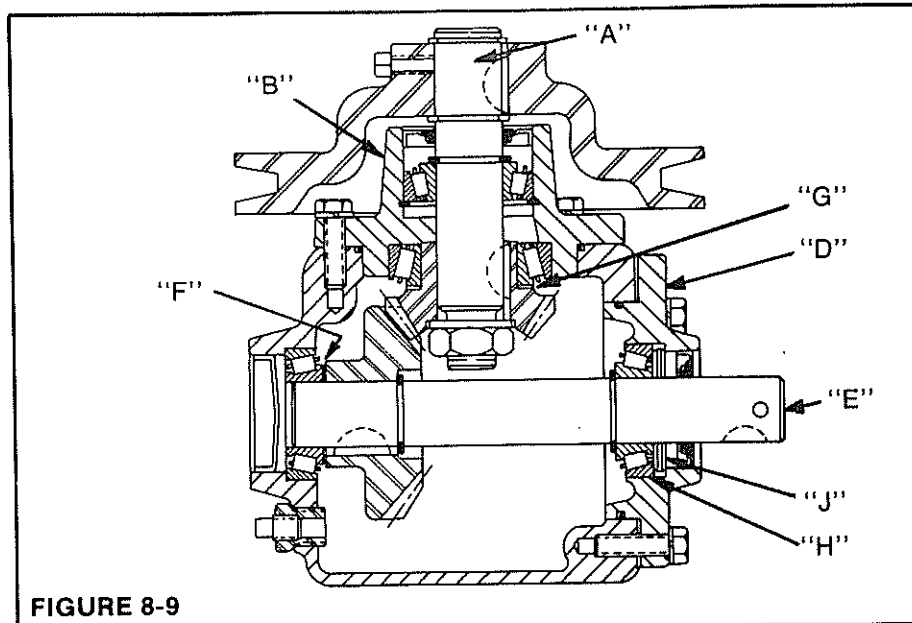
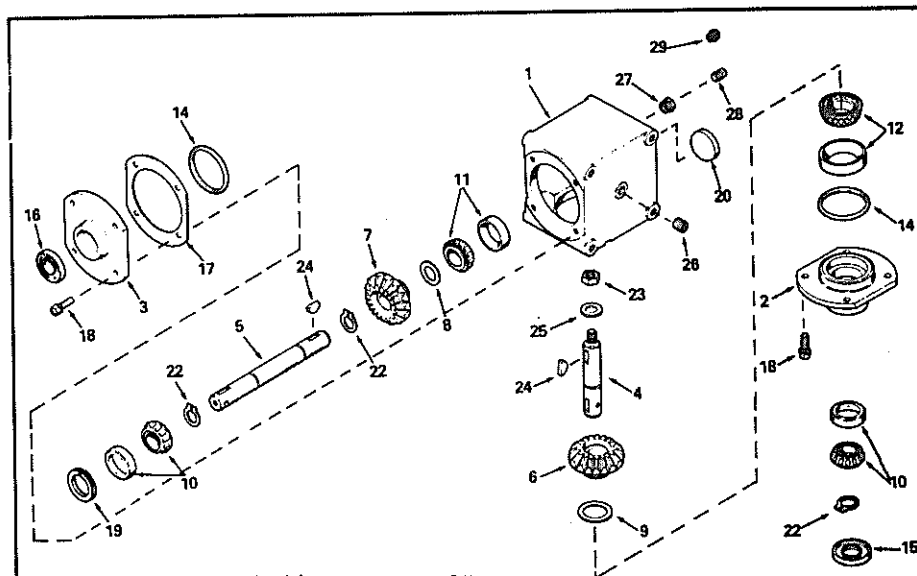


FIGURE 8-9

7. Remove cover (D).
8. Remove roller bearing (H), and load ring (J).
9. Remove input shaft Ass'y (E). Check for shim washers at point (F).
10. Replace all worn parts.

GEAR CASE ASSEMBLY

1. If required, remove and replace any bearings and oil seals.
2. Insert input shaft (E) with any shim washers removed in step 9 above into roller bearing (F).
3. Slide on roller bearing (H) and load ring (J).
4. Secure cover in place.
5. Insert cover and put shaft ass'y into case.
6. Secure with (4) lock washers and hex screws.
7. Torque all screws to 15-18 ft. lbs.
8. Assemble drive pulley and install mower.



- |                               |                          |
|-------------------------------|--------------------------|
| 1. Housing, Right angle drive | 16. Seal, Oil            |
| 2. Cap, Retainer              | 17. Shim, Cap retainer   |
| 3. Cap, Retainer              | 18. Screw, Hex Hd Sems   |
| 4. Shaft, Output              | 19. Ring, Load           |
| 5. Shaft, Input               | 20. Plug                 |
| 6. Gear, Bevel (20 teeth)     | 21. Ring, Retaining      |
| 7. Gear, Bevel (27 teeth)     | 22. Jam Nut, 3/4 - 16    |
| 8. Shim (1-1/2" O.D.)         | 23. Key, Woodruff        |
| 9. Shim (2.000" O.D.)         | 24. Washer, Flat         |
| 10. Bearing & Cup Ass'y.      | 25. Plug, Pipe, 1/4 - 18 |
| 11. Bearing & Cup Ass'y.      | 26. Reducer, Pipe        |
| 12. Bearing & Cup Ass'y.      | 27. Plug, Pipe           |
| 14. "O" Ring                  | 28. Valve, Relief        |
| 15. Seal, Oil                 |                          |

FIGURE 8-10



## TILLER

### LUBRICATION

There are two oil hole plugs in the gear case. The one located on the top front is the filler plug "A", Figure 8-11. The recessed socket pipe plug located on the left side side-wall is the oil level plug "B". Check oil level with unit mounted on the tractor and tines resting on the ground.

This tiller is filled at the factory with Bolens EP gear lubricant or equal. Check oil level before initial use and every 25 hours of operation or once each day if used for continuous duty. Add lubricant as necessary to maintain proper level. Inspect tiller at regular intervals. If any oil leakage is noted, check oil level immediately. Inspect oil seals for wear and replace if necessary.

The capacity of this gear case is approximately 16 ounces.

### GEAR CASE REMOVAL

1. - Remove tiller from tractor.
2. Remove R.H. and L.H. supports (C).

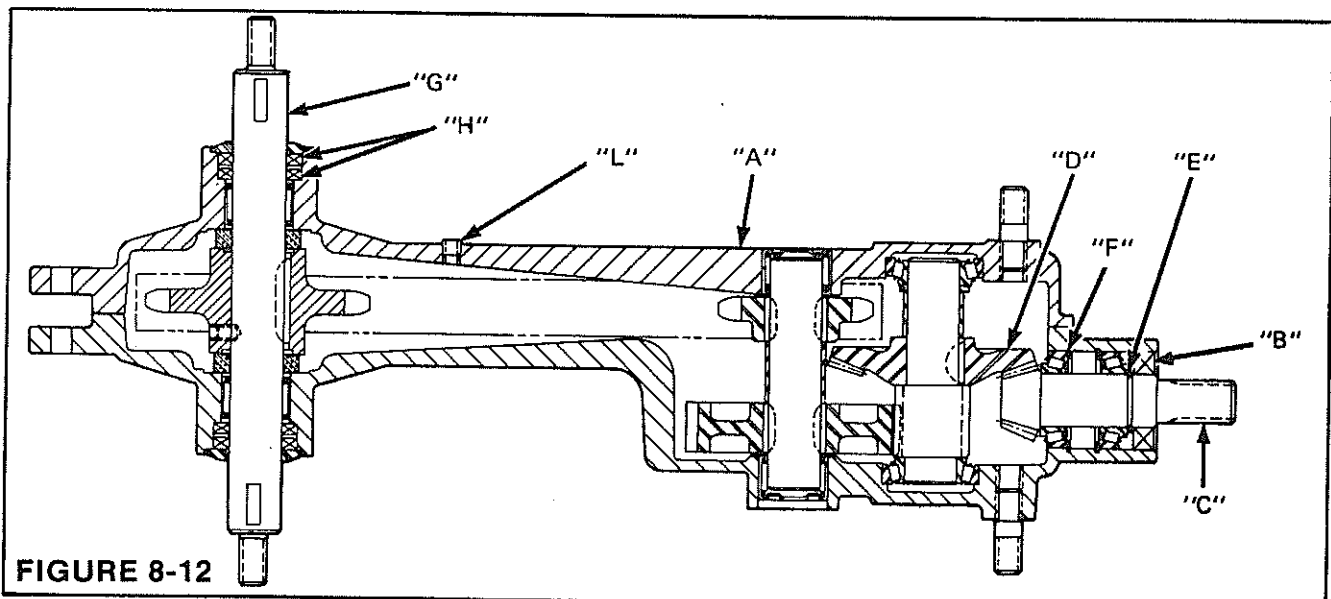
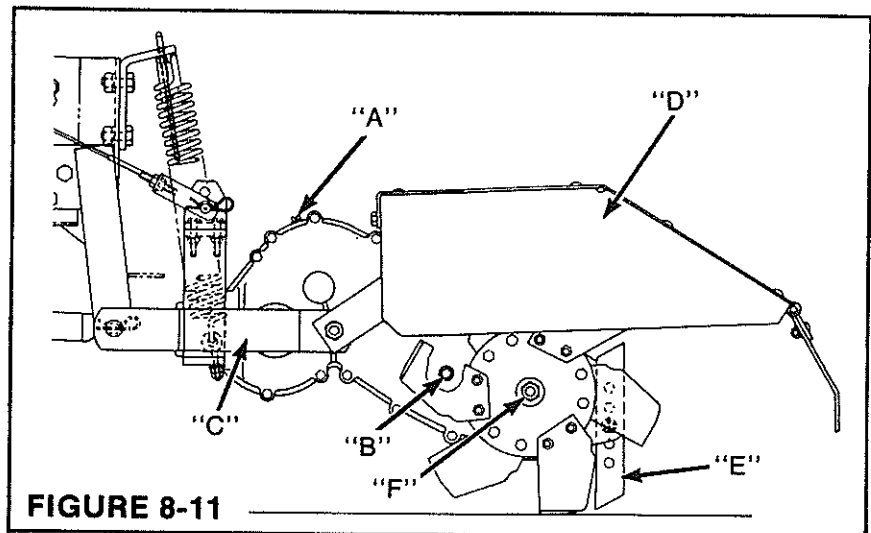
3. Remove hood and hood supports (D).
4. Remove rear depth gage (E).
5. Disassemble the assemblies by removing nuts (F).

### GEAR CASE REINSTALLATION

1. Reverse the above procedure.
2. Torque nuts (E) to 90 ft. lbs. (122 Nm).

### GEAR CASE DISASSEMBLY

1. Remove cover side woodruff key (D) in tine shaft.
2. Remove screws and lock washers securing the case and cover together. Lift cover (A) off.
3. Remove chain connector link from chain.
4. Disassemble and remove any damaged parts.

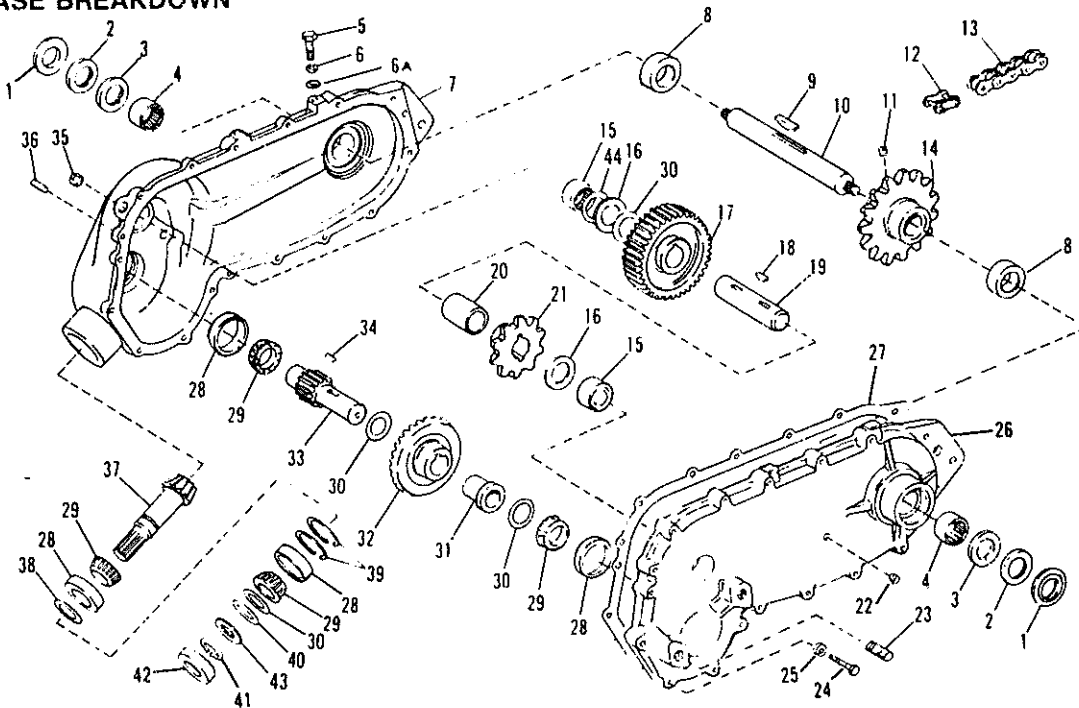


## TILLER

### GEAR CASE ASSEMBLY

1. See Figure 8-12 and 8-13 for assembly. Assemble as shown.
2. Before assembling oil seal (B) check end play of input shaft (C) and gear (D). End play should not exceed .003" (0.07 mm). If required, shim at point (E).
3. Check backlash of gears. If gears move hard, remove required shim at point (F) and add shims at point (E). If gears are loose remove shims at point (E) and add shims at point (F). See parts list for shim numbers.
4. Assemble oil seal (B).
5. When tine shaft (G) is reassembled, pack grease between seals (H). Also apply grease to exposed shaft (G).
6. With gear case on a flat surface, fill gear case through either the top plug hole (K) or side hole (L) to hole (L) level with EP90 gear lube.

### GEAR CASE BREAKDOWN



- |                               |                                |                                  |
|-------------------------------|--------------------------------|----------------------------------|
| 1 Seal Washer                 | 16 Thrust Washer               | 32 Bevel Gear, 40 Tooth          |
| 2 Oil Seal                    | 17 Gear, 39 Tooth              | 33 Pinion and Shaft              |
| 3 Oil Seal                    | 18 Key, 5/16 x 1-1/16          | 34 Woodruff Key, 1/4 x 1         |
| 4 Needle Bearing              | 19 Shaft                       | 35 Filler Cap Assembly Pipe Plug |
| 5 Capscrew                    | 20 Spacer                      | 36 Drive Pin                     |
| 6 Lockwasher                  | 21 Sprocket, 10 Tooth 1" Pitch | 37 Pinion, 13 Tooth              |
| 6A Flatwasher                 | 22 Pipe Plug, 1/2 NPT          | 38 Shim, .005                    |
| 7 Tiller Case                 | 23 Stud                        | 39 Retaining Ring                |
| 8 Thrust Washer               | 24 Capscrew, 5/16-18 x 2-1/4   | 40 Thrust Race                   |
| 9 Hi-Pro Key, 5/16 x 2        | 25 Lockwasher, 5/16            | 41 Retaining Ring                |
| 10 Tine Shaft                 | 26 Gear Case Cover             | 42 Oil Seal                      |
| 11 Set Screw, 3/8-16 x 1/2    | 27 Gasket                      | 43 Thrust Race                   |
| 12 Connector, Roller Chain    | 28 Bearing Cup                 | 44 Shim, .020                    |
| 13 Roller Chain, 1 Pitch      | 29 Bearing Cone                | NI Gear Lube EP90                |
| 14 Sprkcet, 15 Tooth 1" Pitch | 30 Shim, .005                  |                                  |
| 15 Needle Bearing             | 31 Spacer                      |                                  |

FIGURE 8-13

## SNOWTHROWERS

### MODEL 50146 GEAR BOX REPAIR

#### DISASSEMBLY

1. Loosen sprocket (A) Fig. 1 set screws and locking collar set screws behind sprocket. Loosen locking collar by turning.
2. Remove the (2) hex screws and lock washers (B) Fig. 2 of auger shaft.
3. Disassemble gear box from housing support (C).
4. Loosen both set screws and locking collars of housing bearings (D).
5. Remove (6) carriage bolts, lock washers and hex nuts (E) securing housing bearings.
6. Slide gear case as far as possible to the right side and remove the entire auger shaft assembly. Disassemble rear sprocket (A) Fig. 1 and key in shaft as complete shaft assembly is being removed.

#### NOTE

It may be necessary to pry the shaft out of the side housing.

7. After removing the gear case and auger, disassemble coupling (F) Fig. 2 from shaft.
8. Slide off R.H. and L.H. auger blade assemblies.
9. Disassemble gear box and repair as required.

#### ASSEMBLY

1. Slide on R.H. and L.H. auger assemblies.
2. Secure fan assembly coupling (F) in place.
3. Place both end housing bearing assemblies (D) onto auger shaft.
4. Insert complete assembly into housing. Assemble square key and sprocket (A) Fig. 1 onto rear gear box shaft.

5. Secure gear case to housing support (C) Fig. 2.
6. Secure flange bearings (D) to end housings.
7. Secure R.H. and L.H. auger assemblies to gear case shaft.
8. Tighten locking bearing collar behind sprocket (A) Fig. 1 and tighten set screws.
9. Line up rear sprocket (A) and secure with set screws.
10. Tighten locking collar and set screws on each end housing bearing (D).
11. Torque all screws and nuts to approximately 13 ft. lbs. Torque set screws to approximately 75 in. lbs.

#### MAINTENANCE

**GEARBOX** - Check oil level every 10 hours. Fill if necessary with AGMA 5 EP extreme pressure oil.

**AUGER SHAFT** - Grease each shaft at fittings (G) every 24 hours of use.

**DRIVE CHAIN** - Lubricate chain with chain saw oil every 3 hours.

**MOVING PARTS** - Oil rotating parts and bearings with multi-purpose oil every 24 hours of use.

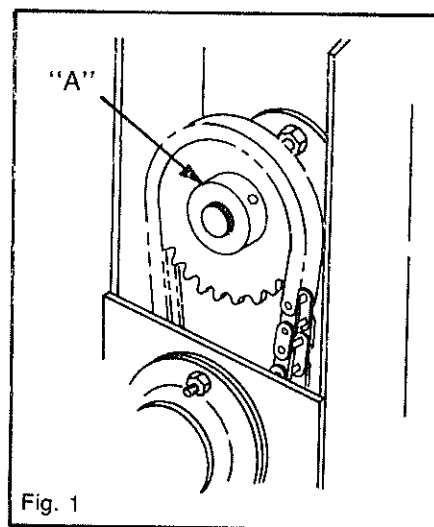


Fig. 1

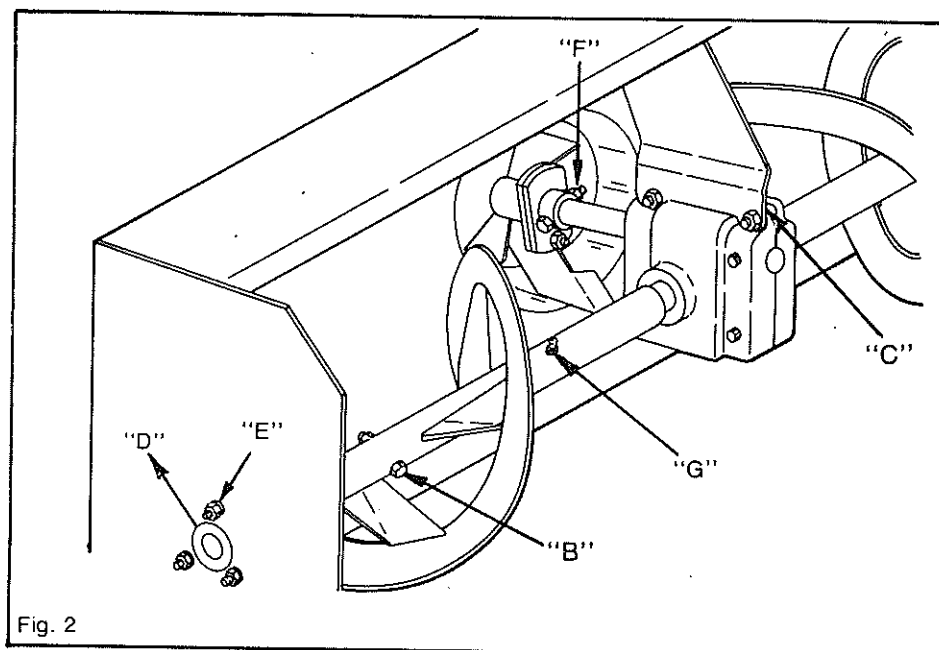
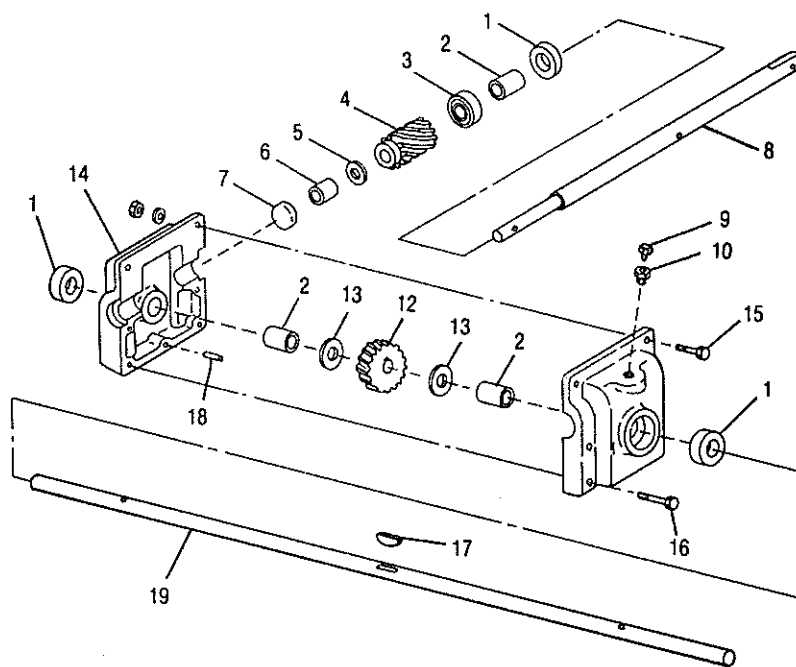


Fig. 2

SNOWTHROWER

GEAR CASE BREAKDOWN



1. Oil Seal CR 9818
2. Bushing (1" int. dia. x 1-1/4" ext. dia. x 1" long)
3. Bearing SKF #51105
4. Worm R.H. Rotation
5. Washer (1 3/8" dia.)
6. Bushing (7/8" int. dia. x 1-1/8" ext. dia. x 1" long)
7. Input Cap
8. Input Shaft
9. Breather (1/8" NPT)
10. Coupling (3/8" NPT Male x 1/8" NPT Female)
11. Cover (R.H.)
12. Bronze Gear
13. Washer (1-1/2" dia.)
14. Cover (L.H.)
15. Bolt (5/16" NC x 1-1/4", Gr. 5)
16. Bolt (5/16" NC x 2-1/2", Gr. 5)
17. Key (Woodruff)
18. Pin (1/4" x 3/4")
19. Output Shaft...