

# SHOP MANUAL

# ALLIS-CHALMERS

## MODELS

8010-8030-8050-8070

The tractor model number and serial number are linked together to form the Product Identification Number (PIN). The PIN number is located on the top surface of left-hand frame rail. The engine model and serial numbers are stamped on a name plate located on left-hand side of cylinder block.

## INDEX (By Starting Paragraph)

|                               | 8010 | 8030 | 8050 | 8070 |                                     | 8010 | 8030 | 8050 | 8070 |
|-------------------------------|------|------|------|------|-------------------------------------|------|------|------|------|
| <b>BRAKES</b>                 |      |      |      |      | <b>ENGINE (CONT.)</b>               |      |      |      |      |
| Adjustment .....              | 171  | 171  | 171  | 171  | Pistons, Rings                      |      |      |      |      |
| Brake Discs .....             | 173  | 173  | 173  | 173  | and Sleeves .....                   | 54   | 54   | 54   | 54   |
| Control Valve .....           | 172  | 172  | 172  | 172  | Rod and Piston Units .....          | 53   | 53   | 53   | 53   |
| Testing .....                 | 170  | 170  | 170  | 170  | Timing Gears .....                  | 46   | 46   | 46   | 46   |
| <b>CAB</b>                    |      |      |      |      | Valve Adjustment .....              | 40   | 40   | 40   | 40   |
| Remove & Reinstall .....      | 204  | 204  | 204  | 204  | <b>FINAL DRIVE</b>                  |      |      |      |      |
| <b>COOLING SYSTEM</b>         |      |      |      |      | Overhaul .....                      | 168  | 168  | 168  | 168  |
| Radiator .....                | 66   | 66   | 66   | 66   | Remove and Reinstall .....          | 167  | 167  | 167  | 167  |
| Thermostats .....             | 67   | 67   | 67   | 67   | <b>FRONT AXLE (Two-Wheel Drive)</b> |      |      |      |      |
| Water Pump .....              | 68   | 68   | 68   | 68   | Axle Main Member .....              | 4    | 4    | 4    | 4    |
| <b>DIESEL FUEL SYSTEM</b>     |      |      |      |      | Spindles and                        |      |      |      |      |
| Filters and Bleeding .....    | 70   | 70   | 70   | 70   | Bushings .....                      | 2    | 2    | 2    | 2    |
| Injection Nozzles .....       | 77   | 77   | 77   | 77   | Tie Rods and                        |      |      |      |      |
| Injection Pump R&R .....      | 74   | 75   | 75   | 75   | Toe-In .....                        | 3    | 3    | 3    | 3    |
| Injection Pump Timing .....   | 72   | 73   | 73   | 73   | Wheel Bearings                      |      |      |      |      |
| <b>DIFFERENTIAL</b>           |      |      |      |      | and Seals .....                     | 1    | 1    | 1    | 1    |
| Adjustment .....              | 159  | 159  | 159  | 159  | <b>FRONT-WHEEL DRIVE AXLE</b>       |      |      |      |      |
| Differential lock valve ..... | 163  | 163  | 163  | 163  | Clutch .....                        | 20   | 20   | 20   | 20   |
| R&R and Overhaul .....        | 162  | 162  | 162  | 162  | Control Valve .....                 | 17   | 17   | 17   | 17   |
| <b>ELECTRICAL SYSTEM</b>      |      |      |      |      | Differential and                    |      |      |      |      |
| Alternator and Regulator ..   | 100  | 100  | 100  | 100  | Bevel Drive Gears .....             | 10   | 10   | 10   | 10   |
| Analog Instrument Panel ..    | 87   | 87   | 87   | 87   | Drive Shaft .....                   | 7    | 7    | 7    | 7    |
| Safety Start Switches .....   | 99   | 99   | 99   | 99   | Final Drive, Wheel Hub              |      |      |      |      |
| Starting Motor .....          | 109  | 109  | 109  | 109  | and Axle Shaft .....                | 9    | 9    | 9    | 9    |
| <b>ENGINE</b>                 |      |      |      |      | Lubrication .....                   | 5    | 5    | 5    | 5    |
| Assembly, R&R .....           | 37   | 37   | 37   | 37   | R&R Axle .....                      | 8    | 8    | 8    | 8    |
| Camshaft and Bushings ...     | 51   | 51   | 51   | 51   | Tie Rods and Toe-In .....           | 6    | 6    | 6    | 6    |
| Connecting Rods and           |      |      |      |      | <b>HYDRAULIC SYSTEM</b>             |      |      |      |      |
| Bearings .....                | 56   | 56   | 56   | 56   | Hitch Control Valve .....           | 197  | 197  | 197  | 197  |
| Crankshaft and Bearings ..    | 57   | 57   | 57   | 57   | Hydraulic Lift                      |      |      |      |      |
| Crankshaft Oil Seals .....    | 58   | 58   | 58   | 58   | Adjustment .....                    | 191  | 191  | 191  | 191  |
| Cylinder Head .....           | 38   | 38   | 38   | 38   | Inlet Valve Section .....           | 198  | 198  | 198  | 198  |
| Flywheel .....                | 60   | 60   | 60   | 60   | Lift Housing and Cylinder .         | 201  | 201  | 201  | 201  |
| Oil Cooler .....              | 65   | 65   | 65   | 65   | Pumps .....                         | 185  | 185  | 185  | 185  |
| Oil Pump and                  |      |      |      |      | Remote Valves .....                 | 199  | 199  | 199  | 199  |
| Relief Valves .....           | 61   | 63   | 63   | 63   | Reservoir and Filters .....         | 182  | 182  | 182  | 182  |

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## INDEX (CONT.)

|                         | 8010 | 8030 | 8050 | 8070 |                                   | 8010 | 8030 | 8050 | 8070 |
|-------------------------|------|------|------|------|-----------------------------------|------|------|------|------|
| <b>"POWER DIRECTOR"</b> |      |      |      |      | <b>TORQUE LIMITER (CONT.)</b>     |      |      |      |      |
| Adjustment .....        | 113  | 113  | 113  | 113  | Tractor Split .....               | 110  | 110  | 110  | 110  |
| Clutch .....            | 124  | 124  | 124  | 124  | <b>TRANSMISSION (POWER SHIFT)</b> |      |      |      |      |
| Control Valve .....     | 123  | 123  | 123  | 123  | Adjustment .....                  | 132  | 132  | 132  | 132  |
| Testing .....           | 115  | 115  | 115  | 115  | Power Shift Valve .....           | 147  | 147  | 147  | 147  |
| Trouble-shooting .....  | 114  | 114  | 114  | 114  | R&R and Overhaul .....            | 148  | 148  | 148  | 148  |
| <b>POWER STEERING</b>   |      |      |      |      | Testing .....                     | 137  | 137  | 137  | 137  |
| Control Valve .....     | 32   | 32   | 32   | 32   | Trouble-shooting .....            | 146  | 146  | 146  | 146  |
| Cylinder .....          | 34   | 34   | 34   | 34   | <b>TRANSMISSION (RANGE)</b>       |      |      |      |      |
| Lubrication and         |      |      |      |      | Overhaul .....                    | 158  | 158  | 158  | 158  |
| Bleeding .....          | 26   | 26   | 26   | 26   | Rear Split .....                  | 157  | 157  | 157  | 157  |
| Steering Column .....   | 36   | 36   | 36   | 36   | <b>TRANSMISSION (STANDARD)</b>    |      |      |      |      |
| Testing .....           | 28   | 28   | 28   | 28   | Overhaul .....                    | 128  | 128  | 128  | 128  |
| Trouble-shooting .....  | 27   | 27   | 27   | 27   | Remove and Reinstall .....        | 127  | 127  | 127  | 127  |
| <b>POWER TAKE-OFF</b>   |      |      |      |      | Shift Cover .....                 | 129  | 129  | 129  | 129  |
| Clutch Valve .....      | 174  | 174  | 174  | 174  | <b>TURBOCHARGER</b>               |      |      |      |      |
| R&R and Overhaul .....  | 177  | 177  | 177  | 177  | Intercooler .....                 | .... | .... | 86   | 86   |
| <b>TORQUE LIMITER</b>   |      |      |      |      | Overhaul .....                    | 85   | 85   | 85   | 85   |
| R&R and Overhaul .....  | 111  | 111  | 111  | 111  | Remove and Reinstall .....        | 84   | 84   | 84   | 84   |

## DUAL DIMENSIONS

This service manual provides specifications in both U.S. Customary and Metric (SI) systems of measurement. The first specification is given in the measuring system perceived by us to be preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance a specification of "0.011 inch (0.28 mm)" would indicate that we feel the preferred measurement in this instance is the U.S. Customary system and the Metric (SI) equivalent of 0.011 inch is 0.28 mm.

## CONDENSED SERVICE DATA

|                                 | MODELS                   |      |                        |                          |
|---------------------------------|--------------------------|------|------------------------|--------------------------|
|                                 | 8010                     | 8030 | 8050                   | 8070                     |
| <b>GENERAL</b>                  |                          |      |                        |                          |
| Engine Make .....               | Own                      |      |                        |                          |
| Engine Model .....              | 649T                     | 670T | 670I                   | 670I                     |
| Number of Cylinders .....       | 6                        |      |                        |                          |
| Bore .....                      | 3.875 in.<br>(98.43 mm)  |      |                        | 4.250 in.<br>(107.95 mm) |
| Stroke .....                    | 4.250 in.<br>(107.95 mm) |      | 5.000 in.<br>(127 mm)  |                          |
| Displacement .....              | 301 cu. in.<br>(4.9 L)   |      | 426 cu. in.<br>(7.0 L) |                          |
| Electrical System .....         | 12 Volt, Negative Ground |      |                        |                          |
| <b>TUNE-UP</b>                  |                          |      |                        |                          |
| Firing Order .....              | 1-5-3-6-2-4              |      |                        |                          |
| Valve Clearance                 |                          |      |                        |                          |
| (Hot)– Intake and Exhaust ..... | 0.015 in.<br>(0.38 mm)   |      |                        |                          |

# CONDENSED SERVICE DATA (CONT.)

## MODELS

|                            | 8010                               | 8030              | 8050                               | 8070               |
|----------------------------|------------------------------------|-------------------|------------------------------------|--------------------|
| <b>TUNE-UP (CONT.)</b>     |                                    |                   |                                    |                    |
| Injection Pump –           |                                    |                   |                                    |                    |
| Make .....                 | Roosa-Master                       | _____             | American Bosch                     | _____              |
| Model .....                | DM-4                               | _____             | M-100                              | _____              |
| Injection Timing .....     | 18 BTDC                            | _____             | 19 BTDC                            | _____              |
| Injection Nozzle           |                                    |                   |                                    |                    |
| Opening Pressure .....     | 3842-4016 psi<br>(26500-27690 kPa) | _____             | 4200-4350 psi<br>(28960-29990 kPa) | _____              |
| Engine Low Idle Rpm .....  | _____                              | 750-850           | _____                              | 800-900            |
| Engine High Idle Rpm ..... | _____                              | 2430-2580         | _____                              | 2450-2690          |
| Engine Full Load Rpm ..... | _____                              | 2300              | _____                              | 2400               |
| Power Rating at Pto .....  | 107 hp<br>(80 kW)                  | 133 hp<br>(99 kW) | 152 hp<br>(113 kW)                 | 170 hp<br>(127 kW) |

## SIZES AND CLEARANCES

|                            |   |       |   |       |
|----------------------------|---|-------|---|-------|
| Crankshaft Main Journal –  |   |       |   |       |
| Diameter .....             | 2.7465-2.748 in.<br>(69.761-69.799 mm)  | _____ | 3.2465-3.2480 in.<br>(82.461-82.499 mm)   | _____ |
| Bearing Clearance .....    | 0.0016-0.0048 in.<br>(0.04-0.12 mm)     | _____ | 0.002-0.005 in.<br>(0.048-0.130 mm)       | _____ |
| Crankshaft Crankpin –      |   |       |   |       |
| Diameter .....             | 2.3720-2.3735 in.<br>(60.248-60.286 mm) | _____ | 2.7470-2.7485 in.<br>(69.774-69.812 mm)   | _____ |
| Bearing Clearance .....    | 0.001-0.004 in.<br>(0.03-0.10 mm)       | _____ | 0.001-0.004 in.<br>(0.03-0.10 mm)         | _____ |
| Crankshaft End Play .....  | 0.004-0.010 in.<br>(0.10-0.25 mm)       | _____ | 0.005-0.013 in.<br>(0.13-0.33 mm)         | _____ |
| Camshaft Journal –         |   |       |   |       |
| Diameter, All .....        | 2.130-2.131 in.<br>(54.10-54.13 mm)     | _____ | 2.130-2.131 in.<br>(54.10-54.13 mm)       | _____ |
| Bearing Clearance .....    | 0.002-0.005 in.<br>(0.05-0.13 mm)       | _____ | 0.002-0.005 in.<br>(0.05-0.13 mm)         | _____ |
| Camshaft End Play .....    | 0.001-0.011 in.<br>(0.03-0.28 mm)       | _____ | 0.001-0.011 in.<br>(0.03-0.28 mm)         | _____ |
| Cylinder Sleeve Bore ..... | 3.8755-3.8770 in.<br>(98.437-98.475 mm) | _____ | 4.2495-4.2510 in.<br>(107.937-107.975 mm) | _____ |
| Piston –                   |   |       |   |       |
| Skirt Diameter .....       | 3.8698-3.8718 in.<br>(98.29-98.32 mm)   | _____ | 4.2455-4.2475 in.<br>(107.84-107.89 mm)   | _____ |
| Clearance in Sleeve .....  | 0.0037-0.0072 in.<br>(0.09-0.18 mm)     | _____ | 0.0025-0.0050 in.<br>(0.063-0.127 mm)     | _____ |
| Intake Valve –             |   |       |   |       |
| Stem Diameter .....        | 0.3715-0.3720 in.<br>(9.44-9.45 mm)     | _____ | 0.3715-0.3720 in.<br>(9.44-9.45 mm)       | _____ |
| Clearance in Guide .....   | 0.0015-0.0027 in.<br>(0.04-0.07 mm)     | _____ | 0.0015-0.0027 in.<br>(0.04-0.07 mm)       | _____ |
| Face Angle .....           | 29°                                     | _____ | 29°                                       | _____ |
| Seat Angle .....           | 30°                                     | _____ | 30°                                       | _____ |
| Exhaust Valve –            |   |       |   |       |
| Stem Diameter .....        | 0.3705-0.3710 in.<br>(9.41-9.42 mm)     | _____ | 0.3705-0.3710 in.<br>(9.41-9.42 mm)       | _____ |
| Clearance in Guide .....   | 0.0025-0.0037 in.<br>(0.06-0.09 mm)     | _____ | 0.0025-0.0037 in.<br>(0.06-0.09 mm)       | _____ |
| Face Angle .....           | 29°                                     | _____ | 29°                                       | _____ |
| Seat Angle .....           | 30°                                     | _____ | 30°                                       | _____ |

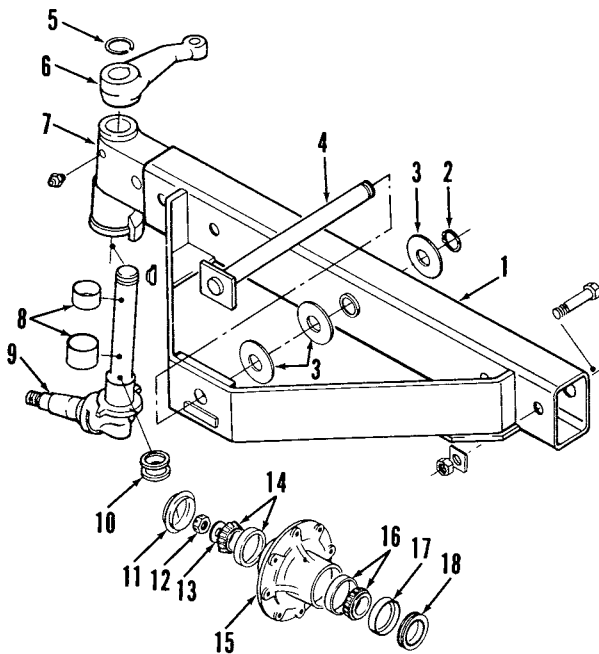
## CAPACITIES

|                       |                     |                   |                   |                   |
|-----------------------|---------------------|-------------------|-------------------|-------------------|
| Cooling System .....  | 26 qts.<br>(24.5 L) | 31 qts.<br>(29 L) | 32 qts.<br>(30 L) | 36 qts.<br>(34 L) |
| Crankcase –           |                     |                   |                   |                   |
| With two              |                     |                   |                   |                   |
| Filters Changed ..... | 16 qts.<br>(15 L)   | _____             | 19 qts.<br>(18 L) | _____             |

# CONDENSED SERVICE DATA (CONT.)

| CAPACITIES (CONT.)  | MODELS                    |                     |                           |                     |
|---|---------------------------|---------------------|---------------------------|---------------------|
|   | 8010                      | 8030                | 8050                      | 8070                |
| With Three<br>Filters Changed . . . . .                       | ....                      | ....                | 21 qts.<br>(19.9 L)       | 21 qts.<br>(19.9 L) |
| Standard<br>Transmission (With<br>Filter Change) . . . . .    | .....                     | .....               | 7.4 gal.<br>(28 L)        | .....               |
| Power Shift<br>Transmission (With<br>Filter Change) . . . . . | .....                     | .....               | 7.0 gal.<br>(26.5 L)      | .....               |
| Differential (With<br>Filter Change) . . . . .                | .....                     | 16.7 gal.<br>(63 L) | .....                     | 17.1 gal.<br>(65 L) |
| Front Drive Axle-<br>Differential . . . . .                   | .....                     | 7.6 qts.<br>(7.1 L) | .....                     | ....                |
| Final Drive<br>(Each) . . . . .                               | .....                     | 1.2 qts.<br>(1.1 L) | .....                     | ....                |
| Fuel Tank . . . . .   | .....                     | 60 gals.<br>(227 L) | .....                     | .....               |
| <b>TIGHTENING TORQUES</b>                                     |                           |                     |                           |                     |
| Cylinder Head . . . . .                                       | 165 ft.-lbs.<br>(225 N·m) | .....               | 165 ft.-lbs.<br>(225 N·m) | .....               |
| Connecting Rod Cap . . . . .                                  | 45 ft.-lbs.<br>(60 N·m)   | .....               | See Paragraph 53          | .....               |
| Main Bearing Cap . . . . .                                    | 150 ft.-lbs.<br>(203 N·m) | .....               | 190 ft.-lbs.<br>(258 N·m) | .....               |
| Flywheel . . . . .  | 135 ft.-lbs.<br>(183 N·m) | .....               | 135 ft.-lbs.<br>(183 N·m) | .....               |
| Crankshaft Pulley . . . . .                                   | 182 ft.-lbs.<br>(247 N·m) | .....               | 220 ft.-lbs.<br>(298 N·m) | .....               |
| Turbocharger . . . . .  | 20 ft.-lbs.<br>(27 N·m)   | .....               | 20 ft.-lbs.<br>(27 N·m)   | .....               |

## FRONT AXLE (TWO-WHEEL DRIVE)



**Fig. 1—Exploded view of adjustable tread width front axle assembly.**

1. Axle main member
2. Snap ring
3. Washers
4. Pivot pin
5. Retaining ring
6. Steering arm
7. Axle extension
8. Spindle bushings
9. Spindle
10. Thrust washers
11. Hub cap
12. Nut
13. Washer
14. Outer bearing assy.
15. Wheel hub
16. Inner bearing assy.
17. Wear sleeve
18. Seal

### WHEEL BEARINGS AND SEALS

1. Front wheel seal assembly consists of a triple lip seal (18—Fig. 1) and a wear sleeve (17). Be sure seal is installed on spindle so side with name and number faces outward. Press new wear sleeve into wheel hub until it bottoms against shoulder of hub.

Lubricate bearings with wheel bearing grease. Install wheel hub with bearings and tighten retaining nut until a definite drag can be felt when turning the wheel, then back nut off to the nearest cotter pin slot.

**SPINDLES AND BUSHINGS**

2. To remove front spindle (9—Fig. 1), raise and support front of tractor. Remove front wheel. Remove snap ring (5), then pull steering arm (6) from spindle. Due to the extreme press fit, steering arm will probably have to be cut off with a torch. Remove key from spindle, then lower spindle from axle.

Drive spindle bushings (8) from axle if necessary. New bushings are presized and should not require reaming if carefully installed. Press or drive new bushings into axle until they are flush to 0.030 inch (0.76 mm) below end of bore.

Install spindle in axle with two new thrust washers (10). Heat steering arm to 600°F (315°C), then press onto spindle until end play is less than 0.030 inch (0.76 mm). Spindle must rotate freely and steering arm must be clear of snap ring groove in spindle. Any adjustment of steering arm on spindle must be made prior to arm cooling below 300°F (150°C).

**TIE RODS AND TOE-IN**

3. Front wheel toe-in, measured at spindle height, should be 1/8 to 7/16 inch (3-11 mm). To adjust, disconnect left-hand end of tie rod from steering arm. Loosen jam nut and turn tie rod end in or out as necessary to obtain correct toe-in.

**AXLE MAIN MEMBER AND PIVOT PIN**

4. To remove axle assembly, raise and support front of tractor. Remove retaining ring (2—Fig. 1) from rear of pivot pin (4), then push pin out of axle and front support.

Reinstall axle and pivot pin with one thrust washer (3) at the rear. Install enough thrust washers at the front to provide axle end play of 0.170 inch (4.3 mm) or less.

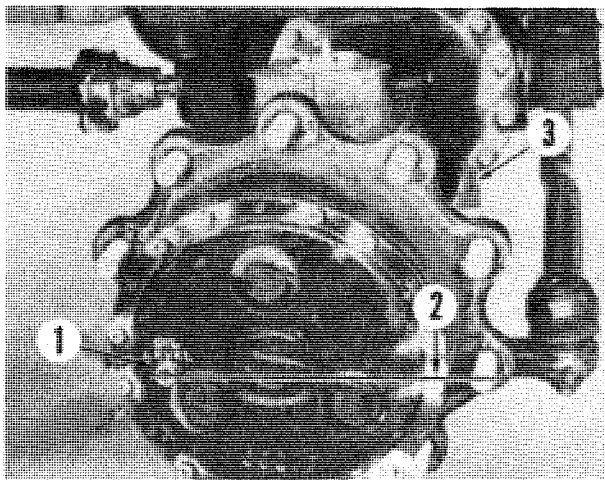
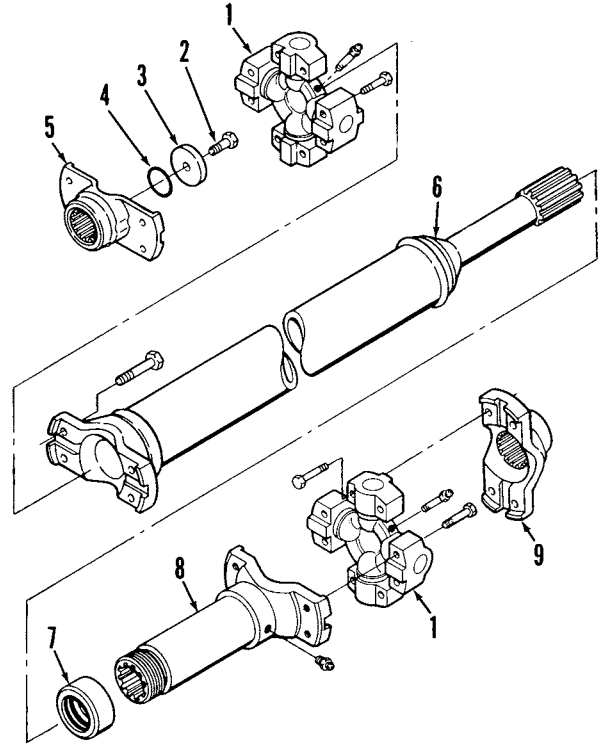


Fig. 2—Final drive oil level plug (1) must be positioned horizontally (2) to check oil level. Final drive drain plug (not shown) is located on outer diameter of wheel hub. Axle housing oil level plug (not shown) is on right-hand front side of housing. Drain plug (3) is located on bottom of housing.

Fig. 3—Exploded view of Mechanics drive shaft assembly used on some tractors with front drive axle. A Spicer drive shaft is also used on some tractors. Spicer unit is similar except that U-bolts are used instead of cap screws to secure drive shaft to yokes.

1. U-joints
2. Cap screw
3. Washer
4. "O" ring
5. Rear yoke
6. Drive shaft
7. Dust cover
8. Slip yoke
9. Front yoke



**FRONT-WHEEL DRIVE AXLE**

**LUBRICATION**

5. Check oil level in front axle housing and final drive housings after every 100 hours of operation. Refer to Fig. 2. Manufacturer recommends renewing lubricant after every 1000 hours of operation. Fill housings to level plug openings with Allis-Chalmers 715 Gear Lube or equivalent SAE 90 EP gear lube.

Lubricate axle pivot, steering linkage and drive shaft with multi-purpose lithium base grease.

**TIE ROD AND TOE-IN**

6. The tie rod is curved to provide clearance between tie rod and axle front bearing support. With tie rod rotated downward against stops of ball joints, clearance between top of tie rod and bottom of bearing support should be approximately 3/4-inch (19 mm). To adjust, loosen tie rod end locknuts and rotate tie rod as necessary.

Front wheel toe-in, measured at axle height, should be 0 to 1/2-inch (0-13 mm). To adjust loosen tie rod locknut and disconnect one ball joint from steering knuckle. Shorten or lengthen tie rod as necessary, then reconnect ball joint to steering knuckle. Tighten ball joint nut to 160 ft.-lbs. (215 N·m) torque and tie rod locknut to 180 ft.-lbs. (245 N·m) torque. Be sure to maintain correct clearance between tie rod and bearing support as outlined above.

**DRIVE SHAFT**

7. Two types of drive shafts are used on tractors equipped with front-wheel drive axle. The Mechanics drive shaft (Fig. 3) uses cap screws to attach drive shaft and U-joints to the yokes while the Spicer drive shaft uses U-bolts to connect drive shaft to yokes.

On both types of drive shafts, the rear yoke (5) is attached to output shaft with a cap screw and washer. An "O" ring (4) is located under the washer for sealing. When installing rear yoke, apply Loctite 277 to threads of cap screw and tighten to 100-115 ft.-lbs. (135-155 N·m) torque.

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