



700 Series

SHOP MANUAL

Introduction

The purpose of this Shop Manual is to detail disassembly and assembly procedures when overhauling Champion 700 Series motor graders equipped with model 8400 transmissions.

The Shop Manual applies to graders having Canadian serial numbers **16224, 16245** and up. U.S. serial numbers **2021-2** to **2658-2**.

The step-by-step sequence provides a comprehensive and progressive method of servicing. Separate sections deal with each main area and begin at the front of the grader.

THINK SAFETY FIRST! Always put the grader in the **SERVICE POSITION**, described on page ii, before attempting any overhaul, maintenance or inspection procedure.

Safety warning symbols and instructions are included where there is a risk of either damage to the grader or injury to service personnel. It is important to use extreme care during these particular operations.

For the best performance from your grader, use only specified recommended lubricants and genuine CHAMPION spare parts.

Champion Road Machinery reserves the right to modify its products by changing any specification without notice.

In case of difficulty in obtaining Parts or Service for your motor grader, please contact Champion Road Machinery, Goderich, Ontario, Canada.

Telephone: 519-524-2601
Telefax: 519-524-5175 or 519-524-5185 or 519-524-4411
Telex: 069-55175 CHAMPARTS GDCH

Table of Contents

TITLE	SECTION
Service Position	ii
Torque Guide	iii
700 Series Lubrication Specifications	iv
700 Series Lubrication Chart	v
Special Tools	vi
Front Axle	1
Drawbar, Circle and Moldboard	2
Blade Lift Assembly	3
Hydraulics	4
Steering Unit and Column	5
Power Master Cylinder – Brakes and Clutch	6
Engine Clutches	7
8400 Transmission	8
Transmission Electrical Troubleshooting Guide – Up to S/N 24259	L-2009
Transmission Electrical Troubleshooting Guide – S/N 24260 to 24735	L-2021
Single Reduction Final Drive	
Models 710/710A S/N 19482 and up	
720/720A S/N 19429, 19431, 19433, 19435 to 19438, 19440, 19442 and up	
730/730A S/N 19425 and up	9
Single Reduction Final Drive	
Models 710/710A S/N 16224, 16245 to 19481	
U.S. S/N 2012-2 to 2658-2	9A
Lock/Unlock Differential Final Drive	10
Standard Double Reduction Final Drive	11
Standard Brakes and Tandems	12
Oil Disc Brakes and Tandems	13
Engine Removal and Installation	14
Hand Brake	15
Master Cylinder – Drum Service Brakes	16
Attachments – Optional	21
Export Package – Optional	L-2006
All Wheel Drive Service Guide – Optional	L-2010

Service Position

Before making any service, maintenance or inspection procedure, the grader must be placed in the SERVICE POSITION.

1. Park the grader on a level surface.
2. Place the transmission in NEUTRAL and apply the hand brake.
3. Lower the moldboard and all attachments to the ground. Do not apply down-pressure.
4. Shut down the engine.
5. If the grader is an articulated model, install both articulation locking pins.
6. Install chocks at the front and rear tandem wheels. Wedge the chocks in place.
7. Relieve residual hydraulic pressure by operating all control levers.
8. Some hydraulic circuits may contain lock valves. Operating the control levers in these circuits will not relieve residual hydraulic pressure. Such pressure must be relieved by loosening a fitting or electrically activating the solenoid valve. Wear face and eye protection. Danger of spraying oil!
9. Fasten a "DO NOT OPERATE" or similar warning tag on the steering wheel.
10. Remove and retain the ignition key.
11. Turn the battery isolation switch to the "OFF" position.
12. If the service procedure includes welding, you must disconnect the following items:
 - a) The negative battery cable(s).
 - b) Positive battery cable(s).
 - c) Main power supply harness at the transmission controller.
 - d) Transmission wiring harness at the transmission controller.
 - e) Alternator wiring harness.Connect the arc-welder ground cable adjacent to the work area. Install the battery box cover(s). After completing your welding procedure, connect items a) through e) in the reverse order. Ensure to connect the negative battery cable(s) last.
13. Allow the engine and hydraulic system to cool before working in these areas.
14. Be aware of other service personnel in your work area.

Torque Guide

Fastener Thread Size (Coarse and Fine)

SAE Grade 5 Fastener



SAE Grade 8 Fastener



Fastener Thread Size (Coarse and Fine)	SAE Grade 5 Fastener			SAE Grade 8 Fastener		
	N.m	kgf.m	lbf.in.	N.m	kgf.m	lbf.in.
4-40	0,68	0,07	6	1,02	0,10	9
4-48	0,79	0,08	7	1,13	0,11	10
6-32	1,35	0,14	12	1,92	0,19	17
6-40	1,47	0,15	13	2,15	0,22	19
8-32	2,48	0,25	22	3,50	0,36	31
8-36	2,60	0,26	23	3,61	0,37	32
10-24	3,61	0,37	32	5,08	0,52	45
10-32	4,07	0,41	36	5,76	0,59	51
						lbf.ft
1/4-20	8,47	0,86	75	12,20	1,24	9
1/4-28	9,72	0,99	86	13,56	1,38	10
			lbf.ft			
5/16-18	17,62	1,80	13	24,40	2,49	18
5/16-24	18,98	1,93	14	27,12	2,76	20
3/8-16	31,18	3,18	23	47,45	4,84	35
3/8-24	33,89	3,46	25	47,45	4,84	35
7/16-14	47,45	4,84	35	75,57	7,60	55
7/16-20	54,23	5,53	40	81,35	8,29	60
1/2-13	75,92	7,74	56	108,46	11,06	80
1/2-20	88,13	8,99	65	122,02	12,44	90
9/16-12	108,46	11,06	80	149,14	15,21	110
9/16-18	122,02	12,44	90	176,26	17,97	130
5/8-11	149,14	15,21	110	230,49	23,50	170
5/8-18	176,26	17,97	130	244,05	24,89	180
3/4-10	271,16	27,65	200	379,63	38,71	280
3/4-16	298,28	30,42	220	433,86	44,24	320
7/8-9	433,86	44,24	320	623,68	63,60	460
7/8-14	488,09	49,77	360	677,91	69,13	500
1-8	650,79	66,36	480	921,96	94,01	680
1-12	718,58	73,27	530	1003,31	102,30	740
1-14	732,14	74,66	540	1030,42	105,07	760
1-1/8-7	813,49	82,95	600	1301,59	132,72	960
1-1/8-12	894,84	91,25	660	1464,28	149,31	1080
1-1/4-7	1138,89	116,13	840	1843,91	188,03	1360
1-1/4-12	1247,35	127,19	920	2033,73	207,38	1500
1-3/8-6	1491,40	152,08	1100	2413,36	246,09	1780
1-3/8-12	1708,33	174,20	1260	2765,87	282,04	2040
1-1/2-6	1979,50	201,85	1460	3199,73	326,28	2360
1-1/2-12	2182,87	222,59	1610	3606,48	367,76	2660

700 Series Lubrication Specifications

Application/ Fluid Code	Capacity	Lubricant Change Interval (see note)	Filter Change Interval	Fluid Type	Air Temperature Range During Fill Period																																
					*C -40 -30 -20 -10 0 10 20 30 40 50																																
					*F -40 -22 -4 14 32 50 68 86 104 122																																
Hydraulic system - HO	42 US gal 159 L	1000 hr	First 100 hr then 500 hr	Hydraulic Oil*												○		SAE 10W, ISO Grade 32																			
																		Dexron®II ATF																			
All Wheel Drive hydraulic system - HO	10 US gal 38 L	2000 hr	First 100 hr then 1000 hr	Hydraulic Oil*												○		SAE 10W, ISO Grade 32																			
																		Dexron®II ATF																			
Tandems - drum brakes - HO	8.5 US gal 32 L (each side)	2000 hr	-	Hydraulic Oil												○		SAE 10W, ISO Grade 32																			
																		Dexron®II ATF																			
Tandems - oil disc brakes - UTHF	26.5 US gal 100 L (each side)	1500 hr	-	Universal Tractor Hydraulic Fluid for Wet Disc Brakes												○		SAE 10W, ISO Grade 32																			
Front wheel bearings	-	500 hr		Multi-Purpose Grease Extreme Pressure Lithium Soap Base												○		NLGI EP2 FRONT WHEEL BEARINGS																			
All grease fittings - MPG	Until grease seeps from joint	-																NLGI EP0 or EP1																			
																		○	NLGI EP2																		
All Wheel Drive pump drive gearbox - GO	0.3 US gal 1.0 L	First 100 hr then 1000 hr	-	Hypold Gear Oil - API GL-5 MIL-L-2105C												○		SAE 85W-140																			
																		SAE 80W-90																			
																		SAE 75W-90																			
All Wheel Drive planetary reduction unit - GO	0.4 US gal 1.5 L (each side)	First 100 hr then 1000 hr	-	Hypold Gear Oil - API GL-5 MIL-L-2105C												○		SAE 85W-140																			
																		SAE 80W-90																			
																		SAE 75W-90																			
Final drive - single reduction lock/unlock differential - GO	6 US gal 23 L	First 100 hr then 1000 hr	-	Hypold Gear Oil - API GL-5 MIL-L-2105C												○		SAE 85W-90																			
																		SAE 80W-90																			
																		SAE 75W-90																			
Final drive - double reduction lock/unlock differential - GO	9 US gal 34 L	First 100 hr then 2000 hr	-	Hypold Gear Oil - API GL-5 MIL-L-2105C												○		SAE 85W-90																			
																		SAE 80W-90																			
																		SAE 75W-90																			
Drum brake/clutch fluid - MVBF	-	1 year	-	Motor Vehicle Brake Fluid												○		SAE J 1703, DOT 3, ISO 4925																			
Transmission - EO	14 US gal 53 L	1000 hr	First 100 hr then 500 hr	Premium Quality Engine Oil* API CD/CE qualified to Allison C-3 and TO-2 specifications												○		SAE 30																			
																		SAE 10W																			
																		SAE 5W-20																			
																		SAE 0W-30																			

○ Standard factory fill *See Cold Weather Operation NOTE: Service intervals are based on: 250 hours or 1 month, whichever comes first; 500 hours or 3 months, whichever comes first; 1000 hours or 6 months, whichever comes first; 2000 hours or 12 months, whichever comes first.

NLGI = National Lubricating Grease Institute
 API = American Petroleum Institute
 Consult your Champion Distributor for alternative lubricants
 Refer to engine manual for engine lubricants

Cold Weather Operation

Lubricant Requirements for Transmission and Hydraulic Systems

When operating in temperatures below -20° C (-4° F), you can use the recommended oils provided the following conditions are met:

- a) Before start up, the oil is preheated to a temperature above the minimum value for the indicated oil and viscosity range.
- b) The operating temperature stays above the minimum value in the applicable range.

Failure to comply with these requirements may result in a malfunction or reduced life of the transmission or hydraulic components.

Cold Weather Start Up Procedure

If oil in the hydraulic circuit is cold, hydraulic functions may move slowly. Do not attempt grader operations until the hydraulic oil is warmed up. If you do not follow the proper warm up procedure, hydraulic pump damage may result.

1. Run the engine at approximately 1000 rpm for five minutes. Do not put load on the hydraulic system.
2. Cycle all hydraulic cylinders through their working range several times until the hydraulic functions operate normally.
3. The grader is now ready to operate under load.



CIRCULATE TO:
PARTS MANAGER _____
SALES MANAGER _____
RETURN TO:
SERVICE MANAGER _____

10 August 1992

PRODUCT SUPPORT BULLETIN NO. 583

SUBJECT: New Clutch Master Cylinder Fluid

Champion Motor Graders no longer use DOT Brake Fluid in the clutch disengaging circuit beginning with S/N 22543 except for grader S/N 22548. The revised circuit uses **mineral based fluid** in the clutch master cylinder to disengage the clutch. Mineral based fluid is now used in the clutch master cylinder as well as the service brakes master cylinder.

Along with the fluid change, the following improvements will help you identify the new system:

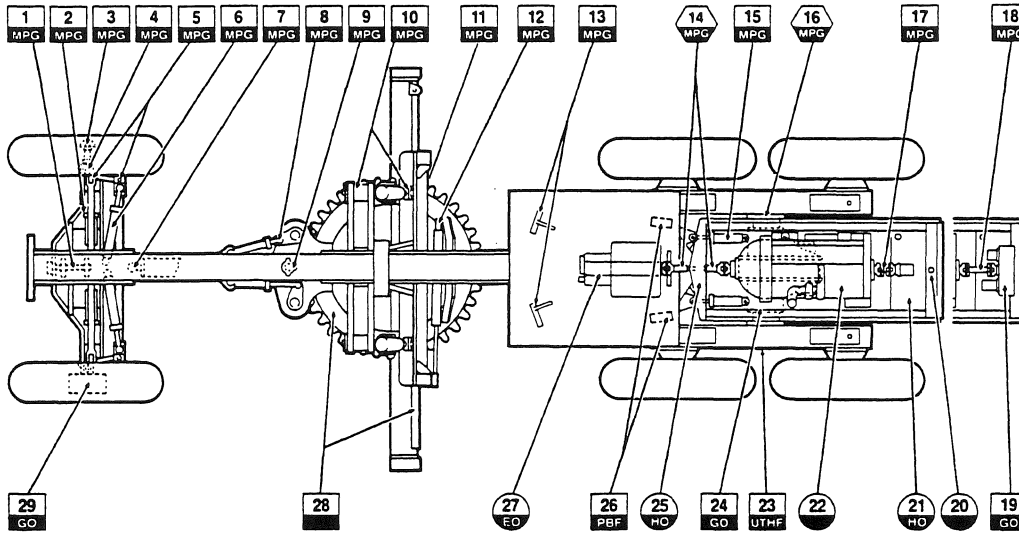
1. The clutch pedal effort is reduced by 50%.
2. The clutch pedal height reduced by 5cm (2.0"). This permits pressing the clutch pedal with the operators heel remaining on the cab floor.
3. The new slave cylinder has larger greaseable rod eyes, stronger rod guide, spring loaded lip seals and rubber bellows to keep contamination out.

When a positive identification of the mineral based fluid clutch master cylinder is made, use only a MINERAL based oil to replenish the reservoir. DO NOT USE DOT 3 BRAKE FLUID. In areas where temperatures never fall below -18°C or 0°F, use 10W hydraulic fluid. In areas where temperatures below -18°C are experienced, Champion specifies the following fluids for use in the clutch master cylinder:

- Champion P/N 58440 apply fluid
- Esso Univs N Arctic
- Shell Tellus T15
- Aero Shell Fluid 4

A copy of the lubrication chart reflecting the new clutch master cylinder fluid is printed on the back of this bulletin.

LUBRICATION CHART



MPG - Multi Purpose Grease **PBF** - Petroleum Base Fluid Check Daily
GO - Gear Oil **UTHF** - Universal Tractor Hydraulic Fluid Check Weekly
HO - Hydraulic Oil **EO** - Engine Oil Check Monthly

Champion recommends increasing the greasing frequency in extremely dusty or wet conditions, or if dry joints are apparent.

GREASE POINTS - MPG

1. Pivot Pin - Two fittings, weekly
2. Leaning Wheel Cylinder - Two fittings each side, weekly
3. Wheel Bearings - One fitting each side with EP2 grade only, weekly
4. Knuckle Pivot Pin and King Pin - Four fittings each side, weekly
5. Drag Link/Pivot Block/Tie Bar - Standard - Five fittings, weekly
Heavy Duty - Nine fittings, weekly
6. Steering Cylinder - Two fittings each side, weekly
7. Drawbar Ball Stud - One fitting, weekly
8. Circle Turn Cylinder and Crank - Three fittings each side, weekly
9. Circle Turn Valve - One fitting, weekly
10. Blade Lift System - Fixed Point - Two fittings each side, weekly
Moveable Point - Nine fittings, weekly
11. Blade Tilt Cylinder/Tilt Quadrant - Standard - Two fittings each side, weekly
Heavy Duty - Three fittings each side, weekly
12. Circle Shift Cylinder - One fitting each end, weekly
13. Brake and Clutch Pedal Shafts - One fitting each shaft, weekly

14. Upper and Lower Drive Shafts - Three fittings each shaft, monthly
15. Articulation Cylinder - Two fittings each side, weekly
16. Tandem Sleeve Thrust Plate - One fitting each side, monthly
17. Hydraulic Pump Drive Shaft - Two fittings, weekly
18. A.W.D. Pump Drive Shaft - Three fittings, weekly

FLUID LEVELS & LUBRICANTS

19. A.W.D. Pump Drive Gearbox - GO - check level weekly
20. Coolant - See appropriate Engine Operation and Maintenance Manual - check level daily
21. Hydraulic Oil Reservoir - HO - check level daily
22. Engine - See appropriate Engine Operation and Maintenance Manual - check level daily
23. Tandems - UTHF - Suitable for wet disc brake applications - check level weekly
24. Final Drives - GO - check level weekly

25. A.W.D. Hydraulic Reservoir - HO - check level daily

26. Oil Disc Brake & Clutch Reservoir - PBF - check level weekly

WARNING

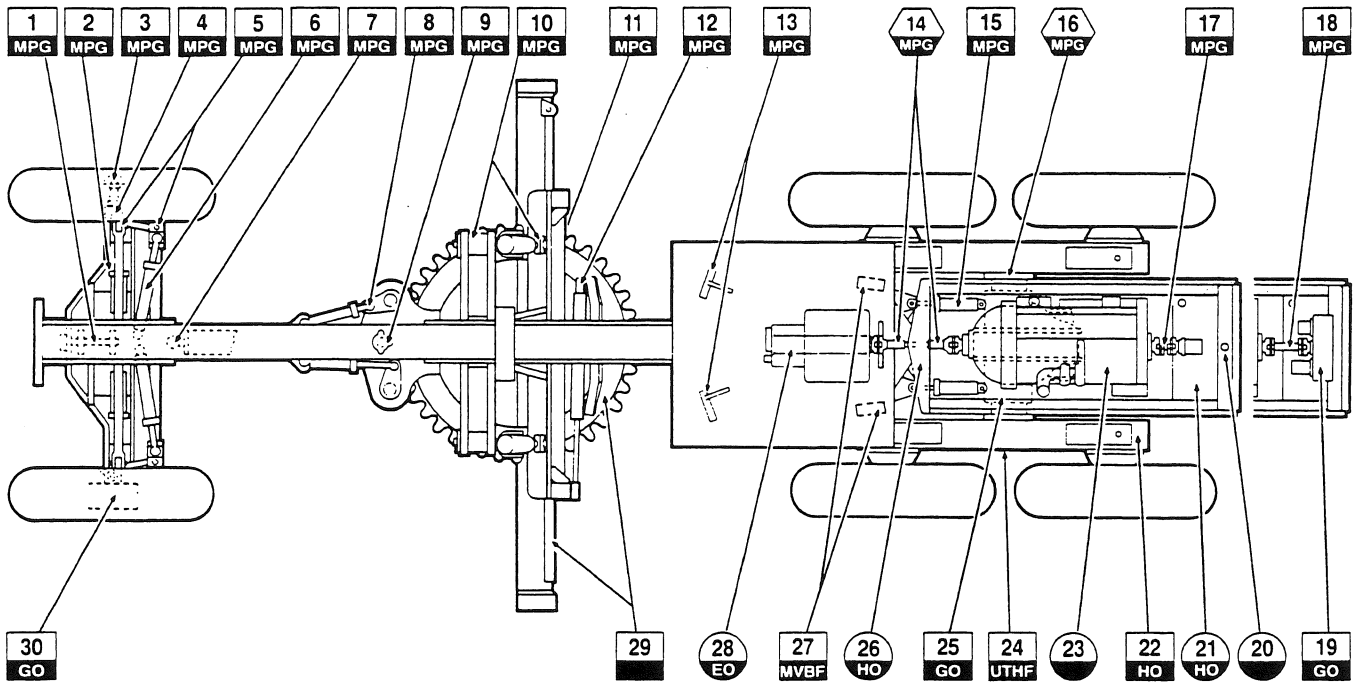
INCORRECT FLUID WILL CAUSE BRAKE FAILURE. SEVERE PERSONAL INJURY OR DEATH COULD RESULT




27. Transmission - EO - check level daily - warm oil at idle and transmission in neutral
28. Circle Top; Clamp and Guide Bearing Surfaces; Moldboard Upper and Lower Slide Rails - Every week or more often as required, wash with diesel fuel - lubricate with:
 - 1) Diesel fuel, or
 - 2) A light coating of Champion graphite spray, P/N 300CL moistened with diesel fuel, or
 - 3) A light coating of MPG. Keep these bearing surfaces clean.
29. A.W.D. Planetary Hub - GO - check level weekly

Refer to 700 SERIES GRADER Operator's Manual for detailed information

		LUBRICANT SPECIFICATIONS												
		AIR TEMPERATURE RANGE DURING FILL PERIOD		°C	-40	-30	-20	-10	0	10	20	30	40	50
				°F	-40	-22	-4	14	32	50	68	86	104	122
HO - Hydraulic Oil		SAE 10W ISO Grade 32												
		Dexron II ATF												
UTHF - Universal Tractor Hydraulic Fluid Suitable for wet disc brake applications		SAE 10W ISO Grade 32												
		SAE 20W ISO Grade 51												
GO - Hypoid Gear Oil API GL-5 MIL-L-2105C		SAE 85W 140												
		SAE 90W 90												
		SAE 75W 90												
MPG - Multi Purpose Grease, Extreme Pressure, Lithium Soap Base		NLGI EP0 or EP1												
		NLGI EP2												
		NLGI EP2 FRONT WHEEL BEARINGS												
EO - Engine Oil - Transmission (for Engine refer to Cummins Engine Manual) Premium Quality Motor Oil - API CD/CE Qualified to Allison C3 and TO-2 Specifications		SAE 30												
		SAE 10W												
		SAE 5W 20												
		SAE CW 30												
PBF - Petroleum Base Fluid OIL DISC BRAKES & CLUTCH		Shell Aeroshell Fluid 4			Shell Tellus T15			Esso Uniris N Arctic						

700 Series Lubrication Chart



MPG - Multi-Purpose Grease	MVBF - Motor Vehicle Brake Fluid	 Check Daily	 Check Monthly
GO - Gear Oil	UTHF - Universal Tractor Hydraulic Fluid	 Check Weekly	
HO - Hydraulic Oil	EO - Engine Oil		

Key to Lubrication Points

GREASE POINTS - MPG

1. **Pivot Pin** - Two fittings, weekly
2. **Leaning Wheel Cylinder** - Two fittings each side, weekly
3. **Wheel Bearings** - One fitting each side with EP2 grade only, weekly
4. **Knuckle Pivot Pin and King Pin** - Four fittings each side, weekly
5. **Drag Link/Pivot Block/Tie Bar** - Standard - Five fittings, weekly
Heavy Duty - Nine fittings, weekly
6. **Steering Cylinder** - Two fittings each side, weekly
7. **Drawbar Ball Stud** - One fitting, weekly
8. **Circle Turn Cylinder and Crank** - Three fittings each side, weekly
9. **Circle Turn Valve** - One fitting, weekly
10. **Blade Lift System - Fixed Point** - Two fittings each side, weekly
Moveable Point - Nine fittings, weekly
11. **Blade Tilt Cylinder/Tilt Quadrant or Manual Link** - Standard - Two fittings each side, weekly
Heavy Duty - Three fittings each side, weekly

12. **Circle Shift Cylinder** - One fitting each end, weekly
13. **Brake and Clutch Pedal Shafts** - One fitting each, weekly
14. **Upper and Lower Drive Shafts** - Three fittings each shaft, monthly
15. **Articulation Cylinder** - Two fittings each side, weekly
16. **Tandem Sleeve Thrust Plate** - One fitting each side, monthly
17. **Hydraulic Pump Drive Shaft** - Two fittings, weekly
18. **A.W.D. Pump Drive Shaft** - Three fittings, weekly

FLUID LEVELS & LUBRICANTS

19. **A.W.D. Pump Drive Gearbox** - GO - check level weekly
20. **Coolant** - See appropriate Engine Operation and Maintenance Manual - check level daily
21. **Hydraulic Oil Reservoir** - HO - check level daily
22. **Tandems** - HO - All models with drum brakes - check level weekly
23. **Engine** - See appropriate Engine Operation and Maintenance Manual - check level daily
24. **Tandems** - UTHF - All models with oil disc brakes (wet brakes) - check level weekly
25. **Final Drives** - GO - check level weekly
26. **A.W.D. Hydraulic Reservoir** - HO - check level daily
27. **Drum Brake and Clutch Reservoirs** - MVBF - check level weekly
28. **Transmission** - EO - check level daily - warm oil at idle and transmission in neutral
29. **Circle Top; Clamp and Guide Bearing Surfaces; Moldboard Upper and Lower Slide Rails** - Every week or more often as required, wash with diesel fuel - lubricate with:
 - 1) Diesel fuel, or
 - 2) A light coating of Champion graphite spray, P/N 300CL moistened with diesel fuel, or
 - 3) A light coating of MPG
 Keep these bearing surfaces clean.
30. **A.W.D. Planetary Hub** - GO - check level weekly

Champion recommends increasing the greasing frequency in extremely dusty or wet conditions; also if dry joints are apparent.

Special Tools

Champion recommends the use of the following special tools. Order from your Champion Distributor.

Assembly	Section Ref. No.	Tool P/N and Description
Front Axle	1	18516 - Socket wrench - wheel
		37116 - Installation drift - steering and leaning wheel cylinders and the tie bar bearings
		37117 - Installation drift - pivot block bearing cups
		37118 - Installation drift - radius arm bearing cones
Engine Clutches	7	5629 - Clutch Repair Pilot Shaft
		45567 - Rivet Tool - Long solid anvil
8400 Transmission	8	29858 - Bearing shim tool
		29859 - Deep-reach socket wrench
Lock/Unlock Differential Final Drive	10	18511 Outer bushing installation tools
		18512
		18512 Inner bushing installation tools
		18513
		43004 - Deep-reach socket wrench
		45006 - Shift rail oil seal installation tool
45007 - Drive axle and bearing assembly installation drift		
Standard Double Reduction Final Drive	11	18504 - Spiral pinion shaft bearing outer race removal tool
		18505 - Spiral pinion shaft bearing cone installation tool
		18507
		18508
		18509 Pinion cap bearing cup installation tools
		18510
		18511 Outer bushing installation tools
		18512
		18512 Inner bushing installation tools
		18513
		33174 - Bull gear bearing outer race installation tool
		43004 - Deep-reach socket wrench
		45261 - Spiral pinion shaft bearing race installation tool
		45294 - Spiral pinion shaft depth setting gauge
Standard Brakes and Tandems	12	377 - Brake adjusting wrench
		5726 - Rear wheel puller plate
		5727 - Rear wheel puller screw
Oil Disc Brakes and Tandems	13	5726 - Rear wheel puller plate
		5727 - Rear wheel puller screw