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# 700 Series

## SHOP MANUAL

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### 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



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# 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



	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
						<b>lbf.ft</b>
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
			<b>lbf.ft</b>			
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





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:

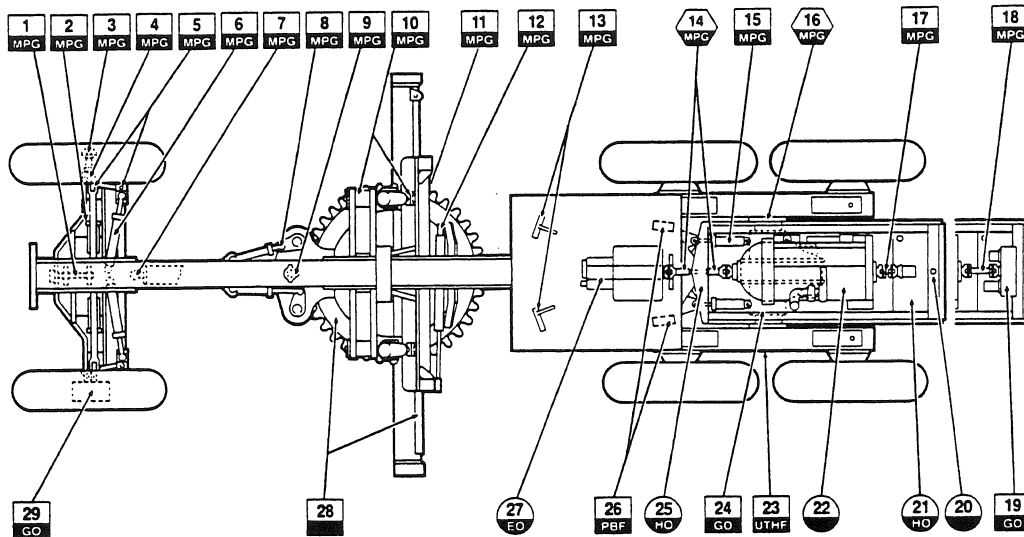
1. The clutch pedal effort is reduced by 50%.
2. The clutch pedal height reduced by 5cm (2.0"). This permits pressing the clutch pedal with the operators heel remaining on the cab floor.
3. The new slave cylinder has larger greaseable rod eyes, stronger rod guide, spring loaded lip seals and rubber bellows 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  $-18^{\circ}\text{C}$  or  $0^{\circ}\text{F}$ , use 10W hydraulic fluid. In areas where temperatures below  $-18^{\circ}\text{C}$  are experienced, Champion specifies the following fluids for use in the clutch master cylinder:

- Champion P/N 58440 apply fluid
- Esso Unis 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 Monthly  
**HO** - Hydraulic Oil                  **EO** - Engine Oil                       Check Weekly

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**

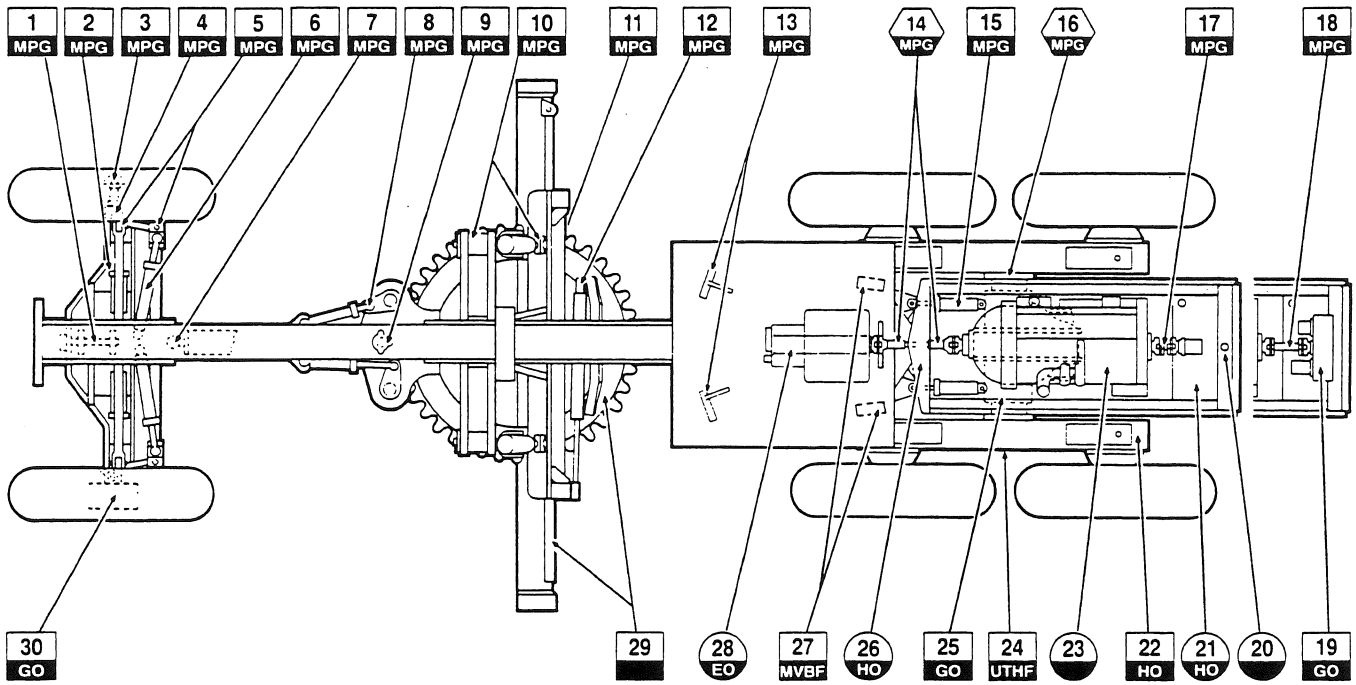
27. Transmission - EO - check level daily - warm oil at idle and transmission in neutral
28. Circle Top; Clamp and Guide Bearing Surfaces; Moldboard Upper and Lower Slide Rails Every week or more often as required, wash with diesel fuel - lubricate with:
  - 1) Diesel fuel, or
  - 2) A light coating 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		°C	-40	-30	-20	-10	0	10	20	30	40	50
AIR TEMPERATURE RANGE DURING FILL PERIOD		°F	-40	-22	-4	14	32	50	68	86	104	122
HO - Hydraulic Oil	SAE 10W ISO Grade 32	[Bar chart showing suitability from -40°C to 50°C]										
	Dexron II ATF	[Bar chart showing suitability from -20°C to 50°C]										
UTHF - Universal Tractor Hydraulic Fluid Suitable for wet disc brake applications	SAE 10W ISO Grade 32	[Bar chart showing suitability from -40°C to 20°C]										
	SAE 20W ISO Grade 51	[Bar chart showing suitability from -20°C to 20°C]										
GO - Hypoid Gear Oil API GL-5 MIL-L-2105C	SAE 65W 140	[Bar chart showing suitability from -20°C to 50°C]										
	SAE 60W 90	[Bar chart showing suitability from -20°C to 50°C]										
	SAE 75W 90	[Bar chart showing suitability from -20°C to 50°C]										
MPG - Multi Purpose Grease, Extreme Pressure, Lithium Soap Base	NLGI EP0 or EP1	[Bar chart showing suitability from -40°C to 50°C]										
	NLGI EP2	[Bar chart showing suitability from -20°C to 50°C]										
	NLGI EP2 FRONT WHEEL BEARINGS	[Bar chart showing suitability from -20°C to 50°C]										
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	[Bar chart showing suitability from -20°C to 50°C]										
	SAE 10W	[Bar chart showing suitability from -20°C to 50°C]										
	SAE 5W 20	[Bar chart showing suitability from -20°C to 50°C]										
	SAE 0W 30	[Bar chart showing suitability from -20°C to 50°C]										
PBF - Petroleum Base Fluid OIL DISC BRAKES & CLUTCH	Shell Aeroshell Fluid 4	[Bar chart showing suitability from -40°C to 50°C]										
	Shell Tellus T15      Esso Univas N Arctic	[Bar chart showing suitability from -40°C to 50°C]										



# 700 Series Lubrication Chart



<b>MPG</b> - Multi-Purpose Grease	<b>MVBF</b> - Motor Vehicle Brake Fluid	 Check Daily	 Check Monthly
<b>GO</b> - Gear Oil	<b>UTHF</b> - Universal Tractor Hydraulic Fluid	 Check Weekly	
<b>HO</b> - Hydraulic Oil	<b>EO</b> - 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 - Outer bushing installation tools
		18512 - Inner bushing installation tools
		18513 - Inner bushing installation tools
		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 - Outer bushing installation tools
		18512 - Inner bushing installation tools
		18513 - Inner bushing installation tools
		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