AL 106
AL206
AL306
Articulated Loader

SERVICE MANUAL

PART #918360

Revision B - 12/11

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CHAPTER 1 — SAFETY

This manual and decals on the machine warn of safety hazards and should be read and observed closely.

Before operating the machine, first read and study the safety information in this manual, and the safety information in the Operator's Manual. Additionally, anyone who operates or works on the machine must be familiar with these safety precautions.



This safety alert symbol means ATTENTION! ALWAYS BE ALERT! YOUR SAFETY IS INVOLVED! This symbol is used throughout this manual and on the decals on the machine.

DANGER

"DANGER" indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

"WARNING" indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

"CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. It is also used to alert users of unsafe practices.

It is essential that operators are thoroughly trained in the safe operation of the machine and handling loads. Operators must not be physically or mentally impaired. Do not allow minors or unqualified personnel to operate the machine, or to be near the machine unless they are properly supervised. It is recommended that the operator be capable of obtaining a valid motor vehicle operator's license.

Use of this machine is subject to certain hazards that cannot be eliminated by mechanical means, but only by exercising intelligence, care and common sense. Such hazards include: hillside operation, overloading, load instability, poor maintenance, and using the machine for a purpose for which it was not intended or designed.

Manitou Americas always takes operator's safety into consideration during the design process. Guards and shields are provided, which protect the operator and bystanders from moving parts and other hazards. Operators must be alert, however, because some areas cannot be guarded or shielded without preventing or interfering with proper operation.

WARNING

The machine must be equipped with a Falling-Object Protective Structure (FOPS) when the machine is intended for applications where there is a risk of falling objects.

Different applications may require optional safety equipment. Be sure you know the work site hazards and equip the machine and the operator as necessary. The information in this manual does not replace any applicable safety rules and laws. Before operating the machine, learn the rules and laws for your area. Make sure the machine is equipped as required according to these rules/laws.

Some photographs in this manual may show doors, guards and shields open or removed for the purposes of illustration only. Be sure that all doors, guards and shields are in the proper operating positions before starting the engine to operate the machine.

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CHAPTER 2 — SPECIFICATIONS

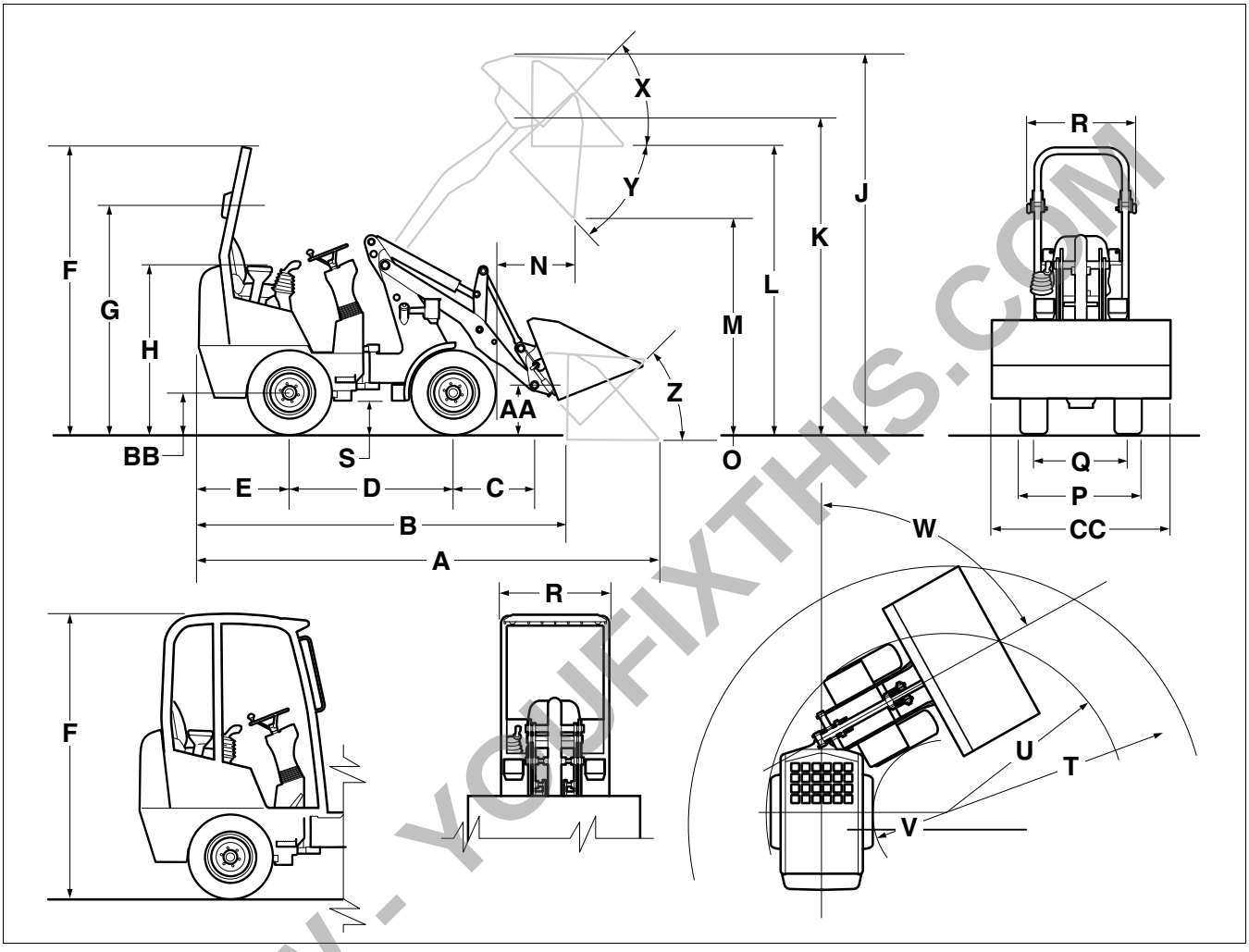
Fluid Capacities/Lubricants

Application	AL 100 Series	AL 200 Series	AL 300 Series
Diesel Engine Oil			
Specification	API CD or Higher (United States) ACEA E-3, E-4, E-5 (European Union)		
Season/Temp. Range	SAE 10W-30: -20°C (-4°F) to 30°C (86°F) SAE 15W-40: -15°C (5°F) to 40°C (104°F) SAE 20W-50: -10°C (14°F) to 50°C (122°F)		
Capacity	4.4 L (4.6 qts.)	6.7 L (7.2 qts.)	7.4 L (7.8 qts.)
Axle Oil	75W90 gear oil or UTTO Fluid (Mobil 424 or equivalent)		UTTO Fluid (Mobil 424 or equivalent
Hubs (each)			0.4 L (0.4 qt.)
Front Center	3.78 L (4 qt.)		2.5 L (2.6 qt.)
Rear Center			3.2 L (3.4 qt.)
Grease			
Specification	KF2K-25 Lithium		
Season/Temp. Range	Year-Round		
Capacity	As Required		
Engine Coolant System/Radiator			
Specification	Long-life coolant ASTM D4985, D6210 (United States) SAE J814D, J1941, J1034 or J2036 (International)		
Season/Temp. Range	Year-Round		
Capacity	5.3 L (5.6 qts.)		
Windshield Washer			
Specification	Windshield Washer Fluid		
Season/Temp. Range	Year-Round		
Capacity	N/A		1.3 L (1.4 qts.)
Brake Fluid	N/A		Automatic Transmis-sion Fluid

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Dimensions - AL 100 Series



Ref.	Description	Millimeters (Inches) unless otherwise noted	
		2-Post ROPS	4-Post ROPS
A	Length with Bucket on Ground	3419 (134.6)	
B	Shipping Length (without bucket)	2741 (107.9)	
C	Front Wheel Center to Pivot Pin	489 (19.3)	
D	Wheelbase	1348 (53.1)	
E	Rear Overhang	738 (29.1)	
F	Height to Top of ROPS/Cab	2340 (92.1)	2190 (86.2)
G	Folded 2-Post ROPS Height	1863 (73.3)	—
H	Hood Height	1359 (53.5)	
J	Maximum Reach Height	3277 (129.0)	
K	Bucket Hinge Pin Height	2705 (106.5)	
L	Ground Plant to Bucket Edge Height	2504 (98.6)	
M	Dump Clearance at Full Height	1969 (77.5)	
Ref.	Description	Millimeters (Inches) unless otherwise noted	
		2-Post ROPS	4-Post ROPS

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SAE (Domestic) Weights and Capacities
AL 100 and AL 300 Series

Description	kg (lbs.)[a]				
	AL 100 Series		AL 300 Series		
	2-Post ROPS	4-Post ROPS	2-Post ROPS	4-Post ROPS	Cab
Operating Weight	1744 (3845)	1774 (3910)	2472 (5450)	2520 (5555)	2649 (5840)
Shipping Weight	1651 (3640	1681 (3705)	2358 (5199)	2406 (5304)	2535 (5589)
Rated Operating Capacity	435 (960)	435 (960)	798 (1760)	834 (1840)	857 (1890)
Static Tipping Loads					
Standard Bucket - Straight[b]	873 (1924)	975 (1929)	1597 (3521)	1670 (3681)	1721 (3794)
SAE J732 Standard Bucket - Turn (Domestic)[b]	692 (1526)	702 (1547)	1244 (2743)	1280 (2821)	1319 (2907)
Standard Pallet Forks- Straight[c]	629 (1386)	643 (1417)	1098 (2420)	1169 (2578)	2147 (2750)
SAE J1197 Standard Pallet Forks - Turn (Domestic)[c]	497 (1096)	508.5 (1121)	857 (1889)	909 (2005)	977 (2155)

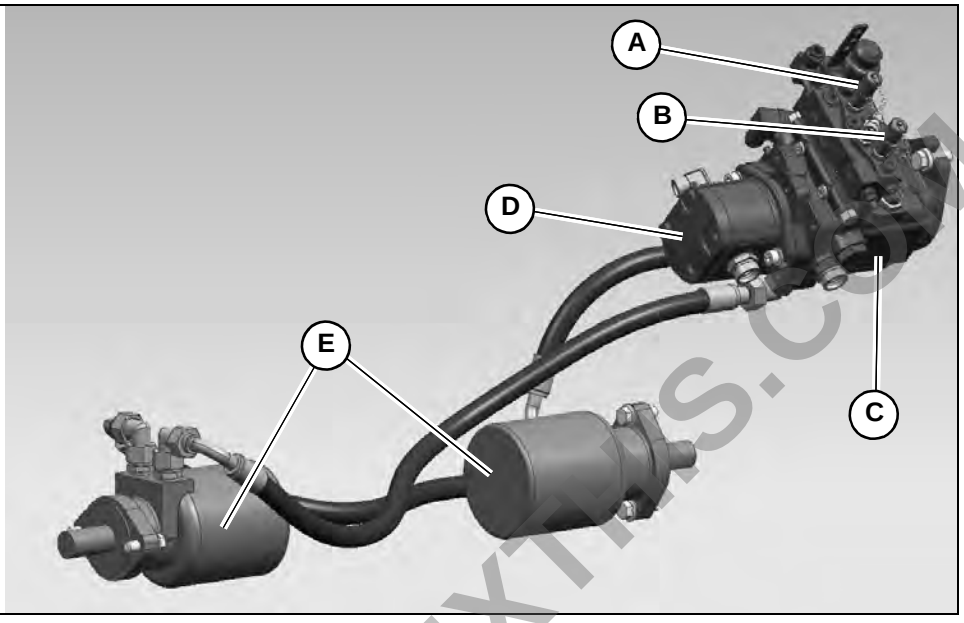
a. Measured on firm and level ground. Equipped with full fluids and 75 kg (165 lbs.) operator.
AL 100 Series equipped w/ 27x10.50-15 tires.
AL 300 Series equipped w/ 30.5X12.5-16.5 tires.
b. AL 100 Series equipped w/ 1116 mm (44”) dirt/construction bucket.
AL 300 Series equipped w/ 1372 mm (54”) dirt/construction bucket.
c. Equipped w/ pallet forks with 1067 mm (42”) tines and 533 mm (21”) load center.

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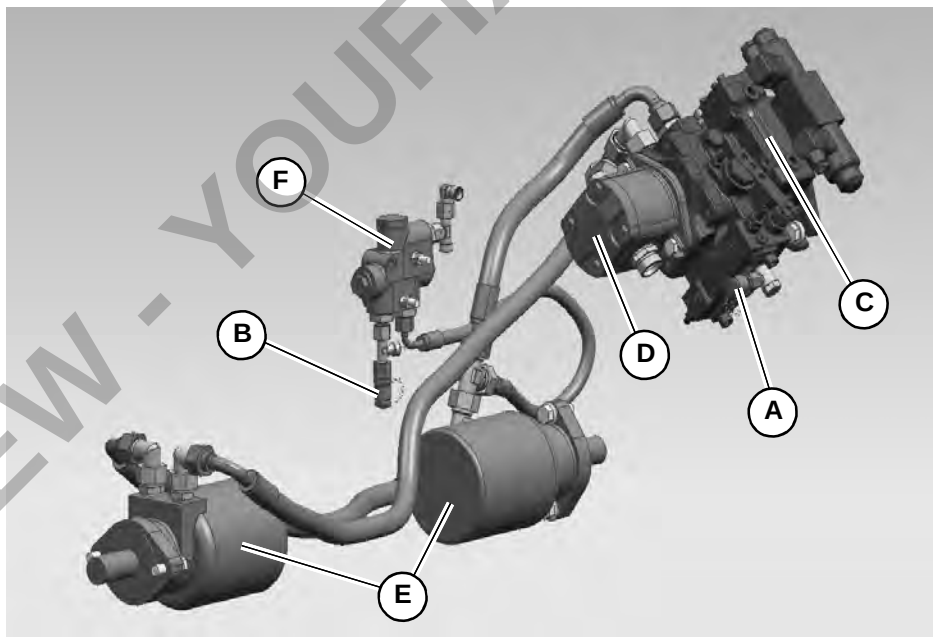
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Drive System Components -- AL100 Series

AL100 Series (SN 11257 and Up)



AL100 Series (SN 11256 and Before)

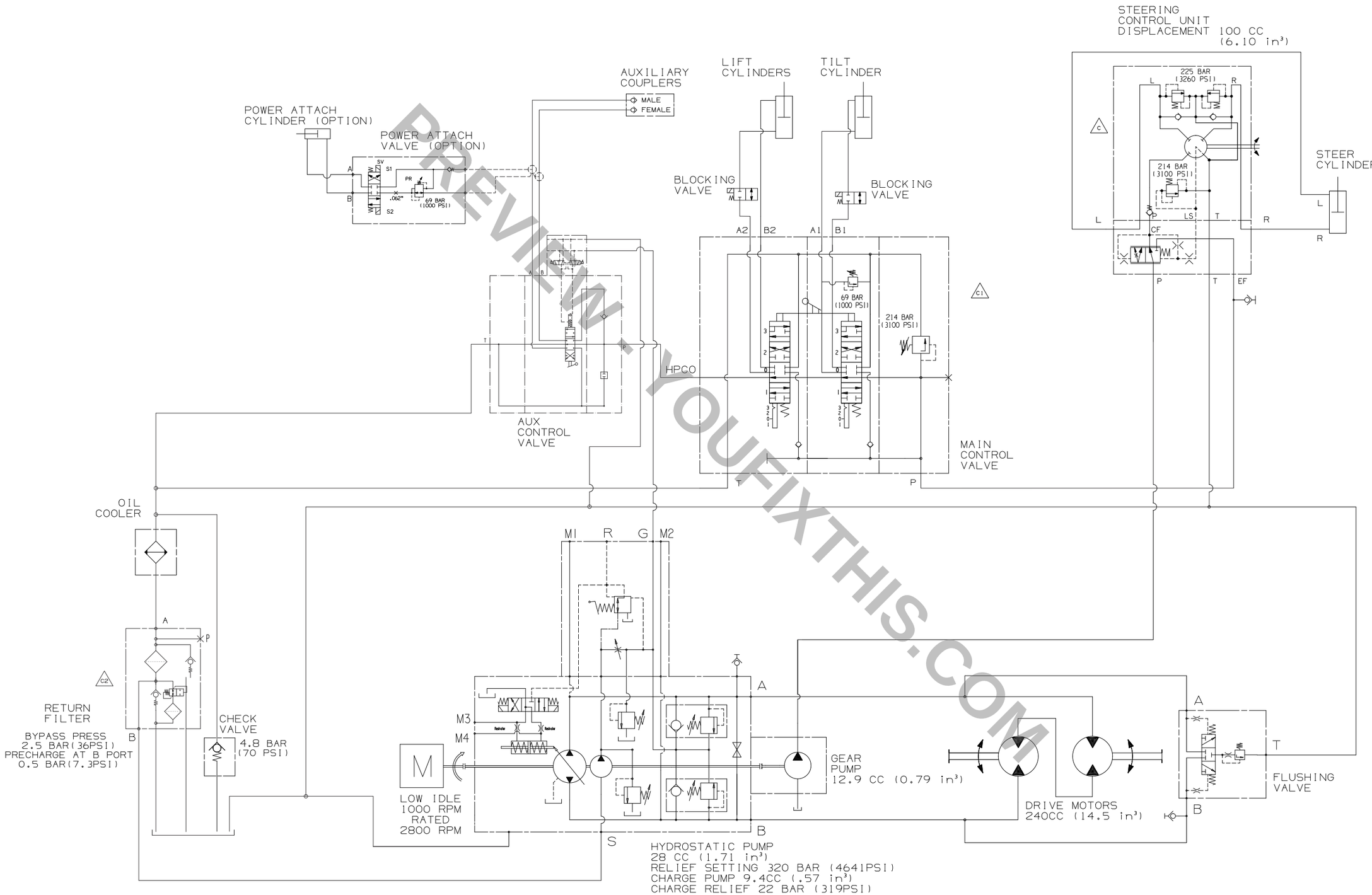


A	"A" Port Test Fitting
B	"B" Port Test Fitting
C	Drive/Piston Pump
D	Work/Gear Pump
E	Drive Motor
F	Flushing Valve

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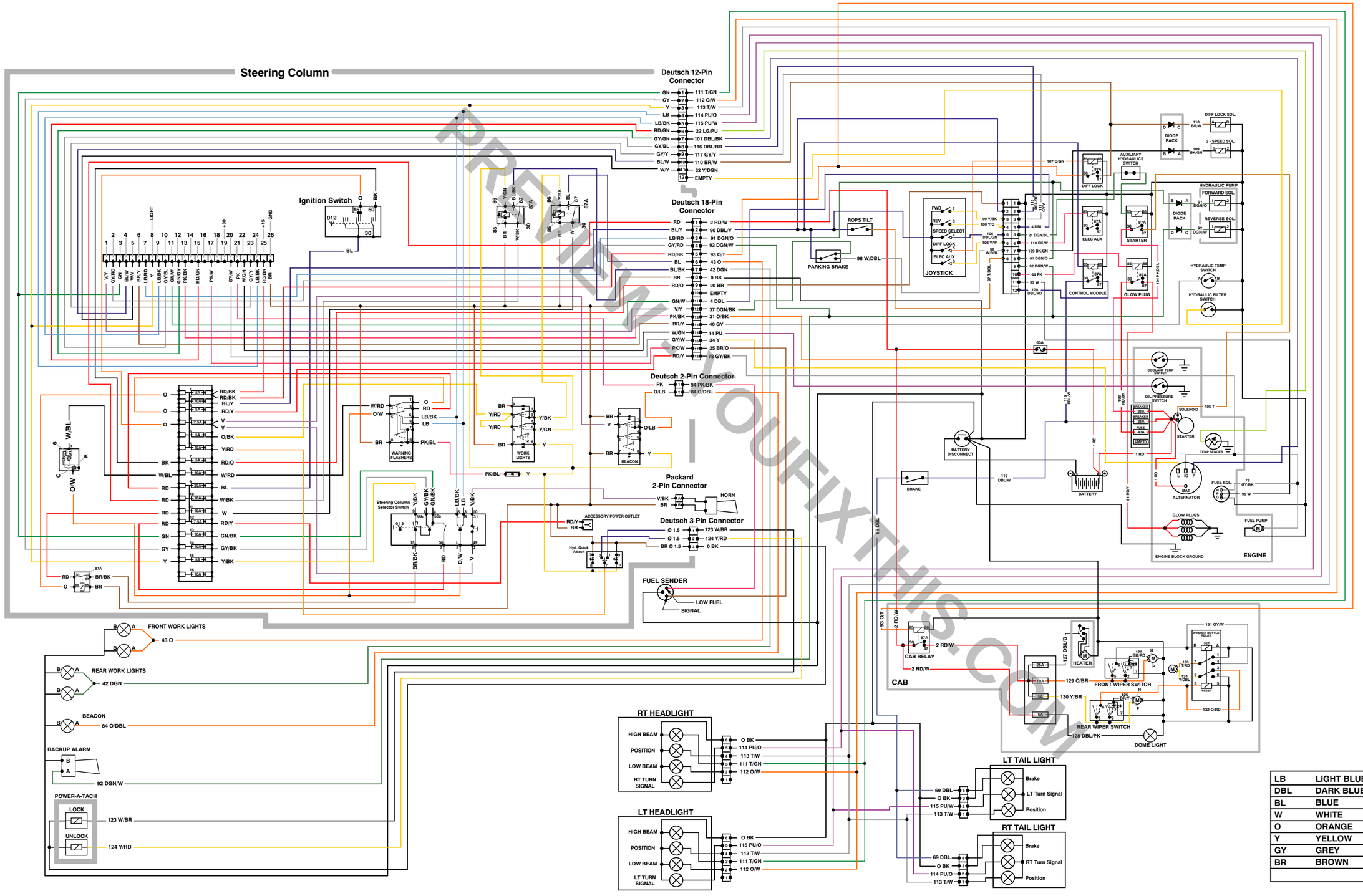
AL100 Series Hydraulic Schematic – SN 11257 and Up



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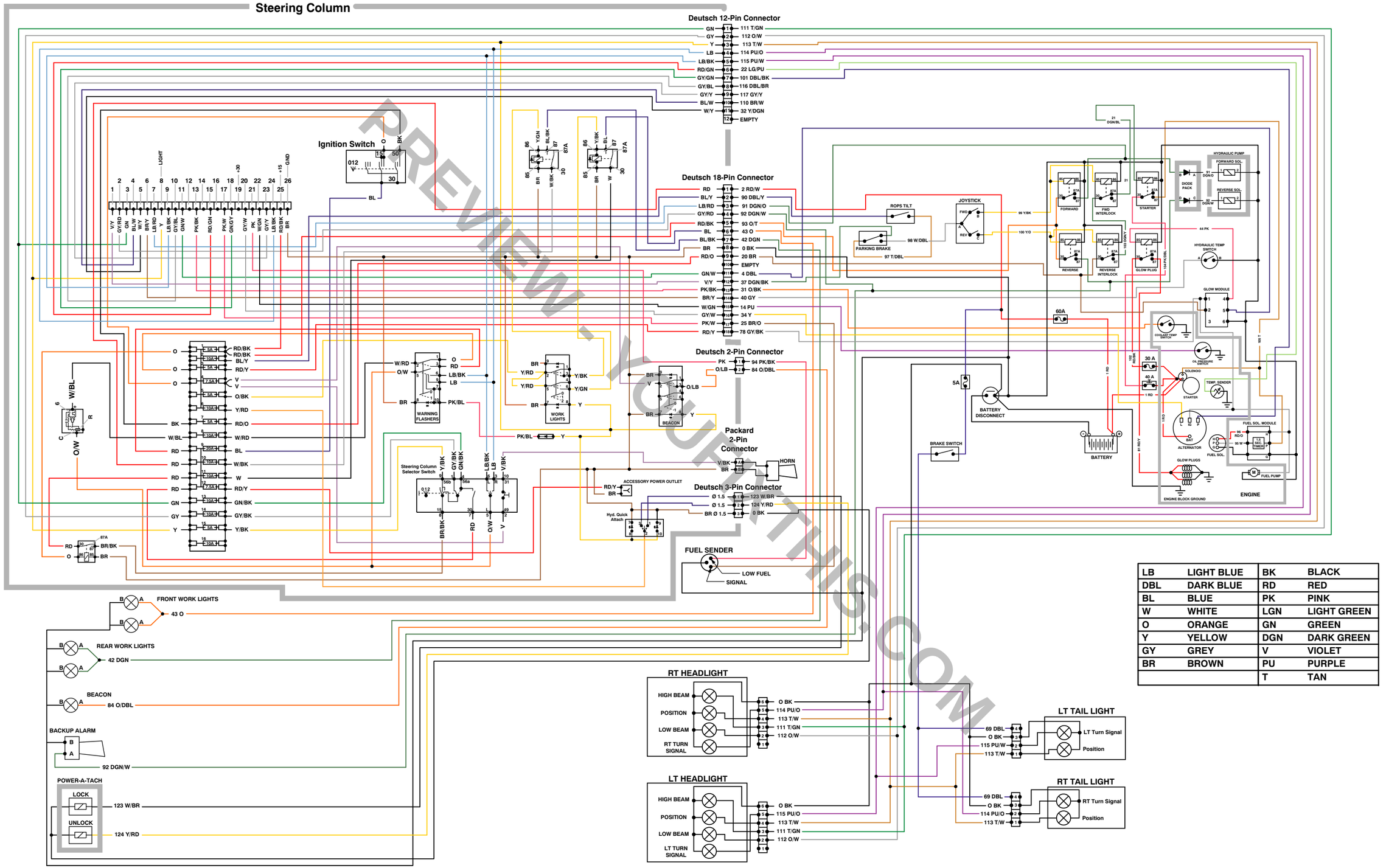
AL300 Series Complete Electrical Schematic (SN 30309 and Before)



LB	LIGHT BLUE	BK	BLACK
DBL	DARK BLUE	RD	RED
BL	BLUE	PK	PINK
W	WHITE	LGN	LIGHT GREEN
O	ORANGE	GN	GREEN
Y	YELLOW	DGN	DARK GREEN
GY	GREY	V	VIOLET
BR	BROWN	PU	PURPLE
		T	TAN

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AL100 and 200 Series Complete Electrical Schematic – With Road Homologation (AL100 Series - SN 10254 and Before; 200 Series - SN 20234 and Before)



LB	LIGHT BLUE	BK	BLACK
DBL	DARK BLUE	RD	RED
BL	BLUE	PK	PINK
W	WHITE	LGN	LIGHT GREEN
O	ORANGE	GN	GREEN
Y	YELLOW	DGN	DARK GREEN
GY	GREY	V	VIOLET
BR	BROWN	PU	PURPLE
		T	TAN

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TORQUE SPECIFICATIONS

Note: Use these torque values when tightening hardware (excluding: locknuts and self-tapping, thread forming and sheet metal screws) unless specified otherwise.

Hydraulic fittings with various seals (light application). All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	**Straight pipe fitting with thread and screwed plug (GE)**			**Non-return valve with elastic seal**	**Identification aid outside Ø**
	Sealing washer	**Elastic seal**	**O-ring**		
M10X1.0	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (10 mm)
M12X1.5	15 (20)	18 (25)	18 (25)	18 (25)	0.5 in. (12 mm)
M14X1.5	26 (35)	33 (45)	26 (35)	26 (35)	0.6 in. (14 mm)
M16X1.5	33 (45)	41 (55)	30 (40)	37 (50)	0.6 in. (16 mm)
M18X1.5	41 (55)	52 (70)	33 (45)	52 (70)	0.7 in. (18 mm)
M22X1.5	48 (65)	92 (125)	44 (60)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	74 (100)	107 (145)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	118 (160)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (48 mm)
G1/8A	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (9.73 mm)
G1/4A	26 (35)	26 (35)	22 (30)	26 (35)	0.5 in. (13.16 mm)
G3/8A	33 (45)	52 (70)	33 (45)	37 (50)	0.7 in. (16.66 mm)
G1/2A	48 (65)	66 (90)	41 (55)	48 (65)	0.8 in. (20.96 mm)
G3/4A	66 (90)	133 (180)	74 (100)	103 (140)	1.0 in. (26.44 mm)
G1A	111 (150)	229 (310)	118 (160)	140 (190)	1.3 in. (33.25 mm)
G1 1/4A	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (41.91 mm)
G1 1/2A	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (47.80 mm)

Hydraulic fittings with various seals (heavy application). All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	**Straight pipe fitting with thread and screwed plug (GE)**			**Non-return valve with elastic seal**	**Identification aid outside Ø**
	Sealing washer	**Elastic seal**	**O-ring**		
M12X1.5	15 (20)	26 (35)	26 (35)	26 (35)	0.5 in. (12 mm)
M14X1.5	26 (35)	41 (55)	33 (45)	33 (45)	0.6 in. (14 mm)
M16X1.5	33 (45)	52 (70)	41 (55)	41 (55)	0.6 in. (16 mm)
M18X1.5	41 (55)	66 (90)	52 (70)	52 (70)	0.7 in. (18 mm)
M20X1.5	41 (55)	92 (125)	59 (80)	74 (100)	0.8 in. (20 mm)
M22X1.5	48 (65)	100 (135)	74 (100)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	125 (170)	100 (135)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	229 (310)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (48 mm)
G1/8A	26 (35)	41 (55)	33 (45)	33 (45)	0.5 in. (13.16 mm)
G1/4A	33 (45)	59 (80)	44 (60)	44 (60)	0.7 in. (16.66 mm)
G3/8A	48 (65)	85 (115)	55 (75)	74 (100)	0.8 in. (20.96 mm)
G1/2A	66 (90)	133 (180)	125 (170)	107 (145)	1.0 in. (26.44 mm)
G3/4A	111 (150)	229 (310)	229 (310)	192 (260)	1.3 in. (33.25 mm)
G1A	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (41.91 mm)
G1 1/4A	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (47.80 mm)

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Standard Steering Column

AL100 and 200 Series only.

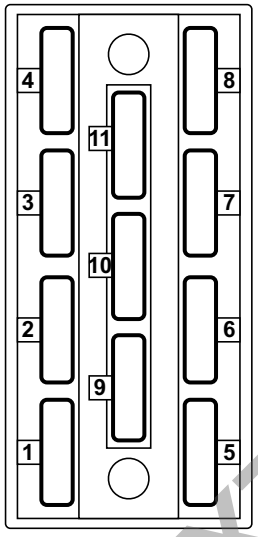


Figure 31 – Fuse Panel, Standard Steering Column

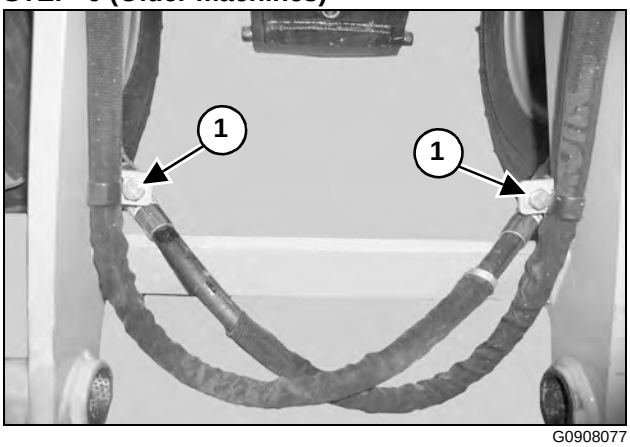
Fuse No.	Rated Current (Amp)	Protected Circuit
1	5	Instrument panel, forward and reverse relays
2	5	Joystick
3	5	Fuel pump, glow module, fuel solenoid hold
4	7.5	Horn, beacon
5	5	Steering column switch lights
6	10	Power-A-Tach® System
7	5	Starter relay
8	20	Ignition switch
9	10	Rear work light
10	10	Front work light
11	7.5	12V accessory power outlet

Figure 32

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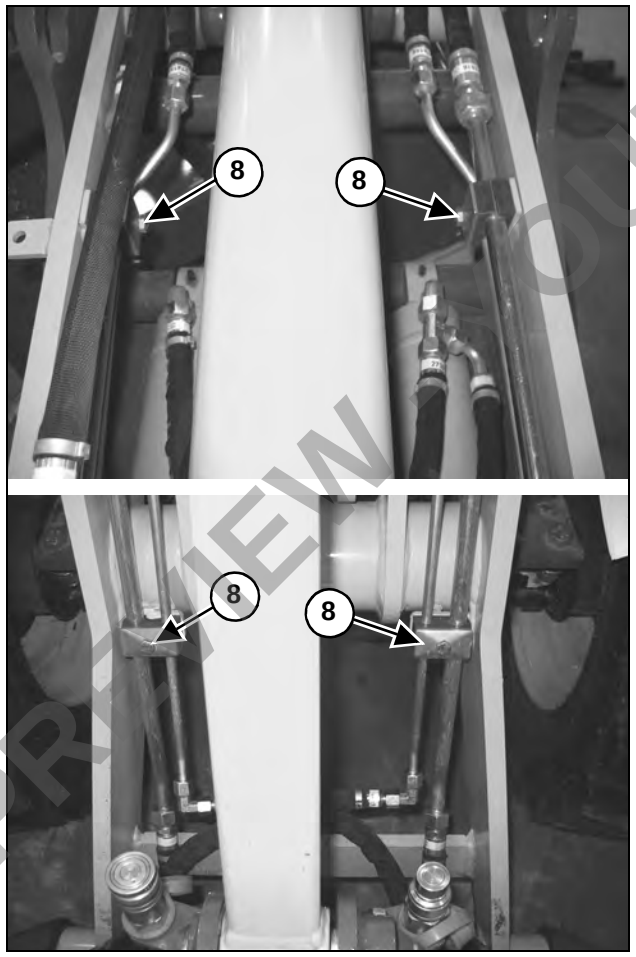
STEP 9 (Older machines)



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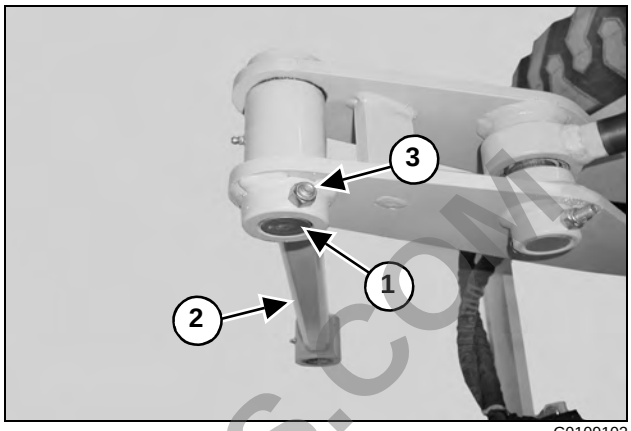
Install the two lower P-clamps, mounting bolts and nuts (1) on the lift arm linkage as shown.

(Newer machines AL300 Series machine shown, others similar)



Secure the hydraulic tubes to the lift arm using hardware and clamps (8).

STEP 10



G0109103

Align the stabilizer arm (1) with the lift arm linkage. Install the stabilizer arm pin (2). Install the retaining bolt and nut (3) and tighten to 33 lb-ft. (45 N•m).

STEP 11

Install the attachment plate according to "Attachment Plate Installation" on page 100.

STEP 12

Start the machine and bleed air out of the tilt cylinder by cycling the cylinder through full extension and retraction three times.

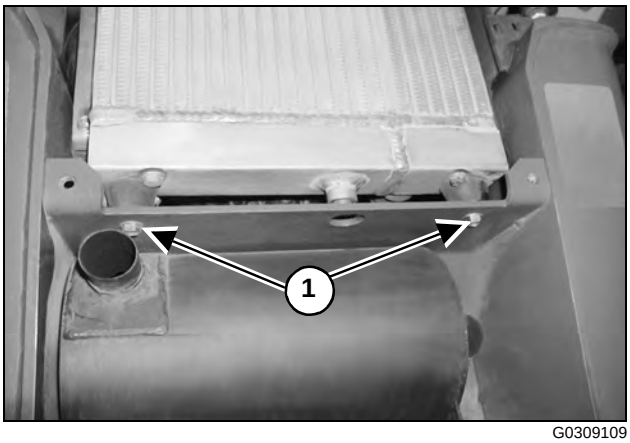
STEP 13

Check the hydraulic fluid level and fill as required. Refer to "Fluid Capacities/Lubricants" on page 11 for hydraulic fluid specifications.

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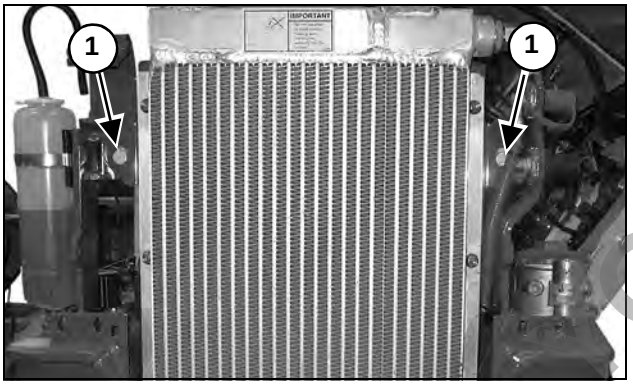
STEP 3



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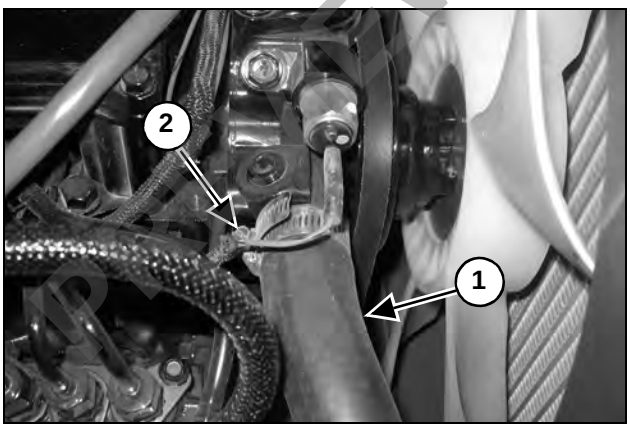
Tighten the two lower radiator / oil cooler mounting bolts (1) to 18 lb.-ft. (25 N•m).

STEP 4



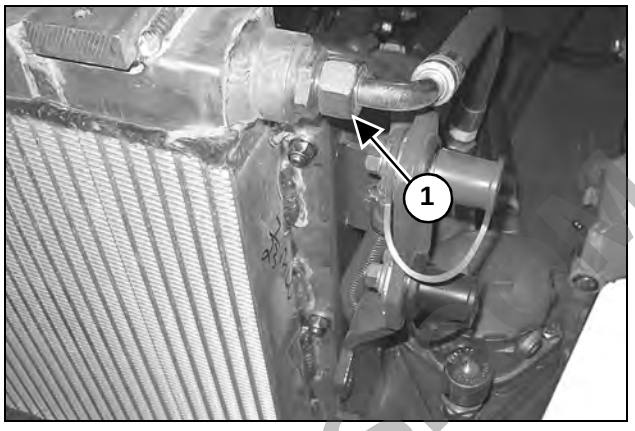
Install and tighten the two upper radiator/oil cooler mounting bolts (1) to 33 lb.-ft. (45 N•m).

STEP 5



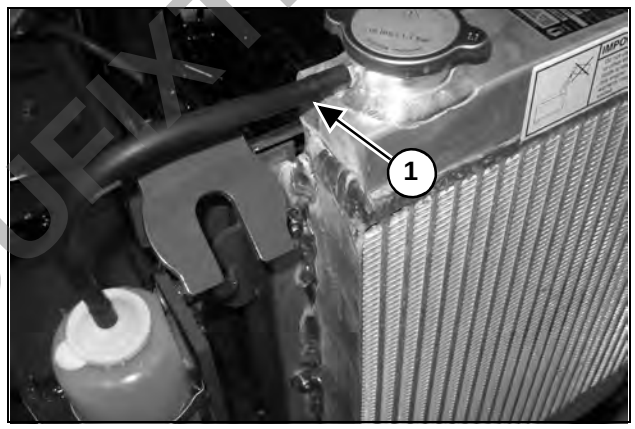
Install the lower radiator hose (1) on the engine. Tighten the hose clamp (2).

STEP 6



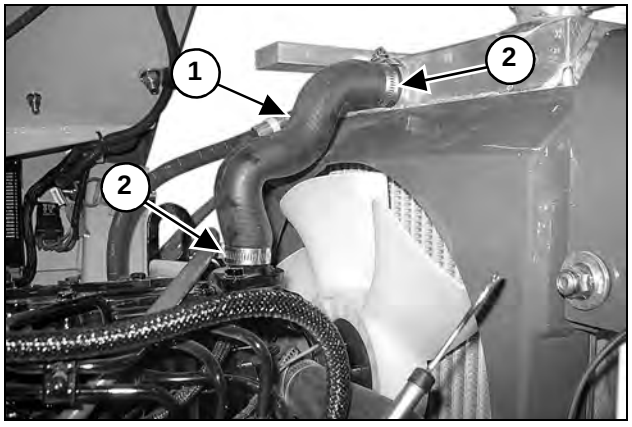
Remove the cap and plug. Install and tighten the upper hydraulic hose (1).

STEP 7



Install the overflow hose (1) on the radiator.

STEP 8

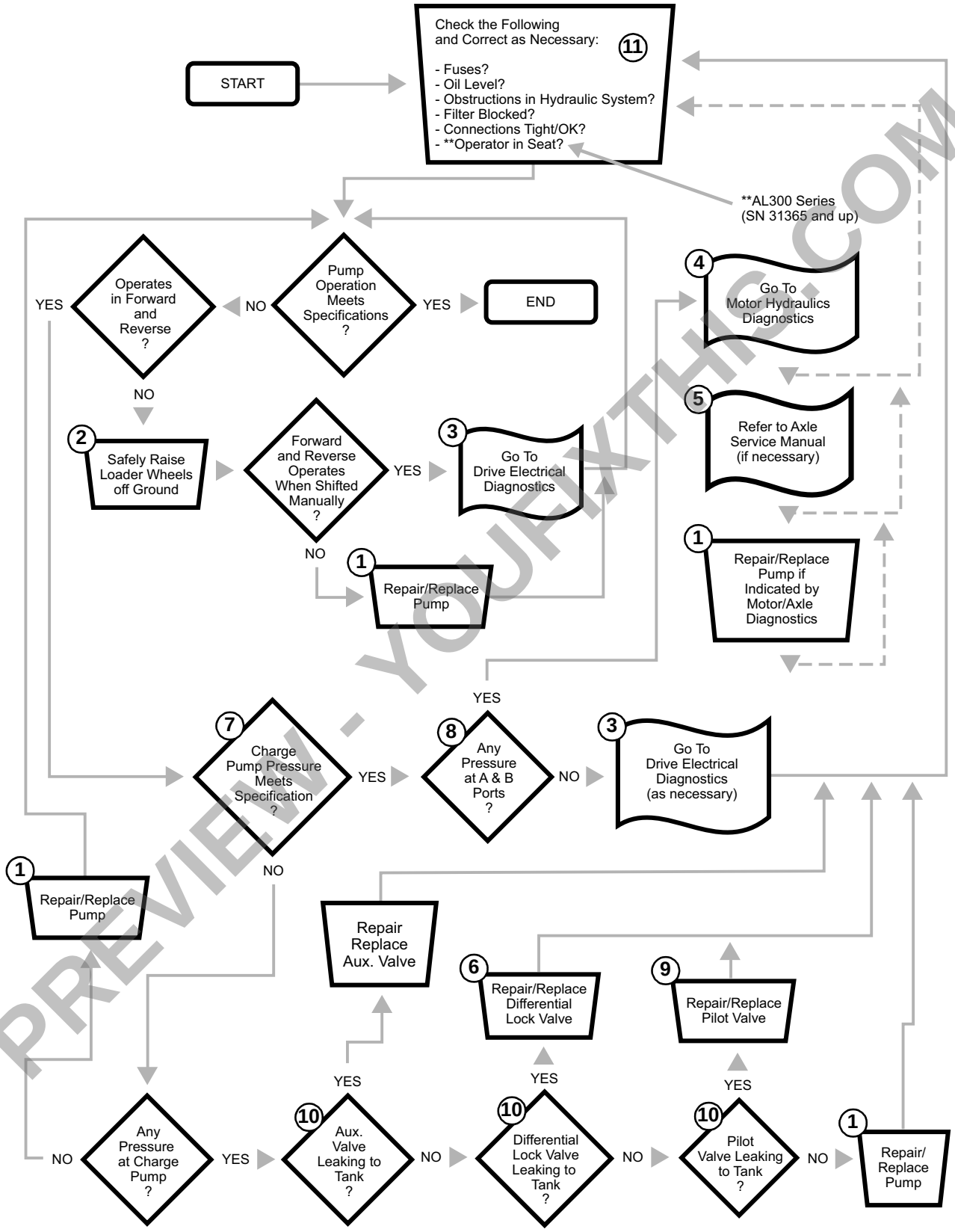


Install the upper radiator hose (1). Tighten hose clamps (2)

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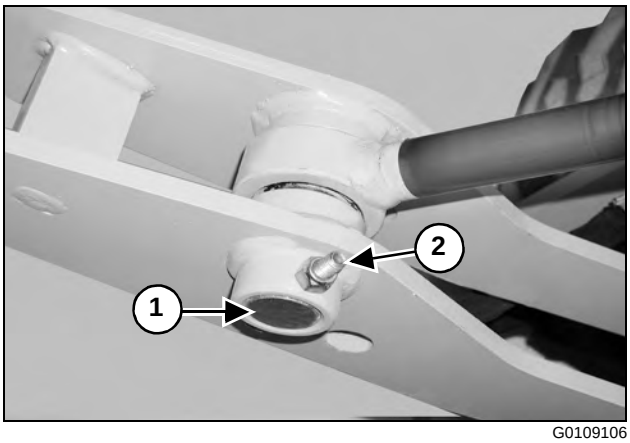
Hydraulic Piston/Drive Pump Diagnostics – AL300 Series



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STEP 3



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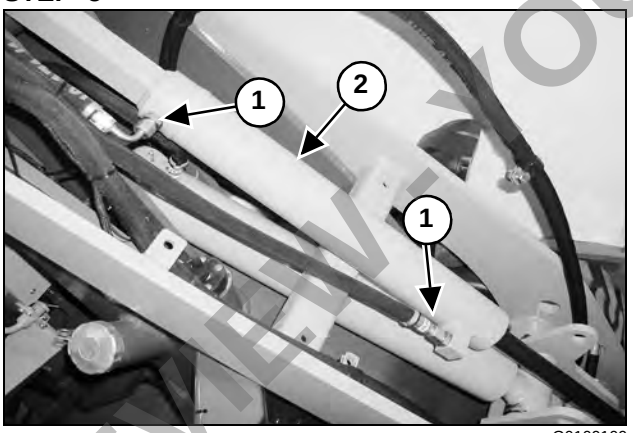
Install the rod end cylinder pin (1) using the retainer bolt (2) and nut. Tighten the bolt and nut to 33 lb.-ft. (45 N•m).

NOTE: *Cylinder plugs will need to be removed to move rod for alignment with pin.*

STEP 4

Remove the lifting device and lifting strap.

STEP 5



G0109109

Remove caps and plugs. Install the two hydraulic hoses (1) on the cylinder (2).

STEP 6

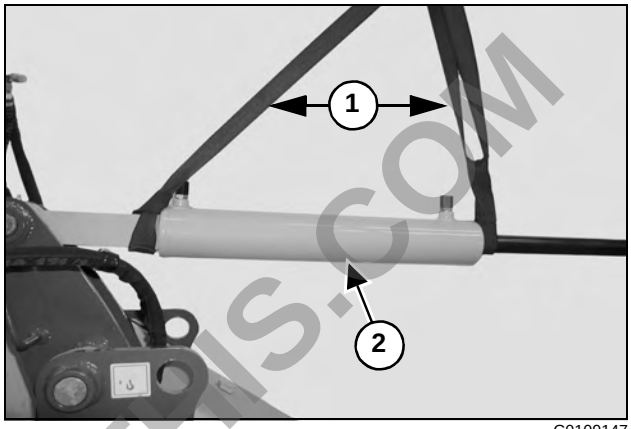
Start the machine and bleed the air out of the cylinder by cycling the cylinder through full extension and retraction three times.

STEP 7

Check the hydraulic fluid level and fill as needed. Refer to "Fluid Capacities/Lubricants" on page 11 for hydraulic fluid specifications.

AL200 and 300 Series Tilt Cylinder Installation

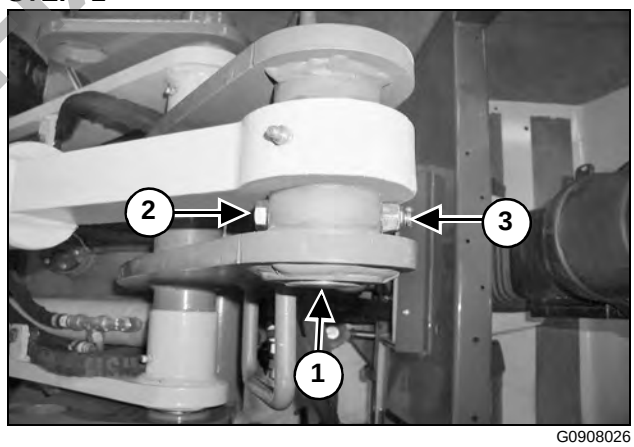
STEP 1



G0109147

Install a lifting strap (1) on the tilt cylinder (2). Use a proper lifting device to lift the cylinder into place.

STEP 2



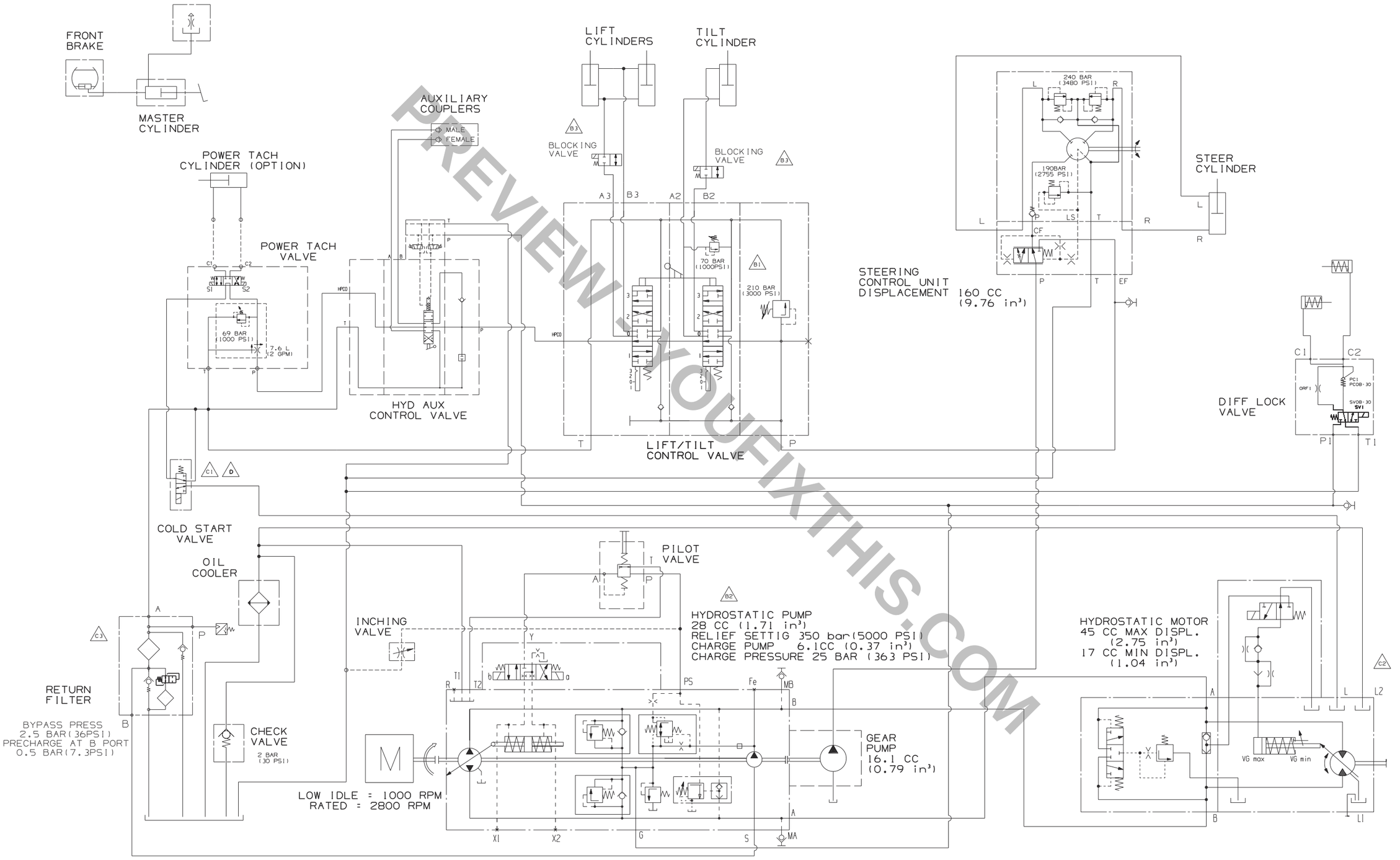
G0908026

Install the base end cylinder pin (1) using the retainer bolt (2) and nut (3). Tighten the bolt and nut to 33 lb.-ft. (45 N•m).

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AL300 Series Hydraulic Schematic – SN 31365 and Up



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