# CHAPTER 3

## SPECIFICATIONS

### Fluid Capacities/Lubricants

| | AL 500/400 Series | AL 300 Series | AL 200 Series | AL 100 Series |
|---|---|---|---|---|
| Diesel Engine Oil | | | | |
| Specification | API CD or Higher (United States)<br>ACEA E-3, E-4, E-5 (European Union) | | | |
| Season/Temp. Range | SAE 10W-30: -20°C (-4°F) to 30°C (86°F)<br>SAE 15W-40: -15°C (5°F) to 40°C (104°F)<br>SAE 20W-50: -10°C (14°F) to 50°C (122°F) | | | |
| Capacity | 7.4 L (7.8 qts.) | 6.7 L (7.2 qts.) | | 4.4 L (4.6 qts.) |
| Diesel Fuel | LSD or ULSD[1] low sulfur or ultra-low sulfur, below 500 PPM. Up to 5% (B5) mixture of BioDiesel allowed. | | | |
| Specification | 1-D or 2-D, ASTM D975-94 (United States)<br>EN 590:96 (European Union)<br>ISO 8217 DMX (International)<br>BS 2869-A1 or A2 (United Kingdom) | | | |
| Season/Temp. Range | Dependent on Outside Temperatures | | | |
| Capacity | 68 L (18 gal.) | 57 L (15 gal.) | | 26 L (7 gal.) |
| Hydraulic Oil [2] System/Tank | | | | |
| *Hydraulic Oil* | | | | |
| Specification | UTTO Fluid (Mobil 424 or equivalent) | | | |
| Season/Temp. Range | Year-Round | | | |
| *Biodegradable Oil* | | | | |
| Specification | Panolin Biofluid LS | | | |
| Season/Temp. Range | Year-Round | | | |
| Capacity | 40 L (10.6 gal.) | 26 L (6.9 gal.) | | 34 L (9.0 gal.) |

1. Ultra-Low Sulfur Diesel (ULSD) fuel lubricity must have a maximum scar diameter of 0.45 mm, as measured by ASTM D6079 or ISO 12156-1, or a minimum of 3100 grams, as measured by ASTM D6078. Contact your fuel supplier for details.
2. IMPORTANT! – When adding hydraulic oil, hydraulic tanks in AL 100 Series machines must be vented by removing oil filter cap and lifting oil filter or tanks will not fill evenly. See “Checking Hydraulic Oil Level” on page 122.

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# CHAPTER 4

## OPERATION

**⚠ WARNING** **Read and understand this entire manual. Follow warnings and instructions for operation and maintenance. Failure to follow instructions can result in injury or death. Read and understand all safety and instructional decals before operation.**

**Do not operate the machine unless all guards and shields are in place. Know how to stop the machine before starting.**

**Use only approved accessories and attachments. Contact the Manitou Americas Service Department for information about approved attachments. Use of non-approved attachments or unauthorized modifications is prohibited.**

**Check for correct function after adjustments or maintenance.**

**If any warning indicators illuminate when the engine is running, turn off the engine immediately. Correct the problem before re-starting the engine.**

**Never adjust the operator's seat or the steering column when the engine is running.**

**If the machine is equipped with a folding 2-post ROPS, only fold the ROPS temporarily if necessary during transport or for operation inside structures with low overhead doors or clearances.**

**Always operate the machine with the seat belt fastened. Repair or replace any damaged seat belt and buckle parts before operation.**

**Position the load as low as possible while traveling. Never make turns with the load raised higher than the axles or tipping could occur, which could result in severe injury or death.**

**If the machine becomes unstable and starts to tip, keep the seat belt fastened, hold on firmly and brace yourself. Lean away from the point of impact and stay with the machine. If tipping occurs, DO NOT jump from the machine. The machine is equipped with rollover protection, which only protects the operator while in the operator's seat. Trying to escape from a tipping machine can result in death or serious personal injury.**

**Travel cautiously, under complete control at all times. Avoid sudden changes of direction while traveling.**



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## Maintenance Schedule

Use the following table with the procedures included in the this chapter, beginning on page 103. For new machine operating guidelines, see "New Machines" on page 70.

***Important:*** *The following maintenance intervals apply to average operating conditions and loads. Under extreme operating conditions, more frequent maintenance may be required. The hourmeter indicates total operating time; use the hourmeter to determine when scheduled maintenance is due.*

**⚠ CAUTION** **Do not postpone maintenance. Postponed maintenance can result in a serious reduction to the service life of the machine, more serious and costly equipment failures, and contribute to unsafe operating conditions.**

### Check, Clean and Inspect

| Service Procedure | Maximum Interval | | | | |
|---|---|---|---|---|---|
| | 10 Hours (or daily) | 50 Hours (or weekly) | Monthly | 250 Hours (or every six months) | 500 Hours (or annually) |
| Clean machine | x | | | | |
| Check machine for general wear/damage | x | | | | |
| Check attachments for wear/damage | x | | | | |
| Check engine oil level and condition | x | | | | |
| Check coolant level and condition | x | | | | |
| Check brake fluid level | x | | | | |
| Check hydraulic fluid level | x | | | | |
| Check windshield washer system | x | | | | |
| Check exhaust for excessive smoke emission | x | | | | |
| Clean air filter; replace if necessary | x | | | | |
| Check tire condition and pressure | x | | | | |
| Check wheel fasteners for damage/tightness | x[1] | | x | | |
| Check hydraulic cylinder piston rods for wear/damage; clean if necessary | x | | | | |
| Check ROPS structure (all fasteners must be installed and securely tightened) | x | | | | |



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# CHAPTER 6

# TROUBLESHOOTING

## Engine Troubleshooting

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| Engine does not turn over | Drive direction switch in forward/reverse | Place drive direction switch in neutral |
| | Tripped circuit breaker | Reset circuit breaker |
| | Blown fuse | Replace fuse. |
| | Dead battery | Charge or replace battery—see “Using a Booster Battery (Jump-Starting)” on page 142 |
| | Operator not in operator’s seat | Operator’s seat must be occupied for engine to start |
| | Battery disconnect switch in open position or malfunctioning | Place battery disconnect switch into closed position— Repair or replace if necessary |
| | Malfunctioning seat switch | Replace seat switch |
| | Operator not in seat<br><br>- or -<br><br>Parking brake not applied<br><br>- or -<br><br>Auxiliary hydraulics pressure relief valve lever not in neutral (later machines only) | Sit in operator’s seat<br><br>- or -<br><br>Apply parking brake<br><br>- or -<br><br>Place auxiliary hydraulics pressure relief valve lever in neutral |
| Engine stops when operator leaves seat | Parking brake not applied or parking brake malfunction | Apply or repair parking brake |

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## SAE (Domestic) Weights and Capacities
## AL 500 and AL 300 Series

| Description | kg (lbs.)[1] | | | | | |
|---|---|---|---|---|---|---|
| | AL 500 Series | | | AL 300 Series | | |
| | 2-Post ROPS | 4-Post ROPS | Cab | 2-Post ROPS | 4-Post ROPS | Cab |
| Operating Weight | 3307 (7290) | 3357 (7400) | 3452 (7610) | 2472 (5450) | 2520 (5555) | 2649 (5840) |
| Shipping Weight | 3182 (7016) | 3235 (7131) | 3380 (7451) | 2358 (5199) | 2406 (5304) | 2535 (5589) |
| Rated Operating Capacity[1, 2] | 1118 (2466) | 1145 (2460) | 1165 (2560) | 798 (1760) | 834 (1840) | 857 (1890) |
| Static Tipping Loads | | | | | | |
| Standard Bucket[2] - Straight | 2237 (4932) | 2290 (5049) | 2330 (5136) | 1597 (3521) | 1670 (3681) | 1721 (3794) |
| SAE J732 Standard Bucket[2] - 45° Turn (Domestic) | 1771 (3904) | 1800 (3969) | 1860 (4101) | 1244 (2743) | 1280 (2821) | 1319 (2907) |
| Standard Pallet Forks[3] - Straight | 1634 (3602) | 1682 (3708) | 1703 (3755) | 1098 (2420) | 1169 (2578) | 1247 (2750) |
| SAE J1197 Standard Pallet Forks[3] - 45°Turn (Domestic) | 1278 (2817) | 1333 (2939) | 1352 (2981) | 857 (1889) | 909 (2005) | 977 (2155) |

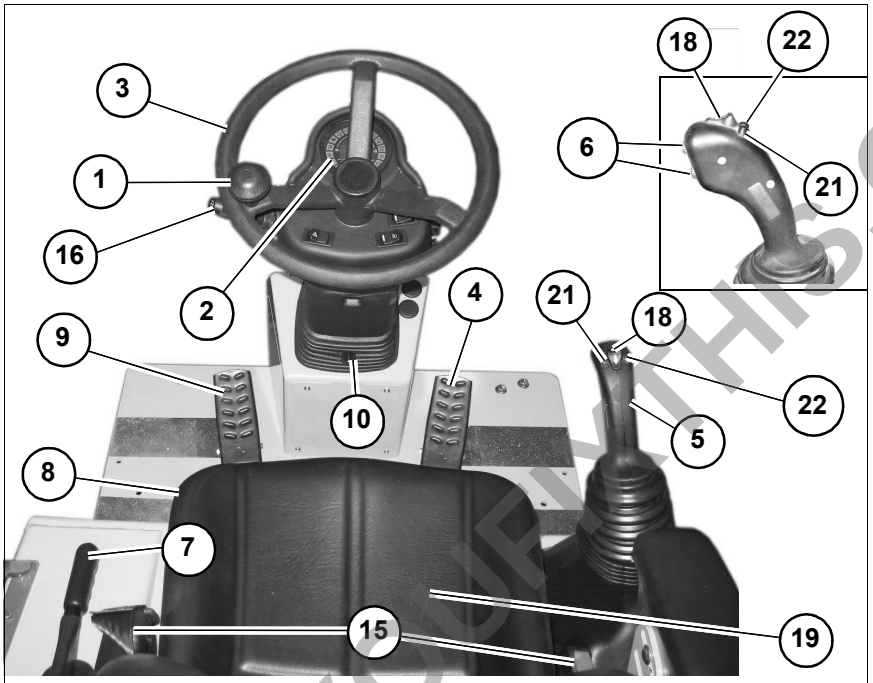
1. Measured on firm and level ground. Equipped with full fluids and 75 kg (165 lbs.) operator.
   AL 500 Series equipped with 33x15.5-16.5 tires, fluid-filled rear tires (air-filled rear tires have reduced capacities) and counterweight.
   AL 300 Series equipped with 30.5X12.5-16.5 tires.
2. AL 500 Series equipped w/ 1524 mm (60”) dirt/construction bucket.
   AL 300 Series equipped w/ 1372 mm (54”) dirt/construction bucket.
3. Equipped w/ pallet forks with 1067 mm (42”) tines and 533 mm (21”) load center.

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## Controls and Switches

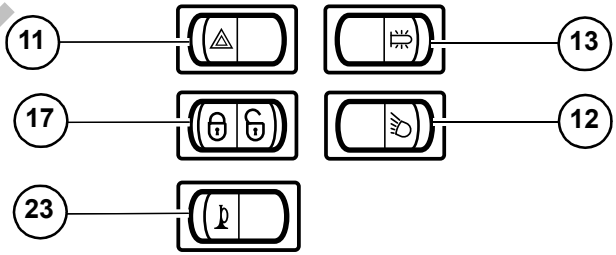





20
Located Behind Joy-stick



OPTION
14
Located Inside Engine Com-partment




***Note:*** *Controls 11, 12, 13 and 17 are located on the steering column, below instrument panel 2.*



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## Lubrication and Filter Changes

| Service Procedure | Maximum Interval | | | | | |
|---|---|---|---|---|---|---|
| | 10 Hours (or daily) | 50 Hours (or weekly) | Monthly | 250 Hours (or every six months) | 500 Hours (or annually) | 1500 Hours (or annually) |
| Lubricate grease zerks according to lubrication diagram | x | | | | | |
| Lubricate all levers, cables and hinges with oil | | | x | | | |
| Lubricate driveshaft universal and slip joint | | | x | | | |
| Change engine oil/filter | | x[1] | | x | | |
| Change axle oil | | | | | x | |
| Change hydraulic fluid and return filter | | | | | x | |
| Change fuel filter; clean pre-filter | | | | | x | |
| Change coolant | | | | | x | |
| Change cabin air filter | | x[2] | | | | |
| Change oil in the axles | | | | | | x |

1. After first 50 hours; every 250 hours thereafter.
2. Replace if needed.

## Functional Check

| Service Procedure | Maximum Interval | | | | |
|---|---|---|---|---|---|
| | 10 Hours (or daily) | 50 Hours (or weekly) | Monthly | 250 Hours (or every six months) | 500 Hours (or annually) |
| Check seat belt | x | | | | |
| Check foot brake and parking brake functions; adjust if necessary | x | | | | |
| Check steering | x | | | | |
| Check windshield wipers | x | | | | |
| Check instruments, indicator lights and audible warning devices | x | | | | |
| Check lighting system (if installed) | x | | | | |


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## Indicator Lamp Troubleshooting

| Indicator Activated | Possible Cause | Corrective Action |
|---|---|---|
| Engine oil pressure | Engine oil pressure too low | Stop engine immediately; check oil level and add oil if necessary; check oil pump |
| | Engine oil level too low | Add oil |
| | Oil pump malfunction | Contact dealer |
| Hydraulic oil temperature | Temperature is too hot | Check cooling system for debris in radiator |
| | | Check hydraulic oil level |
| Hydraulic oil filter | Hydraulic oil filter service required | Replace filter |
| Water temperature | Coolant level too low | Add coolant |
| | Air filter plugged | Replace air filter |
| | Engine overheating | Check cooling system |
| Battery voltage | Alternator not charging properly | Adjust v-belt tension; check alternator |
| Low fuel | Low fuel | Add fuel |

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# AL 140, AL 240 (EU), AL 340, AL 440 (EU), AL 540 Articulated Loaders Operator's Manual

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# CHAPTER 2

## 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. 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 operator's manual and on the decals on the machine.**

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

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

**CAUTION** **"CAUTION" indicates a potentially hazardous situation, which, if not avoided, may result in minor 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.

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.



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