Preventive Maintenance, Extended Storage, and Winterization

This instructional information is provided to you for the care and maintenance of your Sherman+Reilly[®] equipment, including information for preventative maintenance (PM), extended/long-term storage, and winterization of your equipment.

A successful preventative maintenance program improves the performance and safety of your company's valuable Sherman+Reilly[®] assets. Equally important, regularly scheduled maintenance and proper extended storage helps you avoid unplanned downtime. Here are 5 ways a Preventative Maintenance Program can help:

- Saving Money: Unplanned downtime caused by equipment failure can cost a fortune in lost production revenue, not to mention emergency repair costs. From paying technicians overtime to the cost of overnight parts delivery, everything is more expensive in an emergency—especially when a stringing operation goes down.
- Maximizing Efficiency: Regular equipment maintenance optimizes operations so you can run at maximum efficiency. Keeping your equipment running at optimal potential increases uptime, enhancing efficiency.
- Prolong Equipment Life: Preventative maintenance programs result in longer lasting, better-performing equipment.
- Reduce Maintenance Cost: Reactive maintenance is more expensive than preventative maintenance. Over a period of time, regularly scheduled maintenance minimizes breakdowns and makes for much quicker, easier repairs when issues do arise.
- Improve Safety and Reliability: Poorly operating machinery can create hazards and unsafe working conditions. Regular maintenance inspections ensure that faulty equipment does not cause injury. Preventative maintenance is important to make sure the machine may be operated safely and in accordance with all federal, state and local regulatory requirements. Keeping equipment in safe working order helps keep your employees safe.

The included guidelines are not all-inclusive and are provided to assist in identifying maintenance items and areas to be considered. Harsh climate and various operational conditions may necessitate additional considerations. For specific engine preventative maintenance, Sherman+Reilly recommends following the engine manufacturer's guidance. In any instance where the S+R guidance is different than the engine manufacturer's guidance, the engine manufacturer's guidance should take precedence.

Please use this guidance to assist your service crew with your organization's equipment preventative maintenance program. If you have any questions about this information, feel free to email us at ServiceParts@Sherman-Reilly.com.

We are honored you chose Sherman+Reilly[®] for your stringing equipment needs and we look forward to partnering in support of your organization's preventative maintenance program.

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1 Extended Storage Procedures

1.1 Extended Storage

For periods of extended storage, it is important that the following steps be taken to reduce troubleshooting when restarting equipment after it has sat idle for an extended period. Extended storage is considered when the equipment will not be scheduled for operation for at least 3 months. If equipment is stored for more than 6 months, repeat extended storage procedure.

- 1. Store machine in a covered dry area if possible.
 - a. Place a "DO NOT OPERATE" identifier on the control panel with date procedure was conducted.
 - b. Cover all exposed control panels with tarps or plastic.
 - c. Ensure all cab doors and windows are closed and sealed properly.
- 2. Inspect the machine thoroughly and repair any worn or damaged hoses, cables, or components.
 - a. Trailer tire pressures should be periodically monitored, as heavy trailer weight on low tires can create permanent buckling of the tire sidewall resulting in the need for tire replacement. Always see the specified air psi ratings listed on the tire sidewall.
 - b. Inspect trailer axle hubs and ensure they are filled with the manufacturer's recommended lubricant.
- 3. Lubricated all grease points.
 - a. Ensure all Zerk fittings are greased as applicable.
 - b. Ensure all exposed threads are lubricated.
- 4. Regularly apply a corrosion inhibitor, like TC-11 or equivalent, to unfinished metal as well as fairlead rollers and pins. If the unit is stored outdoors, the product should be reapplied every 6 months or more frequently if a visual inspection indicates that the surface is no longer glossy.
- 5. Check air filter. Clean and replace as needed.
- 6. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
- 7. Ensure fuel tank is full to prevent condensation in the fuel tank. Add winter grade diesel, FAME-free fuel. and/or stabilizer additive when appropriate. **NOTE:** <u>BioDiesel fuel is not suitable for extended</u> <u>storage.</u> Operate the engine for a few minutes so that only stabilized FAME-free fuel is still present in the fuel system.
- 8. If machine is equipped with Diesel Exhaust Fluid (DEF), ensure the tank is full.
 - a. DEF commonly has a shelf life of 2 years under optimal temperatures which should be taken into consideration when storing the equipment. While DEF is not affected by freezing its shelf life is shortened when exposed to temperatures greater than 86°F.
- 9. If machine is equipped with windshield washer bottle, ensure bottle is full of window washer fluid.
- 10. Test engine coolant and replace or fill with 50/50 antifreeze and distilled water mixture to prevent freeze damage.
- 11. Disconnect battery and cover terminals, adjust electrolyte level, and recharge it. If stored for extended periods battery may be removed and stored inside a cool, dry place where the batteries can be checked periodically and recharged. Discharged batteries will be damaged if stored below freezing temperatures.
- 12. Cover exhaust and intake filter. Exhaust cover must seal tightly to prevent moisture from entering, especially if stored outside.
- 13. Clean machine, including the undercarriage. Paint chipped or rusty areas to prevent further corrosion. Lock all lockable panels and cab doors. Remove all ignition keys and store in safe place.

- 14. If an engine is not used, oil can run off the parts that normally receive lubrication. This lack of lubricant allows corrosion to begin to appear on the metal, especially in areas of high humidity (water content in the air). If storing machine for extended periods of time, run engine every two to three months for 10 to 15 minutes under no load to keep engine free from rust by moisture in the air. In areas with high humidity, exercising more frequently may be necessary. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valve works smoothly before starting the engine.
- 15. Every two to three months, cycle all hydraulic motors and cylinders for 5-10 minutes to prevent valves from sticking, to lubricate seals, rods, & internal surfaces, and to remove moisture from the system. Failure to cycle hydraulic components regularly may allow spot rust, pitting, or degeneration of rubber seals which will reduce the efficiency and life of hydraulic components. When storing for an extended period, coat the exposed cylinder shafts with a rust inhibitor that is compatible with hydraulic components. Retract rods if possible.
- 16. Review engine specific information below.

1.2 Operation After Extended Storage

Prior to initial startup of equipment after 3 or more months of storage, follow these steps to ensure proper operation. If the equipment has not been started for over a year, consult your engine dealer and/or S+R.

- 1. Visual check of overall condition of equipment. Note any leaks or items that need to be replaced and pay special attention to any pneumatic hoses, hydraulic hose assemblies and wiring harnesses.
- 2. Inspect tires and tire pressure. Fill if required.
- 3. Change the engine oil, engine filters, and hydraulic filters.
- 4. Check hydraulic oil, engine coolant, and fuel. Add/Replace as required.
- 5. If applicable, check fuel/water separator and drain if needed. Frequently check separator during first few hours of use and drain as necessary.
- 6. If battery(s) were not removed place on a trickle charger for at least 24 hours before start-up. If battery(s) were removed ensure they are clean and charged before reinstalling.
- 7. Inspect cab for signs of inhabitation if equipment was stored outdoors. If signs of animal ingress are present, take special care as electrical system will need to be inspected.
- 8. If applicable, replace winter weight oils with traditional weight per engine manufacturer's specifications.

Once the check list above is completed, follow startup procedure denoted in the Operator's Manual and take precaution to inspect for drips or leaks as the machine begins to run. During the first day of use, check the machine frequently for hydraulic fluid, fuel, or oil leaks.

2 Winterization

For optimal performance of equipment, it is important to check the following tasks are completed when operating the equipment in low temperatures.

- 1. Test engine coolant and replace or fill with 50/50 antifreeze and distilled water mixture to prevent freeze damage.
- 2. Adjust oil weight according to average temperature expected during use.

Temperatures	Between 60°F and 5°F (15°C to -15°C)	Between 4°F and -12°F (-16 to -24°C)	Below -13°F (-25°C)
Engine Oil	SAE#10W or SAE#10W30	SAE#5W or SAE#10W30	SAE#5W or SAE#5W20
Coolant	Antifreeze	Antifreeze	Antifreeze + preheating

- 3. Drain and refill fuel tank with winter grade diesel or FAME-free fuel. Operate the engine for a few minutes so that only FAME-free fuel is still present in the fuel system. **NOTE:** BioDiesel fuel is not suitable for extended storage.
- 4. Verify that all glow plugs are in good condition. If only one glow plug is bad, it will prevent the engine from starting.
- 5. Inspect and ensure any equipped fluid, block, battery, or air heaters are working properly and repair or replace accordingly.
- 6. Before the cold temperatures set in, you should clean and inspect the battery, cables, terminals, tray and hold-downs. Also check the battery case for leaks and cracks. To prevent damage caused by selfdischarging and keep the battery charged and ready all year, you can connect a trickle charger/battery maintainer without the risk overcharging while left on the battery for long periods of time.
- 7. Never use starting fluids of any kind. Severe damage to the piston rings or ring lands can be caused using starting fluids.
- 8. If equipped, keep DEF above 40°F and in an insulated cabinet. DEF fluid generally freezes at 12°F and increases in volume by 7%. If the DEF tank on the machine is frozen consult the engine manufacturer manual on thawing procedure.
- 9. If machine is equipped with windshield washer bottle, ensure bottle is filled with a cold weather blend.

3 Service Interval Tables

The following are categorized by Trailer Service Interval, Engine Service Interval, and Machine Service Interval reference tables. Each piece of equipment corresponds to three tables, one from each category.

3.1 Trailer Service Interval

This section contains a Trailer Service Interval reference table that is applicable to all S+R equipment. For Engine and Machine Service Intervals, see sections 3.2 and 3.3.

Trailer Service Int	erval			
Inspection Item	At Every Use	Every 3000 Miles / 3 Months	Every 6000 Miles / 6 Months	Every 12000 Miles / 12 Months
Inspect pintle eye, bracket, and hardware	•			
Check battery for proper charge, corrosion of terminals	•			
Inspect tire inflation	•			
Inspect trailer axle assembly	•			
Inspect axle drum lubricant	•			
Inspect clearance, turn and brake lights	•			
*Drain condensation from air tank	•			
Inspect wheels	•		•	
Inspect safety chains, hooks, and anchors	•		•	
Inspect trailer brakes and breakaway system	•		•	
Inspect trailer plug, breakaway system, and brake wiring	•			•
Inspect axle/trailer seals	•			•
Inspect/maintenance fire extinguisher	•			•
Inspect tire condition		•		
Check torque on wheel nuts and bolts		•		
Check battery electrolyte level		•		
Inspect trailer suspension			•	
*Inspect brake controller			•	
Inspect springs				•
*Inspect trailer brake lines				•
Inspect wheel hubs/drums				•
Inspect wheel bearings and caps				•
Inspect trailer brake linings and shoes				•
Inspect axle suspension hangers				•

*Air Brake Axles Only

Refer to manufacturer's parts and service manual for formal reference and details

3.2 Engine Service Interval

This section contains Engine Service Interval reference tables only. For Trailer and Machine Service Intervals, reference sections 3.1 and 3.3. Always refer to the engine manufacturer's operator's manual.

3.2.1 Kubota

The following Engine Service Interval is applicable to the DDHX, DDHXA, PLW-200X, PLW-400, PT-3000, PTX-3500, PT-7500, and TPVG-1424:

Kubota Engine Service Interval									
Inspection Item	At Every Use	Every 50 Hours	Every 250 Hours/ 12 Months	Every 500 Hours/ 2 Years					
Check engine oil level	•								
Check fuel level	•								
Check coolant level	•								
Check of fan belt	•								
Check fuel lines and clamp bands		•							
Drain water separator		•							
Check radiator hoses and clamp bands			•		l				
Clean air cleaner element			•		l				
Adjust fan belt tension			•						
Check intake air line			٠						
Change engine oil			•						
Replace oil filter cartridge			•						
Replace fuel filter cartridge				•	1				
Replace engine fuel filter cartridge				•	l				
Clean water separator				•	l				
Clean water jacket (radiator interior)				•	l				
Replace fan belt				•	l				

NOTICE: Consult Kubota Service Dealer Concerning Annual and Biannual Service Requirements



3.2.2 John Deere E 4.5L/6.8L and Plus 4505/6068

The following Engine Service Interval is applicable to the **P-1400X manufactured prior to June 1st, 2018**:

John Deere E 4.5L/6.8L a	and Plus 4045/	6068 Engine S	ervice Interva	I	
		Every 40	Every 125	Every 250	Every 500
Inspection Item	At Every Use	Hours/ 2	Hours/6	Hours/12	Hours/ 2
		Months	Months	Months	Years
Check engine oil and coolant level	•				
Check fuel filter/water bowl	•				
Check air cleaner dust unloader valve	•				
Check restriction indicator gauge	•				
Check engine mounts		•			
Sample engine oil			•		
Clean radiator			•		
Check hoses and clamps			•		
Change engine oil and replace oil filter				•	
Check crankcase vent system				•	
Check air intake hoses, connections, and system				•	
Replace fuel filter elements				•	
Check automatic belt tensioner and belt wear				•	
Check engine electrical ground connection				•	
Coolant solution analysis/Add SCAs as required				•	
Check and pressure test cooling system				•	
Open crankcase ventilation (OCV) filter				•	
Inspect/clean aftercooler core				•	
Inspect/Replace air cleaner elements				•	
Replace fan and alternator belts					•
Test thermostats					•
Flush and refill cooling system					•
Clean engine					•
Inspect starter motor					•

NOTICE: Consult John Deere Dealer Concerning Annual and Biannual Service Requirements

3.2.3 Cummins Tier 4 Final

The following Engine Service Interval is applicable to the **P-1400X manufactured after June 1st, 2018**:

Cum	nmins Tier IV	Final Engine	Service Inter	val				
Inspection Item	Start-Up	Initial 50 Hours	Every 250 Hours/3 Months	Every 500 Hours/6 Months	Every 1000 Hours/1 Year	Every 2000 Hours/2 Years	Every 2000 Hours	Every 4500 Hours/3 years
Check diesel exhaust fluid (DEF) level	•							
Check crankcase breather tube	•							
Drain fuel-water separator	•							
Check air cleaner restriction	•							
Check lubricating oil level	•							
Inspect for reuse - cooling fan	•							
Check coolant level	•							
Check aftertreatment exhaust piping	•							
Check air intake piping	•							
Check dust ejection valve	•							
Check for leaks in the fuel system	•	•						
Replace engine oil and filter		•						
Inspect fuel lines and clamps			•					
Check radiator hoses			•					
Check radiator			•					
Check air intake piping			•					
Check charge-air cooler			•					
Check charge-air piping			•					
Apply corrosion inhibitor to exposed metal				•				
Change fuel filter (spin-on type)				•				
Change lubricating oil and filters				•				
Check engine coolant antifreeze				•				
Inspect for reuse radiator pressure cap				•				
Inspect for reuse cooling fan belt tensioner					•			
Inspect for reuse cooling fan drive belt					•			
Check belt driven fan hub					•			
Inspect for reuse aftertreatment diesel exhaust fluid tank filter					•			
Clean engine						•		
Inspect for reuse crankcase breather (external)						•		
Flush cooling system						•		
Change crankcase ventilation filter							•	
Change aftertreatment diesel exhaust fluid dosing unit filter								•

NOTICE: Cummins Service Dealer Concerning Annual and Biannual Service Requirements

3.2.4 Honda 13HP GX390 / 20HP GX630

Honda 13HP GX390 / 20HP GX630								
		Every 20	Every 50	Every 100	Every 300			
Inspection Item	Start-Up	Hours/1	Hours/3	Hours/6	Hours/12			
		Months	Months	Months	Months			
Check engine oil level	•							
Check engine air filter element	•							
Change engine oil filter		•		•				
Change engine oil		•	•					
Clean engine air filter element			•					
Check/adjust spark plug				•				
Clean spark arrester				•				
Clean sediment cup*				•				
Replace spark plug					•			
Check/adjust idle speed					•			
Check/adjust valve clearance					•			
Replace fuel filter					•			
Check fuel tube					•			
Replace air cleaner					•			

The following Engine Service Interval is applicable to **BWT, TRT and CRT**:

3.2.5 Deutz TCD/TCD 2011 L4 and 2013 L06

The following Engine Service Interval is applicable to T-2608, T7212, and PTR-7230:

Deutz TCD/TCD 2011 L4 and 2013 L06 Engine Service Interval								
Inspection Item	At Every Use	Every 125 Hours/ 6 Months	Every 250 Hours/ 12 Months	Every 500 Hours/ 2 Years				
Check engine oil level	•							
Check fuel level	•							
Check coolant Level	•							
Check belts	•							
Maintain suction air filter	•	•						
Change pre-cleaner/pre-filter insert		•						
Drain lube oil and condensate		•						
Clean charge air cooler entry area		•						
Clean turbocharger compressor outlet		•						
Change oil			•					
Lubricate oil filter/insert			•					
Replace fuel filter cartridge			•					
Replace heating plugs				•				
Replace coolant				•				
Check battery and cable connectors				•				
Replace V-Belts				•				
Check engine mounts				•				
Check fasteners, hose unions and clips				•				
Replace fuel filter cartridge				•				

NOTICE: Consult Deutz Service Dealer Concerning Annual and Biannual Service Requirements

3.2.6 Deutz TD 2.9 L4

The following Engine Service Interval is applicable to **PTV-4807 and T-1608**:

Deutz TD 2.	9 L4 Engine Ser	vice Interval		
		Every 125	Every 250	Every 500
Inspection Item	At Every Use	Hours/ 6	Hours/ 12	Hours/ 2
		Months	Months	Years
Check engine oil level	•			
Check fuel level	•			
Check coolant Level	•			
Check belts	•			
Maintain suction air filter	•	•		
Change pre-cleaner/pre-filter insert		•		
Drain lube oil and condensate		•		
Clean air cooler entry area		•		
Clean turbocharger compressor outlet		•		
Change oil			•	
Lubricate oil filter/insert			•	
Replace fuel filter cartridge			•	
Check coolant additive concentration			•	
Check intake air pipes			•	
Check cold starting device				•
Replace dry air filter				•
Replace heating plugs				•
Replace coolant				•
Check battery and cable connectors				•
Replace V-Belts				•
Check engine mounts				•
Check fasteners, hose unions and clips				•

NOTICE: Consult Deutz Service Dealer Concerning Annual and Biannual Service Requirements

3.2.7 CAT 9

The following Engine Service Interval is applicable to **PTR-7240**:

CAT 9 E	ngine Service I	nterval			
		Every 40	Every 125	Every 250	Every 500
Inspection Item	At Every Use	Hours/ 2	Hours/ 6	Hours/ 12	Hours/ 2
		Months	Months	Months	Years
Check/Clean engine air precleaner	•				
Drain fuel system water separator	•				
Check engine oil level	•				
Check cooling system coolant level	•				
Drain fuel tank water and sediment		•			
Clean primary air cleaner element		•			
Inspect/Adjust belts		•			
Replace secondary air cleaner element			•		
Test concentration of supplemental coolant additive			•		
Sample engine oil			•		
Change engine oil and filter			•		
Lubricate fan drive bearing			•		
Replace fuel system primary filter element			•		
Replace fuel system secondary filter			•		
Clean radiator			•		
Check hoses and clamps			•		
Replace primary air cleaner element				•	
Sample coolant system coolant				•	
Inspect/clean aftercooler core				•	
Inspect alternator				•	
Clean engine crankcase breather				•	
Inspect belt tensioner					•
Change cooling system coolant					•
Clean engine					•
Inspect engine mounts					•
Inspect starter motor					•
Inspect water pump					•

NOTICE: Consult CAT Dealer Concerning Annual and Biannual Service Requirements

3.2.8 CAT C4.4 ACERT Tier

The following Engine Service Interval is applicable to **PTV-6013 and P-2000X**:

CAT C4.4 ACERT Tie	r 4 Engine Serv	vice Interval						
		Every 40	Every 125	Every 250	Every 500			
Inspection Item	At Every Use	Hours/ 2	Hours/ 6	Hours/ 12	Hours/ 2			
		Months	Months	Months	Years			
Inspect engine air cleaner service indicator	•							
Check engine oil level	•							
Check cooling system coolant level	•							
Check/Clean engine air precleaner	•							
Drain fuel system primary filter/water separator	•							
Drain fuel tank water and sediment		•						
Clean primary air cleaner element		•						
Inspect/Adjust belts		•						
Test concentration of supplemental coolant additive			•					
Sample engine oil			•					
Change engine oil and filter			•					
Clean radiator			•					
Clean engine crankcase breather				•				
Sample coolant system coolant				•				
Replace engine air cleaner element				•				
Inspect/clean aftercooler core				•				
Replace fuel in-line fuel filter				•				
Replace fuel system primary filter water separator element				•				
Replace fuel system secondary filter				•				
Inspect belt tensioner					•			
Inspect water pump					•			
Inspect engine mounts					•			
Inspect starter motor					•			
Clean engine					•			
Change cooling system coolant					•			
NOTICE: Consult CAT Dealer Concerning Annual and Biannual Service Requirements								

3.2.9 HATZ engine/generator used on E+ Series units

HATZ Engine Service Interval								
Inspection Item	At Every Use	Weekly	Every 250 Hours/ 6 Months	Every 1000 Hours/ 2 Years				
Check engine oil level	•							
Check fuel level	•							
Check the intake area of the combustion and cooling air	•							
Check the air filter maintenance indicator	•							
Check the water separator		•						
Change engine oil			•					
Check and set the tappet clearance			•					
Clean the cooling air area			•					
Check the screw and mount connections			•					
Clean the exhaust screen			•					
Change the fuel prefilter and fuel main filter			•					
Maintain the dry air filter			•					
Clean the oil filter				•				
NOTICE: Consult Hatz 1B30E 1B50E Manual for diesel engine								

Storing the machine for a lengthy period: HATZ Engine

Take the following measures if you intend to take the machine out of service for a lengthy period (3-12 months):

Step	Activity
1	Drain the fuel tank until it is nearly empty and fill with FAME*- free fuel. Operate the engine for a few minutes so that only FAME-free fuel is still in the fuel system.
2	Change the engine oil (see chapter 8.2.4 Change the engine oil, page 55 of Hatz engine manual).
3	Change the fuel filter (see chapter 8.2.10 Changing the fuel filter page 67 of Hatz engine manual).
4	Let the machine cool down.
5	Remove the battery in accordance with the Operator's Manual for the machine and store at ambient temperature. Comply with the local regulations as well as the regulations of the battery manufacturer for the storage of batteries.
6	Close and seal all engine openings (air intake openings, air out- let openings and the exhaust gas opening) so that no foreign bodies can enter, but a small amount of air can still be ex- changed. This avoids condensation.
7	After the machine has cooled down, cover it to protect it against dust and store it in a dry and clean place.

*FAME = Fatty Acid Methyl Ester

Ambient conditions during storage

- Max. permissible storage temperature: -25 °C to +60 °C
- Max. permissible humidity: 70%
- Protect the engine from direct sunlight

3.3 Machine Service Interval

This section contains Machine Service Interval reference tables only. For Trailer and Engine Service Intervals, see sections 3.1 and 3.2.

3.3.1 DDHX

DDHX Machine Service Interval										
Inspection Item	Start-Up	Initial 25 Hours	Every 50 Hours/3 Months	Every 100 Hours/6 Months	Every 200 Hours/9 Months	Every 250 Hours/12 Months	Every 500 Hours/24 Months			
Verify e-stop function	•									
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect drum and drive motor coupler assembly	•									
Inspect bullwheels and cable	•									
Inspect drive chain	•									
Inspect reel drive friction	•									
Check chain and chain tensioner			•							
Replace hydraulic fluid filters		•		•						
Replace winch gearbox oil		•			•					
Grease hinges and latches					•					
Clean hydraulic fluid cooler						•				
Clean and inspect exterior of fuel tank						•				
Clean fuel tank							•			
Clean hydraulic tank and replace hydraulic fluid							•			

3.3.2 DDHXA

The following Machine Service Interval is applicable to the DDHXA:

DDHX	A Machine	Service In	terval				
		Initial 25	Every 50	Every 100	Every 200	Every 250	Every 500
Inspection Item	Start-Up	Hours	Hours/3	Hours/6	Hours/9	Hours/12	Hours/24
		TIOUIS	Months	Months	Months	Months	Months
Verify e-stop function	•						
Inspect hydraulic hose assemblies for leaks and damage	•						
Inspect electrical harnesses for corrosion and damage	•						
Inspect hydraulic tank sight glass for fluid level	•						
Inspect drum and drive motor coupler assembly	•						
Inspect bullwheels and cable	•						
Inspect reel drive friction	•						
Check compressor oil level	•						
Check compressor air filter	•						
Replace hydraulic fluid filters	•						
Check winch gearbox oil	•						
Grease idle pulley	•		•				
Clean hydraulic fluid cooler	•			•			
Drain water from compressor oil		•					
Replace hydraulic fluid filters		•		•			
Replace winch gearbox oil		•			•		
Grease compressor drive shaft slip yoke assembly			•				
Check chain and chain tensioner			•				
Grease oscillating pulley			•				
Check wear of winch chain and tension wheel					•		
Grease hinges and latches						•	
Clean hydraulic fluid cooler						•	
Clean and inspect exterior of fuel tank						•	
Change compressor oil and oil filter						•	
Check compressor shaft seal for leakage						•	
Check air filter piping, fittings and clamps						•	
Check compressor supports						•	
Install new air filter element						•	
Check sump safety valve						•	
Change coalescing element						•	
Clean hydraulic tank and replace hydraulic fluid							•

3.3.3 PLW-200X

The following Machine Service Interval is applicable to the PLW-200X:

PLW-200X Machine Service Interval										
Inspection Item	Start-Up	Initial 25 Hours	Every 50 Hours/3 Months	Every 100 Hours/6 Months	Every 250 Hours/12 Months	Every 500 Hours/24 Months				
Verify e-stop function	•									
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect drums and drive motor coupler assemblies	•									
Inspect drive chain	•									
Inspect reel caliper brake pads	•									
Replace hydraulic fluid filters		•		•						
Check chain and chain tensioner			•		•					
Replace hydraulic fluid filters				•						
Inspect and grease rotating turret gears				•						
Grease hinges and latches					•					
Clean hydraulic fluid cooler					•					
Clean and inspect exterior of fuel tank					•					
Clean fuel tank						•				
Clean hydraulic tank and replace hydraulic fluid						•				

3.3.4 PLW-400X

The following Machine Service Interval is applicable to the PLW-400X:

PLW-400X Ma	chine Servi	ce Interval					
Inspection Item	Start-Up	Initial 25 Hours	Every 50 Hours/3 Months	Every 100 Hours/6 Months	Every 200 Hours/9 Months	Every 250 Hours/12 Months	Every 500 Hours/24 Months
Verify e-stop function	•						
Inspect hydraulic hose assemblies for leaks and damage	•						
Inspect electrical harnesses for corrosion and damage	•						
Inspect hydraulic tank sight glass for fluid level	•						
Inspect hydraulic oil return filter gauge	•						
Inspect levelwind rollers for damage, burrs, cuts	•		•				
Inspect drum and drive motor, coupler, and engagement assemblies	•						
Inspect drive chain	•						
Open evacuator valve on engine air filter housing	•						
Replace hydraulic fluid filters			•				
Replace hydraulic fluid filters		•		•			
Check chain and chain tensioner				•			
Clean hydraulic fluid cooler				•			
Grease hinges and latches					•		
Clean hydraulic fluid cooler					•		
Clean and inspect outside of fuel tank					•		
Clean fuel tank						•	
Clean hydraulic tank and replace hydraulic fluid							•

3.3.5 PT-3000

The following Machine Service Interval is applicable to the PT-3000:

PT-3000 Machine Service Interval									
		Initial 25	Every 50	Every 100	Every 200	Every 250	Every 500		
Inspection Item	Start-Up		Hours/3	Hours/6	Hours/9	Hours/12	Hours/24		
		Hours	Months	Months	Months	Months	Months		
Verify e-stop function	•								
Inspect hydraulic hose assemblies for leaks and damage	•								
Inspect electrical harnesses for corrosion and damage	•								
Inspect hydraulic tank sight glass for fluid level	•								
Inspect drum and drive motor coupler assembly	•								
Inspect reel brake pads and braking systems	•								
Inspect hydraulic oil return filter gauge	•								
Inspect levelwind rollers for damage, burrs, cuts	•		•						
Inspect anti-seize on brake caliper assembly threads	•		•						
Inspect lubricant on reel motor engagement assembly	•		•						
Replace hydraulic fluid filters		•		•					
Replace gearbox oil		•			•				
Grease hinges and latches						•			
Clean hydraulic fluid cooler						•			
Clean and inspect exterior of fuel tank						•			
Clean fuel tank							•		
Clean hydraulic tank and replace hydraulic fluid							•		

3.3.6 PTX-3500

The following Machine Service Interval is applicable to the PTX-3500:

PTX-3500 Machine Service Interval									
		Initial 20	Every 50	Every 100	Every 200	Every 250	Every 500		
Inspection Item	Start-Up	Hours	Hours/3	Hours/6	Hours/9	Hours/12	Hours/24		
		Hours	Months	Months	Months	Months	Months		
Verify e-stop function	•								
Inspect hydraulic hose assemblies for leaks and damage	•								
Inspect electrical harnesses for corrosion and damage	•								
Inspect hydraulic tank sight glass for fluid level	•								
Inspect drum and drive motor coupling assemblies	•								
Inspect hydraulic oil return filter gauge	•								
Inspect levelwind rollers for damage, burrs, cuts	•		•						
Replace gearbox oil		•			•				
Replace hydraulic fluid filters		•		•					
Replace hydraulic fluid filters				•					
Clean hydraulic fluid cooler						•			
Clean and inspect exterior of fuel tank						•			
Clean hydraulic fluid cooler						•			
Clean cabin air filter and inspect for holes						•			
Clean fuel tank							•		
Clean hydraulic tank and replace hydraulic fluid							•		

3.3.7 PT-7500

The following Machine Service Interval is applicable to the PT-7500:

PT-7500 Machine Service Interval										
		Initial 20	Every 50	Every 100	Every 200	Every 250	Every 500			
Inspection Item	Start-Up		Hours/3	Hours/6	Hours/9	Hours/12	Hours/24			
		HOUIS	Months	Months	Months	Months	Months			
Verify e-stop function	•									
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect drum and drive motor coupling assemblies	•									
Inspect hydraulic oil return filter gauge	•									
Inspect levelwind rollers for damage, burrs, cuts	•		•							
Replace gearbox oil		•			•					
Replace hydraulic fluid filters		•		•						
Replace hydraulic fluid filters						•				
Clean and inspect exterior of fuel tank						•				
Grease hinges and latches						•				
Cl <mark>e</mark> an hydraulic fluid <mark>c</mark> ooler						•				
Clean fuel tank							•			
Clean hydraulic tank and replace hydraulic fluid							•			

3.3.8 TPVG-1424

The following Machine Service Interval is applicable to the TPVG-1424:

TPVG-14	24 Machine	e Service In	terval				
Inspection Item	Start-Up	Initial 25 Hours	Every 50 Hours/3 Months	Every 100 Hours/6 Months	Every 200 Hours/9 Months	Every 250 Hours/12 Months	Every 500 Hours/24 Months
Verify e-stop function	•						
Inspect hydraulic hose assemblies for leaks and damage	•						
Inspect electrical harnesses for corrosion and damage	•						
Inspect hydraulic tank sight glass for fluid level	•						
Inspect drum and drive motor coupler assemblies	•						
Inspect reel brake pads and braking systems	•						
Inspect V-groove bullwheel for damage, burrs, cuts	•						
Inspect hydraulic oil return filter gauge	•						
Inspect rollers for damage, burrs, cuts	•		•				
Check chain and chain tensioner	•		•				
Inspect gearbox fluid level sight tube	•		•				
Inspect pillow block bearings			•				
Grease hinges and latches			•				
Grease locking pins				•			
Replace hydraulic fluid filters		•		•			
Replace gearbox oil		•			•		
Grease hinges and latches						•	
Clean hydraulic fluid cooler						•	
Clean and inspect exterior of fuel tank						•	
Clean hydraulic tank and replace hydraulic fluid							•
Clean fuel tank							•
Change hydraulic oil							•

3.3.9 P-1400X

The following Machine Service Interval is applicable to the P-1400X:

P-1400X Machine Service Interval										
		Initial 2E	Every 50	Every 100	Every 200	Every 250	Every 500			
Inspection Item	Start-Up		Hours/3	Hours/6	Hours/9	Hours/12	Hours/24			
		HOUIS	Months	Months	Months	Months	Months			
Verify e-stop function	•									
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect drum and drive motor coupler assemblies	•									
inspect levelwind rollers for damage, burrs, cuts	•		•							
Replace hydraulic fluid filters		•		•						
Replace gearbox oil		•			•					
Grease side frame slides			•							
Replace hydraulic fluid filters			•							
Grease hinges and latches						•				
Clean hydraulic fluid cooler						•				
Clean and inspect exterior of fuel tank		/				•				
Clean cabin air filter and inspect for holes						•				
Clean fuel tank							•			
Clean hydraulic tank and replace hydraulic fluid							•			

3.3.10 BWT, TRT, and CRT

The following Machine Service Interval is applicable to the BWT, TRT, and CRT:

Legacy BWT/TRT/CRT Machine Service Interval										
		Every 50	Every 300	Every 600						
Inspection Item	Start-Up	Hours/3	Hours/12	Hours/24						
		Months	Months	Months						
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect drum and drive motor coupler assemblies	•									
Inspect reel and bullwheel brake pads and braking systems	•									
Inspect anti-seize on brake caliper assembly threads	•	•								
Inspect pillow block bearings		•								
Grease hinges and latches		•								
Grease locking pins			•							
Change oil filter at hydraulic pump				•						
Change hydraulic oil				•						
Clean fuel tank				•						

3.3.11 Zeck

The following Machine Service Interval is applicable to all Zeck equipment:

Zeck Machine Service Interval										
		Initial 25	Every 50	Every 100	Every 200	Every 250	Every 500			
Inspection Item	Start-Up	Hours	Hours/3	Hours/6	Hours/9	Hours/12	Hours/24			
			Months	Months	Months	Months	Months			
Verify e-stop function	•									
Inspect hydraulic hose assemblies for leaks and damage	•									
Inspect electrical harnesses for corrosion and damage	•									
Inspect hydraulic tank sight glass for fluid level	•									
Inspect levelwind rollers for damage, burrs, cuts	•		•							
Lubricate all grease points	•		•							
Inspect/apply lubricant on all exposed shafts and threaded rods	•		•							
Replace hydraulic fluid filters		•		•						
Replace gearbox oil		•			•					
Replace hydraulic fluid filters						•				
Clean hydraulic fluid cooler						•				
Clean and Inspect exterior of fuel tank						•				
Clean hydraulic fluid cooler							•			
Clean hydraulic tank and replace hydraulic fluid							•			

4 Kubota B20 Biodiesel Fuel Policy



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KUBOTA ENGINE AMERICA CORPORATIONDISTRIBUTION: OEM's, Distributors, RSM's, KCL505 Schelter RoadSUBJECT: Kubota B20 Biodiesel Fuel PolicyLincolnshire, IL 60069WRITTEN BY: Nam NguyenTel: 847-955-2500 Fax:847-955-2699TOTAL PAGES: 3

TITLE: Kubota B20 Biodiesel Fuel Policy for North America

Information: Kubota mechanical and common-rail diesel engines are approved to use up to 20% biodiesel blends in North America. Final blended B20 solution must conform to ASTM D7467 Standard. This bulletin is the current revision to KEI-162 and will be effective immediately. Please follow the instructions below for proper preparation, warranty, handling, maintenance, and storage procedures when using up to B20 fuel:

- Definition of Allowable Biodiesel Fuels:
 - 1. Blended diesel fuels B1 up to B5 (0-5% biodiesel) that comply with ASTM D975 are acceptable to use with Kubota engines.
- 2. Blended diesel fuels B6 up to B20 (6-20% biodiesel) that comply with ASTM D7467 are acceptable to use with Kubota engines.
- 3. Any mineral oil diesel fuel used must conform to the ASTM D975 Standard. Pure bio-diesel fuel (B100), which acts as a solute to make blended diesel fuel solution, must meet ASTM D6751 Standard. The final blended B20 solution must conform to ASTM D7467 Standard. Pure vegetable oil is NOT allowed as a solute for any blended bio-diesel fuel solution.
- 4. The maximum volume ratio of the blended solution of fuel must be 20% or less of B100. The B100 biodiesel must be supplied from an accredited BQ-9000 manufacturer or equivalent.

More information about qualified marketer(s) and producer(s) can be found at http://www.bq-9000.org.

Preparation:

- It is advisable to replace the fuel filter before using B6 thru B20 Biodiesel fuel as the service interval will be reduced due to Bio-diesel usage. Please refer to the Operator's Manual or contact your local Kubota Dealer for replacement procedures and identification of correct parts for the machine.
- 2. When using B6 thru B20 Biodiesel fuel products, please replace the mechanical fuel feed pump with a B20 compliant pump according to the KEI-162.

Product Warranty, Emission and Other Precautions:

- Your Kubota engine emission control system is certified according to applicable emissions regulations based on the use of Federal Diesel Fuel Standard, which is ULSD (Ultra Low Sulfur Diesel) fuel. When using biodiesel fuel, we request the owner to comply with the Kubota requirements as stated in the operator's manual. We also encourage user to check applicable local and Federal emission regulations and comply with them as required.
- 2. Biodiesel fuel may cause restricted or clogged fuel filters during cold weather conditions resulting in improper engine operation.
- 3. Biodiesel fuel encourages the growth of micro-organisms which may cause degradation of the fuel, fuel line corrosion, or reduce fuel filter flow sooner than standard diesel fuel.
- 4. Biodiesel fuel inherently absorbs moisture which may cause degradation of the fuel sooner than standard diesel fuel. In order to avoid field issues, drain the water separator and fuel filter port frequently.
- 5. Do not use biodiesel fuel, which blends biodiesel higher than 20% (i.e. greater than B20). Using biodiesel greater than B20 will affect the engine performance, fuel consumption, and cause the degradation of the fuel system.
- 6. Do not re-adjust the engine fuel control system as this action violates emission regulations.
- 7. Palm oil-based feedstock has higher viscosity at lower temperatures than soybean-based and rapeseed-based feedstock. Consequently, higher viscosity fuel may reduce the life of fuel filters particularly in cold weather operation, which will require more frequent service and attention.
- 8. The KUBOTA Limited Warranty only covers defects in product materials and workmanship for KUBOTA approved engines. Therefore, the KUBOTA Limited Warranty will not cover any problems that may arise due to the use of poor quality fuels that fail to meet the above requirements, whether biodiesel or mineral oil based.

Routing handing:

- 1. Avoid spilling Biodiesel fuel onto engine surfaces as it may cause corrosion. If fuel is spilled, immediately wipe up and clean with soapy water to avoid any permanent damage.
- 2. Maintain a full fuel tank level, especially overnight and during short-term storage, to reduce condensation inside of the tank. Tighten the fuel cap after refueling to prevent moisture build up inside of the tank. Water in the biodiesel mixture will damage fuel filters and engine components.

Maintenance Requirements when using Biodiesel fuel B1 thru B5:

- Refer to the "Periodic Service" section in Operator's Manual.
 - 1. When using Biodiesel for the first time in your Kubota engine, replace the engine oil per the specifications in the Operator's Manual and replace the oil filter with a new Kubota approved filter.
 - 2. The engine oil level must be checked daily. Follow the oil change intervals recommended service instructions by referring to the "Periodic Service" section in Operator's Manual.

Extended oil change intervals may result in premature wear or engine damage.

- Maintenance Requirements when using Biodiesel fuel B6 thru B20:
 - Refer to the "Periodic Service" section in Operator's Manual.
 - The engine oil level must be checked daily. Follow the oil change intervals recommended by referring to the "Periodic Service" section in Operator's Manual. Extended oil change intervals may result in premature wear or engine damage.
 - 2. The maintenance interval for fuel related parts changed. Follow the applicable Kubota or OEM workshop manual when servicing these components:
 - Replace the fuel filters at one half (1/2) of the suggested replacement interval as listed on the Operator's Manual.

For example: If the suggested interval is 100 hours to replace fuel filters, then replace at 50 hours.

Replace the fuel hoses at one half (1/2) of the suggested replacement intervals as listed in the Operator's Manual.

For example: If the suggested interval is 2 years to replace fuel hoses, then replace at 1 year.

3. There is a possible reduction of service interval of fuel filter by condition of use.



- 1. Biodiesel fuel easily deteriorates due to oxygen, water, heat and foreign substances. Do not store B6 thru B20 longer than one (1) month and B1 thru B5 no longer than three (3) months.
- 2. When using B6 thru B20 and storing the machine longer than one (1) month, drain the fuel from the tanks and replace with light mineral oil diesel fuel. Subsequently, run the engine at least thirty (30) minutes to remove all of the biodiesel from the fuel lines and filter.
- 3. When using B1 thru B5 fuel and storing the machine longer than three (3) months, drain the fuel from the tanks and replace with light mineral oil diesel fuel. Subsequently, run the engine at least thirty (30) minutes to remove all of the biodiesel from the fuel lines and filter.

