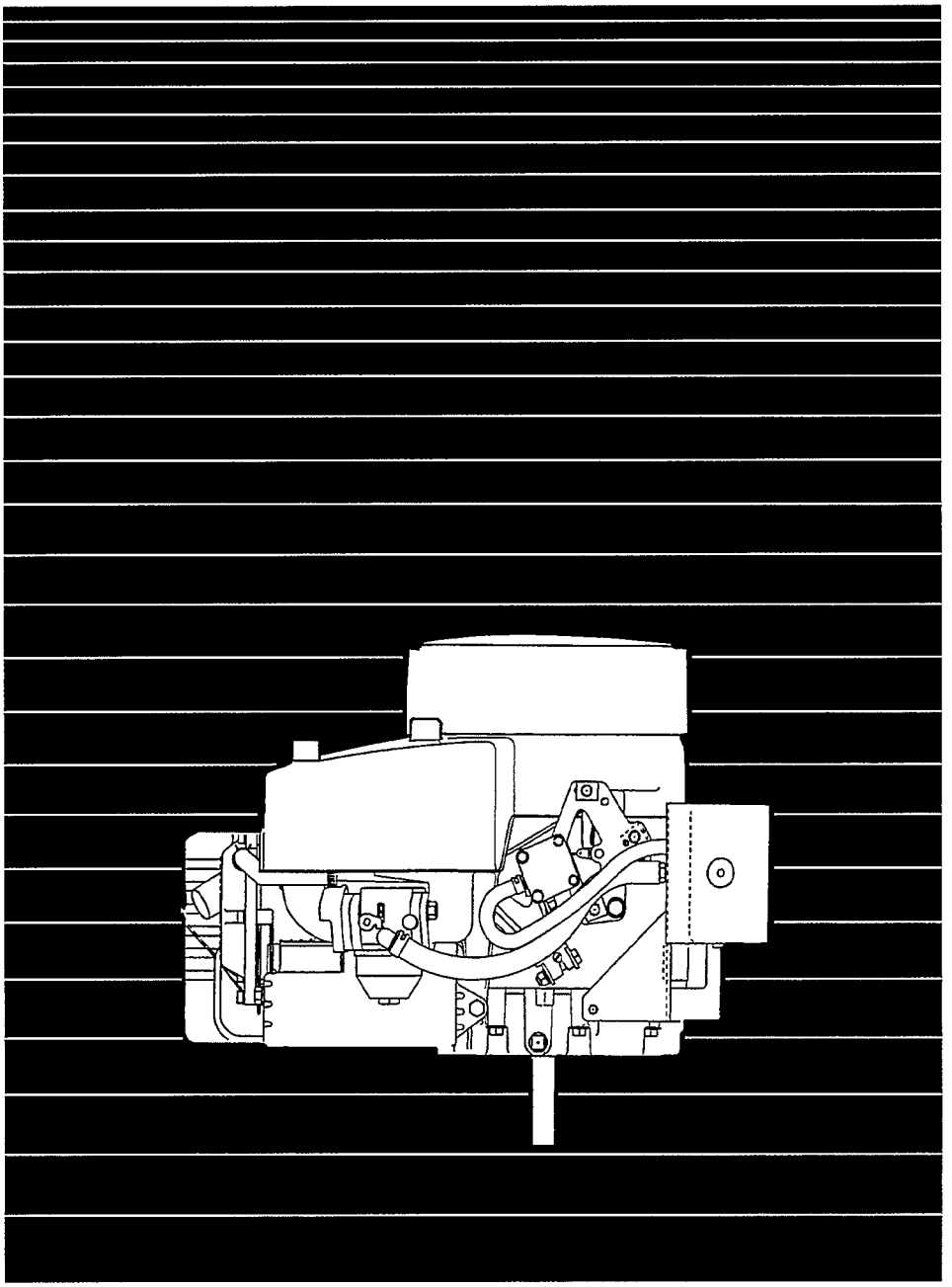
Onan

Engine

Operator's Manual

E125V, E140V

Elite Series



Printed in U.S.A.

965-0153
10-95

Safety Precautions

Before operating the engine, read the Operator's Manual and become familiar with it and the equipment. **Safe and efficient operation can be achieved only if the equipment is properly operated and maintained.**

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠DANGER ***This symbol warns of immediate hazards which will result in severe personal injury or death.***

⚠WARNING ***This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.***

⚠CAUTION ***This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.***

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that can result in severe personal injury. Take care in following these recommended procedures. All local, state and federal codes should be consulted and complied with.

⚠WARNING ***This engine is not designed or intended for use in any type of aircraft. Use of this engine in aircraft can result in engine failure and cause severe personal injury or death.***

GENERAL

- Provide appropriate fire extinguishers and install them in convenient locations. Use an extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the engine are secure and accurately torqued. Keep guards in position over fans, driving belts, etc.
- If it is necessary to make adjustments while the engine is running, use extreme caution when close to hot exhausts, moving parts, etc.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

BATTERIES

- Before starting work on the engine, disconnect batteries to prevent inadvertent starting of the engine.
- DO NOT SMOKE while servicing batteries. Lead acid batteries give off a highly explosive hydrogen gas which can be ignited by flame, electrical arcing or by smoking.
- Verify battery polarity before connecting battery cables. Connect negative cable last.

FUEL SYSTEM

- DO NOT fill fuel tanks while engine is running.
- DO NOT smoke or use an open flame in the vicinity of the engine or fuel tank. Internal combustion engine fuels are highly flammable.
- Fuel line must be LP approved, adequately secured, and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping for flexible lines as copper will work harden and become brittle enough to break.
- Be sure all fuel supplies have a positive shutoff valve.

PROTECT AGAINST MOVING PARTS

- Do not wear loose clothing in the vicinity of moving parts, such as PTO shafts, flywheels, blowers, couplings, fans, belts, etc.
- Keep your hands away from moving parts.

EXHAUST SYSTEM

- Exhaust products of any internal combustion engine are toxic and can cause injury, or death if inhaled. When operating the engine in a confined area, make sure the ventilation system is operating properly.
- DO NOT use exhaust gases to heat a compartment.
- Make sure that your exhaust system is free of leaks. Make sure that exhaust manifolds are secure and are not warped by bolts unevenly torqued.

EXHAUST GAS IS DEADLY!

Exhaust gases contain carbon monoxide, a poisonous gas that can cause unconsciousness and death. It is an odorless and colorless gas formed during combustion of hydrocarbon fuels. Symptoms of carbon monoxide poisoning are:

- Dizziness
- Headache
- Weakness and Sleepiness
- Vomiting
- Muscular Twitching
- Throbbing in Temples

If you experience any of these symptoms, get out into fresh air immediately, shut down the unit and do not use it until it has been inspected.

The best protection against carbon monoxide inhalation is proper installation and regular, frequent inspections of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Make sure that oily rags are not left on or near the engine.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and present a potential fire hazard.

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⚠WARNING

INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT IN SEVERE PERSONAL INJURY AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

⚠ WARNING: ⚠

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Introduction

KNOW YOUR ENGINE

Study this manual carefully and comply with each of the warnings and cautions. Maintain the engine according to the maintenance schedule. Operating the engine properly and performing regular maintenance can result in longer engine life, better performance and safer operation. Regularly scheduled maintenance lowers operating costs.

Figure 1 shows the locations of the components referred to in this manual.

ENGINE MODEL IDENTIFICATION

Identify your model by referring to the *MODEL* and *SPECIFICATION* number as shown on the engine nameplate (Figure 1).

Always use this number and the engine serial number when referring to the engine.

If a major repair or an overhaul is necessary, Onan recommends the work be done by a competent mechanic to see that all dimensions, clearances, and torque values are within the specified tolerances.

An engine service manual is available at additional cost. Contact your nearest authorized dealer or Onan Parts and Service Center.

This manual contains the SI metric equivalents shown in parentheses immediately after the U.S. customary units of measure.

TABLE 1. SPECIFICATIONS

	Unit of Measure	Specification
Number of Cylinders		1
Bore	in (mm)	3.31 (84.2)
Stroke	in (mm)	2.76 (70.0)
Displacement	cu in (cm^3)	23.7 (389)
Compression Ratio		8.5 to 1
Oil Capacity Oil Base Without Filter	qt (liter)	1.5 (1.4)
Oil Filter Capacity	qt (liter	.15 (.14)
Valve Clearance (Cold) Intake	in (mm)	0.003 (0.08)
Exhaust	in (mm)	0.003 (0.08)
Spark Plug Gap	in (mm)	0.035 (0.89)
Ignition Timing	BTDC	23°

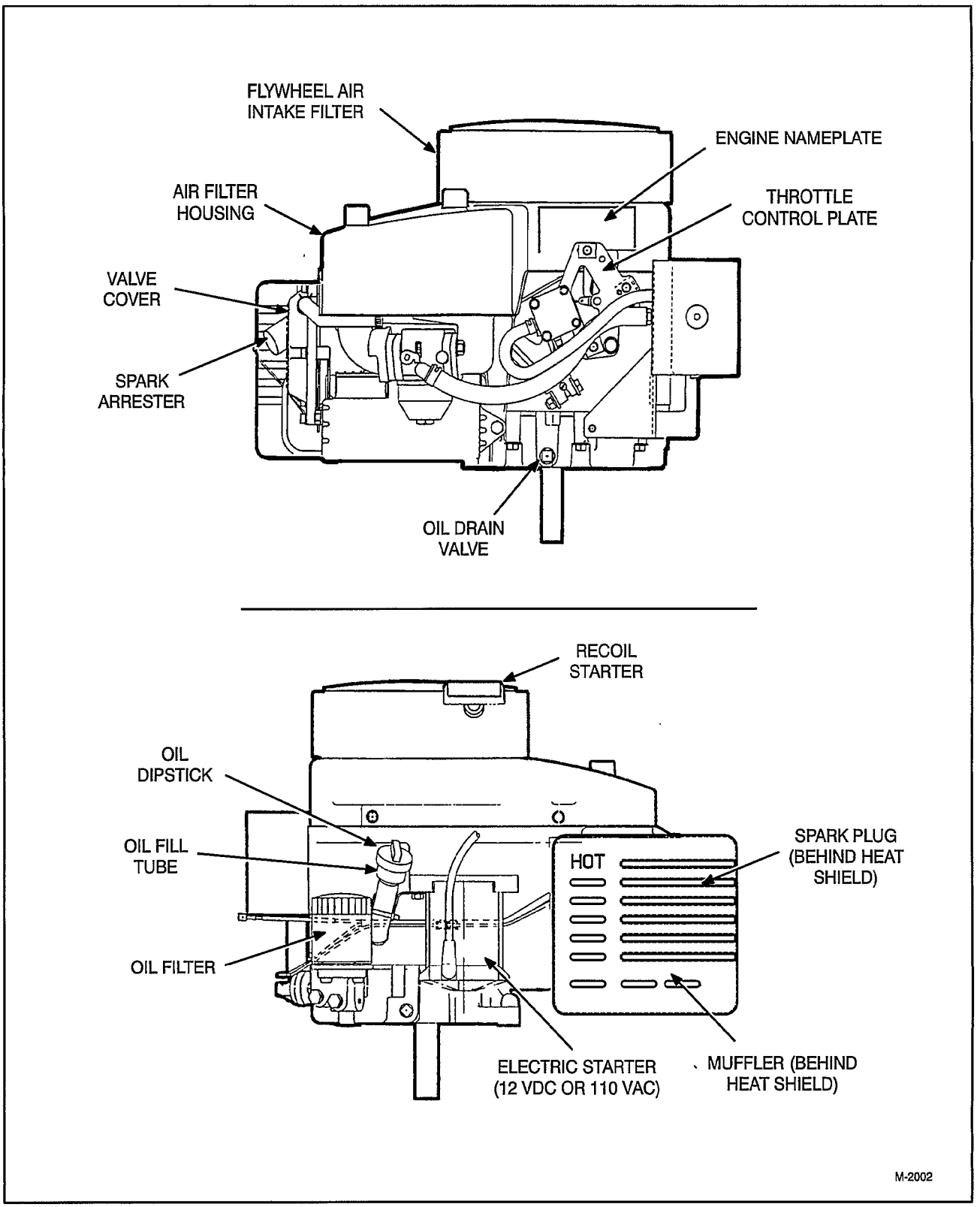

FIGURE 1. ENGINE COMPONENT LOCATIONS

Engine Set-Up

PRE-START CHECKS

Inspect the engine visually. Check for loose or missing parts and any damage that may have occurred in shipment.

⚠ CAUTION ***Starting the engine without oil will result in severe engine damage. Add oil prior to starting the engine.***

CRANKCASE OIL RECOMMENDATIONS

Use premium quality motor oil with the API (American Petroleum Institute) designation SG on the container. Figure 2 shows the recommended oil weight for the temperature range that the engine will be operated in. Make sure the engine oil weight is correct for the expected temperature range.

Refer to Table 1 (*Specifications*) for the crankcase oil capacity.

Single-grade oil is preferable when temperatures are consistently over 30°F (0°C). Multigrade oils are best when wide temperature variations are anticipated.

⚠ WARNING ***Crankcase pressure can blow out hot oil, that can cause severe personal injury. Do not check the oil level while the engine is running.***

⚠ CAUTION ***Excess oil can cause high oil consumption, high operating temperatures, and oil foaming. Do not overfill the crankcase.***

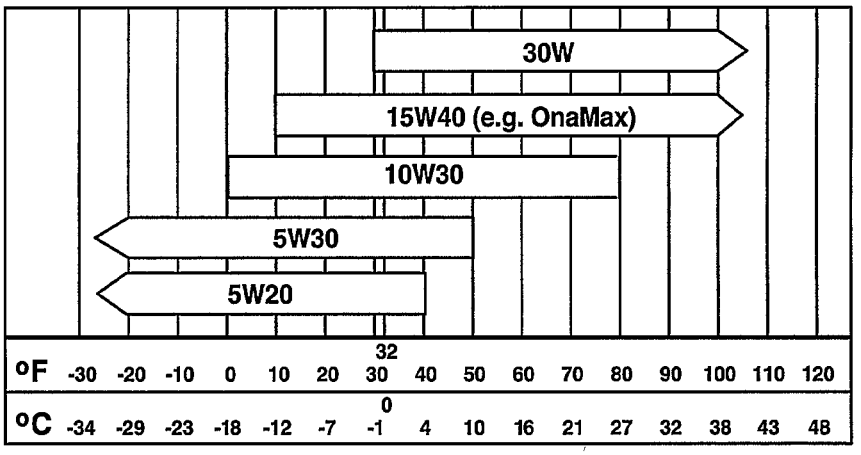

FIGURE 2. OIL VISCOSITY VS. TEMPERATURE

Oil Level

Check the oil level at the intervals recommended in the *Periodic Maintenance Schedule.* Check more frequently on a new or reconditioned engine as oil consumption is normally higher until the piston rings seat properly.

When adding oil between oil changes, it is preferable to use the same brand, because different oil brands may not be compatible. Refer to the *Maintenance* section for recommended oil change intervals and procedures. Figure 3 shows the oil level dipstick and the FULL mark.

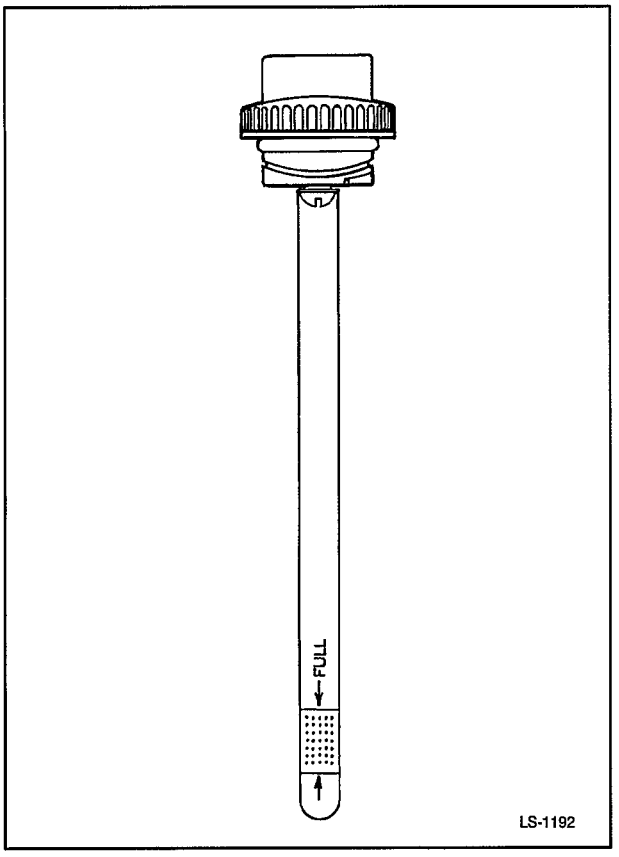

FIGURE 3. OIL LEVEL DIPSTICK

LPG FUEL RECOMMENDATIONS

⚠WARNING ***Ignition of fuel can result in severe personal injury or death. Do not smoke or allow any spark, pilot light, or arcing equipment near the fuel system.***

Use clean, fresh commercial propane or HD-5 grade liquid propane gas in a mixture of at least 90 percent propane. Propane fuels other than HD-5 can contain more than 2.5 percent butane which can result in poor fuel vaporization and poor engine starting in low ambient temperatures (below 32°F or 0°C).

A manual shutoff valve must be mounted on the propane fuel supply tank. This supply tank valve must be opened fully when operating the engine so the flow valve will close if the propane fuel line breaks or is opened.

EXHAUST SYSTEM

Exhaust products of any internal combustion engine are toxic and can cause injury, or death if inhaled. When operating this LPG-fueled engine indoors, make sure that an adequate supply of fresh air is available at all times.

⚠WARNING ***Breathing exhaust gases can result in severe personal injury or death. Make sure an adequate supply of fresh air is available at all times.***

Operation

⚠WARNING

EXHAUST GAS IS DEADLY!

Exhaust gases from all fuels (including diesel, gasoline, liquid propane, natural gas) contain carbon monoxide, an odorless and colorless gas. Carbon monoxide is poisonous and can cause unconsciousness and death. Symptoms of carbon monoxide poisoning can include:

- ***Dizziness***
- ***Nausea***
- ***Headache***
- ***Weakness and Sleepiness***
- ***Throbbing in Temples***
- ***Muscular Twitching***
- ***Vomiting***
- ***Inability to Think Coherently***

IF YOU OR ANYONE ELSE EXPERIENCE ANY OF THESE SYMPTOMS, GET OUT INTO THE FRESH AIR IMMEDIATELY. If symptoms persist, seek medical attention. Shut down the unit and do not operate until it has been inspected and repaired.

Protection against carbon monoxide inhalation includes proper installation, ventilation and regular, frequent visual and audible inspections of the complete exhaust system.

STARTING

Cold Engine

1. Move the speed control to the choke position.
2. Engage the electric starter for up to 30 seconds or pull the recoil starter until the engine starts.
3. When the engine starts, move the speed control to full throttle as the engine warms up, usually within 10 seconds.
4. If the engine does not start, wait 30 seconds and repeat steps 2 and 3.

Warm Engine

1. Move the speed control to approximately half throttle.
2. Engage the electric starter for up to 10 seconds or pull the recoil starter until the engine starts.
3. If the engine does not start, set the speed control to the choke position.
4. Engage the electric starter for up to 30 seconds or pull the recoil starter until the engine starts.
5. When the engine starts, immediately set the speed control to the desired engine speed.
6. If the engine does not start, wait 30 seconds and repeat steps 4 and 5.

BREAK-IN PROCEDURE

Controlled break-in is the ideal fitting of all internal moving metal parts. Using the proper oil and applying a conscientious maintenance program during this period helps to obtain satisfactory service from the Onan engine.

Maintain the proper cooling and lubrication during break-in. Run the engine at half load for the first 1-1/2 hours with intermittent periods of full load to control engine break-in.

⚠CAUTION ***Using the wrong grade and weight of oil with high engine operating temperatures during break-in can cause engine damage. Use the correct oil grade and weight and provide adequate engine cooling during engine break-in. Make sure that the flywheel intake filter is kept clean.***

Check the oil level at least every five operating hours during break-in. Add oil to keep it at the proper level, but never overfill, because overfilling may cause the oil to foam and enter the breather system, resulting in high oil consumption and oil accumulation in the air cleaner housing.

OPERATION

Always be careful when operating power equipment. Follow the operating procedures and observe all warnings and cautions.

⚠WARNING ***Contact with rotating machinery and hot parts can result in severe personal injury or death. Stay clear of rotating components and hot parts. Make sure that protective shields and guards are secured in place before operating power equipment.***

1. Make sure the crankcase is full of the proper oil weight for the ambient temperatures.
2. See that nothing obstructs the air flow to and from the engine. Keep the flywheel intake filter clean.
3. Keep the engine cooling fins clean and free of obstruction.

   ⚠CAUTION ***Plugged or clogged cooling fins or a dirty flywheel intake filter can cause overheating and engine damage. Make sure the cooling fins and intake filter are kept clean.***

4. Change the crankcase oil and oil filter more frequently than scheduled in high or low operating temperatures or in very dusty conditions.

OUT-OF-SERVICE PROTECTION

Protect an engine that will be out-of-service for more than 30 days as follows:

1. Run the engine until it reaches normal operating temperature.
2. Turn off the fuel supply and run the engine until it stops.
3. Drain the oil from the oil base while the engine is still warm. Refill with fresh oil and attach a tag stating the oil viscosity used.
4. Remove the spark plug. Squirt 1 ounce (2 tablespoons or 28 grams) of rust inhibitor or SAE 50 oil into the cylinder. Crank the engine over a few times. Reinstall the spark plug.
5. Service the air cleaner and flywheel intake filter as outlined in the *Maintenance* section.
6. Clean the governor linkage and protect it by wrapping it with a clean cloth.
7. Plug the exhaust outlet to prevent the entrance of moisture, dirt, bugs, etc.
8. Wipe the entire unit clean. Coat bare metal parts with a light film of grease or oil.
9. Provide a suitable cover for the entire unit.

RETURNING UNIT TO SERVICE

1. Remove the cover and all protective wrapping. Remove the plug from exhaust outlet.
2. Check the tag on the oil base and verify that oil weight is still correct for the existing ambient temperatures.
3. Check the fuel lines to make they are secure and have no cracks or leaks.
4. Check that the carburetor throttle lever and governor linkage move freely.
5. Start the engine. Exhaust smoke is normal when the engine is started due to the rust inhibitor oil.

Maintenance Schedule

PERIODIC MAINTENANCE SCHEDULE

Following the maintenance schedule and using the engine properly will result in longer engine life, better performance and safer operation. Perform each maintenance procedure after the number of operating hours indicated. These service intervals are recommended for normal operating conditions. For operation in hot or dusty conditions, service the engine more frequently. Neglecting routine maintenance can result in premature engine failure.

For any abnormalities in operation, unusual noises from the engine or accessories, loss of power, overheating, etc., contact your nearest Onan Service Center.

Refer to the following *Maintenance Procedures* section for routine maintenance procedures.

TABLE 2. PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	AFTER EACH CYCLE OF INDICATED HOURS					
	1	8	25	50	100	200
Clean Flywheel Intake Filter	X					
Inspect Engine Generally		X[1]				
Check Oil Level		X				
Service Air Cleaner Element and Element Wrapper			X[2]			
Change Crankcase Oil			X[3]		X[2]	
Replace Oil Filter			X[3]		X[2]	
Clean Cooling Fins				X[2]		
Check Battery Electrolyte Level (If equipped)				X		
Clean Spark Arrester				X		
Check Valve Clearance					X[4]	X
Replace Air Cleaner Element						X[2]
Check or Replace Spark Plug						X

1 - Check for fuel leaks. With engine running, visually and audibly check exhaust system for leaks.
2 - Perform more often when running under severe operating conditions.
3 - Required for initial break-in only.
4 - Required for initial 100 hours, 200 hour interval thereafter. For detailed maintenance, contact an Onan Service Center or refer to the service manual.

⚠WARNING ***Breathing exhaust gases can result in severe personal injury or death. Do not use air cleaner, exhaust elbow, or connecting parts as a supporting step. Damage to these and connecting parts can cause an exhaust leak.***

Maintenance Procedures

⚠WARNING ***Accidental starting of the engine can result in severe personal injury or death. Disconnect the 110 VAC power cord from the starter switch junction box or disconnect the negative (–) battery cable on 12 VDC starter models. Also disconnect the the spark plug wire while servicing the engine, controls, or associated equipment.***

HOURLY CHECK

Due to the large amount of dust that can be encountered in floor care applications, the flywheel intake filter (Figure 1) should be checked after each hour of operation. Remove and clean the filter as described in this section.

DAILY CHECKS

The operator should make a complete visual and audible inspection of the engine daily. Check the following before starting the engine for the first time each day:

1. Check all fuel lines and fittings for possible leakage.
2. Check crankcase oil level with the engine off. If engine has been run, allow a minimum of 10 minutes for the oil to drain down before checking. Do not operate engine with the oil level below the ADD mark or above the FULL mark.
3. Inspect exhaust system for possible leakage and cracks. Locate leaks in muffler and piping while the engine is operating. Repair all leaks immediately.
4. Inspect air cleaner system for leaks. Make certain all clamps and fittings are tight and free of potential leaks.
5. Check the engine cooling system to make sure the cooling fins and ducting are clean. Remove dust, dirt or oil from the cooling surfaces.

OIL CHANGE

⚠WARNING ***Hot crankcase oil can cause burns if it contacts the skin. Wear protective clothing and keep fingers and hands clear when draining oil.***

Refer to the *Periodic Maintenance Schedule* for oil change intervals.

An oil drain hose (1/2 inch I.D.) can be secured to the oil drain fitting with a hose clamp (clamp not supplied) to reach a convenient location for draining.

1. Run the engine until it is warm. Stop the engine and place a pan under the oil drain outlet.
2. Push in and turn the oil drain fitting 1/10th turn counterclockwise (Figure 4).
3. After the oil is drained, push the oil drain fitting in and turn it clockwise 1/10th turn, until it locks in place.

Used oil is harmful to the environment. Pour used oil into a sealed container and deliver it to the nearest recycling center or automotive service station.

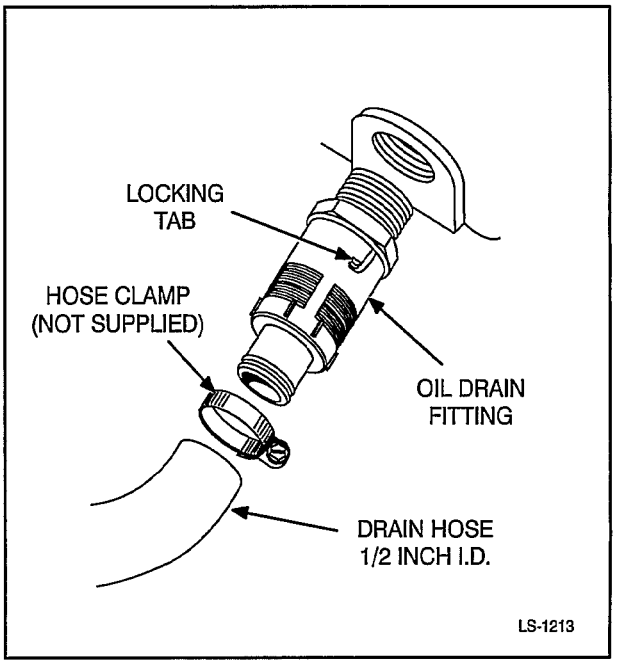

FIGURE 4. OIL DRAIN FITTING

OIL FILTER CHANGE

Refer to the *Periodic Maintenance Schedule* for the oil filter change interval.

1. Spin off the oil filter element. Drain the oil and discard the filter.
2. Thoroughly clean the filter mounting surface.
3. Make sure the new gasket is inserted in the element. Apply a thin film of oil to the gasket.
4. Spin the new element on by hand until the gasket just touches the mounting pad, then turn it down an additional 1/2 to 3/4 turn. Do not overtighten.

Refill with oil of the correct API classification and appropriate SAE viscosity grade for the temperature conditions (refer to Figure 2). The oil level should reach the FULL mark on the dipstick. Refer to Table 1 (*Specifications*) for the oil capacity.

With oil in the crankcase, start the engine and check for leaks around the filter element. Retighten only as much as necessary to eliminate leaks. Do not overtighten.

AIR CLEANER

Air Cleaner Element

Refer to the *Periodic Maintenance Schedule* for air cleaner service and replacement interval.

Service or replace the element more often when operating under severe operating conditions. Clean by gently tapping the element on a flat surface.

Element Wrapper

Refer to the *Periodic Maintenance Schedule* for the element wrapper service interval.

Wash the wrapper in water and detergent and squeeze it dry like a sponge. Rinse with clean water and allow it to dry. Coat the wrapper evenly with one tablespoon (14 grams) of SAE 30 engine oil. Knead the oil into the wrapper and wring out the excess oil.

Failure to adequately wring out excess oil from the wrapper may cause a drop in engine power due to a restriction of inlet air. Install the wrapper over the air cleaner element.

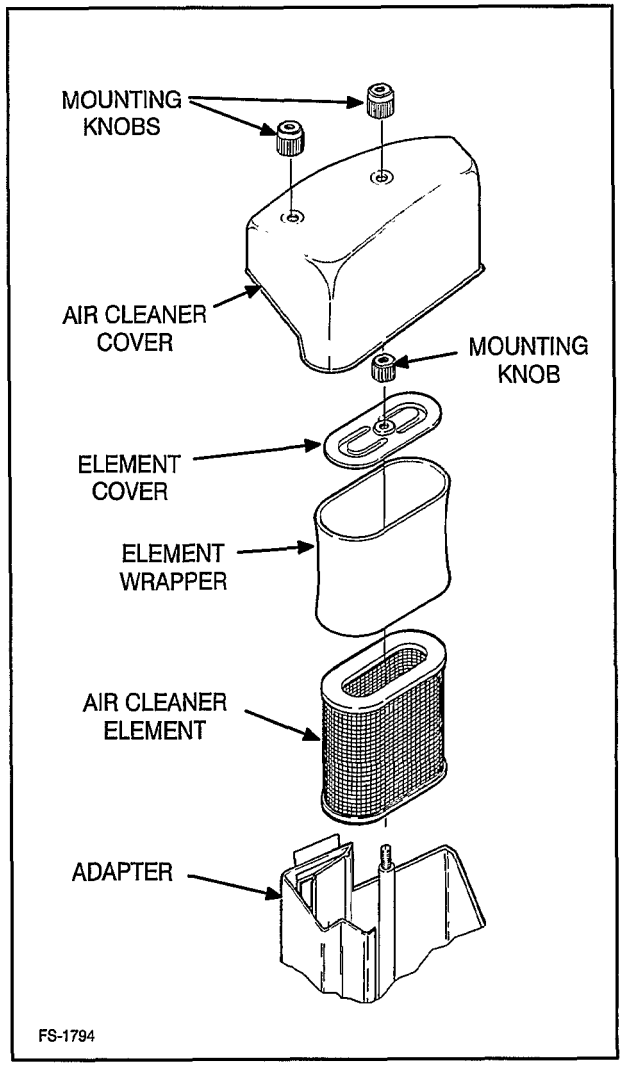

FIGURE 5. AIR CLEANER ASSEMBLY

IGNITION

Spark Plug

Refer to the *Periodic Maintenance Schedule* for the spark plug service interval. Replace the spark plug if it shows signs of fouling or electrode erosion. Refer to *Specifications* (Table 1) for the spark plug gap.

Solid State Ignition

Ignition timing is set at the factory and it is not adjustable. The solid state ignition components do not require any routine maintenance.

COOLING SYSTEM

Refer to the *Periodic Maintenance Schedule* for the cooling system service interval. Clean the cooling fins sooner if required. Remove dust, dirt or oil from the cooling surfaces.

Flywheel Intake Filter

Refer to the *Periodic Maintenance Schedule* for the flywheel intake filter service interval. Check the filter every hour, or more frequently in very dusty conditions.

Remove and clean the filter by washing it in water and detergent. Squeeze the filter dry like a sponge. Rinse it with clean water and allow it to dry. Do not apply oil to the filter or air restriction could cause overheating.

EXHAUST SYSTEM

⚠WARNING A hot exhaust system can cause severe burns. Allow the engine time to cool down before inspecting or servicing the muffler or spark arrester.

Make regular visual and audible inspections of the exhaust system. Locate leaks in the muffler and piping while the engine is operating. Repair all leaks immediately after they are detected for personal safety.

⚠WARNING Breathing exhaust gas can result in severe personal injury or death. Inspect the exhaust system audibly and visually for leaks daily, and repair leaks immediately.

Spark Arrester Service

The spark arrester requires periodic inspection and cleaning for maximum engine performance.

1. Remove the exhaust tube mounting screw.
2. Remove the exhaust tube containing the spark arrester.
3. Inspect the spark arrester screen for for damage and clogging. Replace it if damaged.
4. To clean, lightly tap the the screen, then remove any remaining deposits with a wire brush. A commercial solvent can be used to loosen deposits (carefully follow manufacturer's instructions and safety precautions). Allow the screen time to dry before reinstalling.
5. Reinstall the exhaust tube with the mounting screw.

BATTERY CARE (If Equipped)

Service the battery at the interval shown in the *Periodic Maintenance Schedule.*

⚠WARNING ***Batteries present the hazard of explosion that can result in severe personal injury. Do not smoke or allow any spark, flame, pilot light, arc-producing equipment or other ignition sources around the battery area.***

⚠WARNING ***Battery electrolyte can cause severe eye damage and burns to the skin. Wear goggles, rubber gloves, and a protective apron when working with batteries.***

1. Keep the battery case clean by wiping it with a damp cloth.
2. Make certain that the battery cable connections are clean and tight. Use a terminal puller tool to remove the battery cables.
3. Identify the battery cables as positive (+) or negative (–) before making the battery connections. Always connect the negative (–) cable last, to reduce the risk of arcing.
4. If corrosion is present around the terminal connections, remove the battery cables and wash the terminals. Use an ammonia solution or a solution consisting of 1/4 pound of baking soda added to 1 quart of water. Be sure the vent plugs are tight to prevent the cleaning solution from entering the cells. After cleaning, flush the outside of the battery and the surrounding areas with clean water.
5. Maintain the electrolyte level by adding distilled water. Fill each cell to the split-level marker in the battery. The water component of the electrolyte evaporates, but the sulfuric acid component remains. For this reason, add only water, not electrolyte to the battery.

⚠CAUTION ***Water added to the electrolyte in freezing weather can damage the battery. Do not add water to the battery unless the engine is run long enough (two or three hours) to provide a thorough mixing of water and electrolyte.***

6. Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell (Figure 6). Charge the battery if the specific gravity measures less than 1.215. Do not overcharge the battery. Stop charging the battery when the electrolyte specific gravity reaches 1.260, at approximately 80° F (27° C).

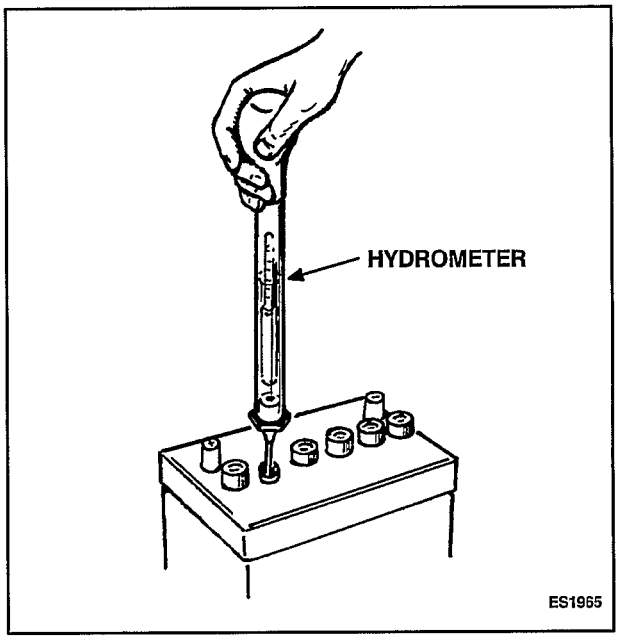

FIGURE 6. BATTERY CHECK

Storing the Battery

If the engine will be in storage for more than 30 days, remove the battery. With the electrolyte level at the bottom of the split ring, charge the battery before storing it. Charge the battery to a full charge every 30 days. Store the battery in a cool place to reduce discharge. Make sure that the electrolyte does not freeze.

Adjustments

HIGH AND LOW IDLE SPEED

The carburetor mixture adjustments are preset for maximum efficiency at the factory. No mixture adjustments are required. Adjust the governor speed settings as follows:

1. Start the engine and allow it to warm up to operating temperature. Then stop the engine.
2. Loosen bolts A and B just enough so the throttle control plate can move in the slot (Figure 7).
3. Move the throttle control lever so a pin can be inserted through the 3.5 mm hole in the throttle control plate and into the throttle control lever. This pin holds the throttle control lever in the wide open position.

   Some equipment manufacturer's require different high and low idle speed settings. Refer to the equipment manufacturer's operator's manual for the correct rpm settings. When rpm settings are not specified by the equipment manufacturer, use the following rpm settings.

4. Start the engine and set the high idle speed by moving the throttle control plate within the slot until 3400 rpm is reached.
5. Tighten bolts A and B.
6. Remove the pin from the 3.5 mm hole.
7. The low idle speed should be approximately 1400 rpm. Low idle speed is determined by the throttle travel distance. If the throttle lever (Figure 7) is resting against the stop when the throttle control is in the idle detent position, back off the idle speed screw 1/32 inch (0.8 mm), so it no longer rests against the throttle lever.

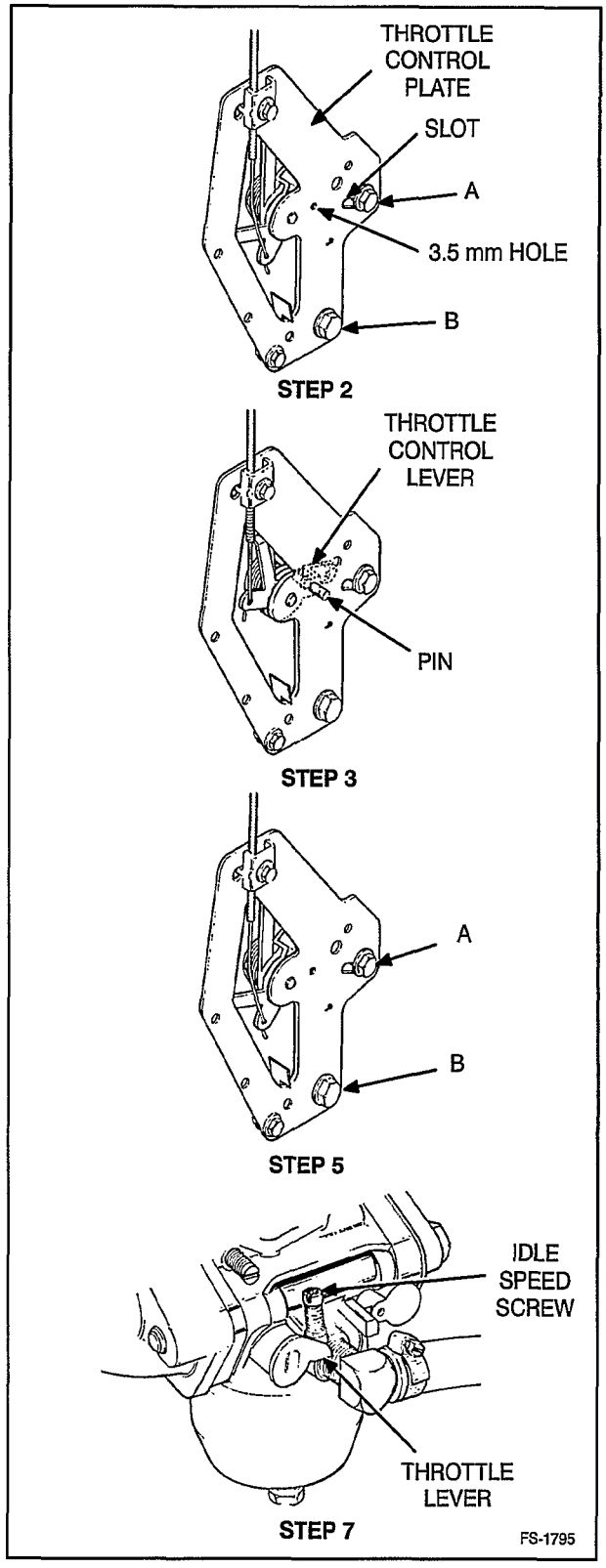

FIGURE 7. GOVERNOR AND CARBURETOR ADJUSTMENTS

Troubleshooting

The following chart is a basic troubleshooting guide. If these recommendations fail to resolve the problem, contact an authorized Onan service center.

⚠WARNING ***Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review the safety precautions on the inside cover page.***

⚠WARNING ***A hot engine can cause severe burns. Always allow the engine time to cool down before performing any maintenance or service procedures.***

TABLE 3. TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
FAILS TO CRANK (110 VAC OR 12 VDC ELECTRIC START)	1. No power to start switch. 2. Low battery. 3. Defective start switch. 4. Defective starter.	1. Check power cord or battery cable connections. 2. Check electrolyte level. 3. Contact an Onan service center. 4. Contact an Onan service center.
CRANKS SLOWLY OR HARD TO PULL RECOIL STARTER	1. Bad battery cable connection. 2. Oil is too heavy.	1. Clean and tighten all battery cable connections. 2. Change to proper weight oil.
CRANKS BUT WON'T START	1. Fuel supply valve closed. 2. Carbon deposits on spark plug. 3. Low oil level. 4. Dirty air cleaner. 5. Fuel or ignition system problem.	1. Fully open fuel supply valve. 2. Clean or replace spark plug. 3. Add oil if low. 4. Clean the air filter. 5. Contact an Onan service center.
UNIT RUNS THEN STOPS	1. Low on fuel. 2. Low oil level. 3. Excess oil.	1. Refill fuel tank. 2. Add oil if necessary. 3. Reduce engine oil level.
UNIT RUNS THEN SURGES	1. Loose or worn spark plug lead. 2. Faulty spark plug. 3. Ignition coil, wiring, or control components defective. 4. Governor out of adjustment. 5. Fuel mixture out of adjustment.	1. Check security of spark plug lead at spark plug and ignition coil. 2. Remove and clean or replace. 3. Contact an Onan service center. 4. Contact an Onan service center. 5. Contact an Onan service center.

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