MICHIGAN U.S.A

RAVENGER®

Ravenger 1950 Wood Chipper

User Manual

[Revision 4.0 July 2019]

READ THIS MANUAL CAREFULLY BEFORE USE – FAILURE TO DO SO MAY RESULT IN INJURY, PROPERTY DAMAGE AND MAY VOID WARRANTY. • KEEP THIS MANUAL FOR FUTURE REFERENCE. • Products covered by this manual may vary in appearance, assembly, inclusions, specifications, description and packaging.

The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil.

Failure to add engine oil will void the product warranty.

Safety

Safety messages are designed to alert you to possible dangers or hazards that could cause death, injury or equipment or property damage if not understood or followed. Safety messages have the following symbols:

 You WILL be KILLED or SERIOUSLY INJURED if you do not follow instructions.	 You CAN be KILLED or SERIOUSLY INJURED if you do not follow instructions.	 You CAN be INJURED if you do not follow instructions or equipment damage may occur.

It is important that you read and understand the instruction manual before use and keep the manual in a safe place for future reference. Safety information presented here is generic in nature – some advice may not be applicable to every piece of equipment. The term “equipment" refers to your product, be it electrical mains, battery or petrol engine powered.

Read all safety warnings and all instructions. When using the equipment, basic safety precautions detailed here must always be followed to reduce the risk of fire, electric shock, personal injury and material damage.

IMPORTANT – Handle the equipment safely and carefully.

BEFORE USE - If you are not familiar with the safe operation/handling of the equipment, or are in any way unsure of any aspect of suitability or correct use it for your application, you should complete training conducted by a person or organization qualified in safe use and operation of this equipment, including fuel/electrical handling and safety.

WARNINGS

- Read all safety warnings and all instructions. When using the equipment, basic safety precautions detailed here must always be followed to reduce the risk of fire, electric shock, personal injury and material damage.
- Do not operate the equipment in flammable or explosive environments, such as in the presence of flammable liquids, gases or dust. The equipment may create sparks or heat that may ignite vapors, dust etc
- Keep clear of moving parts.
- Equipment may be a potential source of electric shock or injury if misused.
- Do not operate the equipment if it is damaged, malfunctioning or is in an excessively worn state.
- Do not allow others to use the equipment unless they have read this manual and are adequately trained.

General Work Area Safety

Work areas should be clean and well it.

Do not operate the equipment if bystanders, animals etc are within operating range of the equipment or the general work area.

General Personal Safety

Keep packaging away from children - risk of suffocation! Operators must use the equipment correctly. When using the equipment, consider conditions and pay due care to persons and property.

Prevent unintentional starting of the equipment - ensure equipment and power source switches are in the OFF position before connecting or moving the equipment. Do not carry equipment with hands/fingers touching any controls. Remove any tools or other items that are not a part of the equipment from it before starting or switching on.

Stay alert and use common sense when operating equipment. Do not overreach. Keep proper footing and balance at all times. Do not use equipment when tired or under the influence of drugs, alcohol or medication. This equipment is not intended for use by persons with reduced physical, sensory or mental capabilities.

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect from serious injury, including eye injury, inhalation of toxic fumes, burns, and hearing loss. Always wear eye protection. Protective equipment such as respirators, non-skid safety shoes, hard hat, hearing protection etc should be used for appropriate conditions. Other people nearby should also wear appropriate personal protective equipment. Do not wear loose clothing or jewellery, which can be caught in moving parts. Keep hair and clothing away from the equipment.

If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used. Use of dust collection can reduce dust-related hazards.

General Equipment Use and Care

Do not force the equipment. Use the correct equipment for your application. The correct equipment will perform better and be safer within its design parameters.

Do not use the equipment if the ON/OFF switch malfunctions – any equipment that cannot be controlled with the ON/OFF switch is dangerous and must be repaired.

Use the equipment and accessories etc. in accordance with these instructions, taking into account working conditions and the work to be performed. Using the equipment for operations different from those intended could result in hazardous situations.

Before use, inspect the equipment for misalignment or binding of moving parts, loose components, damage or any other condition that may affect its operation. If damaged, have the equipment repaired by an authorized service centre or technician before use.

Always keep the equipment and accessories (cutting tools, nozzles, bits etc) properly maintained. Keep the equipment, controls and handles dry and free from dirt, oil and grease.

Store the equipment out of reach of children or untrained persons. To avoid burns or fire hazards, let the equipment cool completely before transporting or storing. Never place the equipment in places where there are flammable materials, combustible gases or combustible liquids etc.

The equipment is not weatherproof, and should not be stored in direct sunlight, at high ambient temperatures or locations that are damp or very humid.

Chipper Use and Care

- The equipment should be operated by responsible adults only, 18 years of age and over.
- The equipment must be used on firm, flat and level surfaces only.
- Maintain a safe working distance of at least 15m (36') between the output chute and any persons, animals or structures.
- Before each use, check the cutting blade clearance and ensure that blade fasteners are tight.
- Do not use the equipment for purposes it is not designed for.
- Do not attempt to chip or shred branches bigger then 120mm diameter.
- Branches greater than 30mm diameter that are growing out of a branch being chipped should be cut off and chipped separately.
- For roots, always remove any attached dirt, stones etc before chipping.
- Do not attempt to chip or shred any material other than suitable wood types.
- Do not attempt to remove materials from the machine or attempt to un-jam it while the machine is running.
- Do not use the machine in confined areas where ventilation or space around the machine is limited.
- After stopping the engine, always allow all moving components (blades etc) to

General Fuel Safety

Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources.

- Do not spill fuel. If you spill fuel, wipe it from equipment immediately – if fuel gets on your clothing, change them immediately
- Do not smoke near fuel.
- Always shut off the engine before refuelling.
- Do not refuel a hot engine.
- Open the fuel cap carefully to allow any pressure build-up in the tank to release slowly.
- Always refuel in well ventilated areas.
- Always check for fuel leakage. If fuel leakage is found, do not start or run the engine until all leaks are fixed.

General Electrical Safety

- Inspect electrical equipment, extension cords, power bars, and electrical fittings for damage or wear before each use. Repair or replace damaged equipment immediately.
- Ensure all power sources conform to equipment voltage requirements and are disconnected before connecting or disconnecting equipment.
- When wiring electrically powered equipment, follow all electrical and safety codes.
- Wherever possible, use a residual current device (RCD).
- Electrically grounded equipment must have an approved cord and plug and be connected to a grounded outlet.
- Do not bypass the on/off switch and operate equipment by connecting and disconnecting the power cord.
- Do not use equipment that has exposed wiring, damaged switches, covers or guards.
- Do not use electrical equipment in wet conditions or damp locations.
- Do not use electrical cords to lift, move or carry equipment.
- Do not tie electrical cords in tight knots and ensure electrical cords do not present trip hazards.

General Service Information

- Have the equipment serviced or repaired at authorized service centers by qualified personnel only.
- Replacement parts must be original equipment manufacturer (OEM) to help ensure that equipment safety is maintained.
- Do not attempt any maintenance or repair work not described in this instruction manual.
- After use, the equipment and components may still be hot – allow the equipment to cool and disconnect spark plugs and/or electrical power sources and/or batteries from it before making adjustments, changing accessories or performing repair or maintenance.
- Do not make adjustments while the equipment is running.
- Perform all service related activities under suitable conditions, such as a workshop etc.
- Replace worn, damaged or missing warning/safety labels immediately.
- Do not clean equipment with solvents, flammable liquids or harsh abrasives.

stop moving before moving, lifting etc.

DANGER

Running petrol engines in confined areas **CAN KILL IN MINUTES**. Engine exhaust fumes contain carbon-monoxide – a deadly gas that you cannot smell or see.

NEVER run a petrol engine in confined areas EVEN IF windows and doors are open. ONLY run petrol engines OUTDOORS and away from doors, windows and vents.

Do not operate the equipment in hazardous locations, such as where there may be a risk of fire or explosions from flammable liquids, gases or dust.

Do not operate the equipment in confined areas where exhaust gases, smoke or fumes could reach dangerous concentrations.

Do not refuel petrol engines while they are running.

Never smoke while refuelling petrol engines.

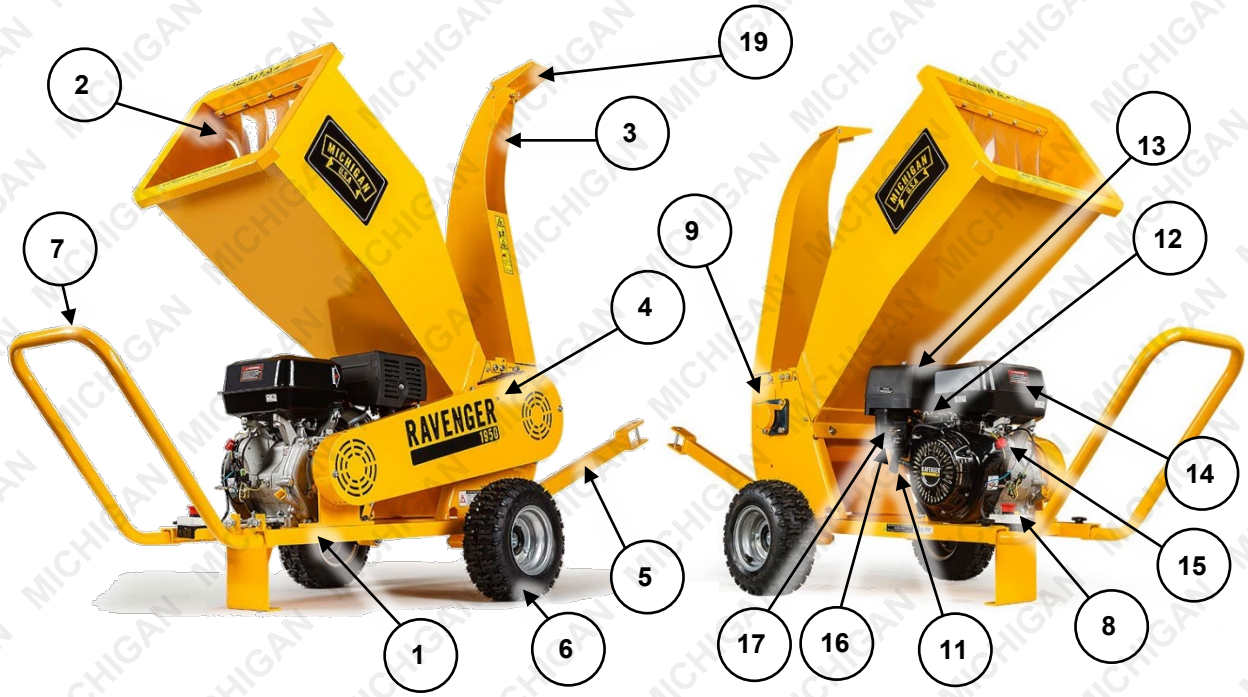
For generators, the electrical output is potentially lethal and must only be connected to a fixed electrical installation by an appropriately licensed person.

Be aware that the equipment may include hazardous components, such as blades, hot surfaces and moving parts.

Table of Contents

Parts Identification

Wood chippers come with all parts required for normal use. A basic toolkit may also be included. It is strongly recommended that you familiarise yourself with all major components of the machine before using it or performing any maintenance tasks.



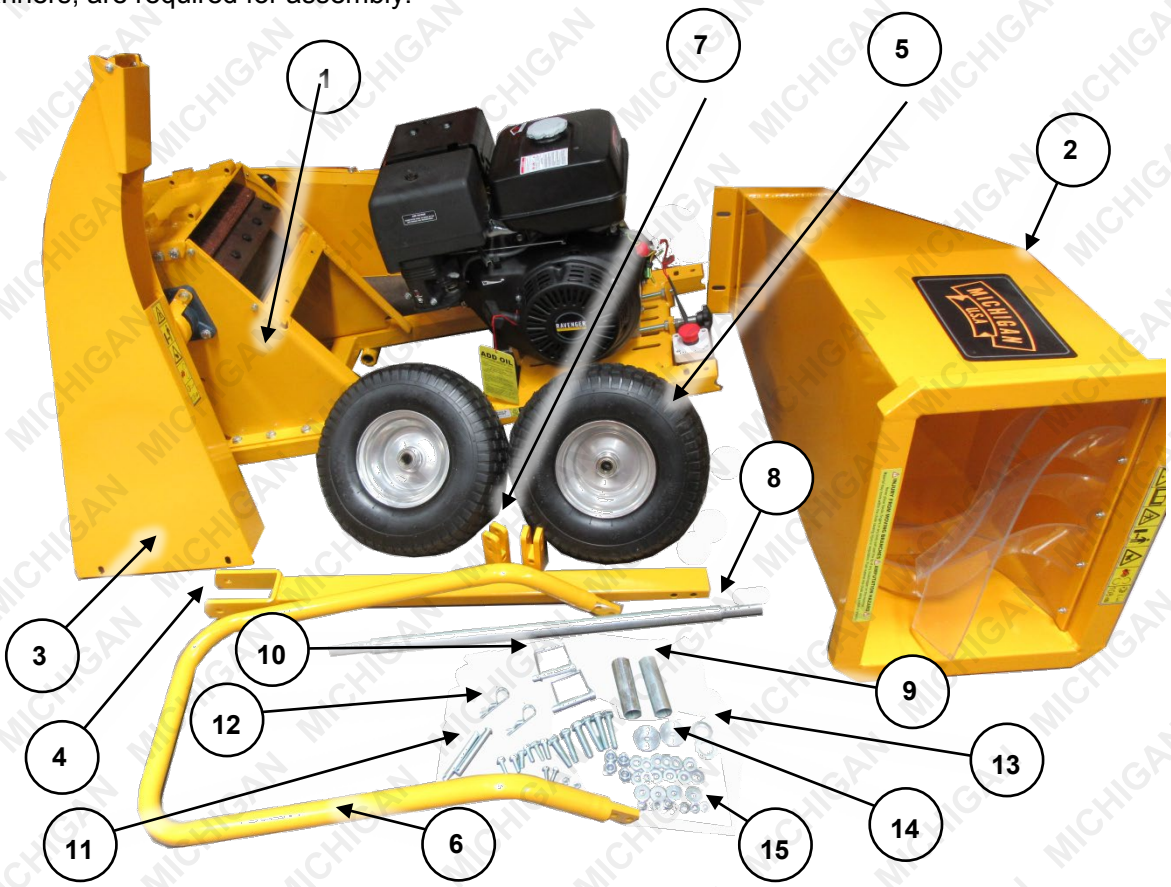
No.	Name	No.	Name
1	Frame	11	Starting Cord
2	Input Chute	12	Throttle Control
3	Output Chute	13	Air Filter Cover (filter inside)
4	Drive Belt Cover	14	Fuel Tank and Cap
5	Towing Arm	15	Engine ON / OFF Switch
6	Wheel (2)	16	Fuel Tap
7	Handle	17	Choke
8	Engine Emergency Stop Button	18	Drive Belt Tensioner (not visible)
9	Blade Shaft Access	19	Output Chute Flap
10	Spark Plug (not visible)		

Before Use Checklist

Ensure that you carry out all procedures below before starting the engine or operating the equipment. **Failure to follow the checklist and carry out the procedures correctly may result in making the product warranty void**. The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**.

Assembly

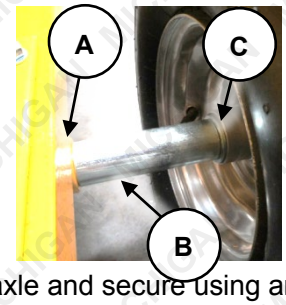
Typically, the chipper requires minimal assembly. Prior to assembly, unpack all components and check that all items have been received. Assembly requires 2 or more persons. Some tools, such as suitable spanners, are required for assembly.

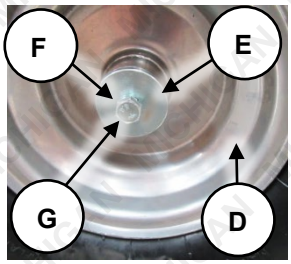


No.	Name	No.	Name
1	Frame	10	Handle Locking Pin (2)
2	Input Chute	11	Towing Arm Locking Pin (2)
3	Output Chute	12	R-Clip (2)
4	Towing Arm	13	Inner Wheel Washer (2)
5	Wheel (2)	14	Outer Wheel Washer (2)
6	Handle	15	Fasteners: M10 Nut (6), M10 x 50 Bolt (4), M10 x 45 Bolt (2), M10 Washer (12), M8 x 25 Bolt (2), M8 x 20 Bolt (4), M8 Spring Washer (6), M8 Washer (4), M6 x 15 Bolt (2), M6 Nut (2)
7	Handle Chock (2)		
8	Axle		
9	Wheel Spacer (2)		

Wheels

1. With the machine frame jacked off the ground safely and sufficiently to get the wheels on, slide the axle through the axle mounts (**A**) on the bottom of the frame.
2. Place a wheel spacer (**B**), followed by an inner wheel washer (**C**) onto each end of the axle.
3. Place a wheel (**D**) onto each end of the axle.

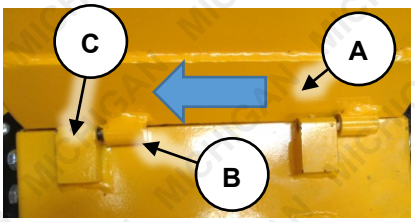


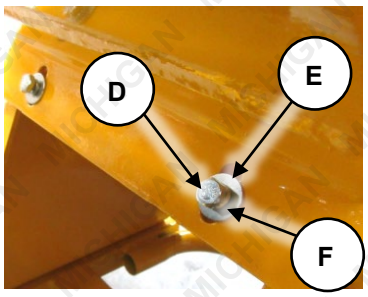


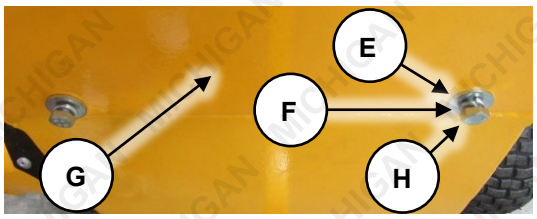
4. Place an outer wheel washer (**E**) over the end of the axle and secure using an M8 spring washer (**F**) and M8 x 20 bolt (**G**). The centre of the axle has "flats" so that a spanner can be used to prevent the axle rotating when tightening the wheel bolts. Firmly tighten (rotate right) the bolts.

Input and Output Chute

5. Place the input chute (**A**) in position on the frame (above the cutting blades) and slide it across so that the locating pins (**B**) in the chute engage with the hinges (**C**) on the frame.
6. Secure the underside lip of the input chute to the machine frame using 2 M8 x 25 bolts (**D**), M8 washers (**E**) and M8 spring washers (**F**). Firmly tighten (rotate right) the bolts.
7. Place the output chute (**G**) in position on the frame (at rear of machine) and slide it across so that the locating pins in the chute engage with the hinges on the frame.
8. Secure the rear lip of the output chute to the machine frame using 2 M8 x 20 bolts (**H**), M8 washers (**E**) and M8 spring washers (**F**). Firmly tighten (rotate right) the bolts.

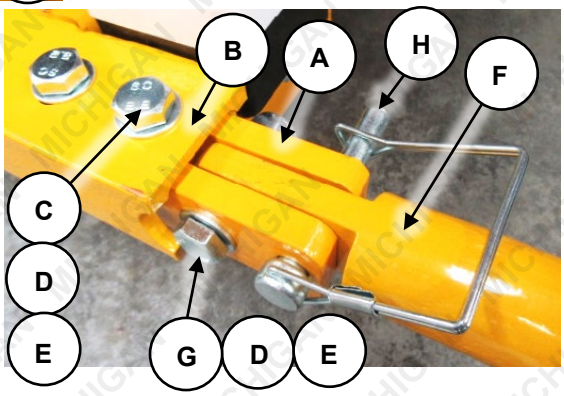






Handle

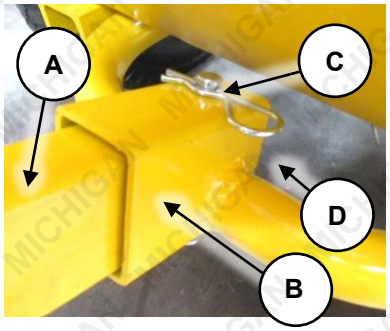
9. Insert a handle chock (**A**) into the end of the frame (**B**) at the front of the machine. Insert the chock so that the "fingers" protrude from the end of the frame.
10. Secure each chock to the frame using 2 M10 x 50 bolts (**C**), 4 M10 washers (**D**) and 2 M10 nuts (**E**). Firmly tighten (rotate right) the bolts.
11. Bring the flat sections at the ends of the handle (**F**) in position between the chock "fingers". Secure each end of the handle at the end hole using a M10 x 45 bolt (**G**), 2 M10 washers (**D**) and a M10 nut (**E**). Firmly tighten (rotate right) the bolts.



12. Use a handle locking pin (**H**) through each remaining handle attachment hole to fully secure the handle.

Towing Arm

13. Insert the end of the towing arm (**A**) into the frame tube (**B**) at the rear of the machine.



14. Insert a towing arm locking pin (**C**) through the frame and handle and secure the pin using an R-clip (**D**). A locking pin and clip is also supplied for securing the other end of the towing arm.

Check Cutting Blades

The cutting system features a fixed blade that is attached to the machine and a spinning rotor that has 2 blades. For safe and correct operation, the clearance between the fixed blade and rotor blades must be correct and all blade fasteners are tight. Before using the machine:

- Check that the cutting blade clearance is between 0.5 and 1.5mm.
- Check that the cutting blade fasteners are secure.

After the first hour of use, re-check the blades.

4-Stroke Engine Oil

The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**.

Four-stroke engines require engine oil in the crankcase for lubrication of internal components. Severe or irreparable damage may occur if the engine is allowed to run without engine oil. The engine oil level requires regular maintenance. Check the engine oil level and ensure that the oil level is at or just under the maximum level indicator.

Always check the engine oil level before starting the engine. See Checking and Changing Engine Oil.

Air Filter

The air filter is used to prevent dirt and other particles from possibly entering the engine and causing internal damage to it. The air filter requires regular maintenance.

Always check the air filter before starting the engine. See Checking, Cleaning and Replacing the Air Filter.

Fuel

Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. • The engine must be cool before refuelling.

Adequately fill the fuel tank with the correct fuel type.

- For 4-stroke engines, use non-ethanol unleaded petrol (higher RON values will provide best engine performance). Do not use old or contaminated fuel.

To fill or top up fuel:

1. Place the machine in an upright position on a flat and level surface.
2. Clean the machine around the fuel filler so that no dirt or other material enters the engine when the cap is removed.
3. Remove (rotate left) the fuel filler cap.

4. Using a funnel, carefully fill the tank with fuel. Do not fill above the top of the strainer (if equipped) or otherwise overfill the tank.

5. When finished, re-install (rotate right) the fuel filler cap until firm. Wipe away any residual fuel from the machine. If fuel has been spilt, move the machine away from the spillage before starting the engine.

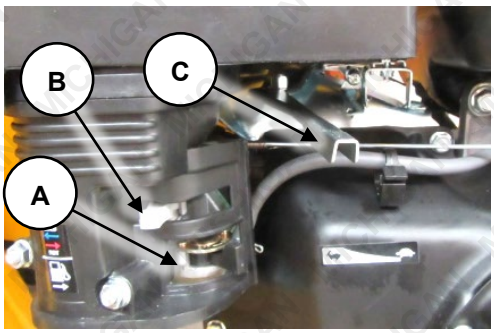
Spark Plug

The spark plug may come disconnected from the spark plug lead. If this is the case, place the electrical lead over the spark plug terminal and push it down so that it connects firmly with the terminal. See Spark Plug Removal/Installation.

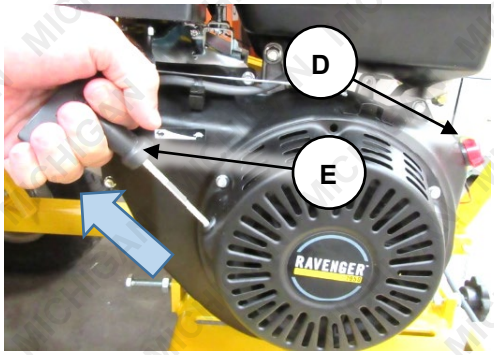
Engine Starting and Stopping

Before starting the engine, ensure that you have followed all procedures described in the Before Use Checklist. The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**.

Major engine controls are identified on the machine by stickers or other markings. To start the engine:

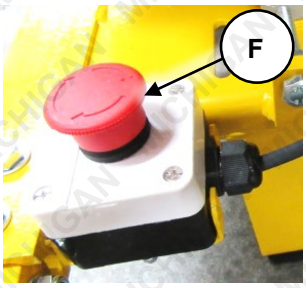


1. **FUEL** – Place the fuel tap (**A**) in the "ON" position. If necessary, “prime” the fuel system by gently pulling the starter cord 4 to 8 times. Priming is required when starting the engine for the first time or after the machine has used all fuel and the carburettor is now "dry".
2. **CHOKE and Throttle** – If the engine is cold, place the choke (**B**) in the "COLD" or "START" position. If the engine is warm or the ambient temperature is high, place the choke in the "HOT" or "RUN" position. Place the throttle control (**C**) just off the "tortoise" (slow) position.



3. **IGNITION** – Place the engine ON/OFF switch (**D**) in the “ON” (“**I**”) position. Ensure that the emergency stop button is not engaged.
4. **START** – Slowly pull out the starter cord (**E**) until you feel it engage with the engine, then pull it out rapidly. The engine should start. Allow the starter cord to rewind slowly – do not let it “snap” back.
5. **WARM-UP and THROTTLE** – It is good practice to allow the engine to warm-up and run smoothly before using the machine. Use the throttle control to set the desired engine speed once the engine is warm. Move the throttle control (**C**) towards the "rabbit" to increase speed, and towards the "tortoise" to reduce speed. If the throttle does not allow the engine to run at a high enough speed, the throttle limiting screw may need to be adjusted.

If the engine does not start, repeat step 4. If the engine fails to start after several attempts, refer to Troubleshooting.



To stop the engine:

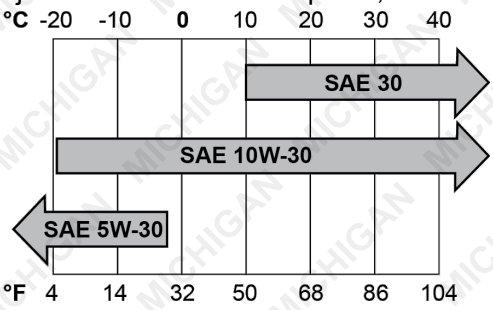
- Place the engine ON/OFF switch (**D**) in the “OFF” position or press the emergency engine stop button (**F**). If the engine is stopped using the emergency stop button, reset the button by rotating it right until it "pops" up. The button must be reset in order to start the engine again.

Environmental Considerations

Altitude

If the engine is being used in altitudes at or above 1500m (approximately 5000'), adjustments to the carburettor may be required. This is because there is less oxygen in the air as altitude increases, which effectively "enriches" the ratio of fuel to air going into the engine and the higher the altitude, the richer the fuel mixture becomes. If the engine is being permanently operated at high altitude, it is recommended to have an authorized service centre make the necessary carburettor adjustments. If the engine is used occasionally at altitude (not extreme altitudes), no adjustments should be required, however, a slight decrease in engine performance can be expected.

Temperature



If the engine is being used in extremely cold or hot environments; for example, desert or snow conditions, the type of engine oil may need to be changed to suit environmental temperatures. Oil thickens as the temperature decreases and thins as temperature increases, which means that if the engine oil is not suited to the temperature its ability to properly lubricate the engine may be affected. Use the following chart to determine the correct engine oil:

Operation

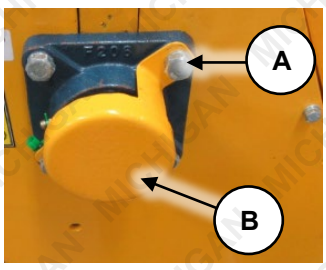
The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**. • Always wear suitable protective clothing and equipment when using the machine. • Inspect the machine before each use and check for wear or damage. If the machine is damaged, have it inspected and repaired at an authorized service centre before using it again. • If you experience excessive vibration or noise or noticeably reduced performance from the machine during operation, this is an indication of possible wear or damage. It is recommended to have it inspected and repaired at an authorized service centre before using it again. • Be aware that once the engine is running, the cutting blades will be rotating and parts of the machine may be extremely hot. • Ensure that the machine stands firmly on the ground and is not tilted in any way or otherwise unstable. • In order to avoid serious injury or damage by chips thrown from the output chute, onlookers, animals and structures should be at least 15m (36') away from the output chute (debris can be thrown up to 12m from the machine).

Chipping and Shredding

Do NOT overload the machine by feeding overly large material into it, or at a rate that creates unnecessary loads. For some wood types that are particularly hard, you may have to reduce the size of the material being chipped. • Never hold on to material as it is being drawn into the machine – always release the material. • Do not attempt to chip or shred tough fibrous plant material such as flax or vines. • When chipping material large material, process one branch at a time. • Do NOT force material into the chipper. • Do not attempt to chip or shred branches bigger than 120mm diameter. • Branches greater than 30mm diameter that are growing out of a branch being chipped should be cut off and chipped separately. • For roots, always remove any attached dirt, stones etc before chipping. • Do not attempt to chip or shred any material other than suitable wood types. • Do not attempt to remove materials from the machine or attempt to un-jam it while the machine is running.

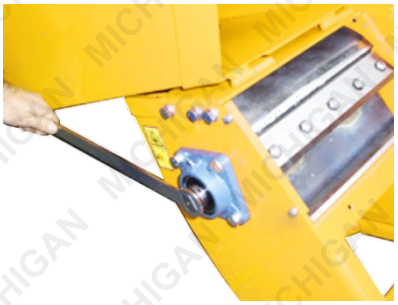
1. Ensure that the input and output chutes are properly attached and free of obstructions.
2. Start the engine, allow it to warm up, then run at full speed.
3. Drop or feed the material to be chipped into the input chute. There is no need to "push" it in – once the material makes contact with the blades it will be pulled into the machine.
4. When finished, stop the engine, turn off the fuel tap etc. Wait until the machine completely stops before moving, cleaning the machine etc

Clearing Jammed Blades



It is possible that the machine blades become jammed. This is usually caused by attempting chip material that is too large. To clear jammed material:

1. Stop the engine immediately.
2. Pull the spark plug lead from the spark plug to prevent accidentally starting the engine or ignition from possibly occurring.
3. Remove the input and output chutes and ensure that the chutes are free of obstructions.



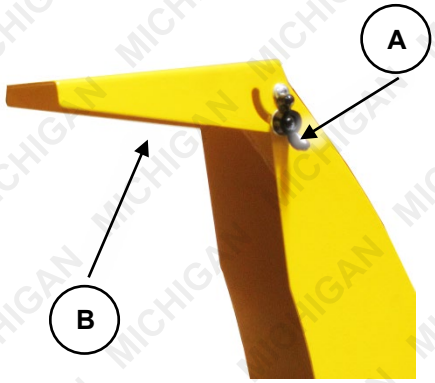
4. Remove the 2 bolts (**A**) securing the blade shaft access cover (**B**) and remove the cover – this allows access to the blade shaft so you can rotate the blades

5. Using a suitable spanner on the end of the blade shaft, rotate the shaft as required.

6. Using suitable tools or objects, remove any obstructions, non-chippable material etc from the blades.

7. Ensure the blades can rotate fully before re-assembling the machine and using it again.

Adjusting the Output Flap



The output chute has an adjustable flap that can be used to help direct where chippings will fall. To adjust:

1. loosen (rotate left) the thumb-screw (**A**).

2. Rotate the flap (**B**) as required – the higher it is, the further away the chippings will fall.

3. Firmly tighten the thumb-screw by hand.

Maintenance

Running petrol engines in confined areas **CAN KILL IN MINUTES**. Engine exhaust fumes contain carbon-monoxide – a deadly gas that you cannot smell or see. NEVER run a petrol engine in confined areas EVEN IF windows and doors are open. ONLY run petrol engines OUTDOORS and away from doors, windows and vents. • Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**. • Do not have the engine running during inspection and maintenance unless specifically required. • The engine should be cool enough to touch before performing maintenance activities. • Some maintenance activities described may be beyond the scope of some users. For procedures that you are not comfortable with or have the tools or experience for, have the unit serviced by a service centre or qualified technician.

To keep the equipment performing at optimal efficiency, regular checks and maintenance is required. Proper care and maintenance ensures best performance and longest service life.

The maintenance schedule below specifies preventative maintenance checks and necessary maintenance tasks and how often they should be performed.

Harsh operating environments such as extreme temperatures, dust etc may necessitate more frequent maintenance. • Maintenance frequencies are based on general factors including a maximum use of approximately 300 hours per year. Apply common-sense when following the maintenance schedule based on your actual use of the product. • Keep reasonable records of maintenance activities for reference. **Failure to follow the maintenance schedule, using incorrect or non-compatible accessories or replacements parts, or general negligence may result in making the product warranty void.**

Maintenance Schedule

		Frequency – *Whichever Comes First*			
Component/Task	**Every Use**	**First Month or 20 Hours Use**	**Every 3 Months or 50 Hours Use**	**Every 6 Months or 100 Hours Use**	**Every Year or 300 Hours Use**
Engine Oil	Check	Replace		Replace	
Oil Leaks	Check/repair as necessary				
Air Cleaner	Check	Clean and replace as necessary			
Spark Plug			Check	Replace	
Valve Clearance					Adjust as necessary
Combustion Chamber					De-coke as necessary
Idle Speed				Check/adjust as necessary	
Fasteners	Check/tighten as necessary				
Fuel Tank					Flush and clean
Fuel Line		Replace as necessary			
Fuel Filter		Clean and replace as necessary			

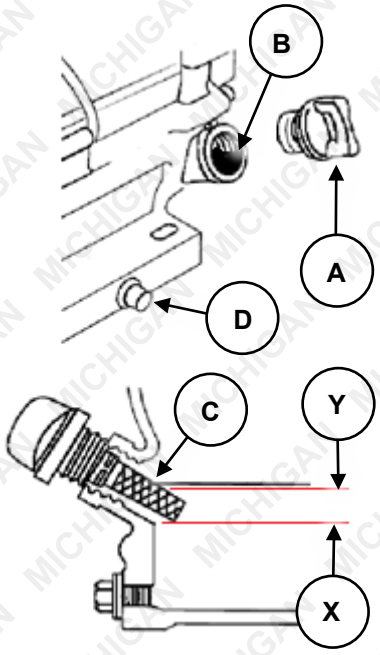
Component/Task	Every Use	Frequency – *Whichever Comes First*			
		First Month or 20 Hours Use	Every 3 Months or 50 Hours Use	Every 6 Months or 100 Hours Use	Every Year or 300 Hours Use
Fuel Strainer	Check				
Blade Shaft				Lubricate	
Drive Belt					Check/adjust as necessary

Checking and Changing Engine Oil

The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use. **Failure to add engine oil will void the product warranty**. • Always check engine oil level when the machine is in an upright position on a flat and level surface. • Do not use used or contaminated engine oils. • Use only engine oils of the correct type (see Specifications). • Perform the first oil change within the first 20 hours of use. Subsequently, change the oil every 20 hours of use. • It is recommended that the engine be warm, but not hot, when performing oil changes. When the oil is warm it drains faster. • Using dirty or incorrect engine oil may cause engine damage and void any warranty • Always use suitable tools. • Always dispose of used oil in an environmentally responsible manner and according to regulations.

Four-stroke engines require engine oil in the crankcase for lubrication of internal components. Severe or irreparable damage may occur if the engine is allowed to run without engine oil. The engine oil level requires regular maintenance as per the maintenance schedule.

To check engine oil level:



1. Place the machine in an upright position on a flat and level surface.
2. Clean the machine around the oil filler cap (**A**) so that no dirt or other material enters the engine when the cap is removed.
3. Remove the oil filler cap (rotate left) until fully unscrewed. For machines without a dipstick, the oil level is determined by how close the oil is to the filler hole (**B**). The lower limit is indicated by (**X**), the upper limit by (**Y**). For machines equipped with an oil level dipstick:
   a. Wipe the dipstick (**C**) clean with a piece of cloth or paper.
   b. Insert the dipstick into the oil filler but do not screw it in.
   c. Remove and inspect the dipstick – the oil level is determined by where oil can be seen on it.
4. Ensure that the oil level is at or just under the permissible maximum. If the oil level is low, add additional oil until the correct level is reached. If the oil level is too high, drain some oil until the correct level is reached.
5. When finished, reinstall (rotate right) the oil filler cap until firm. Wipe off any residual oil from the machine.

To change the engine oil:

1. Place the machine on a suitable work surface that is flat and level and have a container ready to catch drained oil.
2. Clean the machine around the oil drain plug (**D**) and oil filler (**A**) so that no dirt or other material enters the engine when the plug or cap is removed.
3. Unscrew (rotate left) and remove the drain plug and washer.
4. Tilt the machine and drain all oil from the engine. Once drained, allow the machine to sit level again.
5. Clean the drain plug and washer and then reinstall them. Screw in fully (rotate right) and firmly tighten.
6. Remove the oil filler cap (rotate left) until fully unscrewed. Wipe the oil level indicator clean with a piece of cloth or paper.
7. Using a funnel, carefully add oil to the engine until the permissible maximum is reached. Double-check the oil level (described above).
8. When finished, reinstall (rotate right) the oil filler cap until firm. Wipe off any residual oil from the machine.

Checking, Cleaning or Replacing the Air Filter

Operating the machine without a functional air filter may cause severe engine damage and will void any warranty. • A dirty or oil saturated air filter will restrict air flow, which can be mistaken as fuel system problems. Check the condition of the air filter before adjusting engine idle speed, where applicable. • If the air filter is damaged (torn, broken, disintegrating), replace it.

The air filter is used to prevent dirt and other particles from possibly entering the engine and causing internal damage to it. The air filter requires regular maintenance as per the maintenance schedule.

Air Filter Inspection and Cleaning

Inspect the air filter for dirtiness and debris, damage etc. Clean or replace the filter element as necessary. To clean air filters:

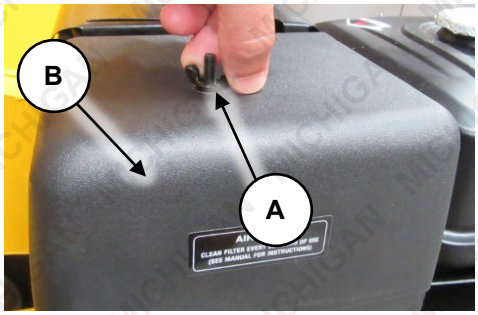
- For foam filters, wash the filter in warm water and mild detergent, then rinse and allow to dry.
- For paper filters, use compressed air to blow particles from it, if possible. The air should be blown from the engine side of the filter. Tapping the filter element against a hard surface and brushing the pleats using a soft brush may also help remove debris from the filter.
- For foam filters, place a few drops of clean engine oil on the filter then squeeze it a few times to spread the oil through the filter material and remove any excess oil.
- It is recommended to clean the air filter cover and air intake assembly of any dirt, cuttings etc.

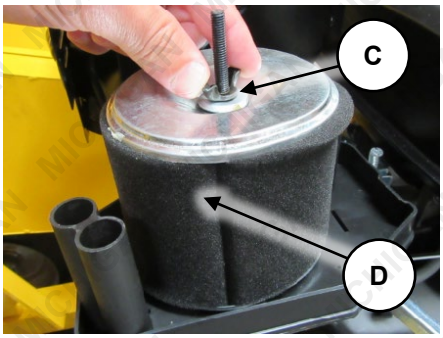
To remove the air filter:

1. Remove (rotate left) the wing-nut (**A**) securing the air filter cover (**B**), then remove the cover from the air intake assembly.
2. Remove (rotate left) the wing-nut (**C**) securing the air filter element (**D**), then remove the filter element from the air intake assembly.

To install the air filter:

1. Insert the air filter element, and ensure it is correctly positioned in relation to the air intake assembly as it will seat and seal properly in one position only. Secure the air filter element with the wing-nut (rotate right and tighten by hand. Do not over-tighten).
2. Re-install the filter cover, ensuring it is fitted properly against the engine and secure it with the wing-nut (rotate right and tighten by hand. Do not over-tighten).



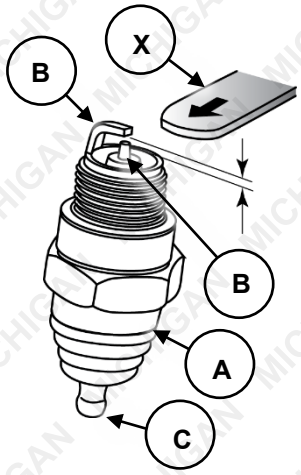


Spark Plug

If the spark plug is damaged (cracked insulator, broken or eroded electrodes etc), replace it. • Always use spark plugs of the correct “heat range” - see Specifications.

The spark plug is used to ignite the air/fuel mixture inside the engine. The spark plug has electrodes on one end and an electrical terminal on the other. The spark plug requires regular maintenance.

Spark Plug Cleaning and Gap Checking



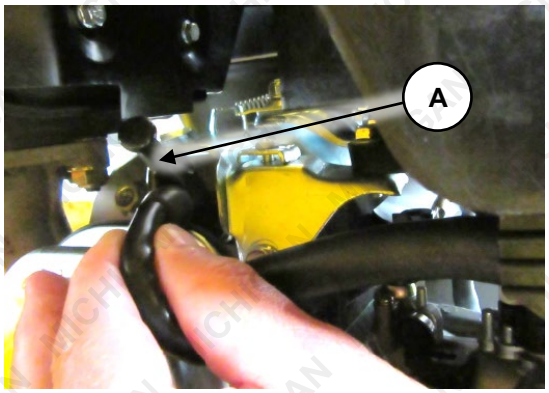
The spark plug should be checked and cleaned as per the maintenance schedule.

1. Remove any carbon deposits on the spark plug (**A**) electrodes (**B**) with a wire brush.
2. Clean the spark plug threads and the electrical terminal (**C**) on the top.

To check and adjust the spark plug “gap”:

1. Use “feeler” or “thickness” gauges (**X**) to measure the existing gap. The gauge must drag a little when being slid between the electrodes (**B**) – this means the measurement is fairly accurate.
2. Adjust the gap to within specification (see Specifications). If the gap needs to be reduced, gently tap the electrode as required. If the gap needs to be increased, use pliers to gently pull the electrode as required.
3. Measure the gap again and ensure it is within the specified range before re-installing the spark plug.

Spark Plug Removal/Installation



1. Pull the electrical lead (**A**) from the terminal on top of the spark plug. The spark plug is located below and between the air filter and exhaust cases.
2. Clean the area around the spark plug so that no dirt or other material can enter the engine when the spark plug is removed.
3. Use the spark plug tool to remove the spark plug (rotate left).

To re-install the spark plug:

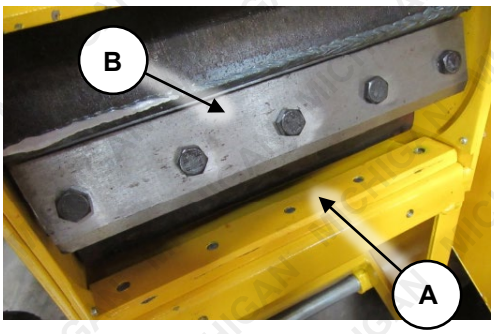
1. Place the spark plug in its hole and screw it in (rotate right) until “finger tight”.
2. Use the spark plug tool to tighten the spark plug approximately one quarter turn (do not over-tighten).
3. Place the electrical lead over the spark plug terminal and push it down so that it connects firmly terminal.

Blades

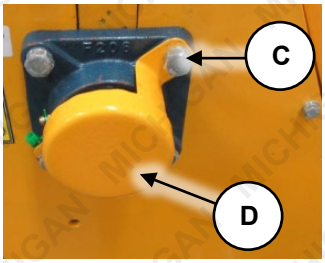
If a blade is damaged (cracked etc), replace it. • Ensure that blades are kept in good condition and correct clearance is maintained - see Specifications. • Ensure that all bolts securing the blades are firmly tightened – check them regularly. • Always handle blades with protective gloves on.

The machine uses 3 blades – 1 fixed blade (**A**) that is bolted to the machine body, and 2 blades (**B**) that are mounted to a rotating shaft. The blades require regular maintenance.

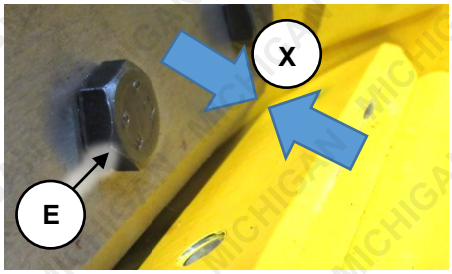
1. Remove the 2 bolts (**C**) securing the blade shaft access cover (**D**) and remove the cover – this allows access to the blade shaft so you can rotate the blades.



2. Using a suitable spanner on the end of the blade shaft, rotate the shaft as required.



Clearance Checking



The blade clearance should be regularly checked. Incorrect blade clearance will affect machine performance.

1. Remove the input chute from the machine.
2. Clean away any chippings, dirt etc from the blades.

To check and adjust the blade clearance:

1. Use “feeler” or “thickness” gauges to measure the existing gap (**X**). The gauge must drag a little when being slid between the blades – this means the measurement is fairly accurate.
2. If the blade requires adjusting, loosen (rotate left) the blade bolts (**E**) just enough to allow the blade to be moved – do not remove the bolts. Adjust the clearance to within specification (see Specifications). If the clearance needs to be reduced, gently move the blade towards the fixed blade as required. If the clearance needs to be increased, gently move the blade away from the fixed blade as required.
3. Measure the clearance again and ensure it is within the specified range before tightening the blade bolts.

Repeat the above procedure for the other blade.

Blade Removal/Installation

The blades can be removed from the machine in order to be sharpened or replaced. Note that the blades may have 2 cutting edges that allows you to switch the blade around to use the other cutting edge.

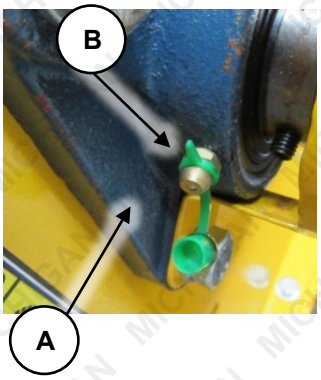
1. Remove (rotate left) all bolts securing the blade to be removed. The bolts for the fixed blade can be accessed from underneath.
2. Carefully remove the blade. When sharpening, use a suitable grinder and remove as little material as possible from the blade.

To re-install blades:

1. Clean the blade and ensure that the bolt holes in the machine are clean.
2. Place the blade in position and screw in (rotate right) all blade bolts until “finger tight”.
3. Check blade clearance and adjust if required.
4. Firmly tighten all blade bolts.

Blade Shaft Lubrication

The blade shaft bearings must be lubricated according to the maintenance schedule. The shaft bearing housing (**A**) on either side of the machine features a grease nipple (**B**). A grease gun and grease is required – normal automotive wheel bearing grease is suitable. Attach the grease gun hose to the nipple and inject one squeeze of grease. Always lubricate both shaft bearings.



Drive Belts

If a drive belt is damaged (cracked, breaking, torn etc), have it replaced. • Ensure that drive belt tension is maintained - see Specifications.

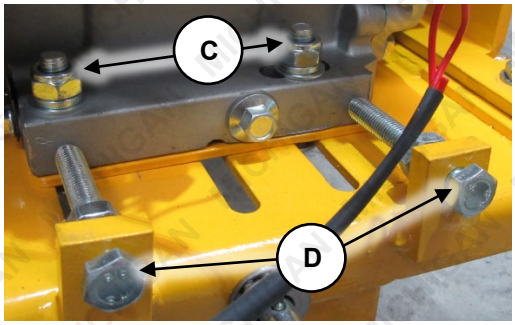
The machine uses 2 "V" profile belts to rotate the blade shaft. The belts use friction against the belt pulleys to provide drive. If the belts are adjusted incorrectly, or are worn, slippage may occur – this is usually noticeable by a "squealing" noise and/or slowing or stopping of the blades when the machine is under load. The belts require maintenance only when necessary.

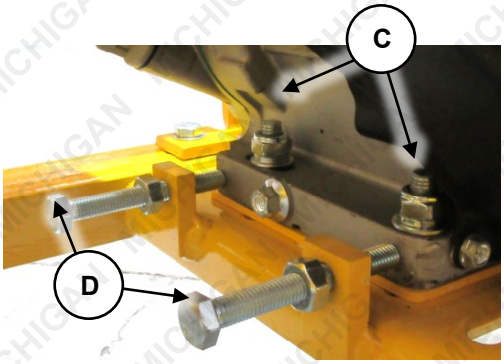
Belt Tension Adjustment

To adjust belt tension:

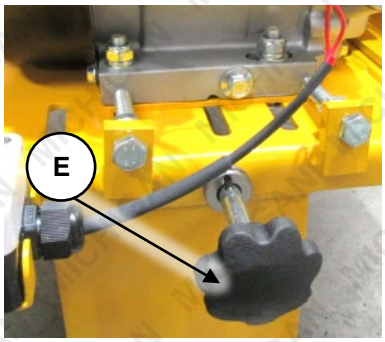
1. Remove (rotate left) the 8 bolts (**A**) securing the drive belt cover (**B**), and remove the cover.

2. Loosen (rotate left) the 4 engine mounting bolts (**C**) at the front and rear of the engine. Do not remove the bolts.



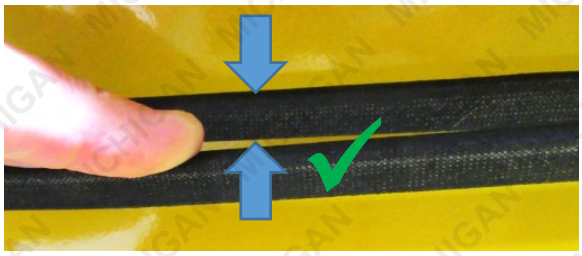


3. Loosen (rotate left) the 4 engine locating bolts (**D**) at the front and rear of the engine. Do no remove the bolts. Depending on the direction that you want to move the engine (towards the machine handle to increase belt tension), back off the bolts and lock nuts sufficiently so the engine can be moved.



4. Rotate the knob (**E**) as required to slide the engine either forward or backward. Adjust the engine position so that when you press hard on a belt it should deflect approximately one thickness of belt.

5. When the belt tension is correct, firmly tighten (rotate right) the engine mounting bolts.



6. Screw in (rotate right) the engine locating bolts until they make contact with the engine (do not actually move the engine), then firmly tighten the lock nuts.

7. Check the belt tension and adjust, if required. Re-install the belt cover and firmly tighten (rotate right) all belt cover mounting bolts.

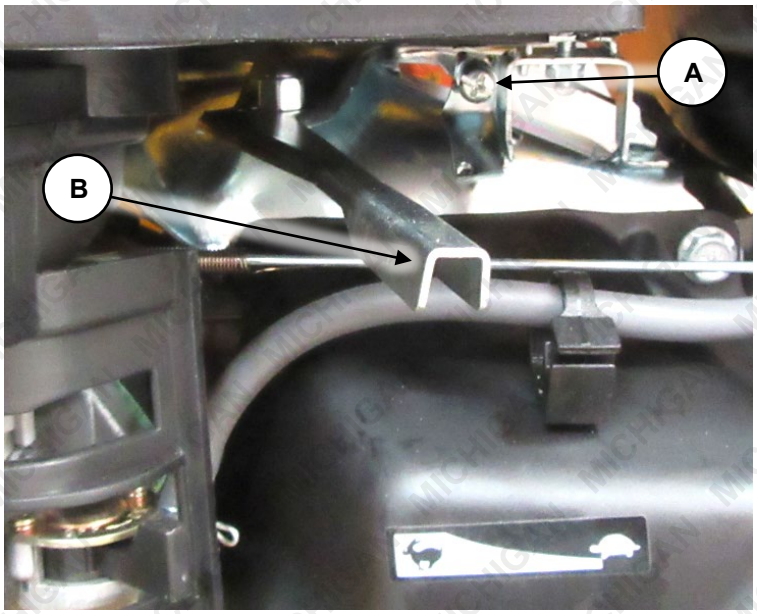
Belt Removal/Installation

The drive belts can be replaced. When replacing belts, always use the correct belt type (see Specifications) and replace both belts.

1. Remove the drive belt cover.
2. Loosen the engine mounting and locating bolts. Back off the rear engine locating bolts sufficiently so that the engine can be moved enough to remove/install the belts.
3. Remove the belt from the drive pulleys.
4. Ensure the drive pulleys are clean and smooth.
5. Place the new belt over the pulleys then adjust as described above.

Throttle Limiter Adjustment

The engine may be equipped with a screw that determines how far the throttle can be opened. This is normally set at the correct position by the factory, however, over time may need adjustment due to vibration etc. If it is not possible to run the engine at full speed, particularly when under load, then the limiter screw may require adjusting. To adjust the throttle limiter:



1. Locate the throttle limiter screw (**A**), above the throttle control (**B**).
2. Rotate the screw to the left (anti-clockwise) to increase the maximum throttle opening. Rotate to the right (clockwise) to reduce the maximum throttle opening.
3. Check throttle operation and engine speed under load – make further adjustments, if required.

Cleaning Guidelines

Do not use solvents, chemicals or abrasives when cleaning the machine, as some surfaces may be damaged. • Do not use high-pressure sprayers near the blade shaft bearings as bearing damage may result. • Wear gloves or use suitable tools to assist in cleaning – do not use bare hands. • Clean the machine after every use to ensure best performance and longest service life. • Avoid tilting the machine to avoid potential fuel or oil spills or leaks.

- Use a slightly damp cloth, water and mild detergent for cleaning.
- Use a brush for parts that are difficult to reach.
- Ensure air vents and surfaces designed for heat dissipation are clean and free of obstructions or debris.
- It is recommended to lightly oil the cutting blades after each use to help prevent corrosion.
- Ensure all chutes and flaps are clean and not obstructed.
- Ensure that all control cables, levers, switches etc are clean and operate normally and smoothly.

Transportation and Storage

Always ensure that the machine is cool enough to touch before transporting or storing. • Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources.

Preparing for Transport and Storage

- Clean the equipment before transport or storage.
- Disconnect the spark plug lead.
- Store the equipment in a dry, well-ventilated area and out of the reach of children.

Long Term Storage

1. Follow the normal procedures for storage, then:

- Drain the fuel system. It is advised to have the fuel tank as empty as possible before draining.
  a. Unscrew (rotate left) the carburettor drain plug. Use a suitable container to catch the draining fuel, and allow the fuel to drain. Store the drained fuel in a properly sealed container.
  b. Re-install (rotate right) the carburettor drain plug and tighten.

2. Remove the spark plug and put 30ml of clean engine oil into the cylinder. Pull the starter rope slowly to distribute the oil. Re-install the spark plug.
3. Lubricate the blade shaft bearings.
4. Cover the equipment to protect it from dirt and dust.

Troubleshooting

Running petrol engines in confined areas **CAN KILL IN MINUTES**. Engine exhaust fumes contain carbon-monoxide – a deadly gas that you cannot smell or see. NEVER run a petrol engine in confined areas EVEN IF windows and doors are open. ONLY run petrol engines OUTDOORS and away from doors, windows and vents. • Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Checking and Changing Engine Oil. **Failure to add engine oil will void the product warranty**. • Do not have the engine running during inspection and maintenance unless specifically required. • The engine should be cool enough to touch before performing maintenance activities. • Some maintenance activities described may be beyond the scope of some users. For procedures that you are not comfortable with or have the tools or experience for, have the unit serviced by a service centre or qualified technician.

The following information may assist in identifying a problem and rectifying it.

Note: Some procedures listed here may need to be performed by a service centre or qualified technician. • If problems persist after following all suggested actions, contact a service centre or qualified technician.

Difficulty starting the engine.

Possible Fault	Action
Lack of fuel	Check that there is fuel in the tank and the fuel system is primed. • To further check if fuel is reaching the carburettor, remove the carburettor drain plug and check if fuel drains.
Engine "OFF"	Ensure engine ON/OFF switch is in the "ON" position (if applicable). • Ensure that the emergency engine stop button is not engaged (that is, reset the switch).
Not enough or too much engine oil	Check oil level and ensure that the level is at or just below the recommended maximum level.
***B**lades jammed*	Remove jammed material from the machine.
Carbon build-up on spark plug	Remove the spark plug and clean any carbon from the electrodes before re-installing it.
Spark plug faulty	Remove the spark plug, then reconnect the plug lead to it. Place the engine ON/OFF switch in "ON" position. Touch the spark plug electrode to a part of the engine crankcase, away from the spark plug hole, and attempt to start the engine – a spark should be visible across the electrodes as the engine is rotated. If no spark is visible, replace the spark plug.
Engine "flooded" with fuel	Place the choke in "HOT" or "RUN" position. Leave the ON/OFF switch in the "OFF" position. Pull the starter cord several times to assist clearing excess fuel from engine before attempting to start engine.

Engine starts but does not idle.

Possible Fault	Action
Blocked air filter	Check and clean the air filter.
⬇	
Idle speed requires adjustment	Adjust idle speed until engine runs smoothly and at a reasonable speed when idling.

Difficulty restarting the engine after use or engine stops suddenly during use.

Possible Fault	Action
No fuel or engine oil	Check fuel level and ensure adequate fuel is available. For some 4-stroke engines, an engine oil sensor will automatically switch off the engine or prevent starting if a low engine oil level is detected.
⬇	
***B**lades jammed*	Remove jammed material from the machine.
⬇	
Overheating	Allow engine to cool before restarting. Ensure all air vents and heat dissipation surface are clean and free of debris. If possible, improve engine cooling, such as operating in lower temperatures.
⬇	
Carbon build-up on spark plug	Remove the spark plug and clean any carbon from the electrodes before re-installing it.
⬇	
Carburettor blocked	Clean the carburettor.

Reduced engine speed/power during use.

Possible Fault	Action
Throttle limiter adjusted incorrectly	Ensure that throttle limiter is set to allow engine to run at full speed..
⬇	
Blocked air filter	Check and clean air filter.
⬇	
Carbon build-up in engine and/or entry to exhaust silencer	Remove the engine cylinder head and clean any carbon from the combustion chamber. For the exhaust silencer, remove it and clean any carbon deposits from the exhaust entry port.
⬇	
Carbon build-up on spark plug	Remove the spark plug and clean any carbon from the electrodes before re-installing it.
⬇	
Carburettor blocked	Clean the carburettor.

Chipping / shredding action is poor.

Possible Fault	Action
Obstruction	Remove overly large branches from machine. • Ensure all chutes are free of obstructions.
⬇	
Blade clearance incorrect	Check that cutting blade clearance is 0.5 to 0.8mm.
⬇	
Drive belts slipping	Adjust drive belt tension.
⬇	
Blades dull or damaged	Sharpen or replace cutting blades.

Machine jamming.

Possible Fault	Action
Material too large / incorrect type	Remove overly large branches from machine. • Reduce size of material being chipped.• Reduce feed rate of material. • Ensure all chutes are free of obstructions and non-chippable material (stones, metal etc).
Blade clearance incorrect	Check that cutting blade clearance is 0.5 to 0.8mm.
Drive belts slipping	Adjust drive belt tension.
Blades dull or damaged	Sharpen or replace cutting blades.

Excessive vibration.

Possible Fault	Action
Material too large / incorrect type	Remove overly large branches from machine. • Reduce size of material being chipped.• Reduce feed rate of material. • Ensure all chutes are free of obstructions and non-chippable material (stones, metal etc).
Blades dull or damaged	Sharpen or replace cutting blades.
Blade clearance incorrect	Check that cutting blade clearance is 0.5 to 0.8mm.
Fasteners loose	Check all accessible fasteners for tightness.

Specifications

Type	4-stroke, single cylinder
Capacity	420cc
Fuel	Non-ethanol unleaded petrol (higher RON values provide best performance)
Spark Plug	F7TC, F7RTC
Spark Plug Gap	0.7 to 0.8mm (0.028 to 0.032”)
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006” ± 0.001”) Exhaust: 0.2mm ± 0.02mm (0.008” ± 0.001”)
Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Oil Capacity	Approximately 1.1l (always check level)
Maximum Branch Size	Approximately 120mm diameter
Blade Clearance	0.5 to 0.8mm (0.020 to 0.032”)
Drive Belt	2 x SPA 1782
Tyre	2 x 15 x 6.00 - 6

Service and Maintenance Record

Use the following tables as a record of machine servicing and maintenance. Keeping accurate records will help ensure better machine service life and may simplify fault diagnosis and any possible warranty claims. Place a tick in the required box for either clean or replace with the date, as required.

	✓	Date	✓	Date	✓	Date	✓	Date	✓	Date
Replace Engine Oil										
Replace Spark Plug										
Replace Air Filter										
Replace Fuel Filter										
Replace Fuel Lines										
Clean Fuel Tank										
Check/Adjust Valve Clearance										
De-coke Combustion Chamber										

	✓	Date	✓	Date	✓	Date	✓	Date	✓	Date
Replace Engine Oil										
Replace Spark Plug										
Replace Air Filter										
Replace Fuel Filter										
Replace Fuel Lines										
Clean Fuel Tank										
Check/Adjust Valve Clearance										
De-coke Combustion Chamber										

Some experts believe the incorrect or prolonged use of almost any product could cause serious injury or death. For information that may reduce your risk of serious injury or death, consult the points below and additionally, the information available at www.datastreamserver.com/safety

- Consult all documentation, packaging and product labelling before use. Note that some products feature online documentation which should be printed and kept with the product.
- Check product for loose / broken / damaged / missing parts, wear or leaks (if applicable) before each use. Never use a product with loose / broken / damaged / missing parts, wear or leaks (if applicable).
- Products must be inspected and serviced (if applicable) by a qualified specialist every 6 months assuming average residential use by a person of average weight and strength, above average technical aptitude, on a property matching average metropolitan specification. Intended use outside these guidelines could indicate the product is not suitable for intended use or may require more regular inspection or servicing.
- Ensure all possible users of the product have completed an industry recognized training course before being given access to the product.
- The product has been supplied by a general merchandise retailer that may not be familiar with your specific application or your description of the application. Be sure to attain third-party approval for your application from a qualified specialist before use regardless of prior assurances by the retailer or its representatives.
- This product is not intended for use where fail-safe operation is required. As with any product (take an automobile, aircraft, computer or ball point pen for example), there is always a small chance of technical issues that needs to be repaired or may require replacement of the product or a part. If the possibility of such failure and the associated time it takes to rectify could in any situation inconvenience the user, business or employee then the product is not suitable for your requirements. This product is not for use where incorrect operation or a failure of any kind, including but not limited to a condition requiring product return, replacement, service by a technician or replacement of parts could cause a financial loss, loss of employee time or an inconvenience requiring compensation.
- If this item has been purchased in error after considering the points above, simply contact the retailer directly for details of their returns policy, if required.