

LITTLE BEAVER

INSTRUCTION MANUAL

Cordless 8" Pole Saw

DUEPSW-20V-4AH



Read before use.

Safety, performance, and dependability have been given top priority in the design of your cordless pole saw.

INTENDED USE

The product is only intended for use outdoors. For safety reasons, the product must be adequately controlled by using two-handed operation.

The product is designed for cutting and pruning of small limbs and branches whose diameter is less than or equal to the bar length, and are located high in the tree while the operator maintains a steady footing on the ground. The product is designed to be extended to a maximum length of 3 m. Do not exceed this working length.

It is not intended to be used while climbing or as a conventional chainsaw for close quarter limbing and pruning of material at ground level.

GENERAL SAFETY WARNINGS

WARNING

Read all safety warnings and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

The term "power tool" in the warnings refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

WORK AREA SAFETY

- **Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
- **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** Power tools create sparks, which may ignite the dust or fumes.
- **Keep children and bystanders away while operating a power tool.** Distractions can cause you to lose control.

ELECTRICAL SAFETY

- **Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools.** Unmodified plugs and matching outlets will reduce risk of electric shock.
- **Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electric shock if your body is earthed or grounded.
- **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- **Do not abuse the cord. Never use the cord for**

carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges, or moving parts. Damaged or entangled cords increase the risk of electric shock.

- **When operating a power tool outdoors, use an extension cord suitable for outdoor use.** Use of a cord suitable for outdoor use reduces the risk of electric shock.
- **If operating a power tool in a damp location is unavoidable, use a residual current device (RCD) protected supply.** Use of an RCD reduces the risk of electric shock.

PERSONAL SAFETY

- **Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
- **Use personal protective equipment. Always wear eye protection.** Protective equipment such as dust mask, non-skid safety shoes, hard hat or hearing protection used for appropriate conditions will reduce personal injuries.
- **Prevent unintentional starting. Ensure the switch is in the off-position before connecting to power source and/or battery pack, picking up, or carrying the tool.** Carrying power tools with your finger on the switch or energising power tools that have the switch on invites accidents.
- **Remove any adjusting key or wrench before turning the power tool on.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
- **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
- **Dress properly. Do not wear loose clothing or jewellery. Keep your hair, clothing and gloves away from moving parts.** Loose clothes, jewellery or long hair can be caught in moving parts.
- **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.

POWER TOOL USE AND CARE

- **Do not force the power tool. Use the correct power tool for your application.** The correct power tool will do the job better and safer at the rate for which it was designed.
- **Do not use the power tool if the switch does not turn it on and off.** Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
- **Disconnect the plug from the power source and/or the battery pack from the power tool before making**

any adjustments, changing accessories or storing power tools. Such preventive safety measures reduce the risk of starting the power tool accidentally.

- **Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool.** Power tools are dangerous in the hands of untrained users.
- **Maintain power tools. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use.** Many accidents are caused by poorly maintained power tools.
- **Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- **Use the power tool, accessories and tool bits etc, in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the power tool for operations different from those intended could result in a hazardous situation.

SERVICE

- **Have your power tool serviced by a qualified repair person using only identical replacement parts.** This will ensure that the safety of the power tool is maintained.

ADDITIONAL GENERAL SAFETY WARNINGS

- Some regions have regulations that restrict the use of the product. Check with your local authority for advice.
- Never allow children or people unfamiliar with the instructions to use the product. Local regulations may restrict the age of the operator.
- Ensure before each use that all controls and safety devices function correctly. Do not use the product if the "off" switch does not stop the motor.
- Wear full eye and hearing protection, strong sturdy gloves as well as head protection while operating the product; use a face mask if operation is dusty.
- Do not wear loose fitting clothing, short trousers or jewellery of any kind.
- Secure long hair so it is above shoulder level to prevent entanglement in moving parts.
- Beware of thrown, flying or falling objects; keep all bystanders, children, and animals at least 15 m away from work area.
- Do not operate in poor lighting. The operator requires a clear view of the work area to identify potential hazards.
- Use of hearing protection reduces the ability to hear warnings (shouts or alarms). The operator must pay extra attention to what is going on in the working area.

- Operating similar tools nearby increases both the risk of hearing injury and the potential for other persons to enter your working area.
- Keep firm footing and balance. Do not overreach. Overreaching can result in loss of balance and can increase the risk of kickback.
- Keep all parts of your body away from any moving part.
- Inspect the product before each use. Check for correct operation of all controls. Check for loose fasteners, make sure all guards, and handles are properly and securely attached. Replace any damaged parts before use.
- Do not modify the machine in any way or use parts and accessories which are not recommended by the manufacturer.
- Do not allow familiarity with the product to make you careless. A careless fraction of a second is sufficient to inflict serious injury.
- Keep handles and grasping surfaces dry, clean and free from oil and grease. Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.
- Only use a weather proof extension cord. Check the extension cord before every use for damage. Always uncoil the extension cord during use because coiled cords can overheat. Damaged extension cords should not be repaired, they should be replaced with an equivalent type.

WARNING

If the product is dropped, suffers heavy impact or begins to vibrate abnormally, immediately stop the product and inspect for damage or identify the cause of the vibration. Any damage should be properly repaired or replaced by an authorised service center.

PRUNER SAFETY WARNINGS

- Do not use the product when there is a possibility of thunderstorm or lightning. Store the product safely indoors.
- Ensure all guards, handles are properly fitted and are in good condition.
- Do not start using the product until you have a clear work area, secure footing, and a planned retreat path away from the falling branches or limbs.
- Beware of the emission of lubricant mist and saw dust. Wear mask or respirator if required.
- During operation, hold the product with both hands. Use one hand to firmly grasp the front hand grip. Use the other hand to grasp the rear handle and operate the trigger release and on/off trigger.
- Hold the power tool by insulated gripping surfaces only, because the saw chain may contact hidden wiring.

Saw chains contacting a “live” wire may make exposed metal parts of the power tool “live” and could give the operator an electric shock.

- Do not modify the product in any way or use it to power any attachments or devices not recommended by the manufacturer.
- Your product comes with a harness. You must use it while operating the product. It will assist you to control the drop of the product after the cut is completed. It will also help support the weight of the product during use and while moving between pruning positions.
- Identify the quick release mechanism and practice using it before you start using the product. Its correct use may prevent serious injury in the case of an emergency. Never wear additional clothing over the harness or otherwise restrict access to the quick release mechanism.
- Before starting the product, make sure the saw chain is not contacting any object.
- An incorrectly tensioned chain can jump off the guide bar and could result in serious injury. Check before each use and frequently, especially a new chain.
- To reduce the risk of injury associated with contacting moving parts, always stop the product, disconnect from the mains, make sure all moving parts have come to a stop before:
 - cleaning or clearing a blockage
 - leaving the product unattended
 - installing or removing attachments
 - checking, conducting maintenance, or working on the product
- Kickback may occur when the nose or tip of the guide bar touches an object, or when the wood closes in and pinches the saw chain in the cut. Tip contact in some cases may cause a sudden reverse reaction, kicking the guide bar up and back towards the operator. Pinching the saw chain along the top of the guide bar may push the guide bar rapidly back towards the operator. Either of these reactions may cause you to lose control of the product, which could result in serious personal injury. Do not rely exclusively upon the safety devices built into the product. As a product user, you should take several steps to keep your cutting jobs free from accident or injury. Kickback is the result of tool misuse and/or incorrect operating procedures or conditions and can be avoided by taking the following precautions:
 - Make sure that the area in which you are cutting is free from obstructions. Do not let the nose of the guide bar contact a branch, limb, or any other obstruction while you are operating the product.
 - Maintain a firm grip, with both hands on the machine and position your body and arm to allow you to resist kickback forces. Kickback forces can be controlled by the operator, if proper precautions are taken. Do not let go of the product.
 - Do not overreach. This helps prevent unintended tip contact and enables better control of the product in

unexpected situations.

- Only use replacement bars and chains specified by the manufacturer. Incorrect replacement bars and chains may cause chain breakage and/or kickback.
- Sharpening the chain safely is a skilled task. Therefore, the manufacturer strongly recommends that a worn or dull chain is replaced with a new one, available from your authorised dealer. The part number is available in the product specification table in this manual.
- Do not use on a ladder or unstable support. Always cut with both feet on solid ground to prevent being pulled off balance.
- To protect yourself from electrocution, do not operate within 10 m of overhead electrical lines.
- Beware of falling branches or those which rebound after hitting the ground.
- Use extreme caution when cutting small-sized brush and saplings because slender material may catch the saw chain and be whipped toward you or pull you off balance.
- When cutting a limb that is under tension, be alert for spring back so that you will not be struck when tension in wood fibres are released.
- If the cutting performance deteriorates over time, check if the chain teeth are sharp and clean. If necessary, replace the original chain (and bar) as recommended by the manufacturer.
- If the chain and bar become pinched or trapped in branches too high to reach, seek advice from a professional tree service specialist about safe removal of the cutting means.

WARNING

Check that all the shaft couplings on the extension pole and tool are securely fastened before each use and at frequent intervals.

Personal protective equipment

Good quality, personal protective equipment as used by professionals will help to reduce the risk of injury to the operator. The following items should be used when operating your product:

Safety helmet

- should comply with EN 397 and be CE marked

Hearing protection

- should comply with EN 352-1 and be CE marked

Eye and face protection

- should be CE marked and comply with EN 166 (for safety glasses) or EN 1731 (for mesh visors)

Gloves

- should comply with EN 381-7 and be CE marked

Footwear

- should comply with EN 20345 and be CE marked

ADDITIONAL BATTERY SAFETY WARNINGS**⚠ WARNING**

To reduce the risk of fire, personal injury, and product damage due to a short circuit, never immerse your tool, battery pack or charger in fluid or allow a fluid to flow inside them. Corrosive or conductive fluids, such as seawater, certain industrial chemicals, and bleach or bleach-containing products, etc., can cause a short circuit.

OPERATION

- Study the condition of the tree and branches before starting work. If there are signs of damage, rot or decay, do not attempt to prune yourself. Damaged or rotten branches are highly unstable. Seek the services of a professional tree surgeon.
- Never stand under the branch to be pruned.
- Pruned branches do not always fall cleanly to the ground. They are easily caught and deflected by other foliage. Ensure that a safety zone at least twice the length of the branch to be cut is available and maintained during your pruning. If this is not possible, seek the services of a professional tree surgeon.
- Ensure that the falling branch is not a danger to yourself, bystanders or property, including utility cables.
- Never operate the product with the pole at an angle of greater than 60° from the horizontal.
- Never operate the product with the cutting means closer than 10 m from overhead power lines.
- Do not force the product, let the chain do the work at its own speed.
- Do not try to cut the branch too close to the tree trunk. Leave about 15 cm from the trunk to the cut.
- Rest the saw bar on the branch to be pruned and push the saw gently forwards so that the ribbed bumper also contacts the branch. This will aid stability, cutting, and provide cleaner cuts.
- Small and thin branches that are not heavy can be cut with one cut using the bottom of the saw bar.
- Branches with larger diameter and are heavier may break or split during the cut so the user must make a first cut from under the branch using the top of the saw bar. The first cut should be approximately one-third of the way through the branch.
- Consider pruning large branches in manageable sections rather than as a whole.

- Never try to restart a previous cut with the chain and bar in the earlier cut. Always start a new cut. This will reduce the risk of kickback and potential injury.

TRANSPORTATION AND STORAGE

- Stop the product, remove the battery pack, and allow it to cool before storing or transporting.
- Clean all foreign materials from the product. Store it in a cool, dry and well-ventilated place that is inaccessible to children. Keep away from corrosive agents, such as garden chemicals and de-icing salts. Do not store outdoors.
- Cover the saw bar with the scabbard before storing or transporting the product.
- When storing the product for a long period of time (one month or longer), be sure the chain is lightly lubricated to prevent rust. The manufacturer recommends the use of Little Beaver bar and chain lubricant, which is available at your Little Beaver authorised dealer.
- For transportation, secure the product against movement or falling to prevent injury to persons or damage to the product.

TRANSPORTING LITHIUM BATTERIES

Transport the battery in accordance with local and national provisions and regulations.

Follow all special requirements on packaging and labelling when transporting batteries by a third party. Ensure that no batteries can come in contact with other batteries or conductive materials while in transport by protecting exposed connectors with insulating, non-conductive caps or tape. Do not transport batteries that are cracked or leaking. Check with the forwarding company for further advice.

MAINTENANCE**⚠ WARNING**

Use only original manufacturer's replacement parts, accessories, and attachments. Failure to do so can cause possible injury, poor performance, and may void your warranty.

⚠ WARNING

Servicing requires extreme care and knowledge and should be performed only by a qualified service technician. For service, we suggest you bring the product to your nearest authorised service center. When servicing, use only identical replacement parts.

⚠ WARNING

The saw chain is very sharp. To prevent personal injury, exercise extreme caution when cleaning, fitting, or removing the chain scabbard. Always wear protective gloves when performing maintenance on the chain.

⚠ WARNING

Improper chain maintenance increases the potential of kickback. Failure to replace or repair damaged chain can cause serious injury.

- Switch off and remove the battery pack before conducting any maintenance or cleaning work.
- You may only make adjustments or repairs described in this manual. For other repairs, contact the authorised service agent.
- Follow instructions for lubricating and chain tension checking and adjustment.
- After each use, clean the body and handles of the product with a soft dry cloth.
- Check all nuts, bolts and screws at frequent intervals for proper tightness to ensure the product is in safe working condition. Any part that is damaged should be properly repaired or replaced by an authorised service center.

MAINTENANCE SCHEDULE

The bar may be reversed to distribute wear for maximum life. The bar should be cleaned every day of use and checked for wear and damage.

Daily check	
Bar lubrication	Before each use
Chain tension	Before each use and frequently
Chain sharpness	Before each use, visual check
For damaged parts	Before each use
For loose fasteners	Before each use

RESIDUAL RISKS

Even when the product is used as prescribed, it is still impossible to completely eliminate certain residual risk factors. The following hazards may arise in use and the operator should pay special attention to avoid the following:

- injury caused by vibration
Always use the right tool for the job. Use designated handles and restrict working time and exposure.
- injury caused by noise

Exposure to noise can cause hearing injury. Wear ear protection and limit exposure.

- injury from contact with the exposed saw teeth of the chain
- injury caused by kickback or sudden and unforeseen movement of the guide bar
- injury caused by ejected parts of the saw chain
- injury caused by thrown-off parts of the workpiece (wood chips and splinters)
- injury caused by dust and particles
- injury caused by skin contact with the lubricant or oil

RISK REDUCTION

It has been reported that vibrations from handheld tools may contribute to a condition called Raynaud's Syndrome in certain individuals. Symptoms may include tingling, numbness, and blanching of the fingers, usually apparent upon exposure to cold. Hereditary factors, exposure to cold and dampness, diet, smoking, and work practices are all thought to contribute to the development of these symptoms. There are measures that can be taken by the operator to possibly reduce the effects of vibration:

- Keep your body warm in cold weather. When operating the unit wear gloves to keep the hands and wrists warm. It is reported that cold weather is a major factor contributing to Raynaud's Syndrome.
- After each period of operation, exercise to increase blood circulation.
- Take frequent work breaks. Limit the amount of exposure per day.

If you experience any of the symptoms of this condition, immediately discontinue use and see your doctor about these symptoms.

⚠ WARNING

Injuries may be caused, or aggravated, by prolonged use of a tool. When using any tool for prolonged periods, ensure you take regular breaks.

ENVIRONMENTAL PROTECTION

Recycle raw materials instead of disposing of as waste. The machine, accessories and packaging should be sorted for environment-friendly recycling.

General chain saw safety warnings

- Keep all parts of the body away from the saw chain when the chain saw is operating. Before you start the chain saw, make sure the saw chain is not contacting anything. A moment of inattention while operating chain saws may cause entanglement of your clothing or body with the saw chain.
 - Always hold the chain saw with your right hand on the rear handle and your left hand on the front handle. Holding the chain saw with a reversed hand configuration increases the risk of personal injury and should never be done.
 - Always hold the chain saw with your right hand on the rear handle and your left hand on the front handle. Hold the chain saw by insulated gripping surfaces only, because the saw chain may contact hidden wiring. Saw chains contacting a "live" wire may make exposed metal parts of the chain saw "live" and could give the operator an electric shock.
 - Wear eye protection. Further protective equipment for hearing, head, hands, legs and feet is recommended. Adequate protective equipment will reduce personal injury from flying debris or accidental contact with the saw chain.
 - Do not operate a chain saw in a tree, on a ladder, from a rooftop, or any unstable support. Operation of a chain saw in this manner could result in serious personal injury.
 - Always keep proper footing and operate the chain saw only when standing on fixed, secure and level surface. Slippery or unstable surfaces may cause a loss of balance or control of the chain saw.
 - When cutting a limb that is under tension, be alert for spring back. When the tension in the wood fibres is released, the spring loaded limb may strike the operator and/or throw the chain saw out of control.
 - Use extreme caution when cutting brush and saplings. The slender material may catch the saw chain and be whipped toward you or pull you off balance.
 - Carry the chain saw by the front handle with the chain saw switched off and away from your body. When transporting or storing the chain saw, always fit the guide bar cover. Proper handling of the chain saw will reduce the likelihood of accidental contact with the moving saw chain.
 - Follow instructions for lubricating, chain tensioning and changing the bar and chain. Improperly tensioned or lubricated chain may either break or increase the chance for kickback.
 - Cut wood only. Do not use chain saw for purposes not intended. For example: do not use chain saw for cutting metal, plastic, masonry or non-wood building materials. Use of the chain saw for operations different than intended could result in a hazardous situation.
- Do not attempt to fell a tree until you have an understanding of the risks and how to avoid them. Serious injury could occur to the operator or bystanders while felling a tree.
 - This chain saw is not intended for tree felling. Use of the chain saw for operations different than intended could result in serious injury to the operator or bystanders.

SYMBOLS ON THE PRODUCT



Safety alert



Read and understand all instructions.



Avoid using in wet or damp conditions.



Electrical hazard. Keep at least 10 m away from the overhead lines.



Beware of thrown or flying objects. Keep all bystanders, especially children and pets, at least 15 m from the operating area.



Wear non-slip, heavy-duty protective gloves when handling the pole saw and the blade.



Wear slip-resistant footwear.



Wear eye, hearing, and head protection when operating this equipment.



Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.



Moving direction of the chain (Marked on the chain bar)



Lock



Unlock

V₀:5.5m/s No-load chain speed is 5.5m/s

The following signal words and meanings are intended to explain the levels of risk associated with this product.

⚠ DANGER

Indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

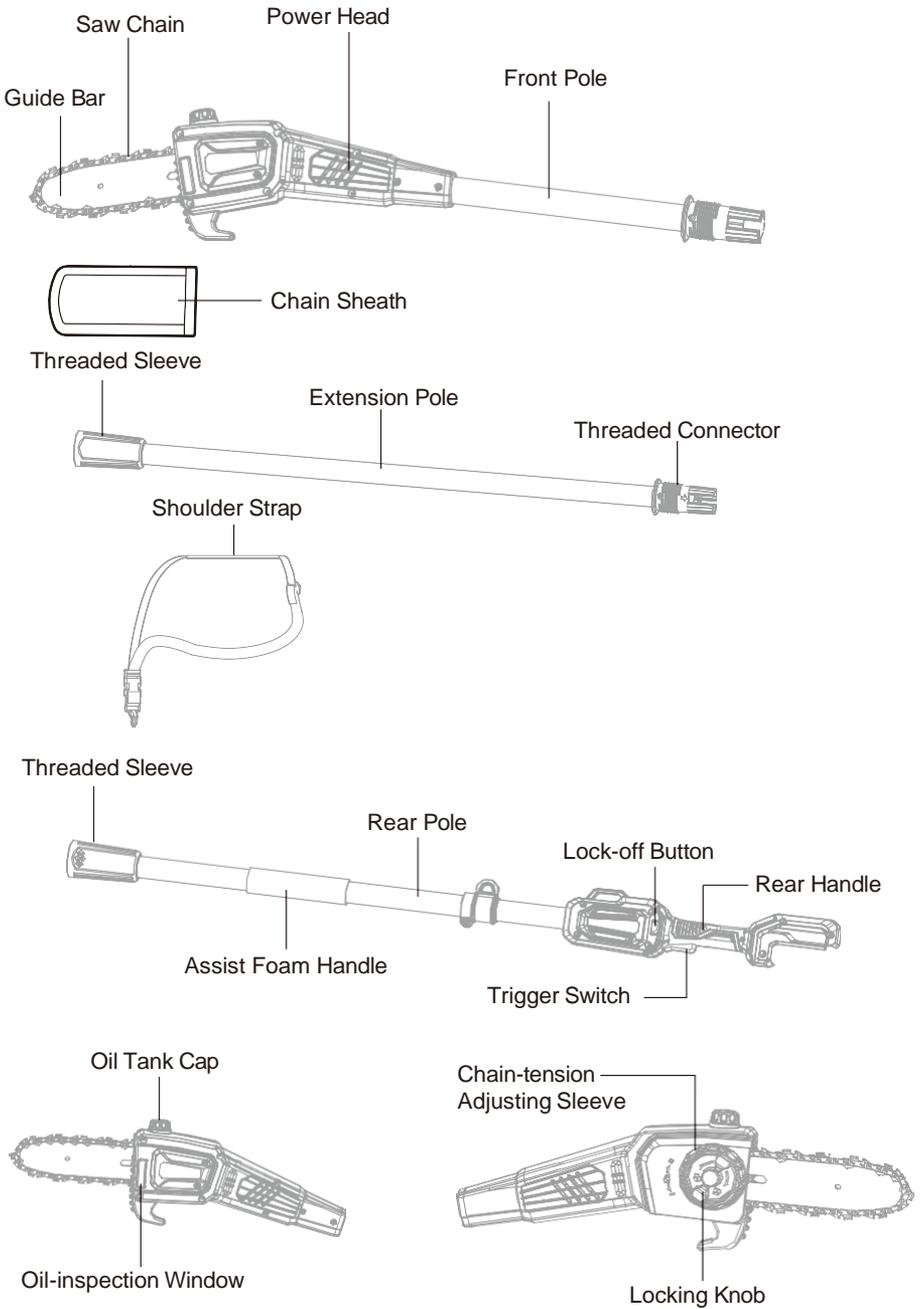
CAUTION

Without safety alert symbol

Indicates a situation that may result in property damage.

GET TO KNOW YOUR POLE SAW

Fig. 1



Trigger Switch

Turns the pole saw On and Off.

Lock-off Button

Helps to prevent accidental or unauthorized activation of the trigger switch. It must be depressed before the trigger switch can be activated.

Oil Tank Cap

Seals the oil tank.

Oil-Inspection Window

Provides a view of the oil level in the oil tank.

Guide Bar

Supports and guides the saw chain.

Chain Sheath

The chain sheath keeps the operator from coming in contact with the sharp chain blades when the tool is not in use. It also helps keep the chain blades from being nicked or damaged when the tool is being transported or stored.

Saw Chain

A loop of chain having cutting teeth that cut the wood when it is driven by the power head and supported by the guide bar.

Assist Foam Handle

For easy control of the pole saw during cutting.

Rear Handle

Ergonomic handle improves comfort and grip.

Threaded Sleeve

Ensures reliable connection of the front, rear, and extension aluminum poles.

Shoulder Strap

Carry out your job safely and ergonomically.

Chain-Tensioning Adjusting Sleeve

Permits precise adjustment of chain tension.

Side Cover

Covers the chain sprocket and secures the guide bar.

Locking Knob

Locks/unlocks the side cover

SPECIFICATIONS

Rated voltage	20V d.c.
Guide Bar Length	8" (200mm)
Chain Pitch	3/8" (9.5mm) LP
Chain Gauge	0.043" (1.1mm)
Chain Speed	6 m/s
Oil Tank Capacity	2.64 fl. Oz (75ml)
Height Adjustment	6.7 ft. to 9.5 ft. (2.05m – 2.9m)
Charging Time	up to 160 min
Run Time	up to 90 min
Protection	IPX1
Battery Charger	
Model No	DUACHG1-20V-2AH/4A
Rating	input:100-240VAC 50/60Hz 45W max output:21VDC 1.5A 34W max
Protection	IPX4
Battery	
Model No	DUABAT-20V-4AH
Technical data	20V 4Ah 80Wh
Recommended charging temperature	41 – 95°F (5 – 35°C)
Protection	IPX0

RECOMMENDED BAR AND CHAIN FOR THIS POLE SAW

PART NAME	MODEL NUMBER
Guide Bar	SGB0800
Saw Chain	SPN0800

ASSEMBLY

⚠ WARNING To prevent accidental starting that could cause serious personal injury, always remove the battery pack from the tool when assembling parts, making adjustments, cleaning, or when not in use.

⚠ WARNING If any parts are damaged or missing, do not operate this product until the parts are replaced. Use of this product with damaged or missing parts could result in serious personal injury.

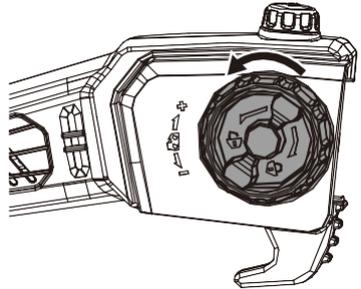
⚠ WARNING Do not attempt to modify this tool or create accessories not recommended for use with this tool. Any such alteration or modification is misuse and could result in a hazardous condition leading to possible serious injury.

Unpacking

- This product requires assembly.
- Carefully remove the product and any accessories from the box. Make sure that all items listed on the box are included.
- Inspect the tool carefully to make sure that no breakage or damage occurred during shipping.
- Do not discard the packing material until you have carefully inspected and satisfactorily operated the tool.
- If any parts are damaged or missing, please return the product to the place of purchase.

Assembling the Guide Bar and Chain

Fig. 2a



1. Remove the battery.
2. Position the pole saw on its side on a firm, flat surface, so that the side cover is facing upwards.
3. Wear gloves. Remove the side cover by turning the locking knob counterclockwise (Fig. 2a).
4. Lay the saw chain in a loop on a flat surface and straighten any kinks (Fig. 2b).
5. Place the chain drive links into the guide bar groove. Make sure that the cutter direction arrows on the saw chain correspond to the rotation direction arrow of the guide bar. Position the chain so there is a loop at the back of the guide bar as shown (Fig. 2c).

Fig. 2b

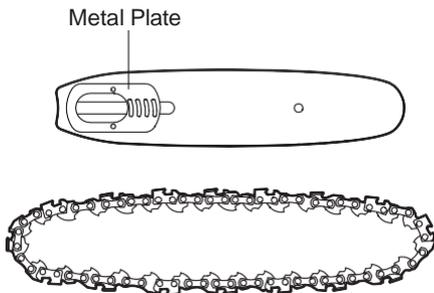
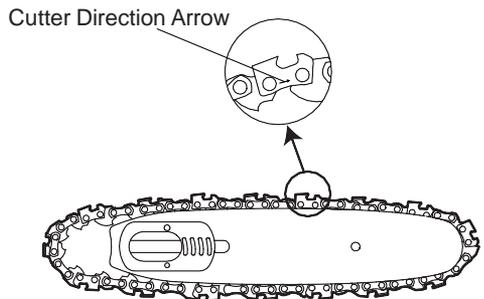


Fig. 2c



6. Hold the chain in position on the guide bar and place the guide bar and chain, with the bar metal plate facing up, in the mounting surface of the housing. At the same time guide the loop around the drive sprocket (Fig. 2d). Make sure that the cutter direction arrows on the saw chain correspond to the rotation direction arrow on the guide.
7. Attach the side cover to the housing so that the screw hole of the locking knob is aligned with the locking bolt in the housing (Fig. 2e). At the same time make sure that the rotation direction arrow on the side cover corresponds to the rotation direction arrow on the housing. Lightly tighten the locking knob clockwise. The bar must be free to move for tension adjustment.

Do not fully tighten the locking knob until after you have adjusted the chain tension (see the following section “**Tensioning the saw chain**”)

Fig. 2d

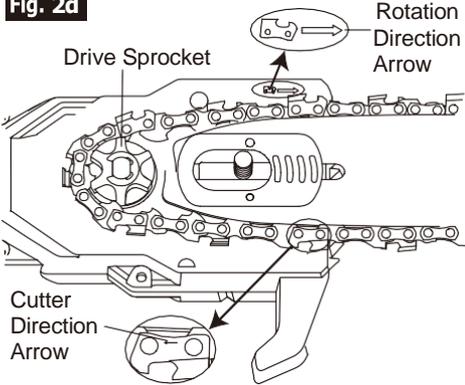
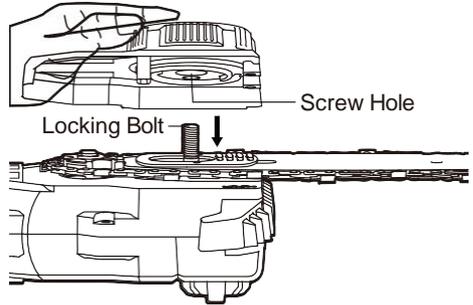


Fig. 2e



Tensioning the saw chain

⚠ CAUTION The saw chain must be properly tensioned before using.

1. Lift up the tip of the guide bar and keep it slightly lifted as you adjust the tension. Ensure that the guide bar has some movement; loosen the locking knob slightly if necessary.
2. Loosen the locking knob of the side cover a few turns (Fig. 3a).
3. Adjust the chain tension with the chain-tension adjusting sleeve according to chain-tension adjusting mark on the side cover. Turning the sleeve clockwise increases the chain tension. Turning it counterclockwise decreases the chain tension (Fig. 3b).

Fig. 3a

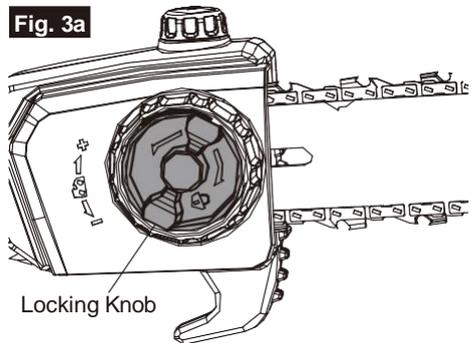
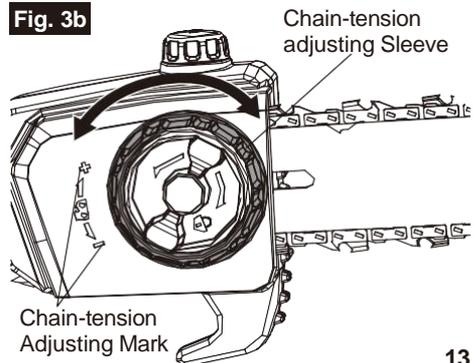
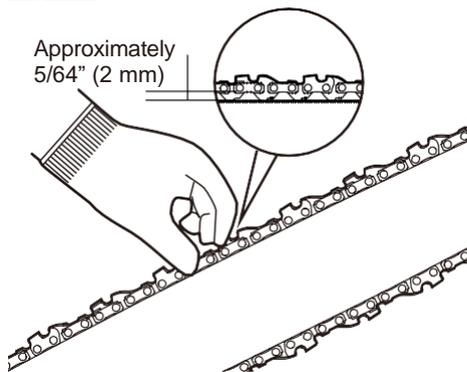


Fig. 3b



4. Check the chain tension using one hand, by pulling upwards on the chain against the weight of the product. The correct chain tension is achieved when the saw chain can be lifted by approximately $5/64''$ (2 mm) from the guide bar in the center (Fig. 3c).
5. Re-adjust the tension as described above if you find that the chain saw is too loose or tight.
6. Pull the saw chain along the upper side of the guide bar by hand (**WEAR PROTECTIVE GLOVE!**) from one end to the other several times. The chain should feel tight but still move freely.
7. Tighten the locking knob firmly to fix the guide bar.

Fig. 3c

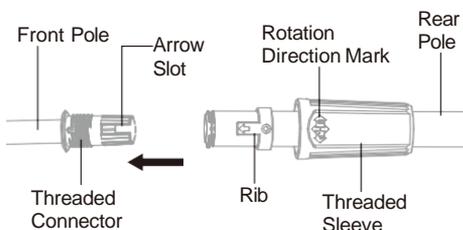


Connecting the Poles

Attaching Without the Extension Pole (Fig. 4a)

Fig. 4a

1. Remove the battery pack.
2. Align the rib on the front pole with the arrow slot on the rear pole and push the front pole into the rear pole.
3. Rotate the threaded sleeve, according to the rotation direction marked on it, to fasten it onto the threaded connector securely.
4. Pull on the front pole to verify that it is securely locked in place.



Attaching the Extension Pole (Fig. 4b)

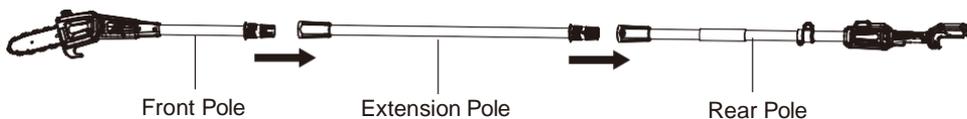
The extension pole extends the cutting range. It should be connected between the front pole and the rear pole.

Follow the previous instructions to connect the front pole to one end of the extension pole, and then connect the rear pole to the other end of the extension pole the same way.

NOTICE: Do not use the screw sleeve as handles during operation. Only hold the screw sleeve during transportation.

⚠ WARNING Be certain that the threaded sleeves are fully tightened before operating the tool. Check it periodically for tightness during use to avoid serious personal injury.

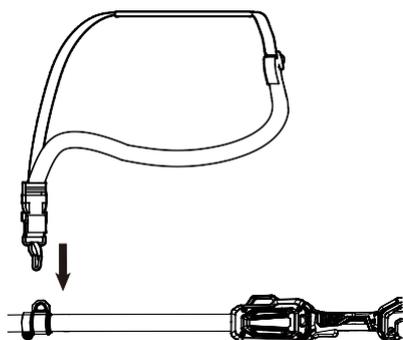
Fig. 4b



Attaching the Shoulder Strap (Fig. 5)

A shoulder strap is supplied with the pole
hedgetrimmer.
Attach the hook on the adjustable end of
the shoulder strap to the lower body loop .

Fig. 5



OPERATING INSTRUCTIONS

⚠ WARNING To reduce the risk of fire, personal injury, and product damage due to a short circuit, never immerse your tool, battery pack, or charger in fluid or allow a fluid to flow inside them. Corrosive or conductive fluids, such as seawater, certain industrial chemicals, and bleach or bleach-containing products, etc. can cause a short circuit.

⚠ WARNING Do not use any attachments or accessories not recommended by the manufacturer of this product. The use of attachments or accessories not recommended can result in serious personal injury.

⚠ WARNING Do not attempt to modify this tool or the battery pack or create accessories not recommended for use with this tool. Any such alteration or modification is misuse and could result in a hazardous condition leading to possibly serious injury.

⚠ WARNING To prevent accidental starting that could cause serious personal injury, always remove the battery pack from the tool when assembling parts, making adjustments, cleaning, or when not in use.

⚠ WARNING Do not allow familiarity with this product to make you careless. Remember that a careless fraction of a second is sufficient to inflict serious injury.

⚠ WARNING Always wear eye protection with side shields marked to comply with ANSI Z87.1, along with hearing protection. Failure to do so could result in objects being thrown into your eyes and other possibly serious injuries.

NOTICE: Please refer to the battery and charger manuals for detailed operating information.

Application

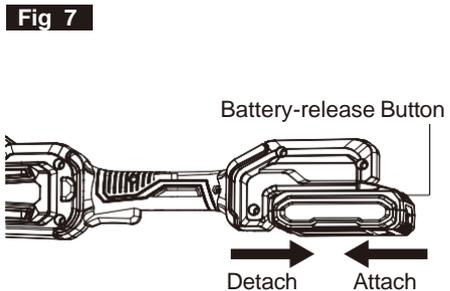
This pole saw is intended to be used for limbing and pruning of trees.

To Attach/Detach Battery Pack (Fig 7)

⚠ WARNING Battery tools are always in operating condition. Therefore, remove the battery pack when assembling parts, making adjustments, cleaning, when the tool is not in use, or when carrying it at your side. Removing the battery pack will prevent accidental starting that could cause serious personal injury.

To attach the battery pack:

Align the raised rib on the battery pack with the grooves in the tool, and then slide the battery pack onto the tool.



To detach the battery pack:

Depress the battery-release button, located on the front of the battery pack, to release the battery pack. Pull the battery pack out and remove it from the tool.

NOTICE: When placing the battery pack on the tool, be sure that the raised rib on the battery pack aligns with the groove on the tool and that the latches snap into place properly. Improper attachment of the battery pack can cause damage to internal components.

Filling Oil Tank with Bar and Chain Lubricant

⚠ WARNING Do not smoke or bring any fire or flame near the oil or the pole saw. Oil may spill and cause a fire.

⚠ WARNING To prevent accidental starting that could cause serious personal injury, always remove the battery pack from the tool before filling the tank with oil.

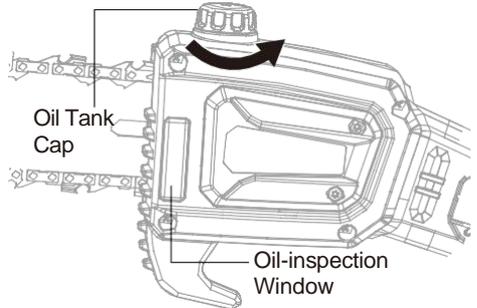
NOTICE: The pole saw is not filled with oil at the time of purchase. It is essential to fill the tank with oil before use. Operating the pole saw without chain oil or when the oil level is below the minimum mark will result in damage to the pole saw. Chain life and cutting capacity depend on optimum lubrication. The chain is automatically lubricated with chain oil during operation.

1. Remove the battery pack from the pole saw.
2. Clean the oil tank cap and the area around it to ensure that no dirt falls into the oil tank.
3. Position the pole saw on its side on a firm, flat surface, so that the tank cap is facing upwards. Rotate the oil tank cap counterclockwise to remove it (Fig. 8).
4. Carefully pour the bar and chain oil into the tank. Be careful not to let the oil spill from the opening. Do not overfill and leave approximately 3/8" (10mm) space between the oil level and the inside edge of the tank to allow for expansion. Wipe off any excess oil.
5. Replace and fasten the cap.

NOTICE:

- We recommend using environment-friendly biodegradable chain oil specifically intended to be used with pole saws.
- Never use oil or other lubricants not specifically designed for use on the bar and chain. This can lead to a clogged oil system, which may cause premature wear of the bar and chain.
- Check the oil level frequently and fill when the oil level falls below the minimum line. Never operate the pole saw if the oil is not visible.
- Do not use dirty, used or otherwise contaminated oil. Damage may occur to the bar or chain.
- It is normal for oil to seep from the saw when it is not in use. To prevent seepage, empty the oil tank after each use, and then run the saw for one minute. When storing the tool for a long period of time, be sure the chain is lightly lubricated. This will prevent rust on the chain and bar sprocket.
- To preserve natural resources, please recycle or dispose of oil properly. Consult your local waste authority for information regarding available recycling and disposal options.

Fig. 8



Starting/Stopping the Pole Saw

Before Starting the Pole Saw:

⚠ DANGER Never cut near power lines, electric cords, or other electric sources. If the bar and chain jams on any electrical cord or line, **DO NOT TOUCH THE BAR, CHAIN OR THE ALUMINUM POLE! THEY CAN BECOME ELECTRICALLY LIVE AND MAY BE VERY DANGEROUS.** Continue to hold the pole saw by the insulated rear handle or lay it down and away from you in a safe manner. Disconnect the electrical service to the damaged line or cord before attempting to free the bar and chain from the line or cord. Contact with the bar, chain, other conductive parts of the pole saw, or live electric cords or lines will result in death by electrocution or serious injury.

⚠ WARNING Do not use any attachments or accessories not recommended by the manufacturer of this product. The use of attachments or accessories not recommended can result in serious personal injury.

Before each use, inspect the entire product for damaged, missing, or loose parts such as screws, nuts, bolts, caps, etc. Tighten securely all fasteners and caps and do not operate this product until all missing or damaged parts are replaced.

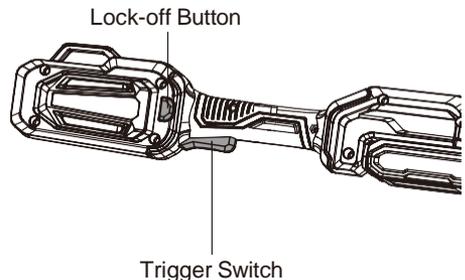
1. Remove the battery pack.
2. Make sure that the chain is properly mounted and correctly tensioned.
3. Check the tension of the locking knob of the side cover before use. If it is loose, securely tighten it.
4. Check the oil level and fill the tank as needed. Make sure the chain is well lubricated.
5. Check the sharpness of the cutting teeth of the saw chain.
6. Hold the pole saw with both hands: with the right hand on the rear handle and the left hand on the assist handle.
7. Make sure that you have a secure and balanced footing. Watch out for obstacles such as tree stumps, roots, and ditches, which could cause you to trip or stumble.
8. Make sure the saw chain is not touching the ground or any other objects.
9. Make sure that the object being cut does not exceed the usable cutting length of the pole saw. The tip of guide bar shall always extend at least 2" (50mm) outside the outline of the wood log.

To Start the Pole Saw (Fig. 9)

1. Install the battery pack.
2. Make sure that no objects or obstructions that could come in contact with the bar and chain are in the immediate vicinity.
3. Firmly grasp the assist foam handle with one hand and the rear handle with the other hand.
4. Press and hold the lock-off button, then squeeze the trigger switch to start the saw. Release the lock-off button and keep squeezing the trigger for continued operation.

⚠ WARNING Do not attempt to start the saw when the saw chain is in a cut or in contact with any surface.

Fig. 9



To Stop the Pole Saw

Move the pole saw away from cutting area, and then release the trigger switch to stop the pole saw.

⚠ WARNING Always remove the battery pack from the pole saw during work breaks and after finishing work.

Cutting

Basic Cutting (Fig.10a & 10b)

NOTICE: Practice cutting a few small logs using the following technique to get the “feel” of using your saw before you begin a major sawing operation. Follow the steps below to prevent damage to tree or shrub bark. Do not use a back-and-forth sawing motion.

1. Make a shallow first cut (1/4 of the limb diameter) on the underside of the limb, close to the main limb or trunk.
2. Make a second cut from the top side of the limb, outboard from the first cut. Continue the second cut through the limb until the limb separates from the tree. Be prepared to balance the weight of the tool when the limb falls.
3. Make the final cut close to the trunk.

NOTICE: For the second and final cuts (from the top of the limb or branch), hold the bucking spikes against the limb being cut (Fig. 10c). This will help to steady the limb and make it easier to cut. Allow the chain to cut for you; exert only light, downward pressure. If you force the cut, damage to the bar, chain, or motor can result.

4. Release the trigger switch as soon as the cut is completed.

NOTICE: Failure to follow proper cutting procedures will result in the bar and chain binding and becoming pinched or trapped in the limb. If this should happen:

- Stop the motor and remove the battery pack.
- If the limb can be reached from the ground, lift the limb while holding the saw. This should release the “pinch” and free the saw.
- If the saw is still trapped, call a professional for assistance.

Fig. 10a

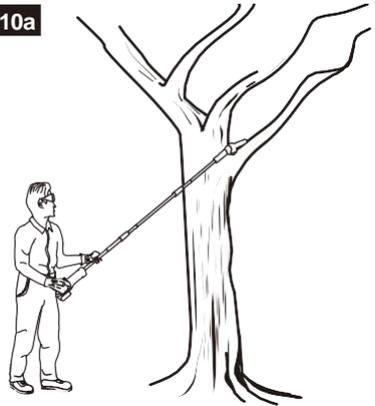


Fig. 10b

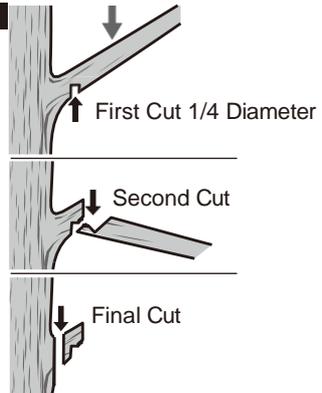
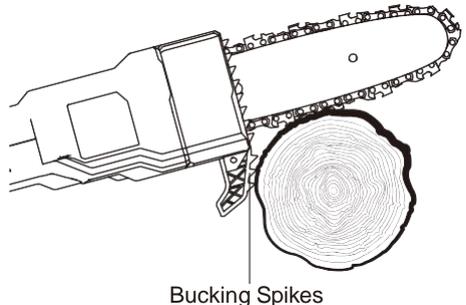


Fig. 10c



Limbing and Pruning (Fig. 11)

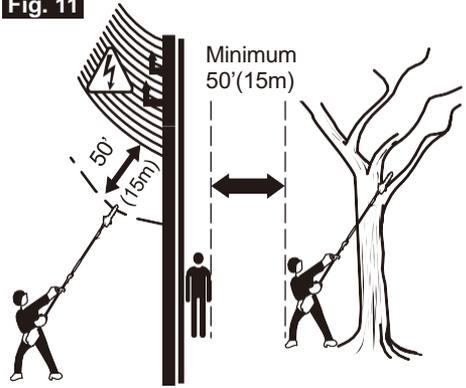
This pole saw is designed for trimming small branches and limbs up to 6.9" (175mm) in diameter. For best results, observe the following precautions:

Plan the cut carefully. Be aware of the direction in which the branch will fall.

⚠ WARNING

- Branches may fall in unexpected directions. Do not stand directly under the branch being cut.
- The most typical cutting application is to position the pole saw at an angle of 60° or less, depending on the specific situation. As the angle of the pole-saw shaft to the ground increases, the difficulty of making the first cut (from the underside of the limb) increases.
- Remove long branches in several stages.
- Cut lower branches first to allow the top branches more room to fall.
- Work slowly, keeping both hands on the saw with a firm grip. Maintain secure footing and balance.
- Keep the tree between you and the chain while limbing. Cut from the side of the tree opposite the branch you are cutting.
- Do not cut from a ladder; this is extremely dangerous. Leave such operations for professionals.
- Do not make a flush cut next to the main limb or trunk until you have cut off much of limb to reduce the weight. Following proper cutting procedures will prevent stripping the bark from the main trunk or limb.
- Do not use the pole saw for felling or bucking.
- To prevent electrocution, do not operate within 50 ft. (15m) of overhead electrical lines.
- Keep bystanders at least 50 ft. (15m) away.

Fig. 11



MAINTENANCE

⚠ WARNING To avoid serious personal injury, remove the battery pack from the pole saw before inspecting, cleaning, or performing maintenance. A battery-operated tool with the battery pack inserted is always on and can start accidentally.

⚠ WARNING When servicing, use only identical replacement parts. Use of any other parts could create a hazard or cause product damage. Periodically inspect the entire product for damaged, missing, or loose parts such as screws, nuts, bolts, caps, etc. Tighten securely all fasteners and caps and do not operate this product until all missing or damaged parts are replaced. Please contact customer service or an authorized service center for assistance.

⚠ WARNING Always wear safety goggles or safety glasses with side shields during power tool operation or when blowing dust. If the operation is dusty, also wear a dust mask.

⚠ WARNING When cleaning the pole saw, DO NOT immerse in water or other liquids.

⚠ WARNING Do not at any time let brake fluids, gasoline, petroleum-based products, penetrating oils, etc., come in contact with plastic parts. Chemicals can damage, weaken, or destroy plastic, which may result in serious personal injury.

Cleaning

After each use, clean debris from the chain and guide bar with a soft brush. Wipe the pole saw surface with a clean cloth moistened with a mild soap solution.

Remove the side cover, and then use a soft brush to remove debris from the guide bar, saw chain, sprocket and side cover.

Always clean out wood chips, saw dust, and dirt from the guide bar groove when replacing the saw chain.

Replacing the Bar and Chain

⚠ WARNING Before performing any maintenance, make sure that the battery pack is removed. Failure to heed this warning could result in serious personal injury.

⚠ WARNING Always wear gloves when handling the bar and chain; these components are sharp and may contain burrs.

⚠ WARNING Never touch or adjust the chain while the motor is running. The saw chain is very sharp.

NOTICE: When replacing the guide bar and chain, always use the specified bar and chain combination listed in the section: “**Recommended Bar and Chain for this Pole Saw**”.

1. Remove the battery, allow the saw to cool. Make sure the oil-tank cap is snug to prevent oil leakage.
2. Position the pole saw on its side on a firm, flat surface, so that the side cover is facing upwards.
3. Wear gloves. Remove the side cover by turning the locking knob counterclockwise (Fig. 12a). Clean the side cover with a dry cloth.
4. Remove the bar and chain from the mounting surface on the housing. Remove the worn chain from the bar.
5. Remove the metal plate of the chain bar by loosening the screw with Phillips screwdriver (not included).
6. Mount the metal plate onto the new guide bar by fastening the screw with Phillips screwdriver (not included) (Fig. 12b).
7. Install new guide bar and saw chain, following the section: **“Assembling the Guide Bar and Chain”**.

Fig. 12a

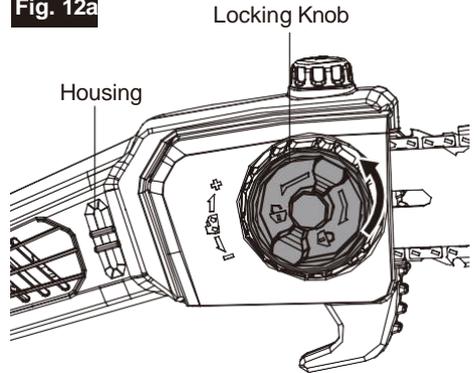
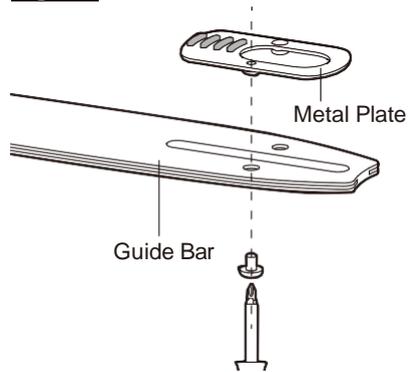


Fig. 12b



NOTICE: This is a good time to inspect the drive sprocket for excessive wear or damage.

Adjusting the Chain Tension

⚠ WARNING Always check the saw-chain tension before use, after the first cuts, and regularly during use. Upon initial operation, new chains can lengthen considerably. This is normal during the break-in period and the interval between future adjustments will lengthen quickly.

Always maintain proper chain tension! A loose chain increases the risk of kickback! A loose chain may jump out of the guide bar groove! This may injure the operator and damage the chain! A loose chain will cause rapid wear to the chain, the guide bar and the sprocket!

Tensioning the chain too tightly will overload the motor and cause damage, and insufficient tension can cause chain derailing, whereas a correctly tightened chain provides the best cutting characteristics and prolonged working life! The chain life mainly depends upon sufficient lubrication and correct tensioning!

1. Stop the motor and remove the battery pack before adjusting the chain tension.
2. Loosen the locking knob of the side cover a few turns.
3. Turn the chain-tension adjusting knob to adjust the chain tension. See the section: **“Replacing the Bar and Chain”** in this manual for additional information.

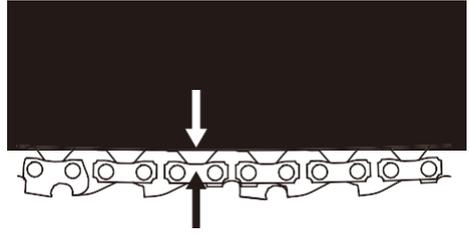
A cold chain is correctly tensioned when there is no slack on the underside of the guide bar, and the chain is snug, but it can be turned by hand without binding. The chain must be re-tensioned whenever the flats on the drive links do not sit in the bar groove.

During normal saw operation, the temperature of the chain will increase. The drive links of a correctly tensioned warm chain will hang approximately 3/64 in. (1.3 mm) out of the bar groove (Fig. 13).

NOTICE: New chains tend to stretch; check chain tension frequently and tension as required.

NOTICE: A chain tensioned while it is warm may be too tight upon cooling. Check the cold tension before next use.

Fig. 13



Approximately 3/64" (1.3mm)

Chain Maintenance

⚠ WARNING Remove the battery pack before performing any maintenance. Failure to heed this warning could result in serious personal injury.

⚠ WARNING Always wear gloves when handling the saw chain. These components are sharp and may contain burrs.

Use only low-kickback chains on this saw. This fast cutting chain will provide kickback reduction when properly maintained.

A properly sharpened saw chain cuts through wood effortlessly, even with very little pressure.

Never use a dull or damaged saw chain. A dull saw chain cutter leads to increased physical strain, increased vibration load, unsatisfactory cutting results and increased wear.

For smooth and fast cutting, the chain needs to be maintained properly. The chain requires sharpening when the wood chips are small and powdery, the chain must be forced through the wood during cutting, or the chain cuts to one side. During maintenance of your chain, consider the following:

- Improper filing angle of the side plate can increase the risk of a severe kickback.
- Raker (depth gauge) clearance. Too low increases the potential for kickback. Not low enough decreases cutting ability.
- If cutter teeth have hit hard objects, such as nails and stones, or have been abraded by mud or sand on the wood, have the chain sharpened by a qualified service technician.

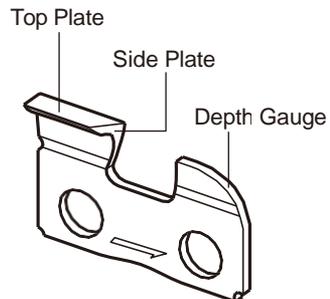
NOTICE: Inspect the drive sprocket for wear or damage when replacing the chain. If signs of wear or damage are present in the areas indicated, have the drive sprocket replaced by qualified service technician.

How to Sharpen the Cutters

Be careful to file all cutters (Fig. 14) to the specified angles and to the same length, as fast cutting can be obtained only when all cutters are uniform.

1. Remove the battery pack. Wear gloves for protection.
2. Properly tension the chain prior to sharpening. Refer to the section: "**Adjusting the Chain Tension**" earlier in this manual.
3. Use a 5/32" (4.0 mm) diameter round file and holder (available separately). Do all of your filing at the middle position of the guide bar.

Fig.14



- Keep the file level with the top plate of the tooth. Do not let the file dip or rock.
- Keep a correct sharpening angle of 30° between the file and the saw chain – see Fig. 15 and 16. Always use a file holder (available separately) when sharpening saw chains by hand. File holders have markings for the sharpening angle.

Fig. 15

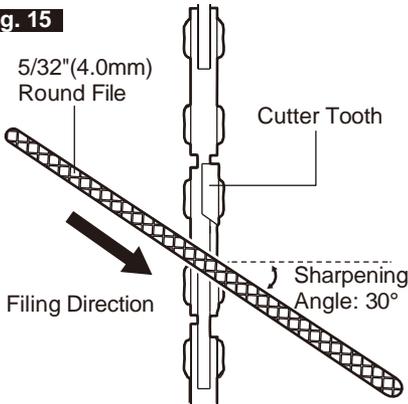
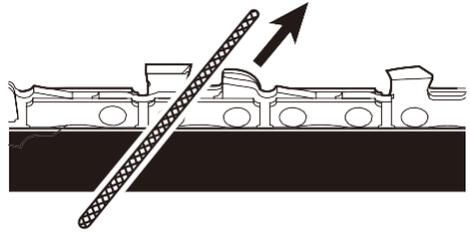


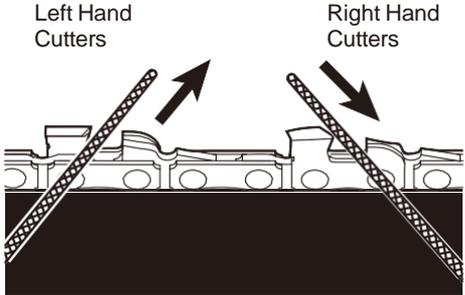
Fig. 16



- Using light but firm pressure, perform a stroke towards the front corner of the tooth. Lift the file away from the steel on each return stroke.

Fig. 17

- Make a few firm strokes on every tooth. File all left-hand cutters in one direction. Then move to the other side and file the right-hand cutters in the opposite direction. Occasionally remove filings from the file with a wire brush (Fig. 17).



⚠ WARNING A dull or improperly sharpened chain can cause excessive motor speed during cutting, which may result in severe motor damage.

⚠ WARNING Improper chain sharpening increases the potential of kickback.

⚠ WARNING Failure to replace or repair a damaged chain can cause serious injury.

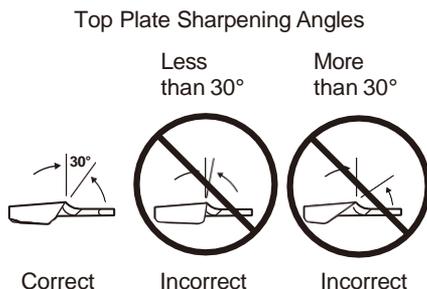
Top-Plate Sharpening Angles (Fig. 18)

CORRECT 30° – This optimal angle can be obtained only when the specified files and proper setting are used. File holders are marked with guide marks to align the file properly to produce the correct top plate angle.

LESS THAN 30° – The tooth is too dull for cutting.

MORE THAN 30° – The edge of the cutting tooth is feathered and dulls quickly.

Fig. 18



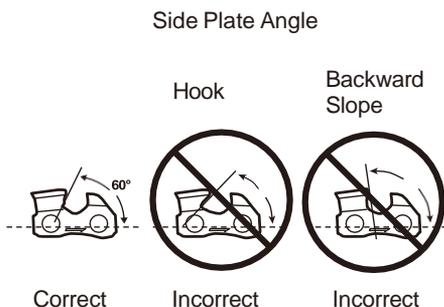
Side-Plate Angle (Fig. 19)

CORRECT 60° – The optimal angle can be produced automatically if the correct diameter file is used in the file holder.

HOOK – “Grabs” and dulls quickly. Increases potential of KICKBACK. Results from using a file with a diameter that is too small, or a file held too low.

BACKWARD SLOPE – Needs too much feed pressure, causes excessive wear to bar and chain. Results from using a file with a diameter too large, or a file held too high.

Fig. 19



Depth-Gauge Clearance

1. The depth gauge should be maintained at a clearance of 0.025 in. (0.6 mm), as shown in Fig. 20. Use a depth-gauge tool (available separately) to check the depth-gauge clearances.
2. Check the depth-gauge clearance every time the chain is filed. Use a flat file and a depth-gauge jointer (both available separately) to lower all gauges uniformly (Fig. 21). Depth-gauge jointers are available in 0.020 in. to 0.035 in. (0.5 mm to 0.9 mm). Use a 0.025 in. (0.6 mm) depth-gauge jointer.

Fig. 20

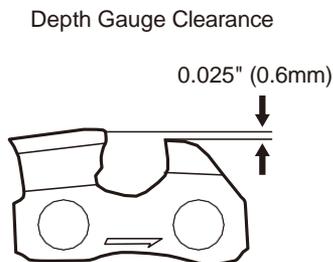
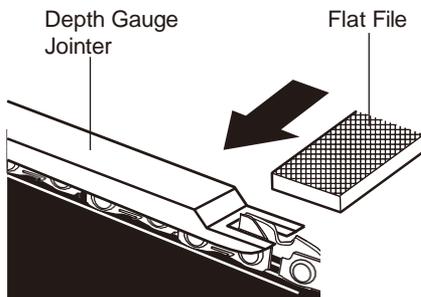


Fig. 21



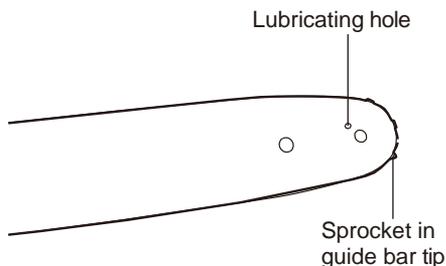
Guide Bar Maintenance (Fig. 22)

Fig. 22

The bar should be cleaned every day of use and checked for wear and damage. Feathering or burring of the bar rails is a normal process of bar wear. Such faults should be smoothed with a file as soon as they occur.

A bar with any of the following faults should be replaced:

- Wear inside the bar rails which permits the chain to lay over sideways.
- Bent guide bar.
- Cracked or broken rails.
- Spread rails.



The guide bar has a sprocket at its tip. The sprocket must be lubricated weekly with a grease syringe to extend the guide-bar life. Use a grease syringe to lubricate weekly with chain oil by means of the lubricating hole. Turn the guide bar and check that the lubrication holes and chain groove are free from impurities.

Transportation

1. Switch the product off and remove the battery pack.
2. Clean the product.
3. Attach the chain sheath on the guide bar and chain.
4. Always carry the product by its handle.
5. Protect the product from any heavy impact or strong vibrations which may occur during transportation in vehicles.
6. Secure the product to prevent it from slipping or falling over.

Storage

1. Switch the product off and remove the battery packs.
2. Clean the product.
3. Before storing the tool, wipe off the saw chain with an oil-soaked rag to prevent corrosion.
4. Attach the chain sheath on the guide bar and chain.
5. Clean the product and empty the oil tank.
6. Store the product and its accessories in a dark, dry, frost-free, well-ventilated place. The ideal storage is under room temperature.
7. Always store the product in a place that is inaccessible to children.
8. Keep away from corrosive agents such as garden chemicals and de-icing salts.

TROUBLESHOOTING

Problem	Cause	Remedy
Motor does not run.	<ol style="list-style-type: none"> 1. The battery pack is not attached to the pole saw. 2. There is no electrical contact between the saw and battery pack. 3. The battery pack is depleted. 4. The battery pack or pole saw is too hot. 5. The lock-off button is not depressed before pressing the trigger switch. 6. Saw chain is bound in the wood. 7. Debris in bar groove. 8. Debris in side cover. 	<ol style="list-style-type: none"> 1. Attach the battery pack to the pole saw. 2. Remove the battery pack, check contacts and reinstall the battery pack. 3. Charge the battery pack. 4. Allow the battery pack or pole saw to cool. 5. Press down the lock-off button and hold it, then depress the trigger switch to turn on the pole saw. 6. Release the trigger switch; remove the saw chain and guide bar from the wood, then restart the pole saw. 7. With the saw turned OFF, press the saw chain against the wood, move the pole saw back and forth to discharge the debris. 8. Remove battery pack, then remove side cover and clean out debris.
Motor runs, but chain does not rotate.	Chain does not engage drive sprocket.	Reinstall the chain, making sure that the drive links on the chain are fully seated on the sprocket.

Problem	Cause	Remedy
<p>Pole saw does not cut properly.</p>	<ol style="list-style-type: none"> 1. Insufficient chain tension. 2. Dull chain. 3. Chain installed backwards. 4. Worn chain. 5. Dry or excessively stretched chain. 6. Chain not in bar groove. 	<ol style="list-style-type: none"> 1. Readjust the chain tension, following the section: “Adjusting the Chain Tension”. 2. Sharpen the chain cutters, following the section: “How to Sharpen the Cutters”. 3. Reinstall the saw chain, following the section: “Replacing the Bar and Chain”. 4. Replace the chain, following the section: “Replacing the Bar and Chain”. 5. Check the oil level. Refill the oil tank if necessary. 6. Reinstall the saw chain, following the section: “Replacing the Bar and Chain”.
<p>Bar and chain running hot and smoking.</p>	<ol style="list-style-type: none"> 1. Check chain tension for over-tightened condition. 2. Chain oil tank is empty. 3. Debris in guide bar groove. 	<ol style="list-style-type: none"> 1. Re-tension the saw chain; see the section: “Adjusting the Chain Tension”. 2. Filling bar and chain lubricant. 3. Clear the debris in the groove.