

STIHL

STIHL MSA 220 C

Instruction Manual
Manual de instrucciones



WARNING

To reduce the risk of kickback injury use STIHL reduced kickback bar and STIHL low kickback chain as specified in this manual or other available low kickback components.

ADVERTENCIA

Para reducir el riesgo de lesionarse como resultado de un culatazo, utilice la barra y la cadena de contragolpe reducido de la forma especificada en este manual o de otros componentes reductores de contragolpe.

WARNING

Read Instruction Manual thoroughly before use and follow all safety precautions – improper use can cause serious or fatal injury.

ADVERTENCIA

Antes de usar la máquina lea y siga todas las precauciones de seguridad dadas en el manual de instrucciones – el uso incorrecto puede causar lesiones graves o mortales.



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RENTWAY

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1 Introduction

Thank you for your purchase. The information contained in this manual will help you receive maximum performance and satisfaction from your STIHL chain saw and, if followed, reduce the risk of injury from its use.

SAVE THIS MANUAL!



Because a chain saw is a high-speed wood-cutting tool, special safety precautions must be observed to reduce the risk of personal injury.



Read this instruction manual thoroughly before use and periodically thereafter. Follow all safety precautions. Careless or improper use of the chain saw can cause serious or fatal injury.

Have your authorized STIHL servicing dealer show you how to operate your chain saw. All safety precautions that are generally observed when working with an axe or a hand saw also apply to the operation of chain saws. Observe all applicable federal, state and local safety regulations, standards and ordinances.

Do not lend or rent your chain saw without this instruction manual. Allow only persons who have the proper training and fully understand the information in this manual to operate the chain saw.

For further information, or if you do not understand any of the instructions in this manual, please go to www.stihlusa.com or contact your authorized STIHL servicing dealer.

2 Guide to Using this Manual

2.1 Signal Words

This manual contains safety information that requires your special attention. Such information is introduced with the following symbols and signal words:

DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

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

NOTICE

Indicates a risk of property damage, including damage to the machine or its individual components.

2.2 Symbols in Text

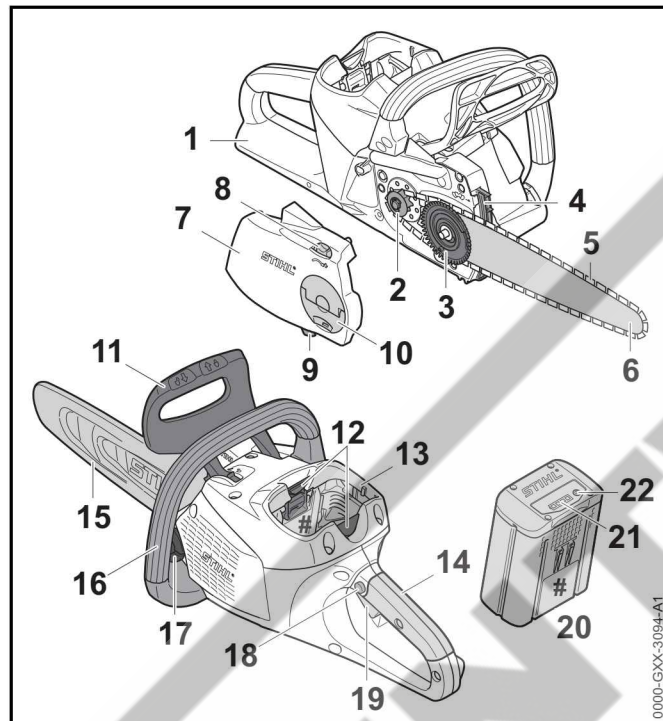
The following symbol is included to assist you with the use of the manual:



Refers to a designated chapter or sub-chapter in this instruction manual.

3 Main Parts

3.1 Chain Saw and Battery



1 Rear Hand Guard

Helps protect the operator's right hand in the event the chain breaks or comes off the bar.

2 Chain Sprocket

Drives the saw chain.

3 Tensioning Gear

Shifts the guide bar and tensions or loosens the saw chain.

4 Bumper Spike

Helps hold the saw steady against the wood during cutting.

5 Saw Chain

Toothed cutting tool consisting of cutters, tie straps and drive links.

6 Guide Bar

Supports and guides the saw chain.

7 Chain Sprocket Cover

Covers the chain sprocket.

8 Adjusting Wheel

Permits precise adjustment of saw chain tension.

9 Chain Catcher

Helps contain the saw chain and reduce the risk of operator contact in the event the chain breaks or comes off the bar.

10 Wingnut

Tightens the chain sprocket cover to the chain saw.

11 Front Hand Guard

Helps protect the operator's left hand from projecting branches and contact with the saw chain. Serves as the activation lever for the chain brake.

12 Locking Levers

Secure the battery in the battery compartment.

13 Battery Compartment

Holds the battery.

14 Rear Handle

Handle for the operator's right hand.

15 Chain Scabbard

Covers the guide bar and saw chain to reduce the risk of injury from inadvertent contact during transportation and storage.

16 Front Handle

Handle for the operator's left hand.

17 Oil Filler Cap

Closes and seals the oil tank.

18 Trigger Switch Lockout

Prevents activation of the trigger switch until depressed.

19 Trigger Switch

Switches the motor on and off.

20 Battery

Supplies electrical power to the motor.

21 Battery LEDs

Indicate the battery's state of charge and display error messages regarding potential malfunctions in the battery or power tool.

22 Push Button

Activates the battery's LEDs.

Rating Plate

Contains electrical information and the product's serial number.

4 Safety Symbols on the Products

4.1 Chain Saw

The following safety symbols are found on the chain saw:



To reduce the risk of injury, follow the specified safety precautions.



Read and follow all safety precautions in the instruction manual. Improper use can lead to serious or fatal personal injury or property damage.



To reduce the risk of serious personal injury and hearing loss, always wear proper eye protection, hearing protection and an approved protective helmet, 6.3.



Avoid contact of the bar tip with any object. This can cause the bar to kick suddenly up and back, which may result in serious or fatal injury. Always use two hands to operate the saw, 7.



To reduce the risk of injury or property damage from unintended activation, remove the battery any time the saw is not in use, 6.5.

4.2 Battery

The following safety symbols are found on the AR series backpack battery and the AP series battery:



To reduce the risk of injury, follow the specified safety precautions.



Read and follow all safety precautions in the battery's instruction manual and the manual for the STIHL tool powered by this battery. Improper use can lead to serious or fatal personal injury or property damage.



To reduce the risk of personal injury or property damage from fire, explosion or burns, including chemical burns, do not disassemble, crush, drop, damage or heat above 212 °F (100 °C). Never expose to fire or incinerate, 9.



To reduce the risk of personal injury or property damage from fire, use and store only within an ambient temperature range of 14 °F to 122 °F (- 10 °C to 50 °C), 9.

AR 900, 1000, 2000, 3000 Backpack Batteries



To reduce the risk of personal injury or property damage from a short circuit, fire or explosion, keep dry. Protect from rain, water, liquids and damp conditions. Never immerse in water or other liquids, 9.

AR L Backpack Batteries

To reduce the risk of personal injury or property damage from a short circuit, fire or explosion, keep dry. Never immerse in water or other liquids, 9.

AP Series Batteries

To reduce the risk of personal injury or property damage from a short circuit, fire or explosion, keep dry. Never immerse in water or other liquids, 9.

Batteries sold separately.

5 General Power Tool Safety Warnings

5.1 Introduction

This chapter contains the prescribed general safety warnings and instructions for handheld, motor-operated electric power tools and motor-operated electric chain saws. Additional important warnings and instructions are provided in subsequent chapters of this manual.

WARNING

- **Read all safety warnings, instructions, illustrations and specifications provided with this power tool.** Failure to follow all instructions listed below 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.

5.2 Work Area Safety

- a) **Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
- b) **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.
- c) **Keep children and bystanders away while operating a power tool.** Distractions can cause you to lose control.

5.3 Electrical Safety

- a) **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 the risk of electric shock.
- b) **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.
- c) **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- d) **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.
- e) **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.
- f) **If operating a power tool in a damp location is unavoidable, use a residual current device (RCD) or ground fault circuit interrupter (GFCI) protected supply.** Use of an RCD or GFCI reduces the risk of electric shock.

5.4 Personal Safety

- a) **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.

- b) **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.
- c) **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 energizing power tools that have the switch on invites accidents.
- d) **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.
- e) **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
- f) **Dress properly. Do not wear loose clothing or jewellery. Keep your hair and clothing away from moving parts.** Loose clothes, jewellery or long hair can be caught in moving parts.
- g) **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.
- h) **Do not let familiarity gained from frequent use of tools allow you to become complacent and ignore tool safety principles.** A careless action can cause severe injury within a fraction of a second.

5.5 Power Tool Use and Care

- a) **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.
- b) **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.

- c) **Disconnect the plug from the power source and/or remove the battery pack, if detachable, 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.
- d) **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.
- e) **Maintain power tools and accessories.** 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.
- f) **Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- g) **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.
- h) **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.

5.6 Battery Tool Use and Care

- a) **Recharge only with the charger specified by the manufacturer.** A charger that is suitable for one type of battery pack may create a risk of fire when used with another battery pack.
- b) **Use power tools only with specifically designated battery packs.** Use of any other battery packs may create a risk of injury and fire.

- c) **When battery pack is not in use, keep it away from other metal objects, like paper clips, coins, keys, nails, screws or other small metal objects that can make a connection from one terminal to another.** Shorting the battery terminals together may cause burns or a fire.
- d) **Under abusive conditions, liquid may be ejected from the battery; avoid contact. If contact accidentally occurs, flush with water. If liquid contacts eyes, additionally seek medical help.** Liquid ejected from the battery may cause irritation or burns.
- e) **Do not use a battery pack or tool that is damaged or modified.** Damaged or modified batteries may exhibit unpredictable behaviour resulting in fire/explosion or risk of injury.
- f) **Do not expose a battery pack or tool to fire or excessive temperature.** Exposure to fire or temperatures above 100 °C may cause explosion.
- g) **Follow all charging instructions and do not charge the battery pack or tool outside the temperature range specified in the instructions.** Charging improperly or at temperatures outside the specified range may damage the battery and increase the risk of fire.

5.7 Service

- a) **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.
- b) **Never service damaged battery packs.** Service of battery packs should only be performed by the manufacturer or authorized service provider.

5.8 General Chain Saw Safety Warnings

- a) **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.

- b) **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 the reversed hand configuration increases the risk of personal injury and should never be done.
- c) **Hold the chain saw by insulated gripping surfaces only, because the saw chain may contact hidden wiring.** Saw chain contacting a "live" wire may make exposed metal parts of the chain saw "live" and could give the operator an electric shock.
- d) **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 and or accidental contact with the saw chain.
- e) **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.
- f) **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.
- g) **When cutting a limb that is under tension, be alert for spring back.** When the tension in the wood fibers is released, the spring loaded limb may strike the operator and/or throw the chain saw out of control.
- h) **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.
- i) **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.
- j) **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.

- k) **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.
- l) **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.
- m) **Follow all instructions when clearing jammed material, storing or servicing the chain saw. Make sure the switch is off and the battery pack is removed.** Unexpected actuation of the chain saw while clearing jammed material or servicing may result in serious personal injury.

5.9 Causes and Operator Prevention of Kickback

- a) 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.
- b) Tip contact in some cases may cause a sudden reverse reaction, kicking the guide bar up and back towards the operator.
- c) Pinching the saw chain along the top of the guide bar may push the guide bar rapidly back towards the operator.
- d) Either of these reactions may cause you to lose control of the saw which could result in serious personal injury. Do not rely exclusively upon the safety devices built into your saw. As a chain saw user, you should take several steps to keep your cutting jobs free from accident or injury.
- e) Kickback is the result of chain saw misuse and/or incorrect operating procedures or conditions and can be avoided by taking proper precautions as given below:
 - 1) **Maintain a firm grip, with thumbs and fingers encircling the chain saw handles, with both hands on the saw 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 chain saw.

- 2) **Do not overreach and do not cut above shoulder height.** This helps prevent unintended tip contact and enables better control of the chain saw in unexpected situations.
- 3) **Only use replacement guide bars and saw chains specified by the manufacturer.** Incorrect replacement guide bars and saw chains may cause chain breakage and/or kickback.
- 4) **Follow the manufacturer's sharpening and maintenance instructions for the saw chain.** Decreasing the depth gauge height can lead to increased kickback.

6 IMPORTANT SAFETY INSTRUCTIONS

6.1 Intended Use

WARNING

- This chain saw is designed for cutting small and medium diameter trees, branches and limbs. It is not designed for felling large trees or cutting large diameter logs. Use of the chain saw for operations different than intended could result in serious injury or death.
 - Cut wood only. For example, do not use chain saw for cutting metal, plastic or masonry.
 - Use this chain saw only for light-duty or moderate-duty cutting tasks.
- For cutting larger trees, logs or branches, a more powerful, faster saw may be necessary to reduce the risk of binding, stalling or other risks caused by a change in conditions during longer cutting times. This battery-

operated chain saw is not suitable for cutting larger trees and logs, and its use could lead to a loss of control of the object being cut and serious personal injury or death.

- Before starting any felling operation, fully charge your STIHL AP or AR battery.
- Before starting any bucking, limbing, pruning or felling operation, ensure that all necessary cuts can be completed using the charge remaining in the STIHL AP or AR series battery. If you are unsure:
 - Have multiple charged batteries available for use;
 - Select a more powerful chain saw;
 - Select a more powerful battery; or
 - Consult a reputable tree removal professional.
- Read and follow the operating and use instructions in this manual for approved applications and recommended working techniques.
- The saw chain has many sharp cutters. If they contact your flesh, they will cut you even if the chain is not moving.
 - Always wear heavy-duty work gloves when handling the saw or its chain.
 - Keep hands, feet and other parts of your body away from the chain.
- Reactive forces, including kickback, can be dangerous.
 - Pay special attention to the sections of this instruction manual dealing with reactive forces.
- Observe all applicable federal, state and local safety regulations, standards and ordinances.
 - When using a chain saw for logging purposes, for instance, refer to the OSHA regulations for "logging operations" at 29 Code of Federal Regulations 1910.266.
- Improper use could result in personal injury or property damage, including damage to the chain saw.
 - Use the chain saw and battery only as described in this manual.
 - Never attempt to modify or override the chain saw's controls or safety devices in any way.

- Never use a chain saw that has been modified or altered from its original design.
- Be sure to read and follow the warnings and instructions for your battery and charger before charging or starting work.

- This power tool may be powered by a STIHL AP series battery. Alternatively, it may be powered by a STIHL AR series backpack battery in combination with an AP adapter.

Batteries, chargers and other accessories are sold separately.

6.2 Operator

WARNING

- Working with the chain saw can be strenuous. The operator must be in good physical condition and mental health. To reduce the risk of personal injury from fatigue and loss of control:
 - Check with your doctor before using the chain saw if you have any health condition that may be aggravated by strenuous work.
 - Do not operate the chain saw while under the influence of any substance (drug, alcohol or medication, etc.) that might impair vision, balance, dexterity or judgment.
 - Be alert. Do not operate the chain saw when you are tired. Take a break if you become tired.
 - Do not permit minors to use the chain saw.
 - Bystanders, especially children, and animals should not be allowed in the area where the chain saw is in use.
- Prolonged use of a chain saw (or other power tools) exposing the operator to vibration may produce white finger disease (Raynaud's phenomenon) or carpal tunnel syndrome. These conditions reduce the hand's ability to feel and regulate temperature. They produce numbness and burning sensations and may also cause nerve and circulation damage as well as tissue necrosis.

- All factors which contribute to white finger disease are not known. Cold weather, smoking and diseases or physical conditions that affect blood vessels and blood transport, as well as high vibration levels and long periods of exposure to vibration, are mentioned as factors in the development of white finger disease.
- To reduce the risk of white finger disease and carpal tunnel syndrome:
 - Wear gloves while working and keep your hands warm.
 - Keep the chain saw well maintained. An improperly maintained chain saw or one with loose components will tend to have higher vibration levels.
 - Keep the saw chain sharp. A dull chain will increase cutting time, and pressing a dull chain through wood will increase the vibration transmitted to your hands.
 - Maintain a firm grip at all times, but do not squeeze the handles with constant, excessive pressure. Take frequent breaks.
- These precautions do not guarantee that you will not sustain white finger disease or carpal tunnel syndrome.
 - Closely monitor the condition of your hands and fingers if you are a regular operator.
 - Seek medical advice immediately if any of the above symptoms appear.
- According to STIHL's current knowledge, the electric motor of this chain saw should not interfere with a pacemaker.
 - However, persons with a pacemaker or other implanted medical device should consult their physician and device manufacturer before operating this chain saw.

6.3 Personal Protective Equipment

WARNING

- To reduce the risk of personal injury:
 - Always wear proper clothing and protective apparel, including proper eye protection.
- Loss of control and severe cut injuries may result if hair, clothing or apparel make contact with the moving saw chain or otherwise become entangled in the components of the saw. To reduce the risk of severe personal injury:



- Wear sturdy and snug-fitting clothing that also allows complete freedom of movement.
 - Wear the type of overalls, long pants or chaps that contain pads of cut-retardant material.
 - Wear a long-sleeve shirt or jacket.
 - Avoid loose-fitting jackets, scarves, neckties, flared or cuffed pants, jewelry and any other apparel that could be caught on branches, brush or the moving chain.
 - Secure hair above shoulder level before starting work.
- To reduce the risk of eye injury:
 - Always wear goggles or close-fitting protective glasses with adequate top and side protection that are impact-rated and marked as complying with ANSI Z87 "+".
 - To reduce the risk of injury to your face, STIHL recommends that you also wear a face shield or face screen over your goggles or protective glasses.
 - To reduce the risk of head injury from falling branches or other objects encountered during work:
 - Wear an approved protective helmet.
 - Prolonged exposure to power tool noise may result in permanent hearing damage. To reduce the risk of hearing damage:





- Wear sound barriers (ear plugs or ear muffs).
 - Regular operators should have their hearing checked periodically.
 - Be particularly alert and cautious when using hearing protection. Your ability to hear shouts, alarms or other audible warnings is restricted.
- Good footing is very important. To help maintain a secure footing and reduce the risk of injury while working:



- Wear sturdy boots with non-slip soles. Steel-toed safety boots are recommended. Do not wear sandals, flip-flops, open-toed or similar footwear.

- To improve your grip and help protect your hands:



- Always wear heavy-duty non-slip work gloves made of leather or another wear-resistant material when handling the chain saw or its chain.

6.4 Chain Saw

⚠ WARNING

- To reduce the risk of electric shock:
 - Do not immerse the chain saw in water or other fluids.
 - Store the chain saw indoors.
- The saw chain has many sharp cutters. Contacting the cutters may result in serious laceration injuries, even if the chain is not moving. To reduce the risk of such injuries:
 - Keep hands, feet and other parts of your body away from the chain.
 - Wear heavy-duty work gloves when handling the chain saw or its chain.
 - Never touch a moving chain with your hand or any other part of your body.
- Cover the guide bar with a chain scabbard before transporting or storing the chain saw to reduce the risk of injury from inadvertent contact.
- Reactive forces, including kickback, can be dangerous.
 - Pay special attention to the section of this instruction manual on "Kickback and Other Reactive Forces," 7.
- This battery-powered chain saw is intended only for cutting small and medium diameter trees, branches and limbs. Use for other purposes may increase the risk of personal injury and property damage.
 - Do not use the chain saw for felling large trees or cutting large diameter logs.
 - Read and follow the operating instructions in this manual for approved applications, 8.
- To reduce the risk of personal injury to the operator and bystanders:
 - Always release the trigger switch, engage the chain brake by moving the front hand guard to and remove the battery before assembling, transporting, adjusting, inspecting, cleaning, servicing, maintaining or storing the chain saw and any other time it is not in use.
- Although certain unauthorized attachments may fit your STIHL chain saw, their use may be extremely dangerous. Only attachments supplied by STIHL or expressly approved by STIHL for use with this specific model are recommended.
 - Use only attachments supplied or expressly approved by STIHL.
 - Never modify this chain saw in any way.
 - Never attempt to modify or override the chain saw's controls or safety devices in any way.
 - Never use a chain saw that has been modified or altered from its original design.



- If the chain saw is dropped or subjected to similar heavy impacts:
 - Check that it is undamaged, in good condition and functioning properly before continuing work.
 - Check that the controls and safety devices, including the chain brake, are working properly,  19.1.
 - Check the LEDs for error messages,  13.1.2 or  13.2.2.
 - Check that the battery has not been damaged. Never use or charge a malfunctioning, damaged, cracked, leaking or deformed battery.
 - Never work with a damaged or malfunctioning chain saw or battery. In case of doubt, have the chain saw and battery checked by your authorized STIHL servicing dealer.
- If the chain saw or battery is damaged, not working properly, has been left outdoors or dropped into water or other liquid, its components may no longer function properly and safety devices may be inoperative. To reduce the risk of personal injury and property damage:
 - Take the chain saw and battery to your authorized STIHL servicing dealer to be checked before further operation.
- Genuine STIHL replacement parts are specifically designed to match your chain saw and meet safety and performance requirements. Use of parts that are not authorized or approved by STIHL may cause serious or fatal injury or property damage.
 - STIHL recommends that only identical STIHL replacement parts be used.

6.5 Using the Chain Saw

6.5.1 Before Operation

WARNING

- Misuse or unauthorized use may result in personal injury and property damage.
 - Use the chain saw only as described in this instruction manual.
- For proper assembly of the bar and chain:
 - Read and follow the instructions on mounting the guide bar and chain,  15.2.1.
- The chain, guide bar and sprocket must match each other in gauge and pitch. Before mounting or replacing:
 - Read the information on guide bar and chain combinations,  27.
 - Read and follow the instructions on kickback and other reactive forces,  7.
 - Select the shortest bar that will meet your cutting needs. Longer bars add weight and may be more difficult to control.
- Proper tension of the chain is extremely important to maximize cutting performance and reduce the risk of personal injury from chain breakage, derailment or reactive forces:
 - Read and follow the chain tensioning instructions,  15.3.
 - Always make sure the chain sprocket cover is tightened securely after tensioning the chain in order to secure the bar. Never start the chain saw with the chain sprocket cover loose or missing.
 - Check chain tension once more after tightening the chain sprocket cover.
 - After adjusting the chain, let the motor run for a minute or two, then switch the motor off and engage the chain brake. Remove the battery and recheck chain tension.

- Check chain tension periodically thereafter at regular intervals (only after engaging the chain brake and removing the battery).
- Never cut with a loose chain. If the chain becomes loose while cutting, switch off the motor, engage the chain brake and remove the battery from the chain saw before tightening the chain. Never attempt to adjust the chain while the battery is inserted.
- Using a chain saw that is modified, damaged, improperly adjusted or maintained, or not completely and securely assembled can lead to a malfunction and increase the risk of serious personal injury or death.
 - Never operate a chain saw that is modified, damaged, improperly maintained or not completely and securely assembled.
 - Always check your chain saw for proper condition and operation before starting work, particularly the trigger switch, trigger switch lockout, front hand guard, chain brake and cutting attachment.
 - Ensure that the trigger switch and trigger switch lockout move freely and always spring back to the locked position when released. The trigger switch must not engage until the trigger switch lockout is depressed.
 - Never attempt to modify or override the controls or safety devices in any way.
 - If your saw or any part is damaged or does not function properly, take it to your authorized STIHL servicing dealer. Do not use the saw until the problem has been corrected.
- Before inserting the battery:
 - Check the contacts in the battery compartment for corrosion or other foreign matter and keep clean.
 - Never insert or use a malfunctioning, damaged, cracked, leaking or deformed battery.
 - Read and follow the instructions on switching on the chain saw,  18.1.
- To help reduce the risk of serious personal injury or death from unintentional starting:
 - Be sure the trigger switch and trigger switch lockout are in the off position when inserting the battery.
 - Avoid contacting the trigger switch lockout and trigger switch when grasping the rear handle of the chain saw.
 - Release the trigger switch and trigger switch lockout and engage the chain brake before removing the battery.

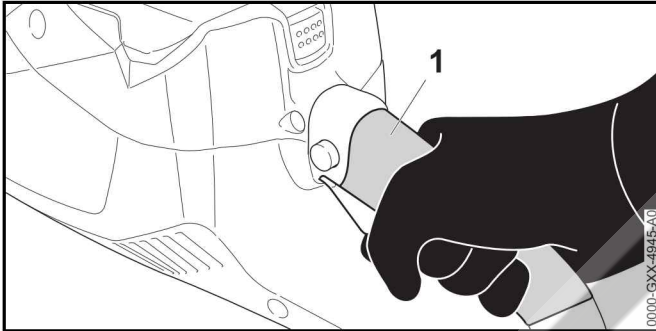


- Remove the battery and engage the chain brake before assembling, transporting, adjusting, inspecting, cleaning, servicing, maintaining or storing the chain saw and any time it is not in use.

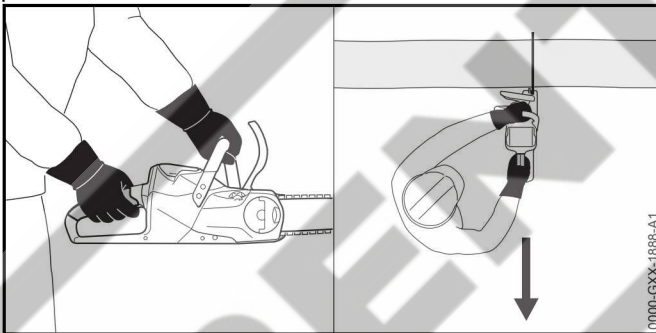
- Never leave the chain saw unattended when the battery is inserted.
- Never store the battery in the chain saw.

- Before disengaging the chain brake and switching on your chain saw, take the following steps to reduce the risk of personal injury from reactive forces, loss of control or inadvertent contact with the chain:
 - Be sure that the guide bar and chain are clear of you and all other obstructions and objects, including the ground.
 - Never attempt to switch on the chain saw when the guide bar is in a cut or kerf. Doing so could lead to reactive forces and injury.
 - Read and follow the instructions on switching on the chain saw,  18.1.

6.5.2 Holding and Controlling the Chain Saw

⚠ WARNING

- To reduce the risk of personal injury from unintentional starting when grasping the rear handle or carrying the chain saw:
 - Wrap the fingers of your right hand tightly around the rear handle, identified by shading in the illustration (1). Avoid grasping the chain saw outside the shaded area or contacting the trigger switch lockout or trigger switch.



- To maintain a firm grip and properly control your chain saw:
 - Keep the handles clean and dry at all times. Keep them free of moisture, pitch, oil, grease and resin.
- To reduce the risk of serious or fatal injuries to the operator or bystanders from loss of control:



- Avoid contacting any object with the upper quadrant of the tip of the guide bar. It may cause kickback to occur.



- Always hold the chain saw firmly with both hands when you are working.

- Place your left hand on the front handle and your right hand on the rear handle (see illustration). Left-handers must follow these instructions too.
- Wrap your fingers tightly around the handles, keeping the handles cradled between your thumb and forefinger.
- Position the chain saw in such a way that all parts of your body are clear of the cutting attachment whenever the battery is inserted. Stand to the left of the cut while bucking, outside of the cutting plane (see illustration).
- Read and follow all warnings and instructions in the chapter Kickback and Reactive Forces, 7.

- Operating the chain saw with one hand is extremely dangerous. One-handed operation makes it difficult to oppose and absorb reactive forces (pushback, pull-in, kickback) without losing control of the chain saw. It also makes it difficult to prevent the bar and chain from skating or bouncing along a limb or log. To reduce the risk of serious or fatal injury to the operator or bystanders from loss of control:



- Never attempt to operate the chain saw with one hand.

- To reduce the risk of serious or fatal cut injuries to the operator or bystanders from loss of control, keep proper footing and balance at all times:
 - Take special care in overgrown or wet terrain and always watch for hidden obstacles such as tree stumps, roots, rocks, holes and ditches to avoid stumbling.
 - Be extremely cautious when working on slopes or uneven ground.
 - For better footing, always clear away fallen branches, scrub and cuttings. Freshly debarked logs and other material can increase the danger of slipping, tripping or falling.
 - Use extreme caution when cutting small-size brush, branches and saplings because slender material may catch the chain and spring toward you or pull you off balance.
- To reduce the risk of injury from loss of control:



- Never work on a ladder, roof, in a tree or while standing on any other insecure support.
- Never operate the chain saw above shoulder height.
- Do not overreach. Keep proper footing and balance at all times.
- Never switch on the chain saw when the guide bar is in a cut or kerf. Doing so could lead to reactive forces and injury. Instead, remove the guide bar from the cut and re-enter at full speed, taking care to avoid contacting any object with the tip of the guide bar.

- The bumper spike is designed to provide greater control of the chain saw while cutting. If you work without the bumper spike, the chain saw may pull you forward suddenly. This could cause loss of control or, if the tip of the guide bar strikes an object, kickback.
 - Always work with the bumper spike to maintain better control of the saw.
- Applying pressure to the chain saw when reaching the end of a cut may cause the bar and rotating chain to accelerate out of the kerf, go out of control and strike the operator or some other object. To reduce the risk of injury:
 - Use caution when approaching the end of a cut.
 - Never put pressure on the chain saw when reaching the end of a cut.
 - STIHL recommends that first-time chain saw users cut logs on a sawhorse.

6.5.3 Working Conditions

⚠ WARNING

- Operate your chain saw only under good visibility during favorable daylight conditions.
 - Postpone the work if the weather is windy, foggy, rainy or inclement.
 - Never cut near power lines.
- Your chain saw is a one-person machine.
 - Do not allow other persons in the general work area.
 - Bystanders, especially children, and animals should not be allowed in the area where it is in use.
 - Switch off the motor immediately if you are approached.
- To reduce the risk of injury to bystanders and unauthorized users:
 - Never leave the chain saw unattended when the battery is inserted.
 - Switch off the chain saw, engage the chain brake and remove the battery during work breaks and any other time the chain saw is not in use.

- Sparks generated from the operation of the chain saw may be capable of igniting combustible gases, liquids, vapors, dusts or other combustible materials and substances. To reduce the risk of fire and explosion:
 - Never operate the chain saw in a location where combustible gases, liquids, vapors, dusts or other combustible materials and substances are present.
 - Read and follow recommendations issued by government authorities (e.g., OSHA) for identifying and avoiding the hazards of combustible gases, liquids, vapors, dusts or other combustible materials and substances.
- If a rotating chain strikes a rock or other hard object, sparks may be created, which can ignite flammable materials under certain circumstances. Flammable materials can include dry vegetation and brush, particularly when weather conditions are hot and dry.
 - When there is a risk of fire or wildfire, do not use your chain saw around flammable materials or around dry vegetation or brush.
 - Contact your local fire authorities or the U.S. Forest Service if you have any question about whether vegetation and weather conditions are suitable for the use of a chain saw.
- Using this chain saw and sharpening its chain can generate dust, oil mist and other substances containing chemicals known to cause respiratory problems, cancer, birth defects and other reproductive harm.
 - Consult governmental agencies such as EPA, OSHA, CARB and NIOSH and other authoritative sources on hazardous materials if you are unfamiliar with the risks associated with the particular substances you are cutting or with which you are working.
- Inhalation of certain dusts, especially organic dusts such as mold or pollen, can cause susceptible persons to have an allergic or asthmatic reaction. Substantial or repeated inhalation of dust or other airborne contaminants, especially those with a smaller particle size, may cause respiratory or other illnesses. This includes wood dust, especially from hardwoods, but also from some softwoods such as Western Red Cedar.
 - Control dust (such as saw dust) and mists (such as oil mist from chain lubrication) at the source where possible.
 - Always work with a properly sharpened chain, which produces wood chips rather than fine dust.
 - To the extent possible, operate the chain saw so that the wind or operating process directs any dust, mist or other particulate matter raised by the chain saw away from the operator.
 - When respirable dust or other particulate matter cannot be kept at or near background levels, always wear a respirator that is approved by NIOSH and rated for worksite-specific conditions. Follow the recommendations of governmental authorities (e.g., OSHA/NIOSH) and occupational and trade associations.
- If the vegetation being cut or the surrounding ground is coated with a chemical substance, such as pesticide or herbicide:
 - Read and follow the instructions and warnings that accompanied the substance coating the vegetation or surrounding ground.
- Breathing asbestos dust is dangerous and can cause severe or fatal illness, respiratory illness or cancer, including mesothelioma. The use and disposal of asbestos-containing products is strictly regulated by OSHA and the EPA.
 - Do not use your chain saw to cut or disturb asbestos or asbestos-containing products.
 - Stop work immediately and contact the relevant state and local authorities and/or EPA, your employer or local OSHA representative if you have reason to believe that you might be disturbing asbestos.

- Repeated contact with waste oil can cause skin cancer and its use is harmful to the environment.
 - Do not use waste oil to lubricate the bar and chain of your STIHL chain saw.

6.5.4 Operating Instructions

⚠ WARNING

- To reduce the risk of severe personal injuries from unintentional starting:
 - Never touch a chain with your hand or any part of your body when the battery is inserted, even when the chain is not rotating.
 - Avoid contacting the trigger switch lockout and trigger switch when grasping the control handle of the chain saw.
- The chain continues to move for a short period after the trigger switch is fully released.
 - Wait for the chain to stop and engage the chain brake before walking with the chain saw or putting it down.
- In the event of an emergency:
 - Switch off the motor immediately, engage the chain brake and remove the battery.
- Your chain saw is equipped with a chain catcher. It is designed to reduce the risk of personal injury in the event of a thrown or broken chain.
 - Never operate the chain saw with a damaged or missing chain catcher.
- Contacting foreign objects while sawing might cause the chain to break or be thrown, or cause the chain saw to propel dangerous debris or kick back in the direction of the operator. To reduce the risk of severe or fatal personal injury caused by contact with foreign objects:
 - Inspect the tree, log or branch before cutting.
 - Remove any foreign objects to ensure that the wood is free of materials such as nails, spikes, cables, or wires.

- Before starting a cut, ensure that it can be completed without contacting surrounding objects or structures such as fencing or stonework.

- Check the chain and guide bar at regular short intervals during operation, or immediately if there is a change in cutting behavior:
 - Switch off the motor, activate the chain brake and remove the battery.
 - Check the condition and tension of the chain. Look for damage to the chain or guide bar.
 - If the chain cannot be properly tensioned, or if other components of the saw are worn or damaged, stop work immediately and take your chain saw to an authorized STIHL servicing dealer for inspection, repair or maintenance.

⚠ DANGER



- To reduce the risk of electrocution:
 - Never operate this chain saw in the vicinity of any wires or cables that may be carrying electric current.
 - Never cut near power lines.
 - Do not rely on the chain saw's insulation against electric shock.

7 Kickback and Other Reactive Forces

7.1 Reactive Forces

⚠ WARNING

- Reactive forces may occur any time the chain is rotating. Reactive forces can cause serious or fatal personal injury.

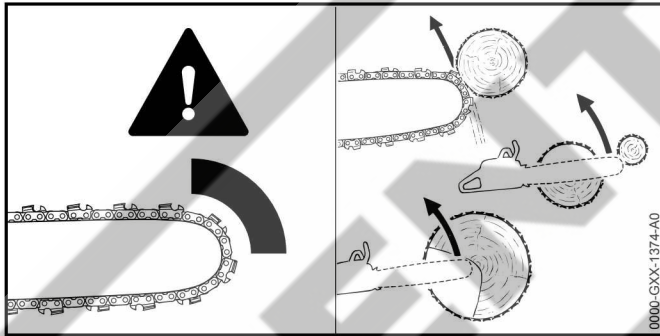
- The powerful forces used to cut wood can be reversed and work against the operator. If the rotating saw chain is suddenly and significantly slowed or stopped by contact with any solid object such as a log or branch, or is pinched, the reactive forces may occur instantly.
- These reactive forces may result in loss of control, which, in turn, may cause serious or fatal injury.
 - An understanding of the causes of these reactive forces may help you avoid the element of surprise and loss of control. Surprise contributes to accidents.

The most common reactive forces are:

- Kickback
- Pull-in
- Pushback

7.2 Kickback

7.2.1 Kickback



⚠ WARNING



Kickback may occur when the moving chain near the upper quadrant of the bar nose contacts a solid object or is pinched.

- When this occurs, the energy driving the chain can create a force that moves the chain saw in a direction opposite to the chain movement at the point where the chain is slowed or stopped. This may fling the bar up and back in a lightning fast reaction mainly in the plane of the bar and can cause severe or fatal injury to the operator.
- Kickback may occur, for example, when the chain near the upper quadrant of the bar nose contacts the wood or is pinched during limbing or when it is incorrectly used to begin a plunge or boring cut.
- The greater the force of the kickback reaction, the more difficult it becomes for the operator to control the chain saw. Many factors influence the occurrence and force of the kickback reaction. These include chain speed, the speed at which the bar and chain contact the object, the location and angle of contact, the condition of the chain, and how quickly the chain is slowed or stopped, among other factors.
 - The type of bar and chain you use is an important factor in the occurrence and force of the kickback reaction. Some STIHL bar and chain types are designed to reduce kickback forces.
 - STIHL recommends the use of reduced kickback bars and low kickback chains.

7.2.2 Chain Saw Kickback Standards

The following standards apply with respect to kickback:

- § 19.108 of UL 60745-2-13
- § 5.11 of ANSI/OPEI B175.1

These standards, referred to as "the chain saw kickback standards" in this chapter, set certain performance and design criteria related to chain saw kickback.

To comply with the chain saw kickback standards, electric chain saws:

- must, in their original condition, meet a 45° computer-derived kickback angle when equipped with certain cutting attachments; and

- must be equipped with at least two devices to reduce the risk of kickback injury, such as a chain brake, low kickback chain, reduced kickback bar, etc.

The computer-derived angles for electric chain saws are measured by applying a computer program to test results from a kickback test machine.

⚠ WARNING

- Compliance with the chain saw kickback standards does not mean that the bar and chain will rotate at most 45° in a real life kickback.
- The computer-derived angles of the chain saw standards may bear no relationship to actual kickback bar rotation angles that may occur in a real life cutting situation.
- Devices designed to reduce the risk of kickback injuries may lose some of their effectiveness when they are no longer in their original condition, especially if they have been improperly maintained.
 - Read and follow the safety precautions and instructions in this manual.
 - When working, always position the chain saw such that your body is clear of the cutting attachment and outside of the cutting plane.
 - Follow the maintenance and service instructions in this manual.
- For the chain saw to meet the chain saw kickback standards, use only the following cutting attachments:
 - Compliant bar and chain combinations listed in "Combinations of Guide Bars and Saw Chains,"  27;
 - Other replacement bar and chain combinations marked in accordance with the standards for use on the chain saw; or
 - Replacement chain designated "low kickback chain."

7.2.3 Devices for Reducing the Risk of Kickback Injury

The STIHL Quickstop chain brake and STIHL's green-labeled, reduced kickback bars and green-labeled, low kickback chains are designed to reduce the risk of kickback injury.

1. STIHL Quickstop Chain Brake



There are two mechanisms for activating the chain brake if it is in a properly maintained condition:

- **Manual Activation:** If a kickback occurs, the chain saw moves upwards toward the user in a rotating motion around the front handle. The brake is designed to engage if the left hand contacts the front hand guard, which is the activation lever for the brake, and pushes it forward.
- **Inertia Activation:** All STIHL chain saws are equipped with an inertia Quickstop chain brake. If the kickback impulse is strong enough, this alone is sufficient to engage the brake even without contacting the front hand guard.

⚠ WARNING

- To reduce the risk of kickback injury:
 - Never use a saw if the chain brake does not function properly.
 - When in doubt, take the saw to an authorized STIHL servicing dealer for inspection and/or repair.
 - Do not use the saw until the problem has been corrected.

- In a kickback situation, the front hand guard helps protect your left hand from contacting the chain. Removal of the front hand guard on a chain saw equipped with a Quickstop chain brake will reduce this protection and also disable the chain brake, increasing the risk of kickback injury.
 - Never operate your saw without a properly functioning front hand guard. If the front hand guard is missing, manual activation and inertia activation of the chain brake will be completely disabled.
 - Never attempt to remove, modify or disable the front hand guard or any other component of the chain brake.
- No Quickstop or other chain brake device prevents kickback. These devices are designed to reduce the risk of injury, if activated, in certain kickback situations. To reduce the risk of severe personal injury or death from kickback:
 - Always follow the instructions in this manual and follow good working technique. For example, position your body clear of the cutting attachment whenever the motor is running. Stand to the left of the cut while bucking, outside of the cutting plane. See chapter "Holding and Controlling the Chain Saw",  6.5.2.
 - Maintain as much distance as possible, and never less than 45 degrees, between the bar and your body to ensure that the Quickstop has sufficient time to activate and stop the chain before reaching any part of your body.
 - Follow the other precautions provided in chapter  8.
- An improperly maintained chain brake may increase the time needed to stop the chain after activation, or may not activate at all. For the Quickstop to reduce the risk of kickback injury, it must be properly maintained and in good working order.
 - Read and follow the instructions on engaging and disengaging the chain brake,  16.1, and maintaining and repairing it,  16.3.

2. Low Kickback Saw Chain and Reduced Kickback Bars

STIHL offers a variety of guide bars and chains. STIHL reduced kickback bars and low kickback chains are designed to reduce the risk of kickback injury. Other chains are designed to achieve higher cutting performance or sharpening ease, but are more prone to kickback and may kick back with more energy, making it more difficult to control the chain saw.

STIHL has developed a color code system to help you identify the STIHL reduced kickback bars and low kickback chains.

- Cutting attachments with green labels on the packaging are designed to reduce the risk of kickback injury.
- Matching green-marked or labeled chain saws with green-labeled bars and green-labeled chains provides compliance with the computed kickback angle requirements of the chain saw standards when the products are in their original condition.
- Products with yellow labels are for users with extraordinary cutting needs, who have experience and specialized training for dealing with kickback.

STIHL recommends the use of its green-labeled reduced kickback bars, green-labeled low kickback chains and a chain saw equipped with a STIHL Quickstop chain brake for both experienced and inexperienced operators.

STIHL recommends green-labeled bars and chains for all chain saws. See your "STIHL Bar and Chain Information" leaflet for details.

New bar and chain combinations may be developed after publication of this literature, which will, in combination with certain electric chain saws, comply with the chain saw standards as well.

⚠ WARNING

- Use of bar and chain combinations not listed in the STIHL Bar and Chain Information leaflet (or other combinations that do not comply with the chain saw standards) may increase kickback forces as well as the propensity for kickback and increase the risk of kickback injury.
 - Please ask your authorized STIHL servicing dealer to properly match your chain saw with the appropriate bar and chain combination to reduce the risk of kickback injury.
- Reduced kickback bars and low kickback chains do not prevent kickback, but they are designed to reduce the risk of kickback injury.
 - STIHL recommends green-labeled bars and green-labeled chains for all chain saws and all users.
- Even if your saw is equipped with a Quickstop chain brake, a reduced kickback bar and/or low kickback chain, this does not eliminate the risk of injury from kickback.
 - Observe all safety precautions discussed in this manual to avoid kickback situations.

a. Low Kickback Saw Chain

Some types of chain have specially designed components to reduce the propensity for kickback and the force of kickback if it occurs. STIHL has developed low kickback chain for your chain saw.

A "low kickback chain" is a chain that has met the kickback performance requirements of ANSI/OPEI B175.1 when tested according to the provisions specified in ANSI/OPEI B175.1.

⚠ WARNING

- Some low kickback chains have not been tested with all chain saw and bar combinations. There are potential saw, bar and low kickback chain combinations which have not

been specifically certified to comply with the 45° computer-derived kickback angle of the chain saw standards.

- STIHL recommends green-labeled bars and green-labeled chains for all chain saws and all users.
 - Please see your STIHL Bar and Chain Information leaflet for the appropriate bar and chain combinations for your saw.
 - Please ask your authorized STIHL servicing dealer to properly match your chain saw with the appropriate bar and chain combination to reduce the risk of kickback injury.
- A blunt or incorrectly sharpened chain may reduce or negate the effectiveness of design features intended to reduce kickback energy and the propensity for kickback. Improper lowering or sharpening of the depth gauges or changing the shape of the cutters may increase the risk and the energy of kickback.
 - Always cut with a properly sharpened chain.
 - Read and follow the instructions on sharpening a chain,  24.4.
 - Any chain saw mounted with a bow guide is potentially very dangerous. The risk of kickback is increased with a bow guide because of the increased kickback contact area and because the design of bow guides places the upper portion of the bar closer to the operator's body. Using a low kickback chain will not significantly reduce the risk of kickback injury when used on a bow guide.
 - Never mount a bow guide on any STIHL chain saw.

b. Reduced Kickback Bars

STIHL green-labeled reduced kickback bars are designed to reduce the risk of kickback injury when used with STIHL green-labeled low kickback chains.

⚠ WARNING

- When used with other, more aggressive chains, green-labeled reduced kickback bars may be less effective in reducing kickback.
 - STIHL recommends green-labeled bars and green-labeled chains for all chain saws and all users.
- For proper balance and to comply with the chain saw standards:
 - Use only bar lengths listed in this manual,  27.

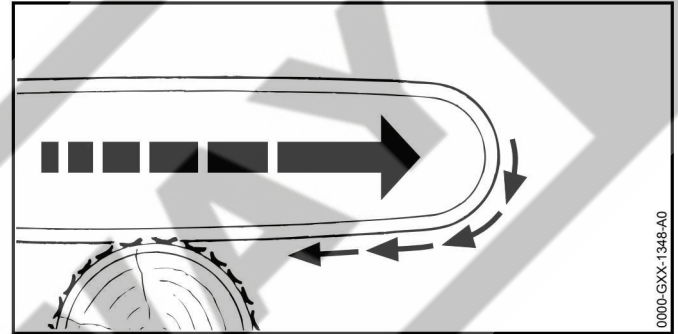
7.2.4 To Avoid Kickback

The best protection from personal injury that may result from kickback is to avoid kickback situations:

- 1) Hold the chain saw firmly and with both hands and maintain a secure grip, with your right hand on the rear handle and left hand on the front handle. Maintain a secure grip with thumbs and fingers encircling the chain saw handles. Don't let go.
- 2) Make sure the area in which you are cutting is free from obstructions.
- 3) Be aware of the location of the guide bar nose at all times. Never let the nose of the guide bar unintentionally contact any object. Do not cut limbs with the nose of the guide bar. Be especially careful near wire fences and when cutting small, tough limbs, small size brush and saplings which may easily catch the saw chain.
- 4) Do not overreach.
- 5) Do not cut above shoulder height.
- 6) Begin cutting and continue at full speed.
- 7) Cut only one log at a time.
- 8) Use extreme caution when re-entering a previous cut.
- 9) Do not attempt to plunge cut if you are not experienced with this cutting technique.
- 10) Be alert for shifting of the log or other forces that may cause the cut to close and pinch the saw chain.
- 11) Maintain saw chain properly. Cut with a correctly sharpened, properly tensioned saw chain at all times.

- 12) Stand to the side of the cutting path of the chain saw.
- 13) Use only replacement bars and chains specified by STIHL, or the equivalent.

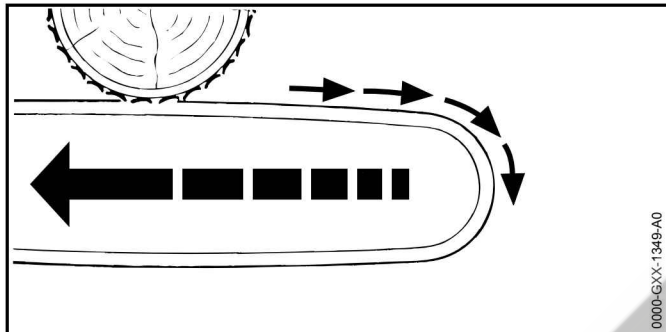
7.3 Pull-in



⚠ WARNING

- Pull-in occurs when the chain on the bottom of the bar is suddenly stopped or significantly slowed when it is pinched, caught or encounters a foreign object in the wood. The reaction of the chain pulls the saw forward and may cause the operator to lose control, which, in turn, may cause serious or fatal injury. If the tip contacts an object, kickback may occur.
- Pull-in usually occurs when the bumper spike of the saw is not held securely against the tree or limb and when the chain is not rotating at full speed before it contacts the wood.
- To reduce the risk of pull-in:
 - Cut with a sharp, properly tensioned chain.
 - Always start a cut with the chain rotating at full speed and with the bumper spike in contact with the wood.
 - Use wedges to open the kerf or cut, where possible.
 - Use extreme caution when cutting small-size brush and saplings which may easily catch the chain, spring towards you or pull you off balance.

7.4 Pushback



⚠ WARNING

- Pushback occurs when the chain on the top of the bar is suddenly stopped or significantly slowed when it is pinched, caught or encounters a foreign object in the wood. The reaction of the chain may drive the saw rapidly straight back toward the operator, causing loss of control which, in turn, may cause serious or fatal injury.
- Pushback usually occurs when the top of the bar is used for cutting.
- To reduce the risk of pushback:
 - Be alert to forces or situations that may cause material to pinch or bind the top of the chain.
 - Do not cut more than one log at a time.
 - Do not twist the chain saw when withdrawing the bar from an underbuck cut because the chain can pinch or bind.
 - Cut with a sharp, properly tensioned chain.

8 Proper Techniques for Basic Bucking, Limbing, Pruning and Felling

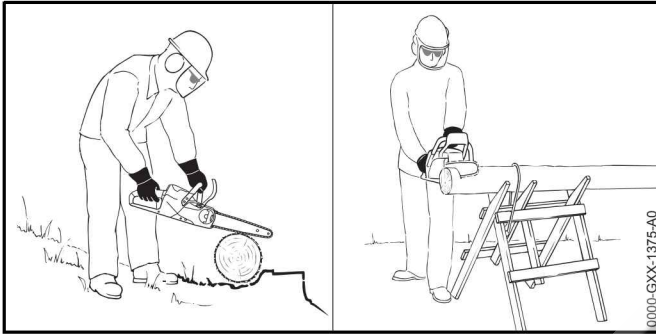
8.1 Intended Uses

⚠ WARNING

- This chain saw is not designed for felling large trees or cutting large diameter logs.
- For cutting larger trees, logs or branches, a larger, more powerful and faster saw may be necessary to reduce the risk of binding, stalling or a change in conditions during longer cutting times. Interruption of cutting speeds or a loss of power during a felling or limbing operation can result in an inability to control the fall of a tree or limb, and can lead to serious or fatal personal injury.
- Before starting any felling, limbing, bucking or pruning operation, fully charge your STIHL AP or AR battery.
- Before starting any bucking, limbing, pruning or felling operation, ensure that all necessary cuts can be completed using the charge remaining in the STIHL AP or AR series battery. If you are unsure:
 - Have multiple charged batteries available for use;
 - Select a more powerful chain saw;
 - Select a more powerful battery; or
 - Consult a reputable tree removal professional.
- Position the chain saw in such a way that your body is clear of the cutting attachment whenever the motor is running. Stand to the left of the cut while bucking, outside of the cutting plane.

8.2 Bucking

Bucking is cutting a log into sections.

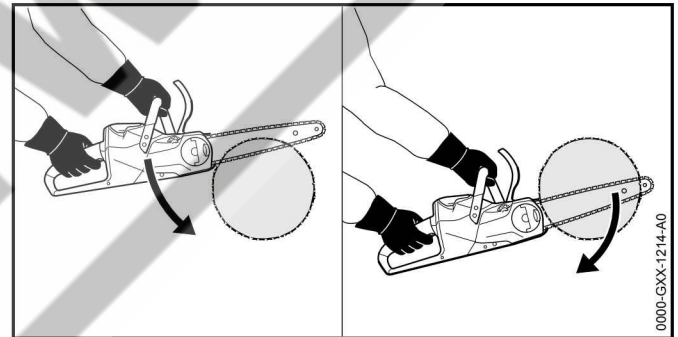


⚠ WARNING

- Be aware of rolling logs. Rolling logs can cause serious or fatal personal injury. To prevent a log from rolling while bucking:
 - Make sure the log is secure and will not roll downhill before starting your cut. If necessary, use sturdy wedges, shims or chocks.
 - If on a slope, always stand on the uphill side of the log.
 - Never stand on the log.
- To reduce the risk of kickback caused by contacting the nose of the guide bar with other logs or limbs:
 - Cut only one log at a time.
 - Do not cut logs in a pile.
- When cutting splintered wood, sharp splinters of wood may be caught and flung in the direction of the operator of the saw or bystanders.
 - Use caution when cutting splintered wood and always wear appropriate apparel and personal protective equipment, including eye protection.
 - Keep bystanders out of the work area.

- When cutting smaller logs, make sure the log is properly supported to reduce the risk of personal injury from loss of control of the chain saw or movement of the log. Small logs can move when contacted by the teeth of the chain:
 - Place logs through "V-shaped" supports on top of a sawhorse whenever possible.
 - Never permit another person to hold the log.
 - Never stabilize the log with your leg or foot.
- Failing to control the saw at the bottom of a bucking cut can cause severe personal injury or death.
 - Prepare the saw to exit the bottom of the cut by reducing the feed force you exert on the saw.
 - Cushion the weight of the saw so that the bar and chain are not thrust downward into your lower body and legs as the bar/chain exits the cut.

When bucking:



- ▶ Position the bumper spike of the saw against the log and use it as a fulcrum.
- ▶ Continually repositioning the bumper spike while pushing the guide bar completely through the log.

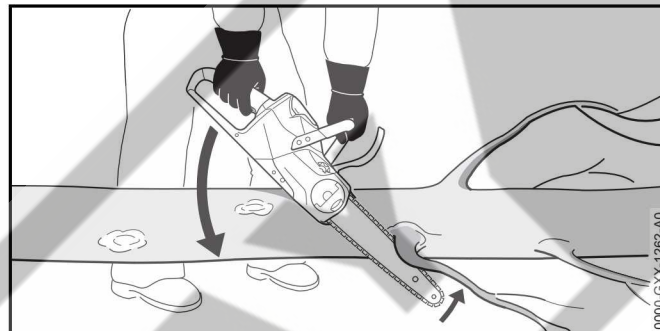
8.3 Limbing

Limbing is removing the branches from a fallen tree.

⚠ WARNING

- To prevent a log from rolling while limbing:
 - Start limbing by leaving the limbs on the lower, downhill side of the log to hold the log off the ground.
 - Stabilize the log with sturdy wedges, shims or chocks, if necessary.
 - Never stand on a log while limbing it.
- There is an increased danger of kickback during limbing operations, as limbs, leaves, stems and other material can entangle (bind) the cutters of the chain in the upper quadrant of the bar nose, causing the chain to slow or stop suddenly.
 - Do not use the nose of the bar to cut limbs.
 - Be extremely cautious and avoid contacting the log, the ground, other limbs and any leafy materials with the nose of the guide bar.
- When underbucking freely hanging limbs, a pinch may result or the limb may fall, hitting the operator or the chain saw and causing loss of control.
 - If a pinch occurs that traps or holds the bar or chain, switch off the motor, activate the chain brake and remove the battery from the saw before attempting to remove the saw from the cut, exercising caution that the limb does not suddenly snap or release.
- Limbs or logs under tension (spring poles) can spring back toward you with great force, striking you or causing you to lose control of the saw, resulting in severe or fatal injury.
 - Be extremely cautious when cutting limbs or logs that may be under tension.
 - Read and follow the warnings and instructions on cutting logs under tension,  8.5.

When limbing:



- ▶ Rest the chain saw on the log.
- ▶ Stand on the side of the log opposite the limb to be cut if it can be done safely.
- ▶ Push the guide bar at full throttle with a hinge motion against the branch.
- ▶ Cut the branch with the top or the bottom side of the guide bar, keeping the tip of the bar free of the log, the ground, other limbs and any leafy materials.

8.4 Pruning

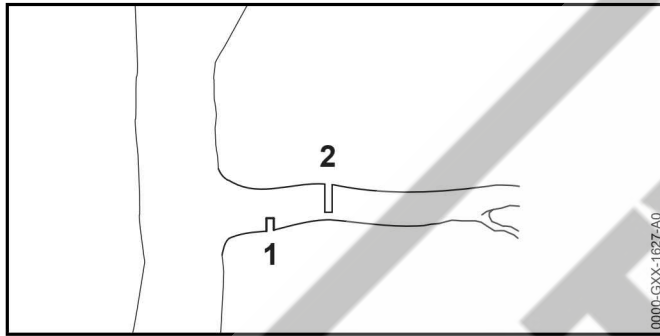
Pruning is selectively removing branches from a standing tree.

⚠ WARNING

- To reduce the risk of injury from loss of control:
 - Do not use the chain saw one-handed.
 - Never work on a ladder, on a roof, in a tree or while standing on any other insecure support.
 - Never operate the chain saw above shoulder height or cut overhead.
 - Do not overreach.
 - If you are unable to follow these instructions, you must use a different tool, such as a pole pruner, or have the work performed by a reputable tree service.

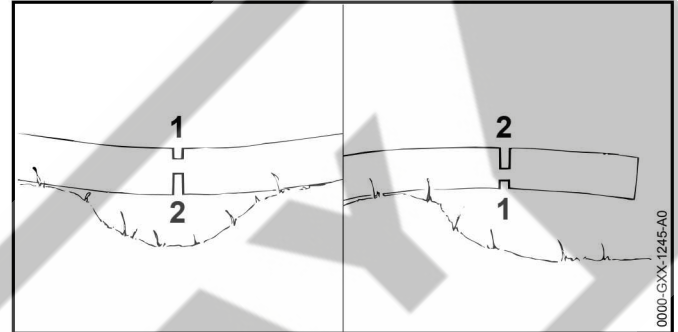
- To reduce the risk of injury:
 - Never stand directly underneath the branch you are cutting.
 - Watch for falling branches. As soon as the branch starts to fall, step aside and keep a sufficient distance away from the falling wood. A branch may spring back at you after it hits the ground.
 - Prior to beginning work, clear the work area of limbs and brush to reduce the risk of tripping and losing control of the chain saw.

To cut branches from a standing tree:



- ▶ Make the first cut (1) on the underside of the branch, approximately 2 in. (5 cm) from the trunk. Cut through approximately 1/4 of the diameter of the branch. This will help prevent the branch from splintering after it is cut.
- ▶ Make the second cut (2) on the top side of the branch, approximately 2 in. (5 cm) from the first cut.
- ▶ As soon as the branch starts to fall, withdraw the chain saw and let the branch fall to the ground.

8.5 Cutting Logs Under Tension



⚠ WARNING

- There is an increased danger of pinching the chain saw when cutting logs under tension. The tension in wood can also release suddenly and with great force, propelling the log, limb or chain saw into the saw operator, causing injury or loss of control.
- To reduce the risk of severe or fatal personal injury from reactive forces, including kickback, or loss of control when cutting wood under tension:
 - Always start with a relieving cut (1) at the compression side of the log, and then make a bucking cut (2) at the tension side.
 - If a pinch occurs that traps the bar/chain, switch off the motor, activate the chain brake, remove the battery and remove the saw from the log, exercising caution that the limb does not suddenly snap or release.
- Working in areas where logs, limbs and roots are tangled is extremely dangerous.
 - Drag the logs, limbs and other material to be cut into a clear area before cutting. Pull out exposed and cleared logs first. Do not cut where the tip of the bar may come into contact with other logs, limbs or leafy material.

8.6 Felling

8.6.1 Felling Conditions

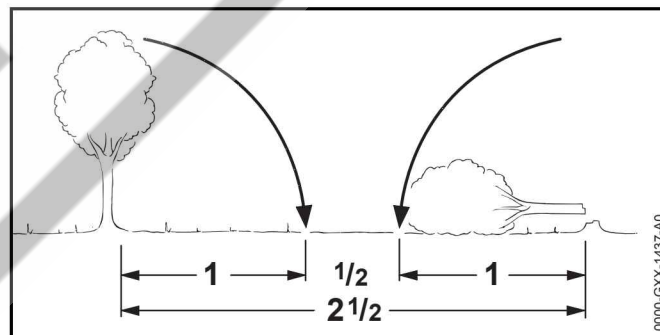
Felling is cutting down a tree. Before felling a tree, carefully consider all of the conditions that may affect the direction of fall.

! WARNING

- This chain saw is not designed for felling large trees, and using it to cut large trees could result in an inability to control the fall of the tree or limb, and can lead to serious or fatal personal injury.
- Before starting the felling operation, make sure the saw you are using has sufficient size, power and run time to complete the felling operation efficiently and without re-charging. Alternatively, have multiple charged batteries available for use, select a more powerful chain saw, select a more powerful battery, or consult a reputable tree removal professional.
- There are a number of factors that may affect and change the intended direction of fall, e.g. wind direction and speed, lean of tree, surrounding trees and obstacles, sloping ground, one-sided limb or foliage structure, wood structure, decay, snow load, etc.
 - To reduce the risk of severe or fatal injury to yourself or others, look for, analyze and plan for these conditions prior to beginning the cut, and be alert for a change in direction while the tree is falling.
- Felling a tree that has a diameter greater than twice the effective cutting length of the guide bar requires use of either the sectioning felling back cut or plunge-cut method. Neither of these cutting techniques is recommended for this model chain saw. These methods can be extremely dangerous because they involve the use of the nose of the guide bar and can result in kickback. Only properly trained professionals should attempt these techniques. If you are inexperienced with a chain saw, plunge-cutting should not be attempted. Seek the help of a qualified professional.

- Never attempt to cut a large diameter tree with a chain saw that lacks sufficient size, power or run-time to complete the task efficiently.
- Trees that are split, decayed or rotted inside or that are leaning or otherwise under tension are more likely to snap or split while being cut, causing serious or fatal injury to the operator or bystanders.
 - Always observe and be aware of the general condition of the tree.
 - Inexperienced users should never attempt to cut such trees.
 - Also look for broken or dead branches which could vibrate loose and fall on the operator during the felling operation. Certain types of trees are more susceptible to this condition, such as Douglas firs. You should check with a reputable tree service if you have questions about the stability of the trees you will be cutting.
 - When felling on a slope, the operator should stand on the uphill side if possible.

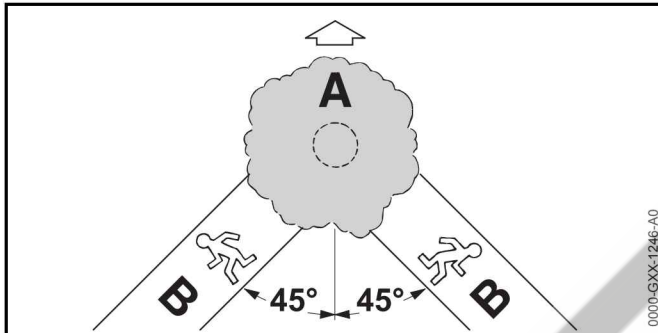
When felling:



- ▶ Maintain a distance of at least 2 1/2 tree lengths from the nearest person or structure.
- ▶ Take extra precautions in the vicinity of roads, railways and power lines. Inform the police, utility company or railway authority before beginning to cut.

8.6.2 Escape Path

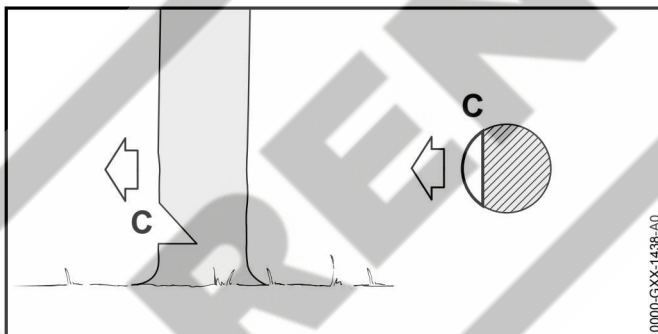
Before making your first cut, prepare an escape path:



- First clear limbs and brush from the area around the base of the tree. Remove vegetation from the lower portion of the tree with an axe.
- Next, establish at least two clear paths of escape (B) and remove any obstacles such as brush, small trees and other vegetation. These paths should lead away from the planned direction of the tree's fall (A) at a 45° angle from the expected fall line. Place all tools and equipment a safe distance away from the tree, but not on the escape paths.

8.6.3 Conventional Notch

For a conventional notch:

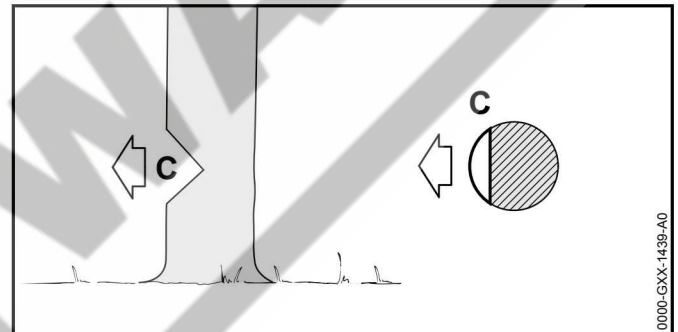


- The felling notch determines the direction of the tree's fall. Make the felling notch perpendicular to the line of fall you have determined, close to the ground.

- Be aware of conditions such as wind, limb and foliage structure, tree lean, the slope of the terrain and other factors that could alter the direction of fall.
- Cut down at a 45° angle to a depth of approximately 1/5 to 1/4 of the trunk diameter.
- Make a horizontal cut that meets the bottom of the first cut.
- Remove the resulting 45° piece. The size of the wedge will vary by tree size. The larger the tree, the larger the wedge. This model chain saw is not intended for felling large diameter trees.

8.6.4 Open-faced Notch

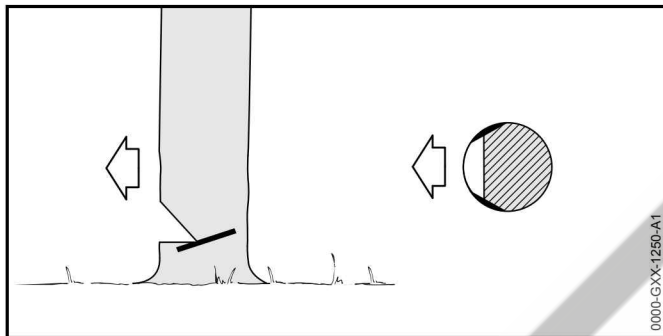
For an open-faced notch:



- The felling notch determines the direction of the tree's fall. Make the felling notch perpendicular to the line of fall you have determined, close to the ground.
- Be aware of conditions such as wind, limb and foliage structure, tree lean, slope of the terrain and other factors that could alter the direction of fall.
- Cut down at a 50° angle to a depth of approximately 1/5 to 1/4 of the trunk diameter.
- Make a second cut that meets the bottom of the first cut from below at a 40° angle.
- Remove the resulting 90° piece. The size of the wedge will vary by tree size. The larger the tree, the larger the wedge. This model chain saw is not intended for felling large diameter trees.

8.6.5 Sapwood Cuts

Sapwood cuts help prevent soft woods in summer from splintering when they fall:



- ▶ Make cuts at both sides of the trunk, at the same height as the subsequent felling back cut.
- ▶ Cut to no more than width of guide bar.

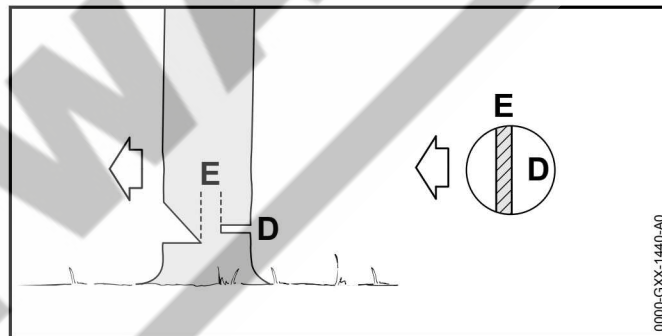
8.6.6 Felling Back Cut

⚠ WARNING

- If the tip of the bar contacts a wedge that has been used to help keep the kerf or cut open, it may cause kickback. Wedges should be of wood or plastic and never steel, which can damage the chain.
- Whichever felling method you select, never cut through the hinge when making your felling back cut. The hinge helps control the fall of the tree. Cutting through the hinge will eliminate the feller's ability to control the tree's fall and may result in serious or fatal personal injury or property damage.
- In order to reduce the risk of personal injury, never stand directly behind the tree when it is about to fall, since part of the trunk may split and come back towards the operator (barber-chairing), or the tree may jump backwards off the stump.

- Always keep to the side of the falling tree. When the tree starts to fall, withdraw the bar, release the trigger switch, engage the chain brake and walk away briskly on the pre-planned escape path.
- Watch out for limbs falling from the felled tree.
- Be extremely careful with partially fallen trees. When the tree hangs or for some other reason does not fall completely, set the saw aside and pull the tree to the ground with a cable winch, block and tackle or tractor. Trying to cut it down with your saw is extremely dangerous and may result in serious or fatal injury. Trees of this nature can fall suddenly and often are under tension.

The tree is brought down with the felling back cut (D).



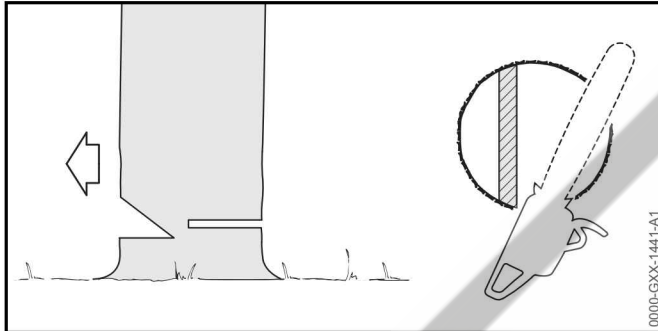
For both conventional and open-faced notches:

- ▶ Begin 1 to 2 in. (2.5 to 5 cm) higher than the bottom of the felling notch.
- ▶ Cut horizontally toward the felling notch.
- ▶ Leave approximately 1/10 of the diameter of the tree uncut. This is the hinge (E) that will help control the fall of the tree.
- ▶ Do not cut through the hinge because you could lose control of the direction of the fall.
- ▶ If necessary, wedges can be driven into the felling back cut to keep the cut open and to help control the direction of the fall. For example, if a tree tends to "sit back," causing a bind of the saw, wedges can be used to re-position it.

This model chain saw is not intended for felling large diameter trees.

8.6.7 Fan Cut

Use the simple fan cut for making the felling back cut on trees with a diameter less than the effective cutting length of the guide bar.



- After creating the felling notch, engage the bumper spikes of the chain saw directly behind the location of the intended hinge and 1 to 2 in. (2.5 to 5 cm) higher than the bottom of the felling notch. Pivot the saw around this point only as far as the back of the hinge. Do not cut through the hinge. The bumper spike should roll against the trunk until the back cut is complete.

9 Battery Safety

9.1 Warnings and Instructions

⚠ WARNING

- Read and follow the safety precautions on the battery and all warnings and instructions that accompany it.

- Use of unauthorized batteries can damage the power tool and result in fire, explosion and personal injury and property damage.
 - Use only genuine STIHL AR or AP series batteries with this power tool.
- Use of STIHL AR or AP series batteries for any purpose other than powering STIHL power tools could be extremely dangerous.
 - Use STIHL AR and AP series batteries only to power compatible STIHL power tools.
- Use of unauthorized chargers can damage the battery and result in fire, explosion and personal injury and property damage.
 - Charge STIHL AP series batteries only with genuine STIHL AL 101, AL 300 or AL 500 series chargers.
 - Charge STIHL AR series backpack batteries only with genuine STIHL AL 300 or AL 500 series chargers.
- The battery contains safety features and devices which, if damaged, may allow the battery to generate heat, rupture, leak, ignite or explode.



- Never heat the battery above 212 °F (100 °C).
- Never incinerate or place the battery on or near fires, stoves or other high-temperature locations.
- Never use or charge a malfunctioning, damaged, cracked, leaking or deformed battery.
- Never open, disassemble, crush, drop, subject to heavy impact or otherwise damage the battery.
- Never expose the battery to microwaves or high pressures.
- Never insert objects into the battery's cooling slots.
- Extreme temperatures may cause the battery to generate heat, rupture, leak, ignite or explode, resulting in severe or fatal personal injury and property damage. Exposure to temperatures outside the recommended temperature range may also reduce battery life and performance.



- Use and store the battery only within an ambient temperature range of 14 °F to 122 °F (-10 °C to 50 °C).
- Never store the battery in direct sunlight or inside a vehicle in hot weather.

- To reduce the risk of personal injury and property damage in the event the battery emits smoke, an unusual smell or feels unusually hot while using, charging or storing:

- Immediately discontinue using or charging the battery. Contact the authorities in the event of fire or explosion.

- To reduce the risk of a short circuit, which could lead to electric shock, fire and explosion:



- Keep STIHL AR 900, 1000, 2000, 3000 backpack batteries dry. Protect from rain, water and other liquids. Attach the rain cover to a STIHL AR 1000, 2000, 3000 battery before starting work in rain or in very damp conditions.



- If a STIHL AP or AR L battery has been exposed to rain during work, remove it from the product and allow it to dry indoors. Make sure it is completely dry before charging or using.

- Never immerse any STIHL battery in water or other liquids.

- Never bridge the battery terminals with wires or other metallic objects.
- Keep a battery that is not in use away from metal objects (e.g., paper clips, nails, coins, keys).
- Never transport or store the battery in a metal container.
- Store the battery indoors in a dry room.
- Never store the battery in damp or corrosive environments or in conditions that could lead to corrosion of its metal components.
- Protect the battery from exposure to corrosive agents such as garden chemicals and de-icing salts.

- Protect the battery from exposure to conductive liquids such as salt water.
- Do not attempt to repair, open or disassemble the battery. There are no user-serviceable parts inside.

- Leaking battery fluid is potentially harmful and can cause skin and eye irritation, chemical burns and other serious personal injury.

- Avoid contact with skin and eyes.
- Use an inert absorbent such as sand on spilled battery fluid.
- In the event of accidental contact, immediately rinse the contact area thoroughly with mild soap and water.
- If fluid gets into your eye(s): do not rub. Rinse water over the open eye(s) for at least 15 minutes and seek medical attention.

- A battery fire can be dangerous. To reduce the risk of severe personal injury and property damage in the event of fire:

- Evacuate the area. Fire can spread rapidly. Stay clear of any vapors generated and maintain a safe distance.
- Contact the fire department.
- Although water can be used to put out a battery fire, use of a multi-purpose dry chemical fire extinguisher is preferable.
- Consult the fire department regarding proper disposal of a burned battery.

10 Maintenance, Repair and Storage

10.1 Warnings and Instructions

⚠ WARNING

- There are no user-authorized repairs for the battery or chain saw. To reduce the risk of fire, electric shock or other personal injury and property damage:
 - Users may carry out only the cleaning and maintenance operations described in this manual.
 - Strictly follow the cleaning and maintenance instructions in the appropriate sections of this instruction manual.
 - STIHL recommends that all repair work be performed by authorized STIHL servicing dealers.
- Unintentional starting may result in personal injury or property damage. To reduce the risk of personal injury and property damage from unintentional starting:



- Engage the chain brake by moving the front hand guard forward to  and remove the battery before inspecting the chain saw or carrying out any cleaning, maintenance or repair work, before storing, and any other time it is not in use.
- The bar and chain are the only user-serviceable parts of the chain saw. Proper maintenance will help maintain cutting performance and reduce the risk of personal injury caused by chain derailment and reactive forces.
 - Wear gloves when handling the saw chain.
 - Keep the chain, guide bar and sprocket clean.
 - Replace the chain and guide bar when they become worn or damaged.
 - Keep the chain sharp and at proper tension.
 - Tighten all nuts, bolts and screws after each use.
- Like an automobile brake, the chain brake on your chain saw incurs wear each time it is engaged. In order for the chain brake on your STIHL chain saw to function properly, it must be properly maintained. Return the chain saw to your STIHL servicing dealer for periodic inspection and servicing of the brake system according to the following schedule:
 - Heavy Usage: every 3 months
 - Moderate Usage: every 6 months
 - Occasional Usage: every 12 months
- Return the chain saw immediately for maintenance whenever there is a change in its operating characteristics.
- Use of parts that are not authorized or approved by STIHL may cause serious or fatal injury or property damage.
 - STIHL recommends that only identical STIHL replacement parts be used for repair or maintenance.
- To reduce the risk of short circuit and fire:
 - Keep the battery guides free of foreign matter. Clean as necessary with a dry cloth or soft, dry brush.
- Improper storage can result in unauthorized use, damage to the chain saw and battery, and an increased risk of fire, electric shock and other personal injury or property damage.
 - Engage the chain brake by moving the front hand guard forward to  and remove the battery from the chain saw before storing.
 - Never store the chain saw and charger with the battery inserted.
 - Store the chain saw and battery indoors in a dry, secure place that cannot be accessed by children or other unauthorized users.
 - Never store the battery in the chain saw, in the charger, in a metal container or in a container with metal objects (e.g., paper clips, nails, coins, keys).

11 Before Starting Work

11.1 Preparing the Chain Saw for Operation

Before starting work:

- ▶ Fully charge the battery,  12.2.
- ▶ Mount the guide bar and saw chain,  15.2.1.
- ▶ Tension the chain,  15.3.
- ▶ Fill the chain oil tank,  15.4.2.
- ▶ Check the chain brake,  19.1.
- ▶ Check the controls for proper function and condition,  19.2.
- ▶ Check the chain oil flow rate,  19.3.

12 Charging the Battery

12.1 Setting up the Charger

WARNING

Read and follow the safety precautions on the battery and charger and all warnings and instructions that accompany those products. To reduce the risk of short circuit, which could lead to electric shock, fire and explosion, make sure the charger and its components are dry and not damaged; operate the charger indoors at an appropriate ambient temperature.

WARNING

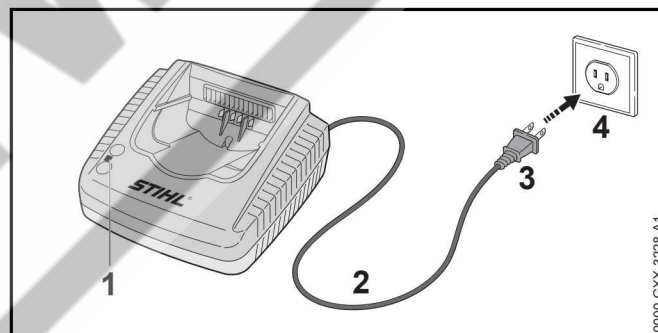
A typical household electric circuit is between 15 and 20 amps. A single STIHL AL 500 charger draws approximately 4.8 amps. A single AL 300 charger draws approximately 4.4 amps. To reduce the risk of fire from overloading an electrical circuit:

- ▶ Ensure the electrical system is rated to withstand the expected electrical draw before charging your battery.
- ▶ Charge multiple batteries one at a time or on separate circuits, unless you know your circuit can handle the total expected draw from multiple chargers.

WARNING

Since the charger heats up during the charging process, do not operate the charger on a combustible surface or in a location where combustible gases, liquids, vapors, dusts or other materials and substances are present.

To set up the charger:



- ▶ Insert the plug (3) into a properly installed electrical outlet (4) matching the voltage and electrical frequency stated on the rating plate on the charger.

The charger runs a self-test immediately after it is plugged in. The charger LED (1) will glow green for about 1 second, then it will glow red briefly before going out. Once the LED goes out, the self-test is complete and the charger is ready to charge the battery.

- Position the power supply cord (2) so that it will not be stepped on, tripped over, come in contact with sharp objects or moving parts or otherwise be subjected to damage or stress.

12.2 Charging

⚠ WARNING

STIHL batteries contain safety features and devices which, if damaged, may allow the battery to generate heat, rupture, leak, ignite or explode. Never charge a malfunctioning, damaged, cracked, leaking or deformed battery, or use a charger that has been damaged. Never insert a wet battery or battery adapter. Never use a wet charger. Follow all product-specific warnings and instructions accompanying your battery and charger.

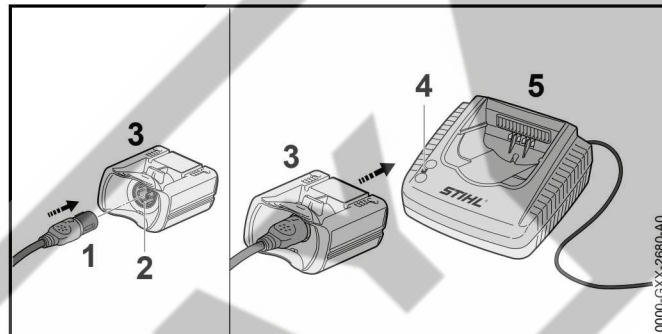
A battery is not fully charged when it ships from the factory. STIHL recommends that you fully charge the battery before using it the first time.

Operate the charger only indoors, in dry rooms and within an ambient temperature range of 41 °F to 104 °F (5 °C to 40 °C).

The battery heats up during operation of the power tool. If a hot battery is connected to the charger, it may be necessary for it to cool down before charging starts. The charging process begins only after the battery has cooled down sufficiently.

Charging time depends on a number of factors, including battery condition and the ambient temperature. For a complete list of approximate charging times, see www.stihl.com/charging-times.

To charge an AR battery:



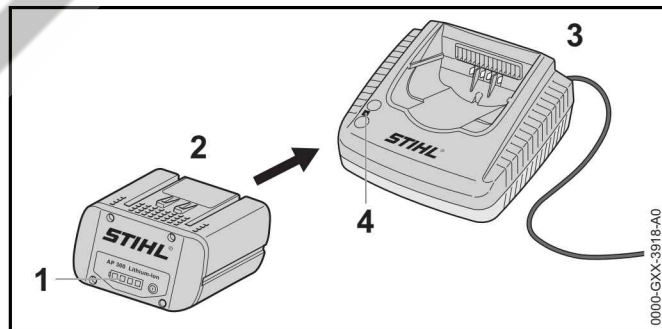
- Push the plug of the connecting cord (1) into the socket (2) of the AP Adapter (3) until it stops.
- Push the AP Adapter into the charger (5) until it stops. The LED on the **charger** (4) glows green when the battery is charging.

The LEDs on the AR battery glow green and show the state of charge.

When the LEDs on the battery turn off, the charging process is complete and the charger will shut itself off. The AP Adapter can be removed from the charger.

- Disconnect the power supply cord from the electrical outlet when the charger is not in use.
- Charge STIHL AR backpack batteries only with genuine STIHL AL 300 or AL 500 series chargers.

To charge an AP battery:



- Push the battery (2) into the charger (3) until it stops. The LED on the **charger** glows green when the battery is charging.

The LEDs (1) on the **AP battery** glow green and show the state of charge.

When the LEDs on the battery go out, the charging process is complete and the charger will shut itself off. The AP battery can be removed from the charger.

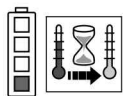
- Disconnect the power supply cord from the electrical outlet when the charger is not in use.
- Charge STIHL AP series batteries only with genuine STIHL AL 101, AL 300 or AL 500 series chargers.

13 LED Diagnostics and Acoustic Signals

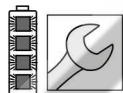
13.1 STIHL AP Battery

13.1.1 Battery Status

Four LEDs show the status of the battery. These LEDs can glow or flash green or red.



If one LED glows red continuously: the battery is either too hot or too cold. Allow the battery to warm up or cool down gradually at an ambient temperature of about 50 °F to 68 °F (10 °C to 20 °C).



If all 4 LEDs flash red: the battery has a malfunction and must be replaced. Do not attempt to charge, use or store the battery.

13.1.2 Power Tool Status

The same LEDs on the battery will indicate the status of the power tool.

If three LEDs glow red continuously: the power tool motor is too hot. Allow the motor to cool down.

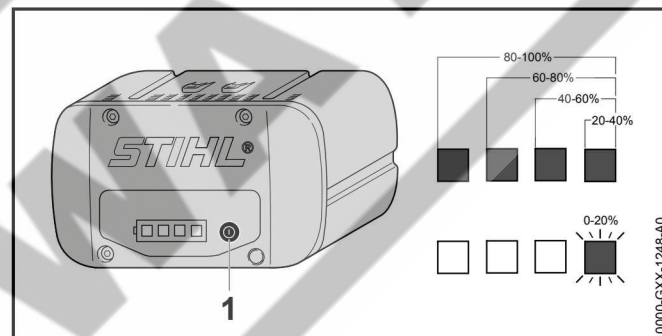
If three LEDs flash red when you activate the trigger switch: the power tool has an electrical malfunction. Do not operate the power tool. Have it checked by an authorized STIHL servicing dealer before use or storage.

For troubleshooting information, 25.

13.1.3 Charge Status

The LEDs on the battery also show the battery's state of charge.

To determine the battery's state of charge:



- Press the button (1) on the battery. The LEDs on the battery will glow or flash green for about 5 seconds and indicate the state of charge (see illustration).

For example:

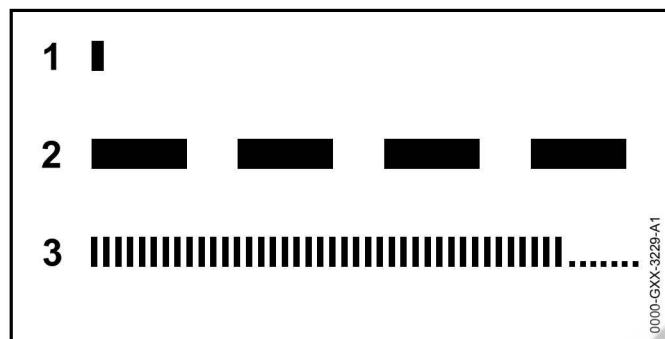
If four green LEDs glow continuously: full charge.

If one green LED is flashing: less than 20 % charge.

13.2 STIHL AR Backpack Battery

13.2.1 Battery Status

Six LEDs and an acoustic signal indicate the status of the battery.

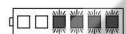
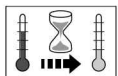


- 1 A short beep**
The acoustic signal works as it should.
- 2 Four or six (AR L) long beeps**
The battery's charge is low. Recharge the battery.
- 3 Rapid succession of short beeps**
There is a malfunction in the battery. The signal stops automatically after a few seconds. Do not attempt to charge, use or store the battery. Replace the battery.

These LEDs can glow or flash green or red.



If one LED glows red continuously: the battery is either too hot or too cold. Allow the battery to warm up or cool down gradually at an ambient temperature of about 50 °F to 68 °F (10 °C to 20 °C).



If the four right side LEDs flash red and a rapid succession of several short beeps is emitted: the battery has a malfunction and must be replaced. Do not attempt to charge, use or store the battery.



- Be aware that your ability to hear the acoustic signal may be reduced when wearing hearing protection.

13.2.2 Power Tool Status

When the battery is connected to the power tool, the same LEDs on the battery will indicate the status of the power tool.

If three LEDs glow red continuously: the power tool motor is too hot. Allow the motor to cool down.

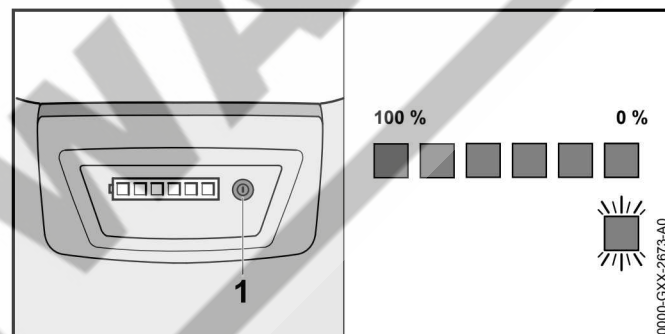
If three LEDs flash red when you activate the trigger switch:
the power tool has an electrical malfunction. Do not operate
the power tool. Have it checked by an authorized STIHL
servicing dealer before use or storage.

For troubleshooting information, 25.

13.2.3 Charge Status

The LEDs and acoustic signals on the battery also indicate the battery's state of charge.

To determine the battery's state of charge:



- Press the button (1) on the backpack battery.

A single short beep will be emitted. The LEDs on the battery will glow or flash green for about 5 seconds and indicate the state of charge (see illustration).

For example:

If six green LEDs glow continuously: full charge.

If one green LED is flashing and four long beeps are emitted:
less than 20 % charge.

14 STIHL AR Backpack Battery

14.1 Positioning and Adjusting the Connecting Cord

⚠ WARNING

Chain saws are designed for right-handed use only - with the operator's right hand on the rear handle and left hand on the front handle. Left-handers must follow these instructions too. (See illustration, Chapter  6.5.2). Accordingly, to reduce the risk of personal injury, run the connecting cord through the guide on the shoulder strap on the operator's right side only. Never run the cord through the guides on the shoulder strap on the operator's left side.

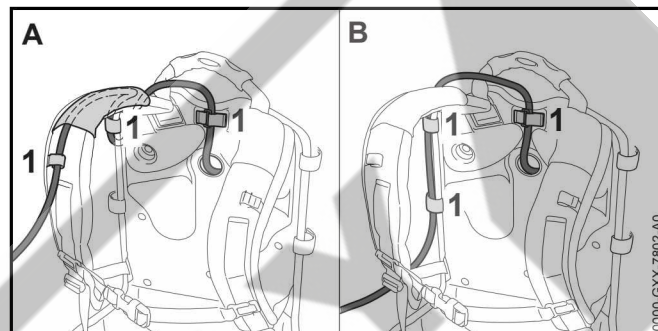
⚠ WARNING

To reduce the risk of injury from tripping or losing control of the chain saw, always secure the connecting cord through the backpack guides and with the hook and eye fasteners as described below. Position and secure the connecting cord on your right side and so that it will not interfere with proper working technique or your ability to maintain control of the chain saw.

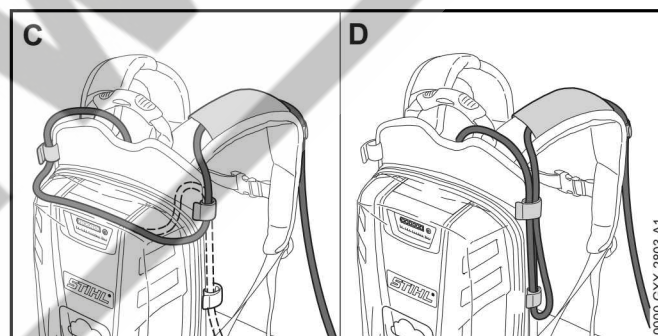
⚠ WARNING

Manage the cord to prevent it from contacting the saw chain or catching on objects, which could cause you to lose balance or control of the chain saw, resulting in serious personal injury and property damage.

The connecting cord can be secured in different positions and adjusted to suit the height and reach of the operator.



The connecting cord can run through the guides on the shoulder strap (Illustration A) or along the back plate (Illustration B). Secure the connecting cord to the backpack with the hook and eye fasteners (1) on the right side of the operator's body, where the chain saw is held and controlled. Do not allow the connecting cord to swing across your body or hang at your side.



The length of the connecting cord can be adjusted by making a loop around the top (Illustration C) or on the side (Illustration D) of the backpack battery.

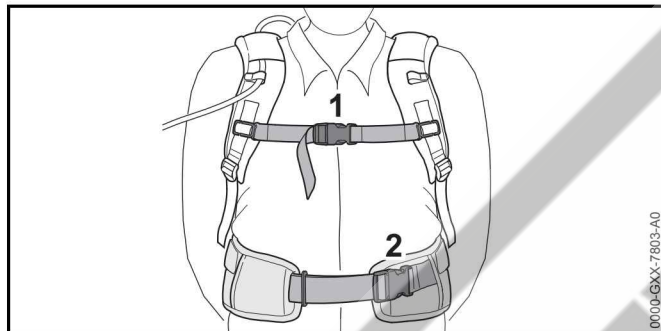
- Position and secure the connecting cord so that it will not interfere with proper working technique or your ability to maintain control of the chain saw.

14.2 Putting on the Harness

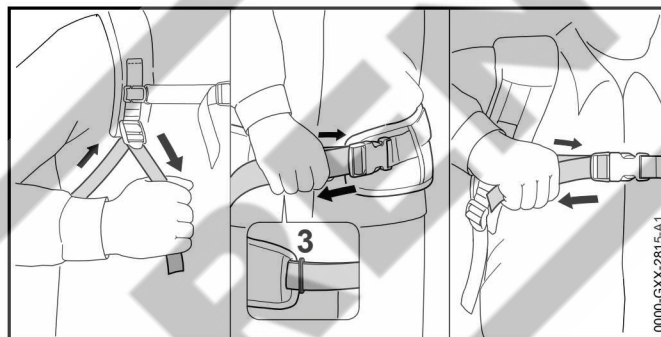
WARNING

To reduce the risk of personal injury, the operator must be able to remove the backpack battery quickly in the event of an emergency. In an emergency, open and remove the waist belt and chest strap quickly before dropping the battery to the ground.

To ensure a proper fit:



- Put the backpack battery on your back.
- Fasten and adjust the waist belt (2) so that it rests comfortably but securely on your hips.
- Fasten the chest strap (1) and adjust it so that it fits comfortably but securely across your chest.



- Adjust the harness straps so that the back padding fits firmly and securely against your back.
- Thread the end of the waist belt through the loop (3).

- To remove the harness, open the quick-release fasteners on the waist belt and chest strap and loosen the harness straps by lifting the sliding adjusters.

To help reduce the risk of injury in the event of an emergency, practice quickly opening the fasteners on the waist belt and chest strap, loosening the shoulder straps and removing the battery.

NOTICE

To avoid damage, ease the battery to the ground when practicing. Do not allow the battery to drop to the ground and do not throw it.

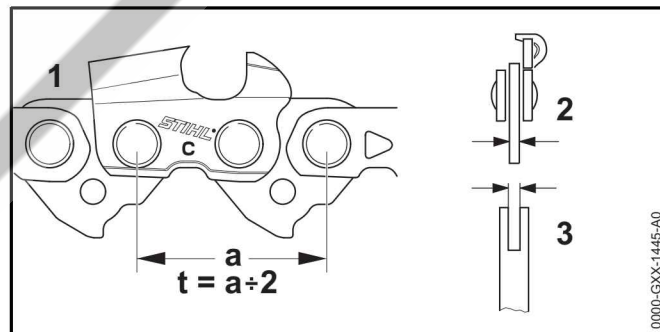
15 Assembling the Chain Saw

15.1 Cutting Attachment

WARNING

If non-matching components are used, the cutting attachment will be damaged beyond repair after a short period of operation, and the chain could de-rail, resulting in serious or fatal personal injury.

A cutting attachment consists of the chain, guide bar and chain sprocket.



- The pitch (t) of the chain (1), chain sprocket and, if using a Rollomatic guide bar, the nose sprocket must match.
- The drive link gauge (2) of the chain must match the groove width of the guide bar (3).

15.2 Mounting and Removing the Guide Bar and Chain

15.2.1 Mounting the Guide Bar and Chain

! WARNING

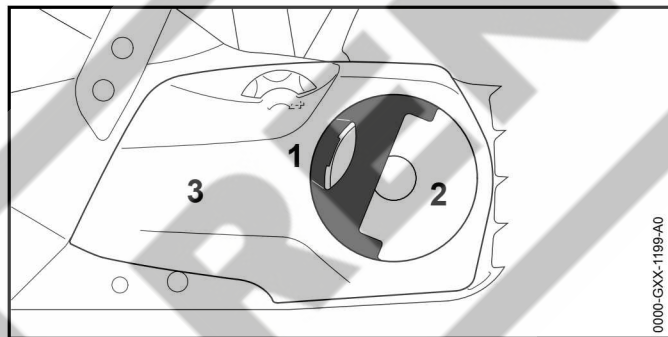
Make sure the battery is removed and the chain brake is engaged before starting assembly. Never operate your chain saw without a properly mounted guide bar and chain, 6.5. Use only guide bar and chain combinations expressly recommended or approved by STIHL, 6.4.

! WARNING

The chain has many sharp cutters. If they contact your flesh, they will cut you, even if the chain is not moving, 6.4. Always wear heavy-duty work gloves when mounting or otherwise handling the chain, 6.3.

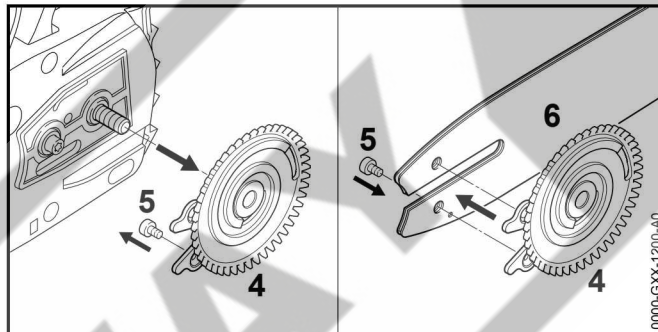
To mount the guide bar and chain:

- ▶ Switch off the chain saw, 18.1.
- ▶ Engage the chain brake, 16.1.
- ▶ Remove the battery, 17.2.

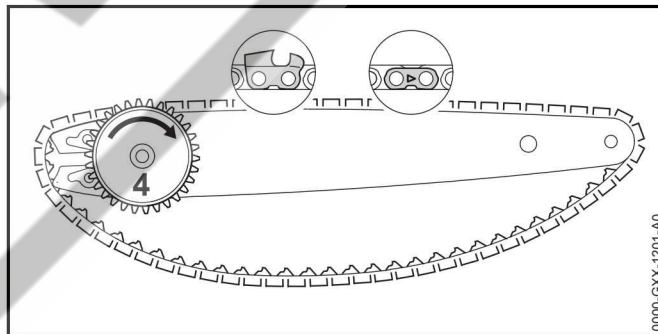


- ▶ Raise the handle (1) of the wingnut (2).

- ▶ Turn the wingnut counterclockwise until the chain sprocket cover (3) can be removed.
- ▶ Remove the chain sprocket cover.

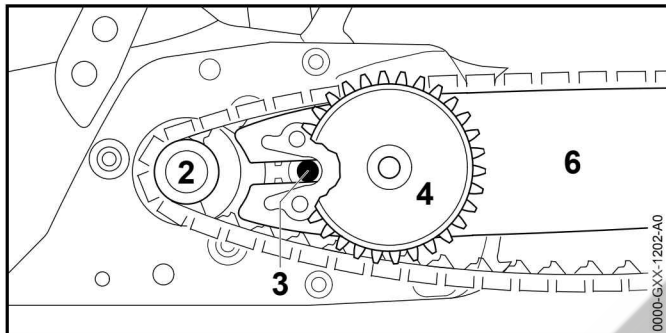


- ▶ Remove the tensioning gear (4).
- ▶ Remove the screw (5).
- ▶ Position the guide bar (6) on the tensioning gear so that the pins of the tensioning gear fit in the holes of the guide bar.
- ▶ Insert the screw and tighten it.

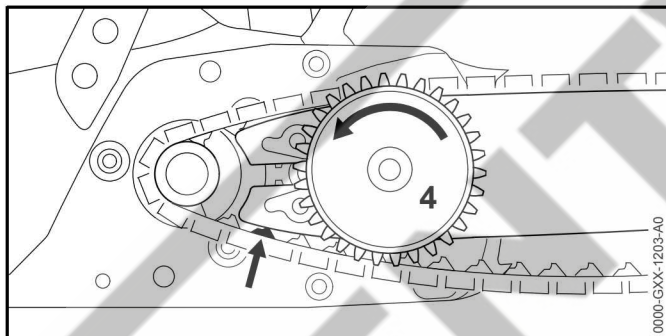


- ▶ Position the chain in the groove of the guide bar, starting at the tip.
- ▶ Make sure that the cutters in the groove on the top side of the guide bar face the tip of the bar. STIHL chains are manufactured with arrows on the tie straps to help the operator determine the proper direction of the chain. Arrows on the tie straps on the top of the bar must point toward the bar tip.

- ▶ Turn the tensioning gear clockwise until it stops.



- ▶ Point the guide bar tip away from the chain sprocket (2), with the teeth of the tensioning gear (4) facing away from the motor.
- ▶ Place the chain around the chain sprocket.
- ▶ Slide the guide bar over the collar screw (3). The head of the collar screw must protrude into the oblong hole.



- ▶ Disengage the chain brake, 16.2.
- ▶ Direct the drive links into the groove of the guide bar (arrow) while turning the tensioning gear (4) counterclockwise until it stops. The guide bar and chain must be firmly and securely mounted on the saw.
- ▶ Fit the sprocket cover on the saw so that it is flush with the housing.
- ▶ When fitting the chain sprocket cover, the teeth of the adjusting wheel and the tensioning gear must mesh.

- ▶ If necessary, turn the adjusting wheel slightly until the chain sprocket cover sits flush against the housing.
- ▶ Turn the wingnut clockwise until the chain sprocket cover is firmly attached to the saw.
- ▶ Close the handle of the wingnut.

15.2.2 Removing the Guide Bar and Chain

- ▶ Raise the handle of the wingnut to open and then turn the wingnut counterclockwise until the chain sprocket cover can be removed.
- ▶ Remove the chain sprocket cover.
- ▶ Turn the tensioning gear counterclockwise until it stops and the chain is loose.
- ▶ Remove the guide bar, including the tensioning gear and chain.

NOTICE

The top and bottom of the guide bar are symmetrical, and the bar may be mounted with the printing facing up or down. Flipping the guide bar each time the chain is sharpened or changed will help reduce uneven wear and improve its service life.

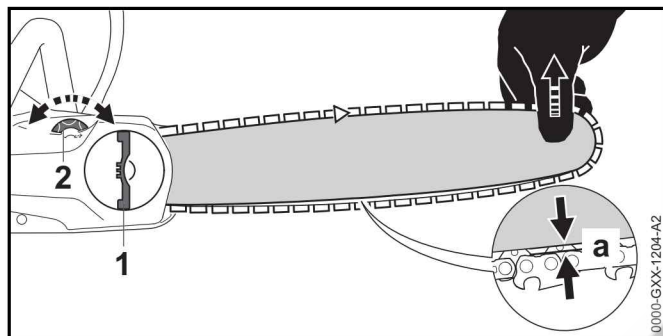
15.3 Tensioning the Chain

! WARNING

To reduce the risk of severe personal injury from chain derailment, check chain tension frequently, 6.5. At operating temperatures, the chain stretches and sags. New chain tends to stretch more than used chain. Tension the chain so that the drive links cannot come out of the groove on the underside of the guide bar.

To properly tension the chain:

- ▶ Switch off the chain saw, 18.2.
- ▶ Engage the chain brake, 16.1.
- ▶ Remove the battery, 17.2.



- ▶ Raise the handle of the wingnut (1).
- ▶ Turn the wingnut counterclockwise twice or until the chain is loose.
- ▶ Disengage the chain brake, 16.2.
- ▶ Lift the guide bar tip.
- ▶ Turn the adjusting wheel (2) clockwise to tighten the chain.
The chain is properly adjusted when the distance *a* between the underside of the guide bar and the chain is within 0.04 in. (1 mm) and 0.08 in. (2 mm) and can still be pulled easily along the bar by hand. Always wear gloves when handling the chain.
- ▶ If the chain cannot be moved along the guide bar, it is too tight.
 - Reduce the tension by turning the adjusting wheel counterclockwise until the chain can move freely along the guide bar.
 - Ensure that the drive links remain in the groove and that the distance (*a*) between the underside of the guide bar and the chain is within 0.04 in. (1 mm) and 0.08 in. (2 mm).
- ▶ Once the chain is properly tensioned, lift the guide bar tip and tighten the wingnut by hand to secure the chain sprocket cover.
- ▶ Finally ensure, that the distance *a* between the underside of the guide bar and the chain is within 0.04 in. (1 mm) and 0.08 in. (2 mm).

NOTICE

Always release tension on the chain after finishing work. The chain contracts as it cools down. If it is not slackened, it can damage the drive shaft and bearings. Properly re-tension the chain before using the saw again.

15.4 Lubricating the Saw Chain and Guide Bar**15.4.1 Bar and Chain Lubricant****! WARNING**

Never operate your saw without bar and chain lubrication. If the chain runs dry, the cutting attachment will be damaged beyond repair within a very short time. A damaged chain may break, resulting in severe or fatal personal injury. Always check chain lubrication and the oil level in the tank before starting work and periodically during work.

! WARNING

Never use waste oil to lubricate your STIHL saw chain and guide bar. Repeated contact with waste oil can cause skin cancer. Moreover, waste oil is environmentally harmful. Bar and chain oil lubricates and cools the rotating saw chain. The service life of the chain and guide bar depends on the quality of the lubricant. It is therefore essential to use only a specially formulated chain lubricant.

- ▶ For automatic and reliable lubrication of the chain and guide bar, use only an environmentally compatible quality chain and bar lubricant. STIHL recommends using rapidly biodegradable STIHL BioPlus.

NOTICE

Biodegradable chain oil must be resistant to aging, since it will otherwise quickly turn to resin. This results in hard deposits that are difficult to remove, especially in the area of the chain drive and chain. It may even cause the oil pump to seize.

NOTICE

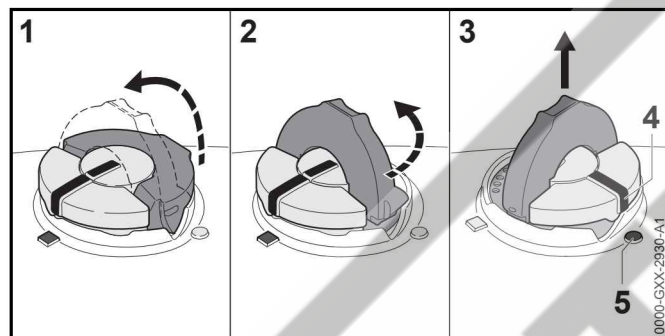
Waste oil does not have the necessary lubricating properties and is unsuitable for chain lubrication.

15.4.2 Filling the Chain Oil Tank

Opening and Filling the Chain Oil Tank

To fill the chain oil tank:

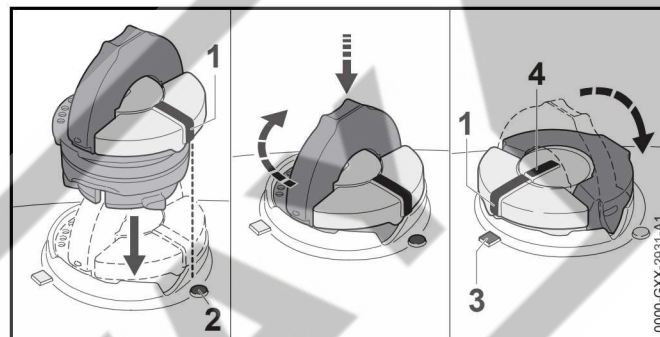
- ▶ Switch off the chain saw,  18.2.
- ▶ Engage the chain brake,  16.1.
- ▶ Remove the battery,  17.2.
- ▶ Position the chain saw on a level surface with the oil filler cap facing upwards.
- ▶ Clean the area around the oil filler cap with a slightly dampened cloth.



- ▶ Flip up the grip and press the cap down firmly (1).
- ▶ Turn the cap slowly counter-clockwise (2) to the open position (3). In the open position, the exterior positioning mark (4) on the cap will line up with the symbol (5) on the chain oil tank housing.
- ▶ Remove the cap and fill the tank with bar and chain oil.
- ▶ Take care not to spill bar and chain oil while refilling the tank.
- ▶ Do not overfill the tank. Leave approximately 0.5 in. (13 mm) of air space.

Closing

To close the tank:



- ▶ Raise the grip on the top of the cap until it is upright at a 90° angle. Insert the cap in the chain oil tank opening with the exterior positioning mark (1) lined up with the open symbol (2) on the chain oil tank housing.
- ▶ Using the grip, press the cap down firmly while turning it clockwise to the closed position (approximately 1/4 turn). In the closed position, the interior (4) and exterior (1) positioning marks will align with the closed symbol (3) on the chain oil tank housing.
- ▶ Fold the grip flush with the top of the cap and check for tightness.
- ▶ If the grip does not lie completely flush with the cap or the detent on the grip does not fit in the corresponding recess in the tank opening, or if the cap is loose, the cap is not properly seated and you must repeat the above steps.

16 The Chain Brake

16.1 Engaging the Chain Brake

WARNING

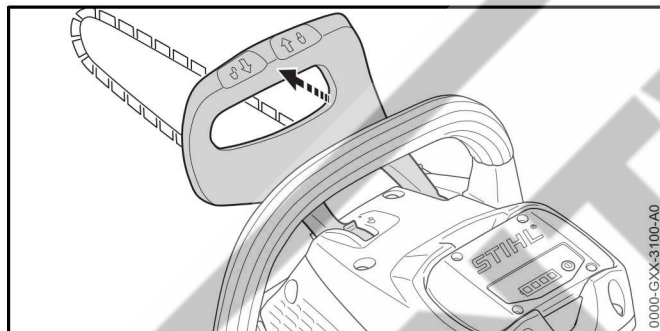
The chain brake will operate only if it has been properly maintained and the front hand guard has not been modified,  7.2.

! WARNING

No chain brake device prevents kickback. This device is designed to reduce the risk of kickback injury, if activated, in certain kickback situations. For the chain brake to remain in good working order, it must be properly maintained,  7.2. In the event of a kickback, the chain brake is designed to engage if the left hand contacts the front hand guard and pushes it forward.

The chain brake is also designed to be activated by the inertia of the front hand guard if the forces are sufficiently high. When the brake is activated by inertia, the hand guard accelerates toward the bar nose, even if your hand is not behind the hand guard, e.g., during a felling back cut.

Engaging the chain brake locks the chain. To manually engage the chain brake:



- Push the front hand guard to the  position, away from the front handle.

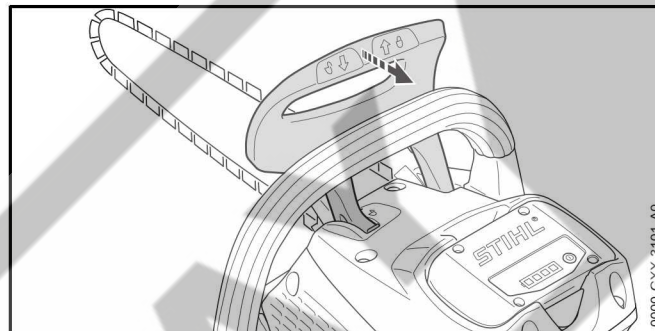
You will hear an audible click when the front hand guard reaches the locked position.

16.2 Disengaging the Chain Brake

! WARNING

Before disengaging the chain brake and switching on your chain saw, be sure that the guide bar and saw chain are clear of you and all other obstructions and objects, including the ground,  6.5.

Disengaging the chain brake unlocks the chain. To disengage the chain brake:



- Pull the front hand guard to the  position, toward the front handle.

You will hear an audible click when the front hand guard reaches the unlocked position. In this position, the chain brake is disengaged and the saw can be switched on.

16.3 Maintaining the Chain Brake

! WARNING

An improperly maintained chain brake may increase the time needed to stop the saw chain after activation, or it may not activate or stop the chain at all,  7.2. The chain brake is subject to wear, depending on the amount of usage, conditions under which the saw is used and other factors. Excessive wear will reduce the effectiveness of the chain brake and can render it inoperable.

- Your chain saw should be returned to your authorized STIHL servicing dealer for periodic inspection and servicing of the brake system according to the following schedule:
 - Heavy Usage: every 3 months
 - Part-Time Usage: every 6 months
 - Occasional Usage: every 12 months

17 Inserting and Removing the Battery

17.1 Inserting the Battery

! WARNING

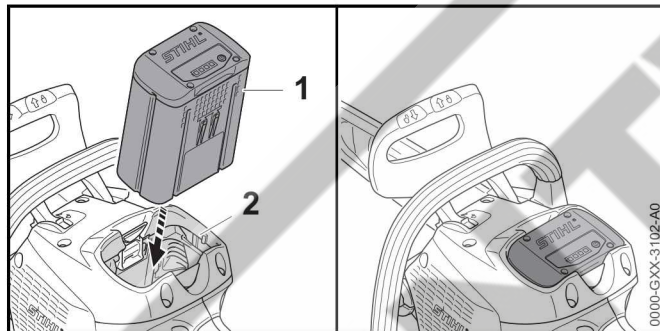
Never use a malfunctioning, damaged, cracked, leaking or deformed battery,  9. Use and store the battery only within an ambient temperature range of 14 °F to 122 °F (- 10 °C to 50 °C),  9.

! WARNING

To reduce the risk of unintended activation, never store the battery in the chain saw,  22.2.

To insert the battery:

- Engage the chain brake,  16.1.



- Place the chain saw on a level surface.
- Insert the battery (1) into the battery compartment (2) until it stops.
The battery is properly inserted when you hear a audible click and the battery is flush with the top of the housing. In this position, there is electrical contact between the battery and the chain saw.

Since a new battery is not fully charged, STIHL recommends that you fully charge the battery before using it the first time,  12.2.

17.2 Removing the Battery

! WARNING

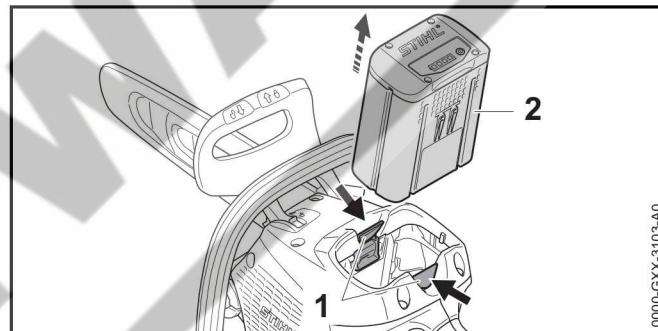
To reduce the risk of severe personal injury from unintended activation, always remove the battery before assembling, transporting, adjusting, cleaning, servicing, maintaining or storing the chain saw and any other time it is not in use.

! WARNING

Use care when ejecting the battery to prevent it from falling and causing personal injury or property damage.

To remove the battery:

- Release the trigger switch.
- Place the chain saw on a level surface.



- Press down on the locking levers (1) to eject the battery (2) from the battery compartment.

NOTICE

Avoid exposing the battery to excessive heat or prolonged periods of direct sunlight. Use or storage outside the recommended ambient temperature range can reduce the performance and/or service life of the battery.

18 Switching the Chain Saw On and Off

18.1 Switching On

! WARNING

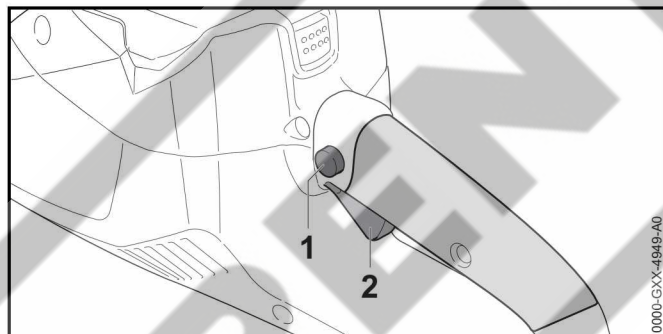
Never operate your chain saw if it is modified, damaged, improperly adjusted or maintained, not completely and securely assembled or not functioning properly,  6.4. To reduce the risk of personal injury, always wear proper clothing and protective apparel, including proper eye protection, when operating your chain saw,  6.3.

Before switching on:

- ▶ Make sure you have a secure and firm footing.
- ▶ Stand upright.
- ▶ Always hold and operate the chain saw with your right hand firmly on the rear or control handle and your left hand firmly on the front handle. Always hold the chain saw with two hands in this manner, whether you are right-handed or left-handed.

To switch the chain saw on:

- ▶ Disengage the chain brake,  16.2.



- ▶ Depress and hold the trigger switch lockout (1) with your thumb.
- ▶ While holding the trigger switch lockout, squeeze the trigger switch (2) with your index finger. The saw chain will start rotating.

The motor will not switch on unless the hand guard is set to the  position and the trigger switch lockout and trigger switch are pressed at the same time. Once the trigger switch is activated and the saw is running, the operator need not continue to hold down the trigger switch lockout.

18.2 Switching Off

! WARNING

The saw chain will continue to rotate for a short while after the trigger switch is released. To avoid serious or fatal injury, avoid contact with the moving saw chain. To reduce the risk of personal injury from unintended activation or unauthorized use, switch off the motor, ensure the chain has stopped, engage the chain brake and remove the battery before transporting or putting the chain saw down.

To switch the chain saw off:

- ▶ Release the trigger switch so that it springs back to the locked position. In the locked position, activation of the trigger switch is once again blocked by the trigger switch lockout.

19 Checking the Chain Saw

19.1 Checking the Operation of the Chain Brake

! WARNING

Operating the saw with a missing, damaged, modified or improperly maintained chain brake increases the risk of severe or fatal injury from kickback. Never attempt to modify or disable the chain brake. Never operate a saw if the chain brake has been modified or does not function properly. If you detect a change in the operating characteristics of the chain brake, have your saw serviced immediately by an authorized STIHL servicing dealer.

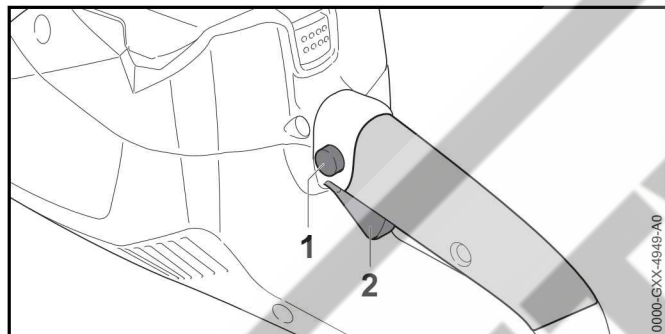
Before starting work, check the operation of the chain brake:

- ▶ Disengage the chain brake,  16.2.
- ▶ Switch on the chain saw,  18.1.

- ▶ Engage the chain brake by pushing the front hand guard to the  position, away from the front handle. A properly functioning chain brake will stop the chain within fractions of a second.
- ▶ If the chain brake fails to stop the chain within fractions of a second, have the saw inspected and repaired by an authorized STIHL servicing dealer.

19.2 Testing the Controls

Before starting work, confirm that the trigger switch lockout (1) and the trigger switch (2) are undamaged and functioning properly.



Trigger Switch Lockout (1) and Trigger Switch (2)

WARNING

To reduce the risk of serious or fatal injuries, keep hands, feet and other parts of the body away from the chain. Do not touch the saw chain while the battery is inserted. Never touch moving chain with your hand or any part of your body,  6.5.2. Keep bystanders out of the area while testing the controls.

To test the controls:

- ▶ Remove the battery.
- ▶ Attempt to depress the trigger switch. If the trigger switch can be depressed without first depressing the trigger switch lockout, take the chain saw to an authorized STIHL servicing dealer to be repaired before use.
- ▶ Insert the battery and hold the chain saw firmly with both hands, your left hand on the front handle and your right hand on the rear handle. Release the chain brake and switch on the chain saw by depressing the trigger switch lockout and trigger switch. If the chain does not start rotating, engage the chain brake and remove the battery. Take the chain saw to an authorized STIHL servicing dealer to be repaired before use.
- ▶ Insert the battery and hold the chain saw firmly with both hands, your left hand on the front handle and your right hand on the rear handle. Release the chain brake and switch on the chain saw by depressing the trigger switch lockout and trigger switch. Then release the trigger switch. If the saw chain does not stop rotating after you release the trigger switch, engage the chain brake and remove the battery. Take the chain saw to an authorized STIHL servicing dealer to be repaired before use.

19.3 Testing Chain Lubrication

WARNING

Never operate your saw without bar and chain lubrication. If the chain runs dry, the cutting attachment will be damaged beyond repair within a very short time. A damaged chain may break, resulting in severe or fatal personal injury. Always check chain lubrication and the oil level in the tank before starting work and periodically during work.

To confirm that the chain oil is flowing properly:

- ▶ Insert the battery,  17.1.
- ▶ Disengage the chain brake,  16.2.
- ▶ Point the guide bar toward a bright surface.

- ▶ Switch on the chain saw,  18.1.
The chain should throw off a small amount of oil.
If the chain oil cannot be seen, check the oil level and refill the tank as necessary.
- ▶ Test the chain lubrication again.
- ▶ If chain lubrication oil is still not visible, the lubrication mechanism is not functioning. Take the saw to an authorized STIHL servicing dealer to be repaired before use.

20 After Finishing Work

20.1 Preparing for Transportation or Storage

WARNING

To reduce the risk of personal injury from unintended activation or unauthorized use, switch off the chain saw, engage the chain brake and remove the battery before transporting the chain saw or putting it down. To reduce the risk of injuries from the sharp cutters on the chain, always cover the guide bar with the chain scabbard before transporting or storing the saw.

To prepare the saw for transportation or storage:

- ▶ Switch off the chain saw,  18.2.
- ▶ Engage the chain brake,  16.1.
- ▶ Remove the battery,  17.2.
- ▶ Release the chain brake and loosen the chain.
- ▶ Re-engage the chain brake.
- ▶ Slide a chain scabbard over the guide bar so that it covers the entire guide bar.
- ▶ If the battery or chain saw became wet during operation, allow them to dry separately and completely before charging or storing.
- ▶ Before using the saw, remember to re-tension the chain.

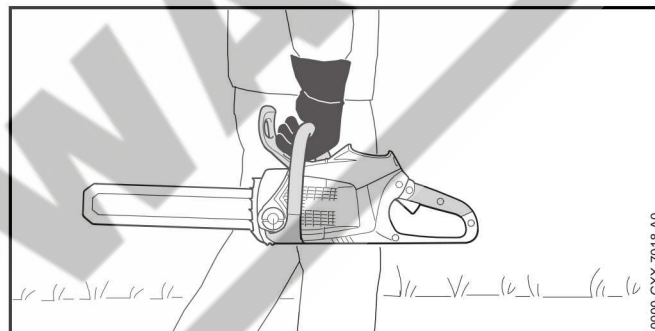
NOTICE

The chain contracts as it cools down. Failing to loosen the chain after finishing work can damage the drive shaft and bearings.

21 Transporting the Chain Saw and Battery

21.1 Chain Saw

When transporting the chain saw:



- ▶ Slide a chain scabbard over the guide bar so that it covers the entire guide bar.
- ▶ When transporting the saw by hand, hold it by the front handle with the guide bar pointing backwards, opposite the direction in which you are walking.
- ▶ When transporting the saw in a vehicle, cover the guide bar with a chain scabbard. Secure and position the chain saw to prevent turnover, impact and damage.

Your saw comes standard with a chain scabbard that matches the cutting attachment. If you use guide bars of different lengths on the saw, the length of the chain scabbard must be matched to the guide bar to reduce the risk of injury. It should cover the full length of the guide bar.

21.2 Battery

WARNING

To reduce the risk of a short circuit, which could lead to electric shock, fire and explosion, never transport the battery in a metal container or near metal objects (e.g., paper clips, nails, coins, keys),  9.

When transporting the battery:

- ▶ Place the battery in a non-metal container or carton and secure it against impact or damage. Never transport the battery in a metal or other container that is capable of conducting electricity, or near metal objects (e.g., paper clips, nails, coins, keys).
- ▶ If you are transporting the battery in a vehicle, secure it and its container to prevent turnover, impact and damage.

STIHL batteries comply with the requirements set forth in UN-Manual ST/SG/AC.10/11/Rev.5/Part III, Subsection 38.3.

Commercial air, vessel and ground transportation of lithium ion cells and batteries is regulated. The battery is classified as a UN 3480, Class 9, packaging group II product. Shipping it, either as a complete tool or the battery, requires compliance with all applicable shipping regulations. Check with the ground, vessel, air cargo or passenger airline to determine if transport is prohibited or subject to restrictions or exemptions prior to shipping or travel.

Normally, no further conditions have to be met by the user in order to transport STIHL batteries by road to the power tool's operating site. Check and comply with any special regulations that may apply to your situation.

For further information please go to www.stihlusa.com/battery-transportation-safety.

22 Storing the Chain Saw and Battery

22.1 Chain Saw

WARNING

Store the chain saw indoors in a dry, secure place that cannot be accessed by children or other unauthorized users,  6.4. Never store the battery in the chain saw or charger. Improper storage can result in unauthorized use and damage to the chain saw,  6.4.

When storing the saw for three months or longer:

- ▶ Remove any wood chips or debris from the battery compartment.
- ▶ Remove the chain and guide bar.
- ▶ Clean and spray the guide bar with a resin solvent, such as STIHL Resin Remover and Lubricant.
- ▶ Clean the saw,  23.
- ▶ Fill up the chain oil tank,  15.4.2.
- ▶ Store the saw indoors in a dry and secure location, out of the reach of children and other unauthorized persons.

22.2 Battery

WARNING

To reduce the risk of a short circuit, which could lead to electric shock, fire and explosion, never store the battery in a metal container or near metal objects,  9. If the battery is damp or wet, allow it to dry thoroughly before storing,  9.

WARNING

Extreme temperatures can damage the battery and may also cause the battery to generate heat, rupture, leak, ignite or explode, resulting in severe or fatal personal injury or property damage. Use and store the battery only within an ambient temperature range of 14 °F to 122 °F (- 10 °C to 50 °C),  9. Never store the battery in direct sunlight or inside a vehicle in hot weather,  9.

To properly store the battery:

- ▶ Take the battery out of the chain saw or the charger.
- ▶ Make sure the battery is dry and store it indoors in a dry and secure location.
- ▶ Keep it out of the reach of children and other unauthorized persons.
- ▶ Protect the battery against dampness and corrosive agents such as garden chemicals and de-icing salts.
- ▶ Protect the battery from exposure to conductive liquids such as salt water.
- ▶ For maximum battery life, store the battery at an ambient temperature between 50 °F and 68 °F (10 °C and 20 °C) with a charge between 40 % and 60 % (2 green LEDs).
- ▶ Do not leave spare batteries unused. Use them in rotation.

23 Cleaning

23.1 Cleaning the Chain Saw and Battery

⚠ WARNING

To reduce the risk of personal injury from unintended activation, remove the battery and engage the chain brake before carrying out any cleaning work,  9. Users of this chain saw should carry out only the cleaning described in this manual.

To clean the chain saw and battery:

- ▶ Clean the chain saw's polymer components with a slightly dampened cloth. Do not use detergents or solvents. They may damage the polymer components.
- ▶ Remove the sprocket cover and clean the area around the chain sprocket with a slightly dampened cloth or resin solvent, such as STIHL Resin Remover & Lubricant.
- ▶ Do not use a pressure washer to clean the chain saw or otherwise spray it with water or other liquids.
- ▶ Keep the battery housing and guides free from foreign matter and clean as necessary with a soft brush or soft, dry cloth.

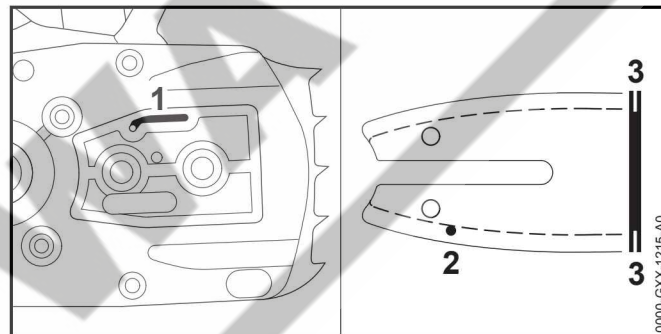
23.2 Cleaning the Guide Bar and Saw Chain

⚠ WARNING

To reduce the risk of personal injury from unintended activation, remove the battery and engage the chain brake before carrying out any cleaning work,  9. Users of this chain saw should carry out only the cleaning described in this manual. To help prevent injuries, always wear heavy-duty work gloves when handling the chain.

To properly clean the guide bar and chain:

- ▶ Remove the guide bar and the chain,  15.2.2.



- ▶ Clean the oil outlet duct (1), oil inlet bore (2) and groove (3) with a brush, a slightly dampened cloth or resin solvent, such as STIHL Resin Remover & Lubricant. Do not use detergents.
- ▶ Clean the chain with a brush, a slightly dampened cloth or resin solvent. Do not use detergents.
- ▶ Do not use a pressure washer to clean the guide bar or chain or otherwise spray them with water or other liquids.

24 Inspection and Maintenance

24.1 Inspecting and Maintaining the Chain Saw

WARNING

To reduce the risk of personal injury from unintended activation, remove the battery before inspecting the chain saw or carrying out any maintenance,  10. Carry out only the maintenance operations described in this manual. There are no user-authorized repairs. STIHL recommends that repair work be performed by authorized STIHL servicing dealers.

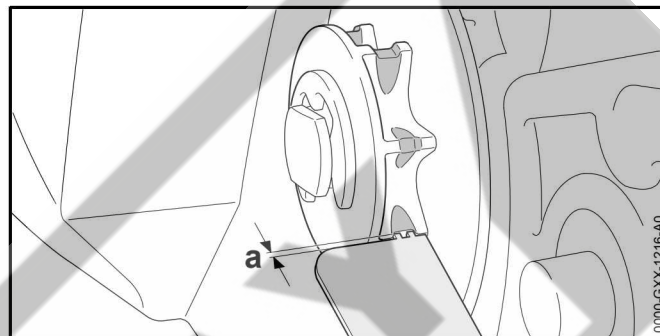
Proper maintenance of the chain saw includes the following activities:

- ▶ Inspecting the chain sprocket periodically and having a worn chain sprocket replaced by an authorized STIHL servicing dealer.
- ▶ Inspecting the guide bar for proper groove depth and spread and replacing the guide bar if it shows signs of excessive wear or damage.
- ▶ Periodically sharpening the chain, maintaining the depth limiting guides at the appropriate height and replacing the saw chain when indicated by the relevant wear marks or when the chain is damaged or shows signs of excessive wear.
- ▶ Having worn, missing or damaged safety labels replaced by an authorized STIHL servicing dealer.

If you make a warranty claim for a component which has not been serviced or maintained properly, coverage may be denied.

24.2 Inspecting and Maintaining the Chain Sprocket

- ▶ Switch off the chain saw, engage the chain brake and remove the battery.
- ▶ Disengage the chain brake,  16.2.
- ▶ Remove the chain sprocket cover, saw chain and guide bar.



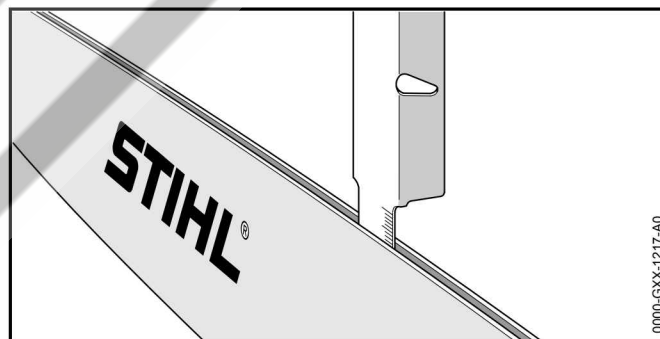
- ▶ Check the chain sprocket cover for wear marks.
- ▶ If the wear marks are deeper than $a = 0.020$ in. (0.5 mm), have the chain sprocket replaced.

STIHL recommends using genuine STIHL chain sprockets to ensure optimal functioning of the chain brake.

Alternating between two chains helps reduce wear to the chain sprocket.

24.3 Inspecting and Maintaining the Guide Bar

- ▶ Switch off the chain saw, engage the chain brake and remove the battery.
- ▶ Remove the guide bar and saw chain,  15.2.2.

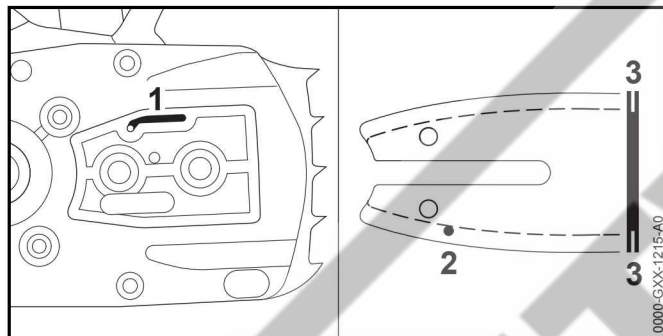


- ▶ Measure the depth of the guide bar groove in the area with the greatest wear using the measuring tool on the file gauge (special accessory, not included).

- ▶ Replace the guide bar if the measured depth is less than the required minimum depths stated in  26.3.
- ▶ Check the spread of the guide bar groove with the measuring tool on the file gauge.
- ▶ Replace the guide bar if the groove is narrowed, spread or shows other signs of substantial wear or damage.

To maintain the guide bar:

- ▶ Flip the guide bar after each sharpening and each time the chain is changed. This will help reduce uneven wear. There is no "top" or "bottom" of the bar. It may be used in either orientation, even though the printing on the bar may be upside down.



- ▶ Clean the oil outlet duct (1), oil inlet bore (2) and groove (3) with a brush, a slightly dampened cloth or resin solvent, such as STIHL Resin Remover & Lubricant. Do not use detergents.
- ▶ Periodically remove any metal burrs that develop along the guide bar with a flat file or a STIHL guide bar dressing tool.
- ▶ Replace the guide bar if the burrs cannot be filed or if the guide bar becomes damaged.

24.4 Inspecting, Maintaining and Sharpening the Saw Chain

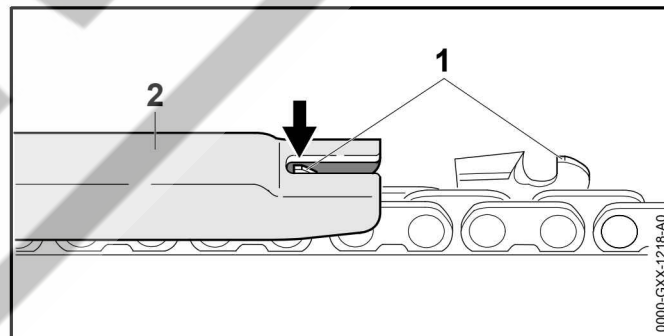
! WARNING

An improperly sharpened chain can increase the risk of kickback and other reactive forces, resulting in severe personal injury or death. For example, depth gauges that are too low or cutters that are filed incorrectly can increase the kickback tendency of the chain saw and can increase kickback forces, making it more difficult to control the saw. Always review and follow the sharpening angles and dimensions recommended by STIHL when checking or sharpening the chain.

! WARNING

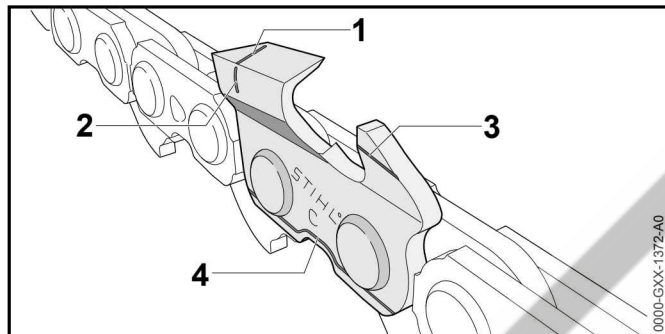
Never use a dull or damaged chain. This leads to increased physical strain, increased vibration load, unsatisfactory cutting results and increased wear. If the chips from cutting are fine, more like saw dust than wood chips, the chain likely is dull.

- ▶ Switch off the chain saw, engage the chain brake and remove the battery.



- ▶ Check the height of the depth gauge (1) with a STIHL file gauge (2) matching the pitch of the chain.
- ▶ If the depth gauge protrudes higher than the file gauge, file the depth gauge to the appropriate height.

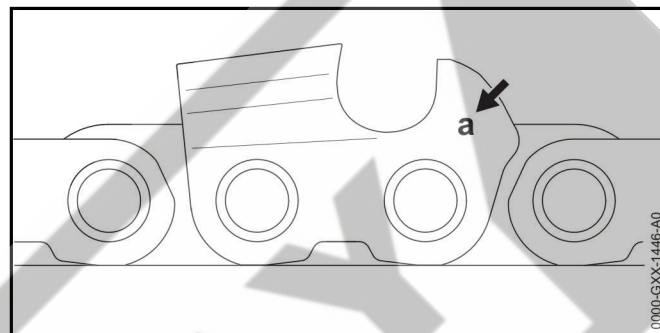
- ▶ Work carefully. Do not file the depth gauge too low. A depth gauge that is too low must be replaced or sharpened by an authorized STIHL servicing dealer, as it can increase the kickback tendency of the chain saw and can increase kickback forces.



STIHL chain is manufactured with wear marks to help the operator identify excessive wear. The wear marks depicted above (1 - 4) must remain visible.

- ▶ Replace the chain if any wear marks are no longer visible.
- ▶ Check the 30° sharpening angle of the cutters with a STIHL file gauge matching the pitch of the chain.
- ▶ If the sharpening angle is incorrect, file the cutters to a 30° angle.
- ▶ If you are unable to achieve the proper angle, or suspect you have not achieved the proper angle, have the chain sharpened by an authorized STIHL servicing dealer.

An improperly filed chain can be very dangerous. It can increase the potential for reactive forces, including kickback, and also increase the magnitude of those reactive forces.



The chain pitch marking (a) is embossed in the area of the depth gauge of each cutter.

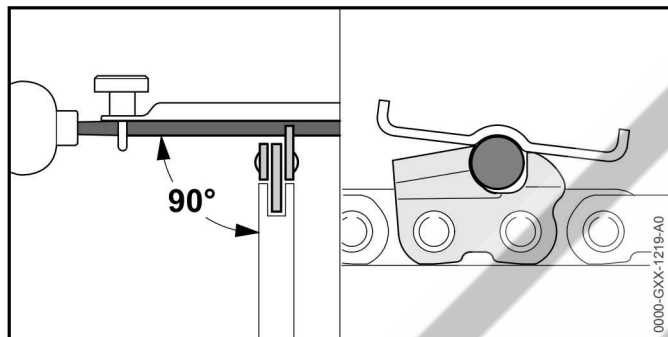
The markings mean the following:

Marking (a)	Saw Chain Pitch
1	1/4"
2	.325"
3	3/8"
4	.404"
6	3/8" PICCO
7	1/4" PICCO

To sharpen the chain:

- ▶ Switch off the chain saw, engage the chain brake and remove the battery.
- ▶ Select a chain file with a diameter matching the pitch of the chain.
Other files are unsuitable and can result in improperly filed chain, which can increase the potential and force of kickback and other reactive forces.
- ▶ Clamp the guide bar if necessary to make filing easier.
- ▶ To advance the chain, first disengage the chain brake, 16.2.
- ▶ Use a file holder.
File holders have markings that indicate the proper sharpening angle.

- ▶ File all the cutters with an identical angle. Two or three strokes of the file are usually sufficient for simple resharpener. Remove a little material with each stroke. Sharpening at varying or inconsistent angles or heights can be very dangerous and may result in rough or uneven running of the chain and increased wear, even to the point of chain breakage. It also can increase the tendency and force of kickback and other reactive forces.



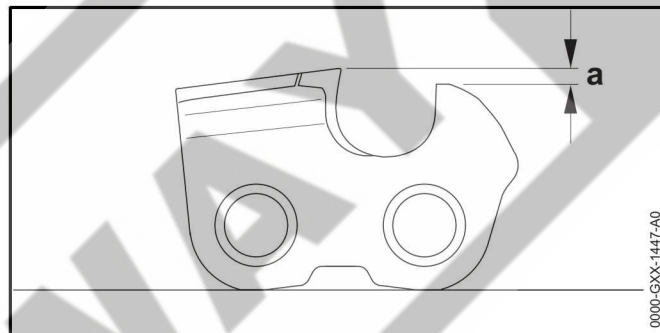
- ▶ Guide the file horizontally at a right angle to the side surface of the guide bar in accordance with the specified angle.
- ▶ File only from the inside of the cutter outward.
- ▶ Lift the file on the backstroke. The file only sharpens on the forward stroke.
- ▶ Do not file tie straps or drive links.
- ▶ Periodically rotate the file in order to avoid uneven wear.
- ▶ To remove a file burr from the cutter tooth, run the cutter across a piece of hardwood.
- ▶ Check the sharpening angle with a file gauge.

All cutters must be of equal length and filed down to the length of the shortest cutter. Otherwise, the tendency and force of kickback and other reactive forces will increase.

STIHL recommends having your chain sharpened by an authorized STIHL servicing dealer to reduce the risk of severe or fatal injury from an improperly sharpened chain.

⚠ WARNING

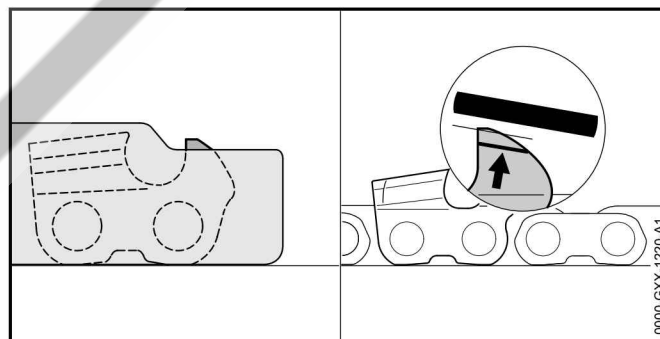
Depth gauges that are too low increase the potential and force of kickback and other reactive forces, which can increase the risk of serious personal injury. Always maintain the proper distance (a) between the depth gauge and the top of the cutter.



The depth gauge determines the depth to which the cutter penetrates the wood and thus the chip thickness.

A depth gauge that is too low will increase the kickback tendency of the chain saw and can increase kickback forces.

A depth gauge that is too high will prevent the cutter from entering the workpiece and will lead to poor cutting performance. Always keep the required distance (a) between depth gauge and cutting edge, 26.4.



To properly lower the depth gauge:

- ▶ Lay the appropriate file gauge for the chain pitch on the chain and press it against the cutter to be checked. If the depth gauge protrudes past the file gauge, the depth gauge must be filed down.
- ▶ File the depth gauge so that it is flush with the top of the file gauge.
- ▶ Afterwards, remove the file gauge and file the leading edge of the depth gauge parallel to the service mark. When doing this, be careful not to further lower the highest point of the depth gauge.
- ▶ Lay the file gauge on the chain to check the height of the file gauge. The highest point of the depth gauge must be flush with the top of the file gauge.
- ▶ After sharpening, clean the chain thoroughly, removing any filings or grinding dust.
- ▶ Oil the chain thoroughly.

25 Troubleshooting Guide

25.1 Chain Saw and Battery

Always remove the battery before carrying out any inspection, cleaning or maintenance.

Condition	LEDs on Battery	Possible Cause	Remedy
Chain saw does not start when switched on.		No electrical contact between chain saw and battery.	▶ Remove the battery,  17.2. ▶ Engage the chain brake,  16.1. ▶ Visually check the electrical contacts in the battery compartment and on the battery. ▶ Reinsert the battery,  17.1.
	1 LED flashes green. STIHL AR only: Additionally, four long beeps are emitted.	Battery has low charge.	▶ Charge the battery,  12.
	1 LED glows red.	Battery too hot / too cold.	▶ Allow the battery to warm up or cool down gradually at ambient temperatures of about 50 °F to 68 °F (10 °C to 20 °C).
	4 LEDs flash red. STIHL AR only: Additionally, a rapid succession of short beeps is emitted.	Malfunction in battery.	▶ Remove the battery and reinsert it,  17. ▶ Switch on the chain saw,  18.1. ▶ If the LEDs continue to flash, do not attempt to use. The battery has a malfunction and must be replaced.
	3 LEDs glow red.	Chain saw too hot.	▶ Allow the chain saw to cool down.
	3 LEDs flash red.	Malfunction in chain saw.	▶ Remove the battery and reinsert it,  17 ▶ Switch on the chain saw,  18.1. ▶ If the LEDs still flash, do not attempt to use. The chain saw has a malfunction and must be checked by a servicing dealer.

Always remove the battery before carrying out any inspection, cleaning or maintenance.

Condition	LEDs on Battery	Possible Cause	Remedy
Chain saw cuts out during operation.	1 LED glows red.	Battery too hot / too cold.	▶ Remove the battery,  17.2. ▶ Engage the chain brake,  16.1. ▶ Allow the chain saw and battery to cool down gradually at ambient temperatures of about 50 °F to 68 °F (10 °C to 20 °C).
	3 LEDs glow red.	Chain saw too hot.	
Runtime is too short.		Battery not fully charged.	▶ Charge the battery,  12.
		Useful life of battery has been reached or exceeded.	▶ Have the battery checked by an authorized STIHL servicing dealer.
During sawing, the wood smokes or smells burnt.		The chain is dull or improperly sharpened.	▶ Properly sharpen the chain,  24.4.
		Working technique is improper or the saw is being mis-used.	▶ Obtain instruction on proper working technique.
		Insufficient bar and chain oil.	▶ Have the chain lubrication mechanism checked by an authorized STIHL servicing dealer.
Battery is not being charged even though LED on charger glows green.	1 LED glows red.	Battery too hot / too cold.	▶ Allow the battery to warm up or cool down gradually at ambient temperatures of about 50 °F to 68 °F (10 °C to 20 °C). ▶ Operate the charger only in enclosed, dry rooms at ambient temperatures of 41 °F to 104 °F (5 °C to 40 °C).

26 Specifications

26.1 STIHL MSA 220 C

- Approved battery types:
 - STIHL AP series
 - STIHL AR series
- Weight without battery, guide bar and saw chain: 6.4 lbs. (2.9 kg)
- Maximum oil tank volume: 7.1 oz. (0.21 l)

For technical information regarding the STIHL AP and AR series batteries, see the product information accompanying your battery.

For technical information regarding the STIHL AL 101, 300 and 500 series chargers, see the product information accompanying your charger.

Batteries, chargers and other accessories sold separately. Contact your authorized STIHL servicing dealer for pricing and availability.

26.2 Chain Sprockets

The following chain sprockets are available for this model chain saw:

- 6-tooth for 3/8" PICCO pitch
- 7-tooth for 1/4" pitch

26.3 Minimum Groove Depth of Guide Bars

The minimum groove depth of a guide bar depends on the pitch of the guide bar.

- Minimum groove depth for 3/8" PICCO pitch guide bars: 0.197 in. (5 mm)
- Minimum groove depth for 1/4" pitch guide bars: 0.157 in. (4 mm)

26.4 Depth Gauge Setting

The depth gauge setting of a saw chain depends on the pitch of the chain.

- Depth gauge setting for 3/8" PICCO pitch chains: 0.026 in. (0.65 mm)
- Depth gauge setting for 1/4" pitch chains: 0.018 in. (0.45 mm)

26.5 Symbols on the Chain Saw

Symbol	Explanation
V	Volt



Engage the chain brake



Disengage the chain brake



Chain oil tank



Maximum guide bar length



Direction of saw chain rotation



Turn clockwise to tension the saw chain



Certification/listing mark of CSA



STIHL products must not be disposed of in the household trash, but only in accordance with local, state and federal laws and regulations and as provided in this manual, 29.

26.6 Engineering Improvements

STIHL's philosophy is to continually improve all of its products. As a result, engineering changes and improvements are made from time to time. Therefore, some changes, modifications and improvements may not be

covered in this manual. If the operating characteristics or the appearance of your machine differs from those described in this manual, please contact your STIHL dealer or the STIHL distributor in your area for assistance.

26.7 FCC 15 Compliance Statement

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- this device may not cause harmful interference.
- this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna,
- increase the separation between the equipment and receiver,
- connect the equipment to an outlet on a circuit different from that to which the receiver is connected,
- consult an authorized STIHL servicing dealer or an experienced radio/TV technician for help.

Do not change or modify this product in any way unless specifically allowed in this manual, since this could void your authority to operate it.

27 Combinations of Guide Bars and Saw Chains

27.1 STIHL MSA 220 C

Pitch	Drive link gauge/Groove width	Length	Guide bar	Number of teeth of sprocket nose	Drive link count	Saw chain
3/8" P	0.050 in. (1.3 mm)	12 in. (30 cm)	Rollomatic E Rollomatic E light	9	44	63 PS3 (Type 3616) ¹⁾
		14 in. (35 cm)			50	
		16 in. (40 cm)			55	
		12 in. (30 cm)			44	63 PS (Type 3617) ²⁾
		14 in. (35 cm)			50	
		16 in. (40 cm)			55	
		12 in. (30 cm)			44	63 PM3 (Type 3636) ¹⁾
		14 in. (35 cm)			50	
		16 in. (40 cm)			55	
		12 in. (30 cm)			44	63 PD3 (Type 3612) ¹⁾
		14 in. (35 cm)			50	
		16 in. (40 cm)			55	
1/4"	0.050 in. (1.3 mm)	12 in. (30 cm)	Carving E	-	64	13 RMS (Type 3661) ²⁾

¹⁾ Low kickback STIHL saw chain (with green label)

²⁾ STIHL saw chain (with yellow label)

The guide bar and chain combinations listed above meet the 45° computed kickback angle requirement of UL 60745-2-13 when used on this model chain saw with the matching chain sprocket listed above.

Use replacement guide bars or chains only as listed above or as listed elsewhere by STIHL as conforming with the 45° computed kickback angle requirement of UL 60745-2-13 when used on this model chain saw.

The listed guide bars are green-labeled reduced kickback STIHL guide bars.

The chains listed below are green-labeled low kickback STIHL saw chains:

- 63 PS3 (Type 3616)
- 63 PM3 (Type 3636)
- 63 PD3 (Type 3612)

Since new bar/chain combinations may be developed after publication of this manual, ask your authorized STIHL servicing dealer for the latest STIHL recommendations.

28 Replacement Parts and Equipment

28.1 Genuine STIHL Replacement Parts

STIHL recommends the use of genuine STIHL replacement parts. Genuine STIHL parts can be identified by the STIHL part number, the **STIHL** logo and, in some cases, by the STIHL parts symbol . The symbol may appear alone on small parts.

29 Disposal

29.1 Disposal of the Power Tool

STIHL products must not be thrown in household trash or disposed of except as outlined in this manual.

- ▶ Take the power tool, accessories and packaging to an approved disposal site for environmentally friendly recycling.
- ▶ Contact your authorized STIHL servicing dealer for the latest information on disposal and recycling.

29.2 Battery Recycling

WARNING

Handle discharged/depleted batteries carefully. Even if believed to be discharged, lithium ion batteries may never totally discharge and still may deliver a dangerous short circuit current. If damaged or exposed to extreme temperatures, they may leak, generate heat, catch fire or explode.

- ▶ Observe all federal, state and local disposal rules and regulations.
- ▶ Contact your authorized STIHL servicing dealer for the latest information on waste disposal.
- ▶ Recycle depleted batteries promptly.
- ▶ Keep batteries away from children. Do not disassemble and do not dispose of in fire.



STIHL is committed to the development of products that are environmentally responsible. This commitment does not stop when the product leaves the authorized STIHL servicing dealer. STIHL has partnered with the RBRC (Rechargeable Battery Recycling Corporation) to promote the collection and recycling of spent STIHL lithium ion batteries in the United States and Canada.

The RBRC seal indicates that STIHL has prepaid for battery recycling. RBRC has a toll free phone number (1-800-822-8837) that connects you to information on battery recycling locations and information on battery disposal bans or restrictions in your area. You can also return your spent battery to any authorized STIHL servicing dealer for recycling free of charge.

30 Limited Warranty

30.1 STIHL Incorporated Limited Warranty Policy

This product is sold subject to the STIHL Incorporated Limited Warranty Policy, available at www.stihlusa.com/warranty.html. It can also be obtained from your authorized STIHL dealer or by calling 1-800-GO-STIHL (1-800-467-8445).

31 Trademarks

31.1 Registered Trademarks

STIHL®

STIHL®



The color combination orange-grey (U.S. Registrations #2,821,860; #3,010,057, #3,010,058, #3,400,477; and #3,400,476)

FARM BOSS®

iCademy®

MAGNUM®

MasterWrench Service®

MotoMix®

OILOMATIC®

ROCK BOSS®

STIHL Cutquik®

AutoCut®
YARD BOSS®
STIHL ROLLOMATIC®
WOOD BOSS®



STIHL DUROMATIC®
STIHL Quickstop®
STIHL WOOD BOSS®
TIMBERSPORTS®



32 Addresses

32.1 STIHL Incorporated

STIHL Incorporated
536 Viking Drive
P.O. Box 2015
Virginia Beach, VA
23452-2015

31.2 Common Law Trademarks

4-MIX™	HT Plus™
BioPlus™	STIHL PowerSweep™
Easy2Start™	STIHL Protech™
EasySpool™	STIHL MiniBoss™
ElastoStart™	STIHL MotoPlus 4™
Ematic™	Master Control Lever™
STIHL Precision Series™	STIHL OUTFITTERS™
FixCut™	STIHL PICCO™
Micro™	TrimCut™
Pro Mark™	STIHL M-Tronic™
Quad Power™	STIHL HomeScaper Series™
Quiet Line™	STIHL PolyCut™
STIHL Arctic™	STIHL RAPID™
STIHL Compact™	STIHL SuperCut™
STIHL Interchangeable Attachment Series™	STIHL Multi-Cut HomeScaper Series™
TapAction™	STIHL Territory™
	

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