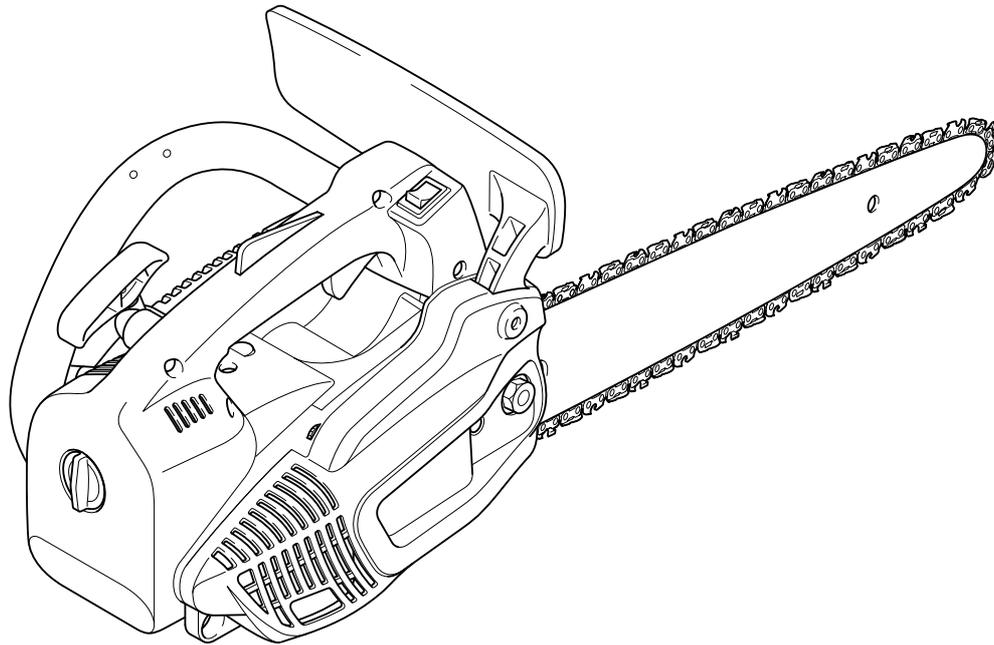


Instruction Manual



DCS230T

DCS232T

Important:

Read this instruction manual carefully before putting the chain saw into operation and strictly observe the safety regulations! Only persons who have completed training in working from elevated platforms (cherry pickers, lifts), from platforms mounted on ladders or who are proficient in climbing with ropes are permitted to operate this chain saw.

Keep this Instruction Manual!

Thank you for purchasing a MAKITA product!

Congratulations on choosing a MAKITA chain saw! We are confident that you will be satisfied with this modern piece of equipment.

The DCS230T and DCS232T (Tophandle) are very light and handy chain saws with the handles on the top. These models were developed especially for tree surgery and care. Only persons who have completed training in working from elevated platforms (cherry pickers, lifts), from platforms mounted on ladders or who are proficient in climbing with ropes are permitted to operate these chain saws.



The automatic chain lubrication with variable-flow oil pump and maintenance-free electronic ignition ensure trouble-free operation, while the hand-saving anti-vibration system and ergonomic grips and controls make work easier, safer, and less tiring for the user.

The safety features of the DCS230T and DCS232T are state of the art and meet all German and international safety standards.

They include handguards on both grips, grip safety, chain catch, safety saw chain, and chain brake. The chain brake can be actuated manually, and is also inertia-actuated automatically in case of kickback.



In order to ensure the proper functioning and performance of your new chain saw, and to safeguard your own personal safety, it is imperative that you read this instruction manual thoroughly before operation. Be especially careful to observe all safety precautions! Failure to observe these precautions can lead to severe injury or death!

Table of contents

Page

Packing	2
Delivery inventory	3
Symbols	3
SAFETY PRECAUTIONS	
General precautions.....	4
Protective equipment	4
Fuels / Refuelling	4
Putting into operation	4
Kickback	5
Working behavior/Method of working.....	5-6
Transport and storage	6
Maintenance.....	6
First aid	7
Technical data	7
Denomination of components	8
PUTTING INTO OPERATION	
Mounting the guide bar and saw chain	8-9
Tightening the saw chain	9
Chain brake	10
Fuels / Refuelling	10-11
Adjusting the chain lubrication	11
Checking the chain lubrication	12
Starting the engine.....	12
Cold start.....	12
Warm start	12
Stopping the engine	12
Checking the chain brake.....	13
Adjusting the carburetor	13
MAINTENANCE	
Sharpening the saw chain.....	13
Cleaning the guide bar, lubricating the sprocket nose	15
Replacing the saw chain	15
Replacing the suction head.....	15
Cleaning the air filter	15
Replacing the spark plug	15
Cleaning the muffler	16
Cleaning the cylinder space	16
Instructions for periodic maintenance	17
Service, spare parts and guarantee	17-18
Trouble shooting	18

Packing

Your MAKITA chain saw will be delivered in a protective cardboard box to prevent transport damage.

Cardboard is a basic raw material and is consequently reuse-able or suitable for recycling (waste paper recycling).



Symbols

You will notice the following symbols on the chain saw and in the instruction manual:

	Read instruction manual and follow the warning- and safety precautions!		I/STOP-switch (short-circuit switch)		Chain brake
	Warning This saw is to be used by properly trained operators only.		Stop engine!		Fuel and oil mixture
	Particular care and caution!		Engine -manual start		Chain oil
	Forbidden!		Choke lever		Saw chain oil adjustment screw
	Wear protective helmet, eye and ear protection!		Direction of chain movement		First aid
	Wear protective gloves!	 	CAUTION: Kickback!		Recycling
	Use appropriate protection for foot-leg and hand-arm.				
	No smoking!		Hold the saw with both hands while working! One-handed use is extremely hazardous!		CE-Marking
	No open fire!				

SAFETY PRECAUTIONS

CAUTION:

This chain saw is designed especially for tree care and surgery. All work with this chain saw is to be carried out by properly trained persons only. Observe all literature, procedures and recommendations from the relevant professional organisation. Failure to do so constitutes a high accident risk! We recommend always using a rising platform (cherry picker, lift) for sawing in trees. Rappelling techniques are extremely dangerous and require special training! The operator must be trained in and familiar with the use of safety equipment and working and climbing techniques! Always use the appropriate belts, ropes and carabiners when working in trees. Always use restraining equipment for both the operator and the saw!

General precautions

- To ensure correct operation the user has to read this instruction manual to make himself familiar with the characteristics of the chain saw. Users insufficiently informed will endanger themselves as well as others due to improper handling.
- Lend this chain saw only to persons with training and experience in the use of tree-surgery saws. Always hand over the instruction manual.
- Children and young persons aged under 18 years must not be allowed to operate the chain saw. Persons over the age of 16 years may, however, use the chain saw for the purpose of being trained as long as they are under the supervision of a qualified trainer.
- Use chain saws always with the utmost care and attention.
- Operate the chain saw only if you are in good physical condition. If you are tired, your attention will be reduced. Be especially careful at the end of a working day. Perform all work calmly and carefully. The user has to accept liability for others.
- Never work under the influence of alcohol, drugs or medication.
- A fire extinguisher must be available in the immediate vicinity when working in easily inflammable vegetation or when it has not rained for a long time (danger of fire).

Protective equipment

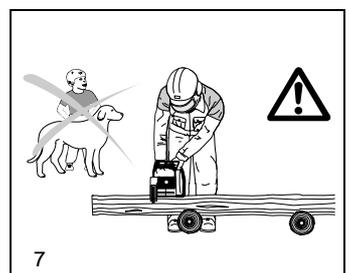
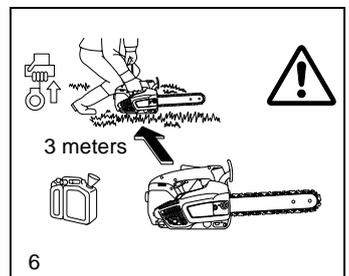
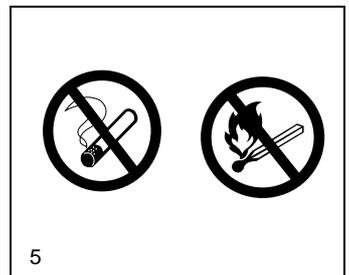
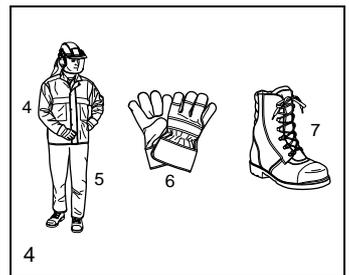
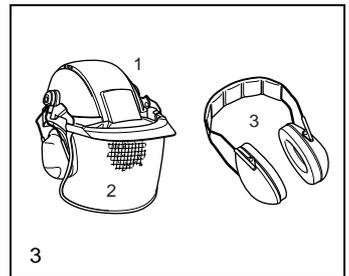
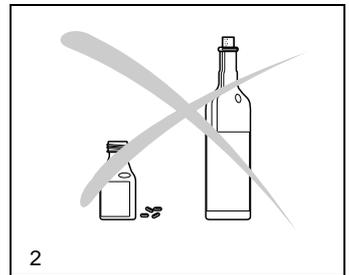
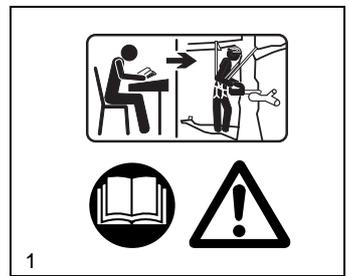
- In order to avoid head, eye, hand or foot injuries as well as to protect your hearing the following protective equipment must be used during operation of the chain saw:
- The kind of clothing should be appropriate, i. e. it should be tight-fitting but not be a hindrance. Do not wear jewelry or clothing which could become entangled with bushes or shrubs. If you have long hair, always wear a hairnet!
- It is necessary to wear a protective helmet whenever working with the chain saw. The **protective helmet** (1) is to be checked in regular intervals for damage and is to be replaced after 5 years at the latest. Use only approved protective helmets.
- The **face shield** (2) of the protective helmet (or the goggles) protects against sawdust and wood chips. During operation of the chain saw always wear a goggle or a face shield to prevent eye injuries.
- Wear adequate **noise protection equipment** (ear muffs (3), ear plugs, etc.). Octave band analysis upon request.
- The **protective jacket** (4) consists of 22 layers of nylon and protects the operator against cuts. It is always to be worn when working from elevated platforms (cherry pickers, lifts), from platforms mounted on ladders or when climbing with ropes.
- The **protective brace and bib overall** (5) is made of a nylon fabric with 22 layers and protects against cuts. We strongly recommend its use.
- **Protective gloves** (6) made of thick leather are part of the prescribed equipment and must always be worn during operation of the chain saw.
- During operation of the chain saw **safety shoes** or **safety boots** (7) fitted with anti skid sole, steel toe caps and protection for the leg must always to be worn. Safety shoes equipped with a protective layer provide protection against cuts and ensure a secure footing. For working in trees the safety boots must be suitable for climbing techniques.

Fuels / Refuelling

- Stop the engine before refuelling the chain saw.
- Do not smoke or work near open fires (5).
- Let the engine cool down before refuelling.
- Fuels can contain substances similar to solvents. Eyes and skin should not come in contact with mineral oil products. Always wear protective gloves when refuelling. Frequently clean and change protective clothes. Do not breathe in fuel vapors.
- Do not spill fuel or chain oil. When you have spilt fuel or oil immediately clean the chain saw. Fuel should not come in contact with clothes. If your clothes have come in contact with fuel, change them at once.
- Ensure that no fuel or chain oil oozes into the soil (environmental protection). Use an appropriate base.
- Refuelling is not allowed in closed rooms. Fuel vapors will accumulate near the floor (explosion hazard).
- Ensure to firmly tighten the screw caps of the fuel and oil tanks.
- Change the place before starting the engine (at least 3 m from the place of refuelling) (6).
- Fuel cannot be stored for an unlimited period of time. Buy only as much as will be consumed in the near future.
- Use only approved and marked containers for the transport and storage of fuel and chain oil. Ensure children have no access to fuel or chain oil.

Putting into operation

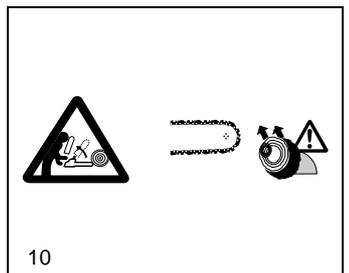
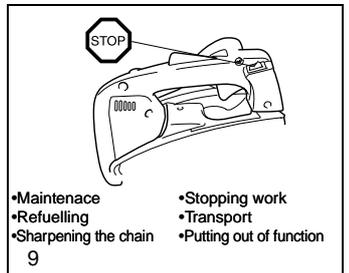
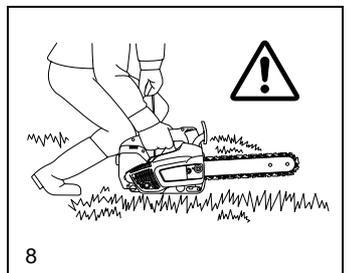
- Do not work on your own. There must be someone around in case of an emergency.
- Ensure that there are no children or other people within the working area. Pay attention to any animals in the working area, as well (7).



Before starting work the chain saw must be checked for perfect function and operating safety according to the prescriptions.

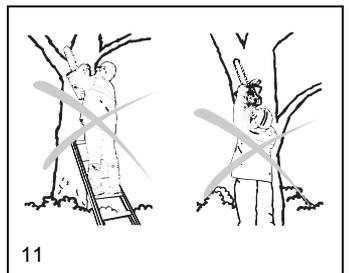
Check especially the function of the chain brake, the correct mounting of the guide bar, the correct sharpening and tightening of the chain, the firm mounting of the sprocket guard, the easy motion of the throttle lever and the function of the throttle lever lock, the cleanliness and dryness of the handles, and the function of the ON/OFF switch.

- Put the chain saw only into operation if it is completely assembled. Never use the chain saw when it is not completely assembled.
- Before starting the chain saw ensure that you have a safe footing.
- Put the chain saw into operation only as described in this instruction manual (8). Other starting methods are not allowed.
- When starting the chain saw it must be well supported and securely held. The guide bar and chain must not be in contact with any object.
- **When working with the chain saw always hold it with both hands.** Take the rear handle with the right hand and the tubular handle with the left hand. Hold the handles tightly with your thumbs facing your fingers. It is extremely dangerous to work with one hand, as the saw can fall through the completed cut uncontrolled (high risk of injury). Furthermore, it is impossible to control kickback with one hand.
- **CAUTION: When releasing the throttle lever the chain will keep on running for a short period of time** (free-wheeling).
- Continuously ensure that you have a safe footing.
- Hold the chain saw such that you will not breathe in the exhaust gas. Do not work in closed rooms (danger of poisoning).
- **Switch off the chain saw immediately if you observe any changes in its operating behavior.**
- **The engine must be switched off before checking the chain tension, tightening the chain, replacing it or clearing malfunctions (9).**
- When the sawing device is hit by stones, nails or other hard objects, switch off the engine immediately and check the sawing device.
- When stopping work or leaving the working place switch off the chain saw (9) and put it down such that nobody is endangered.
- Do not put the overheated power chain saw in dry grass or on any inflammable objects. The muffler is very hot (danger of fire).
- **CAUTION:** Oil dropping from the chain or guide bar after having stopped the saw chain will pollute the soil. Always use an appropriate base.



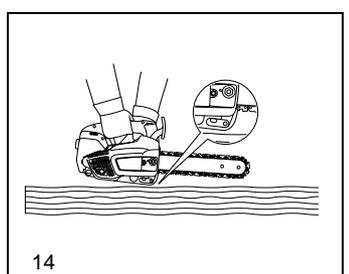
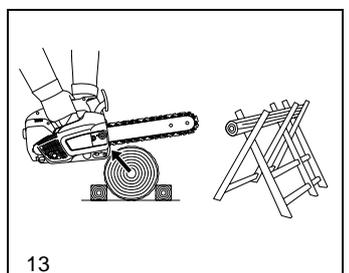
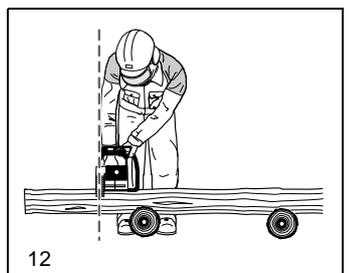
Kickback

- When working with the chain saw dangerous kickbacks may occur.
- Kickback occurs when the upper part of the end of the guide bar inadvertently touches wood or other hard objects (10).
- Before the saw chain enters the cut, it can slip to the side or jump (caution: high risk of kickback).
- This causes the saw to be thrown back toward the user with great force and out of control. **Risk of injury!**
- **In order to prevent kickback, follow these rules:**
- Only specially-trained persons should perform plunge cuts, i.e., piercing timber or wood with the tip of the saw!
- Always observe the end of the guide bar. Be careful when continuing an already started cut.
- When starting to cut the chain must be running.
- Ensure that the chain is always sharpened correctly. Pay special attention to the height of the depth limiter.
- Never cut several branches at the same time. When cutting a branch ensure that no other branch is touched.
- When crosscutting a trunk be aware of the trunks next to it.



Working behavior/Method of working

- Only use the chain saw during good light and visibility periods. Be aware of slippery or wet areas, and of ice and snow (risk of slipping). The risk of slipping is extremely high when working on recently peeled wood (bark).
- Never work on unstable surfaces. Make sure that there are no obstacles in the working area, risk of stumbling. Always ensure that you have a safe footing.
- Never saw above your shoulder height (11).
- Never saw while standing on a ladder (11).
- Never climb a tree and work without the appropriate restraining systems for the operator and the saw. We recommend always working from a rising platform (cherry picker, lift).
- Do not work leaning too far over.
- Guide the chain saw in such a way that no part of your body is within the elongated swivelling range of the saw (12).
- Use the chain saw for sawing wood only.
- Avoid touching the ground with the chain saw while it is still running.
- Never use the chain saw for lifting up or removing pieces of wood or other objects.
- Remove foreign objects such as sand, stones and nails found within the working area. Foreign objects may damage the sawing device and can cause dangerous kickback.
- When sawing pre-cut timber use a safe support (sawing jack, 13). Do not steady the workpiece with your foot, and do not allow anyone else to hold or steady it.
- Secure round pieces against rotation.
- Before performing a crosscut firmly apply the front of the body to the timber, only then can the timber be cut with the chain running. For this the chain saw is lifted at the rear handle and guided with the tubular handle. The front of the body serves as a centre of rotation. Continue by slightly pressing down the tubular handle and simultaneously pulling back the chain saw. Apply the front of the body a little bit deeper and once again lift the rear handle.
- **When the timber must be pierced for cutting or longitudinal cuts are to be performed it is urgently recommended to have this carried out by specially trained persons only** (high risk of kickback).
- Do **longitudinal - lengthwise - cuts** at the lowest possible angle (14). Be very careful when doing this type of cut, as the front body cannot grip.



- The saw must be running whenever you remove the chain saw from the wood.
- When performing several cuts the throttle lever must be released in between.
- Be careful when cutting splintery wood. Cut pieces of wood may be pulled along (risk of injuries).
- When cutting with the upper edge of the guide bar, the chain saw may be pushed in the direction of the user if the chain gets clamped. For this reason use the lower edge of the bar whenever possible. The chain saw will then be pushed away from you (15).
- If the timber is under tension (16), first cut the pressure side (A). Then the crosscut can be performed on the tension side (B). Thus clamping of the guide bar can be avoided.

CAUTION:

People felling trees or cutting of branches must be specially trained. High risk of injuries!

- When cutting of branches, the chain saw should be supported on the trunk. Do not use the end of the bar for cutting (risk of kickback).
- Be aware of branches under tension. Do not cut free branches from below.
- Never perform detensioning cuts while standing on the trunk.
- **Before cutting down a tree ensure that**
 - a) only those people are within the working area which are actually involved in cutting down the tree.
 - b) every worker involved can withdraw without stumbling (the people should withdraw backwards in a diagonal line, i. e. at a degree of 45°).
 - c) the bottom part of the trunk is free from foreign objects, underbrush and branches. Make sure to have a safe footing (risk of stumbling).
 - d) the next working place is at least 2 1/2 tree lengths away (17). Before cutting down the tree check the direction of fall and make sure that there are neither people nor objects within a distance of 2 1/2 tree lengths.

Judging the tree:

Direction of hanging - loose or dry branches - height of the tree - natural overhang - is the tree rotten?

- Take into account the direction and speed of the wind. If strong gusts are occurring, do not do any felling. Avoid sawdust (pay attention to the direction the wind is blowing)!

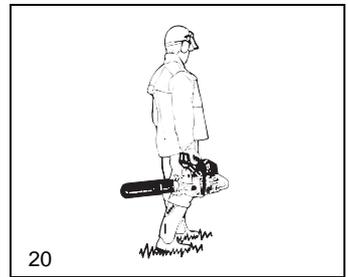
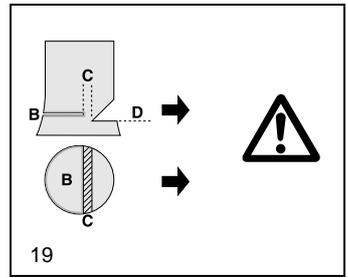
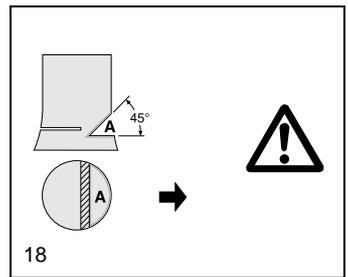
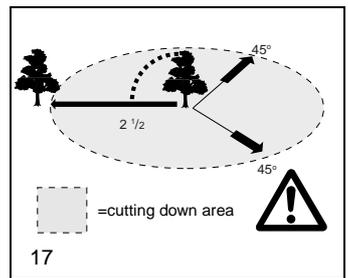
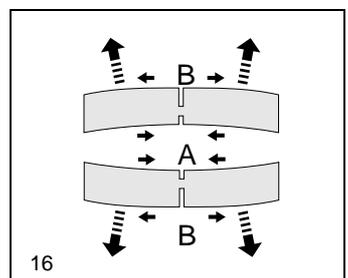
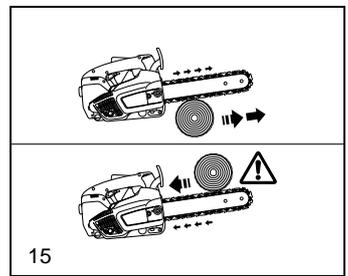
Cutting the roots:

Start with the strongest root. First do the vertical and then the horizontal cut.

Notching the trunk (18, A):

The notch determines the direction of fall and guides the tree. The trunk is notched perpendicular to the direction of fall and penetrates 1/3 – 1/5 of the trunk diameter. Perform the cut near the ground.

- When correcting the cut, always do so over the whole width of the notch.
- **Cut down** the tree (19, B) above the bottom edge of the notch (D). The cut must be exactly horizontal. The distance between both cuts must be approx. 1/10 of the trunk diameter.
- The **material between both cuts (C)** serves as a hinge. Never cut it through, otherwise the tree will fall without any control. Insert felling wedges in time.
- Secure the cut only with wedges made of plastic or aluminium. Do not use iron wedges. If the saw hits an iron wedge the chain can be seriously damaged or torn.
- When cutting down a tree always stay sideways of the falling tree.
- When withdrawing after having performed the cut, be alert for falling branches.
- When working on sloping ground the user of the chain saw must stay above or sideways of the trunk to be cut or the tree already cut down.
- Be alert for trunks which may roll towards you.



Transport and storage

- When changing your location during work switch off the chain saw and actuate the chain brake in order to prevent an inadvertent start of the chain.
- Never carry or transport the chain saw with the chain running.
- When transporting the chain saw over long distances the guide bar protection cover (delivered with the chain saw) must be applied.
- Carry the chain saw with the tubular handle. The guide bar points backwards (20). Avoid coming in contact with the muffler (danger of burns).
- Ensure safe positioning of the chain saw during car transportation to avoid fuel or chain oil leakage.
- Store the chain saw safely in a dry place. It must not be stored outdoors. Keep the chain saw away from children.
- Before storing the chain saw over a long period of time or shipping it the fuel and oil tanks must be completely emptied.

Maintenance

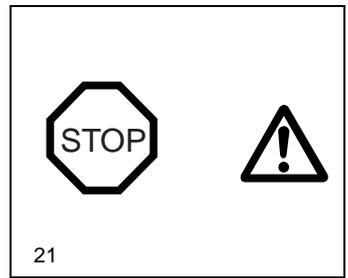
- **Before performing maintenance work switch off the chain saw (21) and pull out the plug cap.**
- Before starting work always check the operating safety of the chain saw, in particular the function of the chain brake. Make sure the saw chain is properly sharpened and tensioned (22).
- Operate the chain saw only at a low noise and emission level. For this ensure the carburetor is adjusted correctly.
- Regularly clean the chain saw.
- Regularly check the tank cap for tightness.

Observe the accident prevention instructions issued by trade associations and insurance companies. Do not perform any modifications on the chain saw. You will put your safety at risk.

Perform only the maintenance and repair works described in the instruction manual. All other work must be carried out by MAKITA Service.

Use only original MAKITA spare parts and accessories.

Using spare parts other than original MAKITA parts or accessories and guide bar/chain combinations or lengths which are not approved bring a high risk of accidents. We cannot accept any responsibility for accidents and damage resulting from using sawing devices or accessories which have not been approved.



First aid

For the event of a possible accident, please make sure that a first aid kit is always immediately available close by. Immediately replace any items used from the first aid box.

When calling for help, give the following information:

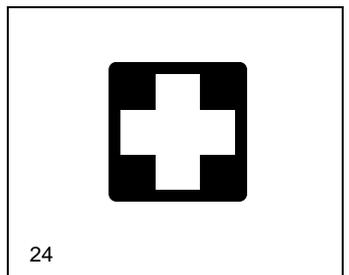
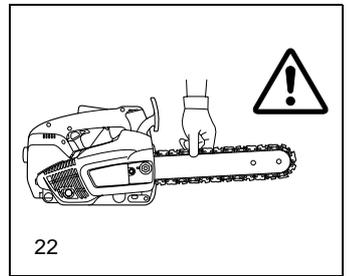
- Place of the accident
- What happened
- Number of injured people
- Kind of injuries
- Your name!

NOTE:

Individuals with poor circulation who are exposed to excessive vibration may experience injury to blood vessels or the nervous system.

Vibration may cause the following symptoms to occur in the fingers, hands or wrists: "Falling asleep" (numbness), tingling, pain, stabbing sensation, alteration of skin colour or of the skin.

If any of these symptoms occur, see a physician!



Technical data

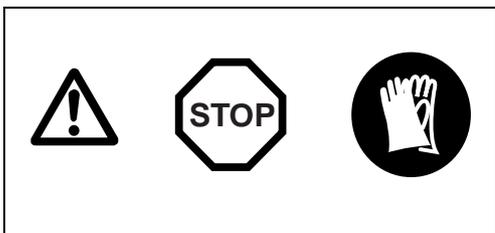
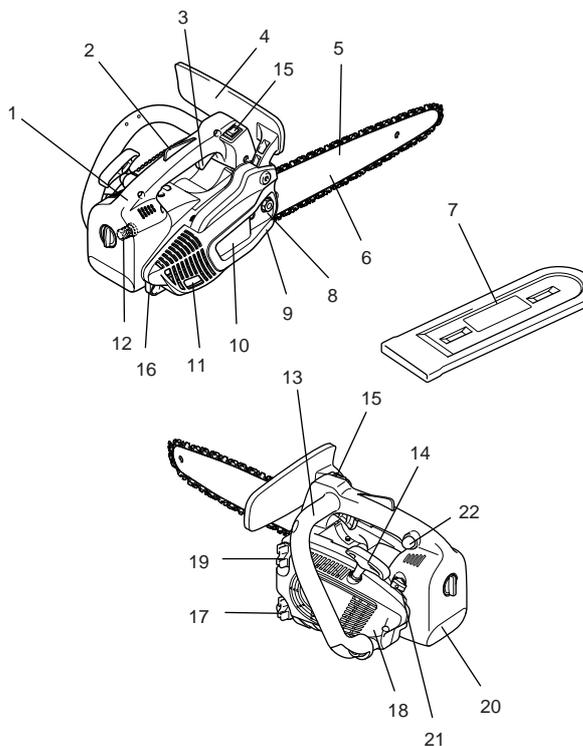
Stroke volume	cm ³	22.2
Bore	mm	33
Stroke	mm	26
Max. power at speed	kW/min ⁻¹	0.74/8,000
Max. torque at speed	Nm/min ⁻¹	0.97/6,500
Idling speed / max. engine speed with bar and chain	min ⁻¹	3,000/11,500 (DCS230T) 3,000/10,000 (DCS232T)
Coupling speed	min ⁻¹	4,500
Sound pressure level at the workplace L _{pA av} per ISO/CD 22868 ¹⁾	dB (A)	95.0
Sound power level L _{WA av} per ISO/CD 22868 ¹⁾	dB (A)	104.1
Vibration acceleration a _{h,w av} per ISO 7505 ¹⁾		
- Tubular handle	m/s ²	4.3
- Rear handle	m/s ²	5.6
Carburetor (diaphragm carburetor)	Type	Walbo WYL
Ignition system	Type	electronic
Spark plug	Type	NGK CMR 6A
Electrode gap	mm	0.6 – 0.7
Fuel consumption at max. load per ISO 7293	kg/h	0.41
Specific consumption at max. load per ISO 7293	g/kWh	561
Fuel tank capacity	cm ³	200
Chain oil tank capacity	cm ³	190
Mix ratio (fuel/two-stroke oil)		25:1
Chain brake		Actuation manually or by kickback
Chain speed ²⁾	m/s	14.9 (91VG) 13.6 (25AP)
Sprocket pitch	inch	3/8 (91VG) 1/4 (25AP)
Number of teeth	Z	6 (91VG) 8 (25AP)
Pitch / Driving element strength	inch	3/8 /0.050 (91VG) 1/4 /0.050 (25AP)
Guide bar, length of a cut	cm	25
Weight (fuel tank empty, without chain and guide bar)	kg	2.5

1) Figures derived in equal part from idle, full-load, and top-speed operation.

2) At max. power

Denomination of components

- 1 Rear handle
- 2 Safety locking button (throttle lock)
- 3 Throttle lever
- 4 Hand guard (release for chain brake)
- 5 Chain
- 6 Guide bar
- 7 Guide bar case
- 8 Retaining nuts
- 9 Chain catch (safety device)
- 10 Sprocket cover
- 11 Muffler
- 12 Spark plug
- 13 Front grip (tubular handle)
- 14 Starter grip
- 15 I/STOP-switch (short-circuit switch)
- 16 Carabiner or rope attachment point
- 17 Oil tank cap
- 18 Fan housing with starting assembly
- 19 Fuel tank cap
- 20 Air filter cover
- 21 Choke lever
- 22 Primer pump



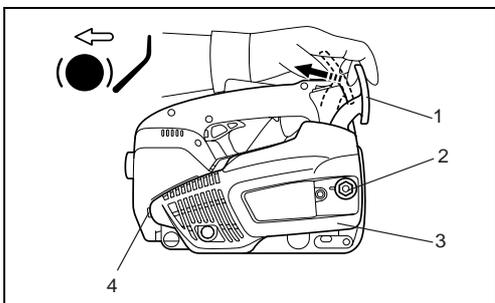
PUTTING INTO OPERATION

CAUTION:

Before doing any work on the guide bar or chain, always switch off the engine and pull the plug cap off the spark plug (see "Replacing the spark plug"). Always wear protective gloves!

CAUTION:

Do not start the saw until it has been completely assembled and inspected!



Mounting the guide bar and saw chain

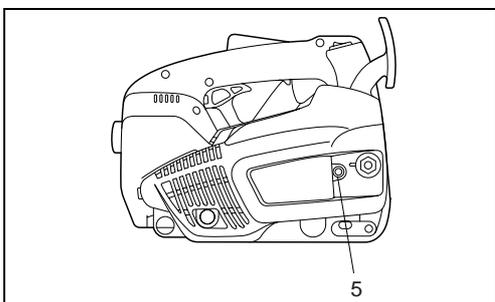
Use the universal wrench delivered with the chain saw for the following work.

Put the chain saw on a stable surface and carry out the following steps for mounting the guide bar and chain:

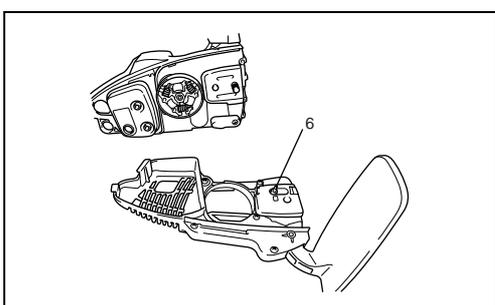
Disengage the chain brake by pulling the hand guard (1) in the direction of the arrow.

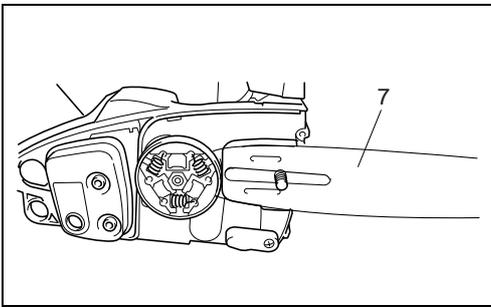
Unscrew retaining nut (2).

Carefully spread the sprocket cover (3), pull it from its fixture (4) and remove it.

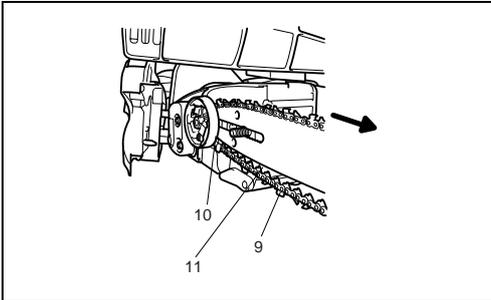


Turn the chain adjusting screw (5) to the left (counterclockwise) until the pin (6) is at the right stop.



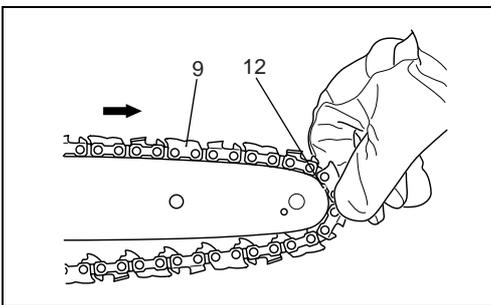


Position the guide bar (7).



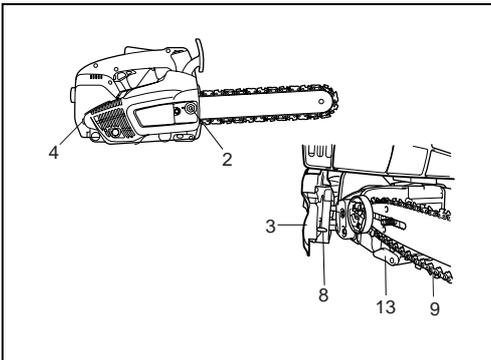
Lift the chain (9) over the sprocket (10). Using your right hand, guide the chain into the top guide groove (11) on the guide bar.

Note that the cutting edges along the top of the chain must point in the direction of the arrow!



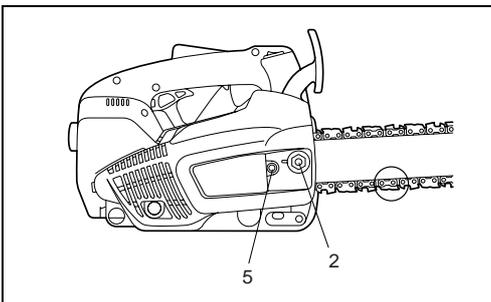
Pull the chain (9) around the nose (12) of the guide bar in the direction of the arrow.

Pull the guide bar by hand fully toward its nose. Make sure that the chain blade fits the grooves of the guide bar.



First, push the sprocket cover (3) into its fixture (4). Make sure that the pin (8) of the chain tightener is in the hole on the guide bar. Then push it over the retaining bolt while lifting the saw chain (9) over the chain catch (13).

Manually tighten the retaining nut (2).

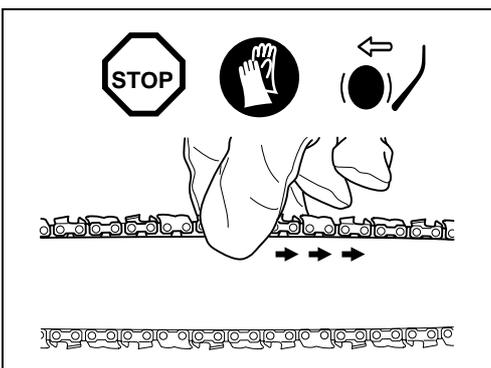


Tightening the saw chain

Turn the chain adjusting screw (5) to the right (clockwise) until the chain engages the guide groove of the bottom side of the bar (see circle).

Slightly lift the end of the guide bar and turn the chain adjusting screw (5) to the right (clockwise) until the chain rests against the bottom side of the guide bar.

While still holding up the tip of the guide bar, tighten the retaining nuts (2) with the universal wrench.



Checking the chain tension

The tension of the chain is correct if the chain rests against the bottom side of the guide bar and can still be easily turned by hand.

While doing so the chain brake must be released.

Check the chain tension frequently - new chains tend to get longer during use!

When checking the chain tension the engine must be switched off.

NOTE:

It is recommended to use 2 – 3 chains alternatively.

In order to guarantee uniform wear of the guide bar the bar should be turned over whenever replacing the chain.



Chain brake

The DCS230T and DCS232T come with an inertia chain brake as standard equipment. If kickback occurs due to contact of the guide-bar tip with wood (see "SAFETY PRECAUTIONS"), the chain brake will stop the chain through inertia if the kickback is sufficiently strong.

The chain will stop within a fraction of a second.

The chain brake is installed to block the saw chain before starting it and to stop it immediately in case of an emergency.

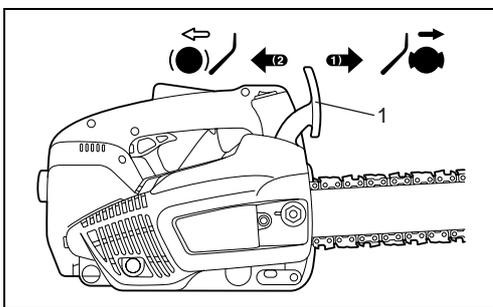
IMPORTANT: NEVER run the saw with the chain brake activated! Doing so can very quickly cause extensive engine damage!



ALWAYS release the chain brake before starting the work!

NOTE:

The chain brake is a very important safety device and like any other component subject to normal wear and tear. Regular inspection and maintenance are important for your own safety and must be done by a MAKITA service centre.



Engaging the chain brake (braking)

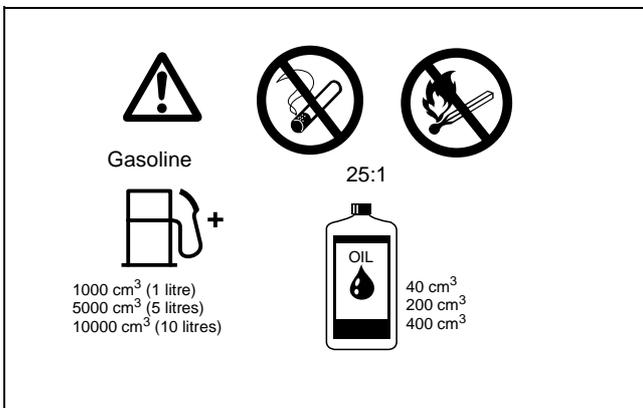
If the kickback is strong enough the sudden acceleration of the guide bar combined with the inertia of the hand guard (1) will **automatically** actuate the chain brake.

To engage the chain brake **manually**, simply push the hand guard (1) forward (towards the tip of the saw) with your left hand (arrow 1).

Releasing the chain brake

Pull the hand guard (1) towards you (arrow 2) until you feel it catch. The brake is now released.

Fuel



CAUTION:

This saw is powered by mineral-oil products. (gasoline (petrol) and oil.)

Be especially careful when handling gasoline (petrol).

Avoid all flame or fire. Do not smoke (explosion hazard).

Fuel mixture

The engine of the chain saw is a high-efficiency two-stroke engine. It runs on a mixture of gasoline and two-stroke engine oil.

The engine is designed for unleaded regular gasoline with a min. octane value of 91 ROZ. In case no such fuel is available, you can use fuel with a higher octane value. This will not affect the engine.

In order to obtain an optimum engine output and to protect your health and the environment use unleaded fuel only.

For lubricating the engine use a two-stroke engine oil (quality grade: JASO FC, ISO EGO), which is added to the fuel.



Caution: Do not use ready-mixed fuel from petrol stations.

The correct mixture ratio: 25:1 i.e. mix 25 parts gasoline with 1 part oil.

NOTE:

For preparing the fuel-oil mixture first mix the entire oil quantity with half of the fuel required, then add the remaining fuel. Shake the mixture thoroughly before pouring it into the tank.

It is not wise to add more engine oil than specified to ensure safe operation. This will only result in a higher production of combustion residues which will pollute the environment and clog the exhaust channel in the cylinder as well as the muffler. In addition, fuel consumption will rise and performance will decrease.

The Storage of Fuel

Fuels have a limited storage life. Fuel and fuel mixtures age. Therefore fuel and fuel mixtures, which have been stored for too long, can cause starting problems. Purchase only that amount of fuel, which will be consumed over the next few months.

Store fuel safely in a dry place in approved containers only.

AVOID SKIN AND EYE CONTACT

Mineral oil products degrease your skin. If your skin comes in contact with these substances repeatedly and for an extended period of time, it will desiccate. Various skin diseases may result. In addition, allergic reactions are known to occur. Eyes can be irritated by contact with oil. If oil comes into your eyes, immediately wash them with clear water.

If your eyes are still irritated, see a doctor immediately!

Chain oil



Use an oil with adhesive additive for lubricating the chain and guide bar. The adhesive additive prevents the oil from being flung off the chain too quickly.

We recommend the use of chain oil which is bio-degradable in order to protect the environment. The use of bio-degradable oil may even be required by local regulations.

The chain oil BIOTOP sold by MAKITA is made of special vegetable oils and is 100% bio-degradable. BIOTOP has been granted the "blue angel" (Blauer Umweltschutz-Engel) for being particularly environment-friendly (RAL UZ 48).



BIOTOP chain oil is available in the following sizes:

1 l order number 980 008 210

5 l order number 980 008 211

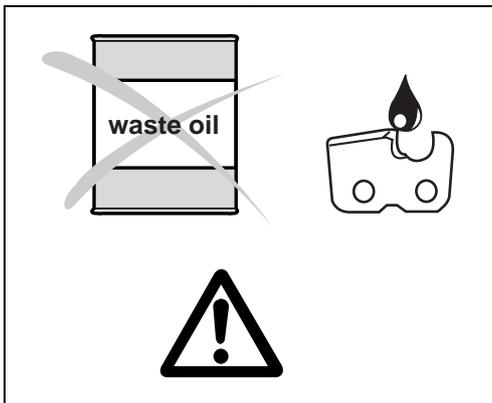
Bio-degradable oil is stable only for a limited period of time. It should be used within 2 years from the date of manufacture (printed on the container).

Important note on bio-degradable chain oils:

If you are not planning to use the saw again for an extended period of time, empty the oil tank and put in a small amount of regular engine oil (SAE 30), and then run the saw for a time. This is necessary to flush out all remaining bio-degradable oil from the oil tank, oil-feed system, chain and guide bar, as many such oils tend to leave sticky residues over time, which can cause damage to the oil pump or other parts.

The next time you use the saw, fill the tank with BIOTOP chain oil again. In case of damage caused by using waste oil or inappropriate chain oil the product guarantee will be null and void.

Your salesman will inform you about the use of chain oil.



NEVER USE WASTE OIL

Waste oil is very dangerous for the environment.

Waste oil contains high amounts of carcinogenic substances. Residues in waste oil result in a high degree of wear and tear at the oil pump and the sawing device.

In case of damage caused by using waste oil or inappropriate chain oil the product guarantee will be null and void.

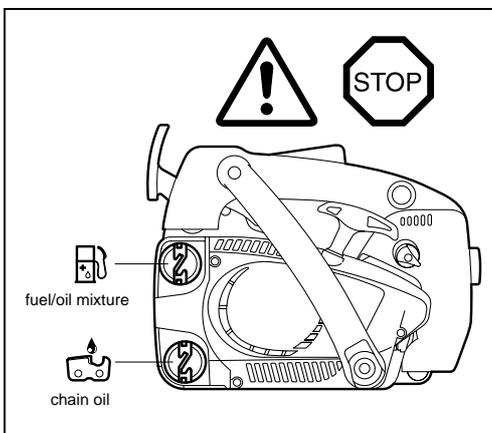
Your salesman will inform you about the use of chain oil.

AVOID SKIN AND EYE CONTACT

Mineral oil products degrease your skin. If your skin comes in contact with these substances repeatedly and for an extended period of time, it will desiccate. Various skin diseases may result. In addition, allergic reactions are known to occur.

Eyes can be irritated by contact with oil. If oil comes into your eyes, immediately wash them with clear water.

If your eyes are still irritated, see a doctor immediately!



Refuelling



FOLLOW THE SAFETY PRECAUTIONS!

Be careful and cautious when handling fuels.

The engine must be switched off!

Thoroughly clean the area around the caps, to prevent dirt from getting into the fuel or oil tank. Unscrew the cap and fill the tank with fuel (fuel/oil mixture) or chain oil as the case may be. Fill up to the bottom edge of the filler neck. Be careful not to spill fuel or chain oil! Tighten the fuel caps far as it will go.

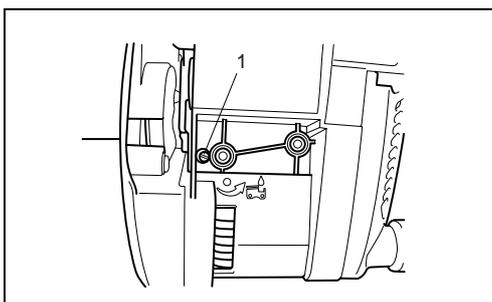
Clean screw cap and tank after refuelling.

Lubricating the chain



During operation there must always be sufficient chain oil in the chain-oil tank to provide good chain lubrication. One filling is sufficient for about one half-hour of continuous operation. When working, check that there is still sufficient chain oil in the tank and top up if necessary.

Check only when the engine is switched off!

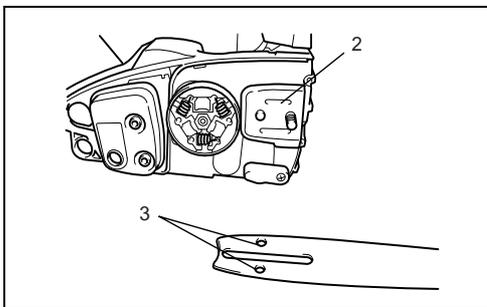


Adjusting the chain lubrication

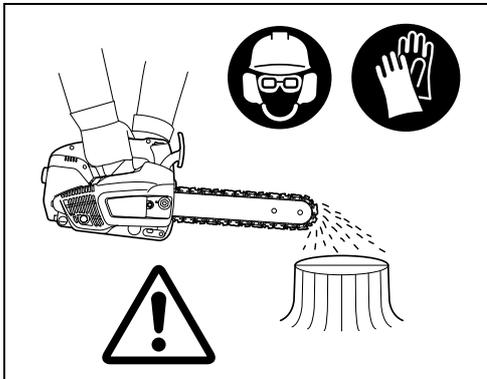
The engine must be switched off.



You can adjust the oil pump feed rate with the adjusting screw (1). The amount of oil can be adjusted using the universal wrench.



To ensure troublefree operation of the oil pump the oil guide groove at the housing (2) and the oil inlet bore in the guide bar (3) must be cleaned regularly.



Checking the chain lubrication

Never work with the chain saw without sufficient chain lubrication. Otherwise the service life of the chain and guide bar will be reduced.

Before starting work check the oil level in the tank and the oil feed.

Check the oil feed rate as described below: Start the chain saw (see "Starting the engine").

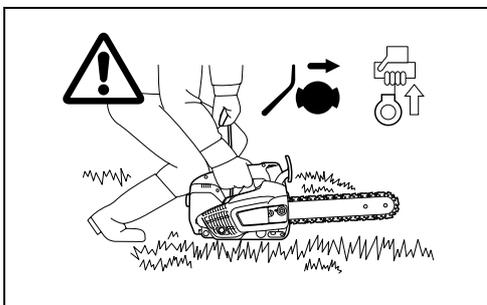
Hold the running chain saw approx. 15 cm above a trunk or the ground (use an appropriate base).

If the lubrication is sufficient, you will see a light oil trace because oil will be flung off the sawing device. Pay attention to the direction the wind is blowing and avoid unnecessary exposure to the oil spray!

NOTE:

After the saw has been turned off it is normal for residual chain oil to drip from the oil feed system, the guide bar and the chain for a time. This does not constitute a defect!

Place the saw on a suitable surface.



Starting the engine

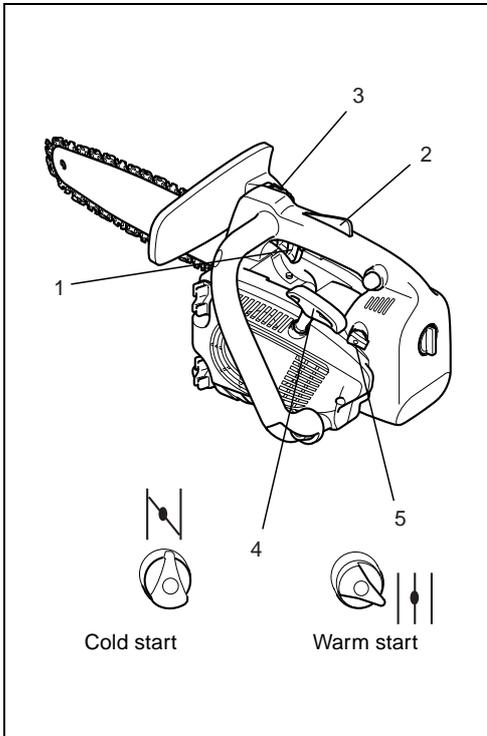
Do not start the saw until it has been completely assembled and inspected!

Move at least 3m away from the place where you fuelled the saw.

Make sure you have a good footing, and place the saw on the ground in such a way that the chain is not touching anything.

Engage the chain brake (lock).

Grasp the rear handle firmly in one hand and hold the saw firmly against the ground. Press with one knee on the rear handle.



IMPORTANT: The choke lever (5) is coupled to the throttle lever (1). It will revert to its original position automatically once the throttle lever has been pressed.

If the throttle lever is pressed before the engine starts, then the choke switch (5) will have to be reset to the appropriate position.

Cold start:



Push the short-circuit switch (3) forward.

Turn the choke lever (5) to position . Push primer pump 7 – 10 times.

Slowly pull out the starter cable (4) until you notice resistance (the piston is positioned before the top dead centre).

Now continue to pull quickly and powerfully. The engine will start after 2 to 4 attempts and will continue to run (at low temperatures, several starting pulls might be necessary).

CAUTION: Do not pull out the starter cable more than approx. 50 cm, and lead it back by hand. For efficient starting, it is important to pull the starter cable quickly and powerfully.

As soon as the engine is running smoothly, gently press the throttle lever (1) once (grasp the handle, the safety locking button (2) will release the throttle lever) this will cause the choke lever (5) to spring back to its original position and the engine will then run at idling speed.

Now release the chain brake.



Warm start:

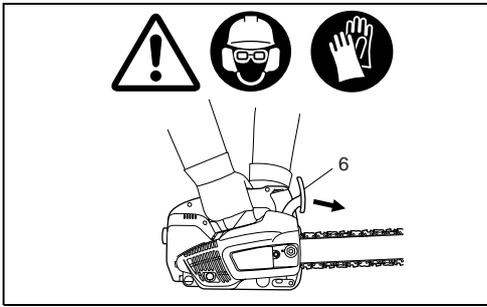
Proceed as described under cold start, but place the choke lever (5) to position .

Important: If the fuel tank has been completely emptied and the engine has stopped due to lack of fuel, press the primer pump 7 – 10 times.

Stopping the engine



Put the short-circuiting switch (3) in position "STOP".

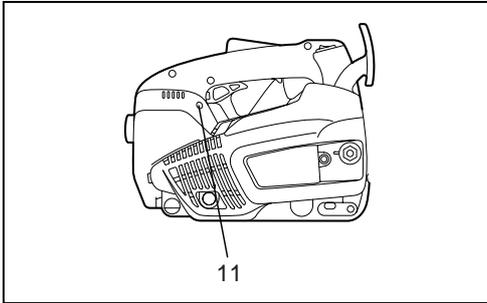


Checking the chain brake

Do not work with the chain saw without first checking the chain brake!

Start the engine as described (make sure you have a good footing, and place the chain saw on the ground in such a way that the guide bar is free of contact). Grasp the tubular handle firmly with one hand and hold the grip with the other. With the engine running at moderate speed, press the hand guard (6) in the direction of the arrow with the back of your hand until the chain brake engages. The chain should stop immediately. Immediately release the throttle and release the chain brake.

IMPORTANT: If the chain does not stop immediately in this test, do not under any circumstances proceed with work. Contact a MAKITA service center.



Adjusting the carburetor



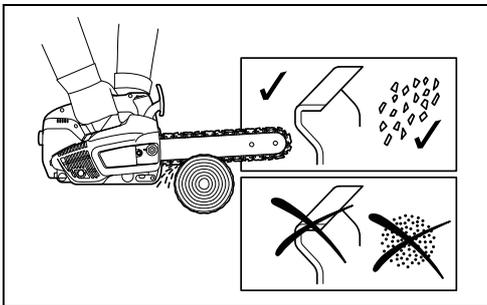
The carburetor eliminates the need to adjust the idle and main nozzles, and no such adjustment is possible.

If necessary, the idle speed can be adjusted using the adjustment screw (11). As installed, the carburetor has fixed nozzles for the air pressure at sea level. At heights above 1000 m /3300 feet it may be necessary to replace the carburetor nozzles. Adjust the carburetor using the screwdriver (7, which has a blade width of 4 mm.) Before undertaking the adjustment, run the engine for 3 – 5 minutes to warm it up, but not at high speed!

Set idle speed

Turning the adjusting screw (11) in (clockwise): increases the idle speed.
Turning it out (counterclockwise): lowers the idle speed.

Caution: In no case should the chain move.



MAINTENANCE

Sharpening the saw chain



CAUTION: Before doing any work on the guide bar or chain, always switch off the engine and pull the plug cap off the spark plug (see "Replacing the spark plug"). Always wear protective gloves!

The chain needs sharpening when:

The sawdust produced when sawing damp wood looks like wood flour. The chain penetrates the wood only under great pressure. The cutting edge is visibly damaged. The saw is pulled to the left or right when sawing. This is caused by uneven sharpening of the chain.

Important: Sharpen frequently, but without removing too much metal!

Generally, 2 or 3 strokes of the file will be enough. Have the chain resharpened at a service centre when you have already sharpened it yourself several times.

Proper sharpening:

CAUTION: Use only chains and guide bars designed for this saw!

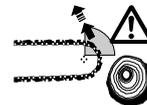
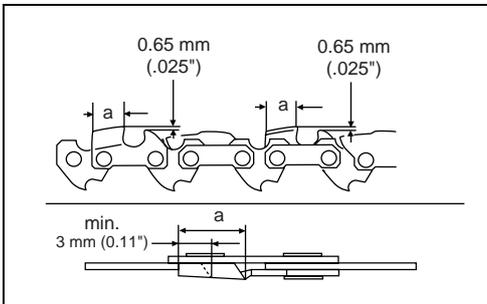
All cutters must be of the same length (dimension a). Cutters with different lengths result in rough running of the chain and can cause cracks in the chain.

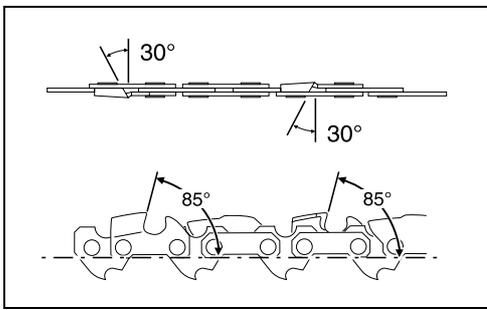
Minimum cutter length is 3 mm. Do not resharpen the chain when the minimum cutter length has been reached; at this point, the chain must be replaced.

The depth of the cut is determined by the difference in height between the depth limiter (round nose) and the cutting edge.

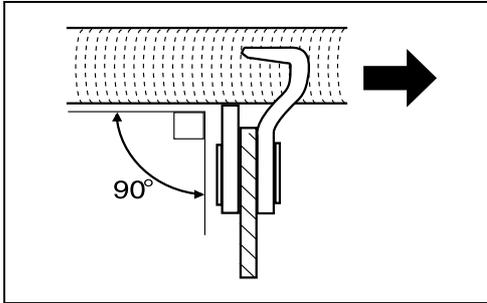
The best results are obtained with a depth-limiter depth of 0.65 mm (.025").

CAUTION: Excessive depth increases the risk of kickback!





All cutters must be sharpened to the same angle, 30°. Different angles result in a roughly, irregularly running chain, increase wear and tear and cause chain beakage. The 85° front rake of the cutter results from the cut depth of the round file. If the proper file is used in the right manner, the correct front rake will be obtained automatically.



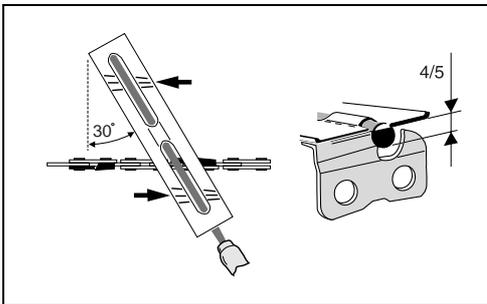
Files and how to work with them

Use a special round file for chains (dia. 4 mm) for sharpening the chain. Normal round files are not appropriate for this work.

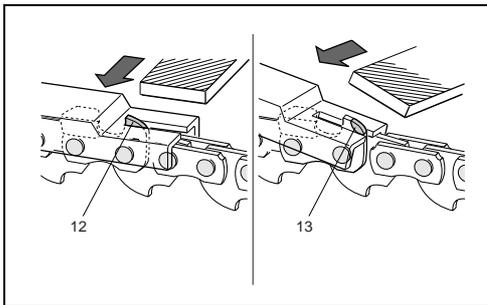
The file should cut only when pushed forwards (arrow). Lift the file when leading it backwards.

First sharpen the shortest cutter. The length of this cutter is then the standard for all other cutters of the chain.

Always guide the file horizontally (90° to the guide bar).



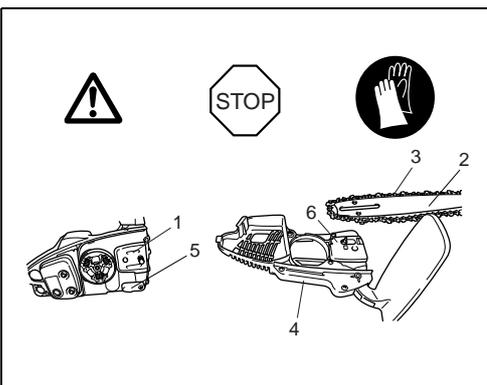
The file holder makes file guidance easier. It is marked for the correct 30° sharpening angle (keep the marks parallel with the chain when filing, see illustration) and limits the cut depth to the correct 4/5 of the file diameter.



After having sharpened the chain, the height of the depth limiter must be checked by means of a chain gauge.

Correct even the smallest excess height with a special flat file (12).

Round off the front of the depth limiter (13).



Cleaning the sprocket interior, checking and replacing the chain catcher

CAUTION: Before doing any work on the guide bar or chain, always switch off the engine and pull the plug cap off the spark plug (see "Replacing the spark plug"). Always wear protective gloves!

CAUTION: Do not start the saw until it has been completely assembled and inspected!

Remove the sprocket cover (4) (see section on "PUTTING INTO OPERATION") and clean the interior with a brush.

Remove the chain (3) and guide bar (2).

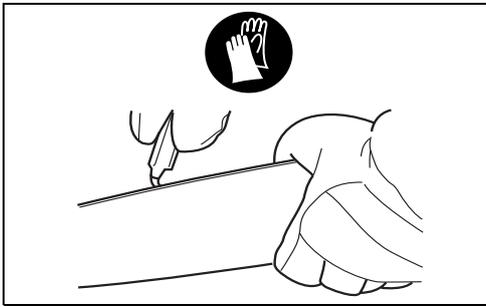
NOTE:

Make sure that no residue or contaminants remain in the oil guide groove (1) and the chain tightener (6).

For replacing the guide bar, chain, and sprocket see "PUTTING INTO OPERATION".

Chain catcher

Visually inspect the chain catcher (5) for damage and replace if necessary.



Cleaning the guide bar, lubricating the sprocket nose

CAUTION: Protective gloves must be worn.

Regularly inspect the bearing surfaces of the guide bar for damage, and clean them with a suitable tool.

Sprocket nose type:

If the saw is used intensively it will be necessary to lubricate the return sprocket bearings regularly (once a week). To do this, first thoroughly clean the 2 mm hole at the tip of the guide bar, and then press in a small amount of multi-purpose grease.

Multi-purpose grease and grease guns are available as accessories.

Multi-purpose grease 944 360 000

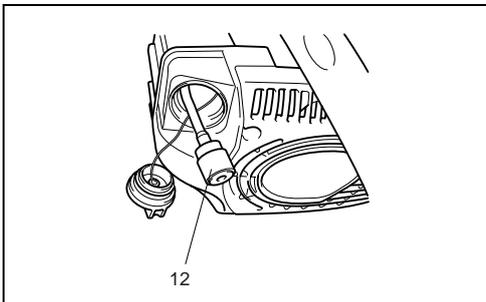
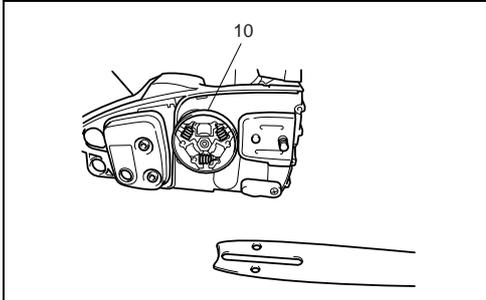
Grease guns 944 350 000

Replacing the saw chain

CAUTION: Use only chains and guide bars designed for this saw.

Check the sprocket (10) before mounting a new chain.

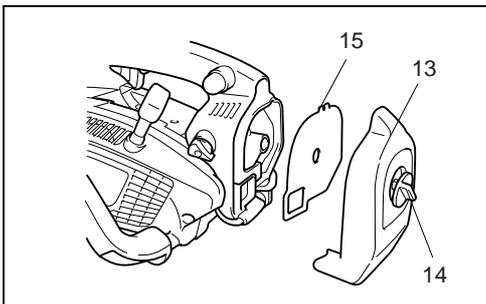
CAUTION: Worn out sprockets may damage the new chain and must therefore be replaced.



Replacing the suction head

The felt filter (12) of the suction head can become clogged. It is recommended to replace the suction head once every three months in order to ensure unimpeded fuel flow to the carburetor.

To remove the suction head for replacement, pull it out through the tank filler neck using a piece of wire bent at one end to form a hook.



Cleaning the air filter



Unscrew screw (14) and remove the cleaner case cover (13).

IMPORTANT: Cover the intake opening with a clean cloth in order to prevent dirt particles from falling into the carburetor. Remove the air filter. (15)

CAUTION: To prevent injury to the eyes, do NOT blow out dirt particles! Do not use fuel to clean the air filter.

Clean the air filter with a soft brush.

If the filter is very dirty, clean it in lukewarm water with dishwashing detergent.

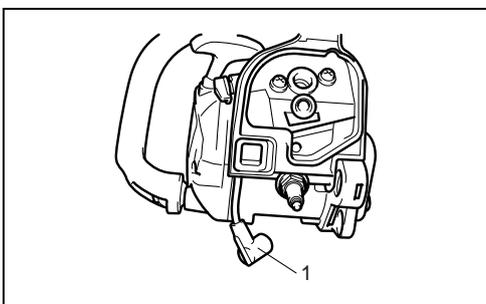
Let the air filter **dry completely**.

If the filter is very dirty, clean it frequently (several times a day), because only a clean air filter provides full engine power.

CAUTION:

Replace damaged air filters immediately.

Pieces of cloth or large dirt particles can destroy the engine!



Replacing the spark plug



CAUTION:

Do not touch the spark plug or plug cap if the engine is running (high voltage).

Switch off the engine before starting any maintenance work. A hot engine can cause burns.

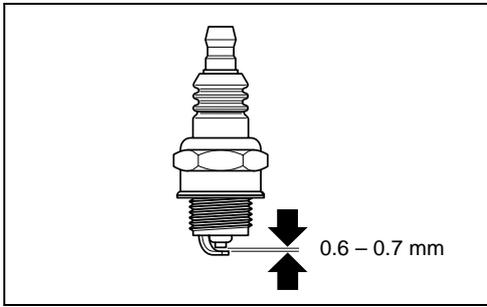
Wear protective gloves!

The spark plug must be replaced in case of damage to the insulator, electrode erosion (burn) or if the electrodes are very dirty or oily.

Remove the cleaner case cover (see "Cleaning the air filter").

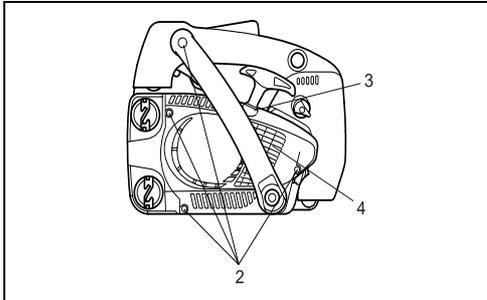
Pull the plug cap (1) off the spark plug. Use only the combination wrench supplied with the saw to remove the spark plug.

CAUTION: Use only the following spark plugs: NGK CMR6A.



Electrode gap

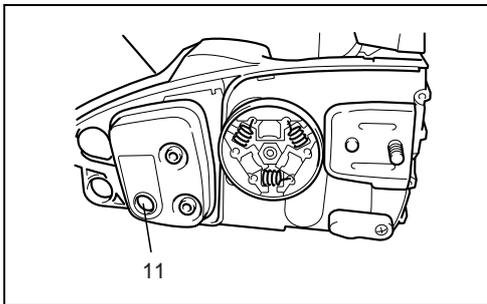
The electrode gap must be 0.6 – 0.7 mm.



Cleaning the inlet port of the cooling air

Unscrew four screws (2). Remove recoil starter (3).

Clean the inlet port (4) and the cylinder fins.



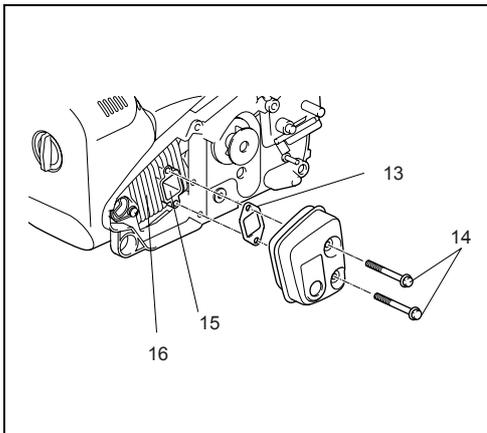
Cleaning the muffler



CAUTION: If the engine is hot there is a risk of burning. Wear protective gloves.

Remove the sprocket cover (see "PUTTING INTO OPERATION").

Remove deposits of carbon from the exhaust outlets (11) of the muffler.



Cleaning the cylinder space

Remove the sprocket cover (see "PUTTING INTO OPERATION").

If necessary remove muffler by loosening and removing the two screws (14).

Stuff a rag into the cylinder port (15).

Use a suitable tool (wooden scraper) to clean out the cylinder space (16), especially the cooling fins.

Remove the rag from the cylinder port and refit the muffler according to the diagram.

Replace the gasket (13) if necessary. Carefully remove any pieces of the old gasket from the muffler.

Ensure correct mounting position. The cowling should follow the contour of the cylinder to ensure correct heat transfer.

Tighten screws (14) to 10 Nm while the engine is cold.

Instructions for periodic maintenance

To ensure long life, prevent damage and ensure the full functioning of the safety features the following maintenance must be performed regularly. Guarantee claims can be recognized only if this work is performed regularly and properly. Failure to perform the prescribed maintenance work can lead to accidents!

The user of the chain saw must not perform maintenance work which is not described in the instruction manual. All such work must be carried out by a MAKITA service centre.

General	Chain saw Saw chain Chain brake Guide bar	Clean exterior, check for damage. In case of damage, have repaired by a qualified service centre immediately. Sharpen regularly, replace in good time. Have inspected regularly at an authorized service centre. Turn over to ensure even wear of bearing surfaces. Replace in good time.
Before each start	Saw chain Guide bar Chain lubrication Chain brake OFF switch, Safety locking button, Throttle lever Fuel/oil tank plug	Inspect for damage and sharpness. Check chain tension. Check for damage. Functional check. Functional check. Functional check. Check for tightness.
Every day	Air filter Guide bar Guide bar support Idle speed	Clean. Check for damage, clean oil intake bore. Clean, in particular the oil guide groove. Check (chain must not run).
Every week	Fan housing Cylinder space Spark plug Muffler Chain catch sleeve	Clean to ensure proper air cooling. Clean. Check and replace if necessary. Check tightness of mounting. Check for damage, replace if necessary.
Every 3 months	Suction head Fuel, oil tanks	Replace. Clean.
Storage	Chain saw Guide bar/chain Fuel, oil tanks Carburetor	Clean exterior, check for damage. In case of damage, have repaired by a qualified service centre immediately. Demount, clean and oil slightly. Clean the guide groove of the guide bar. Empty and clean. Run empty.

Service, spare parts and guarantee

Maintenance and repair

The maintenance and repair of modern engines as well as all safety devices require qualified technical training and a special workshop equipped with special tools and testing devices.

We therefore recommend that you consult a MAKITA service centre for all work not described in this instruction manual.

The MAKITA service centres have all the necessary equipment and skilled and experienced personnel, who can work out cost-effective solutions and advise you in all matters.

Please contact your nearest service centre.

Spare parts

Reliable long-term operation, as well as the safety of your chain saw, depend among other things on the quality of the spare parts used. Use only original MAKITA parts.

Only original spare parts and accessories guarantee the highest quality in material, dimensions, functioning and safety.

Original spare parts and accessories can be obtained from your local dealer. He will also have the spare part lists to determine the required spare part numbers, and will be constantly informed about the latest improvements and spare part innovations.

Please bear in mind that if parts other than original MAKITA spare parts are used, this will automatically invalidate the MAKITA product guarantee.

Guarantee

MAKITA guarantees the highest quality and will therefore reimburse all costs for repair by replacement of damaged parts resulting from material or production faults occurring within the guarantee period after purchase. Please note that in some countries particular guarantee conditions may exist. If you have any questions, please contact your salesman, who is responsible for the guarantee of the product.

Please note that we cannot accept any responsibility for damage caused by:

- Disregard of the instruction manual.
- Non-performance of the required maintenance and cleaning.
- Incorrect carburetor adjustment.
- Normal wear and tear.
- Obvious overloading due to permanent exceeding of the upper performance limits.
- Use of guide bars and chains which have not been approved.
- Use of guide bar and chain lengths which have not been approved.
- Use of force, improper use, misuse or accidents.
- Damage from overheating due to dirt on the recoil starter.
- Work on the chain saw by unskilled persons or inappropriate repairs.
- Use of unsuitable spare parts or parts which are not original MAKITA parts, insofar as they have caused the damage.
- Use of unsuitable or old oil.
- Damage related to conditions arising from lease or rent contracts.

Cleaning, servicing and adjustment work is not covered by the guarantee. All repairs covered by the guarantee must be performed by a MAKITA service centre.

Trouble shooting

Malfunction	System	Observation	Cause
Chain does not run	Chain brake	Engine runs	Chain brake actuated.
Engine does not start or only with difficulty	Ignition system	Ignition spark	Malfunction in fuel supply system, compression system, mechanical malfunction.
		No ignition spark	Switch on STOP, fault or short-circuit in the wiring, plug cap or spark plug defective.
	Fuel supply	Fuel tank is filled	Choke in wrong position, carburetor defective, suction head dirty, fuel line bent or interrupted.
	Compression system	Inside	Faulty crankcase gasket, radial shaft packings defective, cylinder or piston rings defective.
Outside		Spark plug does not seal.	
Mechanical malfunction	Starter does not engage	Spring in starter broken, broken parts inside the engine.	
Warm start difficulties	Carburetor	Fuel tank is filled Ignition spark	Wrong carburetor adjustment.
Engine starts, but dies immediately	Fuel supply	Fuel tank is filled	Wrong idling adjustment, suction head or carburetor dirty. Tank venting defective, fuel line interrupted, cable defective, STOP switch defective.
Insufficient power	Several systems may be involved simultaneously	Engine is idling	Air filter dirty, wrong carburetor adjustment, muffler clogged, exhaust channel in cylinder clogged.
No chain lubrication	Oil tank/pump	No oil on the chain	Oil tank empty. Oil guide groove dirty.

Makita Corporation

Anjo Aichi Japan

884570A5