

## OPERATE & MAINTAIN CHAINSAWS



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## PUBLICATION NOTES

*BHP Billiton Iron Ore is proud to support Greening Australia to provide valuable conservation and land management training to communities throughout the Pilbara through the Indigenous Training Program.*

*This Learning Guide series has been developed as part of our partnership of the program.*

Gavin Price, Head of Environment, BHP Billiton Iron Ore

*Greening Australia is proud to produce and provide the comprehensive suite of new ALEP Learning Guides. The guides are compatible with the new horticulture and conservation industries training package and suited to developing skills in Indigenous communities within remote areas of the country where employment opportunities are limited. We would like to thank BHPBIO for their generous support in the development of the guides.*

Brendan Foran, National CEO Greening Australia

The second series of ALEP Guides is aligned with a number of units of competence from the *Training Package AHC10 – Agriculture, Horticulture and Conservation and Land Management* (Release 8.0). The units selected are frequently used within Certificates I to III in Horticulture and Conservation and Land Management. As such they cover, where possible, the elements, performance criteria and required skills and knowledge of each unit.

The principal goal of these resources is to support the learning process; the learning activities may complement a trainer's assessment plan. The intent is that they will be used in an interactive manner with learners rather than as self-paced study guides. The structure and sequence have been designed to follow the logical steps of the practical tasks wherever possible. Concepts are introduced and then consolidated with discussion and/or practical activities.

The writers consider that these guides can provide a sound technical foundation but also strongly encourage trainers to complement the guides with additional, authentic resources from relevant industry texts and websites. The guides can be used in part or in their entirety but should always be linked to practical activities to strengthen the teaching and learning.

Genuine consideration was given to the level of language used in the guides. The goal has been to find a balance between simplifying the language to an accessible level and ensuring that the vocational concepts are addressed. The writers contend that with appropriate support these texts can provide an opportunity for students to strengthen their language, literacy and numeracy skills, which may be required for pathway progression.

A number of Aboriginal people have been involved in developing this ALEP Guide, which is considered suitable for use within a program based on Aboriginal pedagogies.

# INTRODUCTION

Welcome to *Operate and maintain chainsaws*. This learner guide provides information about how to:

- Maintain a chainsaw
- Do pre-start checks
- Use a chainsaw to cut up timber that has already been felled
- Finish the job and clean up

## RESOURCES REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE)
2. Tools for doing maintenance on chainsaws
3. Manufacturer's instructions for the chainsaw being used
4. Access to fallen or felled timber
5. A chainsaw



*Much of the training for this unit should be completed on the job.*

## LEARNING ACTIVITIES

There are four kinds of activities to complete. These activities may go toward your final assessment.

SECTION	ACTIVITY	SATISFACTORY (Y/N)	DATE
<b>DISCUSSION ACTIVITIES</b>			
1.4	Policies and procedures		
4.3	Tools and equipment		
6.3	Reporting requirements		
<b>WORKBOOK ACTIVITIES</b>			
3.2	Calculate volume		
4.2	Hearing protection		
4.4	Mixing fuel and oil		
<b>PRACTICAL ACTIVITIES</b>			
4.1	Contribute to a Job Safety Analysis		
4.4	Pre-start checks and maintenance		
5.6	Starting and cutting with the chainsaw		
<b>PROJECT</b>			
6.3	Complete a full job involving chainsaw use		

## 1.1 HAZARDS, RISKS & CONTROLS

A **hazard** is anything that can cause injury or damage the health of a person or animal.

**Risk** is the chance of a hazard causing injury and the chance of the injury being serious. Using a chainsaw is a high-risk activity because there is a high chance of injury, and there is a high chance the injury could be serious.

A **control** is something you do or use to reduce the risk of a hazard causing an injury.

There are many hazards when working with chainsaws. It is important to understand these and use appropriate controls to reduce the risks involved in using a chainsaw.

Some of the terms used in the table below might be new to you. These will be discussed in the next sections of the guide.



HAZARDS	CONTROLS
<p><b>NOISY EQUIPMENT</b></p> <p>Can cause: Damage to hearing</p> 	<ul style="list-style-type: none"> <li>• Wear earmuffs</li> <li>• Replace muffler if damaged</li> </ul>
<p><b>SHARP CHAIN TEETH</b></p> <p>Risk of: Cuts</p> 	<ul style="list-style-type: none"> <li>• Take care when sharpening</li> <li>• Don't rotate the chain by hand</li> <li>• Wear cut-resistant chainsaw chaps and gloves</li> <li>• Only use a chainsaw if you are trained</li> </ul>
<p><b>MANUAL HANDLING</b></p> <p>Risk of: Muscle injury, fatigue</p> 	<ul style="list-style-type: none"> <li>• Hold chainsaw correctly</li> <li>• Use correct stance and cutting techniques</li> <li>• Don't use a chainsaw if you are tired or unwell</li> </ul>
<p><b>FLAMMABLE FUEL</b></p> <p>Risk of: Explosions and burns Inhalation and splashes from fuel</p> 	<ul style="list-style-type: none"> <li>• Wear safety glasses</li> <li>• Do not smoke or create sparks around fuel</li> <li>• Only fuel up in a well-ventilated area</li> <li>• Use a funnel to prevent spills</li> </ul>
<p><b>VIBRATION</b></p> <p>Risk of: Hand-arm Vibration Syndrome and nerve damage</p> 	<ul style="list-style-type: none"> <li>• Check the anti-vibration fittings are in good condition</li> <li>• Take regular breaks during the day</li> <li>• Use suitable gloves</li> </ul>
<p><b>FLYING DEBRIS</b></p> <p>Risk of: Eye injury, cutting and bruising Breathing difficulty Skin irritation</p> 	<ul style="list-style-type: none"> <li>• Wear a visor attached to a safety helmet</li> <li>• Wear long sleeves, trousers and dust mask</li> <li>• Wear steel-capped boots and chainsaw chaps</li> <li>• Wear protective gloves and safety glasses</li> </ul>
<p><b>POWERFUL EQUIPMENT</b></p> <p>Risk of: Head injury caused by kickback Leg and foot injury from chain Cuts Fatigue</p> 	<ul style="list-style-type: none"> <li>• Only use equipment you are capable of handling, rest if fatigued, wear cut-resistant chaps or trousers and steel-capped boots</li> <li>• Check the chain brake is working properly</li> <li>• Only use a chainsaw if you are trained</li> </ul>
<p><b>SLIPS, TRIPS AND FALLS</b></p> <p>Risk of: Injury from falling over</p> 	<ul style="list-style-type: none"> <li>• Wear safety boots with ankle support, steel cap and non-slip soles</li> <li>• Clear debris from the worksite</li> </ul>



### NOTE

*Standards are legally enforceable. This means you must follow them.*

## 1.2 LEGAL REQUIREMENTS

Australian Standard 2727-1997 *Chainsaws – Guide to safe working practices* is a document that guides chainsaw operators and their employers in the safe use of chainsaws. This learner guide attempts to cover the basic recommendations of this standard.

Chainsaws have many safety features. These are required by Australian Standard AS 2726.2-2004 *Chainsaws – Safety requirements Part 2: Chainsaws for tree service*. Any chainsaw sold in Australia must meet this standard.

In some states, you need to have a permit to collect firewood on public land and in specified areas. To get the permit you may need to be trained and assessed in chainsaw operations.

If you need to use a chainsaw as part of your job, your employer has a duty of care to make sure you are trained to use the equipment. Some employers might want you to be accredited through an industry or government body such as the Forest Products Commission WA.

## 1.3 DUTY OF CARE

'Duty' means a legal obligation – something you must do. So 'duty of care' means that legally, you must care for yourself and those around you. Under Workplace Health and Safety (WHS) law, employers and employees have responsibilities.

### EMPLOYER RESPONSIBILITIES

The key responsibility of an employer is to show a duty of care towards their employees. They do this by:

- Providing a safe workplace that is free from unnecessary hazards
- Supplying the required PPE and safety equipment for all employees working with equipment that presents a hazard
- Supplying equipment and tools that meet Australian Standards
- Making sure all employees who need to work with equipment that presents a hazard are trained appropriately
- Listening to and acting on feedback from employees

### EMPLOYEE RESPONSIBILITIES

The key responsibility of an employee is to show a duty of care to themselves and others. They do this by:

- Completing the training provided by the employer and following the processes learnt
- Using and looking after PPE and safety equipment as directed
- Following the workplace policies and procedures
- Following manufacturers' safety instructions on equipment and when using dangerous materials
- Making suggestions as to how to reduce risks in the workplace

## 1.4 POLICIES & PROCEDURES

Policies and procedures are documents written by employers. They describe everything employers and employees have to do. Following your workplace policies and procedures will help you meet your duty of care and your other legal requirements.

Your workplace is likely to have a relevant Standard Operating Procedure (SOP) or Safe Work Method Statement (SWMS).



### DISCUSSION ACTIVITY

List the policies and procedures in your workplace that relate to chainsaw use. If you don't have any, use the one from the *Resources* section.

With your work team, read through and discuss the documents.

R1

See *Safe Operating Procedure Resource R1*, page 36



## 1.5 MANUFACTURERS' INSTRUCTIONS

Chainsaws always come with instructions from the manufacturer. You need to read the book for the equipment you are using, even if you have used similar chainsaws before.

These books will tell you about:

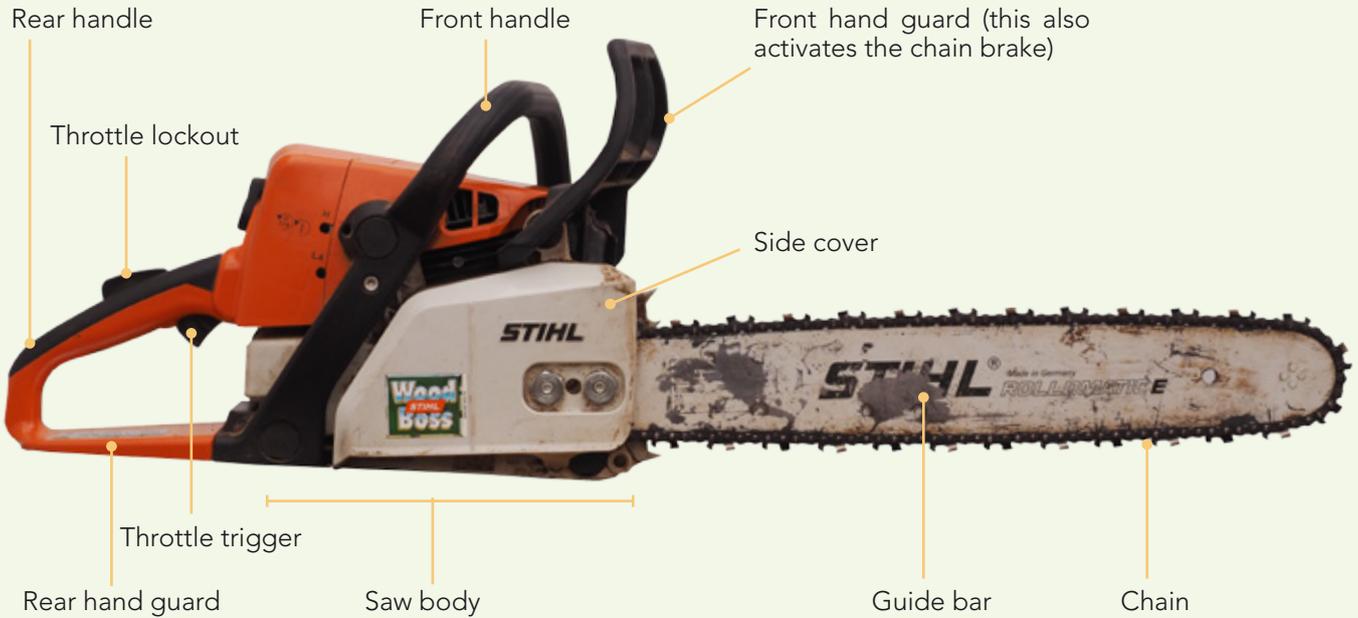
- Safety
- Operation
- Maintenance
- Servicing
- New features



# 2

## FEATURES OF CHAINSAWS

### 2.1 PARTS OF A CHAINSAW



## 2.2 DIFFERENT KINDS OF CHAINSAWS

### PETROL-OPERATED CHAINSAW

This is the most common chainsaw you will see used in a workplace. This learner guide will focus on this kind of chainsaw.

### ELECTRIC CHAINSAW

Electric chainsaws are often smaller, lighter saws. They are best for occasional use around the home garden. They are just as hazardous as petrol saws but with an additional risk of injury caused by electrocution.

### POLE CHAINSAW

These saws are often used for pruning small trees from an elevated work platform bucket. They offer a greater reach and allow the operator to work towards the middle of the crown area, thinning damaged or diseased growth.



# 3

## PLAN THE JOB



You need to think about the reason why you are cutting the wood. You might be:

- Gathering firewood
- Getting wood for building
- Clearing fallen timber from a road or track

### 3.1 CHOOSE YOUR SAW

You need to use a saw that is the right size for the wood you are cutting.

If the saw model and chain size are too small for the job, this could:

- Cause excessive wear on the saw and chain
- Increase the time required to do the job
- Cause more fatigue and muscle strain for the saw operator
- Increase risk of injury as a result of fatigue

### 3.2 CHOOSE A VEHICLE

If you need to transport the wood, you also need to think about the kind of vehicle you will use.

Think about how much you will need to transport away from the site, either as firewood, building timber or rubbish.

If you are cutting firewood, you probably need a ute and/or a small trailer.

If you are taking longer lengths for building, you might need a flatbed truck or large tandem-axle trailer.

You might need a tip truck and a skid steer loader if you are clearing a lot of fallen trees from a roadway.

#### NOTE

*Check with your supervisor for the maximum weight your vehicle can carry.*

*Some kinds of wood are much heavier than others for the same volume.*



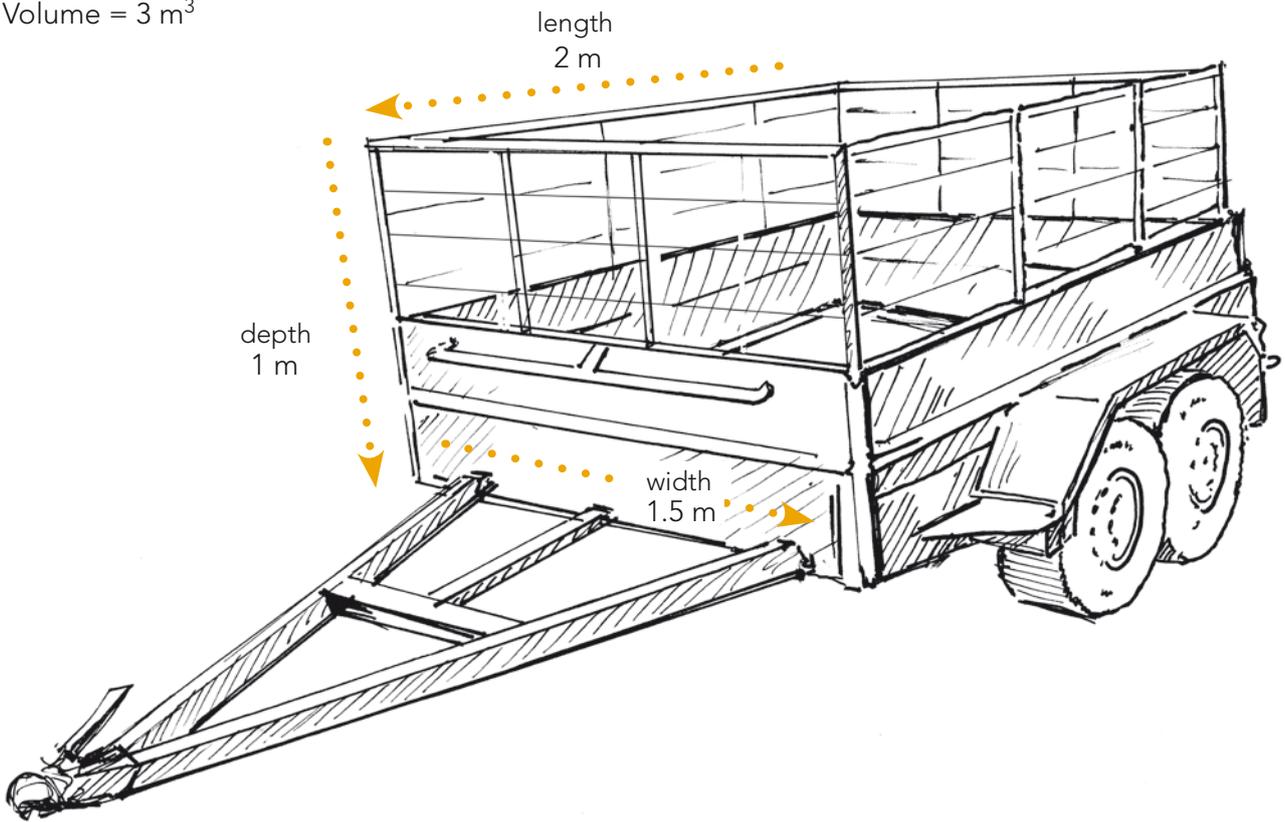
It might be useful to know how much your vehicle or trailer can carry. This is calculated as the volume of your vehicle. The volume of a trailer is how much space there is. For a vehicle, volume is calculated in metres cubed (m<sup>3</sup>).

Volume = length x depth x width

In the diagram this would be:

Volume = 2 m x 1 m x 1.5 m

Volume = 3 m<sup>3</sup>

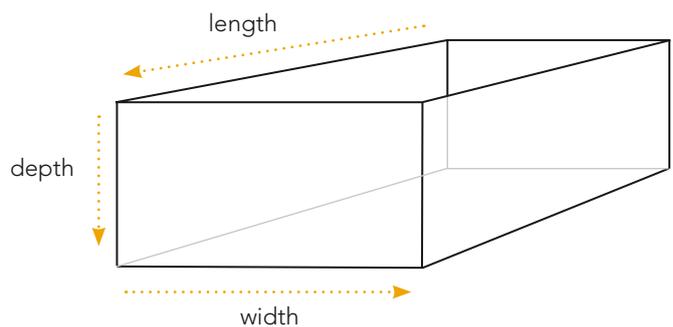


### WORKBOOK ACTIVITY

Calculate the volume of the vehicle and/or trailer you are using to move the wood.

length..... m X depth..... m X width..... m

Volume = .....m<sup>3</sup>



### 3.3 QUALITY & QUANTITY

Quality and quantity are important if you are using the timber for building.

#### QUALITY

Quality is about how suitable the wood is for the job you are planning. When building, it is best to have timber that is free from decay and pests, and hasn't been burned.

You probably also want to look for timber that:

- Termites do not infest
- Is the right diameter and length
- Has a consistent diameter along the length
- Is straight
- Doesn't rot quickly

If you are milling the logs into boards, then you would select trees with the least amount of knots and large branches, as this will provide you with better quality wood. Knots in sawn timber are often referred to as a defect. In boards, the structural strength is reduced by knots, as they are the weak spots where the timber can twist, crack or break.

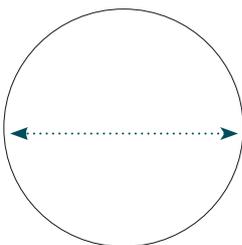
If the wood is to be a feature, you might also think about how the wood looks: its grain and colour.

#### QUANTITY

Quantity is about how much of the timber you need. You need to have details of the building plan, so you know how many lengths to collect and how long they need to be.

#### NOTE

*Diameter is the measure across a circle*





# 4

## GET READY

Before you begin, you need to make sure you have the equipment you need and check that the saw is safe to use.

### 4.1 JOB SAFETY ANALYSIS (JSA)

Before you begin any task you should always get together with your work team to look at the hazards and risks and the controls needed to make the job as safe as possible.

The easiest way to do this is by completing a JSA.



#### PRACTICAL ACTIVITY

With your supervisor and work team, complete a JSA for the job you are planning to do. Use your workplace form, or you can use the one from the Resources section.



See Job Safety Analysis Resource R2, page 38

TASK	HAZARD	RISK	CONTROLS	REVISED RISK
Pre-Start & Maintenance & Fueling	S.T,F's, Cuts, Drop injuries, Spills, splks in eyes, on skin Burns, spills on clothing, fumes, wrong fuel/oil,	H	PPE -gloves, glasses, LS shirt/pant, steel capr, hard hat? Clean safe work env. Fit for work. chaps Well ventilated work space. bunding, No naked flames Machine cool, labels, safe lifting techniques Funnels, Relevant fuel container, use right tools	L
Chainsaw use	Cut people, tree hitting people, saw damage, Wildlife, Heat,dehydration, Fatigue, sunstroke, other people, ants, termites, Fire, snakes, S,T,F's Noise, Weather- Rain storms lightning, Wind, Permits,	H	Training, Well maintained equipment, PPE, check work area - wildlife, Barricades /Signage, Spotter, Take 5- communication, Fit for work, Water Rets, Relevant First Aid Kit-know how to use it, Weather reports, Fire extinguisher, Comms, Awareness, manual handling techniques.	L-M

## 4.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is needed when working with chainsaws. Not all of the following items are needed while you do maintenance. It is recommended industry practice to use all of it while using a chainsaw.

PPE USED WITH CHAINSAWS			
Long-sleeved cotton shirt and trousers		Chainsaw chaps	
Steel-capped boots with good ankle support and non-slip soles		Combination helmet with visor and earmuffs	
Well-fitting gloves		Clear or tinted safety glasses	



## PROTECT YOUR HEARING

A chainsaw runs at very high revs, so it is loud. Noise is measured in decibels. The measurement that reflects what the human ear actually hears is called 'attenuated decibels'. We use the abbreviation dB(A) or dBA.

Silence is 0 dBA, and a chainsaw is often about 100 dBA. You can usually find out exactly how loud a chainsaw is by looking at the symbols on it.

The lowest number will be what is heard by someone standing 7.5 m away from the saw (a bystander). The higher number will be for what the operator hears.



### WORKBOOK ACTIVITY

Look at the symbols on the chainsaw you will be using and record the information.

Bystander ..... dBA

Operator ..... dBA

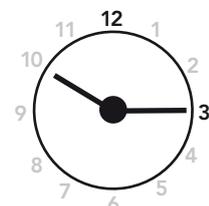
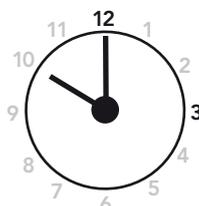
### REMEMBER



*This is the international symbol for the mandatory use of ear protection.*

Hearing is damaged after 8 hours of hearing a noise that is 85 dBA.

Hearing is damaged after 15 minutes of hearing a noise that is 100 dBA if no hearing protection is used. Hearing protection should always be worn by a chainsaw operator.





## WORKBOOK ACTIVITY

Will bystanders who are working six metres away need to wear hearing protection with the chainsaw task you are doing?

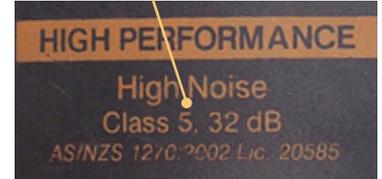
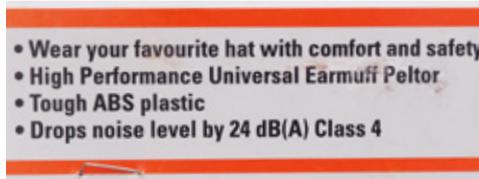
YES                      NO

Will you need to wear hearing protection?

YES                      NO

Your earmuffs should also have a dBA reading on them or their packaging, to show how much noise they will cut out.

If you wear earmuffs that provide 24 dBA, this means you can subtract 24 from the total noise level of the equipment you are using.



## WORKBOOK ACTIVITY

Protection your earmuffs provide .....dBA

Subtract this number from the operator number on the saw.

*Attenuated noise level* .....dBA

If the final number is 85 or less, your hearing will be protected for up to 8 hours.

Are the earmuffs you are using good enough to protect your hearing?

YES                      NO

If they are not, what should you do?

.....  
.....

**Handy Tip**



+



## 4.3 TOOLS & EQUIPMENT

Following is a list of tools and equipment you might need while using a chainsaw. Whether you need these will depend on the task and where you are doing the job.

Signage and barriers		Axe	
Wedges		Sharpening tools	
Spanners to tension chain and for other minor maintenance		Fuel	
First aid kit with materials relevant to chainsaw injuries		Oils	
Water		Communications equipment	



### DISCUSSION ACTIVITY

With your work team, discuss which tools and equipment from this list above you will need to do the job.



If you are working remotely, there might be other things you will need to organise. List these here:

.....

.....

.....



## 4.4 PRE-START CHECKS & MAINTENANCE

You need to do all of the following service tasks and pre-start checks before you start the chainsaw and every time you use it. This will minimise the risk of injury to you. Doing these checks properly is part of your duty of care.

If any of the parts or features are not okay, and you can't fix them, you need to apply an out-of-service tag. Follow your workplace procedures to notify your supervisor or work team members.



### PRACTICAL ACTIVITY

As you read the next six pages, follow the instructions using the chainsaw you use in your workplace. This will help you remember all the steps you need to take. These are summarised in the Standard Operating Procedures (SOP) in the *Resources* section. You can complete the Pre-Start Checklist from the *Resources* section as you carry out each task.



See *Pre-start checklist and maintenance log*  
Resource R3, page 39

## 1. CLEAN & CHECK

### CHECK STARTER HANDLE & CORD

With the ignition in the OFF position, pull out the cord and check for any wear. If it is damaged or does not retract properly, apply an out-of-service tag and report to your supervisor.



### CLEAN THE ENGINE, BODY & AIR INTAKES

Remove covers as required. Use a rag or air compressor to clean the sawdust, oil and dirt from the covers and the chainsaw. As you are cleaning, make sure to clear all air intake grilles. This is important to make sure fresh air can get into the saw.

### CLEAN THE AIR FILTER & CHECK FOR FUEL LEAKS

Remove and clean the air filter by tapping the dust off, rinsing in soapy water or blowing it out with an air compressor. Once you have removed the air filter it is a good idea to check the fuel lines and small throttle linkages, as you will now be able to see them easily.



### REMOVE & CLEAN THE GUIDE BAR

Remove the side cover. Clean the cover and the area it protects and check for damage. Next remove the chain and guide bar. Check the bar for wear and cracks. Clean out the rail grooves from the sprocket down to the back and clean oil holes, using a depth gauge tool. File off any burrs. It is good to reverse the guide bar regularly. This will even out the wear so the guide bar should last longer.



### CHECK THE CHAIN

The chain should be replaced when the cutters are less than 6 mm or if there is any obvious damage such as bent or missing teeth, damaged chain or drive links.

### CHECK THE SPROCKET FOR WEAR

The sprocket drives the chain. While you have the side cover off, you need to make sure the sprocket is not damaged or showing excessive wear. If it is worn, then you should replace it. There are two kinds of sprocket:

- Spur drive or fixed sprocket, which is shaped like a star
- Rim drive or floating sprocket, which is a circle



## CHECK THE SAFETY FEATURES

Following is a list of seven safety features you should know about and check before using your saw.

### 1. CHAIN BRAKE

The chain brake stops the chain rotation if kickback happens. It might be internal, as in the photo, or it might be external within the side cover on some models.

The brake is activated by the front hand guard being moved by the operator's hand, which makes the brake band snap around the clutch cover.

Modern chainsaws also have an inertia chain brake (ICB). 'Inertia' means it won't activate unless there is sudden change to the way the saw is operating. This is the same way a seatbelt locks when you pull it suddenly. This is needed if the saw is being used on its side, as the operator's hand can't come into contact with the front hand guard. The picture on page 31 shows someone operating a saw on its side.



*During your pre-start check, clean around the chain brake band. Make sure it works by pushing the front hand guard forward and check that the band snaps around the clutch cover.*

Chain brake band    Clutch cover



### 2. ANTI-VIBRATION SYSTEM

Chainsaws have either springs or rubber mounts to reduce vibrations and avoid injury to the operator. There are usually about two or three springs or rubbers.



*Inspect all springs or rubber mountings.*

Rubber mounting



### NOTE

*We'll talk more about kickback in Section 5.6.*



Front hand guard

### 3. CHAIN CATCHER

The chain catcher is a metal or plastic piece that catches a broken or derailed chain. The chain catcher can look different on different chainsaws but will always be below the chain towards the front of the saw body.



*Check the chain catcher:*

- Is present
- Doesn't have any cracks or breakages
- Is securely attached to the saw body

Chain catcher



Throttle trigger Throttle lockout



### 4. THROTTLE TRIGGER & THROTTLE LOCKOUT

Both the throttle trigger and the throttle lockout must be held to start the chain rotating.

The throttle lockout is a safety feature that stops the saw from being accidentally run by pressing only the throttle trigger. It requires the operator to have their hand firmly around the rear handle.



*Check that you can't push the throttle trigger in without your hand holding the throttle lockout down.*

### 5. FRONT & REAR HANDLES & GUARDS

These protect your hands from being injured by the wood you are cutting.



*Check the front and rear hand guards are present and not cracked or badly damaged.*



## 6. ON/OFF SWITCH

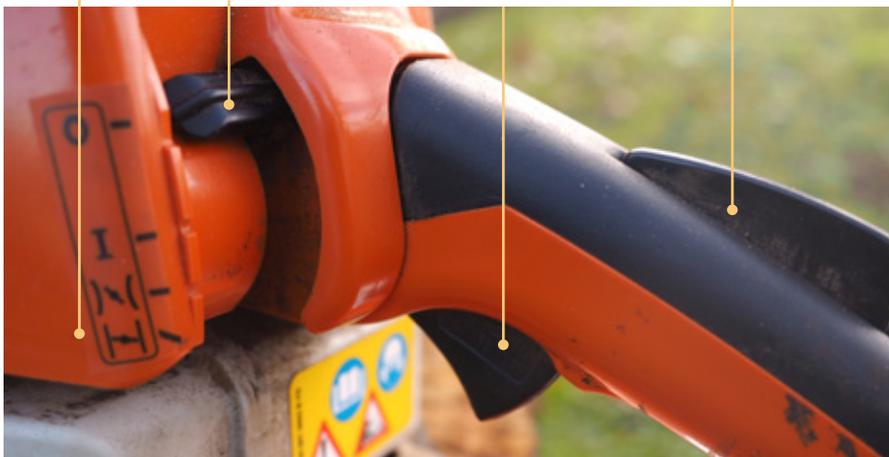
The on/off switch should be used with your right thumb. It allows you to quickly turn off the saw.



*Check this switch is clearly labelled and that it clicks into position correctly.*

It can only be moved into the choke position when the throttle trigger and throttle lockout are held.

Choke position    On/Off switch    Throttle trigger    Throttle lockout



## 7. MUFFLER & SPARK ARRESTOR

The muffler reduces noise and sends the exhaust away from the operator.

The spark arrestor is a screen that covers the exhaust outlet and stops any sparks from leaving the engine. Sparks can start a fire if they come into contact with dry grass, leaves or clothing.

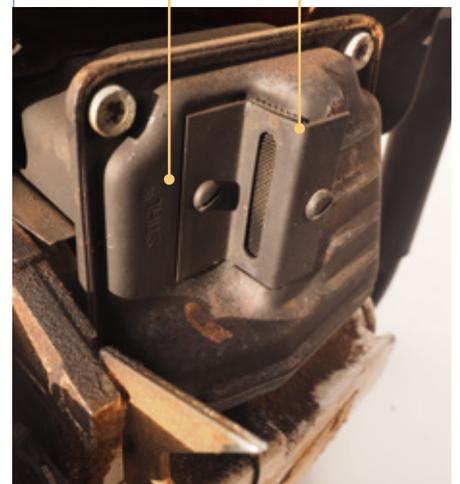


*Check the muffler is firmly attached to the saw body.*

*Check the spark arrestor is firmly attached to the muffler.*

Make sure the muffler and spark arrestor are not badly rusted and that they don't have any holes.

Muffler    Spark arrestor



## REPLACE COVERS & CHECK NUTS & SCREWS

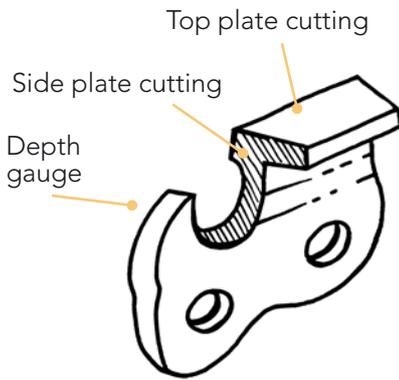
The constant vibration of the motor can cause bolts and screws to come loose. Check all bolts and screws on the saw body before use. When you put the side cover back on, make sure that the side cover nuts are secure.

Nuts



## 2. MAINTAIN THE CHAIN

There are two main shapes of cutting teeth on saw chains. These shapes are called cutter profiles.



**Super-chisel or square profile**  
Cuts slightly faster  
Gets blunt more easily  
Good for green timber

**Semi-chisel or semi-square profile**  
Stays sharper longer  
Good for knotty wood and dry timber

### NOTE

*If you fit a new chain, you need to run it in gradually. Only use it for light cutting at the start. You will need to make sure it is well lubricated and that the tension is checked regularly.*

### TENSION THE CHAIN

When the chain tension is right, the chain sits closely in the chain bar rail. If it is too loose, you will see it sagging under the bar. If it is too tight, you won't be able to pull the chain around the bar, or it will be very difficult.

It is important to have the tension right to reduce the chance of kickback and reduce wear on the chain and guide bar. Your supervisor will demonstrate how to correctly tension a chain and check that it is okay.

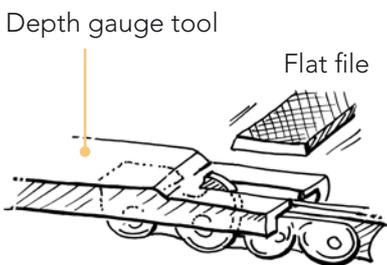
### SHARPEN THE CHAIN

Use a round file and file guide to sharpen the top and side plate cutting edges of each cutter on either of these chains. The size of the file you use will depend on the size of the chain on the saw. Your trainer will help you find the right file for the chain you are using.

### SET THE DEPTH GAUGES

When the saw is running, the bite taken by the cutting edge is controlled by the difference in height between the top plate cutting edge and the depth gauge. If the bite is too big, the teeth will dig in and the chain won't run freely. If the bite is too small, the saw won't cut effectively.

Each time the cutting edge is sharpened, the top plate is lowered a little bit. Using a depth gauge tool, the tip of the depth gauge needs to be filed off with a flat file. A depth gauge tool will make sure the difference in height is the correct amount.



Depth gauge tool

### 3. FUEL & OIL

#### TOP UP THE FUEL

Chainsaws are two-stroke engines, so they take a mix of fuel and oil. You will need to read the manufacturer's instructions to check the right mix. Most chainsaws will use a mix of 50:1. It is a good idea to check that there are no leaks and that the fuel cap is fitted correctly.



#### FUEL/OIL RATIO TABLE

Fuel/Oil Ratio	ml oil per 1 L of fuel	ml oil per 5 L of fuel	ml oil per 10 L of fuel	ml oil per 20 L of fuel
25:1	40	200	400	800
50:1	20	100	200	400
100:1	10	50	100	200



#### WORKBOOK ACTIVITY

If you want to mix a 5 litre container of fuel with oil, how much oil will you need?

#### TOP UP BAR & CHAIN OIL

Bar and chain oil lubricates the guide bar and chain. This is a special oil also known as "bar and cutter lube". This kind of lubricant sticks to the bar and doesn't spin off easily as the chain turns. It is best to top this up every time you fill the fuel tank. Check that there are no oil leaks and that the cap screws on correctly.

#### THINK OF THE ENVIRONMENT

Fuel and oil are toxic to the environment. Make sure to clean up spills using sand. Take soiled sand, empty containers, damaged parts and oily rags to a waste management site. Do not dispose of these in the bush, as they could harm native plants and animals or pollute waterways.

### 4.5 SERVICING

It is important to have your chainsaw serviced every 12 months, even though you will maintain the chainsaw every time you use it.

A trained small-engine mechanic can check the overall operation of the saw. This will keep your chainsaw in top condition for many years.



Remember always to respect the environment you are working in. Take care not to damage other plants around your worksite. Wherever possible, preserve nesting areas and relocate hollows or nests if practical. Any area where you are working might be habitat for other living things. Avoid making unnecessary vehicle tracks in fragile areas, as these could lead to soil erosion.

## 5.1 MAINTENANCE DURING USE

There are a few things you might need to do during your work.

### REFUEL & BAR OIL

You need to take extra fuel and oil with you so you can refuel as you need to.

It's a good habit to top up the bar oil every time you refuel.

### MAINTAIN THE CHAIN

You will also need to sharpen your chain, check depth gauges, and tension the chain if the saw chain is:

- Not cutting well
- Producing sawdust instead of woodchips
- Starting to smoke in the cut
- Sagging under the guide bar

### QUICK CLEAN

Clear sawdust away from cooling vents, and dust out the air filter as required. Some jobs will be dustier than others, depending on the kind of wood you are cutting.



## 5.2 STARTING THE CHAINSAW

It is easiest to learn this procedure by being shown how to start the particular saw you are using by a trained operator. The following steps might help you remember the procedure.

### COLD START

1. Place the saw on firm ground in an area free of rocks and debris.
2. Make sure the chain brake is on.
3. If your saw has a decompression button, push it in.
4. Put the choke on full and switch the throttle to the 'run' or 'start' position. On some models this will happen together. If your model doesn't have this feature, you will need to do both manually.
5. Put your right foot in the rear hand guard.
6. Place your left hand on the front handle.
7. Grip the starter handle firmly in your right hand and pull quickly until the engine fires once.
8. Decrease the choke to the 'half choke' position.
9. Continue pulling the starter until the saw starts, and immediately click the throttle so that the engine returns to the idle position.
10. Pick up the saw and release the chain brake. Depress the throttle to rotate the chain.

### WARM START

Follow the same steps, but you won't need to use the choke.

## 5.3 CARRYING THE CHAINSAW SAFELY

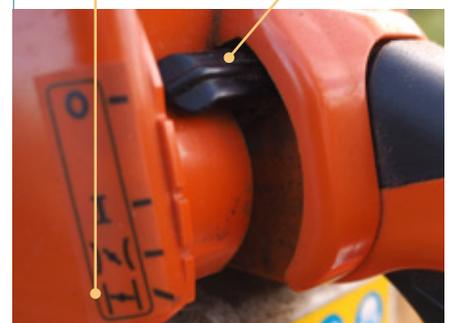
When moving a metre or so around the worksite between cuts, you can leave the engine running and the chain brake off. If you are clearing debris and moving around quite a bit, then it is best to apply the chain brake and place the saw on clear, firm ground.

If you need to walk further to another area, then apply the chain brake and carry the saw with your left hand and the bar pointing backwards. If you trip or fall you won't fall onto the chain. Even though the chain is not moving, it can still injure you.

If you need to take the saw further away or you need to move around rough ground, then you should apply the chain brake, switch off the saw and carry it with bar pointing backwards. The main aim is always to protect both the operator and any other workers in the immediate area.



Choke position On/Off switch



### IMPORTANT

*Never drop start a chainsaw  
This is extremely dangerous,  
as the saw can swing down  
and injure your legs.*



## 5.4 HOLDING THE CHAINSAW SAFELY

It is important to have your feet firmly on the ground while using a chainsaw. Clear the area so you don't risk tripping on rocks, branches or cut wood.

A chainsaw is always held slightly to the right of the body, with your left hand firmly on the front handle and your right hand firmly on the rear handle. Also wrap your thumbs around the handles. There is no such thing as a left-handed chainsaw.

Stand with the legs slightly apart, with your left leg to the front – think of the way a boxer stands. This will help to protect your right leg if the saw swings down.

Cut angle



Bumper spikes



While you need to grip the saw firmly to keep control, you also need to be relaxed overall. If you are tensed up, you are likely to strain muscles and become fatigued more quickly.

When cutting from the top, you don't need to push down; the weight of the saw will do the work. The bumper spikes should be used to pivot the saw through the cut, rather than you taking the weight with your arms.

It is much harder when cutting from the bottom upwards. This will require you to hold the weight of the saw and push upwards into the wood.

You should stop and rest if:

- Your muscles are straining
- You feel fatigued
- You feel uncomfortable and unable to control the saw

## 5.5 COMMON CUTS

With the correct method, the sawn wood should fall easily to the ground. A clean cut means you will maximise the volume of wood you can use, especially if you are using it for building.

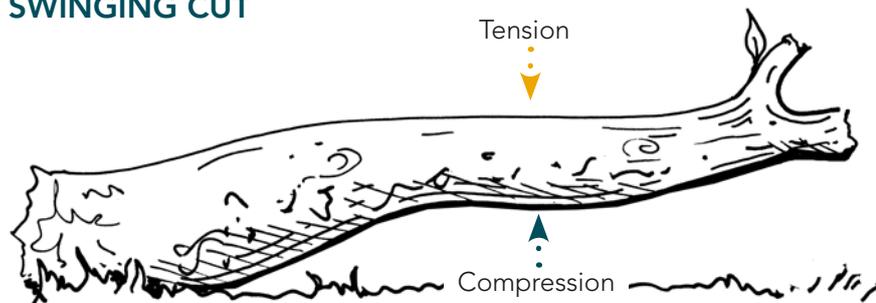
It is useful to notice how the wood is positioned when it:

- Is heavy or twisted
- Is jammed against other trees or branches
- Has thick bark
- Is very fibrous

Thinking about compression and tension can help you to make a good clean cut without jamming the saw in the wood.

- Compression is like squeezing
- Tension is like stretching

### SWINGING CUT



If the wood is positioned like this and you try to saw all the way through from the bottom, the bar will get jammed. This is the compression side.

If you try to saw all the way through from the top, the cut wood might not fall cleanly. This is the tension side.

The best way to do a swinging cut is to make a short undercut from the bottom about a quarter of the way through. Then cut down through the log from the top.

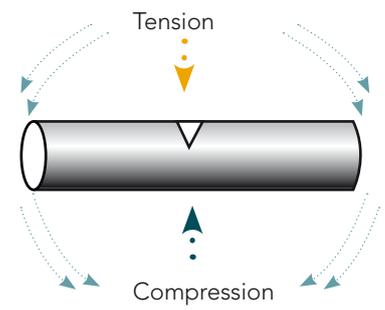
Make the undercut first



Then cut from the top

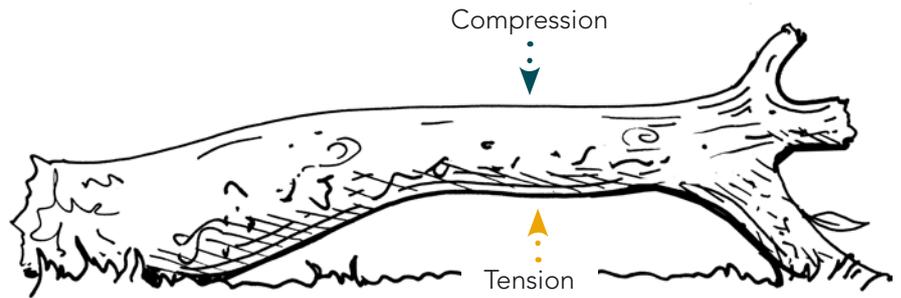


### NOTE



*As a rule, make a short cut on the compression side and then cut the rest of the way through from the tension side. Look at the position of the wood to work out which is which.*

## BRIDGING CUT



If the wood is positioned like this and you try to saw all the way through from the top, the bar will get jammed. This is the compression side.

If you try to saw all the way through from the bottom, the cut wood might not fall cleanly. This is the tension side.

The best way to do a bridging cut is to make a short cut on the top side about a quarter of the way through. Then cut up through the log from the bottom. The wood will fall to the ground as you bring the chain up through it.

## ON THE GROUND

If the wood is lying flat on the ground, you still need to think about compression and tension. You can use a plastic wedge to stop the guide bar from getting jammed. You could also cut halfway through the wood and then roll the log over to cut the other side.

On sloping ground, always stand on the uphill side of a log when cutting, as it can roll onto the operator once cut through.

Avoid hitting the ground with your chain, as this causes it to go blunt very quickly and can spray dirt and debris onto the operator or others. It can also damage the chain and drive links. Wood that is muddy, very dirty, rotting or scorched can affect your chain and how the saw reacts.

Using a wedge



## 5.6 CHAINSAW REACTION

Chainsaw reactions describe the way the saw can move in different situations. Being aware of these will make you a safer operator.

### PULL-IN

This reaction occurs when cutting wood from the top downwards, using the chain on the bottom section of the guide bar. The rotating chain drags the saw towards the wood and away from the operator.

Position the saw body close to the wood to help prevent this reaction from causing you to lose control.



### PUSH-BACK

This reaction occurs when cutting wood from the bottom upwards, using the chain on the top section of the guide bar. The chain pushes the saw away from the wood and towards the operator.

Use the strength of your body and legs to keep control when you experience this reaction. Keeping your chain sharp and letting the saw do the work will also help reduce the amount of push-back that occurs.



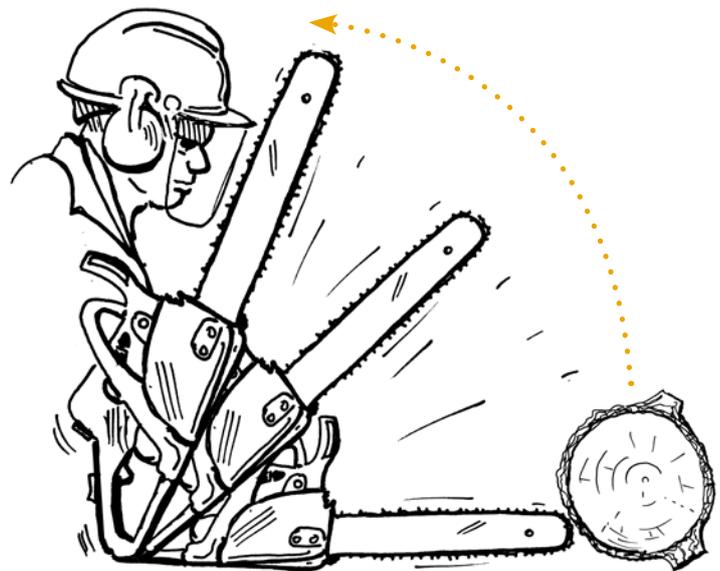
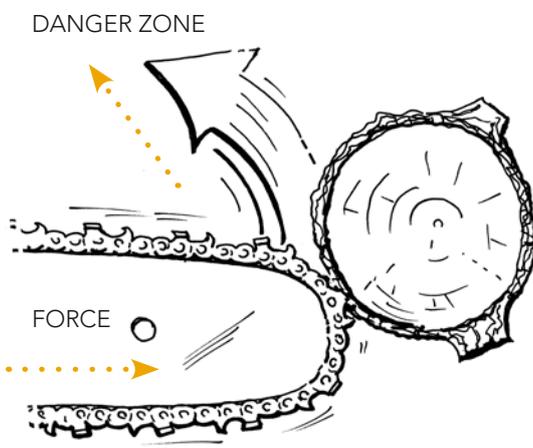


## KICKBACK

Kickback reaction occurs when the top teeth of the tip of the guide bar come into contact with a solid object. This causes the bar and saw to be violently forced up and back towards the operator. Kickback can cause serious injury in less than one second.

To reduce the risk of kickback:

- Do not attempt to saw with the tip of the guide bar
- Clear debris away from the area around the nose of the guide bar and avoid hitting branches and wood when cutting
- Carry out pre-start checks on the saw's safety feature, in particular the chain brake
- Keep your chain sharp and correctly tensioned and maintain correctly filed depth gauge settings
- Always cut at full throttle
- Be aware of compression and tension with the wood you are cutting to avoid pinching the tip of the guide bar when the wood moves



### PRACTICAL ACTIVITY

With your trainer observing and guiding you, practice the starting procedure and sawing techniques described in this section.



# 6

## FINISH THE JOB & CLEAN UP



Finishing off the job correctly is as important as doing it. A good clean-up makes it easier to get going next time, makes the area safe and assists in looking after the environment.

### 6.1 TIDY THE WORKSITE

Before you leave the worksite, there are a few things you need to do.

- Pick up all rubbish and take it back to base with you
- Shovel up fuel or oil spills into a bag or bucket and dispose of them at a waste management facility or other suitable place
- Pick up all tools and equipment and load them into your vehicle
- If the area will be accessed by members of the public, make sure there are no trip hazards, pointy branches or splintered wood that could cause an injury
- Load any wood you need to move, making sure it is safely secured to your vehicle with straps or ropes

### 6.2 CLEAN & STORE CHAINSAW & PPE

When you return to base, you need to maintain and store the chainsaw and any other tools and equipment you used. In some workplaces, the same maintenance procedure is followed as for the pre-start checks.

This reduces:

- The risk of future injury caused by the equipment having been damaged
- The chance of the chainsaw or tools being misplaced or lost
- The time taken to be ready in the case of an emergency during a storm, when trees may have fallen across a road or onto a house

### MAINTENANCE TASKS

- Carry out all pre-start checks
- Apply an out-of-service tag if there are any faults
- Report any faults or damage to your supervisor

Chainsaws are best stored sitting flat and off the ground in a clean, dry area. You can buy a case that helps to protect the saws when being stored or transported. They should never be kept in an area where people smoke, there are sparks (grinding or welding) or fires are lit. A 'flammable liquid' hazard sign should be attached to the door.

You also need to clean and store your PPE so it is ready to use next time you need it. It is useful to store PPE in a plastic tub to keep it dry and free from dirt and damage. Follow the manufacturer's instructions if your chaps require cleaning.



## 6.3 REPORTING

Workplace reporting varies from place to place. You should always let your supervisor know what you did and what else needs to be done. You might do this in conversation or by writing it down.

You will need to report if the chainsaw has any:

- Damage
- Problems when trying to start or during use
- Maintenance or servicing that needs to be done

Some workplaces use a job sheet to record these details.



### DISCUSSION ACTIVITY

Discuss your workplace reporting requirements with your supervisor.

If you don't have any specific documentation to complete, read through the *Job Sheet* in the *Resource Section*.



See *Job Sheet Resource R4*, page 40





## PROJECT

In this project you will use all of the skills and knowledge discussed in this Learner Guide.

With your work team, carry out a job that requires you to use a chainsaw. This could be one of the following, or another job required by your trainer or supervisor.

- Clearing a fallen tree or branches from the road or a track
- Gathering firewood
- Selecting and cutting wood for a building project

Show your trainer that you can do all of the following steps while using a chainsaw.

### 1. GET READY

- Check the manufacturer's instructions
- Follow your workplace SOP (or the one in the *Resources* section)
- Help complete a JSA – your supervisor/trainer will coordinate this
- Select and use the correct PPE and equipment (fill in the Project Planning Sheet)
- Do all pre-start checks and maintenance and complete the Pre-Start Checklist in the *Resources* section

### 2. DO THE JOB

- Follow the correct procedure for a cold start
- Follow the correct procedure for a warm start
- Use the chainsaw with the correct stance and hold, avoiding any risk of kickback
- Use the correct sawing method depending on the position of the wood
- Carry out any ongoing maintenance during use, for example, fuel, oil, cleaning and sharpening
- Carry the chainsaw safely around the worksite

### 3. FINISH UP

- Clean up the worksite
- Clean and store the chainsaw and PPE
- Complete workplace reporting (use the *Job Sheet* in the *Resources* section if your workplace doesn't have a specific form)



# PROJECT PLANNING SHEET

PPE I need

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.....

Tools and equipment I need

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.....

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R1

## SAFE OPERATING PROCEDURE

### CHAINSAW USE – PETROL ENGINE

Training is required prior to chainsaw use; ongoing supervision is recommended for new operators.

#### PPE REQUIRED

- Chainsaw chaps (cut-resistant trousers with no obvious damage or tears)
- Steel-capped work boots
- Earmuffs, safety glasses (or use a combination helmet with a mesh screen and earmuffs; this is an industry standard in some situations)
- Tinted or clear safety glasses (can be worn under the mesh screen)
- Cotton workwear clothing
- Non-slip, well-fitting gloves

Always wear the correct personal PPE when starting or using a chainsaw.

#### PRE-START SAFETY CHECKS

- Check starter handle and cord
- Clean engine body and air intakes
- Clean air filter and check for fuel leaks
- Check guide bar is clean and not damaged
- Check the chain drive links, depth gauges and cutter teeth for excessive wear or damage
- Check the sprocket for wear
- Check that the safety features are in place and fully operational:
  1. Chain brake works (activated by the front hand guard)
  2. Anti-vibration rubbers or springs are in place and not damaged
  3. Chain catcher is fitted
  4. Throttle trigger and throttle lockout are fully operational
  5. Front and rear hand guards and all engine covers are in place and not damaged
  6. On/off switch is working
  7. Muffler has no holes and spark arrestor mesh is in place
- Replace covers, and check nuts and screws
- Ensure the chain has been sharpened and correctly tensioned and the depth gauges are set
- Fill up the fuel and bar oil reservoir and check for leaks. Do this in a well-ventilated area away from sparks and other running machinery.

If any of the above items are faulty, do not operate the machine. Apply an out-of-service tag and notify your supervisor.

## CHAINSAW OPERATIONS

- Ensure you are wearing your PPE
- Do not smoke while operating a chainsaw
- Start the chainsaw on the ground in an area free of rocks, dirt and debris
- Always use the chainsaw with your left hand firmly on the front handle and your right hand on the rear handle, ensuring your thumbs are wrapped around the handles. Never operate a chainsaw one-handed. Never operate a chainsaw left-handed.
- Maintain a proper balanced stance, keeping the chainsaw slightly to the right side of your body when cutting
- To prevent kickback, avoid hitting any obstructions with the tip of the guide bar with the running saw
- Use the chainsaw at peak revs when making all cuts
- Be aware of pull-in and push-back when cutting with the chainsaw
- Ensure you have considered the tension and compression situations for the wood that you are cutting. Do not allow the tip of the guide bar to be pinched in the wood
- Be aware of cut material moving, falling or rolling towards you
- Clear your work area of cut material as you go to avoid slips, trips and falls
- Do not operate the chainsaw above shoulder height
- Do not lean your head or body over the running chain when cutting
- Regularly clean accumulated sawdust and debris from the cooling vents and from under the side cover of the chainsaw
- After use, ensure you fully clean, sharpen and check the condition of the chainsaw before returning it to the store. Check with your supervisor if you are unsure about any aspect.
- Stop work if the weather conditions become unfavourable, for example, high temperature, rain, high winds, fog or smoke
- Stop work if you feel fatigued or unwell
- Drink plenty of water while working
- Do not operate a chainsaw by yourself in isolated areas
- Always carry a suitably stocked first aid kit and have a communications plan in place

## HAZARDS

- Noise
- Flying debris
- Slips, trips and falls
- Sharp chain teeth
- Manual handling
- Vibration
- Flammable fuel
- Powerful equipment

**JOB SAFETY ANALYSIS**

**JSA**

Organisation

Job

Location

Procedure developed by

Approved by

Date

Tick the box for the PPE required.



**Task**

Steps in the job

**Hazards Identified**

What could cause injury?

**Risk Score**

**Controls**

What can be done to minimise the risk of injury?

**Final Risk Score**

## PRE-START CHECKLIST & MAINTENANCE LOG

R3

Chainsaw identification

Form completed by

Date

Tick each item as it is checked and comment where necessary

**Clean & check**

Comment

<input type="checkbox"/>	Starter handle and cord OK	
<input type="checkbox"/>	Engine body and air intakes cleaned	
<input type="checkbox"/>	Air filter cleaned	
<input type="checkbox"/>	No fuel leaks	
<input type="checkbox"/>	Guide bar is clean and not damaged	
<input type="checkbox"/>	Chain OK – drive links, depth gauges and cutter teeth not worn or damaged	
<input type="checkbox"/>	Sprocket is not worn	

**Safety features**

Comment

<input type="checkbox"/>	Chain brake works (activated by the front hand guard)	
<input type="checkbox"/>	Anti-vibration rubbers or springs are in place and not damaged	
<input type="checkbox"/>	Chain catcher is fitted	
<input type="checkbox"/>	Throttle trigger and the throttle lockout fully operational	
<input type="checkbox"/>	Front and rear hand guards and all engine covers in place and not damaged	
<input type="checkbox"/>	On/off switch working	
<input type="checkbox"/>	Muffler has no holes and spark arrestor mesh is in place	
<input type="checkbox"/>	Any covers you removed are replaced and nuts and screws tightened	

**Maintain the chain**

Comment

<input type="checkbox"/>	Chain sharpened	
<input type="checkbox"/>	Chain tensioned	
<input type="checkbox"/>	Depth gauges set	

**Fuel & oils**

Comment

<input type="checkbox"/>	Fuel reservoir filled	
<input type="checkbox"/>	Bar oil reservoir filled	
<input type="checkbox"/>	No fuel or oil leaks	

**Please circle**    In service    Out of service (apply tag)

Describe further work required or any problems

.....

.....

.....

Date ..... Completed by.....

Site name.....

.....

Work team members.....

.....

.....

Work completed.....

.....

.....

Further work required.....

.....

.....

Describe any maintenance required on tools or equipment used.....

.....

.....



## GLOSSARY

*Add your own words and meanings here*


## REFERENCES

ForestWorks. (2009). *Chainsaw operator's manual: chainsaw safety, maintenance and cross-cutting techniques*. Collingwood, Victoria: LandLinks Press.







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Shenton Park  
Western Australia 6008  
T: 08 9287 8300  
E: [per.general@greeningaustralia.org.au](mailto:per.general@greeningaustralia.org.au)  
W: [www.greeningaustralia.org.au](http://www.greeningaustralia.org.au)

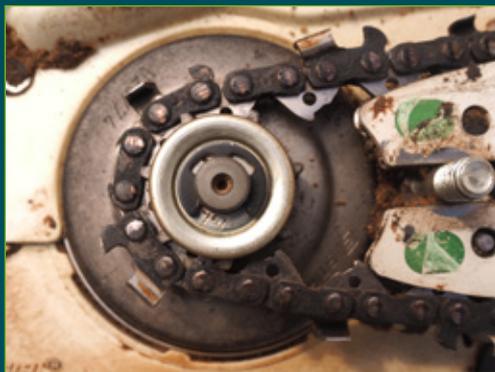
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Project Manager: Mike Clark  
Authors and instructional designers: Catherine Ralston and Volker Mischker  
Aboriginal advisor: Wayne Barbour  
Technical advisors: Volker Mischker and James Gorrie  
Artwork photography: TASWA Training Consultants unless otherwise stated  
Editing: Gretta Beveridge  
Proof: Ruth Davies (centrEditing)  
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# ALEP

**Aboriginal Landcare Education Program**



## OPERATE & MAINTAIN CHAINSAWS

This learner guide provides information about how to maintain a chainsaw and do pre-start checks. It then talks about how to safely cut up timber and finish a job.

Topics include:

- WORKPLACE HEALTH & SAFETY
- FEATURES OF CHAINSAWS
- PRE-START CHECKS
- STARTING, CARRYING & HOLDING THE CHAINSAW
- COMMON CUTS
- CHAINSAW REACTION
- FINISH THE JOB & CLEAN UP

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For further information contact Greening Australia on

T: 08 9287 8300 E: [per.general@greeningaustralia.org.au](mailto:per.general@greeningaustralia.org.au) W: [www.greeningaustralia.org.au](http://www.greeningaustralia.org.au)