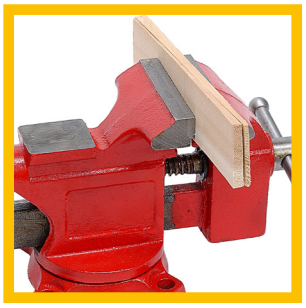
Use Furniture-Making-Sector Hand Tools and Power Tools

Learner's Guide



Government of Western Australia
Department of Training
and Workforce Development

BC2015

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Learner’s Guide

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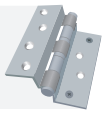

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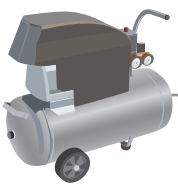
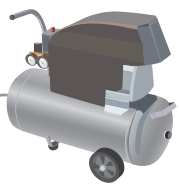




Section 1 – Introduction

In museums around the world you can still see many pieces of furniture – some of which are now valuable antiques – that are testimony to the fine skills and craftsmanship of craftspeople from bygone years. Many of these pieces date back to a time long before the discovery of electricity. In those days, hand tools were the order of the day, and people who knew what tools to use and how to use them were much sought after and well compensated for their skills.

Today, the range of power tools available and a greater understanding of cutter technology have taken some of the mystery out of shaping and working timber. Power tools not only make the job easier but, when used in conjunction with the appropriate hand tools, have improved the productivity of workers in the furniture-making industry.

Nonetheless, there is still a level of skill and knowledge to be developed if today's craftsperson/tradesperson/apprentice is to master the safe use of tools. This learner's guide covers the use of hand tools and power tools in applications related to the furniture-making, cabinet-making, machining and polishing sectors of the furnishing industry.

Practical requirements

You are required to complete various tasks successfully to demonstrate competence. These tasks are outlined within your practical workbook – *In the Workshop* (BC2014). Each one consists of a number of exercises. you are also required to complete a number of exercises within this learner's guide.

See your lecturer/trainer for further information and guidance throughout the tasks.

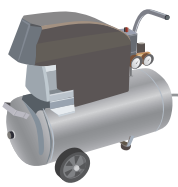
Suggested text resources

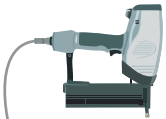
Walton, JA 1979, *Woodwork: in theory and practice*, metric edn, Australian Publishing Company, Sydney.

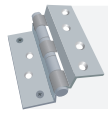
Day, David and Jackson, Albert 2005, *Collins Complete Woodworker's Manual*, HarperCollins Publishers, London, United Kingdom.

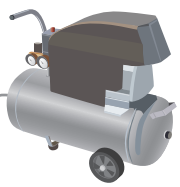
Peters, R 2000, *Air Tools: How to Choose, Use and Maintain Them*, Sterling Publishing Co, New York, USA.

Joyce, E 2003, *The Technique of Furniture Making*, 4th edn, Batsford Ltd, London, United Kingdom.









Section 2 – Hand tools

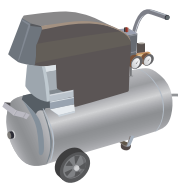
Evidence exists to show that humankind has had the ability to shape, join and manipulate timber for thousands of years. Carvings on the inner walls of pyramids – and, in one well-documented case, a large throne that once supported upholstery was found to be at least 5 000 years old – are examples that hand tools were used by our forebears.

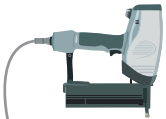
As time passed, the development of specific-purpose hand tools made crafting and manipulating timber a highly skilled trade. A sound knowledge of tools was – and still is – important, because specific tools have their specific applications, even today. It is imperative for the sake of productivity, accuracy and neatness that we use the correct tool for the task at hand.

It should also be noted that your personal safety, and the safety of those around you, are at risk when the correct tools for the task are not used. In addition, the correct maintenance of tools is important for your safety and that of others.

List as many hand tools that you can think of and discuss their specific uses.

Hand Tools	Uses





Activity 3.1

Identification of tools

The following activity requires you to identify hand tools used in various furniture-related trades and identify their specific uses and maintenance requirements.

The maintenance requirements (grinding, sharpening and honing) of plane blades, chisels and drill bits are also covered separately in the practical workbook entitled *In the Workshop* (BC2014).

After viewing a presentation or discussing hand tools with your lecturer/trainer and completing the required class exercises, complete the workbook with help from the suggested resources. Note that, as an example, some tool information has been completed to the required standard.

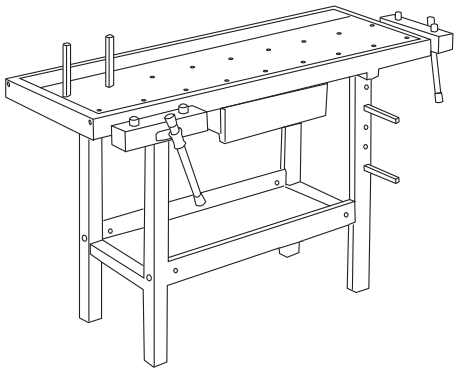


Fig 2.1

Workbench

Use

Maintenance

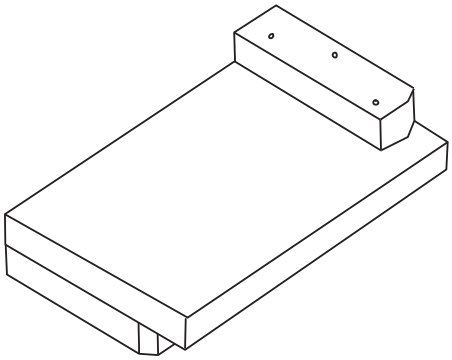


Fig 2.2

Bench hook

Use

The bench hook is a holding device used in conjunction with a bench vice to hold pieces of timber whilst they are being cut. The cutting (to length or for joining) is usually done with a tenon saw. Whilst the primary function is to help control the timber being cut, the bench hook's secondary function is to protect the bench from accidental saw damage.

Maintenance

This tool is regarded as an expendable item as its manufacture is relatively simple.

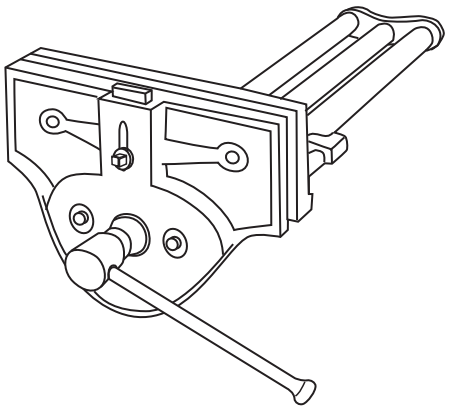


Fig 2.3

Bench vice

Use

Maintenance

Measuring and marking tools

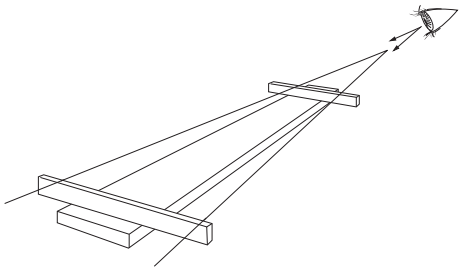


Fig 2.4

Winding sticks

Use

Maintenance

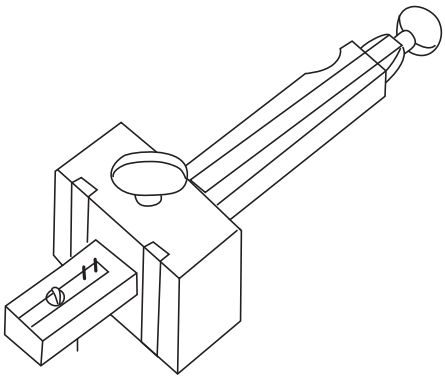


Fig 2.5

Mortise gauge

Use

Maintenance

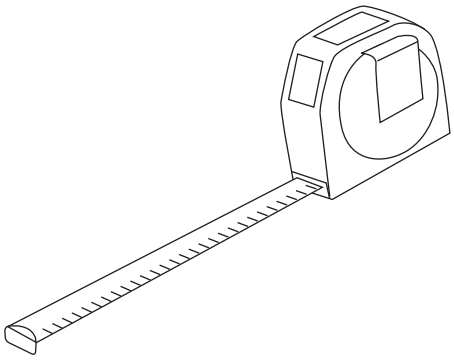


Fig 2.6

Tape measure

Use

Maintenance

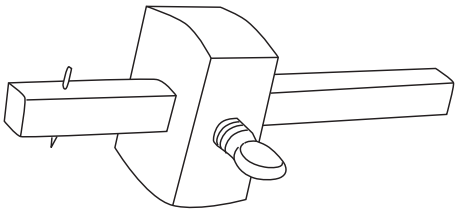


Fig 2.7

Marking gauge

Use

The marking gauge is used for marking sharp lines onto the surface of the timber, parallel to the face or edge of the timber. These lines are usually accurate locations for dowels, or they are accurate cut lines for joints such as half lap joints and rebate joints, or the depth for housing joints and dovetail joints. They are generally used because the scratch made is much more accurate than the pencil line and the marking can be repeated on many pieces of timber without having to re-measure each piece.

Maintenance

The pins on this tool must be kept sharp at all times. It is also important to prevent any damage to the stem and the stock of the gauge, and to keep it free from adhesives.

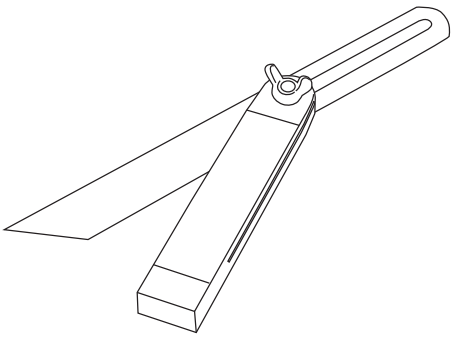


Fig 2.8

Sliding bevel

Use

Maintenance

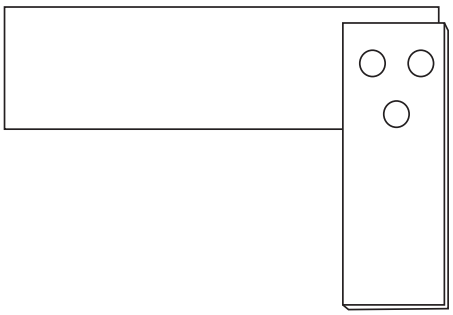


Fig 2.9

Try square

Use

Maintenance

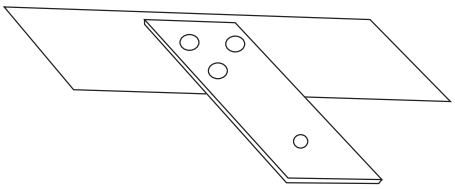


Fig 2.10

Mitre square

Use

Maintenance

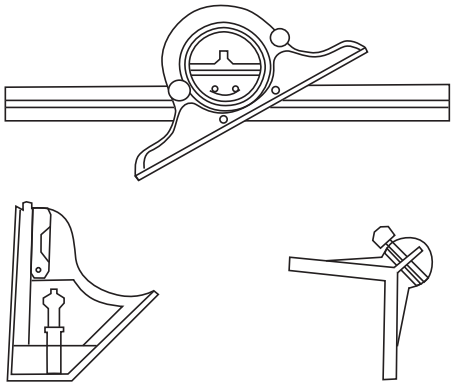


Fig 2.11

Combination square

Use

Maintenance

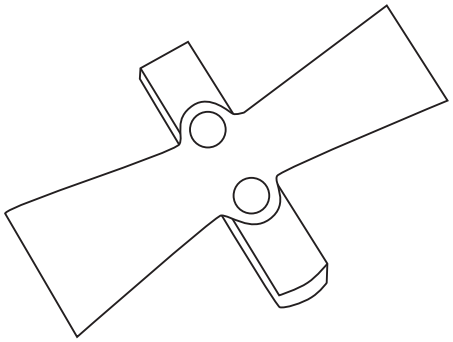


Fig 2.12

Dovetail template

Use

The dovetail template is used for the fast and accurate marking out of dovetail joints. It is available in any combination of angles consisting of 1:4, 1:6 or 1:8. The template may be constructed from brass or many other materials, such as durable hardwoods or sheet materials like plywood or thin MDF.

Maintenance

Nil

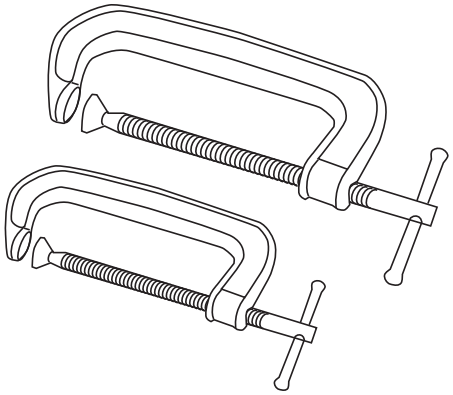


Fig 2.13

G-cramp

Use

This rigid steel cramping device may be used for holding pieces of timber in place during the gluing or repairing of furniture. It can also be used for holding timber to a bench whilst it's being chiselled or sawed.

More importantly, this is the choice of cramp for cramping fences, jigs or guards to machines, as it will not vibrate its way free if it has been properly tightened.

Maintenance

The tool's screw must be oiled annually. Do not over-tighten it. Remove any adhesive from its shoes and bar as soon as it appears.

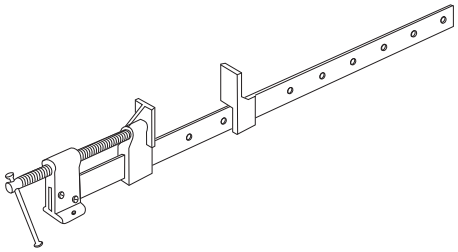


Fig 2.14

Sash cramp

Use

Maintenance

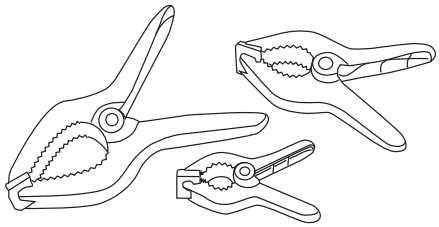


Fig 2.15

Hand/Spring toggles

Use

Maintenance

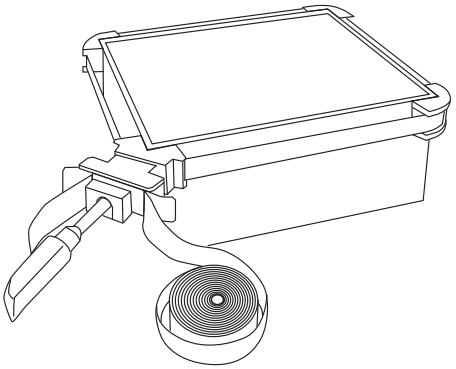


Fig 2.16

Band cramp

Use

Maintenance

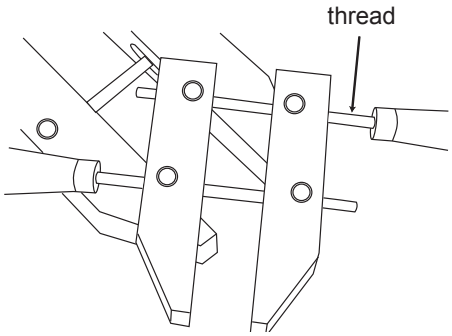


Fig 2.17

Hand screw

Use

Maintenance

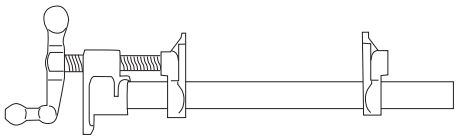


Fig 2.18

Pipe cramp

Use

Maintenance

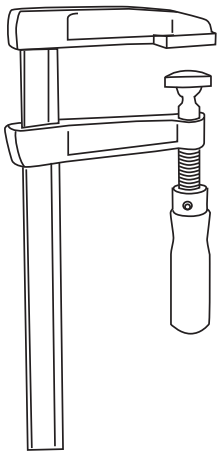


Fig 2.19

Quick action cramp

Use

Maintenance

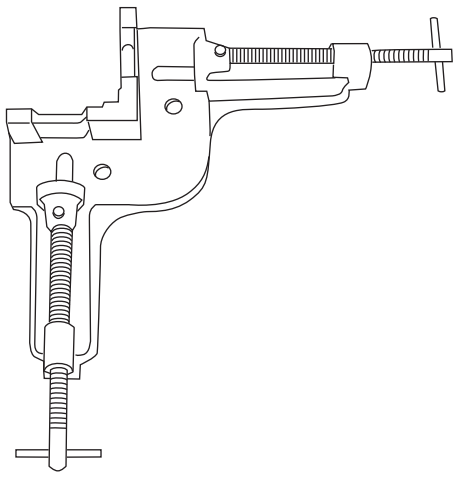


Fig 2.20

Mitre cramp

Use

The mitre cramp is used for gluing corner joints on light frames. Used mostly for mitre joints, its open design allows the joint to be nailed whilst it is held in position. This prevents slippage during the nailing process. The body mounting holes enable the cramp to be screwed to a bench to assist with further control during the process.

Maintenance

The cramp's screw threads must be kept free from adhesive and be lubricated as required. Make sure that you keep the vice faces clear of adhesives.

Section 3 – Driving tools

Part 1 – Hammers and mallets

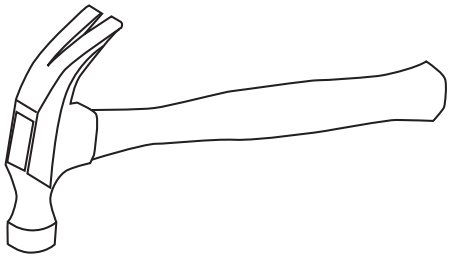


Fig 3.1

Claw hammer

Use

Maintenance

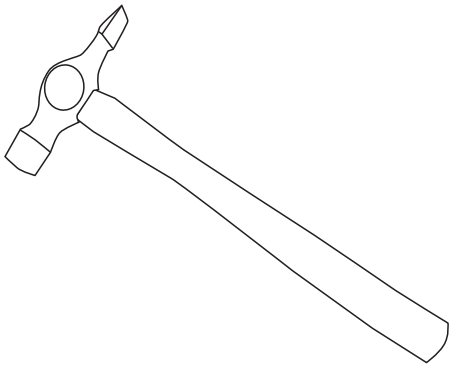


Fig 3.2

Cross pein hammer (Warrington pattern)

Use

Sometimes called a 'joiner's hammer', the cross pein hammer is used specifically for driving nails or pins. The cross pein side is used to start the nail or pin, then the hammer is reversed to use the flat head to drive the nail or pin home.

Maintenance

The face of the hammer must be cleaned regularly by rubbing it across a piece of fine abrasive paper, because any build-up of adhesive on the face will cause the hammer to glance off the nail. This usually results in the nail bending.

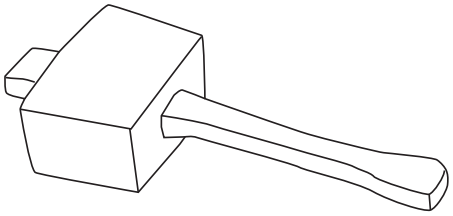


Fig 3.3

Mallet

Use

Maintenance

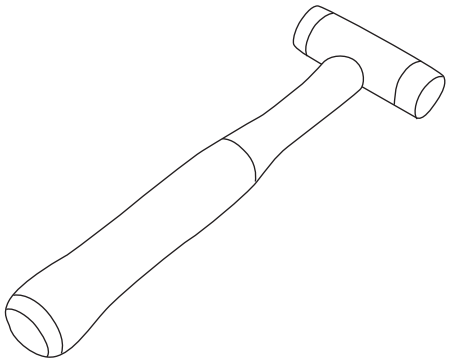


Fig 3.4

Soft face (nylon tip) mallet

Use

Maintenance

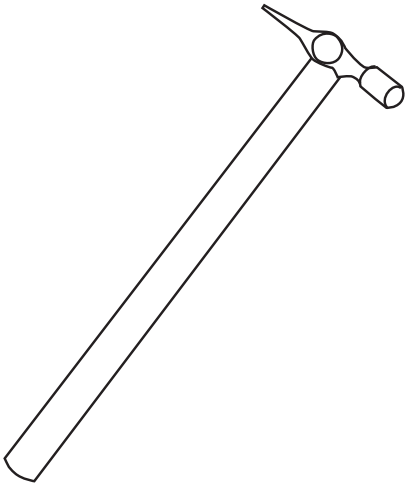


Fig 3.5

Pin hammer

Use

Maintenance

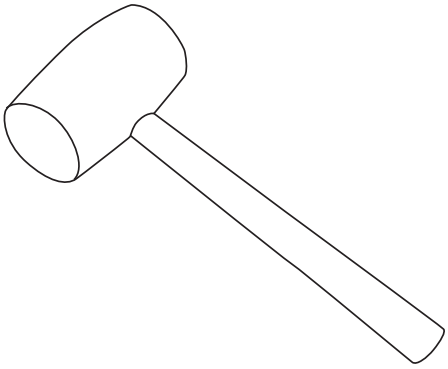
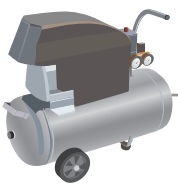


Fig 3.6

Rubber mallet

Use

Maintenance



Part 2 – Screwdrivers and punches

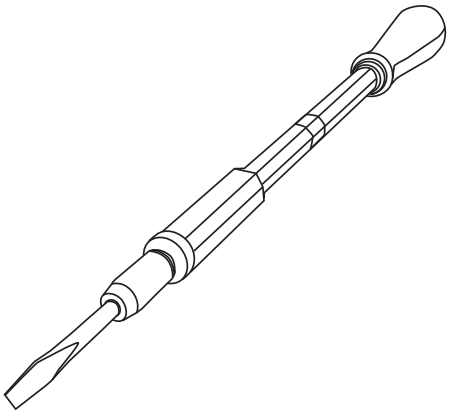


Fig 3.7

Spiral ratchet (Yankee) screwdriver

Use

Maintenance

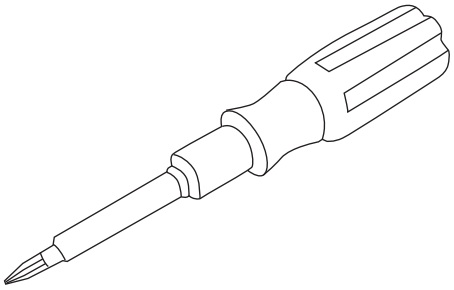


Fig 3.8

Ratchet screwdriver

Use

Maintenance

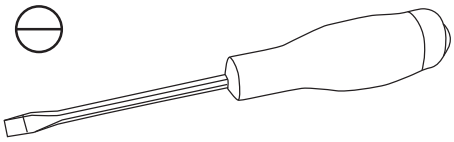


Fig 3.9

Standard slot screwdriver

Use

Maintenance

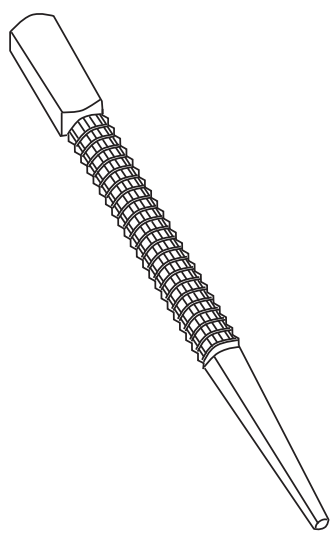


Fig 3.10

Nail punch

Use

The nail punch is used to set nails below the surface of the timber where a finish is to be applied.

Maintenance

All adhesive build-up in the tip must be cleaned. Re-shape the tip as required, in order to keep the subsequent nail hole as small as possible.

Notes

Section 4 – Cutting tools

Part 1 – Saws

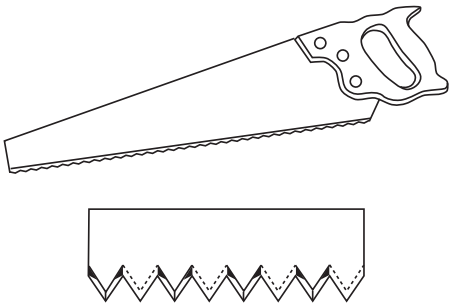


Fig 4.1

Crosscut saw

Use

Maintenance

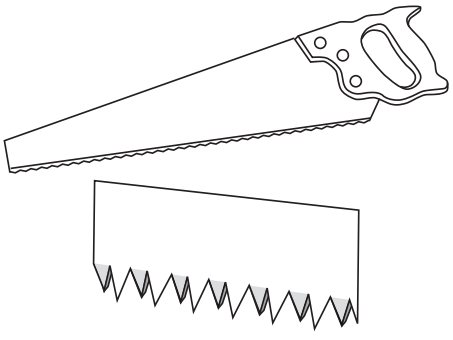


Fig 4.2

Panel saw

Use

Maintenance

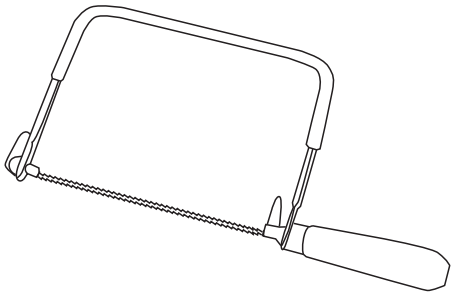


Fig 4.3

Coping saw

Use

Maintenance

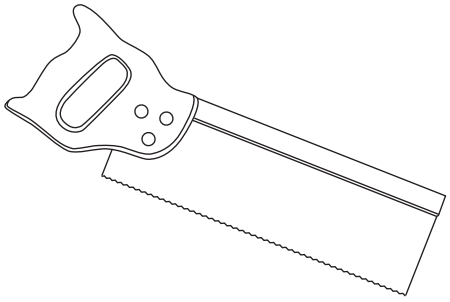


Fig 4.4

Tenon saw

Use

Maintenance

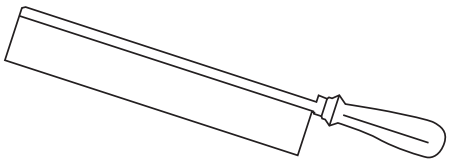


Fig 4.5

Dovetail (light back) saw

Use

Maintenance

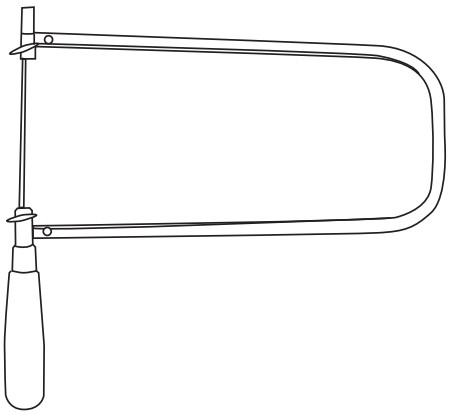


Fig 4.6

Fret saw

Use

Maintenance

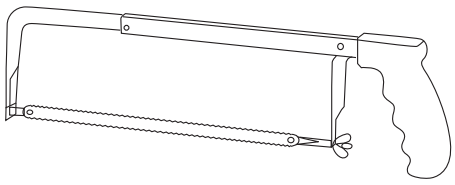


Fig 4.7

Hacksaw

Use

Maintenance

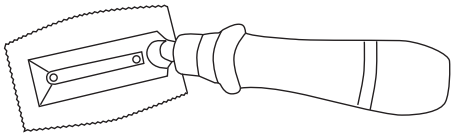


Fig 4.8

Veneer saw

Use

Maintenance

Part 2 – Planes and scrapers

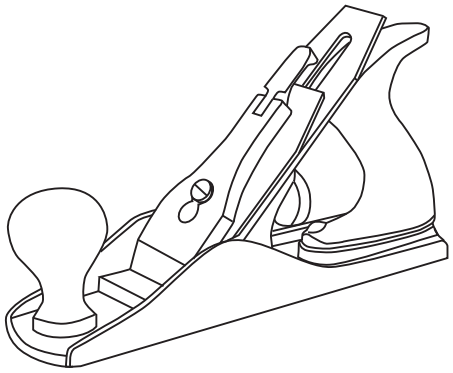


Fig 4.9

Smoothing plane (No. 4)

Use

Maintenance

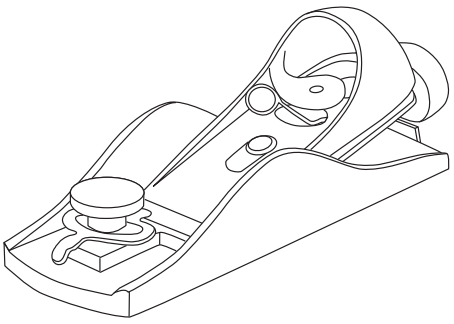


Fig 4.10

Block plane

Use

Maintenance

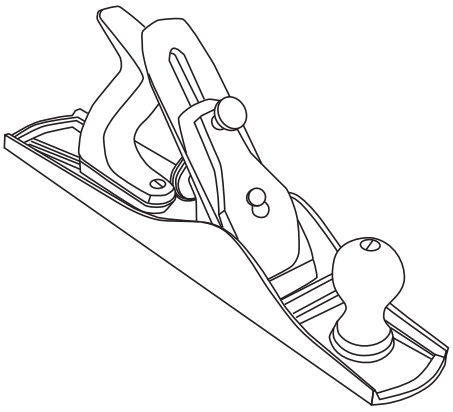


Fig 4.11

Jack plane

Use

Maintenance

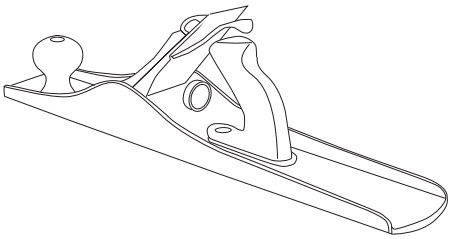


Fig 4.12

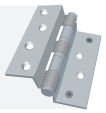
Trying plane (No. 7)

Use

The trying plane, or No. 7, is used to achieve true flat surfaces and perfectly straight edges. This is no more important than when planing the edge of boards that are to be joined to make a wide table or countertop. Widening joints need to be used where fielded panels are required for doors, and for the general widening of boards for end panels and drawer fronts.

Maintenance

The cutting edge of the tool must be kept in good condition. Make sure the trying plane is stored away from moisture, and that you use the correct tool for the job.



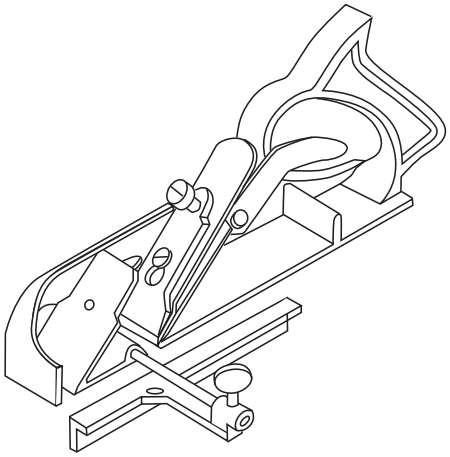


Fig 4.13

Rebate plane

Use

Maintenance

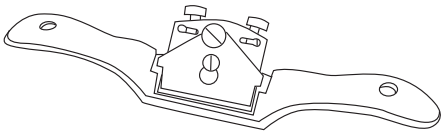
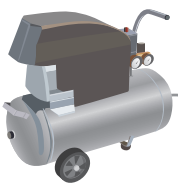


Fig 4.14

Flat face spokeshave

Use

Maintenance



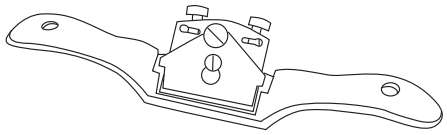


Fig 4.15

Round face spokeshave

Use

Maintenance

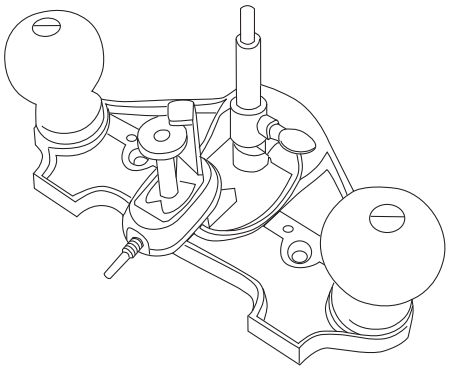


Fig 4.16

Router plane

Use

Maintenance

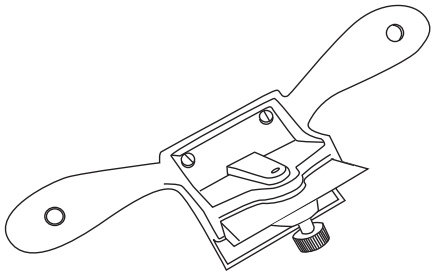


Fig 4.17

Scraper plane

Use

Maintenance

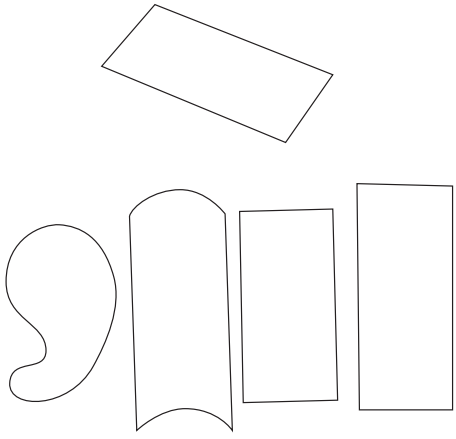


Fig 4.18

Cabinet scrapers

Use

Maintenance

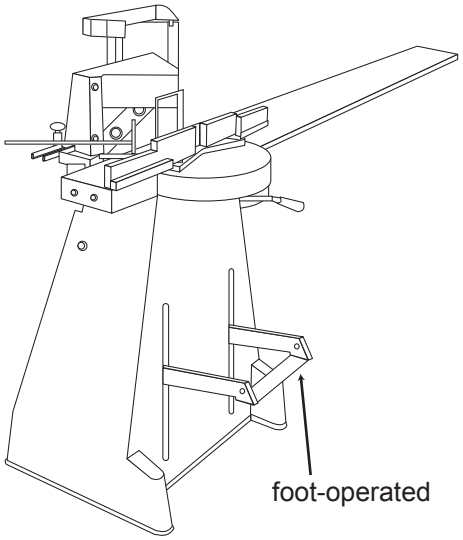


Fig 4.19

Guillotine

Use

Maintenance

Part 3 – Chisels and gouges

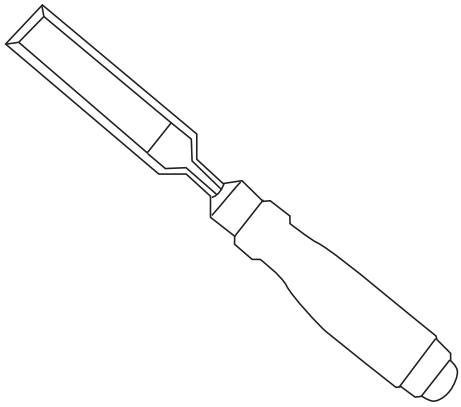


Fig 4.20

Firmer chisel

Use

Maintenance

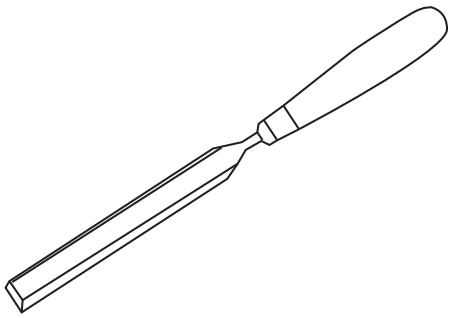


Fig 4.21

Paring chisel

Use

Maintenance

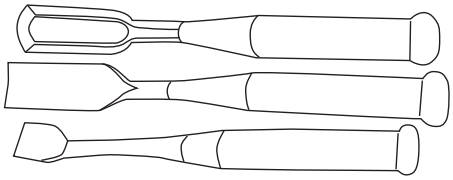


Fig 4.22

Gouges

Use

Maintenance

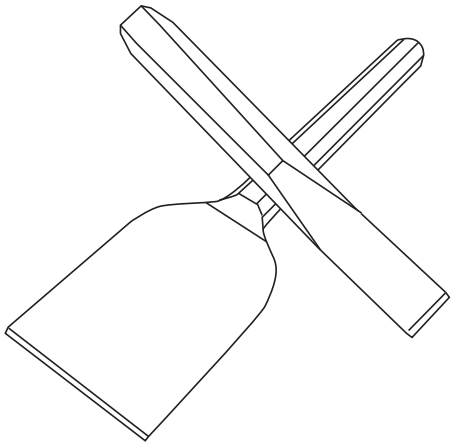


Fig 4.23

Cold chisels/bolsters

Use

Maintenance

Section 5 – Boring tools

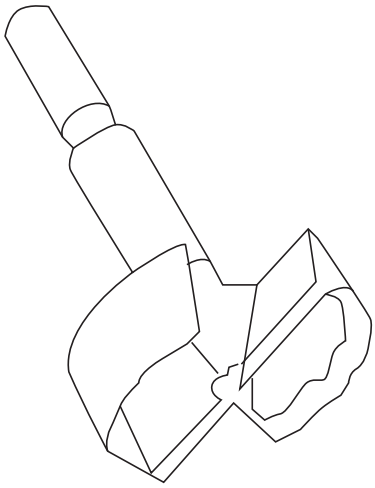


Fig 5.1

Forstner drill bits

Use

Maintenance

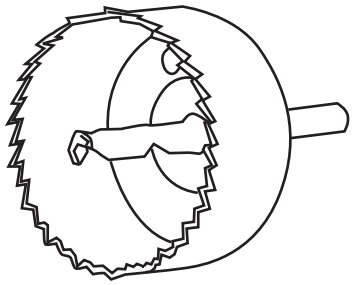


Fig 5.2

Hole saw

Use

Maintenance

Fig 5.3

Twist drill bit

Use

Maintenance

Fig 5.4

Dowelling drill bit

Use

Maintenance

Fig 5.5

Masonry drill bit

Use

Maintenance

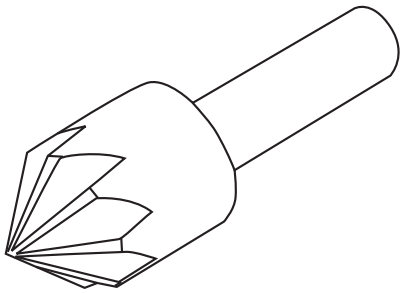
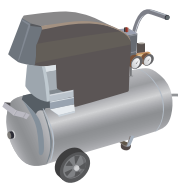


Fig 5.6

Countersink drill bit

Use

Maintenance



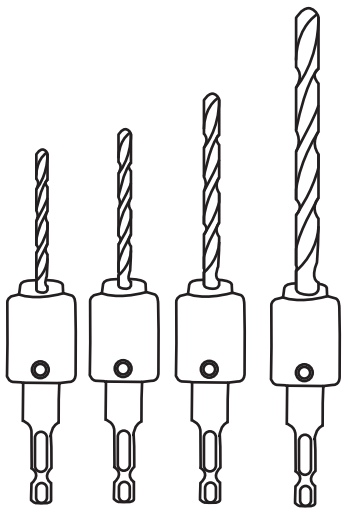


Fig 5.7

Combination drill bit

Use

Maintenance

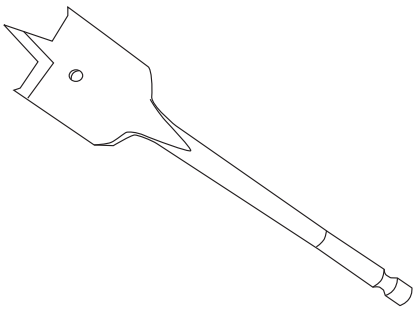


Fig 5.8

Spade (paddle) drill bit

Use

Maintenance

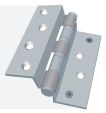


Fig 5.9

Auger drill bit

Use

Maintenance

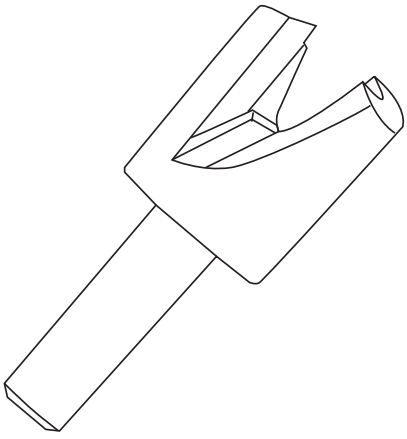
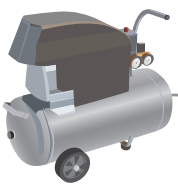


Fig 5.10

Plug cutter

Use

Maintenance



Notes

Section 6 – Files

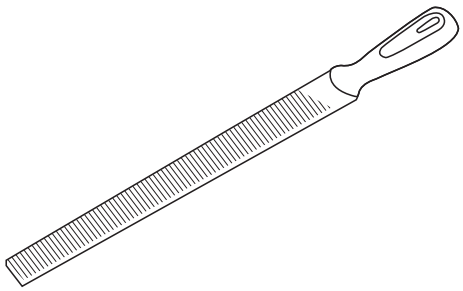


Fig 6.1

Mill file

Use

Maintenance

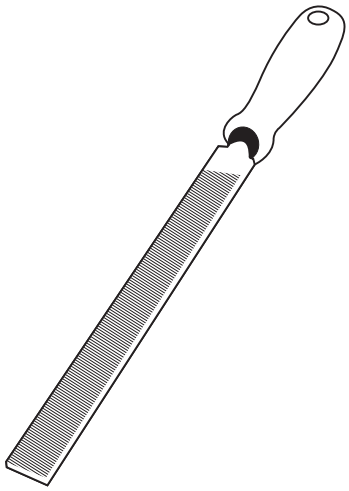


Fig 6.2

Second cut file

Use

Maintenance

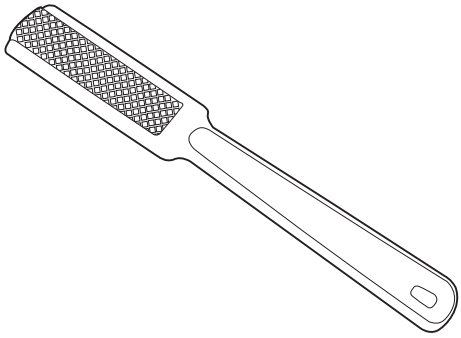


Fig 6.3

Rasp

Use

Maintenance

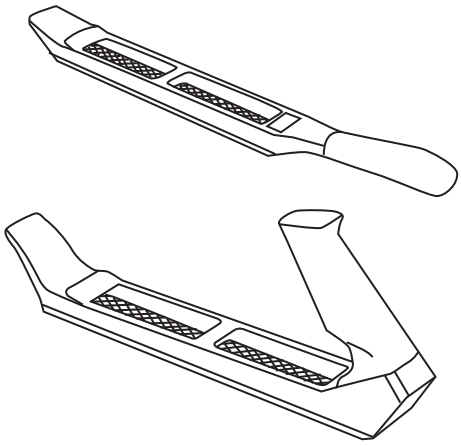


Fig 6.4

Surforms

Use

Maintenance

Section 7 – Miscellaneous hand tools

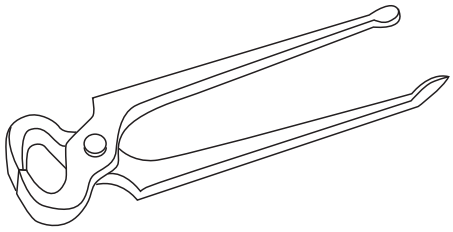


Fig 7.1

Pincers

Use

Maintenance

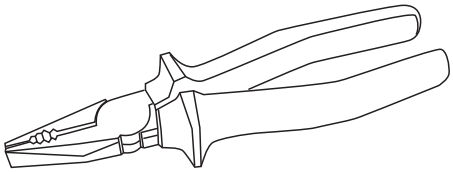


Fig 7.2

Pliers

Use

Maintenance

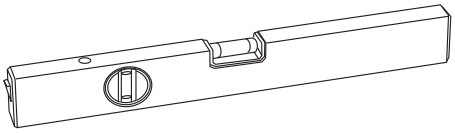


Fig 7.3

Spirit level

Use

Maintenance

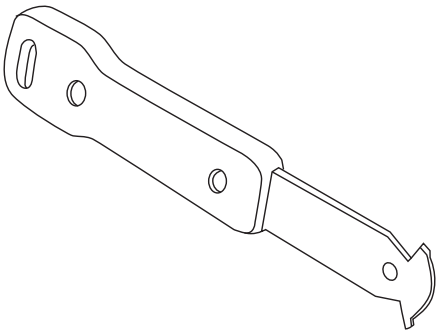


Fig 7.4

Scoring knife

Use

Maintenance

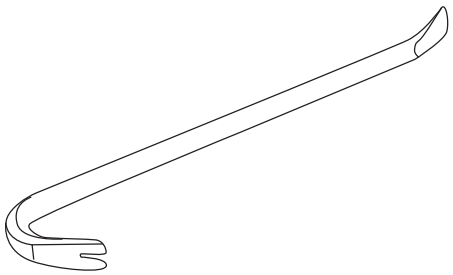


Fig 7.5

Wrecking (pinch/crow) bar

Use

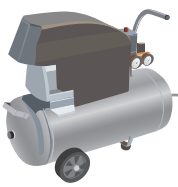
Maintenance

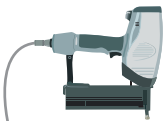
Notes

Section 8 – Planes

The hand plane is one of the most important pieces of equipment in your toolbox. You should know how to dismantle and reassemble one so that it can be properly maintained and serviced. You should also be able to correctly adjust your hand plane in order to maximise its performance.

Complete the table in activity 8.1 to correctly identify the different parts of a hand plane, as marked on the diagram. Refer to your research and textbooks for more information.





Activity 8.1

Parts of a hand plane

From the diagram, identify all of the numbered parts of a hand plane.

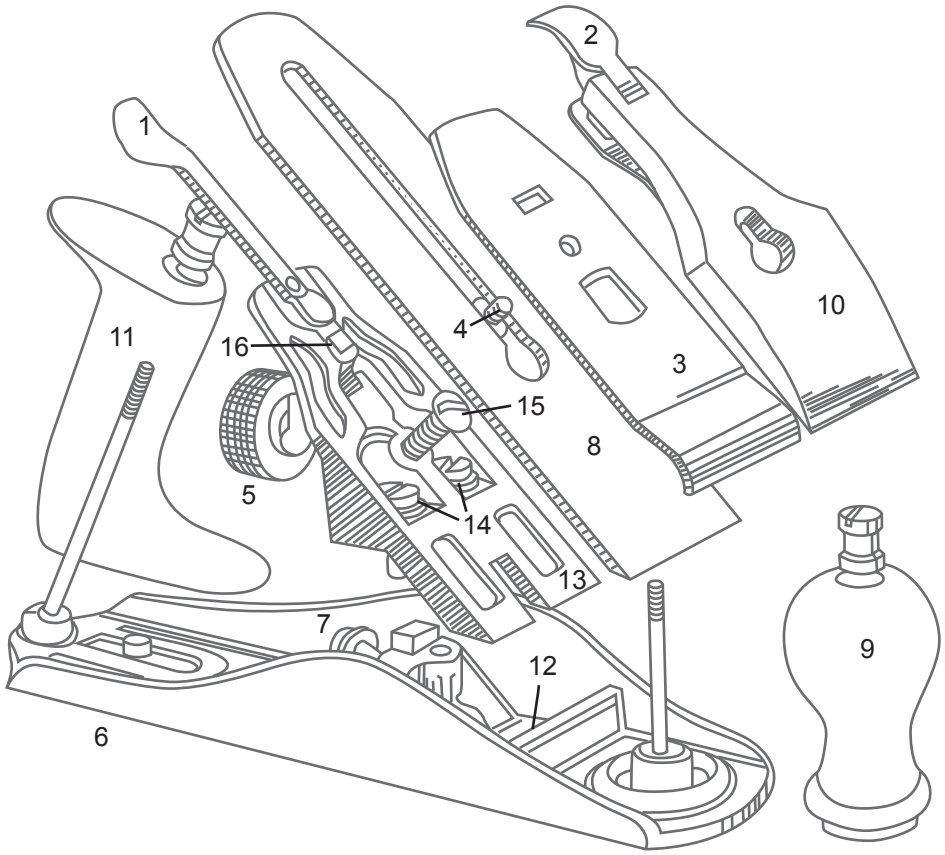


Fig 8.1

1.		9.	
2.		10.	
3.		11.	
4.		12.	
5.		13.	
6.		14.	
7.		15.	
8.		16.	

Section 9 – Chisels

Chisels are designed for specific jobs and work requirements. A chisel's handle will indicate whether it is suitable for use in heavy or light-to-medium work. The diagram below illustrates two such chisels.

Activity 9.1

Complete the table using the labels on the diagram and referring to your research and textbooks for further information.

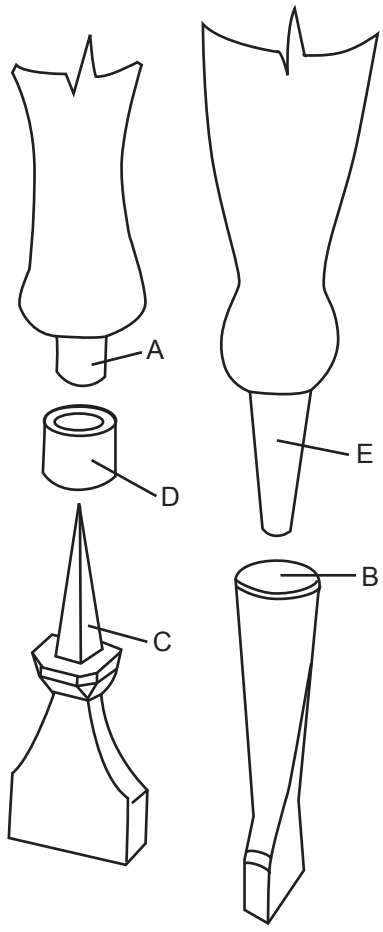


Fig 9.1

From the diagram on the left, identify the labelled parts of the chisels.	
A	
B	
C	
D	
E	

Notes

Section 10 – Power tools

Since the Industrial Revolution, humankind has realised the benefits of harnessing and/or manipulating power into production processes.

As time passed, more compact machines of specific purpose were developed. These machines eventually came to rival many of the hand-tool processes carried out by tradespeople, and are now relied upon on a daily basis in the modern factory and for on-site cabinetry installations.

This section details these power tools. To stay safe and well in the workshop, it is important that tradespersons have a good knowledge about tools and their correct applications. Finally, as well as knowing how to correctly use the tools, it is essential to be able to correctly set up, change cutters (where applicable) and maintain these tools for our safety.

Activity 10.1

Identification of power tools

The following activity requires you to identify power tools used in various furniture-related trades and detail their specific uses, type of power sources and maintenance requirements.

You also need to note down any additional safety requirements that need to be observed, such as the placement and handling of the tools and the use of appropriate PPE.

Part 1 – Corded power tools

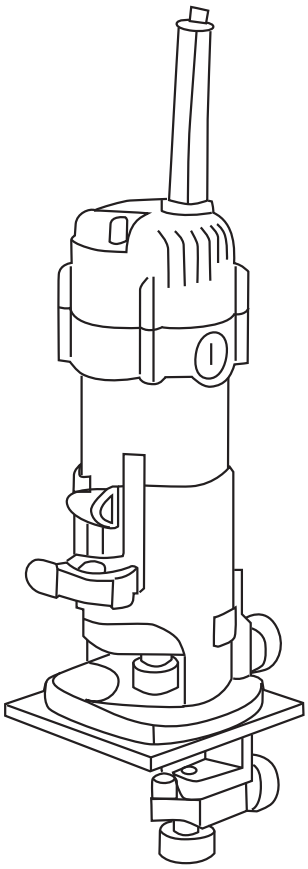


Fig 10.1

Laminate trimmer

Power source 240v

Use

With a large array of cutters available, the laminate trimmer is one of the most versatile pieces of equipment for the cabinet-maker. It is used to apply decorative mouldings to thin pieces of timber and small decorative mouldings into the face of sheet materials, cut trenches or grooves for plywood bottoms and backs, and trim the overhang of plastic laminate during the production of benchtops.

Maintenance

The body must be cleaned of all dust to prevent it from jamming. Each time the cutter is changed, clean out the collet to ensure the cutter is secure. Keep ventilation slots clear of dirt. Check the cutters and electrical cord for damage before each use.

Safety requirements

Make sure the piece of work is clamped to the bench during use of the trimmer and keep the cord clear of the cut path. Ensure the cutters are correctly seated and run a test cut before use. Also observe all PPE requirements.

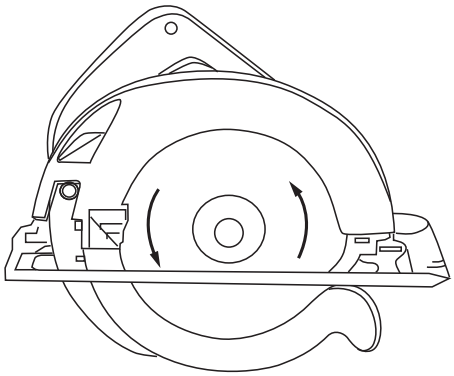


Fig 10.2

Circular saw

Power source

Use

Maintenance

Safety requirements

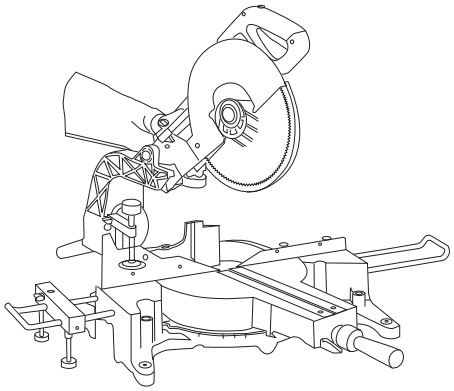


Fig 10.3

Dual slide compound angle saw

Power source

Use

Maintenance

Safety requirements

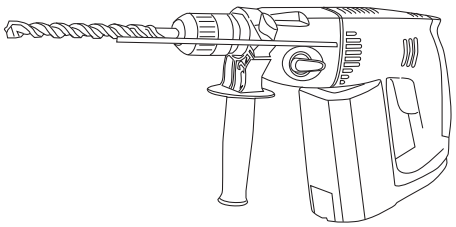


Fig 10.4

Hammer drill

Power source

Use

Maintenance

Safety requirements

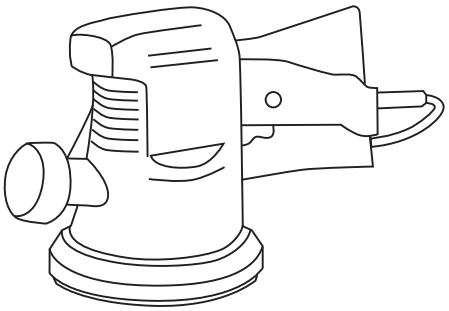


Fig 10.5

Random orbital sander

Power source

Use

Maintenance

Safety requirements

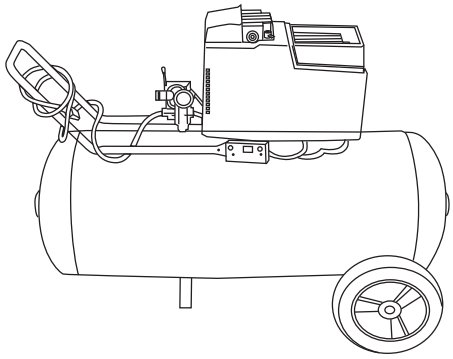


Fig 10.6

Compressor

Power source

Use

Maintenance

Safety requirements

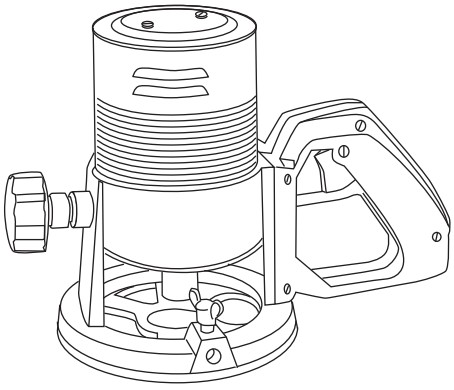


Fig 10.7

Router

Power source

Use

Maintenance

Safety requirements

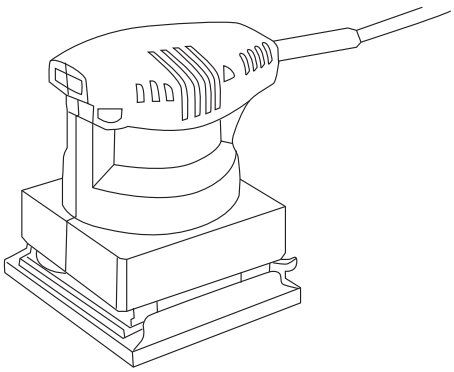


Fig 10.8

Palm sander

Power source

Use

Maintenance

Safety requirements

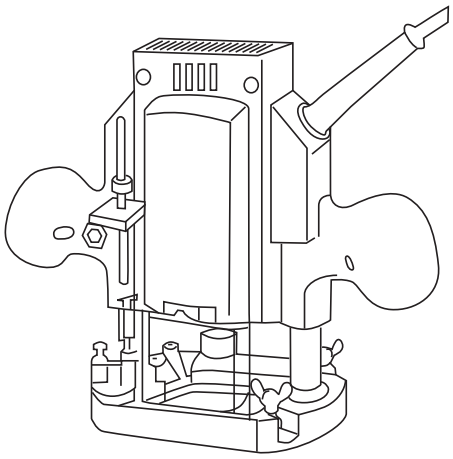


Fig 10.9

Plunge router

Power source

Use

Maintenance

Safety requirements

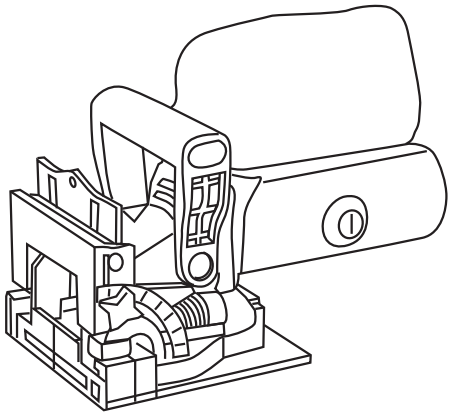


Fig 10.10

Biscuit machine

Power source

Use

Maintenance

Safety requirements

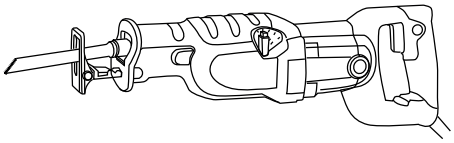


Fig 10.11

Reciprocating saw

Power source

Use

Maintenance

Safety requirements

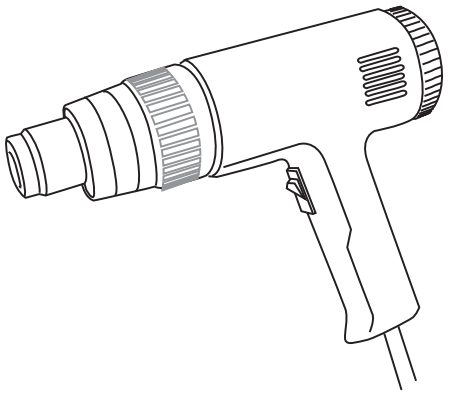


Fig 10.12

Heat gun

Power source

Use

Maintenance

Safety requirements

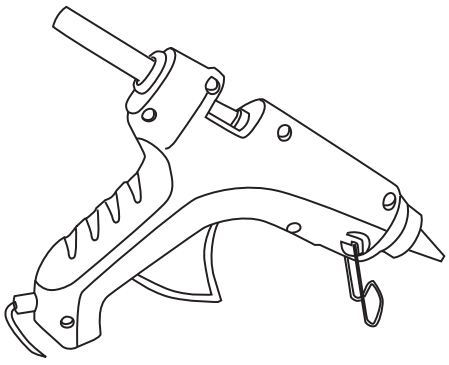


Fig 10.13

Glue gun

Power source

Use

Maintenance

Safety requirements

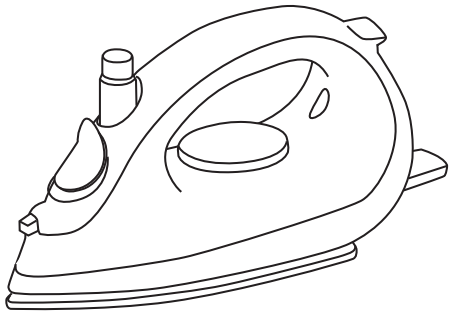


Fig 10.14

Iron

Power source

Use

Maintenance

Safety requirements

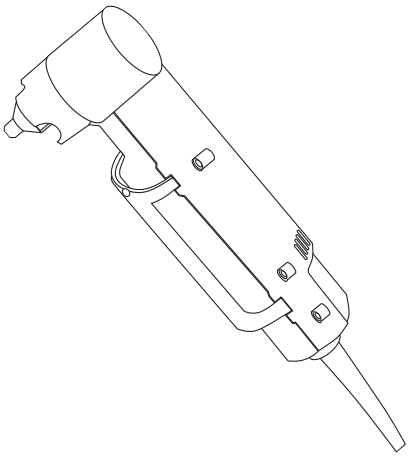


Fig 10.15

Right angle drill

Power source

Use

Maintenance

Safety requirements

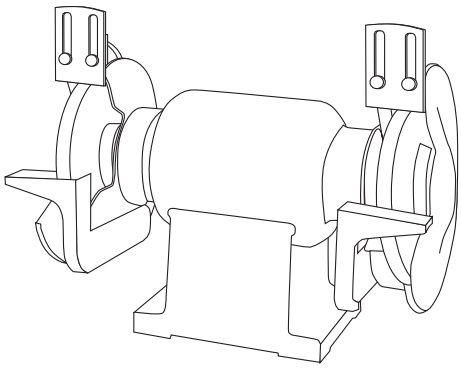


Fig 10.16

Bench grinder

Power source

Use

Maintenance

Safety requirements

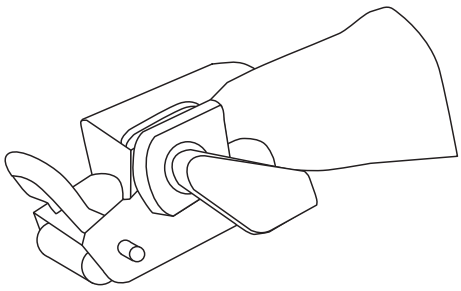


Fig 10.17

Belt sander

Power source

Use

Maintenance

Safety requirements

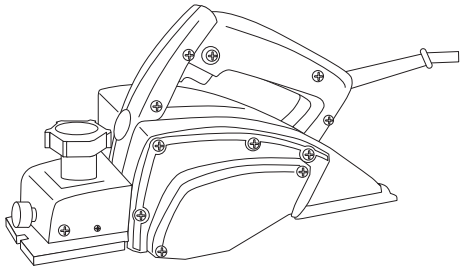


Fig 10.18

Hand planer

Power source

Use

Maintenance

Safety requirements

Part 2 – Air tools

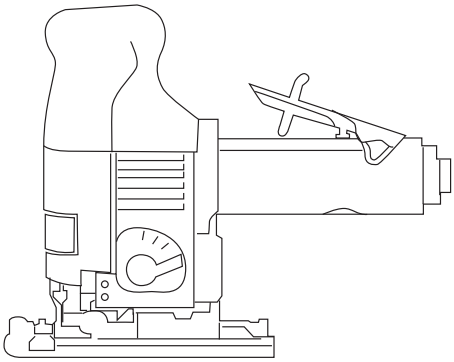


Fig 10.19

Jigsaw

Power source

Use

Maintenance

Safety requirements

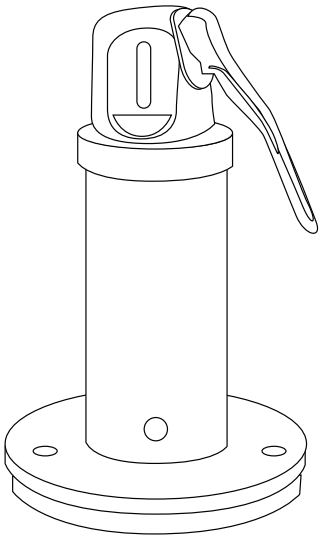


Fig 10.20

Trimmer

Power source

Use

Maintenance

Safety requirements

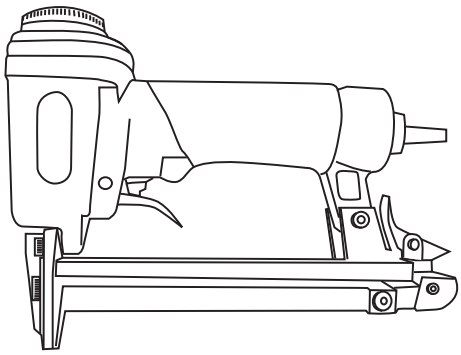


Fig 10.21

Nail gun

Power source

Use

Maintenance

Safety requirements

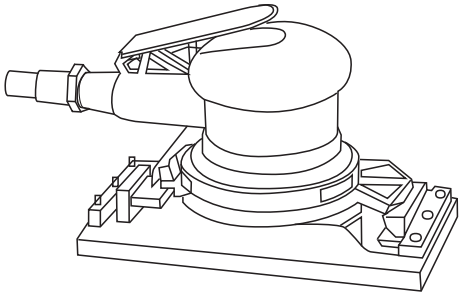


Fig 10.22

Random orbital sander

Power source

Use

Maintenance

Safety requirements

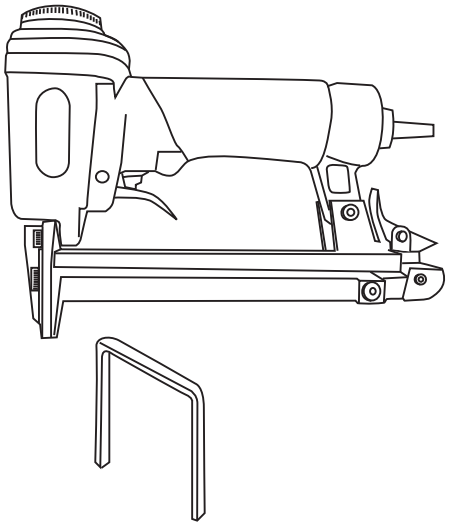


Fig 10.23

Backing gun

Power source

Use

Maintenance

Safety requirements

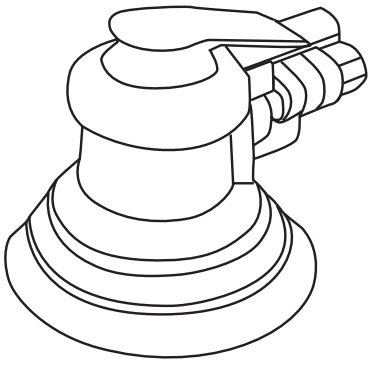


Fig 10.24

Random disc sander

Power source

Use

Maintenance

Safety requirements

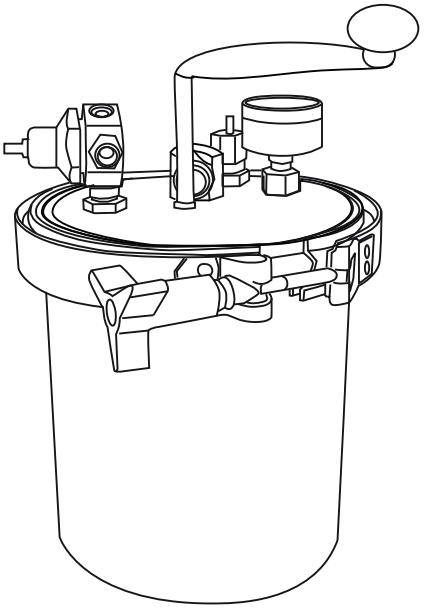


Fig 10.25

Spray pressure pot

Power source

Use

Maintenance

Safety requirements

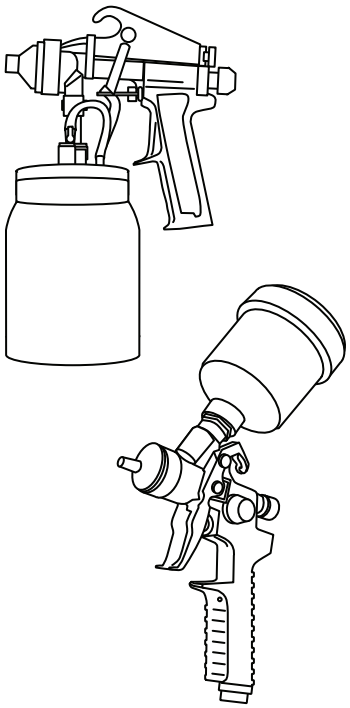


Fig 10.26

Spray guns

Power source

Use

Maintenance

Safety requirements

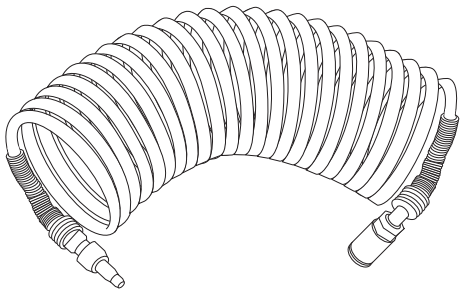


Fig 10.27

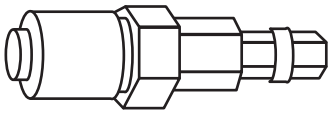
Air hose

Power source

Use

Maintenance

Safety requirements



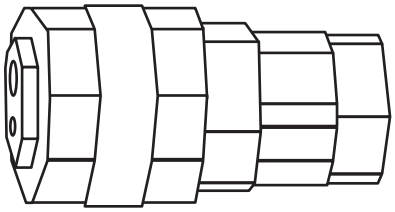


Fig 10.28

Hose fittings

Power source

Use

Maintenance

Safety requirements

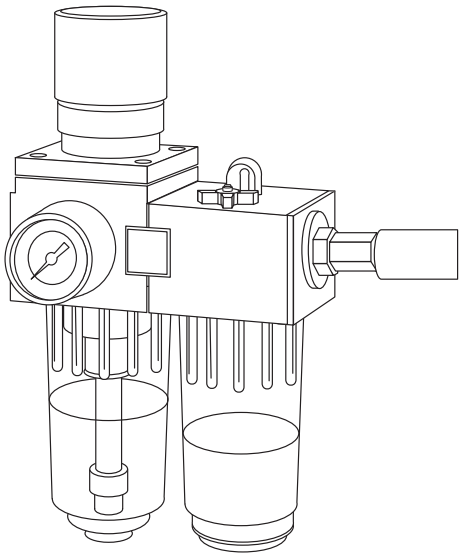


Fig 10.29

Regulator and air dryer

Power source

Use

Maintenance

Safety requirements

Part 3 – Battery-operated tools

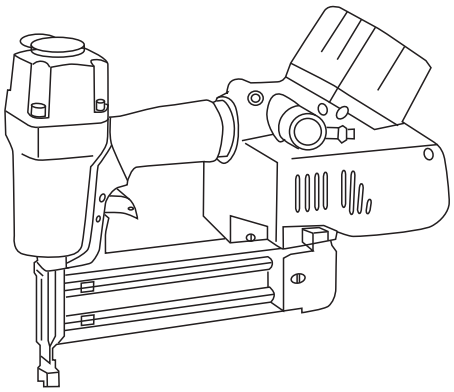


Fig 10.30

Nail gun

Power source

Use

Maintenance

Safety requirements

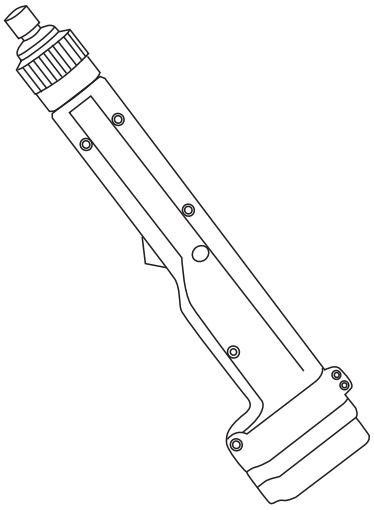


Fig 10.31

Screwdriver drill

Power source

Use

Maintenance

Safety requirements

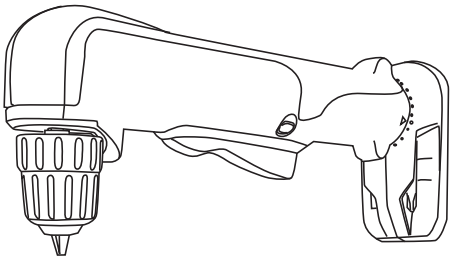


Fig 10.32

Right angle drill

Power source

Use

Maintenance

Safety requirements

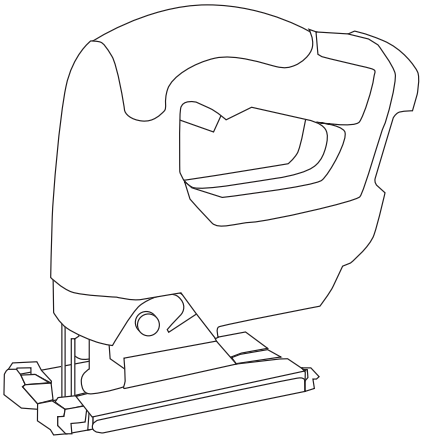


Fig 10.33

Cordless jigsaw

Power source

Use

Maintenance

Safety requirements

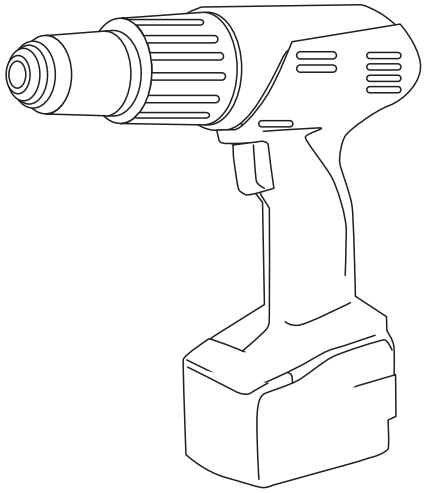


Fig 10.34

Screwdriver drill

Power source

Use

Maintenance

Safety requirements

Section 11 – Safety when using tools

Health and safety laws in each state regulate the safety and well-being of the workforce. In Western Australia, Section 20 of the *Occupational Safety and Health Act 1984* details the responsibilities that employees have to observe in the workplace. These responsibilities relate to all workers undertaking work for an employer, including those on awards rates. Employers, sub-contractors and contractors are also subject to these laws, but have additional issues to take into consideration. These are all outlined in other sections of the Act, which can be viewed in full at <www.worksafe.wa.gov.au>.

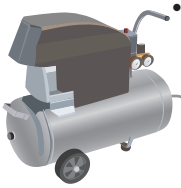
The importance of safe work practices cannot be emphasised enough, and this is especially true when you are dealing with or operating machinery or tools. It is vital – and **your responsibility** – to ensure your own safety and the safety of your colleagues. Both the general and specific safety precautions of the Act are essential work practices in the furniture-making industry, and to contravene these precautions is to contravene Section 20 of the Act. In addition to the disciplinary issues that a student will face at college for contravening these precautions, if the issue is reported to WorkSafeWA, the student may be subject to the penalties imposed on workers under Section 20A of the Act.

Safe operating procedures for hand tools and power tools

General work-area safety

Students/trainees must:

- **seek the appropriate permission** before using any machines or power tools
- **wear goggles or eye shields** when using machines such as saws, sanders, grinders and routers, which produce dust, chips and shavings
- **adopt responsible behaviour** when working in a workshop environment – no running, no fooling around
- **make sure there is adequate working space** in which to operate hand tools, power tools and machines safely
- **remove rubbish from the floor** around the bench or work area before starting work
- **maintain a safe level of cleanliness** in the immediate work area – clear and dispose of all off-cuts and scrap as soon as they are identified
- **assume full control of the switches and controls** of power tools and machines – do not allow interference from anyone
- **concentrate fully on the task at hand** and do not allow yourself to be distracted whilst using hand tools, power tools or machines
- **direct observers to stand at a safe distance** away from the work area and/or from the task being performed.



General safety precautions

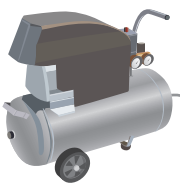
- Disconnect tools/machines from the power source by removing the plug from the outlet before you make any adjustments to them or fit any cutting tools or accessories. These precautions must be taken to prevent tools from being switched on accidentally while they are being set up, which could cause severe injury.
- Always ensure that the piece of work is securely clamped. Never hold it in your hands or support it on your knees as you will risk the cutting edges coming into contact with your hands or legs. The piece of work may also end up moving too rapidly towards the rotation of the cutting edge.
- Wear eye protection and hearing protection and, where appropriate, a respiratory protector when using power tools. In the long term, exposure to dust from some types of wood may cause lung disease or respiratory problems.
- Don’t over-reach. Maintain proper footing and balance at all times.
- Maintenance instructions for tools will vary according to the type of tool involved and its brand name. However, always check that the power lead, extension cord, switches and machine casing are in good condition before you use the tool. If you find a fault, report it immediately. Do not attempt to fix it yourself.
- Ensure that loose clothing does not become entangled in the machine by rolling up long sleeves and tucking in baggy shirts. Your footwear should provide reasonable protection; steel-capped shoes or boots are best, while sneakers give minimum protection. Open footwear (such as sandals and thongs) is illegal in the workshop. Long hair must be contained within a cap or hairnet.
- Keep guards in place and in proper working order.
- Keep hands away from cutting edges while the tool or machine is in operation.
- Keep the work area clean. Clutter in work areas and on benches can cause accidents.
- Don’t force tools to do what they are designed to do easily. Operate them at the feed rates for which they have been designed.
- Make sure that all adjusting keys and/or wrenches have been removed from the tool before running it. Get into the habit of checking these items.

Pneumatic-tool operator safety instructions

Safety precautions

Your tools have been designed, produced and inspected with safety in mind. However, there are some basic safety precautions that the operator should always take. These include:

- never operating or working in the vicinity of the tool in use without wearing proper eye protection, including side shields
- never assuming that the tool is empty
- never pointing the tool at anyone, even if you think it is empty or disconnected
- never operating the tool unless it is in contact with the piece of work
- never tampering with, disabling or removing the safety device
- never leaving the work area for any extended period of time without disconnecting the tool from the airline
- never directing the air jet at your body and, in particular, your face when disconnecting an airline – care should be taken at all times
- never allowing the air pressure to exceed the maximum marked on the tool, always checking the air pressure gauge at least twice daily and not operating with bottled air or gases
- never letting anyone use the tool unless they have been properly trained
- never allowing the tool to be within reach of children
- never operating a dirty tool and always cleaning the tool at least once a day, lubricating it if required
- never dropping the tool or hitting it against hard surfaces, as it may damage or break the external body
- never carrying the tool with the trigger depressed
- never loading a tool with the trigger depressed
- never clamping the trigger in a locked operating position
- never using fasteners other than those specifically designed and recommended for use in the tool and the work to be done
- never using the tool in the vicinity of flammable or explosive materials, as a spark may result if the fastener hits a metal object.



In case of tool malfunction:

- stop using the tool as soon as there is any indication of malfunction
- disconnect it from the airline immediately and remove all fasteners from the magazine
- do not reconnect the airline until the tool has been thoroughly repaired and inspected
- never set aside a malfunctioning tool without tagging the air inlet or turning it over to the person responsible for its repair.

Personal Protective Equipment (PPE)

What is the purpose of PPE?

PPE is equipment used to eliminate or reduce the exposure to or contact with physical or chemical agents that may cause injury or sickness.

It includes:

- eye protection
- hearing protection
- skin protection
- head protection
- body protection
- feet protection
- respiratory system protection.

Safety precautions

Some form of PPE is required at some time or another in all trades to protect the:

eyes

using face shields, welder's helmets, goggles, safety spectacles

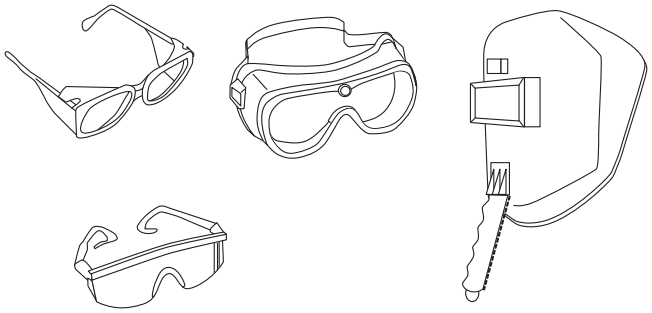


Fig 11.1

ears

using ear plugs, ear muffs

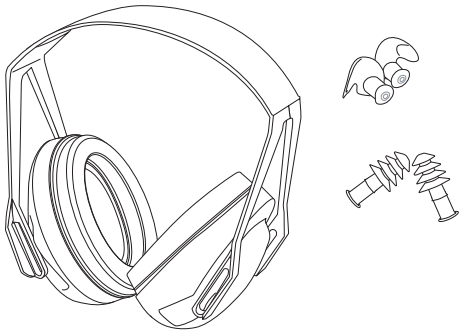


Fig 11.2

skin

using gloves for handling chemicals, heat processes, cold processes

Fig 11.3

head

using safety helmets

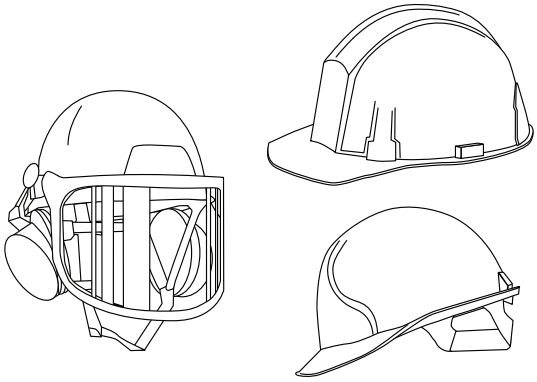


Fig 11.4

body

using aprons, full body suits, dust coats

Fig 11.5

feet

using safety boots, gaiters

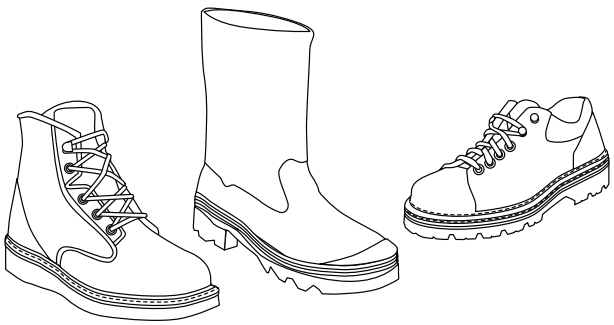


Fig 11.6

respiratory system

using half and full face pieces, air filtering, air supplied.

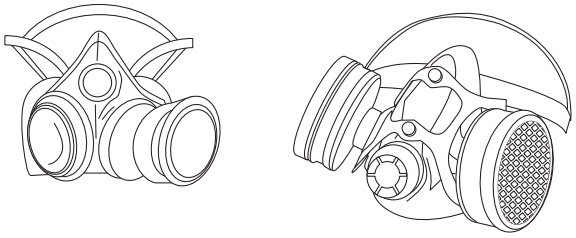


Fig 11.7

Basic maintenance of portable power tools

Basic maintenance of portable power tools should be carried out regularly to ensure their best performance, safe operation and trouble-free service. When carrying out maintenance or adjustments, make sure the power tool is disconnected from the power outlet. Instructions supplied with the tool generally advise periodic inspection of:

- **carbon brushes** — These are held in place by non-conducting screw caps. Worn, badly fitting or sticking brushes can cause sparking and overheating that may result in costly motor rewinds.
- **bearings** — Some power tools can be dismantled so that inspection and lubrication of the bearings can be carried out. Experts normally perform this task.
- **gears** — A chain of gears is necessary in some power tools to reduce the speed of the motor.
- **dust and dirt** — Ventilation slots should be examined frequently and kept free from dust. An air jet or vacuum cleaner may be used.
- **leads** — The cord and terminals of plugs and sockets must be regularly checked and repaired by an electrician if necessary.
- **drill chucks** — Dust should be removed from, and a spot of oil should be occasionally applied to, moving parts.
- **attachments** — Operating and maintenance instructions are usually supplied with attachments. Apply a spot of oil to the moving parts and periodically check nuts, bolts and screws for tightness.
- **foam cutting and cloth cutting machines** — Oil is necessary only in the oil pad holder marked ‘OIL’. Apply a few drops once a day. Every three months, grease the retainer at the back of the machine.

- **saw blades**

  Ensure their efficient and safe use by keeping saw blades sharp and maintained correctly. Remove the saw blade periodically to remove the build-up of dust and resin from inside the guards.

  - Remove the resin using a solvent.
  - Masonry dust may require removal by compressed air.
  - Clean the resin from the saw blades using a solvent.

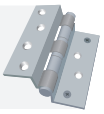
  Very blunt saw blades, or blades that have been lightly sharpened several times, should be sent to a saw doctor for setting, gulleting and sharpening.

  In the case of tungsten-tipped blades, the tips should be faced (sharpened) when blunt.

- **power-planer cutter maintenance**

  Gapped or very blunt cutters need grinding. Many cutters, particularly those with tungsten carbide tips, are sent to a saw doctor. To hone freshly ground or blunt cutters, adhere to the following procedures.

  1. Insert the cutters into the honing guide (usually supplied as a standard accessory).
  2. Keep the cutters as an exact pair by keeping the back edge of the cutters tightly against the shoulders of the guide.
  3. Hone the cutters on an oilstone using a suitable lubricant.
  4. Take the cutters from the guide and lightly remove the burr from the face of the cutters.



Section 12 – Quizzes

Complete the following quizzes to check your progress.

Quiz 1

Select the correct words from the word bank below to complete each sentence. Note that each word can be used only once throughout this exercise.

1. The _____ _____ is a hand tool that is used to scribe two lines _____ to each other on the surface of a piece of _____.

2. A _____ _____ is a small machine that spins a cutter at high speeds and is used extensively for trimming plastic _____.

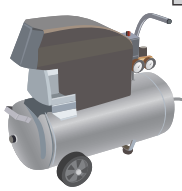
3. _____ sticks are used to check for _____ in a frame. This check should be made before the _____ is allowed to dry.

4. A battery-operated drill serves as a useful _____ when used in the assembly of cabinets.

5. A cross pein (Warrington pattern) hammer is very useful when we need to insert small _____ or _____ into the job.

6. The _____ angle of a smoothing plane is _____ degrees and the _____ angle of the blade is _____ degrees.

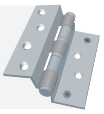
nails	adhesive	parallel	twist	laminate trimmer
honing	winding	screwdriver	mortise gauge	25–30
grinding	pins	laminate	timber	20–25



Quiz 2

Connect each tool with an arrow to its correct use.

Tool	Used for
keyhole saw	cleaning up difficult grain in timber
block plane	docking and mitring timber to size
masonry drill bit	picture framing
cabinet scraper	drilling large-diameter holes
palm sander	cutting along the grain of timber
compound mitre drop saw	cleaning up end grain
trying plane (No. 7)	cleaning up timber before polishing
regulator	cutting across the grain of timber
mitre cramp	drilling holes into brick and concrete
sliding bevel	sharpening a cabinet scraper
rip saw	producing a true flat surface on timber
coping saw	cleaning up and fitting joints
crosscut saw	controlling air pressure for air tools
mill file	marking and transferring angles
paring chisel	cutting shapes in thin sheet material



Quiz 3

1. Circle the tool that is the most suitable for cutting irregular-shaped holes in sheet material.

rip saw	keyhole saw	jigsaw
panel saw	circular saw	crosscut saw

2. Circle the drill that is the most suitable for use when combined with a Forstner drill bit to drill flat-bottom holes.

12v battery	horizontal borer	hammer drill
pneumatic	drill press	

3. Circle the plane that is used for flushing joints and general cleaning up of timber.

trying plane (No. 7)	smoothing plane (No. 4)	router plane
block plane	compass plane	rebate plane

4. Circle the clamp/cramp that is the most suitable for joining narrow boards together to make one wider board.

sash cramp	mitre cramp	G-cramp
F-cramp	band cramp	cam clamp

5. Circle the correct marking tool for drawing lines at an angle of 45º to a timber edge.

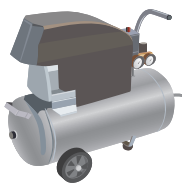
try square	centre square	tee square
mitre square	set square	roofing square

6. Circle the saw that is the most suitable for the accurate cutting and fitting of joints.

keyhole saw	coping saw	panel saw
rip saw	bow saw	tenon saw

7. Circle the processes that can be carried out safely with the use of a router.

trenching	rebating	dowelling
docking	ripping	moulding



8. Circle the tools that require eye protection when being used.

router	circular saw	trimmer
planer	jigsaw	grinder

9. Circle the tools that exceed 85 dB when in operation, thereby requiring the operator to wear hearing protection.

hammer drill	circular saw	trimmer
planer	jigsaw	palm sander

10. Circle the tools that are in common use in the factory and require the use of air.

battery drill	nail gun	guillotine
staple gun	pneumatic drill	spray gun

BC2015

Use Furniture-Making-Sector Hand Tools and Power Tools

Learner's Guide

DESCRIPTION

This learner's guide has been developed to assist in the delivery of Certificate I, II and III in furniture-making and cabinet-making qualifications within the furnishing training package. It contains information and activities that cover the types of hand tools and power tools, workplace safety requirements and workflow in the workplace for the learner to work through.

EDITION

Second edition

CATEGORY

Building and Construction

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