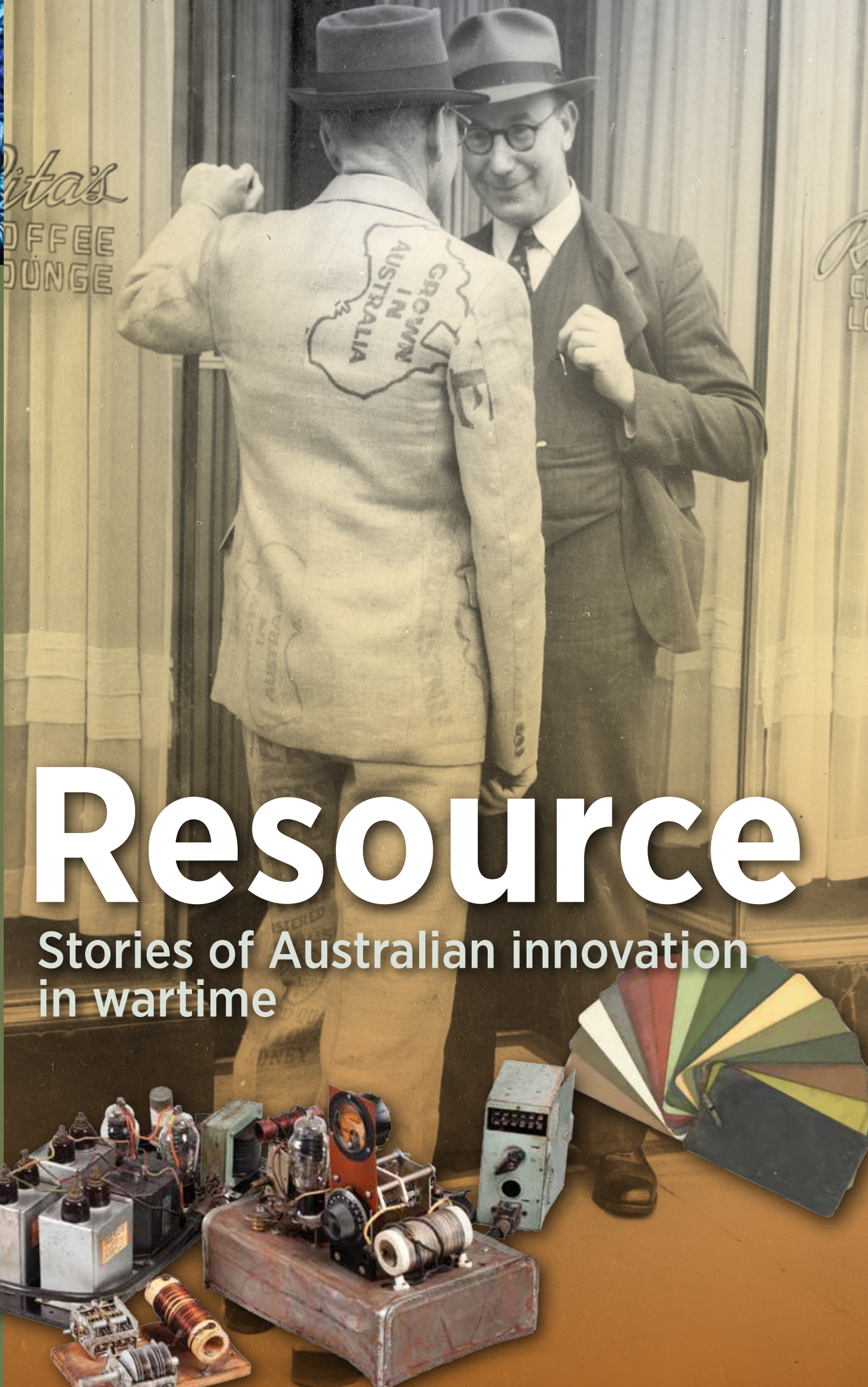




Pita's
OFFEE
DUNGE

CENTURY OF SERVICE



Resource

Stories of Australian innovation
in wartime





Resource: *Stories of Australian innovation in wartime*

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**AUSTRALIAN
WAR MEMORIAL**

Comradeship

Ancestry

Patriotism

Chivalry

Loyalty

Resource

Candour

Curiosity



ART190410001 (detail)

In the Hall of Memory at the Australian War Memorial in Canberra there are 15 stained-glass windows. Each shows a figure dressed in military uniform, and under each figure is a word which describes a quality displayed by Australians during wartime. One window features an aircraftman. He represents all service men and women who have found creative and bold solutions to difficult problems in wartime.

This window bears the word *Resource*.

Resource

Stories of Australian innovation
in wartime

Written by Jennet Cole-Adams & Judy Gauld

Devotion

Independence

Coolness

Control

Audacity

Endurance

Decision

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Note to the reader:

Most of the events described take place during wartime. You may feel sad after reading some of them. Teachers may wish to be sensitive to those students who have parents serving overseas in war zones.



RELAWM 00955

Introduction

A resourceful person finds unique and clever ways to overcome challenges – a quality that is much needed during times of conflict. Over the last century, Australians have demonstrated resourcefulness during wartime in many ways, from surviving in harsh environments without specialist equipment, to deceiving the enemy with **ingenious** plans or inventing new and effective weapons. This book explores examples of Australian wartime **innovation**, some of which occurred in Australia – in laboratories, offices and homes – and some on the battlefields where Australians have fought.

As a nation, Australia has made significant contributions to war related innovations that help service men and women to operate efficiently and safely. The Owen Gun, developed during the Second World War, and the more recently developed Bushmaster Protected Mobility Vehicle are two examples. The Bushmaster is still in use, protecting Australian and international troops being transported in **combat** zones.

The challenges presented by active service have seen many individuals display resourcefulness on the battlefield. Lance Corporal William Beech, for example, responded to the dangerous situation in the trenches of **Gallipoli** by creating the **periscope** rifle, which allowed soldiers to aim and fire without exposing their heads above the **parapet**. In Korea, Sergeant Thomas Murray showed great ingenuity in using improvised ladders and ropes to evacuate **casualties** across a river after a bridge collapsed.

Many Australians have received honours or awards during wartime for innovations. Resourcefulness, however, is a quality so frequently displayed by service men and women from all nations that it often goes unnoticed. This book recognises the innovation, ingenuity, and creativity displayed by many Australians during wartime.

Kitting out the troops

Imagine you are preparing for a 48-hour hike in the Australian bush. What would you need to take with you? Now imagine that you are an Australian soldier in a foreign country about to go on a 48-hour patrol in a combat zone. How might this change what you will pack?

A soldier's kit includes clothing, protective gear, tools, weapons, **ammunition**, first aid supplies and food and water **rations**. Over the years much thought has been put into identifying exactly what a kit should contain. While the goal is to be prepared for any situation in a given environment, soldiers need to be able to carry their kits. This challenge has led to many innovations in the design of Australian military uniforms and equipment. Today, cutting edge design and technology ensures that the soldiers are well equipped and prepared for action.

Uniforms are a significant part of a military kit and over the years they have changed significantly as new technologies became available. The heavy woollen jackets, flannel shirts and woollen singlets worn by the **Anzacs** during the First World War provided them with warmth but were difficult to get dry in wet and muddy conditions. Those serving in tropical climates during later conflicts required lighter clothing to keep cool but also needed protection from sun, vegetation and insects. Today, hard-wearing, lightweight fabrics have been developed to keep service personnel warm or cool depending on the climate they are in. Such clothing is easy to pack, wash and dry, which helps keep the troops clean. Changes in fabric technology have also enabled the widespread use of **camouflage** patterns on uniforms. The current Australian combat uniform features a pattern that includes seven different colours to provide effective cover in a range of environments.

Acting Corporal Victor James Jolly, 24th Battalion, with his kit and kitbag outside a barracks building during the First World War.

AWM P12296.001



Camouflage uniforms

Camouflage has been helping to protect service men and women for over a century. Since the First World War Australian uniforms have been made in colours such as khaki or tan, allowing the wearer to blend in with their environment. More recently, specially designed fabric with camouflage patterns has been used for combat uniforms. These 'disruptive patterns' have been developed with the help of artists, naturalists and even neurologists to ensure they effectively conceal a person wearing the camouflage.



William Dargie, *In the Owen Stanley Jungle: two camouflaged soldiers about to go out on patrol* (1942, oil on canvas, 110.3 x 74.4 cm, AWM ART27560)

This painting shows Australian soldiers in New Guinea during the Second World War. The artist noted 'Green faces, green uniforms, tangled jungle background'.

These cotton trousers in Disruptive Pattern Desert Uniform fabric were used in the 2003 Iraq War. The camouflage was specifically designed for Australian Defence Force members serving in desert areas.

AWM REL33103.002



A soldier serving on a **peacekeeping** mission in Somalia in 1993 wears a Disruptive Pattern Camouflage Uniform. The pattern on the fabric was developed using aerial photographs of Australian landscapes.

AWM P01735.415

What colours are found in your local area? Design a camouflage pattern using these colours.



Boer War
1899–1902

First World War
1914–1918

Second World War
1939–1945

Malayan Emergency
1948–1960



These men are preparing for winter in Korea, where temperatures fall below freezing. Their uniform is better adapted to the climate than that worn by soldiers in earlier conflicts. It includes warm fabrics such as a fur-lined parka, combat pants made from windproof fabric and long woollen underwear.

AWM MELJ086

**What fabrics do you wear to keep warm?
How do they compare with the ones shown
in this image?**

A kit needs to include the right equipment for the circumstances in which it is being used. This gas mask, used during the Second World War, had many improvements over earlier models. It was lighter to wear, the design allowed soldiers to more easily aim a rifle while wearing the mask, and it was waterproof.

AWM REL25222.002

**What protective equipment might be
needed in a military kit today?**

Equipment designed to protect service men and women has always been a critical part of military kit. Innovations in personal protective equipment have reflected the specific challenges that troops faced in different times and places. Those who served on the **Western Front** during the First World War were issued with gas masks to protect them from potentially **lethal** gas. Steel helmets also became standard equipment as the destructive power of weapons increased. During the Second World War, the helmet issued to Australian troops was changed to provide greater protection by making the bowl deeper, the brim smaller and the chinstrap more flexible. More recently, in response to the horrific injuries caused by land mines and improvised explosive devices (**IEDs**), the basic uniform for Australian troops has been adapted to feature a lightweight tiered body armour system, designed to stop small arms fire and explosive fragments.

There have also been innovations in the processes for preparing and packaging food rations that are carried by troops. In the Boer War and the First and Second World Wars, the main food supplied in ration packs for Australian soldiers was hard dry biscuits and canned meat known as 'bully beef', which was high in salt and often eaten straight from the tin. In his diary on 24 April 1915, Sergeant Apcar De Vine described packing rations for the landing at Gallipoli:

Two tins of Bully Beef, tea, sugar, biscuits, 2 cubes of Bovril, also rations for the first day of landing, bully-beef and biscuits, we had to rearrange our packs to get all the food in, also an extra ration of water ... in an empty lemonade bottle.¹

De Vine also packed a billy to boil water for tea.

This innovative piece of equipment protected soldiers from mosquitos in Malaya during the 1950s. It included five nets in the form of veils, sleeves and even oversocks which a soldier wore when he removed his boots for sleeping. Each week soldiers soaked the nets in repellent in the rubberised pouch designed for the purpose.

AWM REL28232.001

What diseases can you get if you are bitten by a mosquito in the tropics?



Did you know?

Members of Australia's defence forces wear personal identity tags when on military operations or on armed exercises. The two metal tags are connected to chains and worn around the service man or woman's neck. The tags record the individual's country, identification number, name, religion and blood group. This is an established international custom to help identification of military casualties: one tag stays with the body and one is collected for official records.

AWM REL33268



Rations

An important part of any service man or woman's kit is food rations to be eaten during battles, and patrols or in emergency situations. Over the years much innovation has gone into producing light, long-lasting and nutritious ration packs.

This tin of emergency rations is from the Boer War in 1901. It could be opened from either end, providing the hungry soldier with either bully beef or cocoa.

AWM REL00957

This emergency ration tin could only be opened with the permission of a senior officer. Why?



Australian soldier Private Philip Shimmin starts on his daily ration of bully beef in Papua New Guinea during the Second World War. By eating straight from the can a bowl was not needed.

AWM 027062



This tin contains five pre-packed one-day ration packs, which were typical of the rations used by Australians serving in Afghanistan and Iraq between 2003 and 2004. Each of the five packs offers a different menu, designed with reference to the latest findings in nutrition and food science. The menu for one of the packs is:

This is a list of food for one person for a day. How does it compare with the food you eat in a day?

- Beef & Vegetables (Dutch Style) 1 x 250 ml
- Beef, Minced, With Spaghetti 1 x 225 ml
- Freeze Dried Rice 1 x 55 g
- Beverage, Powder, Sport, Lemon & Lime 1 x 12 g
- Beverage, Powder, Sport, Orange 1 x 12 g
- Soup, Low Salt, Chicken Flavour 1 x 30 g
- Biscuit, Shortbread 1 x 35 g
- Chewing Gum, Juicy Fruit 1 x pkt 4
- Curry Powder 1 x 3.5 g
- Fruit Grains, (URC), Apricot 1 x 15 g
- Fruit Spread, Peach 1 x 26 g
- Fruit, Peaches, Diced, Canned 1 x 140 g
- Muesli Bar, Apricot & Coconut 1 x 31.3 g
- Sauce, Tomato, Ketchup 1 x 15 g
- Biscuit, Jam Sandwich Type 2 1 x 45 g

AWM REL37392

By the time of the Vietnam War, soldiers were eating a variety of freeze-dried meals which could be rehydrated when cooked with water. More recently, scientists and nutritionists have worked together to transform the food rations carried by Australian troops. Meals such as tuna mornay and pasta salad are preserved in sealed plastic pouches or foil sachets. Powdered sports drinks and protein bars are provided to boost energy levels.

Drinkable water is critical for service men and women on active duty. The kit they carry needs to contain fresh water and/or equipment to **sterilise** local water if it is not safe for drinking. Over the years, sterilisation equipment carried by Australian troops has included saucepans for boiling water, canvas bags to sieve water through, evaporation kits and a variety of sterilisation tablets.

Although the kits supplied to Australian troops have always covered their basic needs, living with so few possessions is challenging. Being resourceful has helped service men and women endure in difficult environments. An example of this is Corporal George Benson, who described his 'home' in a dugout on the Gallipoli **peninsula** in 1915:

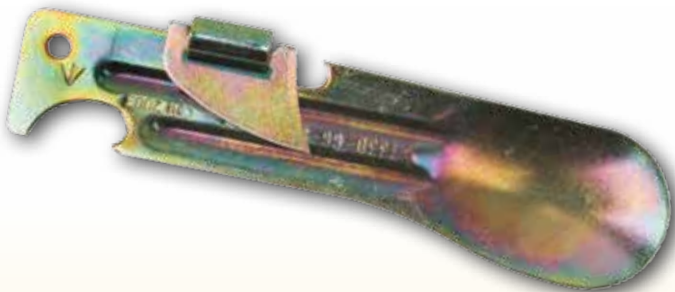
For furnishing there's a cupboard – a hole made in the wall and a box stuck into it. Table? Why yes – a piece of biscuit box resting on a biscuit tin and for a chair a water tin. Four shell cases make a fine fireplace, and for a dresser to carry the "crockery", a forked stick in the ground outside.²

The kit of Australian soldiers today still serves the same purpose as that of the first Anzacs. Lightweight, technologically advanced clothing, equipment and rations, however, allow them to carry a greater range of items than ever before. And while combat troops still carry a kit weighing up to 58 kilograms, they have a more nutritious diet and a hi-tech backpack to assist them. It remains to be seen what an Australian soldier's kit will include in the future.



In many areas where Australians have served, the water supply was not safe for drinking. Service men and women have carried various types of equipment over the years to sterilise or filter water. This bag, used in East Timor, is designed to hang from a tree. Clean water comes through the canvas into a bowl while particles and parasites are caught in the fine fabric.

AWM REL33924.003



The clever design of this can opener made it a light and multifunctional part of the kit provided to Australian soldiers in the Vietnam War. It could also be used as a spoon.

AWM REL34973

Design a multifunction tool that you would like to see included in a kit.

FAST FACTS Defence supplies

Providing Australia's service men and women with the uniforms, weapons and military equipment they need to perform their duties has always been an enormous task. Today, the Capability Acquisition and Sustainment Group (CASG) in the Department of Defence has responsibility for purchasing and maintaining military equipment and supplies for the army, navy and air force. CASG delivers approximately 18,500 different products including personal clothing, footwear and other items to defence personnel.

Then and now

In many ways the kit of Australian service men and women today is similar to that used by the Anzacs during the First World War – boots, clothing, protective gear and ways to carry equipment. Yet, changes to the basic combat gear have also been significant.

Compare the following items used by Private George Giles in Europe during the First World War and Private Christopher Donovan in Afghanistan in 2005.

How important do you think it is for combat soldiers to have the right uniform and equipment?



AWM E02818

RELAWM04500.003

AWM E02819

REL34644

Advances in fabric technology are reflected in these jackets. Giles' jacket is made of wool while Donovan's jacket is made from artificial weatherproof fabrics.



RELAWM04500.002

Pocket knives have always been carried by soldiers but the more recent tool can also work as a screwdriver, chisel, bottle opener and ruler, among other things.



REL34651

Why have the kits of service men and women changed? Why have they stayed the same?



RELAWM04500.001

The web equipment of both soldiers allowed them to carry and easily access weapons, ammunition and other equipment during combat.



REL34645

While both these pairs of boots are made from leather, Donovan's also includes rubber and nylon for extra strength and comfort.



RELAWM04500.005



REL34639.005

Stronger and smarter

War has always driven innovation and technological advances. Over thousands of years the weapons that people carried into battle have evolved, changing from clubs and swords to arrows and guns. In the last century, new technologies have continued to transform the nature of warfare and influence the outcome of wars.

Australians have shown great innovation in times of conflict, from improvised creativity on the battlefield to scientific inventions at home. During the First World War, the challenges facing Australians were so great that survival often depended on resourcefulness. An example of this was the development of a periscope rifle for firing from the trenches on Gallipoli. Using this rifle, soldiers could target and shoot the enemy without risking injury by raising their heads above the trench. Also, to overcome a shortage of bombs Anzac troops started a bomb factory, where old food tins were recycled into weapons. Another example of innovation occurred on the Western Front. Faced with the challenge of getting fresh ammunition to advancing **infantry** during battle, **Australian Flying Corps** pilot Captain Lawrence Wackett developed a method for dropping ammunition by parachute.

RELAWM00409.001

Being resourceful at Gallipoli in 1915 included turning old food tins into weapons. These soldiers at the 'bomb factory' near Anzac Cove are cutting up barbed wire for what were known as jam tin bombs. The bombs were created by filling old tins with fragments of Turkish shells and pieces of enemy barbed wire.

AWM G00267

Why do you think the Anzacs decided to make their own weapons?



Gallipoli periscopes

The fighting between Anzac troops and Turkish soldiers on the Gallipoli peninsula in 1915 was largely waged from trenches. In some places the distance between the Australian and Turkish positions was less than 50 metres.

Periscopes allowed soldiers to see out of a trench without raising their head and risking enemy fire. Realising how useful they were, Anzac soldiers created their own, like this one, using mirrors scavenged from ships and their own kits.

RELAWM00342



An Australian soldier uses a periscope rifle in a trench at Gallipoli in 1915. The upper mirror of the periscope was fixed to show the rifle's line of sight which then reflected onto a lower mirror viewed by the soldier.

AWM H02310

Can you think of other ways that periscopes are used by the military?

Lance Corporal William Beech, of the Australian Imperial Force (AIF), invented the periscope rifle in May 1915. The device allowed a soldier standing in a trench to aim and fire without exposing himself to the enemy. British General William Birdwood said of it in 1916, *'Our complete moral superiority over the Turk is partly due to a very clever invention of a man named Beech ...'*²

In 1921, Beech was offered 100 pounds by the Department of Defence as a reward for his efforts.

AWM P00600.002

Boer War
1899–1902

First World War
1914–1918

Second World War
1939–1945

Malayan Emergency
1948–1960



Creations like this were attached to Australian barbed wire entanglements on Gallipoli in 1915 to help warn sentries when Turkish soldiers were approaching the Australian lines.

RELAWM00326

Do you think that equipment is recycled in conflict zones today?

The spirit of inventiveness was not only in evidence on the battlefield during the First World War. Political leaders in Australia also acknowledged the need for new technologies to support the **war effort**. After seeing a demonstration of scientific advances in Melbourne in 1915, Victorian Governor Arthur Stanley commented that there was the need during wartime 'to bring that mass scientific power ... to the assistance of the country and the **Empire**'¹. This was a plea that Australians responded to and the Department of Defence received many designs for new technologies, ranging from a military tank to a 'defence fence' to repel enemy fire.

At the same time as civilians contributed their design ideas, research into technology was funded and supported by the military. A message-carrying rocket was invented at the Australian Imperial Force (AIF) Research Section and successfully used on the Western Front. The Royal Australian Navy (RAN) also nurtured innovation. HMAS *Sydney*'s captain, John Dumaresq, designed a platform for launching aircraft from a ship's deck to combat the threat posed to shipping by German **zeppelins**, and in 1917 the **Admiralty** agreed to install the first such platform on the *Sydney*.

Not all innovation gets recognised. Australian engineer Lancelot De Mole first developed a design for a tank in 1912 and described it as a tracked fighting vehicle. He offered it to the British War Office and later, in 1915, had this model made. His tank was never built but it remains the earliest practical design to have been developed.

RELAWM01900

What purpose do tanks serve in battles?



FAST FACTS Defence Science

For more than a century, Australia has supported innovation in defence technology. Today, the Defence Science and Technology Group (DST Group) has research centres in each Australian state.

| State | Operating since | Responsibilities |
|-------------------|-----------------|--|
| Victoria | 1907 | Initially specialised in munitions and later aeronautical research |
| Queensland | 1950 | Research on materials and equipment in tropical conditions and exploring hypersonic flight |
| South Australia | 1954 | Research into long-range weapons, initially conducted in cooperation with Britain |
| Tasmania | 1954 | Research on developing techniques for food compression and creation of ration packs |
| New South Wales | 1956 | Maritime research including amphibious operations and maritime security |
| Western Australia | 1996 | Submarine research, including sonar data display analysis and surface-to-ship sonar systems |

Captain John Dumaresq, sitting front centre, was an inventive man. As Captain of HMAS *Sydney*, he saw the benefits of planes being able to take off from a ship, and convinced the Royal Australian Navy to install a platform for this purpose on *Sydney* in 1917. He also invented a device that improved the accuracy of naval gunnery. The Dumaresq, named for its inventor, became an important instrument on navy vessels.



AWM EN0224

AWM EN0174

Communicating during battle

Communicating a strategy, tactics or other battlefield information to units in different locations has always been a challenge.



LIEUT. W. H. GEAKE,
of Hornsby, who has been appointed
a member of the Order of the British
Empire in recognition of his services
as the inventor of an improved bomb
for use in trench warfare.

This message-carrying rocket was designed by Lieutenant William Geake in 1917. The head of the rocket held propellant and included a siren whistle. The tail had a message compartment and carried material that flared so the rocket could be seen and found. The message rocket could travel up to two kilometres.

RELAWM04381

Lieutenant William Geake was appointed head of the Australian Imperial Force Research Section in 1917. Based in England, the unit developed innovative equipment to assist with the war effort. Geake travelled to France frequently to test new devices and was wounded three times in the process. In 1918 he was appointed an MBE (Member of the Order of the British Empire).

'Our Brave Boys on the Battle fields', 26 January 1918,
The Cumberland Argus and Fruitgrowers Advocate Parramatta.



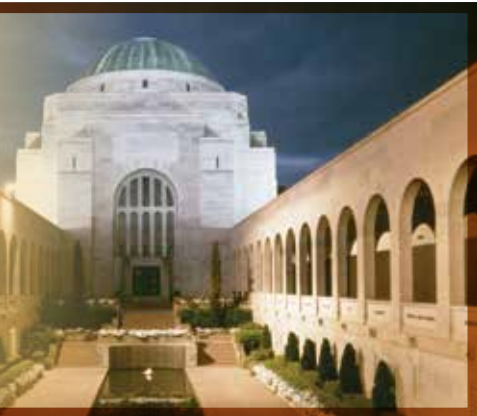
AWM REL28974

During the First World War, pouches containing messages were dropped from aircraft to troops on the ground. These long colourful streamers were attached to the pouches so they could easily be seen and found.

What are some other ways that messages have been sent during battles?

Did you know?

The Australian War Memorial (AWM) helps Australians to explore the Australian experience of war. Its large collection contains diaries, photographs, official records and relics. The Memorial's military technology collection includes aircraft, vehicles, shipping vessels, and communications equipment, much of which demonstrates the nature of military innovation.



AWM PAU2001/05610

By the Second World War, the nature of warfare had changed even more. Technology played an increasingly significant role, particularly with advances in flight and communications technologies. However the resourcefulness of individual Australians continued to be important to the survival and morale of Australian troops. An example of this was a **wireless radio** nicknamed ‘Winnie the War Winner’. This radio set was created from scavenged materials by a group of Australians who had become isolated after the Japanese army invaded Timor in 1942. It allowed the survivors to establish and maintain contact with the Australian mainland. Another innovation, the Owen Gun, was widely adopted by the army from 1943. Evelyn Owen had designed a sub-machine gun prior to the war, but only when Australian troops were fighting in the tropics to the north of Australia was the gun’s value reconsidered, leading to its development. The gun, which had fewer moving parts than other models at the time, proved extremely reliable – even when it became wet or muddy. The Owen Gun went on to be used in the Korean War, the **Malayan Emergency** and the Vietnam War.



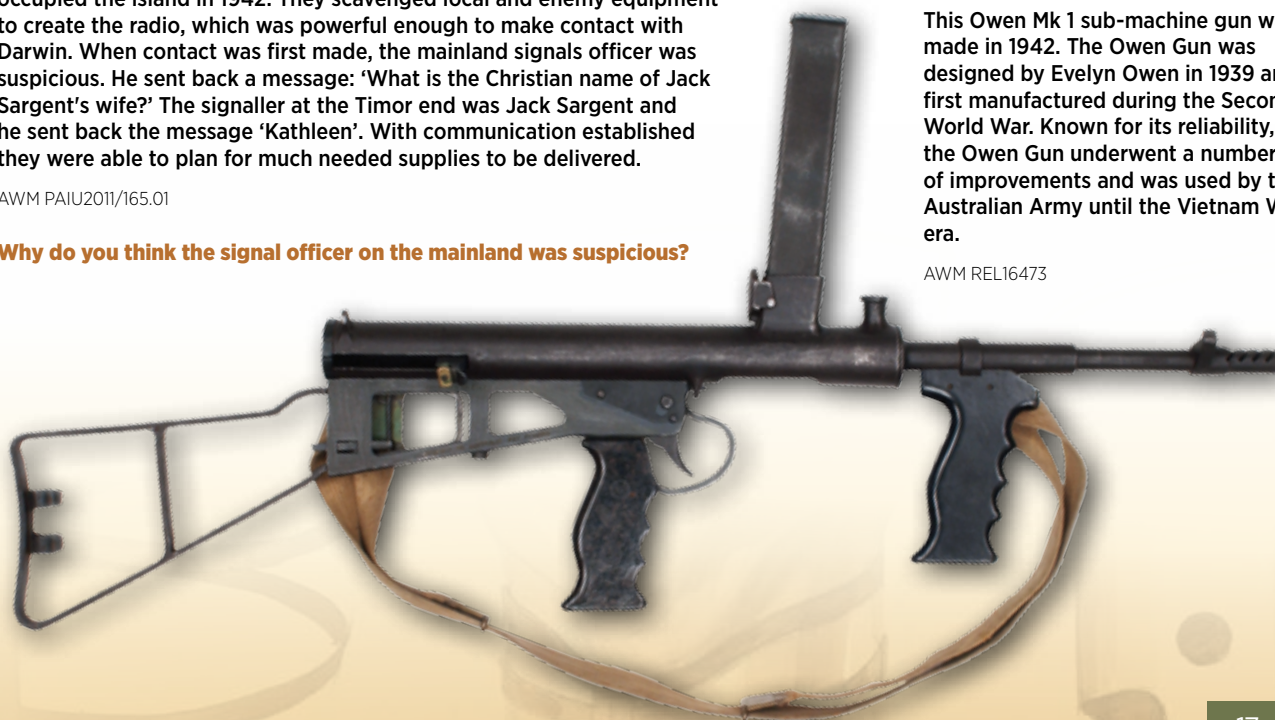
This wireless radio set, nicknamed ‘Winnie the War Winner’ was built by an isolated group of Australian soldiers on Timor after the Japanese occupied the island in 1942. They scavenged local and enemy equipment to create the radio, which was powerful enough to make contact with Darwin. When contact was first made, the mainland signals officer was suspicious. He sent back a message: ‘What is the Christian name of Jack Sargent’s wife?’ The signaller at the Timor end was Jack Sargent and he sent back the message ‘Kathleen’. With communication established they were able to plan for much needed supplies to be delivered.

AWM PAIU2011/165.01

Why do you think the signal officer on the mainland was suspicious?

This Owen Mk 1 sub-machine gun was made in 1942. The Owen Gun was designed by Evelyn Owen in 1939 and first manufactured during the Second World War. Known for its reliability, the Owen Gun underwent a number of improvements and was used by the Australian Army until the Vietnam War era.

AWM REL16473



The design and development of improved technology often involves contributions from large numbers of scientists and significant funding. In recent decades, the Jindalee Operational Radar Network was developed as a major military innovation. This government project was developed between 1971 and 1987 with the aim of protecting Australia’s northern borders from attack. The team developed Over the Horizon Radar, a ground-breaking technology which can detect aircraft and ships operating beyond the horizon.

Contemporary Australian defence personnel also benefit from local innovation. The Bushmaster Protected Mobility Vehicle was first developed in 1998 and its design has been improved in later models. These vehicles have been used to transport and protect troops in Timor, Iraq and Afghanistan, where many were damaged by improvised explosive devices (IEDs). While there have been some serious injuries to soldiers in Bushmasters as a result of IEDs, the vehicle is credited with saving many lives. Bushmasters have been sold overseas to the Netherlands, Britain and Japan, which demonstrates global recognition of Australian inventiveness.

Australia can be rightly proud of the scientists, engineers, designers and other individuals who have contributed to improving the nation’s military capacities. However, it is also important to consider the resourcefulness of those who have served during all conflicts and whose innovative thinking has benefitted Australians on battlefields and in conflict zones around the world. They have repaired equipment using improvised tools, created temporary warning systems around their camps from junk, recycled enemy equipment for their own use and found more effective ways to use their weapons.

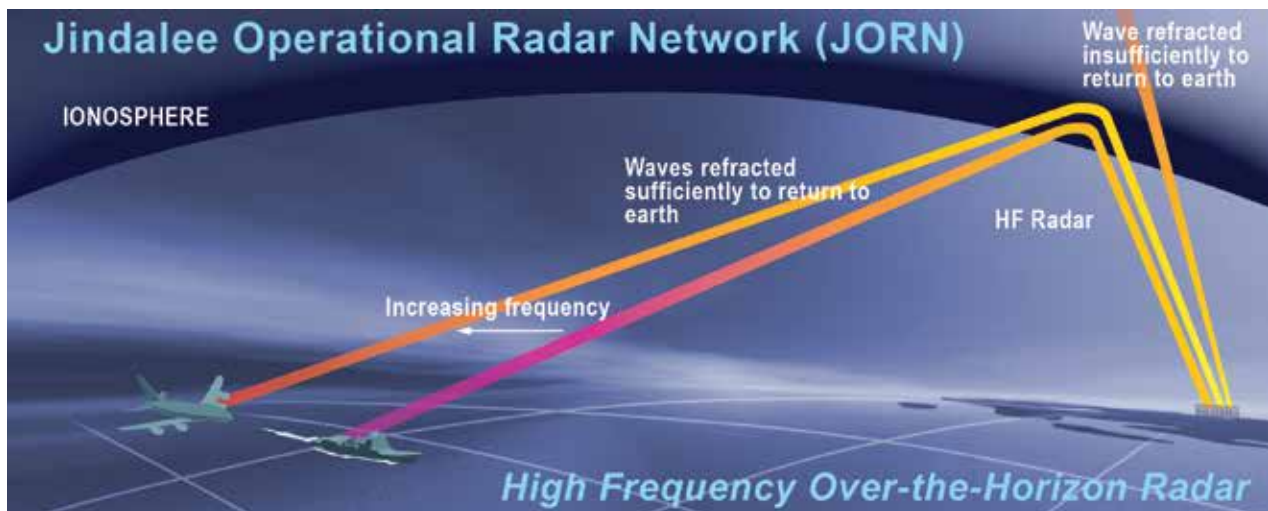


Image courtesy of Lockheed Martin

Bending radar? This diagram illustrates the Over The Horizon Radar technology that helps protect Australia’s northern borders. The technology, largely developed between 1971 and 1987 by the Defence Science and Technology Organisation, makes it possible to track the movements of ships and aircraft beyond the horizon, something not previously possible.

Why do you think this radar focuses on the north of Australia?



Image of Jindalee Operational Radar Network courtesy of Department of Defence.

Department of Defence CAND98_0153-06

Did you know?

If a person wants to be recognised as the inventor of a device or process they have created, they can apply to the government for a **patent**. Once a patent is granted for an invention, it is illegal for someone else to copy the idea to produce and sell it.



The Bushmaster is an Australian innovation success story. First developed in 1998, the vehicle has continued to be improved and is still used by Australian and international troops in conflict zones. Its strength and versatility is credited with saving many lives.

AWM REL31116.001

What features would you include in a design for a vehicle developed to protect troops?

Top image: AWM P11138.001
Bottom image: AWM P07964.030



Decoys, dummies and deception

In 1915, tens of thousands of Anzacs evacuated from Gallipoli largely undetected by the enemy. In 1942, a small force of Australian soldiers on a New Guinea island held their position despite being significantly outnumbered by nearby enemy forces. In 2010, an Australian soldier under heavy fire in Afghanistan ensured the evacuation of a wounded soldier. These events in different times and places had one thing in common – they all involved the strategy of deception.

Success in war is not always related to military might. While having more troops and weapons can determine military outcomes, clever strategies often prove to be critical. Over many years Australians and others have used strategies involving deception to conceal plans, positions, movements and equipment from the enemy. Tactics have included moving under the cover of darkness, communicating with secret codes and disguising equipment and buildings with camouflage. **Decoys**, ranging from brave individual acts to the creation of fake equipment, have also been used as a form of deception.

In September 1918, these members of the 4th Field Company Engineers constructed dummy tanks from wooden frames and painted hessian. The dummies were used during an attack by Australian troops on the Western Front to give a false impression about the number of tanks being used.

AWM E04935 AWM E04934

Why was a camouflage pattern used on a dummy tank?



Drip rifle

The drip rifle invented by Lance Corporal William Scurry was a delayed action device which was designed to fire after Anzac troops had evacuated the trenches at Gallipoli. Scurry used a system of weights where water dripped from one tin to another and then triggered the rifle to fire – up to 20 minutes after it was set.

AWM G01291

What personal qualities did Scurry display with this invention?



AWM P03143.001

Devising ways to draw the enemy's attention away from a strategic position or manoeuvre requires ingenuity and innovation. The successful withdrawal of Anzac troops from Gallipoli is one example. In the final months of 1915, when the decision was made to evacuate from the peninsula, British and Australian military leaders were concerned that thousands of soldiers would be killed as they left. The Anzacs were fighting in trenches so close to the enemy that it was highly likely that the Turkish soldiers would be alerted if there was a mass movement of troops. As a precaution, an elaborate evacuation plan was devised. An early part of the plan involved 'silent stunts' where the Anzacs stopped firing for long periods, after which they fired at their usual rate. Another element of the plan was the staged withdrawal of equipment and troops over several weeks, meaning there were fewer men to evacuate on the final day. An invention by Private William Scurry assisted in the last stage of the withdrawal. Scurry created a drip rifle which used water to trigger gunfire after the soldiers had left. This helped to create the illusion that sections of trenches that had been evacuated earlier, were still occupied. The Anzacs were able to withdraw with very few casualties.

During the Second World War, deception through camouflage was a significant strategy. With advances in photography and **aviation**, both the **Allied** and **Axis** powers increasingly used aerial photographs to learn about the strength and location of their enemy's forces. Forces on both sides made widespread use of sophisticated camouflage to conceal military sites and equipment, including fuel tanks, aircraft hangars and tanks. Camouflage was also used to create the impression of military activity where none existed. For example, fake vehicles, planes or weapons were positioned to look as if they formed part of genuine military installations.

Throughout the war, the army, navy and air force committed resources to the science of camouflage. In addition many civilian artists, photographers, architects, scientists and engineers offered their skills to this part of the war effort. In one of their reports to government, the Sydney Camouflage Group acknowledged the widespread tactic of disguising important military installations and creating fake alternatives. It noted:

*Anything which resembles an aerodrome in Germany is now regarded as a fake.
To produce that effect in Australia is our aim ...¹*

In 1942 and early 1943, the Australians were able to convince the Japanese that a whole Australian **brigade** defended a strategic offshore island, when in fact the New Guinea island was occupied by a much smaller force. In this act of deception on Goodenough Island, dummy camps, trucks, anti-aircraft guns, tents and roads were made from readily available materials and installed on the island. Fake wireless messages were sent, smoking kitchen chimneys were maintained, and plane and ship movements were staged to add authenticity to the illusion.

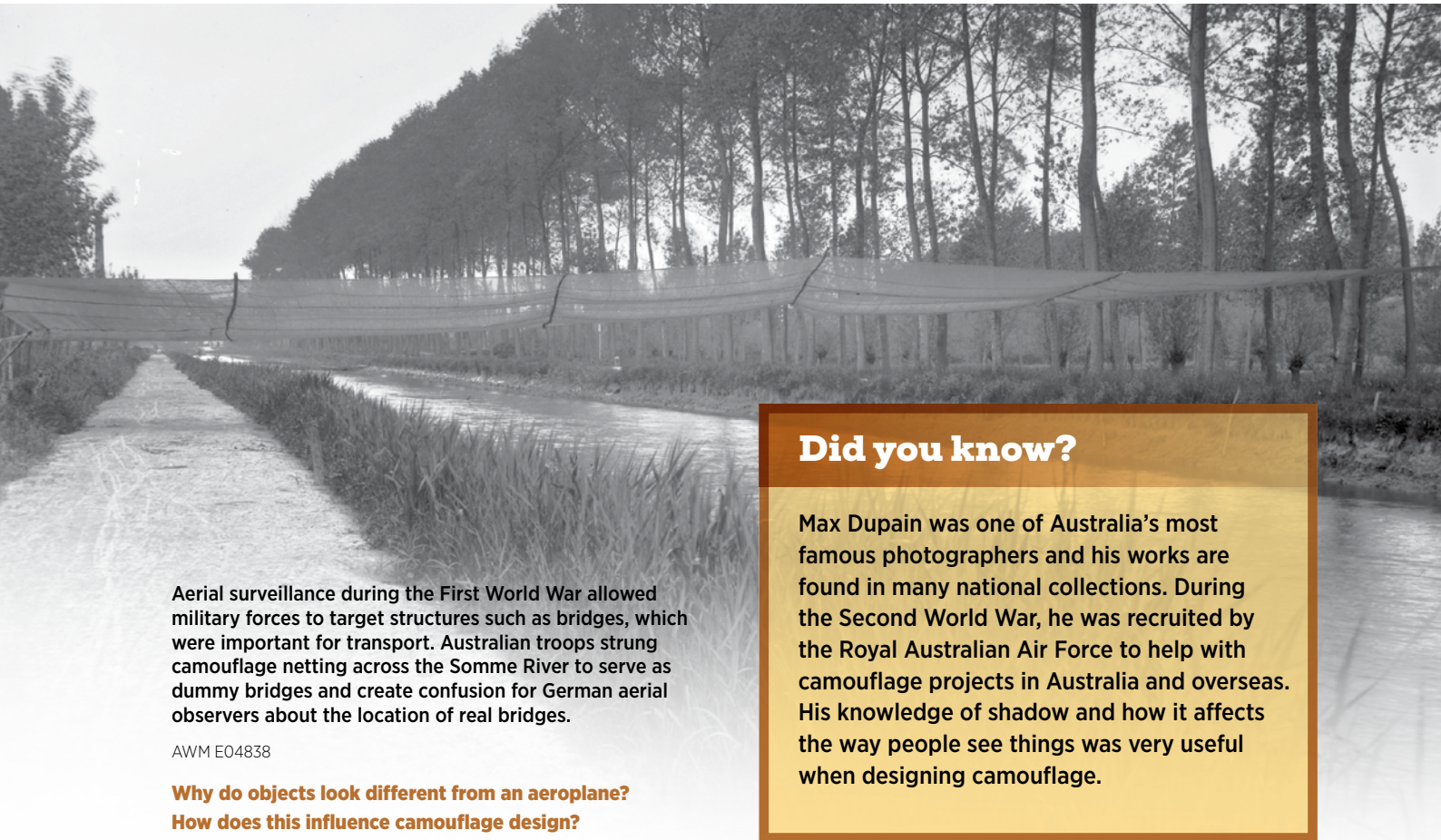
Goodenough Island

In 1942 and early 1943, a small force of Australians on Goodenough Island, New Guinea, created numerous dummies to give the impression that the island was occupied by an entire brigade of Australian troops. This dummy anti-aircraft gun was set up on the beach and fires burnt continuously in imitation kitchens.



AWM 090199

AWM 090217



Aerial surveillance during the First World War allowed military forces to target structures such as bridges, which were important for transport. Australian troops strung camouflage netting across the Somme River to serve as dummy bridges and create confusion for German aerial observers about the location of real bridges.

AWM E04838

**Why do objects look different from an aeroplane?
How does this influence camouflage design?**

Did you know?

Max Dupain was one of Australia's most famous photographers and his works are found in many national collections. During the Second World War, he was recruited by the Royal Australian Air Force to help with camouflage projects in Australia and overseas. His knowledge of shadow and how it affects the way people see things was very useful when designing camouflage.

Wartime deception has not always involved advance planning. There have been many instances where individuals have made spontaneous decisions to mislead the enemy for tactical gain. In 2010, for example, Corporal Daniel Keighran, who was serving in Afghanistan, deliberately exposed himself to enemy fire to divert attention from a wounded colleague. His decoy manoeuvre allowed the casualty to be evacuated. Another example occurred in 1915 in the Sea of Marmara, where the commanding officer of the submarine *AE2*, Lieutenant Commander Henry Stoker, tried to convince the Turkish enemy that there were several Allied submarines in the area. In describing his actions he said:

Dived under gunboat down Strait, and returned up Strait showing periscope in endeavour to give impression that another submarine had come through.²

A heroic decoy

Corporal Daniel Keighran was awarded the **Victoria Cross (VC)** for Australia. His actions in Uruzgan province, Afghanistan, on 24 August 2010 included exposing himself as a decoy to assist with a medical evacuation. The citation for his VC says, in part:

... when his patrol sustained an Australian casualty, Corporal Keighran with complete disregard for his own safety, left his position of cover on the ridgeline to deliberately draw fire away from the team treating the casualty. Corporal Keighran remained exposed and under heavy fire while traversing the ridgeline, in order to direct suppressing fire and then assist in the clearance of the landing zone to enable evacuation of the casualty.³

What is a decoy?

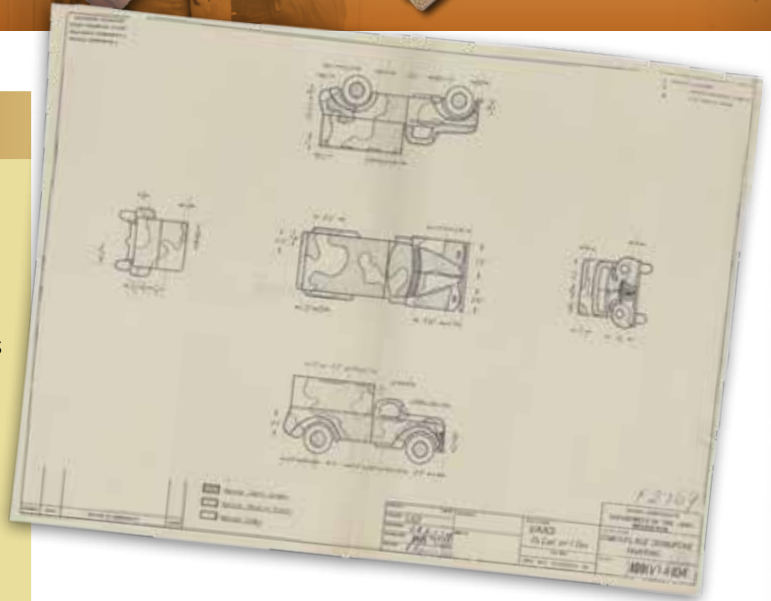


AWM P10927001

FAST FACTS NORFORCE

Camouflage and concealment strategies are regularly used by defence force members operating in Australia today. The North-West Mobile Force (NORFORCE), is a regional surveillance unit of the Australian Army that was formed in 1981. It conducts **surveillance** and **reconnaissance** across 1.8 million square kilometres of northern Australia, protecting against activities such as illegal fishing, drug smuggling and terrorism.

Indigenous Australians form 60 per cent of NORFORCE, and most of the men and women are from the areas they patrol. They use their traditional knowledge of the sea, landscape, seasons and weather to travel undetected through their lands. Members of NORFORCE use bushcraft skills to camouflage themselves and conceal their equipment.



During the Second World War, the Australian Department of Defence produced material for training army engineers in camouflage techniques. Photographs and diagrams outlined instructions for camouflaging military installations, camps and vehicles.

National Archives of Australia 32172421

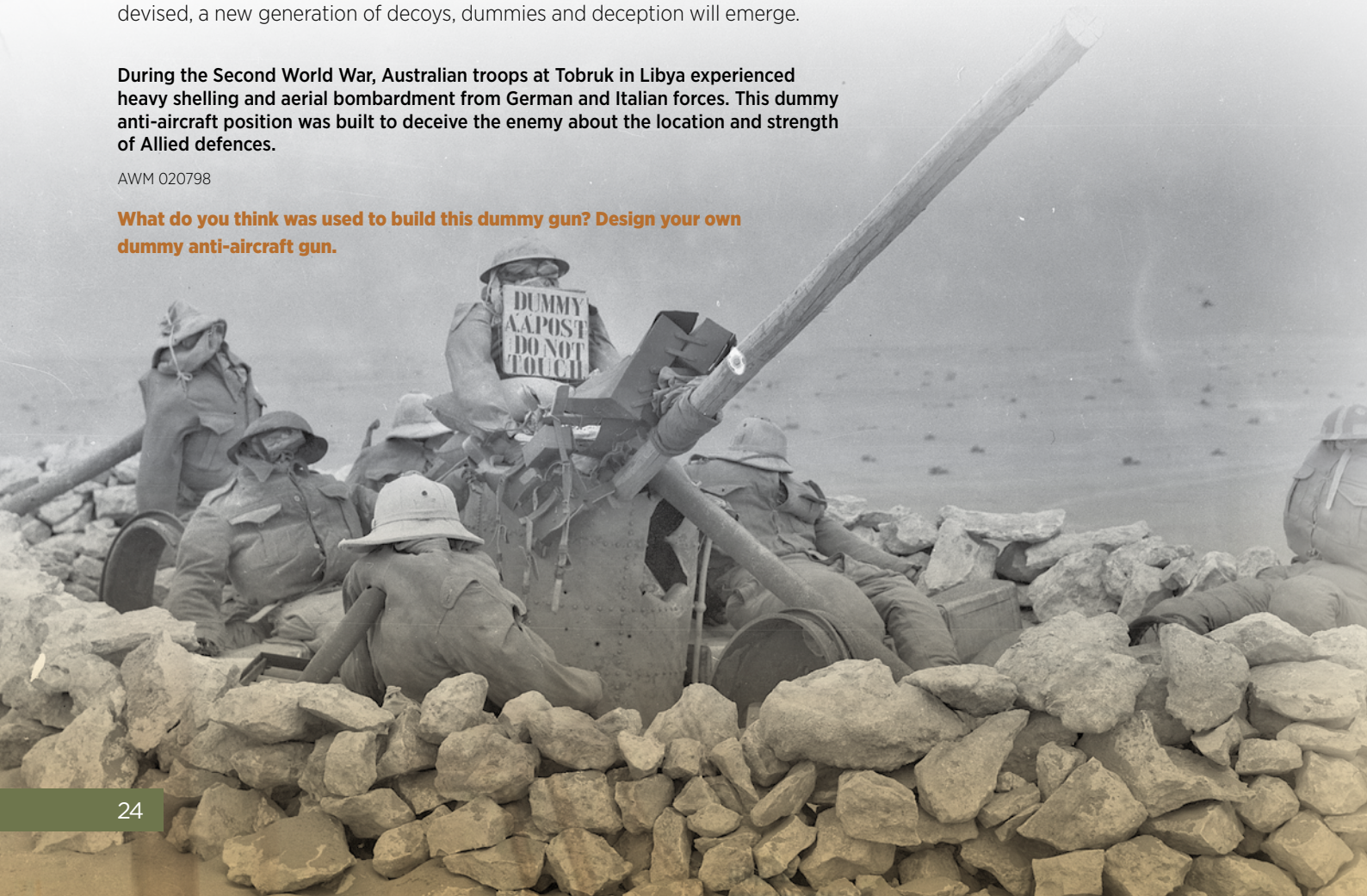
What needs to be considered when designing camouflage?

While Australian service personnel in all conflicts have used deception as a tactic or strategy, the methods adopted have continued to change over time. Advances in technology, including code-cracking computers, thermal-infrared imaging, radar surveillance and **drones**, mean the process of deception has had to become ever more sophisticated in response. As the technology of military weapons evolves, and smarter ways of gaining **military intelligence** are devised, a new generation of decoys, dummies and deception will emerge.

During the Second World War, Australian troops at Tobruk in Libya experienced heavy shelling and aerial bombardment from German and Italian forces. This dummy anti-aircraft position was built to deceive the enemy about the location and strength of Allied defences.

AWM 020798

What do you think was used to build this dummy gun? Design your own dummy anti-aircraft gun.



While serving in Palestine in 1918, Australian Light Horse members made a set of dummy horses. The row of dummies was set up to confuse enemy airmen about the location of the real horses.

AWM B02667

This photo was taken from the ground. How would these dummy horses have looked from above?



The colours used in camouflage designs are selected from those that occur naturally in the environment. The Camouflage Wing of the Royal Australian Engineers developed this set of seventeen metal paint samples during the Second World War.

AWM REL/16500

Can you find these colours in your local environment?



This fake aircraft was used as a decoy to lure Japanese bombers away from the real runway at Kota Bharu, Malaya, in 1941.

AWM P02266.007



Saving lives

What's the best way to transport an injured man across a desert? How do you make an artificial leg in a camp for prisoners of war (POWs)? What would a soldier use to stop herself bleeding to death if her leg is wounded by shell fire? Can a dog help someone cope with trauma caused by war experiences? These are just some of the problems that doctors, nurses and other medical personnel have had to solve during times of war.

Casualties are an inevitable outcome of war. The number and types of injuries caused by weapons can create many challenges for those responsible for the care of injured troops. Often the task is further complicated by the conditions under which medical personnel must work. For more than a century, those providing medical support to Australian service men and women have been using innovative methods and resourcefulness to save lives.

In 1914, when the First World War began, few anticipated the huge number of casualties that would occur in the coming conflict. The length of the war, the number of troops in action and the nature of combat meant that a large proportion of those who served needed treatment for an injury or illness. Many required medical attention on more than one occasion. While the number of injuries in subsequent conflicts has not been of the same scale, medical personnel have nonetheless faced the challenge of responding to large numbers of complex cases in difficult circumstances.

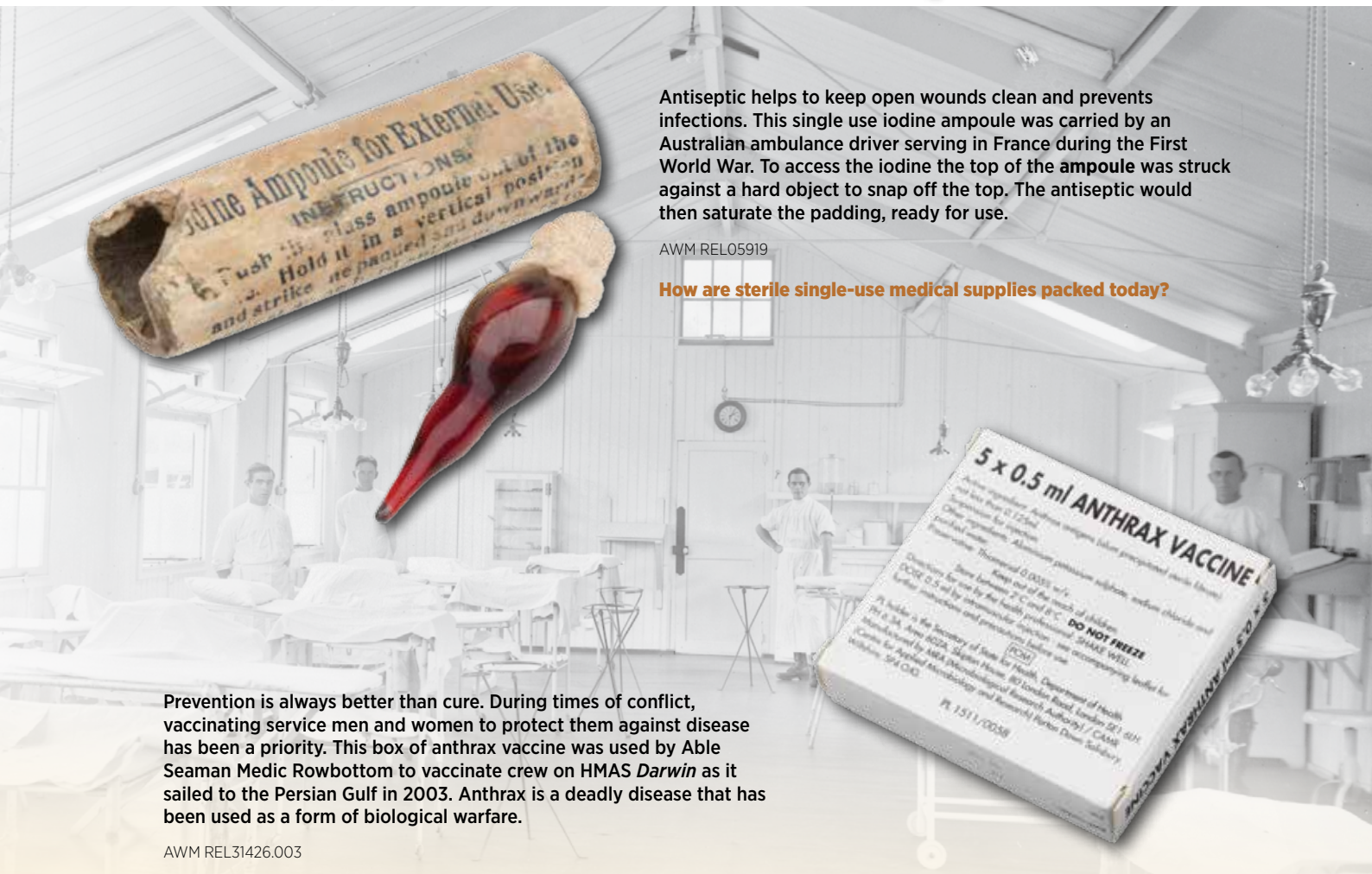
The injuries resulting from armed conflict are often life-threatening. Without medical intervention, trauma and blood loss caused by powerful weapons can quickly lead to death. Even minor open wounds that are not treated promptly can result in serious infections. **Dysentery** and other debilitating conditions are common in the **unsanitary** environment of the battlefield, while diseases such as **malaria** can occur in some regions. Many service men and women can also suffer mental health issues as a result of their experiences on active service.

An Australian surgical team uses an improvised operating theatre in Papua in 1942. The team is setting and applying plaster to a soldier's broken left leg. To support the fractured limb during the procedure, a makeshift frame of rough wooden poles has been set up at the entrance to the tent that serves as the operating theatre.

AWM P02424.057

What skills would the members of this surgical team have needed to care for the injured soldier?





Antiseptic helps to keep open wounds clean and prevents infections. This single use iodine ampoule was carried by an Australian ambulance driver serving in France during the First World War. To access the iodine the top of the ampoule was struck against a hard object to snap off the top. The antiseptic would then saturate the padding, ready for use.

AWM REL05919

How are sterile single-use medical supplies packed today?

Prevention is always better than cure. During times of conflict, vaccinating service men and women to protect them against disease has been a priority. This box of anthrax vaccine was used by Able Seaman Medic Rowbottom to vaccinate crew on HMAS *Darwin* as it sailed to the Persian Gulf in 2003. Anthrax is a deadly disease that has been used as a form of biological warfare.

AWM REL31426.003

The men and women responsible for providing medical care to Australian defence personnel have frequently had to respond without access to familiar equipment or facilities. Many battles have taken place in remote or devastated regions where there were either no established hospitals or clinics or where those that had existed had been destroyed. Medical teams have frequently established makeshift hospitals where they were needed, including in tents and tunnels, on trains and ships and even in an abandoned amusement park. A diary entry on 28th June 1941 by the wounded Arthur Bryant reveals the conditions in which he and other patients were treated:

We were removed in the afternoon to underground caves ready to be evacuated from Tobruk. There I saw such shockingly wounded men that I certainly lost any sympathy for myself.¹

Australian doctors have performed surgical operations without power and in extreme climatic conditions. They have devised ways of dealing with tropical humidity in Malaysia and Vietnam, and sub-zero temperatures on the Western Front and in Korea. The hygienic conditions required for medical procedures have sometimes been difficult or impossible to maintain. In a letter to her cousin from the Western Front during the First World War, Sister Gertrude Doherty wrote:

*Do you know, Muriel, that as many as 72 operations have been performed in one day in our hospital alone ... you could not imagine how dirty the poor beggars are, never able to get a wash, mud and dirt ground in and nearly all of them alive with **vermin**.²*

Coping in such difficult circumstances required resourcefulness. Examples of the creativity of Australian medical personnel include an act as simple as Sister Alicia Kelly using enamel wash basins and bedpans to shield her patients' heads during a bombing raid on a casualty clearing station in France in 1917; and the innovation of Warrant Officer Arthur Purdon, himself a prisoner of war, who developed artificial limbs from salvaged materials for other prisoners in Singapore during the Second World War. Contemporary conflicts have also driven medical invention. Soldiers in the **Middle East** now carry their own life-saving equipment, including **tourniquets** that can be applied to major wounds with one hand while waiting for medical assistance.



The conditions in which the troops lived, particularly during the First and Second World Wars, meant that lice, fleas, worms and other vermin were a common problem. Not only did these cause discomfort, they could also spread disease and cause infections. This Thresh Disinfector (on the left) was used in Egypt in 1916 to steam and kill lice living in blankets and clothing. To increase capacity, barrels were also adapted for this purpose.

AWM A02718

Do you think lice, fleas, worms and other vermin are a problem for service men and women serving in conflict zones today?

Did you know?

Antibiotics are drugs that can kill germs and fight infection. Australian medical researcher Howard Florey worked with Ernest Chain for over a decade to develop the first antibiotic, which is known as penicillin. Penicillin was first used with patients during the Second World War and it saved the lives of thousands of wounded service men and women. Millions of people are still benefiting from antibiotics throughout the world each year.

While such innovations were driven by the desperate circumstances of war, service men and women are not the only ones who benefit. The medical advances that have been developed across the world in response to wartime challenges have, over time, made significant contributions to medicine in general. For example, the need to prevent the outbreak of infectious diseases such as typhoid, cholera and smallpox among troops a century ago promoted the widespread availability of **vaccines** that are still used across the world today. Similarly, in recent years, those who have lost limbs may benefit from **prosthetic** limbs which are controlled by the brain and able to perform complex movements. This technology has developed rapidly in response to the high number of soldiers requiring artificial limbs after being wounded by explosive devices in Middle Eastern conflicts.

War will always challenge doctors, nurses and other medical personnel. Their aim is to save lives. War inevitably results in injury, illness and death. This means that the role of medical personnel is never more important or demanding than during times of conflict. It is due to their resourcefulness, creativity and dedication that so many lives have been, and will continue to be, saved.

Transporting the wounded

The need to act quickly is essential when service personnel are wounded. The minutes, hours or days it takes to get medical care for a patient can mean the difference between life and death. This reality has driven much innovation during times of war. Creative minds have, over the years, developed a variety of methods for moving the injured from the battlefield to medical facilities.



Camel chairs were used during the First World War by the 2nd Australian Light Horse Field Ambulance to transport wounded soldiers over deserts and roads impassable by vehicles.

AWM J02848

Horses were also used to transport the wounded in desert regions during the First World War. Design a chair or stretcher that could be used with a horse.

Medical personnel tend wounded soldiers being flown from New Guinea to Australia in 1944, in a specially equipped aircraft of the RAAF Transport Command.

AWM OG3345

What factors need to be considered when transporting sick or wounded patients from a war zone?



A portable stretcher and carriage with a special attachment for hauling along an aerial line, which was designed by Sergeant Alexander Worsfold of the 9th Australian Field Ambulance during the First World War.

AWM C04779

What may have inspired Sergeant Worsfold to invent this contraption?



A six-stretcher steel cage was used to transfer patients on and off ships in Borneo, 8 July 1945.

AWM 110732

How might the wounded have felt about being transported in this cage?

A RAAF Iroquois helicopter in Vietnam winches a patient to safety in a litter designed to support an injured person, in 1969.

AWM P05104.047



FAST FACTS The casualties of war

It is very hard to know exactly how many Australian service men and women have required medical assistance during wars. While thousands of service men and women have been killed in action, many more have been wounded. Some of these have required treatment for months or years after the end of the conflict.

Record keeping is difficult in combat zones and methods of counting cases have changed over time. The following figures are approximate only.

First World War

Deaths: 60,000

Sickness or injury: 586,000 cases

Second World War

Deaths: 39,000

Wounded in action: 55,249 cases

Korea, Malaya and Indonesia

Deaths: 416

Wounded in action: 1535

Vietnam War

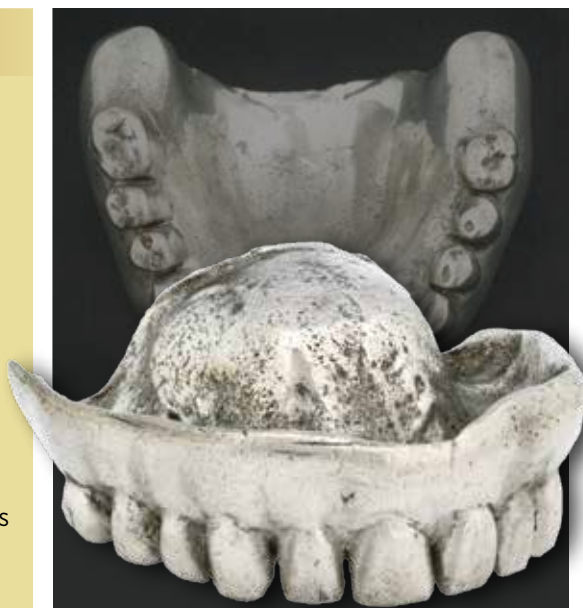
Deaths: 521

Wounded in action: 2400 cases

Middle East conflicts

Deaths: 40

Wounded in action: 250 cases



These dentures were made by Lance Corporal Alfred Lewis during the Second World War at a German prisoner of war camp in Poland. He created them using melted down silver foil from chocolate bars provided by the Red Cross.

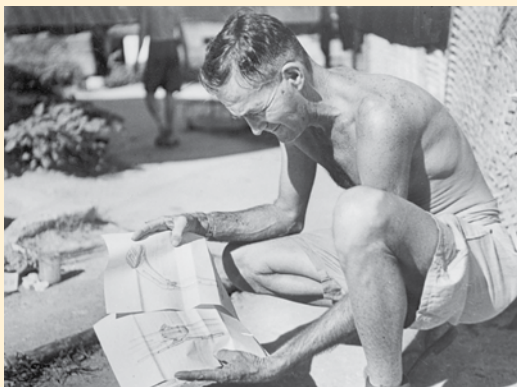
AWM REL/09653



Jack Chalker, *Colonel Edward "Weary" Dunlop and Captain Jacob Markowitz working on a thigh amputation, Chungkai* (1946, oil on cardboard, 21 x 29.7 cm, AWM ART91848)

Artificial limbs at Changi Prison Camp

Many Australian soldiers captured by the Japanese during the Second World War spent time in the Changi Prison Camp in Singapore. Without access to adequate food or medicine, many became seriously ill. Infections were common and sometimes required the amputation of limbs. Not to be defeated by their desperate situation, many of the prisoners of war worked together to establish a factory that created artificial limbs for amputees from materials scavenged from around the camp.



Warrant Officer Arthur Purdon in 1945 examines diagrams of artificial limbs. Purdon developed a way of making artificial legs from springs, bolts, aluminium and other salvaged metal located around the camp. Using principles he learnt in first aid training, Purdon drew up plans for how to construct a leg that included ankle and knee joints.

AWM 019332



Murray Griffin, *Artificial Limb Factory, Changi* (1943, brush and brown ink and wash over pencil on paper, 36.2 x 46.8 cm, AWM ART26503)

The production of the limbs was a real team effort. It involved some prisoners secretly collecting the scrap materials from dumps or aeroplane wreckage, while others worked in the 'limb factory', where they followed Purdon's plans to build the limbs. This drawing by Murray Griffin in 1943 shows three different aspects of making artificial limbs at Changi Prison Camp.

Why do you think the running of the limb factory was a team effort?



Murray Griffin, *Artificial limb construction, Changi* (1942-1945, brush and brown ink and wash over pencil on paper, 46.8 x 36.2 cm, AWM ART26502)



Recently liberated POWs pose with their artificial limbs, designed by Purdon and made by Australian POWs at Changi, 1945.

AWM 019327

The limb factory was not the only example of innovation by the prisoners at Changi Prison Camp. Research some of the other items they designed and created.

Boer War
1899–1902



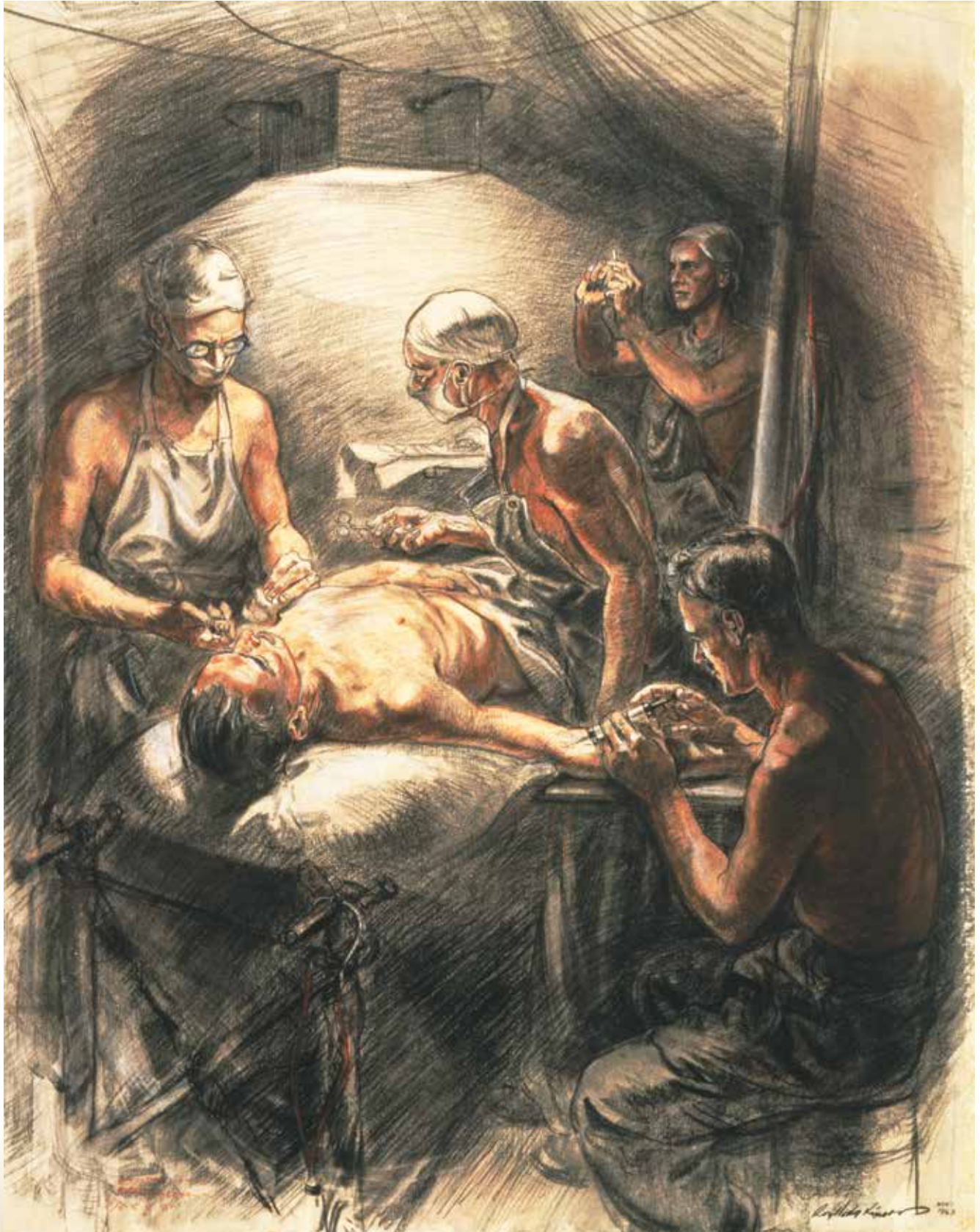
First World War
1914–1918



Second World War
1939–1945



Malayan Emergency
1948–1960



Roy Hodgkinson, *Operating in the field Finschhafen, 2/3 Casualty Clearing Station (Captain Ray Kaines, Major Clive Mendelsohn, Sergeant West and R.H Cheney)* (1943, black and sanguine conte crayon with charcoal heightened with white and with coloured wash on paper, 62.8 x 50.6 cm, AWM ART22756)

Did you know?

Many people who serve in armed conflicts develop mental health issues as a result of trauma they experience. Symptoms can include anxiety, panic attacks, nightmares and sleeplessness. Over the years such conditions have had many names, including Shell Shock, Combat Stress Reaction and, more recently, Post Traumatic Stress Disorder (PTSD). Various programs are now available to support serving and returned members of the defence forces who suffer from PTSD. A recent innovation involves using specially trained service dogs to help sufferers manage their symptoms.

Most Australian service men and women on active duty today carry their own tourniquets as part of their kit. Tourniquets are used to stem the flow of blood from major arm or leg wounds. Blood loss is the biggest killer in wars, and a tourniquet can keep someone alive until they can get medical assistance. Defence force personnel are trained in how to use these tourniquets, including on themselves.

AWM REL34496



Medical knowledge can save lives. Today, it is not just doctors who can stop a bleed-out or perform cardiopulmonary resuscitation (CPR). These medical dummies are used to train all defence force members so they know what to do when people are injured. The dummies can be used to simulate a number of traumas, such as life threatening bleeding and a punctured lung.

AWM P09777.006

How would you feel tending to the patients in this training exercise?



Escapes and rescues

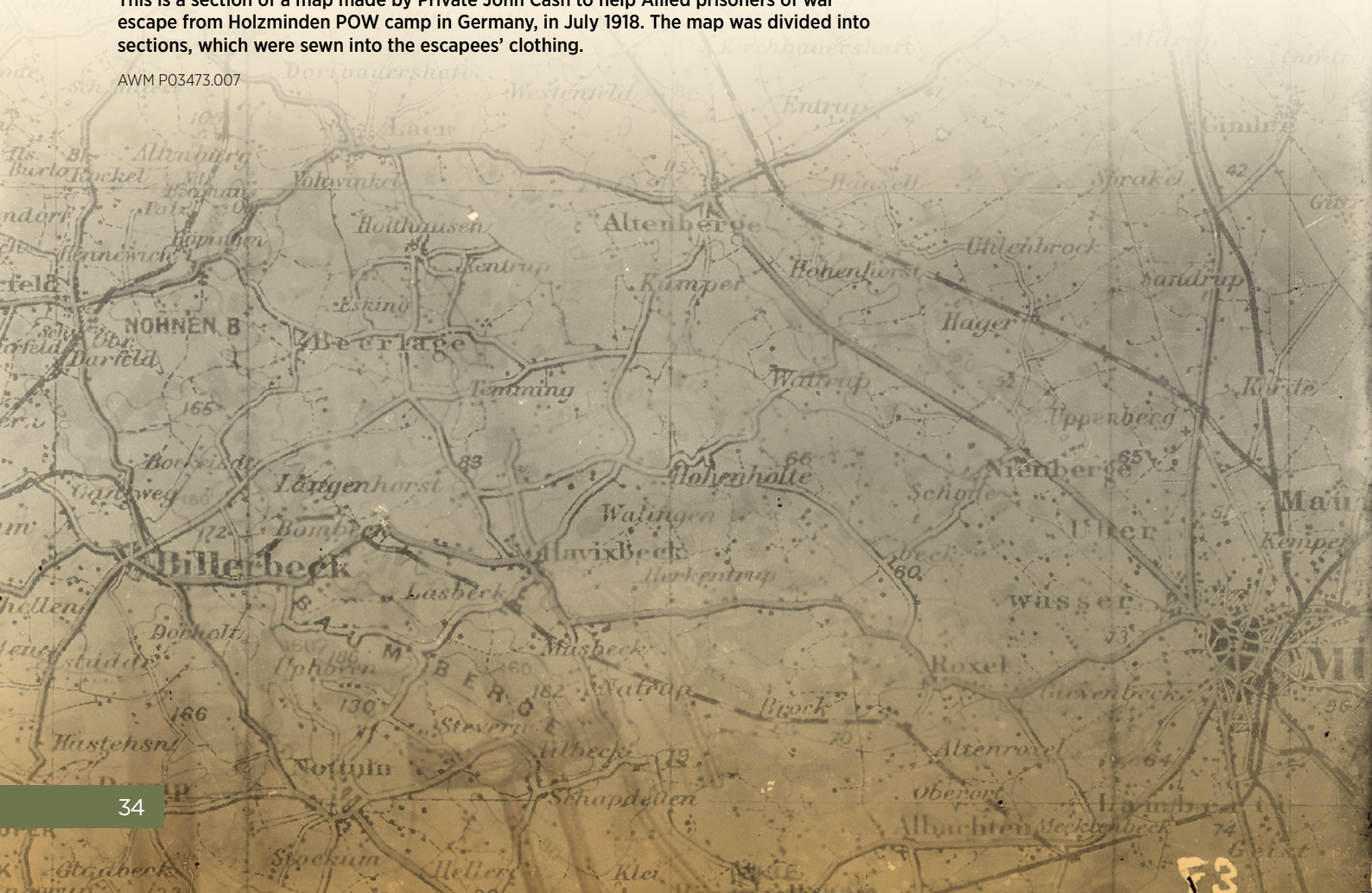
There are many gripping stories of escape and rescue during times of war. Some involve Australians risking their lives – at sea, in the skies or on the ground – to escape the enemy or save a comrade. The skill and bravery of those involved have been captured in artworks, photographs, letters, diaries, books and films. Behind the dramatic events, however, are the actions of hard-working and innovative Australian service men and women.

A determination to be free has motivated many escape attempts by members of Australia's armed forces during times of conflict. While some Australians have managed to avoid capture by an advancing enemy, many have attempted to escape from captivity. Over the last century, more than 34,000 Australians have been taken prisoner of war (POW).

Planning an escape from capture often required secrecy and trust. At times, groups of POWs pooled their talents and spent long hours making elaborate plans. Such mateship has been associated with the Anzacs, but the unique challenges faced by POWs meant they frequently developed close bonds with fellow prisoners of all nationalities. Ingenuity was also necessary, and Private John Cash, who was captured by the German army on the Western Front in May 1917, exemplified this. He collaborated with a group of Allied prisoners to plan an escape. During the nine months it took to dig a tunnel, Cash collected wire-cutters, a map and photographic equipment by exchanging food from his **Red Cross** parcels with German civilians. Cash used the equipment to make copies of the map for the entire group. Although he was not one of the twenty-nine men who succeeded in escaping, all the escapees sewed sections of the map into their clothing so they could find their way to safe territory.

This is a section of a map made by Private John Cash to help Allied prisoners of war escape from Holzminden POW camp in Germany, in July 1918. The map was divided into sections, which were sewn into the escapees' clothing.

AWM P03473.007



FAST FACTS Australian prisoners of war

Over the last century, more than 34,000 Australians have become prisoners of war. The Turkish and German armies imprisoned 4000 Australian servicemen during the First World War, and many more Australians experienced captivity during the Second World War. Between 1940–1945, about 8000 Australians became prisoners of the Italians and Germans, while the Japanese imprisoned more than 22,000 servicemen and nurses. Conditions were particularly difficult for the POWs held in Japanese camps and just over a third died during their captivity. North Korean or Chinese forces also held thirty Australians as POWs during the Korean War, from 1950–53.



Lieutenant Archibald Walker made this compass from objects that were part of a Red Cross parcel he received as a prisoner of war in Germany during the Second World War. Many POWs secretly made compasses from everyday objects to assist in escape attempts, while other compasses came into the camps concealed in welfare packages.

AWM REL18630

Why were compasses so important to POWs planning an escape?



Albert Comber, *Extending the tunnel at the working face, Stalag Luft III* (1945, pen and brush and ink, pencil on paper, 28.8 x 39.2 cm, AWM ART34781.016)

An escape committee co-ordinated the actions of 200 Allied prisoners as they planned an escape from Stalag Luft III, a German POW camp, in 1944. While some prisoners dug tunnels, others hid the soil that had been removed. They were protected by hidden trapdoors and 'stooges' who kept watch for prison guards.

What were the advantages and disadvantages of a large group planning an escape?

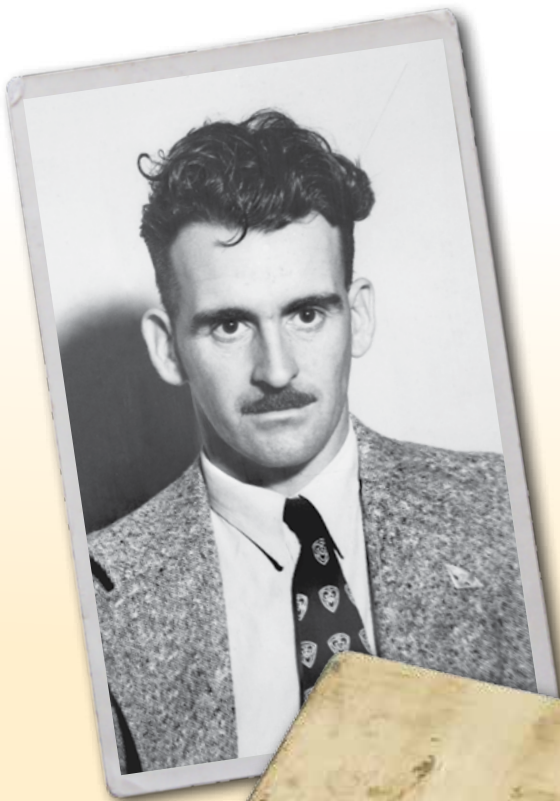
A large number of Australians were taken prisoner during the Second World War and many of them demonstrated similar ingenuity in attempting to escape. This included the March 1944 breakout of Allied prisoners from Stalag Luft III in Germany – known as ‘the great escape’. One of the Australians involved in this escape was Warrant Officer Albert Hake, who made compasses for the escapees from melted phonograph records, slivers of magnetised razor blades, glass from broken windows and solder from the seals of tin cans. Hake was one of the seventy-six Allied airmen who managed to escape, but the **Gestapo** recaptured him and he was among the escapees executed by the Germans. Since 1929 there have been international rules that protect the rights of those captured during wartime, but the rules have not always been observed.

For Australians held as POWs by the Japanese during the Second World War, the conditions were so horrific that escape was sometimes the only chance for survival. During the Sandakan ‘death marches’ in Borneo, nearly 2500 Australian and British soldiers were forced to march through the jungle by Japanese troops. The only survivors were six Australians who managed to escape either during or after the march.

After being captured by Japanese forces and imprisoned in Borneo, Gunner Owen Campbell and four other Australians escaped during the march from Sandakan to Ranau when Allied aircraft flew over a column of prisoners and their guards in June 1945. Two of the escapees died from malaria and dysentery in the jungle and another two were shot by Japanese soldiers. Campbell, assisted by natives, survived for several weeks before being taken to the coast. He was picked up at sea by a flying boat.

AWM 041489

What skills and qualities might Campbell have needed to survive in the jungle?



The crew of Catalina flying boats on long range rescue and evacuation patrols carried a kit that included chocolate, benzedrine sulphate (to overcome drowsiness), morphine tartrate (for very severe pain), a combination waterproof matchbox and compass, a mirror and a book titled ‘Malay glossary for airman’.

AWM REL31567-1 AWM REL31567-2

Why do you think each of these items were included in an emergency kit?



This compass was used in escape kits carried by troops serving in the tropics during the Second World War. The plastic coating protected the compass from humidity.

AWM REL18568.003

Did you know?

The Geneva Convention is a set of international rules that aim to protect the rights of prisoners of war, the wounded, **non-combatants** and civilians during wartime. Under these rules prisoners must be treated humanely at all times and given adequate food, clothing and medical care. In the past, these guidelines were not always followed and many Australians experienced extremely harsh conditions during periods of captivity.

During the Second World War the Royal Australian Air Force (RAAF) produced maps of the South West Pacific Area where Australian aircrews were flying. The maps were part of the survival gear issued to aircrews in case they were forced down in enemy territory. They were produced on silk, a light and strong fabric.

AWM VIC0181

Why was silk used as the material for RAAF maps?

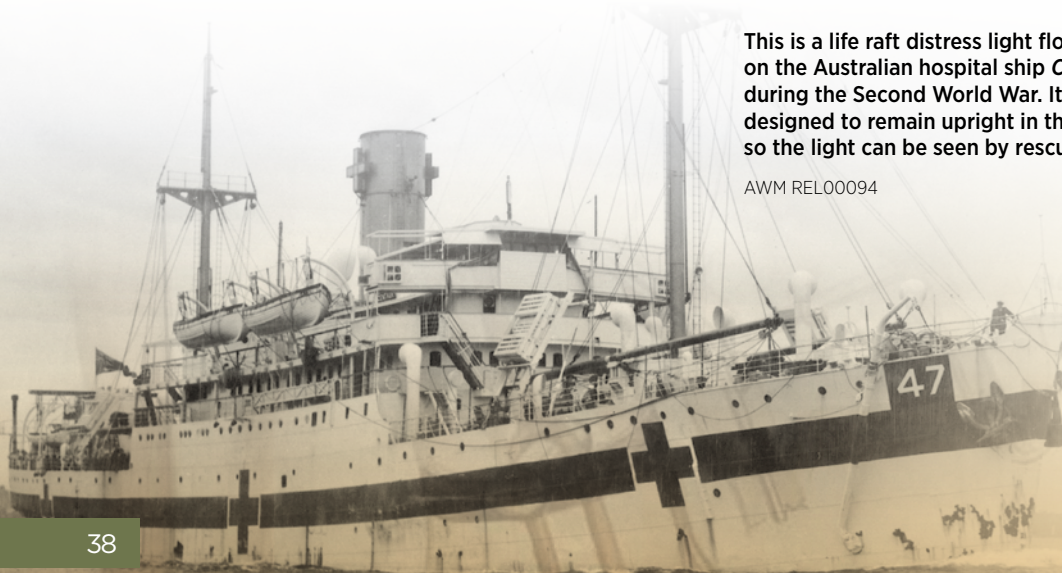


While the survival instinct has at times inspired escapes, it has also saved many Australians during emergency situations. Successful rescues, however, can depend not only on the will of the victims but also on the resourcefulness of those who come to the rescue. Although the training of military personnel equips them to handle a range of situations, when emergencies happen there is often no time to develop a plan. When pilot Lieutenant Frank McNamara saw a fellow **squadron** member shot down over Gaza in March 1917, he landed his own plane to rescue him. McNamara had just suffered a serious leg wound, which led to him crashing his plane as he tried to take off with his passenger. With the enemy approaching, the two men managed to get to the other plane and fly to safety. Stretcher bearer Sergeant Thomas Murray also showed initiative during a rescue in the Korean War when he organised a medical evacuation across a broken bridge. While under enemy fire, patients were successfully manoeuvred across a freezing, fast-flowing river using manpower, ropes, and boats.



Septimus Power, *The incident for which Lieutenant F.H. McNamara was awarded the VC* (1924, oil on canvas, 171.5 cm x 262 cm x 8.5 cm, AWM ART08007)

In March 1917, Lieutenant Frank McNamara managed a 'brilliant escape in the very nick of time and under hot fire'.² Having seen a member of his squadron shot down near Gaza, McNamara landed his plane and successfully rescued his comrade. He was awarded the Victoria Cross for his actions.



This is a life raft distress light float used on the Australian hospital ship *Centaur* during the Second World War. It is designed to remain upright in the water so the light can be seen by rescuers.

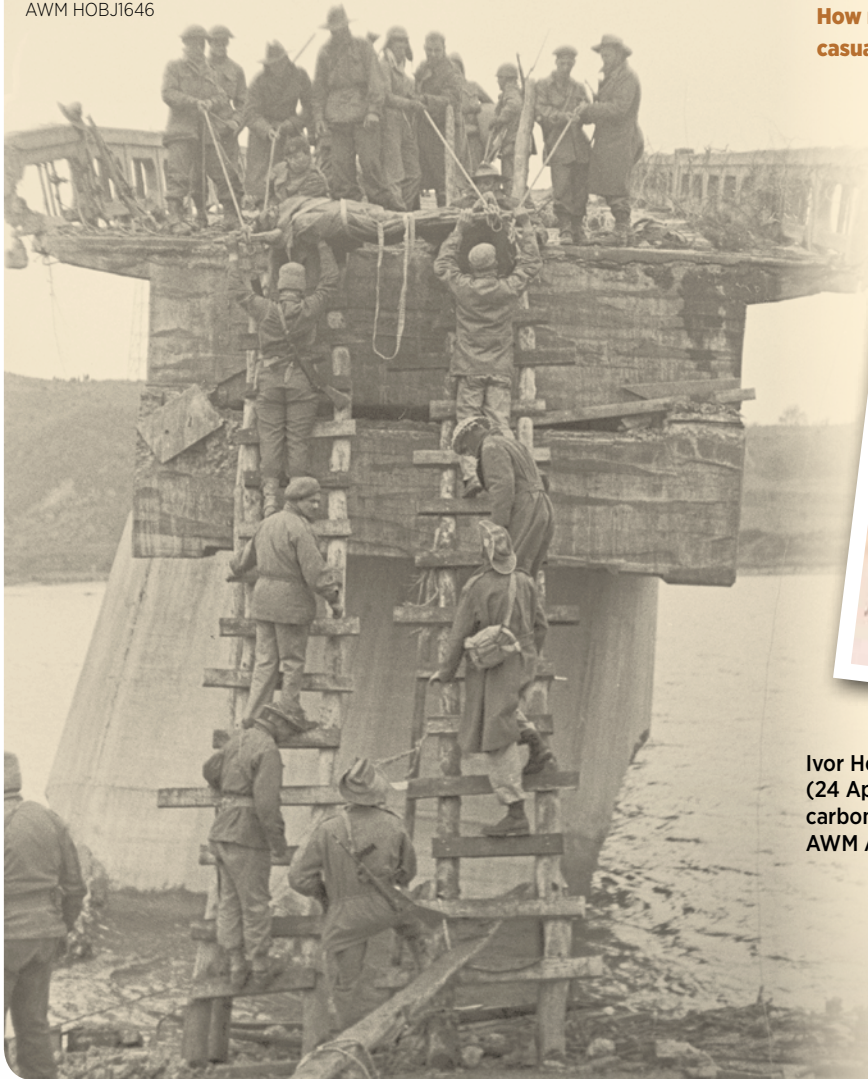
AWM REL00094



Sergeant Thomas Murray

In October 1950, Sergeant Thomas Murray overcame the challenge of a wrecked bridge and a rising tide to evacuate casualties across a river in North Korea. Murray exposed himself to fire as he improvised ladders and lines to lower the wounded to a borrowed boat, which was hauled by rope to waiting ambulances. Murray was awarded the **George Medal** for his actions.

AWM HOBJ1646



How might Murray have felt after the casualties were safely evacuated?



Ivor Hele, *Sergeant Thomas Murray*
(24 April 1952, red conte crayon,
carbon pencil on paper, 37.8 x 27.8 cm,
AWM ART40400)

Animals and birds are sometimes the heroes of rescues. This carrier pigeon flew sixty-five kilometres to deliver a message from the crew of an Australian Army boat stranded off the New Guinea coast in July 1945. In response, a rescue ship was sent and it arrived in time to rescue the crew and salvage the boat and its cargo.

RELAWM30785

Can you think of other ways that animals could be used in rescue operations?



AWM 073820

It was the ingenuity of crew on board a stricken vessel, rather than rescuers, that enabled survival during a maritime emergency in 1942. After Japanese **torpedoes** sank HMAS *Armidale* near Timor, more than 100 Australian lives were lost. Following further attacks by Japanese aircraft, the survivors created a makeshift raft to keep them afloat. To this they hitched a badly damaged and semi-submerged **whaler** from the *Armidale*. While some survivors were able to reach the area patrolled by Australian ships and aircraft in a small, damaged motorboat, the remainder, after waiting for two days and despairing of rescue, set to work repairing the whaler. They invented a way to support the boat on the raft and repaired it with canvas. Twenty-nine men then took turns rowing the whaler in the open sea until they were rescued. Another group remained on the raft and a floatation device waiting to be rescued, but could not be picked up and were never seen again. Col Madigan, one of the men on the whaler, later recalled:

*... as survivors we were hurled into this incredibly hostile environment.
We had to adapt to the environment or die.¹*

Different factors have motivated the individuals who participated in escapes and rescues during times of war. For some it was survival instinct, for others it was a will to be free or remain part of the war effort. For many it was a desire to help others when they were in need. But the quality that all these Australians have demonstrated by their actions was resourcefulness.



Image courtesy Jan Senbergs

Jan Senbergs, *The rescue* (1998, pastel and synthetic polymer paint on paper, 115 x 153 cm, AWM ART91501)

After HMAS *Armidale* was sunk on 1 December 1942, some of the survivors spent eight days at sea before being rescued by HMAS *Kalgoorlie*. As well as needing to repair a small boat, they survived sharks and thirst before they were rescued.

What feelings has the artist tried to capture in this drawing?

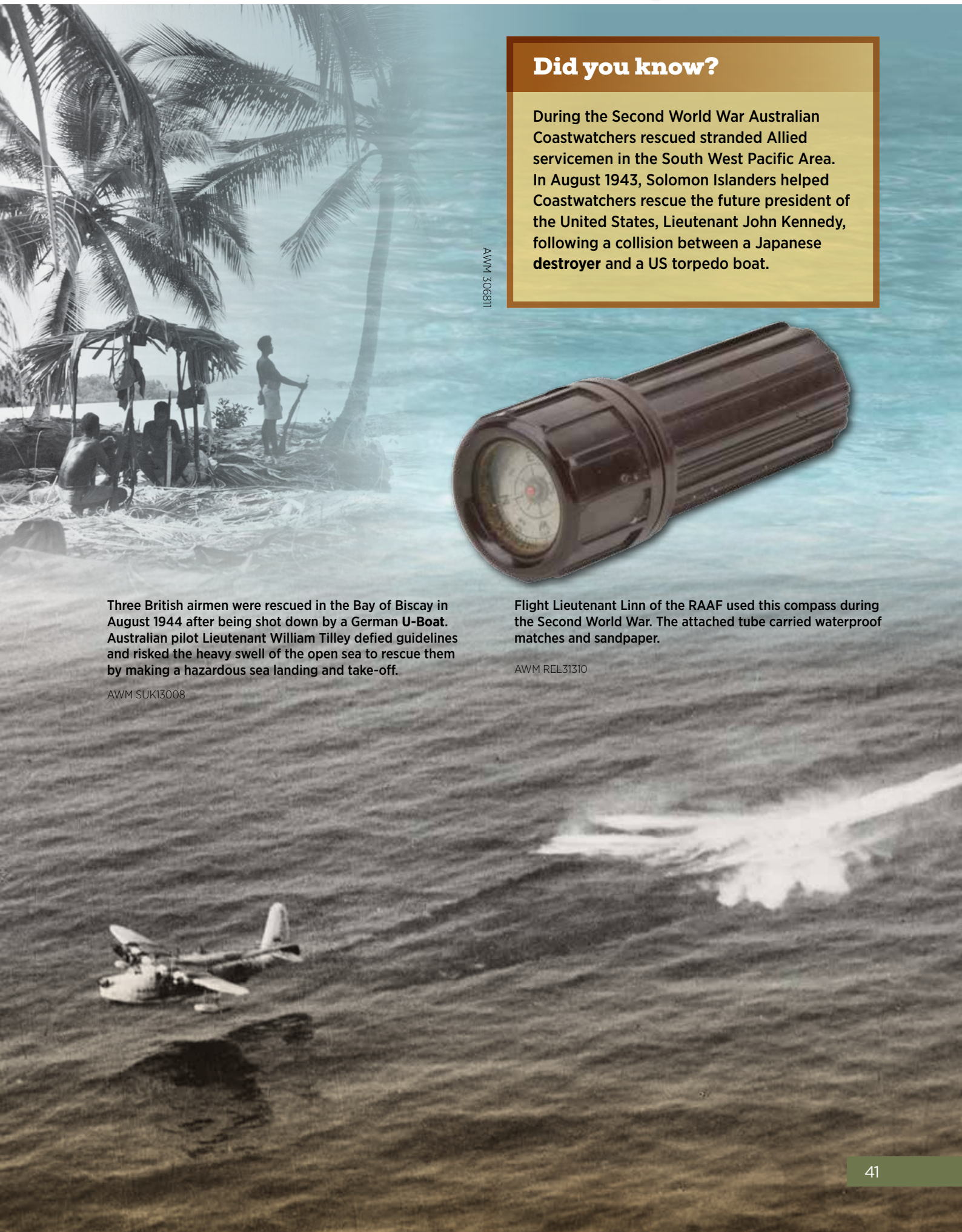


Korean War
1950–1953

Indonesian Confrontation
1962–1966

Vietnam War
1962–1975

Recent conflicts and peacekeeping
1990–today



Did you know?

During the Second World War Australian Coastwatchers rescued stranded Allied servicemen in the South West Pacific Area. In August 1943, Solomon Islanders helped Coastwatchers rescue the future president of the United States, Lieutenant John Kennedy, following a collision between a Japanese destroyer and a US torpedo boat.

AWM 306811



Three British airmen were rescued in the Bay of Biscay in August 1944 after being shot down by a German U-Boat. Australian pilot Lieutenant William Tilley defied guidelines and risked the heavy swell of the open sea to rescue them by making a hazardous sea landing and take-off.

AWM SUK13008

Flight Lieutenant Linn of the RAAF used this compass during the Second World War. The attached tube carried waterproof matches and sandpaper.

AWM REL31310

Helping from home

What do a rattle, a pattern for knitting two socks at once, and a spotter's chair have in common? They are all innovations used by Australians on the home front during wartime.

Those who remain at home face challenges when Australia is involved in armed conflicts. This was particularly the case during the First and Second World Wars. Hundreds of thousands of servicemen took part in combat operations or, along with servicewomen, served in support roles. Those at home also made sacrifices and contributed to the war effort. Australians found ways to make do with less, change their behaviours and habits and cope with separation and loss.

During the First and Second World Wars, Australian governments made rules and regulations that aimed to assist with the war effort. This included taking control of pricing and enforcing restrictions on some products to ensure that resources were available to feed, clothe and arm the troops. Keen to assist their country in wartime, Australians rallied. Women's groups were formed to raise funds, knit garments and prepare comfort packs for the troops. Some industries changed their production lines to create equipment, weapons and ammunition. Women filled jobs that had previously been done by men. They displayed great resourcefulness in learning new skills, including those of factory workers and, during the Second World War in particular, as farm labourers. Thousands of women also joined the women's services during the Second World War, which saw them wearing uniforms and performing jobs for the defence forces.

Many women did voluntary work for welfare groups during the First World War. These women are making clothes and packing home comforts parcels for members of the Australian Imperial Force serving overseas.

AWM A03343

What might Australians serving overseas today receive in parcels from home?



AWM REL12522



During the First World War, volunteers across Australia knitted items for the troops. This pattern, produced in 1917 by the Melbourne Lady Mayoress's League, allowed experienced sock knitters to knit two socks at once.

AWM RCDIG0001172

What other items may have been knitted for the troops?



Women on the home front were encouraged to be resourceful by taking on jobs previously filled by men. This leaflet was used during the Second World War to encourage women to work on farms.

AWM SCO1062

Why might women have decided to join the Australian Women's Land Army after seeing this leaflet?



FAST FACTS Women in the workforce

In the First World War, many Australian women helped the war effort by joining voluntary organisations such as the Red Cross, Country Women's Association and Australian Comforts Fund. More women worked outside the home than before the war, mainly in food and clothing industries.

During the Second World War, the Australian government actively encouraged women to work in industry in order to free men for **enlistment**. The number of women in industry rose from 1000 in 1939 to 145,000 in 1943. They worked in a range of jobs in places such as munitions factories, steel mills and meatworks, and as drivers in the transport industry. The Australian Women's Land Army was formed in 1942 to recruit women to work on farms. By 1944 it had 3000 members.

The world wars were times when Australians learnt to make do with less, which encouraged innovation. With resources being diverted to the war effort, there was less available for civilians. In response, Australians shared recipes that made meat go further, grew more of their own vegetables and kept chickens in their back gardens. People made dish cloths from old sugar bags and clothing from recycled fabrics. School children also contributed by collecting useful items for recycling, knitting for the troops and growing vegetables at school. The shortage of petrol during the Second World War led to many cars being converted to run on gas produced by burning charcoal. A shortage of weapons for training volunteer defence corps recruits also created a problem. Captain Leonard Seton came up with a clever solution by creating a series of imitation weapons, often made of wood, which could be used for practise **drills**.

With a shortage of petrol during the Second World War, equipment like this was attached to cars so they could run on gas. These men are adding charcoal to a burner to produce the gas.

AWM 027267

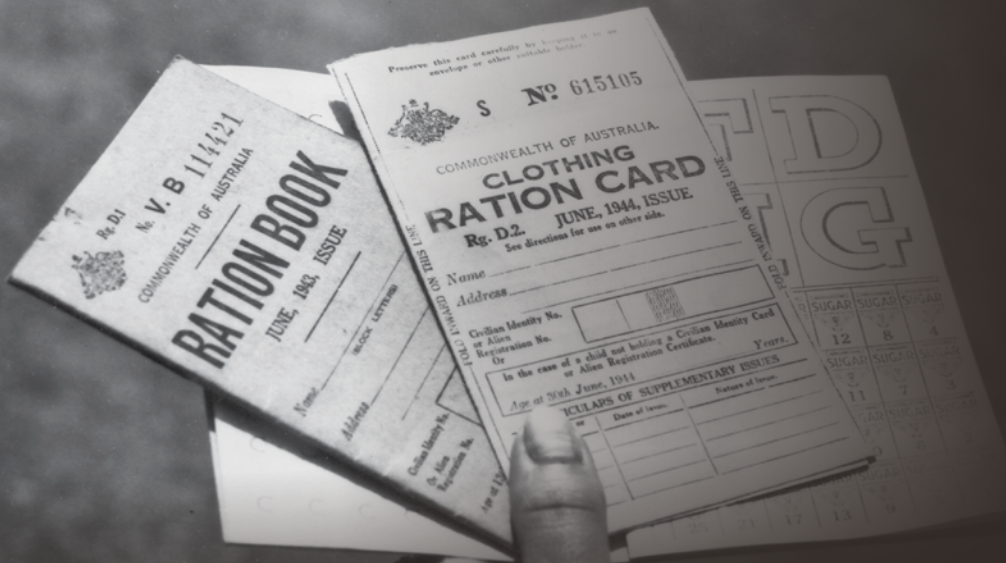
Why was there a shortage of petrol?



Rationing of clothing during the Second World War inspired this tailor to make a suit from used sugar bags. With people buying fewer clothes, the tailor had to close one of his shops.

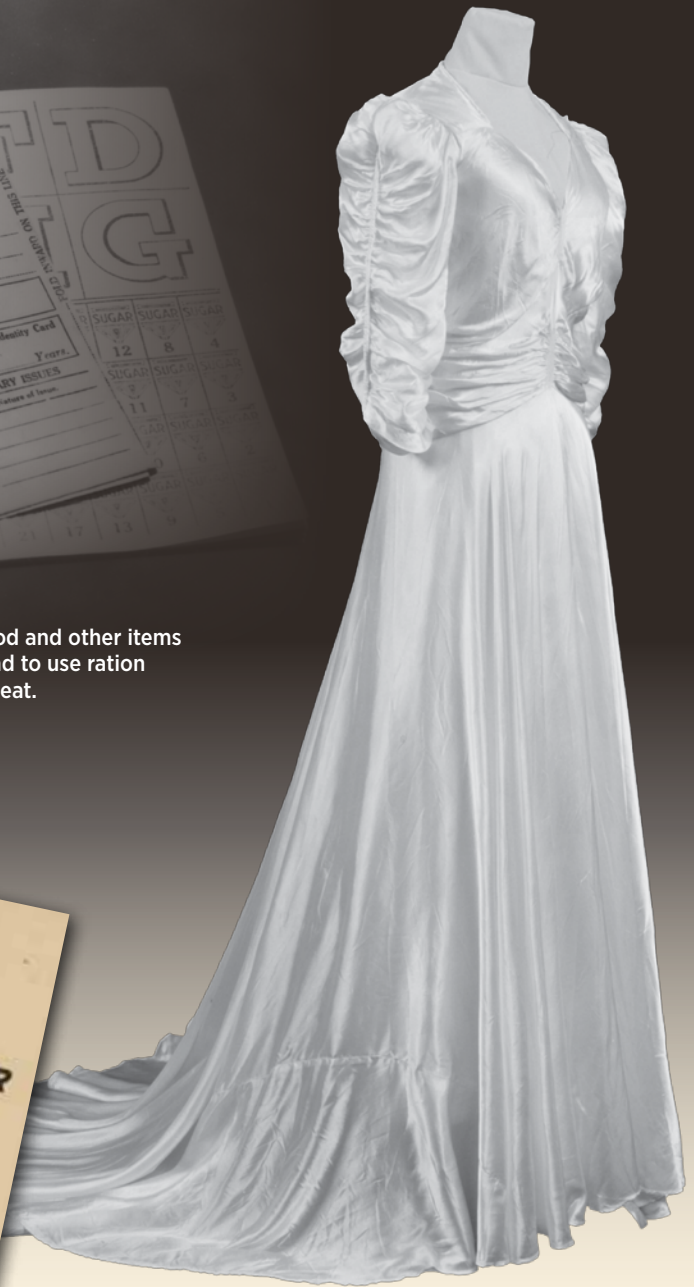
AWM013237

Why do you think clothing was rationed during the Second World War?



Rationing was introduced in Australia in 1942 to make sure food and other items were available and fairly distributed during the war. People had to use ration books like these when buying clothing, tea, sugar, butter or meat.

AWM 042770



The wearer of this wedding dress showed great resourcefulness during the Second World War. With limits on the purchase of fabrics, it was created using curtain lining fabric, furniture piping cord and cotton mosquito netting.

How do you think the bride felt wearing this dress on her wedding day?

AWM PAIU1995/070.14



This leaflet from the Second World War provided recipes which helped a family of four make their meat ration go further.

AWM RC04609



Captain Leonard Seton made this practise rifle from bush timber and old machinery during the Second World War. Seton was a member of the Volunteer Defence Corps, which did not have access to enough real weapons for training purposes.

AWM RELAWM24506

Most battles and campaigns involving members of Australia's armed forces have been fought outside Australia. The exception to this was during the Second World War when Japanese planes and submarines attacked the mainland, prompting fears of invasion. The government introduced strict regulations in an attempt to protect Australia. Blackouts were enforced at night and people installed window coverings in their homes and headlight caps on their cars. In anticipation of bombing raids, **air raid** shelters or **slit trenches** were made in some back gardens and school children practised air raid drills. Camouflage was installed to protect critical facilities like fuel tanks.

Throughout the war, members of the public also contributed their own ideas about how to protect Australia. These included:

*The attachment of **incendiary** devices onto birds migrating to Japan; a deception scheme for Centennial Park to make it appear to be Sydney Harbour, thereby disorienting enemy bombers; and the attachment of mirrors to war ships to make them invisible on the water.¹*

While the scale of conflicts involving Australia has varied considerably, the challenge for those who have loved ones on active service has remained constant. Over the years, Australians have found many creative ways to let service men and women know that they are missed. Anzac biscuits, made from ingredients that keep for months while being transported, have been sent to Australians serving overseas since the First World War. Other gifts have included embroidered messages and gum leaves from home.

Technological advances over the last century have not only changed the nature of warfare but also the experience of war for those on the home front. Modern communication technologies, including television and the internet, keep people at home up to date about events in conflict zones and inform them of any likely threats to Australia. They also allow people to maintain regular contact with friends or family members serving overseas. Nonetheless, responding to the challenges of war will always require resourcefulness, demonstrated by so many Australians.

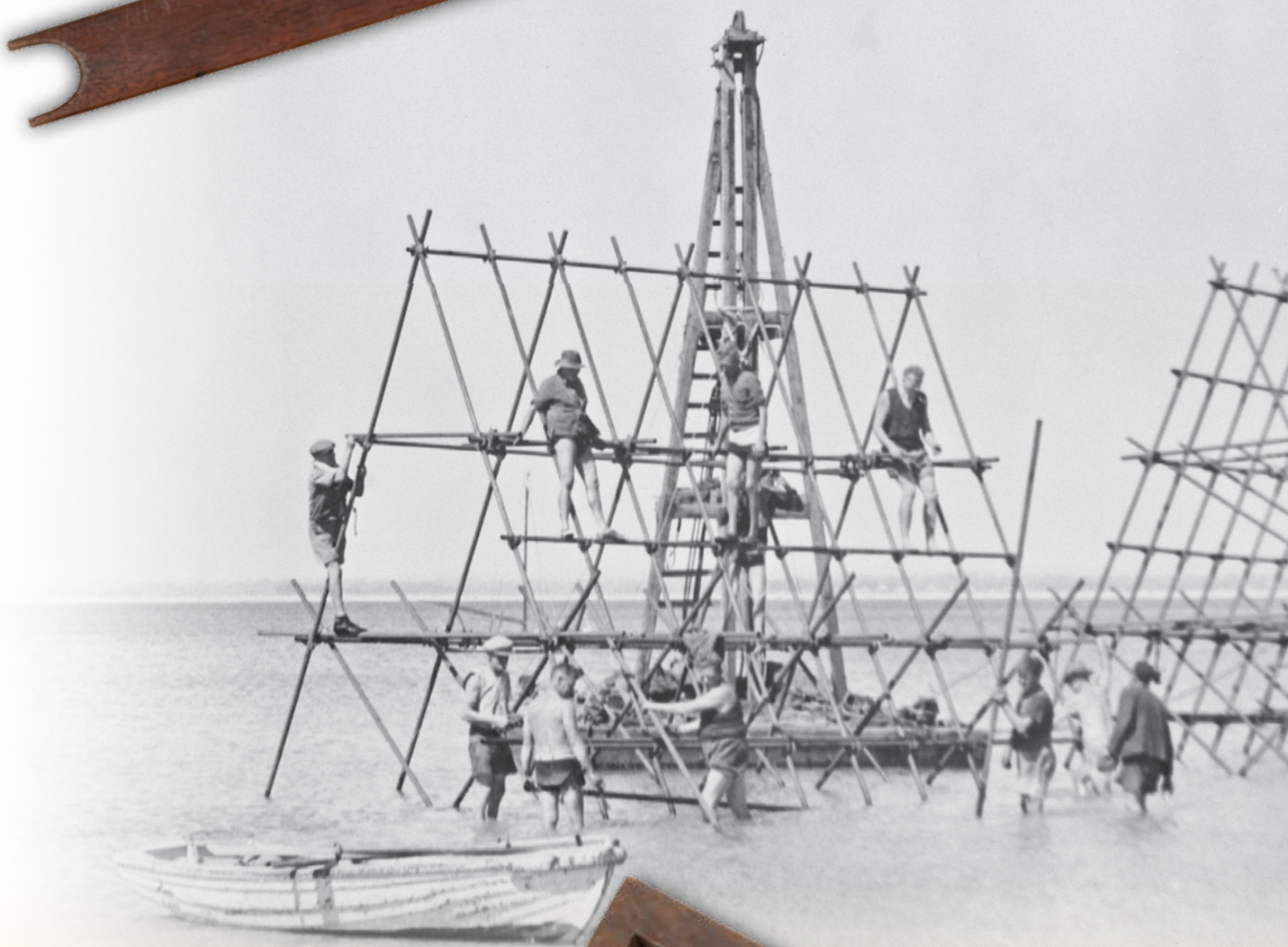
These Adelaide children are practising building an air raid shelter, 1942.

AWM 045120



Members of the Queensland Voluntary Net Camouflage Makers used needles such as this to produce camouflage netting to disguise military targets during the Second World War.

AWM REL38759.001



From 1942, increased efforts were made to defend Australian shores to prepare for the possibility of a Japanese invasion. Defence hurdles, such as this one being built at Fremantle in Western Australia, were erected in some coastal areas to prevent launches or tanks from landing on the beach.

AWM P04262.003

During the Second World War, Air Raid Wardens were responsible for warning people in the event of an air raid or gas attack. This rattle was designed to attract attention by making a sharp, loud sound.

AWM REL14094



Did you know?

Between February 1942 and November 1943, there were sixty-four Japanese air raids on Darwin. In the first two attacks, at least 243 people were killed, twenty aircraft were destroyed and eight ships were sunk. During the war bombs were also dropped on Broome, Wyndham, Derby, Katherine, Townsville, Port Hedland, Drysdale, Exmouth Gulf, Millingimbi, Mossman, Onslow, Port Patterson, Horn Island, Brock's Creek and Stuart.

Paddy Fordham Wainburranga, *World War II supply ships, Darwin* (1991, natural pigments on bark, 180 x 83.5 cm, AWM ART29718)

Paddy Fordham Wainburranga was a 12-year-old aboriginal boy when Darwin was bombed by the Japanese. His painting depicts his memories of planes dropping bombs onto ships that were being unloaded in the harbour by Aboriginal labourers.

What symbols can you see in the picture? What does the painting tell you about the attacks on Darwin?

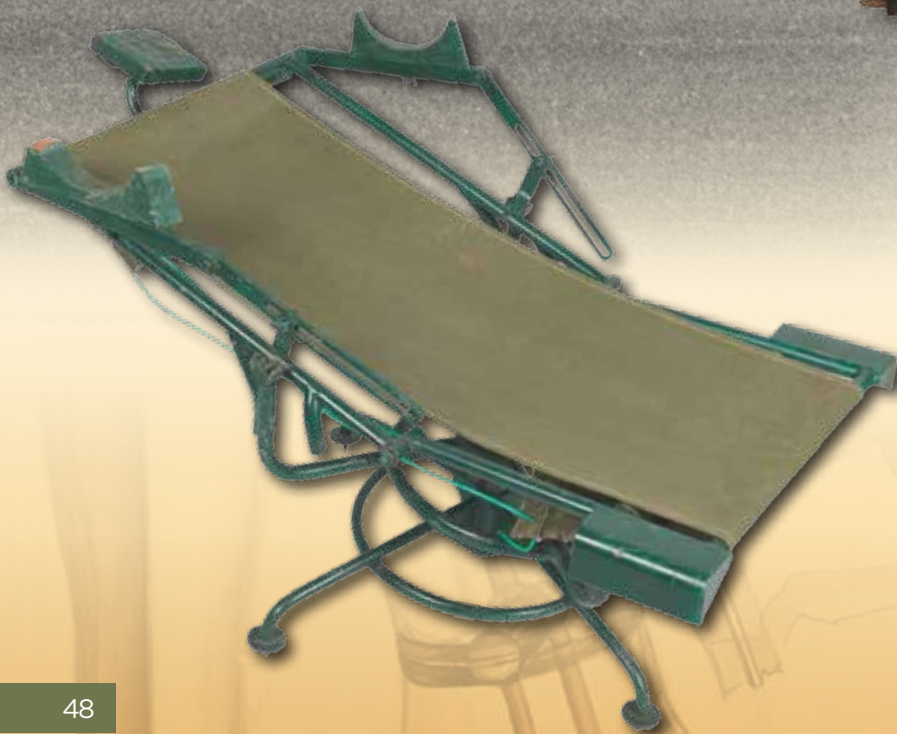
AWM012953



During the Second World War, thousands of Australians joined the Volunteer Air Observers Corps to watch the skies for signs of enemy aircraft. This spotter's chair had a swivelling base, a horizontal canvas seat, a padded headrest and fixtures on the armrests to hold binoculars.

AWM REL29218

What skills would spotters need to identify enemy aircraft?



Children also contributed during the Second World War. In Victoria, the boys from Raleigh Street State School collected rubber for the war effort. These North Queensland children have learnt how to watch the sky for enemy aircraft.

Right image: AWM138617
Bottom image: AWM NEA0128A

Why were children doing these jobs?



Boer War
1899–1902

First World War
1914–1918

Second World War
1939–1945

Malayan Emergency
1948–1960



Can you identify these innovative objects and the conflicts in which they were used?



Korean War
1950-1953

Indonesian Confrontation
1962-1966

Vietnam War
1962-1975

Recent conflicts and peacekeeping
1990-today



Glossary

| | |
|--------------------------------|---|
| Admiralty | The British government department with control over naval affairs. |
| aeronautical | Relating to flight. |
| AIF | Australian Imperial Force. The Australian force formed for overseas service during the First World War. A second AIF was created for service in the Second World War. |
| air raid | An attack in which aircraft drop bombs. |
| Allied | The group of nations, including Britain, which fought together against Germany and its allies in the First World War and against the Axis powers in the Second World War. |
| ammunition | Bullets, cartridges, bombs, grenades and other material used in weapons. |
| amphibious | Capable of operating on land and water. |
| ampoule | A sealed glass container used to hold medicine. |
| amputation | A surgical operation to remove a body part such as a limb. |
| Anzacs | Originally soldiers from the Australian and New Zealand Army Corps (ANZAC) in 1915. |
| Australian Flying Corps | An Australian flying group that operated in the First World War as a corps of the AIF. |
| aviation | Aircraft and matters related to flying. |
| Axis | The alliance of Germany, Italy and Japan during the Second World War. |
| barracks | Building/s for soldiers to live in. |
| brigade | A large military unit consisting of several battalions and/or other units. |
| camouflage | Disguise used to hide a person or object from the enemy. |
| casualties | People listed as sick, wounded, missing or killed in action during war. |
| citation | A brief official statement explaining why a medal was awarded. |
| combat | Fighting, generally between armed forces. |
| decoys | Objects or people used to distract attention and deceive an enemy. |
| destroyer | A small, fast warship. |
| drills | Military training exercises. |
| drone | Remotely controlled aircraft. |
| dummy | A copy of something designed to substitute for the real item. |
| dysentery | A disease that causes severe cramps and diarrhoea. |
| empire | A group of nations or colonies ruled by a powerful government. |
| enlistment | Joining an armed force for military service. |
| Gallipoli | A peninsula located in Turkey where Australian soldiers fought in 1915. |
| George Medal | A medal for bravery awarded to civilians. |
| Gestapo | The secret state police in Nazi Germany during the Second World War. |
| hypersonic | Speed more than five times greater than the speed of sound. |
| IEDs | Improvised Explosive Devices. These devices are intended to destroy vehicles and kill or wound personnel, and are often hidden on roads. |
| incendiary | Used to make fire. |
| infantry | The land-based section of an army that fights on foot. |
| ingenious | Clever and inventive. |
| innovation | A new method, idea or product. |
| lethal | Something that will cause death. |
| liberated | Set free. |
| litter | A stretcher used to transport casualties. |

| | |
|------------------------------|--|
| malaria | A mosquito-borne infectious disease. |
| Malayan Emergency | The conflict from 1948 to 1960 between the Malayan government and communist forces. |
| maritime | Relating to the sea e.g. shipping or naval matters. |
| Middle East | A large geographical area of south-west Asia and northern Africa including countries such as Iran, Iraq, Turkey and Egypt. |
| military intelligence | Information which might assist in military operations. |
| munitions | Weapons and ammunition used in war. |
| non-combatants | Military personnel without a fighting role e.g. nurses. |
| parapet | A protective wall of a trench or fortification. |
| patent | An official document giving rights to the inventor to sell, manufacture or use an invention for a certain number of years. |
| patrol | Soldiers on duty guarding or protecting an area. |
| peacekeeping | Maintaining peace and order in an area with armed forces. |
| peninsula | An area of land almost surrounded by water. |
| periscope | A long, vertical instrument that uses mirrors to allow a user to see what is visible from the top of the instrument. |
| POWs | Prisoners of war. |
| prosthetic | An artificial body part e.g. leg. |
| rations | An allowance of food. |
| reconnaissance | Collecting information about the enemy. |
| Red Cross | An international humanitarian organisation, founded in 1863, which provides relief to victims of war or natural disasters. |
| relics | Objects that have survived from the past. |
| sentries | Soldiers who keep guard or control access to an area. |
| slit trenches | Small narrow trenches to protect people from enemy fire. |
| sonar | A method of locating objects under water using soundwaves. |
| squadron | A military unit consisting of two or more aircrew, army regiments or warships. |
| sterilise | To kill bacteria and germs. |
| stooges | Someone who assists in doing unpleasant work, and is controlled by others. |
| surveillance | Observing and tracking the activities of people. |
| torpedoes | Explosive underwater missiles. |
| tourniquets | Devices to stop bleeding by compressing blood vessels. |
| U-Boat | A German submarine. |
| unsanitary | Not clean; likely to cause infection. |
| vaccines | Substances injected into a body to prevent disease. |
| vermin | Harmful insects or parasites that live on humans or animals. |
| Victoria Cross | The highest award for bravery in battle, awarded to members of the British and Commonwealth forces during wartime. |
| wardens | People responsible for enforcing rules. |
| war effort | Activities to support a nation during wartime. |
| Western Front | The area of operations in which Allied forces faced Germany in Western Europe during the First World War. It consisted of a fortified line of trenches stretching from the English Channel to the French-Swiss border. |
| whaler | A narrow, open boat that is pointed at both ends. |
| wireless radio | A radio which transmits messages through space without wires. |
| zeppelins | Large airships. |

References

Kitting out the troops

¹'Rations for the Gallipoli landing – diaries of Sergeant Apar De Vine', Australian War Memorial website: <https://www.awm.gov.au/blog/2014/04/24/rations-gallipoli-landing-diaries-sergeant-apcar-de-vine/>

²George Courtney Benson, Letter, 6 July 1915, Australian War Memorial collection, AWMPR88/177

Stronger and smarter

¹'Science and War', *The Argus*, October 16 1915, p. 20: <http://nla.gov.au/nla.news-article1571400>

²'Australian Periscopic Rifle', *The Age*, August 12 1915, p. 8: <http://nla.gov.au/nla.news-article155001161>

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¹'Camouflage in Australia', by Dakin, 31 March 1942, p. 3, NAA (NSW), C1707/30 item 1

²'Submarines in the Dardanelles, 1915 – Documents: The *AE2*', Gallipoli and the Anzacs website: <http://www.gallipoli.gov.au/submarines-in-the-dardanelles/henry-stoker-and-the-ae2/documents-the-ae2.php>

³Victoria Cross for Australia citation, Daniel Keighran, Australian Army website: http://www.army.gov.au/-/media/Files/Our%20history/Traditions/DanielKeighran_VCCitation.pdf

Saving lives

¹'Tobruk Diaries: Danger below...' Australian War Memorial website: <https://www.awm.gov.au/blog/2011/06/27/tobruk-diaries-danger-below/>

²'Women in action – nurses and serving women', Australian Government website: <http://www.australia.gov.au/about-australia/australian-story/women-in-action>

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¹*7.30 Report*, 14 January 2000, ABC website: <http://www.abc.net.au/7.30/stories/s93770.htm>

²Cutlack, F. M.(1941). *The Australian Flying Corps in the Western and Eastern Theatres of War, 1914–1918*. Sydney: Angus & Robertson, p. 59.

Helping from home

¹Ann Elias, 'The organisation of camouflage in Australia in the Second World War', *Journal of the Australian War Memorial*, Australian War Memorial website: <https://www.awm.gov.au/journal/j38/camouflage.asp?query=Camouflage+Uniform>

Useful websites

Australian Dictionary of Biography online
www.adb.anu.edu.au

Australian War Memorial collection
www.awm.gov.au/search/collections

Australian War Memorial education
www.awm.gov.au/education

Australian War Memorial honours and awards
www.awm.gov.au/research/people/honours_and_awards

Department of Defence
www.defence.gov.au

Department of Veterans' Affairs Anzac portal
www.anzacportal.dva.gov.au

National Archives of Australia
www.discoveringanzacs.naa.gov.au

National Library of Australia
www.trove.nla.gov.au



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Moving troops in conflict zones can be a difficult and dangerous job.

Using a South African design, the Australian built Bushmaster Protected Mobility Vehicle has a uniquely designed sloped hull or base, which protects its occupants from injuries caused by landmines and explosive devices. The heavily armoured slanted base assists in deflecting the force of the explosion away from the people inside the vehicle. Additional innovative design features include run-flat tyres, which allow the vehicle to continue to operate with punctures.

The Australian Army has operated the Bushmaster in a range of conditions in conflict areas all over the world, and its innovative design has assisted in saving the lives of many people.

P07964.072





1. METAL CAGE SHAPED ON

2. SHOWING SHAPED RUBBER WOOD MOULD FITTED INTO METAL CAGE

‘The Aussies don’t fight out of a textbook. They’re resourceful, inventive soldiers, with plenty of initiative.’

Instructions for American Servicemen in Australia 1942, p. 33.

