

= British anti @-@ invasion preparations of the Second World War =

British anti @-@ invasion preparations of the Second World War entailed a large @-@ scale division of military and civilian mobilisation in response to the threat of invasion by German armed forces in 1940 and 1941 . The British army needed to recover from the defeat of the British Expeditionary Force in France , and 1 @.@ 5 million men were enrolled as part @-@ time soldiers in the Home Guard . The rapid construction of field fortifications transformed much of the United Kingdom , especially southern England , into a prepared battlefield . The German invasion plan , Operation Sea Lion , was never taken beyond the preliminary assembly of forces . Today , little remains of Britain 's anti @-@ invasion preparations . Only reinforced concrete structures such as pillboxes are common .

= = Political and military background = =

On 1 September 1939 , Germany invaded Poland ; two days later , Britain and France declared war on Germany , launching the Second World War . Within three weeks , the Red Army of the Soviet Union invaded the eastern regions of Poland in fulfilment of the secret Molotov @-@ Ribbentrop Pact with Germany . A British Expeditionary Force (BEF) was sent to the Franco @-@ Belgian border , but Britain and France did not take any direct action in support of the Poles . By 1 October , Poland had been completely overrun .

There was little fighting over the months that followed . In a period known as the Phoney War , soldiers on both sides trained for war and the French and British constructed and manned defences on the eastern borders of France .

On 9 April 1940 , Germany invaded Denmark and Norway . This operation preempted the British ' own plans to invade Norway . Denmark surrendered immediately , and , after a short @-@ lived attempt by the British to make a stand in the northern part of the country , Norway also fell . The invasion of Norway was a combined forces operation in which the German war machine projected its power across the sea ; this German success would come to be seen by the British as a dire portent .

On 7 and 8 May 1940 , in the British House of Commons , the Norway Debate revealed intense dissatisfaction with and outright hostility toward the government of Prime Minister Neville Chamberlain . Two days later , with events moving swiftly , Chamberlain resigned and was succeeded by Winston Churchill .

On 10 May 1940 , Germany invaded France . By that time , the BEF consisted of 10 infantry divisions in three corps , a tank brigade and a Royal Air Force detachment of around 500 aircraft . The BEF was pinned by a German diversionary attack through Belgium and then isolated by the main attack that came through the Ardennes forest . Well @-@ equipped and highly mobile Panzer divisions of the Wehrmacht overran the prepared defences . There was some fierce fighting , but most of the BEF withdrew to a small area around the French port of Dunkirk .

As things had gone badly for the allies in France , it became evident that some thought needed to be given to the possibility of having to resist an attempted invasion of Britain by German forces .

= = British armed forces = =

= = = British Army = = =

The evacuation of British and French forces (Operation Dynamo) began on 26 May with air cover provided by the RAF at heavy cost . Over the following ten days , 338 @,@ 226 French and British soldiers were evacuated to Britain . Most of the personnel were brought back to Britain , but many of the army 's vehicles , tanks , guns , ammunition and heavy equipment and the RAF 's ground equipment and stores were left behind in France . Some soldiers even returned without their rifles . A further 215 @,@ 000 were evacuated from ports south of the Channel in Operation Ariel during

June .

In June 1940 the British Army had 22 infantry divisions and one armoured division . The infantry divisions were , on average , at half strength , had only one @-@ sixth of their normal artillery , (over 600 medium guns , both 18 / 25 and 25 pounder , and 280 howitzers were available , with a further 100 25 pounders manufactured in June , over 300 4 @.@ 5 inch howitzers ? 900 were modified in 1940 alone ? and a number of 60 pounder howitzers and their modified 4 @.@ 5 inch version as well as antiquated examples of the 6 inch howitzer recovered from reserve after the loss of current models in France , with several hundred additional 75 @-@ mm M1917 guns and their ammunition arriving from the US) , and were almost totally lacking in transport (just over 2 @,@ 000 carriers were available , rising to over 3 @,@ 000 by the end of July) . There was a critical shortage of ammunition such that none could be spared for practice . However , records show that the British possessed over 290 million rounds of .303 ammunition of various types on 7 June , rising to over 400 million in August . VII Corps was formed to control the Home Forces ' general reserve , and included the 1st Armoured Division . In a reorganisation in July , the divisions with some degree of mobility were placed behind the " coastal crust " of defended beach areas from The Wash to Newhaven in Sussex . The General Headquarters Reserve was expanded to two corps of the most capable units . VII Corps was based at Headley Court in Surrey to the south of London and comprised 1st Armoured and 1st Canadian Divisions with the 1st Army Tank Brigade . IV Corps was based at Latimer House to the north of London and comprised 2nd Armoured , 42nd and 43rd Infantry divisions .

Estimates of the numbers of tanks in Britain after the fall of France vary ; Viscount Cranbourne stated in the House of Lords (in 1942) that Britain only had 50 infantry tanks and 200 light tanks armed only with machine guns , and these figures have become the basis of the myth that the British Army in June 1940 had very few tanks . But Churchill stated that there were 102 cruiser tanks , 132 infantry tanks and 252 light tanks left in Britain after the fall of France . Churchill also stated " in the last half of September we were able to bring into action on the south coast front sixteen divisions of high quality of which three were armoured divisions or their equivalent in brigades " . An official history gave the figures for tank numbers on 10 June 1940 as 103 cruisers and 142 infantry tanks . Other sources indicate that these had more than doubled by the end of July . Whatever the exact numbers in August 1940 the British Government felt sufficiently confident in Britain 's ability to repel an invasion (and in its tank production factories) that it sent 52 cruiser and 50 infantry tanks to Egypt . At this time Britain 's factories were almost matching Germany 's output in tanks and by 1941 they would surpass them .

= = = Home Guard = = =

On 14 May 1940 , Secretary of State for War Anthony Eden announced the creation of the Local Defence Volunteers (LDV) ? later to become known as the Home Guard . Far more men volunteered than the government expected and by the end of June , there were nearly 1 @.@ 5 million volunteers . There were plenty of personnel for the defence of the country , but there were no uniforms (a simple armband had to suffice) and equipment was in critically short supply . At first , the Home Guard was armed with guns in private ownership , a knife or bayonet on a pole , Molotov cocktails and improvised flamethrowers .

By July 1940 the situation had improved somewhat with uniforms , a modicum of training and the arrival of hundreds of thousands of rifles and millions of rounds of ammunition from the USA . New weapons were developed that could be produced cheaply without consuming materials that were needed to produce armaments for the regular units . An early example was the No. 76 Special Incendiary Grenade (a glass bottle filled with highly flammable material of which more than six million were made) , and the No. 73 Grenade (an anti @-@ tank grenade resembling a Thermos flask) .

The sticky bomb was a glass flask filled with nitroglycerin and given an adhesive coating allowing it to be glued to a passing vehicle . In theory , it could be thrown , but in practice it would most likely need to be placed ? thumped against the target with sufficient force to stick ? requiring courage and

good fortune to be used effectively . An order for one million sticky bombs was placed in June 1940 , but various problems delayed their distribution in large numbers until early 1941 , and it is likely that fewer than 250 @,@ 000 were produced .

A measure of mobility was provided by bicycles , motorcycles , private vehicles and horses . A small number of units were equipped with armoured cars , some of which were of standard design , but many were improvised locally from commercially available vehicles by the attachment of steel plates .

Later in 1941 , more sophisticated weapons were made available such as the Blacker Bombard anti @-@ tank weapon , the Northover Projector (a black @-@ powder mortar) , and the Smith Gun (a small artillery gun that could be towed by a private motorcar) .

= = = Royal Air Force = = =

In mid @-@ 1940 , the principal concern of the Royal Air Force , together with elements of the Fleet Air Arm , was to contest the control of British airspace with the German Luftwaffe . For the Germans , achieving at least local air superiority was an essential prerequisite to any invasion .

If the German air force had prevailed and attempted a landing , a much @-@ reduced Royal Air Force would have been obliged to operate from airfields well away from the southeast of England . Any airfield that was in danger of being captured would have been made inoperable and there were plans to remove all portable equipment from vulnerable radar bases and completely destroy anything that could not be moved . Whatever was left of the RAF would have been committed to intercepting the invasion fleet in concert with the Royal Navy ? to fly in the presence of an enemy that enjoys air superiority is very dangerous . However , the RAF would have kept several advantages , such as being able to operate largely over friendly territory , as well as having the ability to fly for longer as , until the Germans were able to operate from airfields in England , Luftwaffe pilots would still have to fly significant distances to reach their operational area .

A contingency plan called Operation Banquet required all available aircraft to be committed to the defence . In the event of invasion almost anything that was not a fighter would be converted to a bomber ? student pilots , some in the very earliest stages of training , would use around 350 Tiger Moth and Magister trainers to drop 20 lb (9 @.@ 1 kg) bombs from rudimentary bomb racks .

Shortly before the outbreak of the Second World War the Chain Home radar system began to be installed in the south of England , with three radar stations being operational by 1937 . Although the German High Command suspected that the British may have been developing these systems , Zeppelin test flights had proved inconclusive . As a result , the expanding Chain Home radar system , and aircraft @-@ based radar first fielded in 1940 , became a vital piece of Britain 's defensive capabilities during the Battle of Britain .

= = = Royal Navy = = =

Although much larger in size and with many more ships , the Royal Navy , unlike the Kriegsmarine , had many commitments , including against Japan and the defence of Scotland and Northern England . The Royal Navy could overwhelm any force that the German navy could muster but would require time to get its forces in position since they were dispersed , partly because of the aforementioned commitments and partly to reduce risk of air attack . On 1 July 1940 , one cruiser and 23 destroyers were committed to escort duties in the Western Approaches , plus 12 destroyers and one cruiser on the Tyne and the aircraft carrier Argus (I49) . More immediately available were ten destroyers at the south coast ports of Dover and Portsmouth , a cruiser and three destroyers at Sheerness on the River Thames , three cruisers and seven destroyers at the Humber , 9 destroyers at Harwich , and two cruisers at Rosyth . The rest of the Home Fleet ? five battleships , three cruisers and nine destroyers ? was based far to the north at Scapa Flow . There were , in addition , many corvettes , minesweepers , and other small vessels . By the end of July , a dozen additional destroyers were transferred from escort duties to the defence of the homeland , and more would join the Home Fleet shortly after .

At the end of August , the battleship HMS Rodney was sent south to Rosyth for anti @-@ invasion duties . She was joined on 13 September by her sister ship HMS Nelson , the battlecruiser HMS Hood , three anti @-@ aircraft cruisers and a destroyer flotilla . On 14 September , the old battleship HMS Revenge was moved to Plymouth , also specifically in case of invasion . In addition to these major units , by the beginning of September the Royal Navy had stationed along the south coast of England between Plymouth and Harwich , 4 light cruisers and 57 destroyers tasked with repelling any invasion attempt , a force many times larger than the naval escorts that the Germans had available .

= = Field fortifications = =

The British engaged upon an extensive programme of field fortification .

On 27 May 1940 a Home Defence Executive was formed under General Sir Edmund Ironside , Commander @-@ in @-@ Chief , Home Forces , to organise the defence of Britain . At first defence arrangements were largely static and focused on the coastline (the coastal crust) and , in a classic example of defence in depth , on a series of inland anti @-@ tank ' stop ' lines . The stop lines were designated Command , Corp and Divisional according to their status . The longest and most heavily fortified was the General Headquarters anti @-@ tank line , GHQ Line , which ran across southern England , wrapped around London and then ran north to Yorkshire . It was intended to protect the capital and the industrial heartland of England . Another major line was the Taunton Stop Line , which defended against an advance from England 's south @-@ west peninsula . London and other major cities were ringed with inner and outer stop lines . Some 50 known stop lines were constructed in Britain , though some of the less important lines were just demolition belts and not all lines were completed .

Military thinking shifted rapidly . Given the lack of equipment and properly trained men , Ironside had had little choice but to adopt a strategy of static warfare , but it was soon perceived that this would not be sufficient . Ironside has been criticised for having a siege mentality , but some consider this unfair , as he is believed to have understood the limits of the stop lines and never expected them to hold out indefinitely .

However , Prime Minister Churchill was not satisfied with Ironside 's progress , especially with regard to the creation of a mobile reserve . Anthony Eden , the Secretary of State for War , suggested that Ironside should be replaced by General Brooke (later Viscount Alanbrooke) . On 17 July 1940 Churchill spent an afternoon with Brooke and was soon convinced that they were in close agreement as to how best to defend the nation . On 19 July Brooke replaced Ironside .

Brooke 's appointment coincided with more trained men and better equipment becoming available . Under Brooke , new strategies and tactics were devised . More concentration was placed on defending the coastal crust , while inland a hedgehog defence strategy of defended localities and anti @-@ tank islands was established , each having all @-@ round defence . Many of these anti @-@ tank islands were established along the already constructed stop lines , where existing defences could be integrated into the new strategy and , especially , at towns and villages where there was a Home Guard to provide personnel .

= = = Coastal crust = = =

Any German invasion of Britain would have to involve the landing of troops and equipment somewhere on the coast , and the most vulnerable areas were the south and east coasts of England . Here , Emergency Coastal Batteries were constructed to protect ports and likely landing places . They were fitted with whatever guns were available , which mainly came from naval vessels scrapped since the end of the First World War . These included 6 inch (152 mm) , 5 @. 5 inch (140 mm) , 4 @. 7 inch (120 mm) and 4 inch (102 mm) guns . These had little ammunition , sometimes as few as ten rounds apiece . At Dover , two 14 inch (356 mm) guns known as Winnie and Pooh were employed . There were also a small number of land based torpedo launching sites .

Beaches were blocked with entanglements of barbed wire , usually in the form of three coils of

concertina wire fixed by metal posts , or a simple fence of straight wires supported on waist @-@ high posts . The wire would also demarcate extensive minefields , with both anti @-@ tank and anti @-@ personnel mines on and behind the beaches . On many of the more remote beaches this combination of wire and mines represented the full extent of the passive defences .

Portions of the Romney Marsh , which was the planned invasion site of Operation Sea Lion , were flooded and there were plans to flood more of the Marsh if the invasion were to materialise .

Piers , ideal for landing of troops , and situated in large numbers along the south coast of England , were disassembled , blocked or otherwise destroyed . Many piers were not repaired until the late 1940s or early 1950s .

Where a barrier to tanks was required , Admiralty scaffolding (also known as beach scaffolding or obstacle Z.1) was constructed . Essentially , this was a fence of scaffolding tubes 9 feet (2 @. @ 7 m) high and was placed at low water so that tanks could not get a good run at it . Admiralty scaffolding was deployed along hundreds of miles of vulnerable beaches .

An even more robust barrier to tanks was provided by long lines of anti @-@ tank cubes . The cubes were made of reinforced concrete 5 feet (1 @. @ 5 m) to a side . Thousands were cast in situ in rows sometimes two or three deep .

The beaches themselves were overlooked by pillboxes of various types (see British hardened field defences of the Second World War) . These were sometimes placed low down to get maximum advantage from enfilading fire whereas others were placed high up making them much harder to capture . Searchlights were installed at the coast to illuminate the sea surface and the beaches for artillery fire .

Many small islands and peninsulas were fortified to protect inlets and other strategic targets . In the Firth of Forth in east central Scotland , Inchgarvie was heavily fortified with several gun emplacements , which can still be seen . This provided invaluable defence from seaborne attacks on the Forth Bridge and Rosyth Dockyard , approximately a mile upstream from the bridge . Further out to sea , Inchmickery , 1 @. @ 6 miles (2 @. @ 6 km) north of Edinburgh , was similarly fortified . The remnants of gun emplacements on the coast to the north , in North Queensferry , and south , in Dalmeny , of Inchmickery also remain .

= = = Lines and islands = = =

The primary purpose of the stop lines and the anti @-@ tank islands that followed was to hold up the enemy , slowing progress and restricting the route of an attack . The need to prevent tanks from breaking through was of key importance . Consequently , the defences generally ran along pre @-@ existing barriers to tanks such as rivers and canals ; railway embankments and cuttings ; thick woods ; and other natural obstacles . Where possible , usually well @-@ drained land was allowed to flood , making the ground too soft to support even tracked vehicles .

Thousands of miles of anti @-@ tank ditches were dug , usually by mechanical excavators , but occasionally by hand . They were typically 18 feet (5 @. @ 5 m) wide and 11 feet (3 @. @ 4 m) deep and could be either trapezoidal or triangular in section with the defended side being especially steep and revetted with whatever material was available .

Elsewhere , anti @-@ tank barriers were made of massive reinforced concrete obstacles , either cubic , pyramidal or cylindrical . The cubes generally came in two sizes : 5 or 3 @. @ 5 feet (1 @. @ 5 or 1 @. @ 1 m) high . In a few places , anti @-@ tank walls were constructed ? essentially continuously abutted cubes .

Large cylinders were made from a section of sewer pipe 3 to 4 feet (91 to 122 cm) in diameter filled with concrete typically to a height of 4 to 5 feet (1 @. @ 2 to 1 @. @ 5 m) , frequently with a dome at the top . Smaller cylinders cast from concrete are also frequently found .

Pimples , popularly known as Dragon 's teeth , were pyramid shaped concrete blocks designed specifically to counter tanks which , attempting to pass them , would climb up exposing vulnerable parts of the vehicle and possibly slip down with the tracks between the points . They ranged in size somewhat , but were typically 2 feet (61 cm) high and about 3 feet (91 cm) square at the base . There was also a conical form .

Cubes , cylinders and pimples were deployed in long rows , often several rows deep , to form anti @-@ tank barriers at beaches and inland . They were also used in smaller numbers to block roads . They frequently sported loops at the top for the attachment of barbed wire . There was also a tetrahedral or caltrop @-@ shaped obstacle , although it seems these were rare .

Where natural anti @-@ tank barriers needed only to be augmented , concrete or wooden posts sufficed .

Roads offered the enemy fast routes to their objectives and consequently they were blocked at strategic points . Many of the road @-@ blocks formed by Ironside were semi @-@ permanent . In many cases , Brooke had these removed altogether , as experience had shown they could be as much of an impediment to friends as to foes . Brooke favoured removable blocks .

The simplest of the removable roadblocks consisted of concrete cylinders of various sizes but typically about 3 feet (0 @. @ 91 m) high and 2 feet (61 cm) in diameter ; these could be manhandled into position as required . However , these would be insufficient to stop armoured vehicles . One common type of removable anti @-@ tank roadblock comprised a pair of massive concrete buttresses permanently installed at the roadside ; these buttresses had holes and / or slots to accept horizontal railway lines or rolled steel joists (RSJs) . Similar blocks were placed across railway tracks because tanks can move along tracks almost as easily as they can along roads . These blocks would be placed strategically where it was difficult for a vehicle to go around ? anti @-@ tank obstacles and mines being positioned as required ? and they could be opened or closed within a matter of minutes .

There were two types of socket roadblocks . The first comprised vertical lengths of railway line placed in sockets in the road and was known as hedgehog . The second type comprised railway lines or RSJs bent or welded at around a 60 ° angle , known as hairpins . In both cases , prepared sockets about 6 inches (152 @. @ 40 mm) square were placed in the road , closed by covers when not in use , allowing traffic to pass normally .

Another removable roadblocking system used mines . The extant remains of such systems superficially resemble those of hedgehog or hairpin , but the pits are shallow : just deep enough to take an anti @-@ tank mine . When not in use , the sockets were filled with a wooden plug allowing traffic to pass normally .

Bridges and other key points were prepared for demolition at short notice by preparing chambers filled with explosives . A Depth Charge Crater was a site in a road (usually at a junction) prepared with buried explosives that could be detonated to instantly form a deep crater as an anti @-@ tank obstacle . The Canadian pipe mine (later known as the McNaughton Tube after General Andrew McNaughton) was a horizontally bored pipe packed with explosives ? once in place this could be used to instantly ruin a road or runway . Prepared demolitions had the advantage of being undetectable from the air ? the enemy could not take any precautions against them , or plot a route of attack around them .

Crossing points in the defence network ? bridges , tunnels and other weak spots ? were called nodes or points of resistance . These were fortified with removable road blocks , barbed wire entanglements , and land mines . These passive defences were overlooked by trench works , gun and mortar emplacements , and pillboxes . In places entire villages were fortified using barriers of scaffolding , sandbagged positions and loopholes in existing buildings .

Nodes were designated ' A ' , ' B ' or ' C ' depending upon how long they were expected to hold out . Home Guard troops were largely responsible for the defence of nodal points and other centres of resistance such as towns and defended villages . Category ' A ' nodal points and anti @-@ tank islands usually had a garrison of regular troops .

The rate of construction was frenetic : by the end of September 1940 , 18 @, @ 000 pillboxes and countless other preparations had been completed .

= = = Airfields and open areas = = =

Open areas were considered vulnerable to invasion from the air : a landing by paratroops , glider @-@ borne troops or powered aircraft which could land and take off again . Open areas with a

straight length of 500 yards (460 m) or more within five miles (8 km) of the coast or an airfield were considered vulnerable . These were blocked by trenches or , more usually , by wooden or concrete obstacles , as well as old cars .

Securing an airstrip would be an important objective for the invader . Airfields , considered extremely vulnerable , were protected by trench works and pillboxes which faced inwards towards the runway , rather than outwards . Many of these fortifications were specified by the Air Ministry and defensive designs were unique to airfields ? these would not be expected to face heavy weapons so the degree of protection was less and there was more emphasis on all @-@ round visibility and sweeping fields of fire . It was difficult to defend large open areas without creating impediments to the movement of friendly aircraft . Solutions to this problem included the pop @-@ up Pickett Hamilton fort ? a light pillbox that could be lowered to ground level when the airfield was in use .

Another innovation was a mobile pillbox that could be driven out onto the airfield . This was known as the Bison and consisted of a lorry with a concrete armoured cabin and a small concrete pillbox on the flat bed . Constructed in Canada , a ' runway plough ' , assembled in Scotland , survives at Eglinton Country Park . It was purchased by the army in World War II to rip up aerodrome runways and railway lines if an invasion took place as means of causing disruption , making them useless to the occupying forces . It was used at the old Eglinton Estate , which had been commandeered by the army , to provide its army operators with the necessary experience . It was hauled by a powerful Foden Trucks tractor , possibly via a pulley and cable system .

= = = Hardened field defences = = =

The field fortifications constructed throughout Britain included large numbers of hardened field defences : mostly in the form of pillboxes .

In May 1940 , the Directorate of Fortifications and Works (FW3) was set up at the War Office . Its purpose was to provide a number of basic pillbox designs which could be constructed by soldiers and local labour at appropriate defensive locations . In the following June and July FW3 issued 6 basic designs for rifle and light machine gun pillboxes , designated Type 22 to Type 27 . In addition , there were designs for gun emplacements suitable for either the Ordnance QF 2 pounder or the Hotchkiss 6 pounder gun (designated Type 28) and a design for a hardened medium machine gun emplacement .

There were also designs for pillbox @-@ like structures for various purposes including light anti @-@ aircraft positions , observation posts and searchlight positions to illuminate the shoreline .

A small number of pillboxes had been constructed in the First World War and where possible these were integrated into the defence plans . Some pillboxes may pre @-@ date the publication of the FW3 designs , but in any case some local commanders introduced modifications to the standard FW3 designs or introduced designs of their own . These non @-@ standard design pillboxes may be produced in some numbers or completely ad hoc designs suited to local conditions . Other designs were produced as commercial ventures .

About 28 @, @ 000 pillboxes and other hardened field fortifications were constructed in the United Kingdom of which about 6 @, @ 500 still survive .

= = Other defensive measures = =

Other basic defensive measures included the removal of signposts , milestones (some had the carved details obscured with cement) and railway station signs making it more likely that an enemy would become confused . Petrol pumps were removed from service stations near the coast and there were careful preparations for the destruction of those that were left . Detailed plans were made for destroying anything that might prove useful to the invader such as port facilities , key roads and rolling stock . In certain areas non @-@ essential citizens were evacuated . In the county of Kent , 40 % of the population was relocated ; in East Anglia , the figure was 50 % .

Perhaps most importantly , the population was told what was expected from them . In June 1940 ,

the Ministry of Information published *If the Invader Comes* , what to do ? and how to do it . It began :

The first instruction given quite emphatically is that , unless ordered to evacuate , " THE ORDER IS ' STAY PUT ' " [capitalisation as in original] . The roads were not to be blocked by refugees . Further warnings were given not to believe rumours and not to spread them , to be distrustful of orders that might be faked and even to check that an officer giving orders really is British . Further : keep calm and report anything suspicious quickly and accurately ; deny useful things to the enemy such as food , fuel , maps or transport ; be ready to block roads ? when ordered to do so ? " by felling trees , wiring them together or blocking the roads with cars " ; to organise resistance at shops and factories ; and , finally :

On 13 June 1940 the ringing of church bells was banned ; henceforth they would only be rung by the military or the police to warn that an invasion ? generally meaning by parachutists ? was in progress .

It is clear that more than merely passive resistance was expected ? or at least hoped for ? from the population . Churchill considered the formation of a Home Guard Reserve , given only an armband and basic training on the use of simple weapons such as Molotov cocktails . The reserve would only have been expected to report for duty in an invasion . Later , Churchill wrote how he envisaged the use of the sticky bomb : " We had the picture in mind that devoted soldiers or civilians would run close up to the tank and even thrust the bomb upon it , though its explosion cost them their lives [*Italics added for emphasis*] . " He also later recorded how he intended to use the slogan " You can always take one with you . "

In 1941 , in towns and villages invasion committees were formed to cooperate with the military and plan for the worst should their communities be isolated or occupied . The members of committees typically included representatives of the local council , the Air Raid Precautions service , the fire service , the police , the Women 's Voluntary Service and the Home Guard , as well as officers for medicine , sanitation and food . Plans of these committees were kept in secret War Books although few remain . Detailed inventories of anything useful were kept : vehicles , animals and basic tools , and lists were made of contact details for key personnel . Plans were made for a wide range of emergencies , including improvised mortuaries and places to bury the dead . Instructions to the Invasion Committees stated : " ... every citizen will regard it as his duty to hinder and frustrate the enemy and help our own forces by every means that ingenuity can devise and common sense suggest . "

When the UK went to war on 3 September 1939 , the strength of the Metropolitan Police stood at 18 @, @ 428 , which was 900 officers short of full strength . Due to the threat of invasion three reserve groups were mobilised , the first consisted of 2 @, @ 737 police pensioners who were re @-@ engaged , a second reserve of 5 @, @ 380 Special Constables serving on a temporary full @-@ time basis for the duration of the war , and 18 @, @ 868 War Reserve Constables employed on the same basis as the Special Constables . On the same day as the Battle of Dunkirk , Scotland Yard issued a memorandum detailing the police use of firearms in wartime . This detailed the planned training for all officers in the use of pistols and revolvers , as it was decided that even though the police were non @-@ combatant , they would provide armed guarding at sites deemed a risk from enemy sabotage , and would assist the British Armed Forces in the event of an invasion . Because of the possibility of the police assisting the armed forces , firearms and ammunition supplied to divisions were increased . On 1 June 1940 , 3 @, @ 500 Ross Rifles , which had last seen service in 1916 , and 72 @, @ 384 rounds of .303 ammunition were received from the military and were distributed among divisions . Thames division had the smallest rifle allocation with 61 , and " S " Division the largest with 190 . Fifty rifles were also issued to the London Fire Brigade , and Port of London Authority Police .

= = Guns , petroleum and poison = =

In 1940 , weapons were critically short ; there was a particular scarcity of anti @-@ tank weapons , many of which had been left in France . Ironside had only 170 2 @-@ pounder anti @-@ tank guns

, but these were supplemented by 100 Hotchkiss 6 @-@ pounder guns dating from the First World War , improvised into the anti @-@ tank role by the provision of solid shot . By the end of July 1940 , an additional 900 75mm field guns had been received from the USA , ? the British were desperate for any means of stopping armoured vehicles . The Sten submachine gun was developed to replace infantry weapons left in France , and to supplement supplies from America of the Thompson submachine gun .

One of the few resources not in short supply was petroleum oil ; supplies intended for Europe were filling British storage facilities . Considerable effort and enthusiasm was put into making use of petroleum products as a weapon of war . The Army had not had flame @-@ throwers since the First World War , but a significant number were improvised from pressure greasing equipment acquired from automotive repair garages . Although limited in range , they were reasonably effective .

There were many ideas for using petroleum on a larger scale and although many proved fruitless a number of practical weapons were developed .

A mobile flame trap comprised surplus bulk storage tanks on trucks , the contents of which could be hosed into a sunken road and ignited . A static flame trap was prepared with perforated pipes running down the side of a road connected to a 600 @-@ imperial @-@ gallon (2 @,@ 730 L ; 720 US gal) elevated tank . Usually gravity sufficed but in a few cases a pump assisted in spraying the mixture of oil and petrol .

A flame fougasse comprised a 40 gallon light steel drum filled with petroleum mixture and a small , electrically detonated explosive . This was dug into the roadside with a substantial overburden and camouflaged . Ammonal provided the propellant charge , it was placed behind the barrel and , when triggered , caused the barrel to rupture and shoot a jet of flame 10 feet (3 @.@ 0 m) wide and 30 yards (27 m) long . They were usually deployed in batteries of four barrels and would be placed at a location such as a corner , steep incline or roadblock where vehicles would be obliged to slow .

Variants of the flame fougasse included the demigasse , a barrel on its side and left in the open with explosive buried underneath ; and the hedge hopper : a barrel on end with explosive buried underneath a few inches deep and slightly off centre . On firing , the hedge hopper barrel was projected ten feet (3 m) into the air and over a hedge or wall behind which it had been hidden . 50 @,@ 000 flame fougasse barrels were installed at 7 @,@ 000 sites mostly in southern England and at a further 2 @,@ 000 sites in Scotland .

Early experiments with floating petroleum on the sea and igniting it were not entirely successful : the fuel was difficult to ignite , large quantities were required to cover even modest areas and the weapon was easily disrupted by waves . However , the potential was clear . By early 1941 a flame barrage technique was developed . Rather than attempting to ignite oil floating on water , nozzles were placed above high @-@ water mark with pumps producing sufficient pressure to spray fuel which produced a roaring wall of flame over , rather than on , the water . Such installations consumed considerable resources and although this weapon was impressive , its network of pipes was vulnerable to pre @-@ landing bombardment ; General Brooke did not consider it effective . Initially ambitious plans were cut back to cover just a few miles of beaches .

It seems likely the British would have used poison gas against troops on beaches . General Brooke , in an annotation to his published war diaries , stated that he " ... had every intention of using sprayed mustard gas on the beaches " . Mustard gas was manufactured as well as chlorine , phosgene and Paris Green . Poison gases were stored at key points for use by Bomber Command and in smaller quantities at many more airfields for use against the beaches . Bombers and crop sprayers would spray landing craft and beaches with mustard gas and Paris Green .

= = Deception and disinformation = =

In addition to hiding real weapons and fortifications , steps were taken to create the impression of the existence of defences that were not real . Drain pipes stood in place of real guns , dummy pillboxes were constructed , and uniformed mannequins kept an unblinking vigil .

Volunteers were encouraged to use anything that would delay the enemy . A young member of the Home Guard (LDV) recalled :

In the villages use was made of any existing walls or buildings , loopholes for firing or passing heavy chains and cables through to form barriers strong enough to slow down or stop soft skinned vehicles . The chains and cables could also be made into psychological barriers to tanks by attaching an imitation bomb to them , an impression which could be augmented by running a length of cable from it to a position out of sight of a tank commander . These positions could be made even more authentic by breaking up the surface immediately in front of the obstacle and burying an old soup plate , or similar object . For occasions where time did not permit the passing of cables and chains we had concrete cylinders the size of a 45 gallon oil or tar barrel ready to roll into a roadway or other gap . These generally had a large metal loop cemented into one end through which a cable could be passed to link several together . Again , suspicious looking parcels could be attached to strengthen the illusion .

In 1938 , a section funded by MI6 was created for propaganda , headed by Sir Campbell Stuart . It was allocated premises at Electra House and was dubbed Department EH . On 25 September 1939 the unit was mobilised to Woburn Abbey where it joined a subversion team from MI6 , known as Section D , and by July these teams became a part of the newly created Special Operations Executive (SOE) . These SOE elements went on to form the core of the Political Warfare Executive in 1941 . Their task was to spread false rumours and conduct psychological warfare . Inspired by a demonstration of petroleum warfare , one false rumour stated that the British had a new bomb : dropped from an aircraft , it caused a thin film of volatile liquid to spread over the surface of the water which it then ignited . Such rumours were credible and rapidly spread . American broadcaster William Shirer recorded large numbers of burns victims in Berlin ; though it is not clear what he personally saw , it seems likely his reports were influenced by rumours . The interrogation of a Luftwaffe pilot revealed the existence of such weapons was common knowledge , and documents found after the war showed the German high command were deceived . The rumour seemed to take on a life of its own on both sides leading to persistent stories of a thwarted German invasion , in spite of official British denials . On 15 December 1940 , The New York Times ran a story claiming that tens of thousands of German troops had been ' consumed by fire ' in two failed invasion attempts .

= = Planned resistance = =

The War Office did not treat the threat of invasion seriously until the collapse of France in May 1940 . The Secret Intelligence Service had , however , been making plans for this eventuality since February 1940 , creating the core of a secret resistance network across the country . This remained in existence until at least 1943 and comprised both intelligence and sabotage units . In May 1940 , SIS also began to distribute arms dumps and recruit for a larger civilian guerrilla organisation called the Home Defence Scheme . This was deeply resented by the War Office who created the Auxiliary Units as a more respectable military alternative .

Auxiliary Units were a specially trained and secret organisation that would act as uniformed commandos to attack the flanks and rear of an enemy advance . They were organised around a core of regular army ' scout sections ' , supported by patrols of 6 - 8 men recruited from the Home Guard . Although approval for the organisation had been given in June 1940 , recruiting only began in early July . Each patrol was a self @-@ contained cell , expected to be self @-@ sufficient . There was , however , no means of communicating with them once they had gone to ground , which greatly reduced their strategic value . Each patrol was well @-@ equipped and was provided with a concealed underground operational base , usually built in woodland and camouflaged . Auxiliary Units were only expected to operate during an organised military campaign , with an expected lifespan of 14 days . They were not , therefore , intended to operate as a long term resistance organisation . The latter was the responsibility of the Secret Intelligence Service Section VII , which would have only begun to expand its operations once the country had actually been occupied , thus confining knowledge of its existence only to those men and women who would have been available at the time .

In addition , the Auxiliary Units included a network of civilian Special Duties personnel , recruited to

provide a short @-@ term intelligence gathering service , spying on enemy formations and troop movements . Reports were to be collected from dead letter drops and , from 1941 , relayed by civilian radio operators from secret locations . The wireless network did , however , only become operational from 1941 and was based upon a very rigid system which meant that it was unlikely to survive more than a few days following invasion . More important in 1940 for intelligence gathering were the mobile patrols of the GHQ Liaison Unit (' Phantom ') , which were staffed by skilled linguists and equipped with powerful wireless sets for direct communication with GHQ .

= = Offensive anti @-@ invasion operations = =

The War Cabinet and the Chiefs of Staff Committee were not content to sit and wait for the Germans to make the first move ; considerable efforts were to attack by air and sea the enemy shipping which had been assembled in occupied ports between The Hague and Cherbourg , starting in July 1940 . These attacks became known as the " Battle of the Barges " . Some notable operations are shown below :

12 August : Five Handley Page Hampdens attacked the Ladbergen Aqueduct on the Dortmund @-@ Ems Canal . The waterway was blocked for ten days , impeding the movement of barges towards the Channel ports .

8 September : Two cruisers and ten destroyers swept along the French coast and bombarded Boulogne harbour . In a separate operation , 3 Motor Torpedo Boats attacked a convoy of small vessels off Ostend ; two of the MTBs then entered the harbour and torpedoed two transport ships .

10 September : Three destroyers found a convoy of invasion transports off Ostend and sank an escort vessel , two trawlers that were towing barges and one large barge .

13 September : Three destroyers sent to bombard Boulogne but the operation was cancelled due to bad weather . A further twelve destroyers swept parts of the French coast .

15 September : Sergeant John Hannah gained the Victoria Cross during a raid by RAF bombers on invasion barges at Antwerp .

17 September : A major attack by Bomber Command on ports along the occupied coast . 84 barges were damaged at Dunkirk .

26 September : Operation Lucid , a plan to send fire ships into the harbours at Calais and Boulogne to destroy invasion barges , was abandoned when one of the old tankers that were to be used had engine failure .

30 September : The monitor HMS Erebus fired seventeen 15 @-@ inch shells into Calais docks .

4 October : Second attempt at Operation Lucid , this time cancelled because of bad weather .

7 October : Third attempt at Lucid , cancelled when the destroyer carrying the force commander hit a mine and had to be towed home .

10 ? 11 October : Operation Medium , the bombardment of invasion transports in Cherbourg . During the 18 minute bombardment , 120 15 @-@ inch shells were fired by the battleship HMS Revenge , and a total of 801 4 @.@ 7 @-@ inch shells were fired by her escorting destroyers . German coastal artillery replied for 30 minutes without hitting any of the warships .

Between 15 July and 21 September , German sources stated that 21 transport vessels and 214 barges had been damaged by British air raids . These figures may have been under @-@ reported .

= = The threat recedes = =

After the evacuation of Dunkirk , people believed that the threatened invasion could come at almost any time . Churchill was at times personally pessimistic about Britain 's chances for victory , telling Hastings Ismay on 12 June 1940 that " [y] ou and I will be dead in three months ' time " . German preparations would require at least a few weeks , but all defensive precautions were made with an extreme sense of urgency . In the summer of 1940 , an invasion attempt could have occurred at any time , but some times were more likely than others : the phase of the moon , the tides and , most of all , the weather were considerations . The weather usually deteriorates significantly after

September , but an October landing was not out of the question . On 3 October , General Brooke wrote in his diary : " Still no invasion ! I am beginning to think that the Germans may after all not attempt it . And yet ! I have the horrid thought that he may still bring off some surprise on us . "

The Battle of Britain had been won , and on 12 October 1940 , unknown to the British , Hitler rescheduled Sealion for the spring of 1941 . By that spring , the state of Britain 's defences had much improved , with many more trained and equipped men becoming available and field fortifications reaching a high state of readiness . With national confidence rising , Prime Minister Churchill was able to say : " We are waiting for the long promised invasion . So are the fishes ... "

When Germany invaded the Soviet Union , on 22 June 1941 , it came to be seen as unlikely that there would be any attempted landing as long as that conflict was undecided ? from the British point of view at the time , the matter hung in the balance . In July 1941 , construction of field fortifications was greatly reduced and concentration given to the possibility of a raid in force rather than a full @-@ scale invasion .

On 7 December 1941 , a Japanese carrier fleet launched a surprise air attack on the American fleet at Pearl Harbor ; the USA entered the war on Britain 's side . With America 's Germany first strategic policy , resources flooded into the UK , effectively ending the danger of invasion after two years .

= = Effectiveness = =

General Brooke frequently confided his concerns to his private diary . When published , he included additional annotations written many years later :

... I considered the invasion a very real and probable threat and one for which the land forces at my disposal fell far short of what I felt was required to provide any degree of real confidence in our power to defend these shores . It should not be construed that I considered our position a helpless one in the case of an invasion . Far from it . We should certainly have a desperate struggle and the future might well have hung in the balance , but I certainly felt that given a fair share of the fortunes of war we should certainly succeed in finally defending these shores . It must be remembered that if my diary occasionally gave vent to some of the doubts which the heavy responsibility generated , this diary was the one and only outlet for such doubts .

The question of whether the defences would have been effective in invasion is vexed . In mid @-@ 1940 , the preparations relied heavily upon field fortifications . The First World War made it clear that assaulting prepared defences with infantry was deadly and difficult , but similar preparations in Belgium had been overrun by well @-@ equipped German Panzer divisions in the early weeks of 1940 and with so many armaments left at Dunkirk , British forces were woefully ill @-@ equipped to take on German armour . On the other hand , while British preparations for defence were ad hoc , so were the German invasion plans : a fleet of 2 @,@ 000 converted barges and other vessels had been hurriedly made available and their fitness was debatable ; in any case , the Germans could not land troops with all their heavy equipment . Until the Germans captured a port , both armies would have been short of tanks and heavy guns .

The later experiences of the Canadian Army during the disastrous Dieppe Raid of 1942 , American forces on Omaha Beach on D @-@ Day and taking on Japanese defenders on Pacific Islands showed that under the right conditions , a defender could exact a terrible price from assaulting forces , significantly depleting and delaying enemy forces until reinforcements could be deployed to appropriate places via the sea and inland .

In the event of invasion , the Royal Navy would have sailed to the landing places , possibly taking several days . It is now known that the Germans planned to land on the southern coast of England ; one reason for this site was that the narrow seas of the English Channel could be blocked with mines , submarines and torpedo boats . While German naval forces and the Luftwaffe could have extracted a high price from the Royal Navy , they could not have hoped to prevent interference with attempts to land a second wave of troops and supplies that would have been essential to German success ? even if , by then , the Germans had captured a port essential for bringing in significant heavy equipment . In this scenario , British land forces would have faced the Germans on more equal terms than otherwise and it was only necessary to delay the German advance , preventing a

collapse until the German land forces were , at least temporarily , isolated by the Royal Navy and then mounting a counterattack .

Scholarly consideration of the likely outcome of invasion , including the 1974 Royal Military Academy Sandhurst war game , agree that while German forces would have been able to land and gain a significant beachhead , intervention of the Royal Navy would have been decisive and , even with the most optimistic assumptions , the German army would not have penetrated further than GHQ Line and would have been defeated .

Following the failure to gain even local air superiority in the Battle of Britain , Operation Sea Lion was postponed indefinitely . Hitler and his generals were aware of the problems of an invasion . Hitler was not ideologically committed to a long war with Britain and many commentators suggest that German invasion plans were a feint never to be put into action .

While Britain may have been militarily secure in 1940 , both sides were aware of the possibility of a political collapse . If the Germans had won the Battle of Britain , the Luftwaffe would have been able to strike anywhere in southern England and with the prospect of an invasion , the British government would have come under pressure to come to terms : the extensive anti @-@ invasion preparations demonstrated to Germany and to the people of Britain that whatever happened in the air , the United Kingdom was both able and willing to defend itself .

= = = Official documents = = =

Consolidated Instructions to Invasion Committees in England and Wales (July 1942) HM Government .

Barrel Flame Traps , Flame Warfare . Military Training Pamphlet No. 53 . Part 1 . War Office . July 1942 .

= = = Collections = = =

" The National Archives " . Repository of UK government records . Retrieved 3 August 2010 .

" WW2 People 's War " . BBC . Retrieved 3 August 2010 . ? an online archive of wartime memories contributed by members of the public and gathered by the BBC .

Sylvester , Rachel ; Coates , Sam . " The Times and The Sunday Times Archive " . London . Retrieved 3 August 2010 . ? subscription required