

ARK ROYAL FLEET AIRCRAFT CARRIER

BRIEFING

written by
James Davies



Key Information

Country of Origin:	Great Britain
Manufacturers:	Cammell Laird
Major Variants:	-
Role:	Fleet aircraft carrier
Operated by:	Royal Navy
First Laid Down:	16 September 1935
Last Completed:	16 December 1938
Units:	<i>Ark Royal</i>

Overview

HMS Ark Royal was Britain's first purpose-built aircraft carrier, and as with most warships of the era she was built under the influence of the inter-war naval treaties. These limited Britain to a total standard displacement of aircraft carriers not exceeding 135,000 long tons, with a maximum standard displacement per vessel of 27,000 long tons. With six other aircraft carriers in service Britain had 19,545 long tons remaining of her treaty allocation, however as it was intended to remove *HMS Argus* from service when *HMS Ark Royal* was commissioned Britain was free to build up to the 27,000-ton limit for an individual ship.

Britain was actively lobbying for a new upper limit on the size of aircraft carriers of 22,000 long tons, and in accordance with this national policy it was decided that the Ark Royal should match this displacement. Unlike carriers of other nations, the ship structure in Britain's aircraft carriers encompassed the whole ship, including the flight deck. Contemporary American and Japanese designs had the hangars and flight deck built as a relatively weak structure, perched on top of the ship's hull. This had the advantage of making the British ships tremendously strong, however the penalty was paid in increased weight from the extra structural steelwork.

The original design requirements called for the ship to carry 60 aircraft, and had increased to 72 by the time of the final sketch design, all to be stored below-deck in two hangars, along with a specification for a speed of 30 kt and a 900-ft flight deck, all within the 22,000-ton displacement. It was soon realised that this combination was impossible to achieve, and the flight deck was reduced to 800 ft, with considerable overhang forward and aft. A feature of British carriers of the time was a rounding down of the aft end of the flight deck. This made landing-on easier by reducing eddies, and the first pilots to land-on reported that the final few moments before touchdown were "very smooth".

The Ark Royal was the first British aircraft carrier to be fitted with a crash barrier, positioned at the mid-point of the flight deck. A crash barrier improves an aircraft carrier in several important ways, allowing aircraft to be landed-on more quickly as each arrival can simply be rolled forward of the barrier rather than having to be stowed below decks before the next landing, and also allowing aircraft to be stowed on deck in a permanent deck-park, increasing the number of aircraft that can be carried. The designers cited both these reasons when the crash barrier was proposed for the Ark Royal, and although the Admiralty firmly intended to use a deck park in wartime for the Ark Royal it was only used when transporting RAF aircraft to Malta.

Armour was provided for the magazines, shell rooms and machinery spaces, and was primarily designed to be proof against the American 1000-lb armour-piercing bomb dropped by a dive-bomber, as well as to prevent penetration from six-inch guns. The flight deck was minimally protected over the hangar areas, and was intended to prevent penetration by 20-lb bombs. Late in the construction process there was considerable debate as to whether to redesign the ship with an armoured flight deck, providing even more protection against dive-bombers. This was expected to half the number of aircraft that could be carried as well as drastically delay the completion, and it was the overriding need for more ships to be completed quickly that prevented this drastic change from being made. Underwater protection was designed against a 750-lb explosion, and tests concluded that the intended structure "seemed to have plenty in hand and would probably have withstood a larger charge."

Guns were provided for protection against air attack, and unlike previous British aircraft carriers were placed high up on the side of the ship, giving much-improved arcs of fire. Eight dual purpose (high-angle / low-angle) twin 4.5-in guns were chosen, backed up by six well-proven Mk VIII pom-poms for close-in defence (although only four were fitted initially). Eight sets of quadruple 0.5-in machineguns were also fitted, although British wartime experience with these guns was poor and, had the Ark Royal survived, they would almost certainly have been replaced by 20-mm machineguns later in the war (as they were in other ships). Other guns were fitted wherever there was space, including both Lewis and Vickers machineguns and 2-lb low-angle guns.

The Ark Royal was one of Britain's most important warships. She was continually in action, providing vital support at the Western end of the Mediterranean in the dark days of 1940 and 1941. Although she and her aircraft achieved many 'firsts' (including the first British air-to-air victory of the war, and the first sinking of a major warship by aircraft in wartime), her contribution can more clearly be seen by the fact that no ship reached Malta from the Western end of the Mediterranean for more than six months after she was lost.

Units

<i>Ark Royal</i>	Builder	Laid Down	Launched	Completed	Left Service
	Cammell Laird	16 Sept 1935	13 Apr 1937	16 Dec 1938	14 Nov 1941

At the start of the Second World War the *Ark Royal* was assigned to anti-submarine patrols off Northern Ireland. She nearly came to grief quickly when, on 14 September 1939, she was attacked by the German submarine *U39*, who fired a spread of three torpedoes. These exploded close to the ship, but no damage was caused and the hunter became the hunted as *U39* was then sunk by *Ark Royal's* escort. This was the first U-boat sunk in the Second World War.

On the 26 September 1939 aircraft from the *Ark Royal* scored the first British air victory of the war (a German flying-boat), but again had a close brush with disaster when she was nearly hit by a bomb dropped by a German aircraft. This led to the Germans announced the sinking of the *Ark Royal* for the first of many times, and every time Lord Haw-Haw (William Joyce, broadcasting in English for the German radio service) asked "where is the *Ark Royal*?" loud cheers and shouts of "we're here" sounded from the seaman's messes.

In October she rushed to the South Atlantic to search for the commerce raider *Admiral Graf Spee*, and she remained in the area until February 1940, and after a refit was sent to the Mediterranean at the end of March 1941. She was hastily recalled in April to fight the Norwegian campaign, and her aircraft (which had been temporarily disembarked) sank the cruiser *Königsberg* on 10 April – this was the first ever sinking of a major warship by aircraft. They also struck the last blow of the campaign by attacking the ships in Trondheim harbour on 12 June, scoring one hit on the *Scharnhorst*, although the bomb failed to explode.

Her next assignment was to form part of a new detached squadron in the Mediterranean – Force H. She took part in the attack on French forces at Mers el Kébir, in North Africa, at the beginning of July, and on 2 August her aircraft attacked Cagliari airfield and harbour as a diversion for the flying off of hurricane aircraft from the carrier *Argus* to Malta. This was the first of many 'club runs', as the regular ferrying of aircraft to Malta became known. Another attack on Cagliari followed on 1 September, this time to act as a diversion for the movement of warships through the Mediterranean to Suez. Her next excitement was in supporting the ill-fated attack on Dakar.

After a refit in the UK, Cagliari was again attacked on 8 November 1940 as part of a 'club run', and although a similar attack on Alghero airfield on 16 November was cancelled the associated 'club run' went ahead. Temporarily assigned to Force B on 21 November, the *Ark Royal* acted as cover for the movements of men and material to Malta. A brief skirmish with the Italian fleet took place off Cape Spartivento on 27 November, with little result. She then rejoined Force H, covering an anti-submarine sweep and a return convoy from Malta.

In January 1941 the *Ark Royal* was again involved in the Malta convoys, then went to the North Atlantic to search for German pocket battleship *Admiral Scheer*. After returning to Gibraltar she acted as the ferrying carrier for two 'club runs' in April. She had a narrow escape on 8 May when, whilst withdrawing from covering convoy WS8 she narrowly evaded torpedoes dropped by Italian aircraft. Another 'club run' followed on 19 – 22 May.

With the breakout of the *Bismarck* in to the Atlantic, Force H headed through the straits of Gibraltar, and after the *Bismarck* was found at 10:30 am on 26 May she launched a strike. This attacked (but did not damage) a British cruiser by mistake, and a second strike was launched at 7:00 pm, hitting the *Bismarck* twice, jamming her rudder and allowing her to be caught by the pursuing British battleships.

Force H returned to the Mediterranean, and was involved in three 'club runs' in June, then reverted to covering shipping movements in July (including convoy GM1 to Malta). Her aircraft attacked Alghero on the night of 31 July / 1 August whilst covering the movement of Force X to Malta, and later in August her aircraft attacked the cork-oak woods in the North of Sardinia with incendiary bombs whilst covering the returning ships from convoy GM1. On 24 August her aircraft attacked Tempio airfield, as a diversion for two ships returning from Malta.

Another 'club run' followed in September, and whilst covering convoy GM2 information was received that the Italian fleet was at sea. She launched a strike force against the Italian fleet on 27 September, but they were not found and the two forces retired without meeting. Yet another 'club run' took place in October.

After launching Hurricane fighters to Malta on 12 November, she was torpedoed by the German submarine *U81*, who fired three torpedoes at the *Ark Royal* and four at the battleship *Malaya*. One torpedo struck the *Ark Royal* on the starboard side, below the bridge, knocking out all electrical power. She was towed to within 30 miles of Gibraltar (partly under her own power), and the flooding appeared to be under control until a fire again eliminated her power. Flooding progressed rapidly, and she finally capsized and sank at 6:13 am on 14 November.

Specifications

Ark Royal																			
Displacement	22,585 long tons (22,946 tonnes) Standard 28,530 long tons (28,986 tonnes) Full load																		
Length	799 ft 7.75 in (243.73 m) Overall 725 ft 0 in (220.98 m) Waterline (full load)																		
Beam	94 ft 9 in (28.89 m)																		
Draft	22 ft 9 in (6.93 m) Standard 28 ft 0 in (8.53 m) Full Load																		
Block Coefficient	0.52																		
Propulsion	103,000 shp (76,807 kW)																		
Speed	31 kts																		
Weapons	16 x 4.5-in (114 mm) HA/LA guns in eight double mounts 4 x QF Mk VIII eight-barrelled pom-poms ^[Note 1] 32 x 0.5-in (12.7 mm) machineguns in eight quadruple mounts 8 x 2-lb (0.75 kg) LA guns 16 x 0.303-in (0.77 mm) Lewis machineguns 4 x 0.303-in (0.77 mm) Vickers machineguns																		
Magazine	<table border="1"> <thead> <tr> <th>Ship's Weapons</th> <th>Aircraft Weapons</th> </tr> </thead> <tbody> <tr> <td>4,000 x 4.5-in (114 mm) HE shells</td> <td>72 x 18-in (457 mm) torpedoes</td> </tr> <tr> <td>2,400 x 4.5-in (114 mm) SAP shells</td> <td>360 x 500-lb (187 kg) bombs</td> </tr> <tr> <td>200 x 4.5-in (114 mm) star shells</td> <td>300 x 250-lb (93 kg) bombs</td> </tr> <tr> <td>57,600 x pom-pom shells ^[Note 1]</td> <td>576 x 100-lb (37 kg) bombs</td> </tr> <tr> <td>80,000 x 0.5-in (12.7 mm) rounds</td> <td>800 x 20-lb (7.5 kg) bombs</td> </tr> <tr> <td>2,160 x 2-lb (0.75 kg) shells</td> <td>360,000 x 0.303-in (0.77 mm) Lewis rounds</td> </tr> <tr> <td>40,000 x 0.303-in (0.77 mm) Lewis rounds</td> <td>360,000 x 0.303-in (0.77 mm) Vickers rounds</td> </tr> <tr> <td>20,000 x 0.303-in (0.77 mm) Vickers rounds</td> <td></td> </tr> </tbody> </table>	Ship's Weapons	Aircraft Weapons	4,000 x 4.5-in (114 mm) HE shells	72 x 18-in (457 mm) torpedoes	2,400 x 4.5-in (114 mm) SAP shells	360 x 500-lb (187 kg) bombs	200 x 4.5-in (114 mm) star shells	300 x 250-lb (93 kg) bombs	57,600 x pom-pom shells ^[Note 1]	576 x 100-lb (37 kg) bombs	80,000 x 0.5-in (12.7 mm) rounds	800 x 20-lb (7.5 kg) bombs	2,160 x 2-lb (0.75 kg) shells	360,000 x 0.303-in (0.77 mm) Lewis rounds	40,000 x 0.303-in (0.77 mm) Lewis rounds	360,000 x 0.303-in (0.77 mm) Vickers rounds	20,000 x 0.303-in (0.77 mm) Vickers rounds	
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Armour	4.5 in (11.4 cm) over magazines, shell rooms and machinery spaces 3.5 in (8.9 cm) side belt																		
Miscellaneous																			
Complement	1,550 (867 ship branch, 683 air branch)																		
Aircraft	72																		

Note 1: The original intention was to fit six, with a proportionally larger shell allocation, however two were temporarily removed in 1938 whilst waiting for the crash barrier to be fitted as they may have interfered with an aircraft that missed the final wire. The fittings were left in place, however the pom-poms were diverted to other ships, and once the crash barrier was installed it was discovered that no more were available until 1942. The Ark Royal was sunk before they could be fitted.