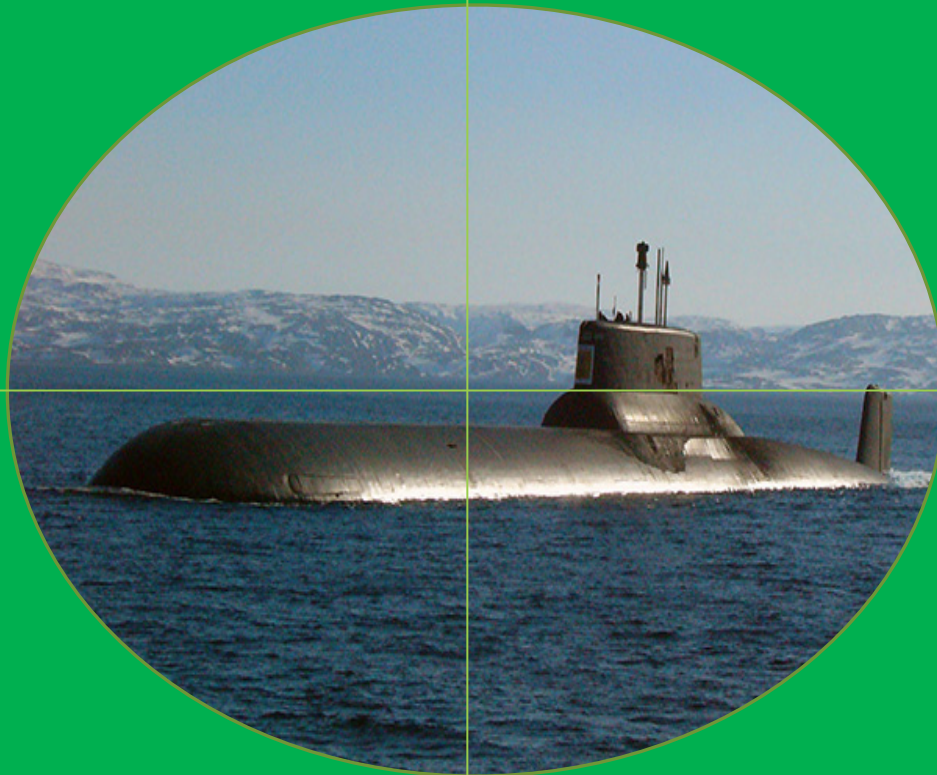




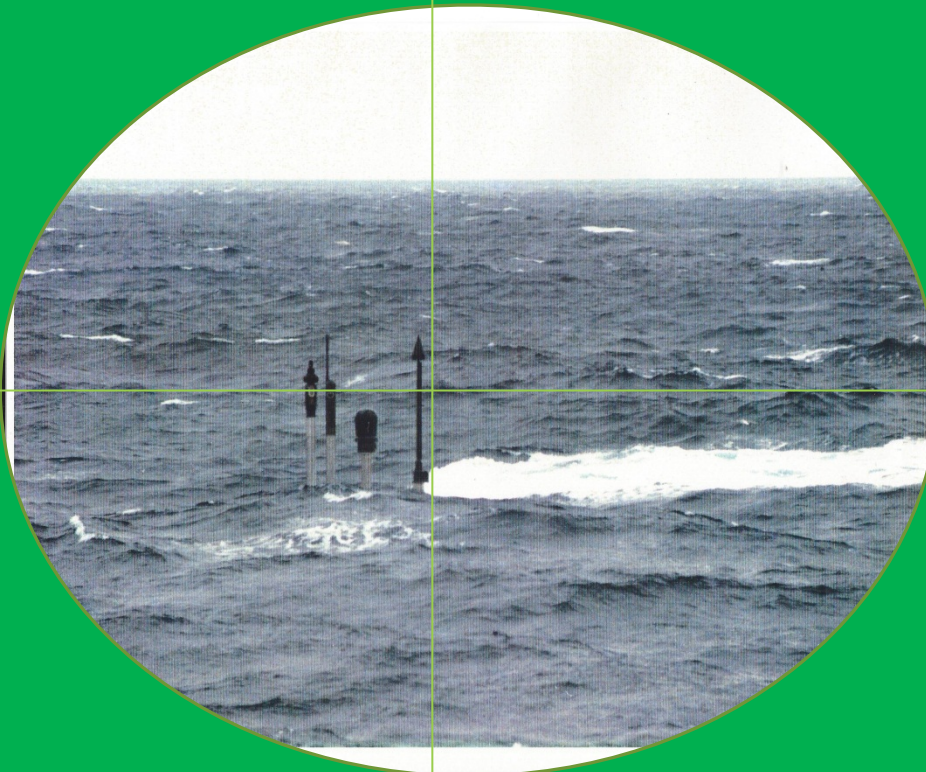
A FISH EYE VIEW FROM THE PERISCOPE

WHY SUBMARINERS ARE BEST!

A BIG RUSSIAN!



A CLOSE SHAVE



WARNING!

- There are submarines.....



- There are targets....



A SHORT HISTORY OF SUBMARINES

- 1578 William Bourne – mathematician and Royal Navy gunner
- 1620/4 Cornelius Drebbel – first working submarine – dived in Thames and went from Greenwich to Westminster. Rumour is King James went onboard!

Maritime Museum, Falmouth had a replica on display in 2010

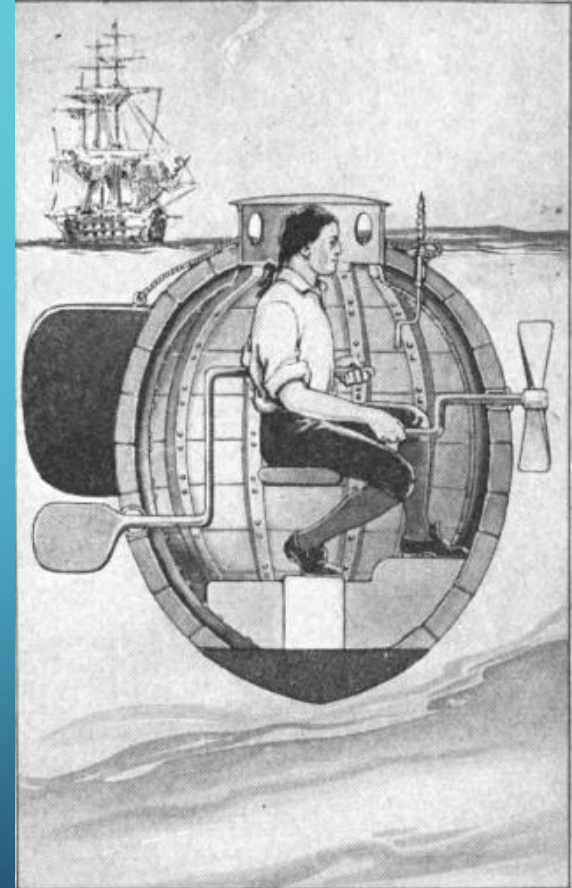
CORNELIUS DREBBEL



SUBMARINE DEVELOPMENT

- 1690 Denis Papin – the inventor of the pressure cooker – first design of air system
- 1749 Giovanni Borelli – the first ballast tank
- 1776 David Bushnell – *Turtle* – the first military submarine

TURTLE



BRITISH SUBMARINES

- 1902 HOLLAND Class – an example is in the Submarine Museum at Gosport. Designed by an American
- USN Submarine Fleet is 1 year older than the RN
- Launched 1901
- Foundered 1914 – enroute breaker's yard
- Raised 1982
- The batteries still held a charge!

HOLLAND I



ADMIRAL SIR ARTHUR WILSON VC GCB OM GCVO

- Submarines are “*underhand, unfair and damned un-English*”
- Submariners are “*no better than pirates*” – and should be hanged!
- He was Controller of the Navy at this point – later to become First Sea Lord – *abrasive, inarticulate and autocratic!*
- BUT ... a supporter of submarine ops!



MAX HORTON

- Served in early submarines
- Commanded the E-9 in 1914.
- Successful campaign in Baltic and sank several German ships
- On his return.....



THE JOLLY ROGER

- Flew the Jolly Roger as an indication of “kills” and to commemorate Arthur Wilson!
- Flown (HMS Utmost) many subsequent times
- Including HMS Conqueror (1982)
- HMS Swiftsure (1999)
- HMS Turbulent (2003)



PIRATES – ONE AND ALL!

HMS SPLENDID - 1999



HMS TURBULENT - 2003



SUBMARINE DESIGNATORS

- **SSK** Diesel submarine – electric motors
- **SSN** Nuclear powered submarine
 - Diesel engines for emergency
- **SSBN** Ballistic missile submarine
- **SSGN** Nuclear s/m with guided missiles
- **AIP** Air Independent Propulsion

CONVENTIONAL SUBMARINES

- Commonest form of submarine in many navies of the world;
- Battery power for electric motors;
- Diesel engines (the “Donk Shop”) for charging – on surface or snorkelling;
- Vulnerabilities during recharging phase;
- Very quiet on electric motors.

UPHOLDER CLASS



NUCLEAR SUBMARINE

- Nuclear reactor generates steam which, in turn generates electricity;
- Long life – ASTUTE Class never need refuelling;
- Very quiet;
- Long endurance;
- Very expensive!

DIAGRAM OF ASTUTE



ASTUTE CLASS SSN



BALLISTIC SUBMARINES

- Equipped with nuclear armed ballistic missiles;
- China, US, France, UK, Russia;
- Ranges up to 7000 nm;
- Usually 16 missiles per vessel;
- Patrol for weeks at a time in undisclosed areas;

SSBN

HMS RESOLUTION



HMS VANGUARD



AIR INDEPENDENT PROPULSION

GOTLAND

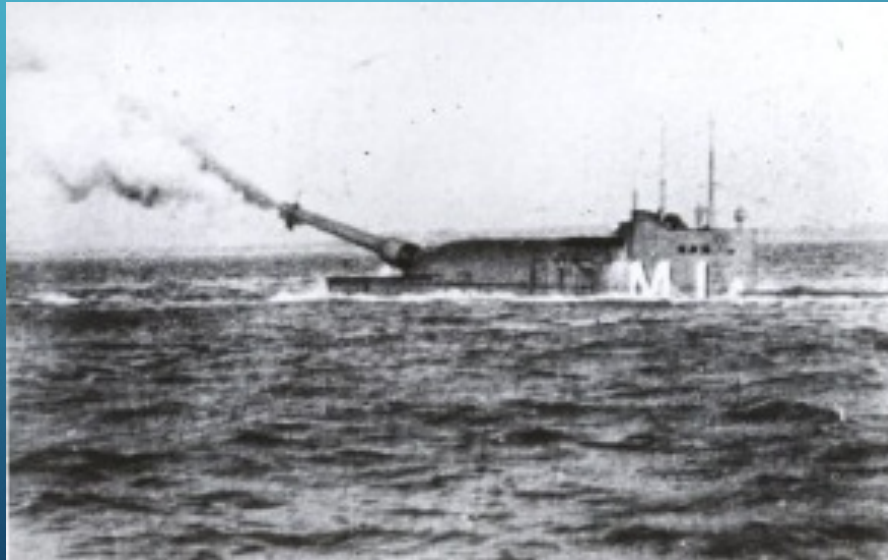


- Royal Swedish Navy
- Long endurance
- Oxygen and diesel
- Operated with USN with great success



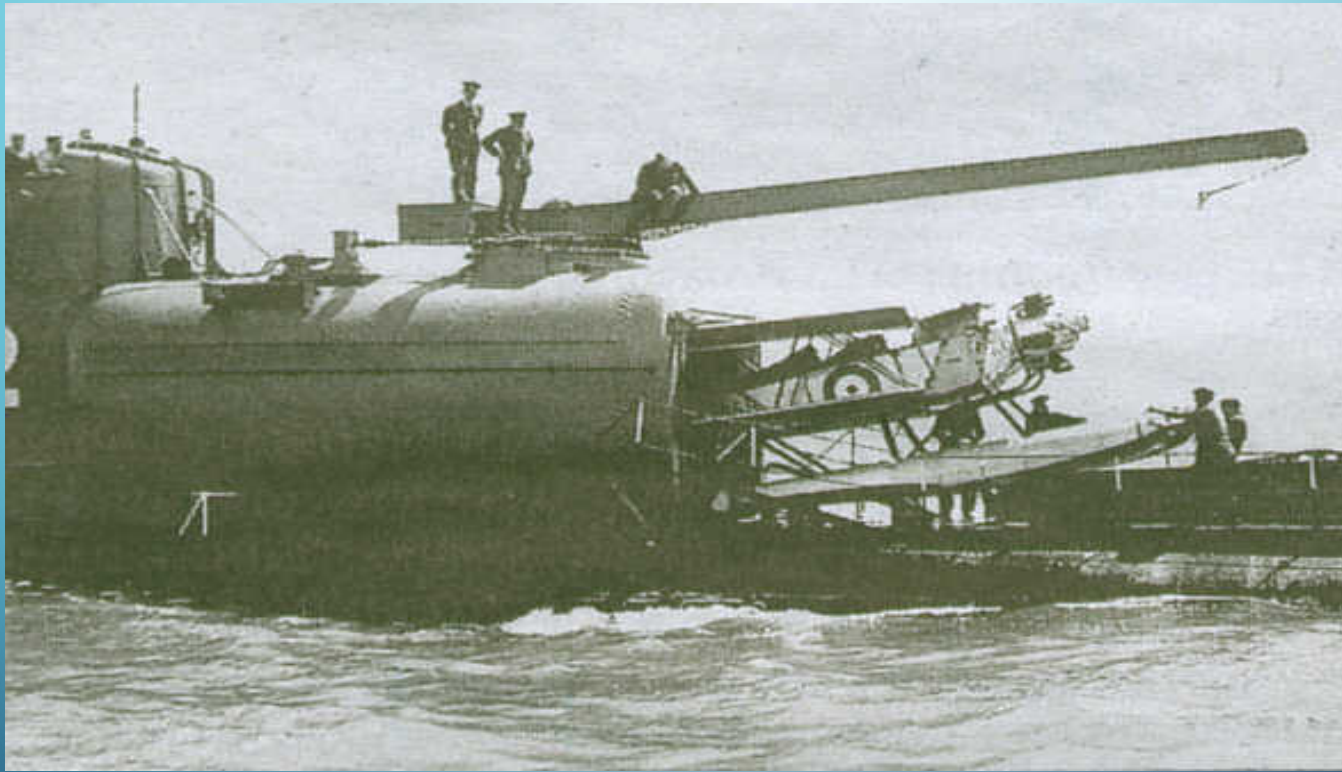
S/M COCK-UPS!

- It doesn't always go smoothly!
- How about a large gun – trying to turn a s/m into a battleship – the British M Class



“

AIRCRAFT CARRIER

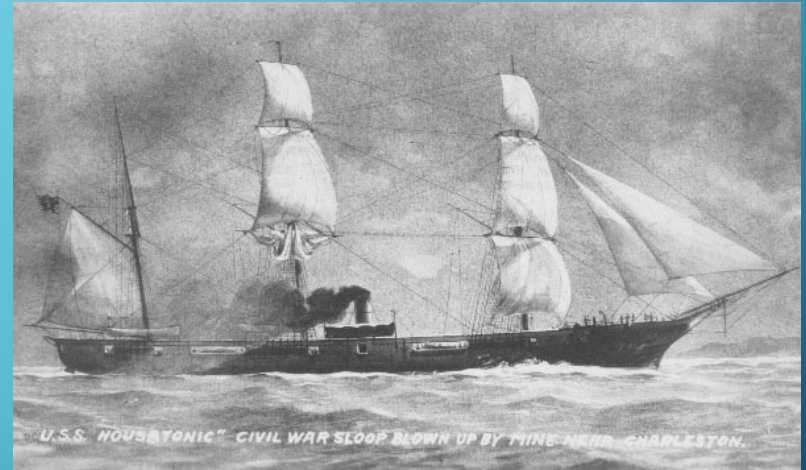


”

Another modification was to incorporate an aircraft to support the fleet!

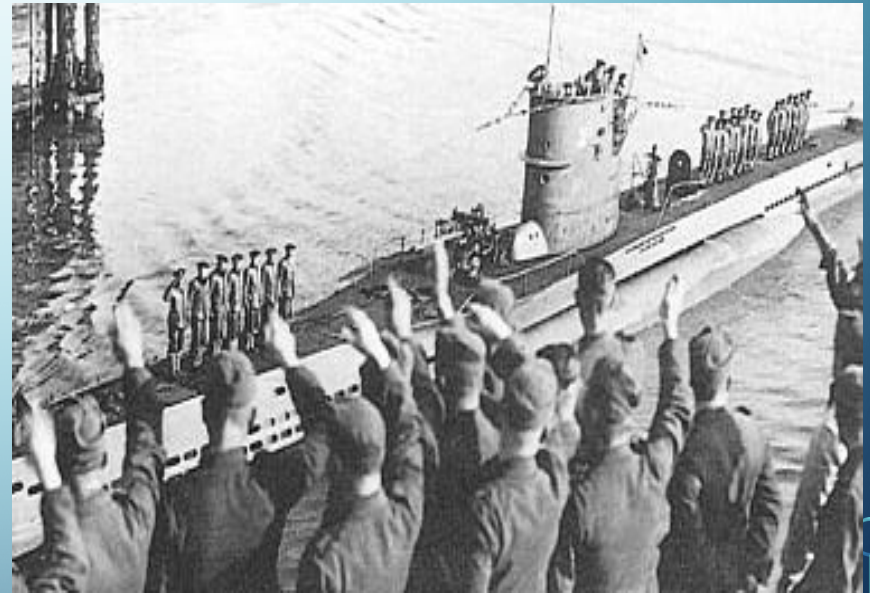
FIGHTING SUBMARINES

- Traditional roles:
 - Anti-ship
 - Anti submarine
 - Special Ops
 - Intelligence gathering
 - Deterrent



WOLF PACK

- German U Boats conducted unrestricted warfare in form of convoy attacks – relatively unrestrained between 1939 and 1943.
- U-47, commanded by Gunther Prein, attacked and sank HMS ROYAL OAK in Scapa Flow 13/14 October 1939 with the loss of 833 lives.



HMS ROYAL OAK *IN SCAPA FLOW*



FALMOUTH SUBMARINES

- U-86:



- Visible off Pendennis Point
- Remains of a number of other hulls – mostly WWI units wrecked in the Bay

FALMOUTH AND SUBMARINES

- 1962 Nassau Agreement:

- Choice of Home Ports:

- Faslane, Scotland
- Falmouth

And they chose.....



The slide features a dark blue background with a gradient. In the corners, there are decorative white and light blue circuit-like patterns consisting of lines and circles, resembling a printed circuit board or a network diagram.

- **Falmouth!**

- 1964 Incoming Labour Government reselected Scotland – now a major RN Base.
- What happens if Scotland becomes independent?
- It would have major implications!

WE ARE ALL



