



Part II

Session 3

“Technology to Seize an Enemy-held Shore”

Opposed Allied Amphibious Operations Prior to Normandy-Many Painful Lessons

- **UK-Norway, April 1940**
- **UK-Dakar, September 1940**
- **UK-Madagascar, May 1942**
- **UK/Canadian-Dieppe raid on the French coast, August 1942**
- **US/UK-Torch-Casablanca, Oran and Algiers, Nov 1942**
- **US/UK- Sicily/Italy – Sicily (Husky), Salerno (Avalanche), Anzio (Shingle), July –September 1943**

“How to seize an enemy-held shore”

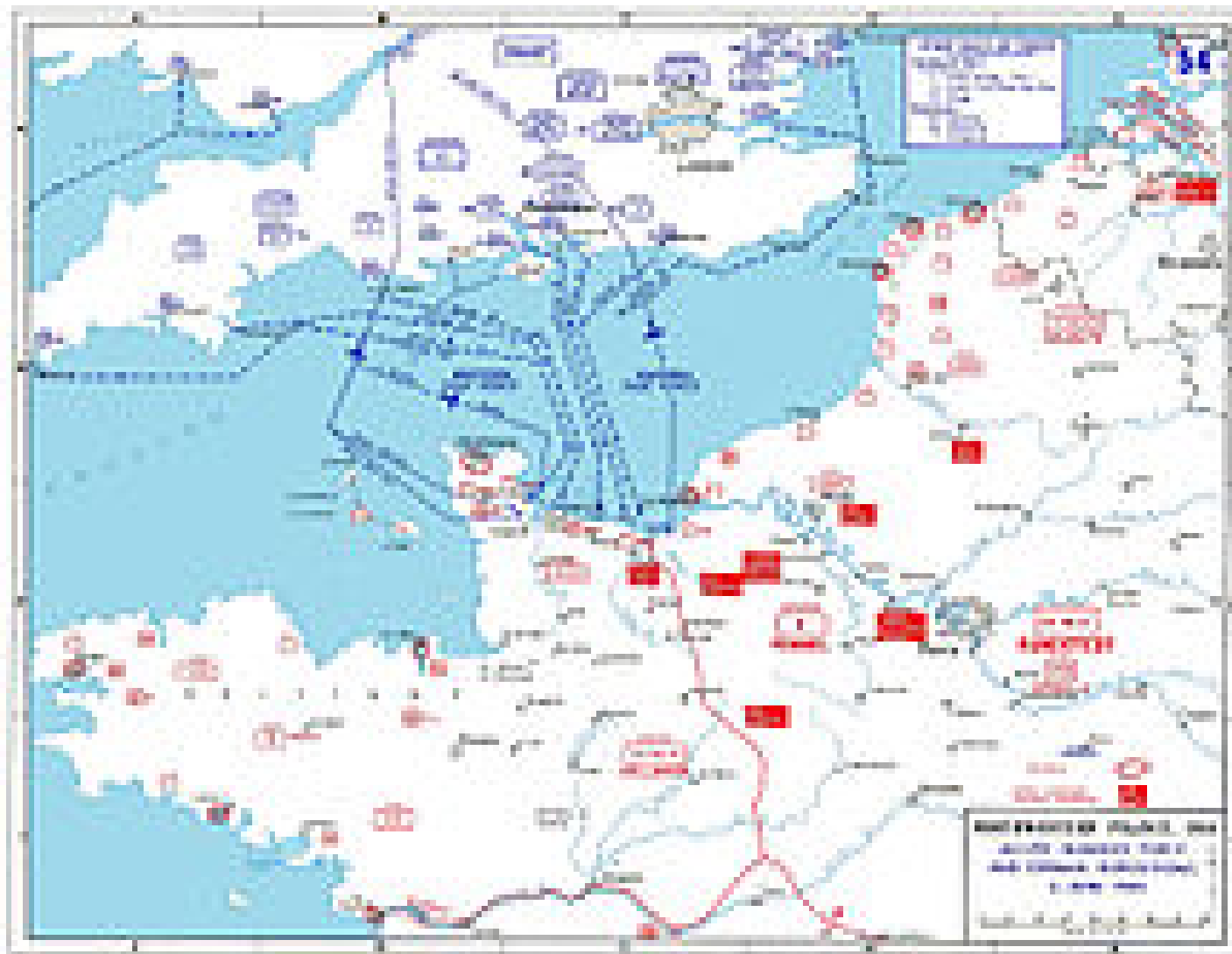
- Examine from that past, then **plan, plan, review the plan and exercise what you can of the plan.**
- Make sure that **some one was in-charge** of each action and was drilled in what to do.
- What are the Germans doing and what would be a German response? **Plan** for that response.
- **Special training, new weapons, what do you need to clear the beach, how do you protect the landing forces, where is the unified command and control?**

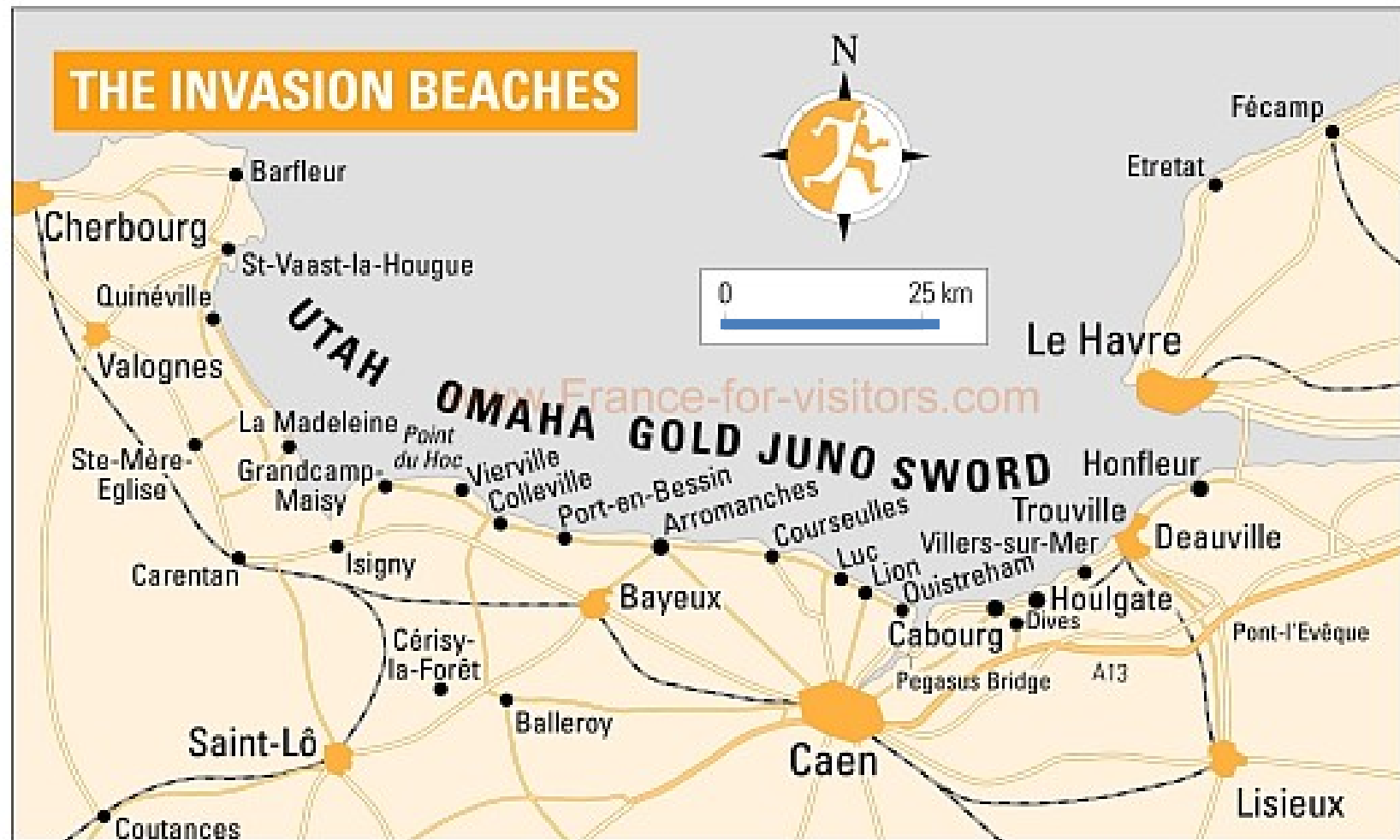
“How to seize an enemy-held shore”

- **While some of this sessions applies in the Pacific, the context here is a build up for the **Normandy** invasion:**
 - **One million troops and a 100,000 vehicles and everything needed to kept functioning.**
 - **The Normandy invasion was on the shore of a continent.**
- **The Pacific War was a series of island invasions or jungle enclaves in New Guinea. No opposing armor, limited air cover or the probably of massed reserves.**
- **Only the Philippine invasion and the possible invasion of the Japanese home Islands in November 1945 had the scope of Normandy.**

What a Successful Amphibious Landing Requires-1

- **Off-shore Command** ships containing cooperative inter- service and inter-Allied staffs functioning below the Senior Chiefs level.
- **Air Superiority** over the beachhead and the off-shore waters.
- **Rapid deployment of fighter aircraft** onto the beachhead.
- A **logistic plan** to move vast quantities of everything from off the ships to the beach and distribution points behind the front.





from www.france-for-visitors.com

What a successful Amphibious Landing Requires-2

- **Aerial reconnaissance and the best intelligence possible**
- **Deception**
- **Heavy bombardment of shore defenses that are sufficient and still mask the landing site.**
- **Specialized landing craft, beach clearing devices**
- **Specific training and specialized weapons for the assault forces**

Normandy Imponderables

- **Channel weather and tides.**
- **The state of German preparation, which was improving under Rommel's command.**
- **How quickly would German reserves be pressed in the battle.**

What Was **missing** at Normandy?

- A large port between Cherbourg and Le Havre:
- **Solution**: Something never seen before in invasions, an **artificial harbor** - the two **Mulberrys**.
- Multi-thousand ton **concrete caissons** hauled by tugs to the shore and sunk like dominos with a road way on top. Old ships forming a breakwater.
- Floating piers to accommodate the channel tides.
- In operation by Day 4.
- Six day after D-Day 326,000 troops and 54,000 vehicles were on the beach.

Mulberry Port



A Mulberry being floated to the shore



Dock piers. A “whale”- a floating roadway

By 9 June, just 3 days after D-Day, two harbors code named Mulberry "A" and "B" were constructed at Omaha Beach and Arromanches, and trucks were being driven to the shore.

Further Imponderable

- **Von Clausewitz's warning that as soon as the battle begins, all the greatest prewar planning lies in the hands of the Gods.**

Utah, the Most Western Landing Beach

- **Need to secure and then advance west to secure Cherbourg's harbor, 20 miles away.**
- **Cherbourg to be the major port after German damage repaired.**
- **It would allow incoming reinforcing US forces to land directly in France, bypassing England.**
- **Fuel pipeline terminus, pipeline laying began on June 7th from England.**

New: Landing Ship Tank (LST)

- The LST requirement came from the 1940 UK's Dunkirk evacuation experience. Following the **August 1941** Roosevelt/Churchill Newfoundland meeting the LST became a **joint US/UK** development.
- LST – a naval vessel designed to support amphibious operations by carrying significant quantities of vehicles, cargo, and landing troops directly onto an unimproved shore.
- More than a thousand LSTs, were designed and built during World War II for use by the US and the British.
- A quotation attributed to Winston Churchill:
"The destinies of two great empires ... seemed to be tied by some god-damned things called LST's."

LST-Initially a US Naval Doctrine Issue

- Early LST operations required overcoming the 18th century language of the Articles for the Government of the United States Navy:
"He who doth suffer his ships to founder on rocks and shoals shall be punished..."
- There were some tense moments of concept testing at Quonset, Rhode Island in early 1943 when John C. Niedermair of the Bureau of Ships encouraged the commanding officer of the first U.S. LST to drive his ship onto the beach at full speed of 10 knots.



Versatility: Ocean Going and Beachable

- Able to [1] embark and disembark tanks, motor transport, etc. on beaches of varying slopes, and [2] amphibians and Dual Drive Sherman tanks into deep water.
- Carry five Landing Craft Assault (LCA) or similar craft and one LCT (5) or LCT (6) on the upper deck in place of transport and as an alternative to LCT (5) two NL causeway to be carried; the LCT (5) and NL causeways to be capable of launching direct from the upper deck.
- Carry **500 tons of military load** and to beach with that and carry sufficient fuel and stores for 1,000 mi return journey at 10 knots on draughts 4 ft 6 in forward and 11 ft 6 in aft.
- Carry a load of sixty tons over the main ramp and ten tons over the vehicle ramp (i.e., the 50 ft ramp from the upper deck to the bow door.
- Out-fitted for operations in the tropics and in cold climates

The Need for LSTs Was Urgent-the Program Enjoyed a High Priority Throughout the War

- Not unlike the industrialization of the Aircraft assembly, LST production had *Kaiser* and *Knudsen* like methodologies.
- Factories in new and unlikely locations, Like Kaiser.
- New procurement Methods.
- Separate fitting locations, like *Knudsen's FMC*.

LST manufacturing Details

- Since most shipbuilding activities were located in coastal yards and were largely used for construction of large, deep-draft ships, **new construction facilities were established along inland waterways.**
- In some instances, heavy-industry plants such as **steel fabrication yards were converted** for LST construction.
- There was problem of getting the completed ships from the inland building yards to deep water. **The chief obstacles were bridges.** The Navy successfully undertook the modification of bridges and, through a "Ferry Command" of Navy crews, transported the newly constructed ships to coastal ports for fitting out — FMCs.

LST manufacturing Details, Con't.

- The success of these "cornfield" shipyards of the Middle West was a revelation to the long-established shipbuilders on the coasts.
- Of the **1,051 LSTs** built during World War II, 670 were constructed by five major inland builders.
 - Chicago Bridge and Iron [NYSC: CBI] shipyard in Seneca, Illinois launched 156 ships and was specifically chosen because of their reputation and skills, particularly in welding.
 - Most of the other LSTs constructed were built in Evansville, Indiana, by Missouri Valley Bridge and Iron & International Steel Co.

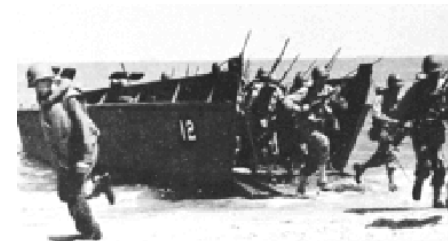
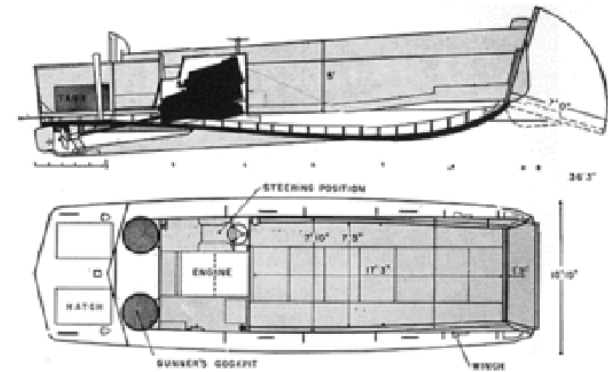
Fudging the WWII Time Interval the Higgins Boat



- The Landing Craft, Vehicle, Personnel (LCVP) or Higgins boat was a landing craft used extensively in amphibious landings in World War II.
- **USMC**, always interested in finding better ways to get troops across a beach in an amphibious landing, and frustrated that the Navy's Bureau of Construction and Repair could not meet its requirements, began to express interest in **1938 in a civilian craft - the Higgins' boat design.**
- There was limited production, but it lacked an easy way to get off the boat.
- In 1941 Navy and Marine Corps officers viewed a **Japanese front ramp shallow draft boat in China.**
- This design was sent to Higgins and the LCVP build began.

Higgins Landing craft

Displacement: 18,000 lb
Length: 36 ft 3 in
Beam: 10 ft 10 in
Draft: 3 ft aft , 2 ft 2 in forward
Propulsion: Gray Marine diesel engine, 225 hp or Hall-Scott gasoline engine, 250 hp
Speed: 12 knots
Capacity: 6,000 lb vehicle or 8,100 lb general cargo
Troops: **36 troops**
Crew: 4
Armament: 2 × .30 cal (7.62 mm) machine guns



The LVCP and the DUWK are both similar and different

The DUWK



- The DUKW (colloquially known as Duck), a six-wheel-drive amphibious truck designed by a partnership between Sparkman & Stephens (Yacht Builders) and GMC truck.
 - To transport supplies and troops over land and water
 - Approach and cross beaches in amphibious attacks
- **D** indicated a vehicle designed in 1942, **U** = utility, **W** indicated two powered rear axles and **K** indicated driven front wheels.
- Designed only to last long enough to meet the demands of combat, mass produced DUWKs, were a modification of the standard WW II 2-ton capacity "deuce" trucks.
- Seaworthy enough to cross by the English Channel.
- After Normandy used extensively to cross rivers.



- **21,137** were manufactured by GMC, Pontiac MI. Most of the assemblers were women **[Our Friend Rosie]**.
- Powered by a 270 cu in GMC straight-six engine.
- Weighed 6.5 tons empty
- Operated at 50 miles per hour on paved road and 5.5 knots on water.
- 31 feet long, > 8 feet wide, > 7 feet high with the folding-canvas top down and >8.8 feet high with the top up.
- It was not an armored vehicle, built with hollow ribs and welded sheet steel plating between 1/16 and 1/8 inches thick to minimize weight.
- A **high capacity bilge pump system kept the DUKW afloat** if the thin hull was breached by holes up to 2 inches in diameter.
- Front and rear winches



How does the DUKW fit our story

Rapid design for a specific requirement. The DUKW went from a 1942 requirement to first prototype in 7 months

Unique design features. The DUKW was the first vehicle to allow the driver to **vary the tire pressure from inside** the cab, an accomplishment of **Speir's** device. The tires could be fully inflated for hard surfaces such as roads and less inflated for softer surfaces, especially beach sand. This added to the DUKW's great versatility as an amphibious vehicle. This feature is now standard on many military vehicles.



Cross Company cooperation. The DUKW's windshields were provided by GM rival Libbey Glass (Ford) under the "Defense Plant Corporation" umbrella as a result of Henry Gassaway, one of the GM engineers whose wife's family worked for Libbey, and whose test driving broke the first windshields.

The DUKW was designed to last a only a short period in combat or use and then be scrapped; if it hadn't been destroyed in combat first. Circa-July 2013 Boston.



Land Mines and Acoustic Mine Detectors

- Early World War II era land mines, had casings made of steel or aluminum. However, by the middle of World War II, the British Army was using the first, practical, portable metal detectors—the [Polish mine detector](#).
- The Germans responded with mines that had a [wooden](#) or [glass](#) casing to make detection harder.
- Wooden mines had been used by the Russians starting in 1939, before the appearance of metal detectors, in order to save steel.

Effects

- The effect of mines is to slow or stop infantry or vehicles from advancing because of **fear of the unseen.**
- The mines are often designed to injure, not kill, victims in order to increase the medical support required by the forces that encounter them.
- Some types of anti-personnel mines can also damage the tracks on armored vehicles or the tires of wheeled vehicles.

Mine Detector (Polish) Mark I

- A metal landmine detector was developed during WWII. Initial work on the design started in Poland but it was not until the **winter of 1941–1942** that work was completed in England by Polish lieutenant Józef Kosacki.
- His design was accepted and **500 mine detectors were immediately sent to El Alamein** where they doubled the speed of the British Eighth Army.
- During the war more than **100,000** of this type were produced, together with several hundred thousands more advanced models (Mk. II, Mk. III and Mk IV).
- The detector was used later during the invasions of Sicily, Italy and Normandy and advances into Germany.



**British Forces using a mine detector
in North Africa**

Operation *Pluto* (Pipe-Lines Under The Ocean) and The Conundrum

- D-Day West England to Cherbourg (Dumbo)
- Dover to Calais (Bambi)
- You may have already known of this, but I sure didn't. In spite of watching many films about WW II and the European theater, I never thought to wonder how all the military vehicles were supplied with fuel.
- They sure couldn't just stop at the corner gas station and fill up their tank or jeep fuel tanks.
- I found this film fascinating.
- <http://www.youtube.com/v/Nv9lBqPVuoE%26feature=uploademail>

Hobert's Funnies

- The Funnies came from the need to create a series of modern **“siege engines”** to lead the assault on the of the French coast beach defenses – this need was a bitter lessons of the disastrous UK/Canadian 1942 Dieppe Raid.
- A rapid sweeping away of the obstacles and defenders in the British sectors would be crucial, as the lay of the land would favor a rapid counterattack by German armor.
- Field Marshal Sir Alan Brooke made the decision in 1943 to create these **new specialized units**. Responsibility for the build up of vehicles and the training of crews was given to armored warfare expert Major General Percy Hobart.
- Resulting were Hobart's Funnies a number **of unusually modified tanks** operated by the UK's 79th Armored Division or by specialists from the Royal Engineers.

Hobert's Funnies

- Many of the ideas had already been tried, tested or were in experimental development both by Britain and other nations.
 - The Scorpion flail tank (a modified Matilda tank) had already been used during the North African campaign to clear paths through German minefields.
- Soviet T-34 tanks had been modified with mine-rollers, as close-support tanks and bridge-layers.
- Fascine carriers had also been developed elsewhere.
- **The Funnies were the largest and most elaborate collection of combat engineering vehicles assembled in WW II.**

Hobart's Funnies Build-out

- Start with mostly Churchill and some Sherman tanks, and then build.
- Amphibious tanks with inflatable skirts.
- Mine Flailing Tanks with gigantic whirling chains.
- Tanks with massive wire cutters and bulldozer blades.
- Fascine tanks that carried rolled up metal and wooden bridges.
- Flame throwing “crocodile” tanks.
- Tanks that became ramps for other tanks, and so on.
- **15 different models** in all.





Amphibious DD [Dual Drive] tanks await blowing of breaches in the sea wall on Utah Beach. This photo was taken shortly after H Hour.



The Centaur bulldozer was a Cromwell tank with the turret removed and a bulldozer blade added which could be raised and lowered with a winch. The commander of the tank dozer was protected by an armored lookout tower.

(1/5) TANKS! The Battle of Normandy

Hobart's funnies at 5 min and 24 sec

www.youtube.com/watch?v=ImV30KURF7I

Minimal US Use of the Funnies

- **British General Montgomery recommended that the US forces use the Funnies.**
- **A third of the available vehicles were offered to the US, but response was minimal. Eisenhower was in favor of the amphibious tanks, but left the decision on the others to General Bradley.**
 - **None of the other designs were used, because it was thought that they required specialized training and an additional support organization.**
 - **Also, the Americans were reluctant to make use of funnies based on the Churchill tank, as they did not want the logistical complexity of adding another tank model to their inventory.**
- **In the light of difficult operations during the US landing on Omaha beach, Bradley's decision has been criticized, as it was felt that use of the use of the various "funnies" would have saved American lives.**
- **After D-Day, American forces did make limited use of the Sherman Crab mine-clearing tank [basically an armored bulldozer]**

The Ghost Army

- An Army tactical deception unit imitating earlier British operations, officially known as the US 23rd Headquarters Special Troops.
- The 1,100-man unit was given a unique mission within the U.S Army: to **impersonate other U.S. Army units** to deceive the Germans.
- From a few weeks after D-Day, when they landed in France, until the end of the war,
 - they put on a "traveling road show" utilizing inflatable tanks,
 - sound trucks,
 - fake radio transmissions and pretense.
- They staged more than **20 battlefield deceptions**, often operating very close to the front lines.
- Their mission was kept secret until 1996, and elements of it remain classified. **We might have to use the techniques against the Russians.**

Unique Staff and Operation

- **Ghost soldiers were encouraged to use their brains and talent to mislead, deceive and befuddle the German Army.**
 - **Many were recruited from art schools, advertising agencies and other venues that encourage creative thinking.**
 - **In civilian life, ghost soldiers had been artists, architects, actors, set designers and engineers.**
- **Although the 23rd Headquarters Special Troops consisted of only 1,100 soldiers,**
 - **They used dummy tanks and artillery, fake aircraft and giant speakers broadcasting the sounds of men and artillery to make the Germans think it was upwards of a two-division 30,000 man force.**
- **The unit's elaborate ruses helped deflect German units from the locations of larger allied combat units.**

Ghost Soldiers

- **The unit consisted of the 406th Combat Engineers (which handled security), the 603rd Camouflage Engineers, the 3132 Signal Service Company Special and the Signal Company Special.**

Tactics-I

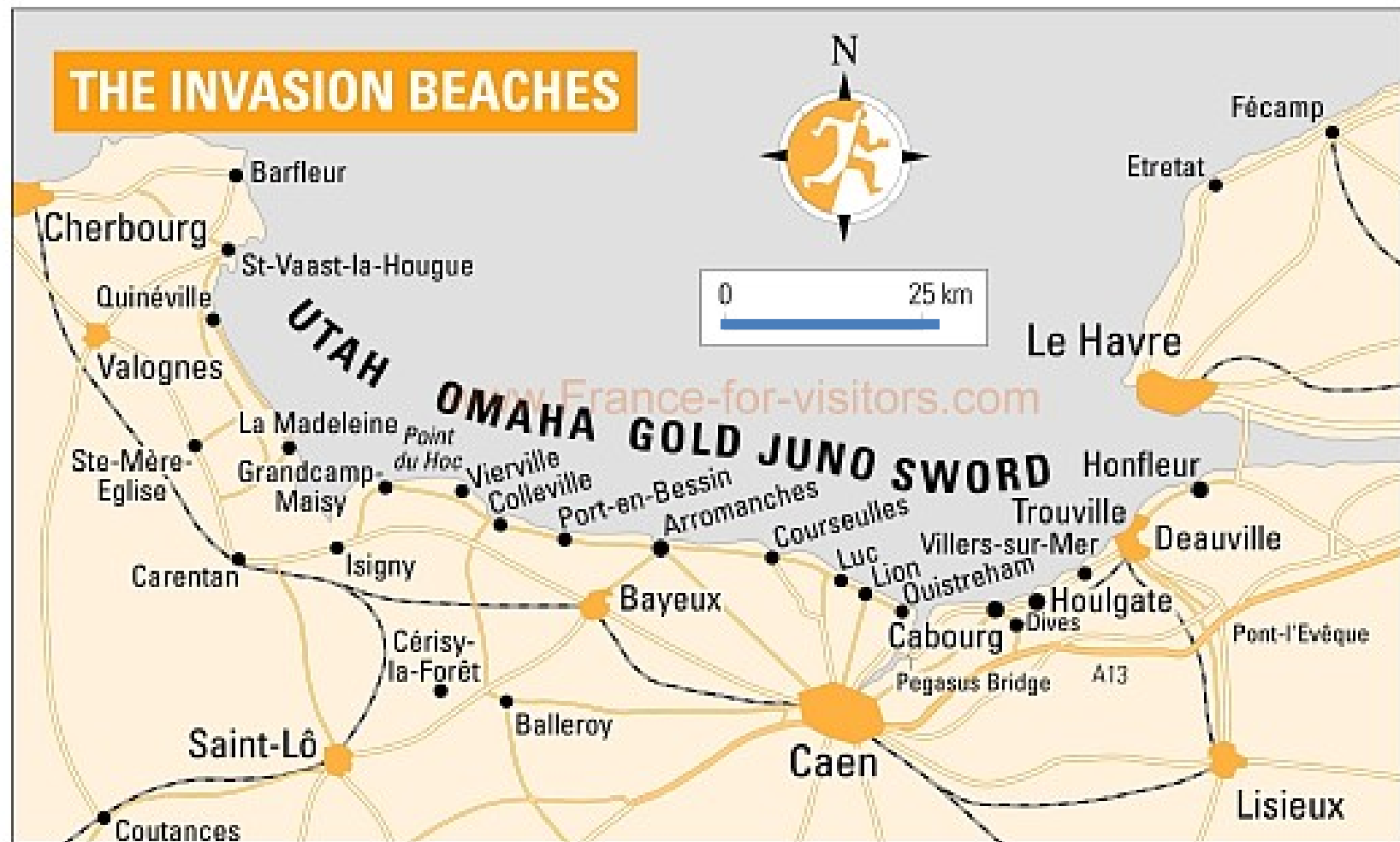
- **Visual Deception** - The visual deception arm of was equipped with inflatable tanks, cannons, jeeps, trucks, and airplanes that the men would inflate with air compressors, and then camouflage imperfectly so that enemy air reconnaissance could see them.
- **Phonic Deception** - Sounds of actual armored and infantry units were recorded. For each deception, sounds could be “mixed” to match the scenario they wanted the Germans to believe. This program was recorded on **state-of-the-art wire recorders** (the predecessor to the tape recorder), and then played back with powerful amplifiers and speakers mounted on halftracks. The sounds they played could be heard 15 miles (24 km) away.

Tactics-II

- **Radio Deception** - Operators created phony traffic nets, impersonating the radio operators from real units. They learned the art of mimicking a departing operator's method of sending Morse Code so that the enemy would never detect that the real unit and its radio operator were long gone.
- **Atmosphere** - the unit often employed theatrical effects to supplement the other deceptions.
 - Collectively called "atmosphere", these included simulating actual units deployed elsewhere by the application of their divisional insignia, painting appropriate unit insignia on vehicles
 - Having the individual companies deployed as if they were regimental headquarters units.

Unintended Deception

- 82nd Airborne units parachuted into **Saint Mère-Eglise**, to begin the westward assault to take Cherbourg Harbor.
- Because the air drops were **disrupted** the troops were scattered into many small units; but they fought with such **tenacity**, that the Germans thought that their numbers were much larger than they were.
- 9 June 1944 picture



from www.france-for-visitors.com



82nd Airborne unit at Saint Mère-Eglise, 9 June 1944. Because the air drops were disrupted and the troops scattered, the Germans thought that the forces were much larger than they were.

How Do You Identify Friend or Foe at 300 MPH?

- At a half mile away and moving at 300MPH an FW-190 and a P-47 look alike.



- Quick solution **Black and white** Invasion strips on every Allied tactical and support aircraft flying first over Normandy beaches and then through the European Theater.
- Second best secret after the Normandy landing place and date. Strips painted on the day before the invasion.

“WW II Amphibious warfare was a special kind of fighting that required many special ingredients

- New inter-service/allied command structure**
- An extremely high level of battle training**
- Beachhead air and sea supremacy**
- Very sophisticated low altitude aerial support**
- Novel and very often weird-looking weapons**
- Incredibly complex logistics**
- Smart ways of directing masses of troops**
- Moving vehicles on and off narrow beachheads**
 - Navy Beach-masters**

How to seize an enemy-held shore

- **“Getting all these right meant a very good chance of winning.**
- **But, ignoring any of these critical requirements most likely would mean heavy punishment.**
- **And, then there is always the element of luck.”**

Photos

Observations

- **A Very Scientific Victory**
- **WW II Commanders, contrary to earlier tradition, permitted and encouraging “Civilian and Military Tinkerers” in mid-level ranks.**
- **There was a confluence of Allied designs, ingenuity, industrialization, organizations, logistics coupled with the happenstance of geography and over-extension by the Axis.**