

**GN 300274**  
**MISSION GUIDE**

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**DAM  
BUSTERS™**



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**COLECO**  
ELECTRONICS

RAF Scampton  
15 May 43

F/L D.J. Shannon  
RAF Albermarle  
WARCS

Dear David,

This is doubtless going to come as a shock, but you're one of mine, now. We have an operation that calls for a precise number of aircraft, due to go off in less than 24 hours, and we've just lost a pilot to an auto accident. The silly bloke was watching a WAAC when he should have been looking at the oncoming lorry. Only a broken leg, mercifully, but it put him out of action just when we needed him most.

As a result, we're short one expert low-level pilot. It's a hell of a complex mission, and I'm sorry to drop you in it without special training, but it calls for a lot of treetop stuff, and you're the only one I know who can take a Lanc under Tower Bridge with the wheels down.

The timing of this thing is absolutely critical, as the weather is due to sock in day after tomorrow, so we have to have you instantly. There won't be time for even one training flight, and you'll be lucky if you make it in time for the briefing. Air Marshall Harris, therefore, has authorized me to take the extraordinary measure of sending you all this very sensitive material by means of a "Special Courier". He's frightfully touchy so approach with caution.

Please familiarise yourself with all the enclosed information on your train trip north, since it's all you're going to get. I've given you the best navigator in the squadron, and he'll help as much as he can. Engage a private compartment (if you can), as we cannot risk this classified material falling into the wrong hands now.

Sorry the package appears to be so disorganised but you'll find everything you need to know to carry out this mission included in it. I'll meet you tomorrow.

Good Luck!

*Gibson*  
Gibson

# CERTAIN ASPECTS OF HARD-CASING EXPLOSIVE BEHAVIOR AT DEPTH

By B.N. Wallis M.S.E., F.R.S.

## PREFACE:

Current strategic theory holds that the bombing of enemy factories and centres of population beyond the battlefield will cause a collapse of production capacity and severe deterioration in civilian morale. The Air Targets Sub-Committee has identified three targets of special strategic significance: the Moehne, the Eder, and the Sorpe dams. All are in the Ruhr valley and account for the bulk of water supply to the monstrous German arsenal. For example, the German method of iron production needs between 100 and 150 tons of water to produce a ton of steel. These dams also provide domestic water to the Ruhr district.

The Moehne creates Moehne Lake. The level of this lake is maintained so that barges with coal and steel and tanks can travel to and from the foundries. If the dam were to be breached, the reservoir would empty 134 million tons of water in approximately ten hours into the lower Ruhr, causing wide spread disaster. There would be a serious shortage of water for drinking purposes and industrial supplies.

The Eder dams the Eder River to form Eder Lake — 212 million tons of water. It controls the level of Germany's second most important waterway, the Mittelland Canal, and prevents flooding of surrounding agricultural land and towns. Several power stations lying along the river would be damaged or destroyed by a breach in the dam, and transportation on the Mittelland would be seriously hampered to the point of a virtual cessation of traffic. The Sorpe holds a similar position of importance.

A psychological as well as physical effect will be felt, should the dam be burst. Rumours will circulate regarding disease, water shortage, and loss of firefighting capabilities.

Countervailing arguments were submitted by high-ranking officers of Bomber Command, who drew the Sub-Committee's attention to the massive construction of the German dams, against which existing weaponry would be useless. There was considerable doubt as to whether the structure could be breached even if fissures were made in a gravity-type dam (the Moehne). These dams are also protected by nets against torpedoes.

The Moehne is 112 feet thick at the base, 130 feet high and 25 feet thick at the top. The Eder, also a gravity dam, is even bigger.

It is calculated that the bomb will not ricochet if the angle of impact exceeds 30 degrees, and therefore the best height is 10-15,000 feet. At this height the average error was 102-113 yards (if a 50-yard-long portion of the dam were attacked, only a 6 % chance existed of hitting it--this is reduced to 2 % during war-time).

Nonetheless, air attacks on reservoirs and dams have been deemed so important that the Air Targets Sub-Committee desires that the issue be "treated as urgent and of pressing importance."

## DEVELOPMENT

It was clear that conventional techniques were unsuitable to the destruction of these very solid objects, and that an unusual approach would be required to solve the problem. Obviously, a kind of "explosive judo" would be needed, to use the vast weight of water behind the dam to assist in its own destruction.

An underwater bomb exploded on the upstream side of the dam would use the water pressure to magnify the shockwave against the dam. Such a bomb would produce a shockwave that would travel through the side of the dam, smashing a hole through the masonry. However, experimentation revealed that if the bomb was even slightly too far upstream from the dam face when detonated, the surrounding water would damp and absorb the shockwave, making the explosion useless. A new delivery system, incorporating both weapons and techniques, was called for.

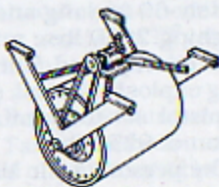
Early in 1942, I had the idea of a missile, which if dropped on the water at a considerable distance upstream of the dam would reach the dam in a series of ricochets, and after impact against the crest of the dam, would sink in close contact with the upstream face of the masonry. The germ of this idea came from a technique used by one of the greatest naval strategists of all time, Horatio Nelson, who discovered that by skipping cannon shot across the surface of the water it would gain distance and hit the target vessel just above the water line.

The bomb uses some of the same principles as a rock skipping across the water, but differs in that a rock skipping rotates along its vertical axis while the bomb rotates counter clockwise along its horizontal axis. The essential parameters in delivering such a bomb are airspeed and initial approach angle. In theory, an appropriately constructed bomb capable of being carried by a heavy bomber could be delivered using this principle. Extensive testing has proven this to be correct.

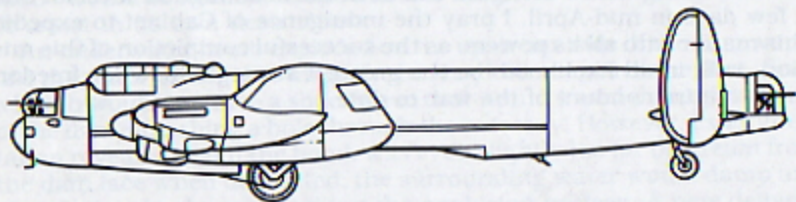
I had projected a near-spherical steel weapon seven and a half feet in diameter. But the Ministry of Supply predicted a two-year wait for steel to make the case, so we settled on a smaller cylinder. The final version of the bomb is approximately 60 in. long and 50 in. in diameter, made of 3/8 in. thick steel, weighing 2650 lbs., and containing 6600 lbs. of Torpex underwater explosive compound. There are three pistols, armed with the powerful initiating explosive Tetryl, set to explode at 30 ft., and a fourth self-destructive pistol set to go off 90 seconds after release. Total weight of the weapon is 9250 lbs.

Bomber Command, in the person of Air Marshal Harris, assures me that its personnel and equipment can deliver the weapon on target within the specified parameters. To that end, a special squadron, number 617, has been formed and is currently undergoing intensive training for the exclusive purpose of conducting this single mission. Equipped with modified Lancaster III bombers and carefully selected on the basis of their low-level expertise, the men of 617 Sqn. should have excellent chance of success. Time, however, is one of the essence, since the dams are now filling with water, and will be at the ideal highest level for only a few days in mid-April. I pray the indulgence of Cabinet to expedite this matter with all its powers, as the successful completion of this mission, will, in all likelihood, be the greatest strategic blow for freedom in the entire conduct of the war to date.

## DAMBUSTING BOMB DETAIL



ED825/G carried out test dropping of the cylindrical mines, but was not selected to be one of the attacking aircraft. Underneath can be seen the mine-support pylons and belt drive mechanism for spinning the mine prior to release. The specially fitted .303 can be seen silhouetted just behind the starboard landing gear. (British Official).



### LANCASTER B. MK I/III (DAM BUSTER)

This modified version of the Mark III has been especially adapted for this mission. The original Mark I/III had H2S radar, a downward looking radar, used to obtain directional bearings from the local landscape. This has been removed in the Dam Buster Lancaster to increase the bomb load capacity. The bomb bay doors were removed and faired in to allow for two v-shaped caliper arms which protrude from the front of the bomb bay. These calipers hold the mine between their points and a 20-inch diameter disk mounted on the inside of these extremities engages a track at the end of the cylinder. A hydraulic motor attached to the track (used for steering the hydroplane operator in submarines) is mounted on the floor of the fuselage. This motor is used to spin the mine backwards at the required 500 rpm.

## LANCASTER Mk I (Early)

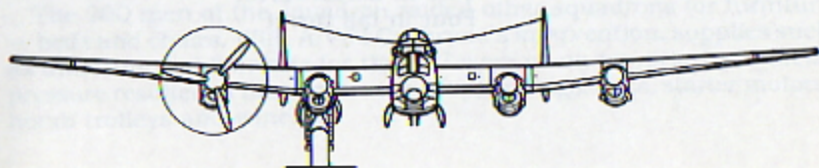
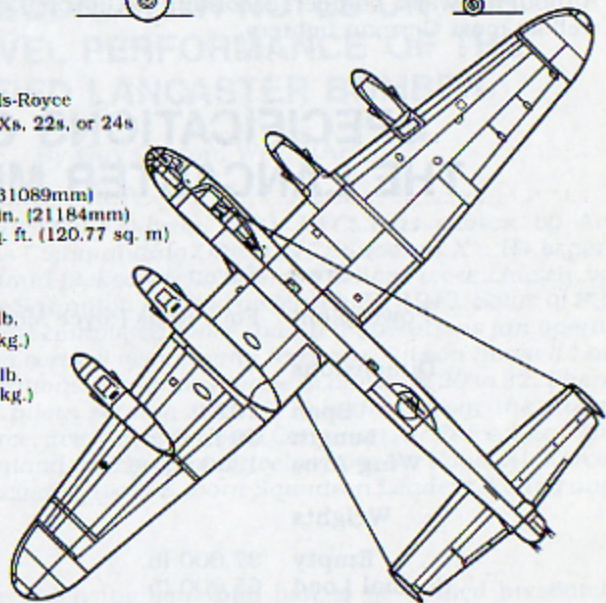
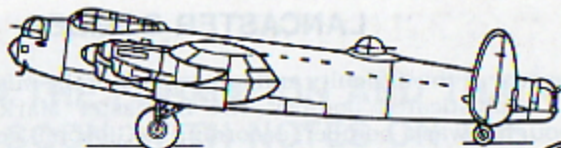
### Specification

<b>Crew</b>	Seven
<b>Powerplant</b>	Four Rolls-Royce Merlin XXs, 22s, or 24s
<b>Dimensions</b>	
<b>Span</b>	102 ft. (31089mm)
<b>Length</b>	15 ft. 6 in. (21184mm)
<b>Wing Area</b>	1,300 sq. ft. (120.77 sq. m)
<b>Weights</b>	
<b>Empty</b>	37,000 lb. (16783 kg.)
<b>Normal Load</b>	65,000 lb. (29484 kg.)

### Performance

<b>Max. Speed</b>	275 mph (442.5 km/hr.) fully loaded at 15,000 ft.
<b>Service Ceiling</b>	24,500 ft. (7467 m)
<b>Range</b>	2530 miles (4072 km) with 7000 lb. load (3175 kg.) 1730 miles (2784 km) with 12000 lb. load (5443 kg.)

<b>Armament</b>	Eight 0.303 (7.7 mm) machine guns Two in nose turret Two in dorsal turret Four in tail turret
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## LANCASTER BOMBER

Because of the difficulty and importance of the mission the latest and most sophisticated bomber, the Lancaster Mark III, was chosen. Although it was a bomber, according to Gibson it could manoeuvre as well as most German fighters.

# SPECIFICATIONS OF THE LANCASTER MK III

<b>Crew</b>	Seven
<b>Powerplant</b>	Four Rolls-Royce Merlin 24s
<b>Dimensions</b>	
<b>Span</b>	102 ft.
<b>Length</b>	59 ft. 6 in.
<b>Wing Area</b>	1300 sq. ft.
<b>Weights</b>	
<b>Empty</b>	37,000 lb.
<b>Normal Load</b>	65,000 lb.
<b>Performance</b>	
<b>Max. Cruising Speed</b>	275 mph
<b>Service Ceiling</b>	24,000 (with special superchargers)
<b>Range</b>	2530 miles with 7000 lb. load 1730 miles with 12000 lb. load
<b>Armament</b>	Eight 0.303 machine guns Two in nose turret Two in dorsal turret Four in tail turret



# REPORT ON THE FORMATION AND TRAINING OF 617 SQDN. WITH NOTES ON THE LOW-LEVEL PERFORMANCE OF THE MODIFIED LANCASTER BOMBER

By Guy Gibson, W/C, RAF.

*Wing Commander Guy Gibson, DSO, DFC, was chosen by Air Marshall Harris as Commanding Officer of "Squadron X". He began assembling the hand-picked crew, some of whom were chosen by Gibson himself, at Scampton Airfield on March 21, 1943. Some of the crew members have completed more than ten operations (an operation is 25 bombing sorties) over enemy territory. Gibson himself has completed 23 operations. The crews range in age from 20 to 32. There are currently 21 pilots serving with 617 — three from the Royal Australian Air Force, five from the Royal Canadian Air Force, one from the Royal New Zealand Air Force, and twelve from the Royal Air Force. This last figure includes two U.S.-born Squadron Leaders, Young and McCarthy.*

The speed with which the squadron had to be formed presented various difficulties. Initial facilities at Scampton were quite limited, and indeed, until the arrival of the Type 464 Provisioning Lancasters, only ten aircraft on loan from other squadrons were available to the men. Their accommodations were less than luxurious, being a group of condemned wooden billets of First World War vintage. Each hut housed 24 men. In the interests of bringing the motley group together, it was suggested that each night they do callisthenics before retiring. A newcomer to the crew who arrived one evening in the midst of these exercises was convinced that he had "stumbled on an annex of the local mental institution".

The 700 men of the squadron raided other squadrons for furniture — beds and chairs. With A/V/M Cochrane's intervention, supplies such as uniforms and blankets for the 617 were given top priority. Official pressure resulted in the appearance of spark plugs, tools, starter motors, bomb trolleys and winches.

On March 27, 1943, I was issued with "most secret" written orders, which outlined the plan of attack without naming the targets.

"No. 617 Squadron will be required to attack a number of lightly defended special low level targets over enemy territory in moonlight with a final approach to the target at 60 ft. at a precise speed, which will be about 240 mph."

It was noted that the exact speed would be determined later and visibly might well "not exceed one mile". It was assumed that aircraft would be despatched at ten-minute intervals to attack the first target. When this was destroyed, subsequent aircraft would be diverted in the air to the next target and so we had to ensure that navigation was accurate in moonlight, at a height which would be secure as possible against fighter attack. Air position indicators would be available, but training was to proceed without them. Accordingly, the squadron has been performing low-level night flying exercises almost nonstop to date. The efficiency attained in these areas has been most gratifying.

According to Barnes Wallis's specifications of the delivery of the bomb, each Lancaster must release the bomb at 240 mph, 60 ft. above water and exactly 800 yds. away from the dam.

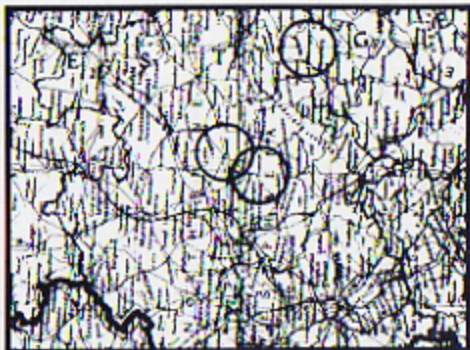
Visual sighting at night is difficult to impossible because of the existence of a sort of grey no-man's land between the surface of the water and the aircraft flying so close at high speed. Several different techniques were tried and all were rejected due to measuring error impracticality. Finally, a simple solution was found, using two spotlights, one at either end of the aircraft. As the aircraft flies over the water, the spots shine down upon the surface of the water. The spotlights are angled such that when the two spotlights touch, the aircraft is flying at 60 ft. with virtually no error.

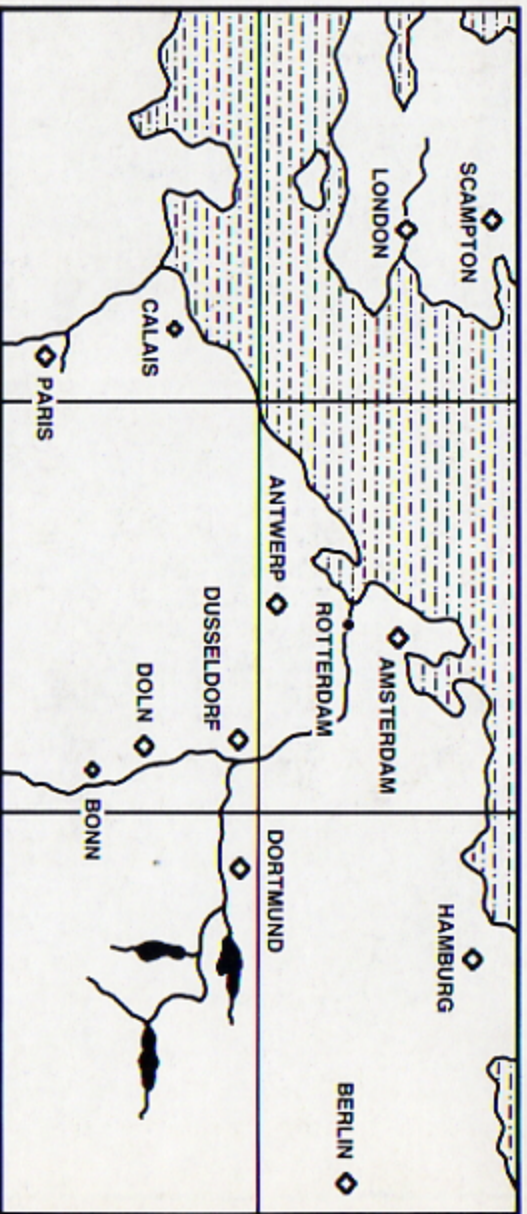
The distancing problem had a similar trivial solution involving angles. The front gunner, using the bomb aimers bubble, will sight on the twin towers of the dam, through a Y shaped distancing sight. When the twin towers of the dam align with the markers on the end of the sight, the aircraft is exactly 800 yds. from the dam, again with virtually no error.

The conventional airspeed indicator used by the Lancaster is accurate enough to render an airspeed reading within acceptable tolerances.

Therefore, I have the honour to report that 617 Squadron is, in all respects, ready for battle.

**OPERATION CHASTISE**  
**May 16, 1945**





**COLECO**  
ELECTRONICS