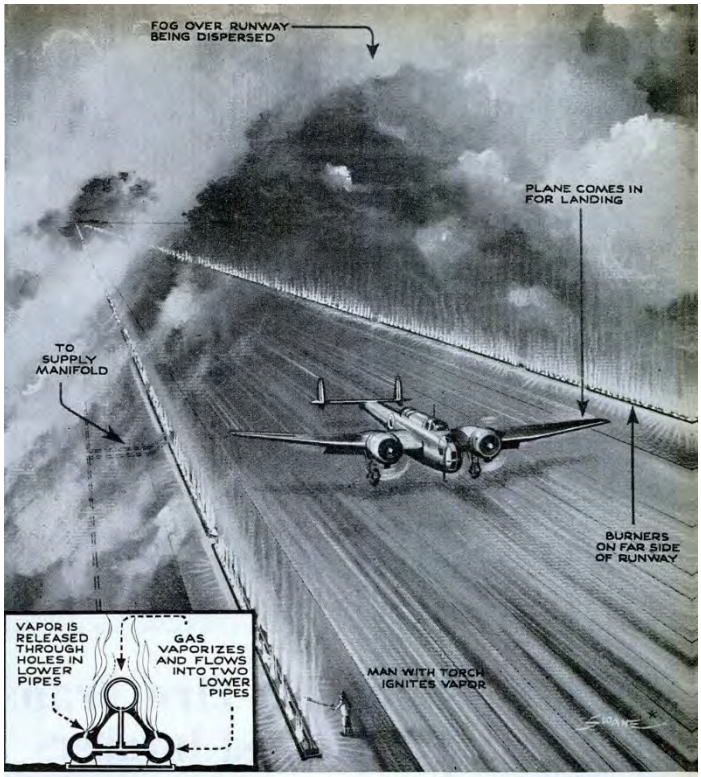
Flame Across Britain - Part 3

Slightly different in tone from the previous two parts, this one sees the Petroleum Warfare Department (PWD) engaged in saving lives instead of plotting to incinerate the enemy. They then become involved in a project in which no petrol is ignited.

Probably one of the best known developments of the PWD was FIDO, (*left*), variously said to be an abbreviation of *Fog Investigation and Dispersal Operation*, *Fog Intense Dispersal Operation* or *Fog, Intense Dispersal Of.* The Science Museum says that "the name FIDO was adopted to stand for *Fog Investigation Dispersal Operation*, later being adjusted by the RAF to refer to *Fog, Intensive Dispersal Of*.

It appears that they found a good acronym and adjusted it as necessary.

Before smokeless fuel and Clean Air Acts, fogs, and smogs, were much worse than they are now, and this was made worse as the war proceeded, as so many factories were running for long hours and pouring out pollutants. Blind flying techniques were not well-developed and the standard operating procedure for a returning bomber which could not land due to fog was for the crew to bail out near the airfield and for the pilot to point the aircraft toward the coast before baling out himself. This was damaging to morale, to personnel and to aircraft.



Fido's triple pipe line flanking a landing strip is 1,000 yards long on each side, 500 yards of it in the approach and 500 on the runway. In equipping intersecting runways, lines are sunk flush with ground.

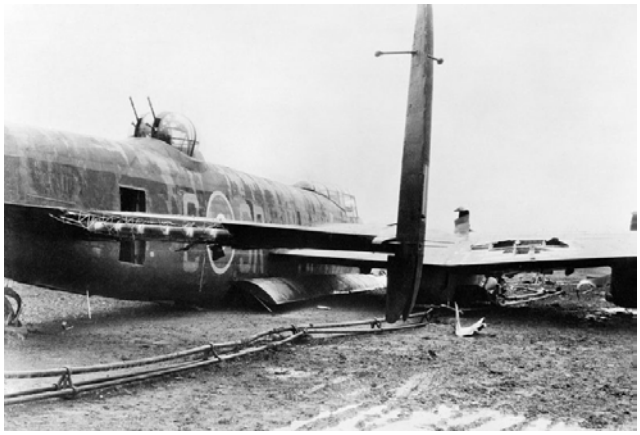
There is a story, which may or may not be true, that early PWD flame experiments were seen to disperse fog. Later, PWD was approached with a view to them producing a workable system for clearing fog and an engineer called Arthur Hartley was given the job. He had worked in aeronautical engineering in the Great War, then gone on to work in the oil industry, so he had a useful combination of skills. An early system used mobile burner units but it soon became a much bigger system with fixed pumps and pipe assemblies down each side of the runway. Each "pipe" consisted of three pipes with burner jets. When an aircraft was nearby, having been directed to the FIDO-equipped airfield, they would start pumping fuel, the system would be lit

and two walls of flame would rise, forcing the fog to lift, and illuminating the runway.

Ignition, in true PWD style, was not sophisticated. At best, a jeep towing burning debris, would drive along the pipe. However, there are reports of bicycles and even runners (*left*), being used. Once lit, it consumed an incredible amount of fuel – often quoted as 100,000 gallons of per hour, but his could rise to 250,000 gallons when longer runways were used. At the time, fuel was inexpensive and easy to get, so the economics looked good compared to the resources and time needed to build planes and train crews. It is often said that 2,500 aircraft and 10,000 aircrew were saved by use of the system between 1943 and 1945. The Science Museum estimate is 3,000 aircraft and 15,000 crew.

It still had its problems as the wind affected the flames, the burners caused turbulence as the hot air rose, and the aircraft had to descend to between 80 and 200 feet before it could get the benefit of clear air. But it was still preferable to baling out at night and throwing away a serviceable aeroplane. One veteran Pathfinder pilot (Flt Lt Colin Bell DFC BEM) has been interviewed online several times – he had to use FIDO three times when returning from missions and is happy to credit it with saving his life.

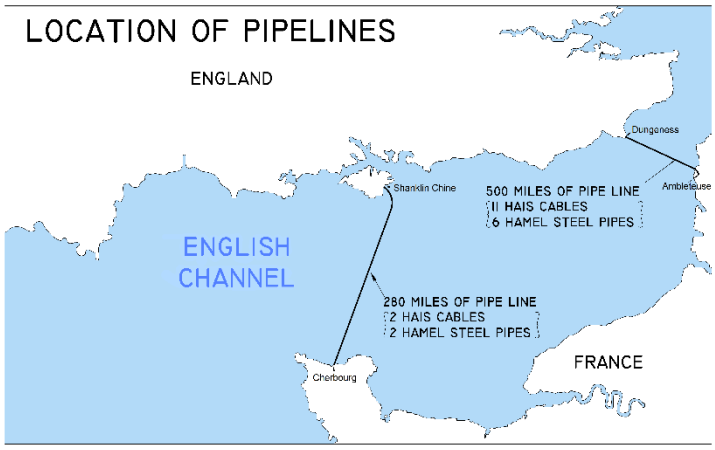
The first operational use of FIDO was in November 1943 at RAF Graveley, when four Halifax bombers were caught in 100 yard visibility on their return from the Ruhr. The system also allowed for operations to be flown on nights which would otherwise have been impossible, including during the Battle of the Bulge, when Europe was covered in fog but the RAF kept flying. By the end of the war there were 15 operational systems in use, including the local RAF stations at Downham Market, Fiskerton, Graveley, Ludford Magna, Metheringham and Sturgate.



The picture (left), shows the crash landing of a Lancaster of 101 Squadron, an ECM squadron. The details are Avro Lancaster B Mark I, ME590 'SR-C' made a successful crash landing in the night of 25-26 February 1944 at RAF Ludford Magna. The remains of the FIDO system can be seen clearly. FIDO was fitted at Ludford as the work of 101 Squadron in Electronic Counter Measures was considered highly important. The last system to be maintained after the war

was at RAF Manston, which was in service until 1952. A system was planned and partially installed at Heathrow airport but it was never completed. After the war the system was considered expensive to run and the rapid growth of aviation technology rendered it obsolete.

PLUTO was another of their projects – the Pipeline Under the Ocean, though it followed the pattern of FIDO – select a good acronym and then force it to fit – as it really only went under the English Channel (*below*). It is sometimes said to mean "pipeline underwater transportation of oil". Unusually, for a PWD project, it did not require the burning of huge amounts of fuel. It was a small but important element of the Normandy Campaign and delivered 8% of the fuel needed by the army and RAF in Normandy, being extended to the Rhine as the war continued. Numerically this looks small but it was, unlike ships, able to deliver day in, day out, regardless of weather, port facilities or enemy action, and it allowed shipping space to be used for other things.



Wars are, arguably, not won by strategy, genius or firepower, but by logistics. The planning for Operation Overlord was meticulous and it included an estimate that 60% of the weight shipped to Europe would be fuel. Initially, this fuel would need to be carried in drums and Jerricans, but they would need to move on from that situation as quickly as possible. This meant that a port would have to be captured to allow tankers to dock, but the planners wanted to back this up with several layers of contingency plans. They built specially designed small tankers for shipping the fuel and they built a Jerrican factory to make the twenty million Jerricans that would be needed for the invasion. There were discussions other projects too, including ship to shore pipelines to allow small tankers to discharge bulk cargo without needing a port (Operation Tombola). This was all aimed at ensuring the allied advance would not be held up by fuel shortages, as any set-back could result in a German counter-attack forcing our troops back onto the beaches. (Above left), PLUTO pipes running along the side of the road in Normandy.

During a planning meeting, who should be there but Arthur Hartley, last seen in the FIDO project. The discussion was about the feasibility of supplying oil to Normandy by pipeline, and this was a subject where Hartley had great experience. As Chief Engineer of the Anglo-Iranian Oil Company he had developed and run a system capable of withstanding the hilly conditions and climate of Iran and

delivering 100,000 gallons a day through a three-inch pipe, the equivalent of 20,000 Jerricans. He eventually proposed that a similar rate could be achieved under the Channel using flexible pipes. They would be based on submarine telegraph cables, with the centre left open for fuel. The armoured construction (*left*), used under the oceans should, he said, be capable of protecting the pipes under the Channel. It could be laid by a normal cable-laying ship, which was a definite advantage, as such things already existed and, for the sake of security and secrecy, could do the job under cover of darkness on a single night.

Hartley's pipe design was known as HAIS for Harley, Anglo-Iranian and Siemens. Siemens were the manufacturer, selected for their expertise in underwater cables. The pipelines were made in continuous lengths of 40 miles, weighing 2,000 tons and demanding considerable experience in handling cables.

The design called for large amounts of lead (24 tons per mile of pipe) and the PWD thought it prudent to have a back-up plan as lead was in short supply. The back-up was known as HAMEL, a combination of Hammick and Ellis, two engineers who developed a mild-steel alternative to HAIS. It was more complicated to lay, as it required welding and specialised equipment but it worked well and it was decided to use both types of pipe.

The HAMEL pipeline was made by Stewarts & Lloyds of Corby, who also used a subsidiary factory in Glasgow for some of the work.

The first test, in May 1942, used a 120-yard pipe under the River Medway. It failed and the method of manufacture was altered. In June, a test under the Firth Clyde proved to be successful. The pipe was eventually made by a combination of manufacturers in the UK and USA. A full-scale test was conducted in December 1942 when 45 miles of pipeline was laid across the Bristol Channel, from Wales to South Devon, in poor weather conditions. (*Left*), cable laying ship.

It was a massive operation. Two routes were used, the Isle of Wight route (known as Bambi) was not a success and ran only a short time. The other route, from Dungeness, was known as Dumbo and was in use throughout the war, eventually crossing Europe to reach the Rhine at Emmerich. The construction work included a thousand miles of piping in the UK – transporting fuel from ports including Bristol and Liverpool to camouflaged pumping stations. It included a dummy oil dock at Dover – Operation Fortitude. Not only was an elaborate fake facility constructed, but it had visits from King George VI, Eisenhower and Montgomery who were seen speaking to the “workers”.

At peak, the operation had a fleet of 34 vessels and 17 pipelines, supplying a million and a half gallons of fuel each day.

Verdicts are mixed. Some historians point out that it was of little significance, others consider it made an important contribution to victory. The truth is probably somewhere in between. The system delivered 172,000,000 gallons of fuel and thus saved a lot of shipping space. It wasn't vulnerable to weather conditions or enemy bombs and if we had failed to capture a port, it would have been a very useful back-up. Eisenhower himself declared it "Second in daring only to the artificial 'Mulberry' harbors".

After the war, most of the pipelines were recovered, which is why only a few buildings and some odds and ends of coastal pipes survive. The lead and steel were needed by industry and even the hemp wrappings, used in separating the layers, were pressed into blocks and burned to power industrial furnaces.

By late 1949 salvage operations had recovered 478 miles of HAIS cable (from a total of 482 miles laid) and around 300 miles of HAMEL out of 330 miles which had been laid - 22,000 tons of lead and 3,300 tons of steel. They also collected 75,000 gallons of fuel that had been left in the pipes. In addition, they recovered a German fighter aircraft, which they threw back, as they didn't want unexploded munitions aboard, and a number of sea mines, which were, carefully, allowed to return to the depths. Another hazard of salvage was that a number of the pipelines had been laid on top of one another, which slowed work considerably.

Surviving infrastructure includes a number of repurposed pumping stations including what is now a crazy golf course on the Isle of Wight (two pictures above), and a Bed & Breakfast at Dungeness. Remnants of the pipeline can also be seen at various places on the shore and, at low tide, they can be seen at Port-en-Bessin, near Bayeux, where they went ashore in France.