Operation Pluto

Chapter 8. The Underworld and Overlord.

If anybody ever really looks forward to an occasion on which it is possible they may be blown to bits, Force Pluto and its inspired leader probably did so, determined that their contribution should be a major one in operation 'Overlord'* - the code name for the mighty re-entry to the continent by the American, British and allied armies.

The massive array of vessels of all kinds in the Solent no doubt convinced Force Pluto that they were part of a mighty organisation and the military activity throughout southern Hampshire was more than enough to convince even the most casual onlooker that something unusual was afoot. Indeed, enemy reconnaissance must have conveyed a similar impression to the German High Command. All they lacked was the time and place and even the place must have had some indications, inspite of diversionary tactics.

Long before D-day the people to whom the date of the invasion was to be communicated were put on the Bigot list, Bigot being the code name of the ultimate in Top Secrecy. It so happened that one naval liaison officer with a special contingent of Royal Engineers had not been put on the list as he had arrived on the scene after it had closed. When the C.R.E. to whom he was attached received orders to move his outfit to an assembly point on D-1, he asked his N.L.O. when D-day was, without which knowledge he could hardly be certain of complying. The N.L.O. said he had very little idea, but would ask Admiral Creasy (Chief of Staff to Admiral Ramsay, Allied Naval Commander Expeditionary Force) (ANCXF) under whose orders he was. Admiral Creasy

* The naval part of the operation had the code name 'Neptune'.

at once appreciated the difficulty but said that the Bigot rule was like the laws of the Medes and Persians and could not be altered. However, he said he would take some advice on the matter and in the meantime the N.L.O. might care to read an interesting document on his desk. With that he left the room, returning in something less than a minute, which time proved just sufficient for the N.L.O. to read the date of D-day on the paper on the desk. A minor equivalent to Nelson's blind eye, perhaps.

Captain Hutchings also celebrated the near approach of D-day unusually by calling on Admiral Ramsay with a basket of strawberries. As it was the strawberry month, these delicacies figured prominently during the invasion period on both sides of the Channel. In France, the majority of strawberries were eaten by customers entirely unexpected by the growers.

Although, as has been mentioned, the planners of the invasion had endeavoured to provide for every contingency, there was very little they could do about the weather. As the original date of D-day - 5 June, 1944 - approached the meteorologists forecasts became less and less encouraging and with gales approaching a delay of 24 hours was reluctantly decided upon. This meant that all the troops who had already been embarked, must remain in their craft, nearly all in conditions of considerable discomfort and, of course, the chances of the enemy knowing that the fatal day had come were greatly increased. In order that the Channel crossing could be made at night with the right tidal conditions on arrival, 6 June was 7

considered to be the last day practicable in the present lunation and so any further postponement would have to be for a fortnight, when the tides would serve again. In the event the weather proved to be an ally rather than an enemy for the Germans were ~~concerned~~ convinced that no invasion could take place in the conditions obtaining and were not quite as prepared for the landings as they might have been.*

The cable-laying ships of Force Pluto had been dispersed to the Bristol Channel in order to escape the possibility of an attack and also to keep them out of the way of the vast armada on D-Day.

Pluto's first job after the invading forces had established beach-heads was to co-operate with the Royal Engineers in the provision of the Tombola lines. These were planned to be laid at Port en Bessin for the British forces and at St.Honorine, a few miles to the westward, for the Americans. The requirement was for Tombola to be in action by D + 10. In his notes, Captain Hutchings gives the proposed throughput as 300 tons daily, but this is probably a slip of the pen and should have been 3,000 tons daily. Apart from interference from weather and the enemy, the small coastal tankers pumping through 6 ins. (152 mm.) pipes would easily reach this target and it must be remembered that estimated requirements of fuel increased from 2,000 tons a day in the initial phase to 7,000 tons a day in a general advance.

So the great invasion went ahead and on the night of 5 June 1944 the great armada of ships and landing craft made their way across a choppy channel under cover of a short darkness; a darkness, alas, which was soon to become permanent for many of the troops suffering discomfort and sea-sickness as a prelude to violent death.

* A number of high ranking German officers, of which Rommel was one, wished to make terms with the allies on the western front in order to move troops to the east and try to prevent the Russians over-running their home-land. They feared for the safety of their families.

Although in general the landings went well on the area assaulted by British and Commonwealth troops, the Americans did not fare so well and were held up on Omaha beach with heavy casualties.

As soon as he received the signal to say that Port en Bessin was in allied hands, S.N.O. Force Pluto led the Tombola division to sea. This little fleet consisted of converted Thames barges, motor fishing vessels, echo-sounding craft and the corvette Campanula as the escort and which Captain Hutchings used as his flagship.

The English Channel was carefully buoyed to show the lanes and swept channels through which the various forces were routed, with a light buoy marking the centre of activity, as someone described it - "like Eros in Piccadilly Circus".

Off the beaches a lightship (with a familiar Trinity House look) and JUNO painted in large letters on her side, provided a useful sea mark and a check for uncertain navigators. The sea offshore was crowded with vessels of all kinds from battleships to busy little landing craft and tenders, all getting on with the job in hand in staid or in cheeky fashion. Of enemy activity along the water-front, there was little sign and it was fairly clear that many of the provisions and precautions necessarily taken by the planners were proving needless, although at intervals there would be an indication that the Germans were still hostile and not far away. On shore, of course, it was a different matter and the enemy was putting up a stubborn resistance which increased as new troops were moved up into the fighting line.

On arrival at Port en Bessin the smaller craft of the Tombola fleet made their way into the outer harbour where they moored. The main force anchored to the westward of the harbour entrance. What must have been a last minute effort to close the entrance to Port en Bessin had been made by the Germans by sinking anti-aircraft Flak ships. A massive wall had been built across the landward side of the harbour which the R.Es. demolished.

Contact was made with Colonel Seagrim and the Royal Engineers who were already assembling the pipelines for hauling out to the tanker moorings. As the chart showed rocky ledges in the vicinity of the port, it was clear that the process of hauling out the pipes was not going to be easy and it seemed doubtful that the wooden sledge device, attached to the seaward end of a pipeline, would in fact function as successfully as during the initial trials and training, which took place on flat, sandy beaches.

Captain Hutchings decided to run a series of echo soundings to determine the best lines for the haul and where in fact the sledges did suffer damage from the rocks, bringing hauling to a standstill, he devised a specially modified telegraph buoy which was fitted to the end of the pipe and which negotiated the uneven sea bed reasonably successfully.

At thesame time it was clear that the site ~~chosen~~ was by no means suitable for Tombola, as it had been devised, but there was little choice in the matter since it was necessary to be near the tankage system built to deal with off-loading coastal tankers when they could

enter the port. It seems strange that it was considered absolutely necessary to site the Tombola in the immediate vicinity of Port en Bessin as running pipelines on land was a quick and relatively simple matter.

Once a pipeline had been hauled out into sufficient depth of water for the tankers expected, moorings were laid round the end of the pipeline and a flexible hose connected which was hauled on board the tanker.

'Bar' vessels, officially boom working ships, specially fitted to deal with buoys, chains and moorings, were used to lay the moorings, the positions of which were marked by small spherical floats known to fishermen as 'pellets'. Unfortunately, a lot of the busy traffic along the beaches insisted on ploughing through the mooring area, displacing pellets and generally making the work of the Tombola force difficult and frustrating.

There was a little air activity but attacks were only sporadic and usually made by single planes. Port en Bessin was virtually intact and it seems that no attempt was made by the Germans to bomb either the port or the petrol installations.

The uneven foreshore proved too much for some of the pipelines which fractured on the rocks. In all, four lines were hauled out and moorings laid at the ends for tankers. But it was not long before the harbour was cleared of obstructions and tankers were able to enter and go alongside to discharge. This, of course, reduced the value of the Tombola lines, but with the possibility

of enemy action closing the port, it was essential to keep them in use. In all, some 2,000,000 tons of petrol was pumped ashore through the Tombola lines and from tankers in the harbour at Port en Bessin. Storage for 15,000 tons was erected ashore. Concrete barges were also provided for storage in ports but details of actual use are lacking.

The coastal tankers cannot have found Port en Bessin particularly easy to use but their masters entered eagerly into the spirit of the operation and there was considerable competition amongst them to make the fastest turn-round. An engineer officer on one of the larger tankers, F.Y. Workman, has vividly described the proceedings from D + 5 onwards. He said the tanker fleet consisted of two medium sized tankers and some forty or fifty 700 - 1,000 ton units. These, of course, were the British 'Chants' and the American 'Y' tankers. The American tankers apparently had very tall superstructures as they were nicknamed 'Queen Anne's Mansions' - a title which previously belonged to H.M.S. Rodney and H.M.S. Nelson.

Mr. Workman's tanker was one of the first to use the Port-en Bessin Tombola and he remarked that the rest of the 'Hamble Circus', as the tanker fleet was called, entered the port and discharged at a jetty. He also suggested that the complete success of the tanker operations was principally due to the fact that the masters of the vessels arranged a sweepstake on the fastest round trip from the Hamble jetty, where they loaded, to Port en Bessin, discharge cargo and return. The entrance fee was £5 per ship and the winner was to be awarded a large brass cockerel to wear at the masthead as 'cock of the fleet'. It seems the competition was intense, the tanker

captains ignoring convoys and going full speed to the beach-head, forcing their vessels over the sandbar off the port if the tide was not high enough. On one occasion three tankers arrived off the port almost simultaneously. The first struck the seaward side of the bar, the second put on more speed and finished on top, the third, going faster still, slithered over the bar and into the harbour. Her captain's ~~His~~ noble effort is said to have won him £270. It is really not surprising that at one time a third of the coastal tankers were undergoing damage repair! All the crews were volunteers and came from the British, Canadian and American merchant marines and with their highly explosive cargoes must have realised the dangers they must face. In fact, as far as is known, not one received serious damage from enemy action. Nevertheless, one cannot but admire the courage and splendid spirit of these men who clearly made a tremendous contribution to the success of the operation.

Two Tombola lines were laid for the U.S. forces at St. Honorine, a few miles west of Port en Bessin, and also some special pipelines working in the opposite direction from shore to craft for re-fuelling. These last were laid off Omaha beach.

D + 13 brought a return of the bad weather and a storm which was described as the worst in the area for thirty years. Small craft sought what shelter they could and Port en Bessin proved a useful haven, but the heavy swell running in parted many moorings and a number of those sheltering were wrecked. On the beaches many landing craft and other vessels were driven ashore, pontoon

causeways were damaged and, when the storm abated, there was a scene of devastation which must have delighted the enemy who, up to that point, had done little or nothing to discourage the use of the beaches.* The American Mulberry harbour was wrecked and the one on the British sector was badly damaged.* The Pluto craft were not put out of action by the storm, but Tombola was delayed, as indeed was the landing of stores generally, with a consequent upsetting of the invasion time-table.

Although the Mulberry harbours have been rightly praised as ingenious engineering marvels, they did not handle the major part of the stores landed, the greater ~~part of which were handled~~ amount being landed across the beaches and through ports as they were captured. Like Pluto, the Mulberry harbours were an absolute necessity to the planners, but in the event many of the more dangerous possibilities failed to materialise. This fact in no way minimises the brilliance of the projects, but does perhaps emphasise the point that many of the difficulties facing the planners and for which they had to provide, were not met with by the invading forces. On the other hand, there were no doubt a number of unforeseen problems which had to be dealt with on the spot on an ad hoc basis.

For the main Pluto projects, the laying of the Hais and Hamel pipelines, the capture of Cherbourg was essential. This was originally forecast as on D + 8 but in fact it was D + 63 before the wreckage of the port could be cleared and the large number of various types of mines rendered harmless. During this time, fuel supplies were arriving steadily through Port en Bessin and the British and American

* Hundreds of vessels and landing craft were damaged or sunk and vast quantities of stores and ammunition lost in the storm. (Footnote or could go into text)

Tombola lines and from 30 June, when the first petrol was landed at Port en Bessin, Tombola and the coastal tankers using the port provided the only supplies of fuel reaching the invading armies.

While Cherbourg was being cleared by the Americans, who had landed a wide variety of machinery to deal with the rubble, wrecked cranes, sunken ships and other impedimenta, Captain Hutchings was busy surveying the shoreline and approaches to determine the best line for the Hais and Hamel cables. The Cherbourg area was by no means ideal for Pluto but its use was essential owing to the fact that provision of tankage for eventual ship discharge had to be constructed at the port. It was clear that to end the lay at Cherbourg would impose extremely difficult conditions, so it was decided to make the lay from France to England, rather than the other way about as originally planned.

Nacqueville Bay, just west of Cherbourg harbour, was chosen as a suitable starting point, as it was reasonably sheltered and had a stretch of sandy beach. On both sides were rocky reefs leaving very little room to manoeuvre, but it was the best site available. It seems likely that some thought must have been given to the Pluto terminal long before this. See (A) below // Captain Hutchings decided that one of the first requirements would be the Penfold ploughing engine used for hauling the end of the pipes, both Hais and Hamel, ashore and this was sent for at high priority. On its arrival ~~the~~ by landing craft, with steam up, 'Steve' as the proud veteran was dubbed, made his way ashore sedately, saluting with an encouraging

(A) Since the Pluto terminal was eventually located outside the port of Cherbourg it is difficult to understand why it was necessary to wait for the harbour to be cleared before running the first pipelines. This seems likely to remain a mystery

toot on his whistle the astonished American soldiers who were gazing open-mouthed. 'Steve' became one of the seven wonders and Americans came from far away to convince themselves that it was true that a real steam traction engine was one of the secret weapons! From one of the many pieces of information supplied by ex-members of Force Pluto, it was learned that some of the Penfold ploughing machines earmarked for the operation ended up as casualties of the groundnuts scheme in Africa some years later.

Commander Treby Heale had been chosen to make the first lay in H.M.S. Latimer. In his notes, Captain Hutchings personally remarked that he was excited, but filled with anxiety for the success of this first lay which he considered to be vital to the success of the allied armies. Once again, for various reasons this did not prove to be the case, which, as it turned out, was extremely fortunate.

On 12 August 1944, sixty-seven days after the initial landings, H.M.S. Latimer commenced the first lay of Operation 'Bambi', the code name for the Cherbourg - Isle of Wight pipelines. Commander Treby Heale commented that it was an awe-inspiring sight and that it seemed as if half the British Navy was providing an escort with some considerable assistance from the R.A.F. Destroyers, sloops, corvettes, M.Ls. and special service vessels surrounded the cable ship while overhead there was strong air cover. The enemy ignored the whole proceedings and, as Treby Heale remarked, ~~that~~ was only ~~the case~~ provided for the first lay - for the final one the escort was one M.L.! On the evening of 11 August Latimer moved up to a buoy in Nacqueville Bay. The barge Runic with the shore-end

cable on board came alongside and the main cable was connected with the specially designed mechanical muff, an operation which only took some thirty minutes. The barge was then hauled ashore by 'Steve' and the tug Danube V made fast to Latimer's quarter, to ensure that she remained astern to shore. This, of course, was essential in order to avoid putting a kink in the cable.

At 0345 on 12 August Latimer slipped from the buoy and proceeded at 4 knots, the cable paying out over the bow sheaves. In company wereH.M.S. Campanula (Captain Hutchings' 'flagship'), H.M.S. Mimico and H.M.S. Brinmaric, the latter vessel acting as navigator and also sounding ahead, in order to determine the state of the sea bed. Throughout the lay the revolutions of the cable drum, round which the cable passed between the hold and the bow sheaves, were taken at intervals, as was the strain as registered by dynamometer. The revolutions of the drum varied from 12 RPM at 4 knots to 17.5 RPM at 5.4 knots, dynamometer readings varying from 32 to 40 cwt.

At 0744 H.M.S. Brinmaric signalled that the bottom was becoming uneven, Latimer at that time doing just over 5 knots. At 1120 Brinmaric signalled that the bottom was becoming increasingly rough with a steep gradient.

At 1200 speed was reduced preparatory to changing from one cable tank to the other, and at 1210 the mechanical joint was clear over the bow sheaves.* It was noted that the outer serving of the cable in No.2 tank was very damaged in places and the cable very dry and sticky.

* This appears to be the only occasion on which Haws cable was laid over the bow sheaves. Subsequently the stern rollers were used.

It had, of course, been in the tank for some considerable time. At 1805 Latimer reduced speed approaching the buoy in Sandown Bay and at 1900 she was fast to the buoy and the barge Britannic was alongside with the shore end of the cable. The first operational lay of the Hais cable had been completed in just over 14 hours, with no sign of enemy activity and with a smoothness and precision which must have delighted the Pluto protagonists. The sceptics no doubt decided that they would wait and see whether fuel could really be pumped through the great length of cable and, if so, in what quantities.

Alas, the luck was not on the side of Force Pluto and its dedicated leader. Soon after the arrival in Sandown Bay, H.M.S.Mimico, one of the escorts, signalled that her anchor was foul of an obstruction, probably the cable just laid.*

It is possible that intensive research might have revealed the name and rank of the captain of H.M.S. Mimico. It is also possible that somewhere the details of an exchange of signals after this unfortunate happening have

* Footnote: In his notes Captain Hutchings described this incident as happening at the end of the second lay from Cherbourg to Sandown Bay, but the log of H.M.S. Latimer records it as happening as detailed above. Sir Donald Banks, Director General of the Petroleum Warfare Department, in his book 'Flame over Britain', (and who was present at the time) also records it as happening at the end of the first lay.

been recorded. But with deference to the fact that time has probably healed the painful wound, well and ill have been left alone. Even Captain Hutchings, reputed to give full vent to his feelings on such occasions, remarked in his notes that repairs were soon made. In fact, the line leaked badly and was soon closed down as virtually useless.

Undismayed, S.N.O. Force Pluto proceeded with arrangements for the second lay. This time the ship was H.M.S. Sancroft, commanded by J.A. Lee, who had originally been in command of H.M.S. Persephone and even at this distance in time, stands out as a very competent officer who was also extremely versatile. He was a Scot and a master mariner and apparently found naval ways a little difficult to understand. Possibly the most genuine and impressive appreciation of Commander Lee came from Treby Heale, who remarked that, with only the short period of training in Latimer in the Clyde, Lee achieved the most successful lays of Hais cable. A generous tribute from the maestro himself.

One of the officers who served with Lee told how Sancroft lost her anchor in Cowes roads. In merchant ships the anchor shackle pins are secured with a tapered wooden pin, driven through the lugs of the shackle and the shackle pin. The wooden pin swells in water and jams tight. The navy use steel pins, kept in place by a lead pellet hammered out to fill a ridged cavity in one of the lugs of the shackle. As Sancroft had become H.M.S., Captain Hutchings insisted on navy methods

being used and the shackle pins of his cable were secured with steel pins. But the shackles did not have the special cavity for the lead pellet to get a grip and the result was that, when Sancroft attempted to weigh anchor off Cowes the anchor stayed on the bottom. Apparently Commander Lee had suggested something of the sort might happen and the teller of the story said "Perhaps Commander Lee could have been more forceful but he was at a bit of a disadvantage in the R.N. I liked him and was happy to serve with him".

Twenty four hours after Latimer brought the Hais cable into Sandown Bay pumping, initially with water, commenced and it was soon evident that there was a leak as the volume was well below what it should have been.

Sancroft commenced her lay from Nacqueville Bay on 14 August and had a trouble free run right through to Sandown Bay. But all was not plain sailing and H.M.S. Algerian, which was assisting with the connection of the shore end, got a rope round her propeller and it was some time before the final link-up was made. Leaks in the line were suspected and coloured liquids pumped through in order to try and locate the leak positions. It was not until 18 September that the Sancroft line was water tested and 22 September before pumping of petrol commenced. At 750 lbs. sq.in. 56,000 gallons a day were pumped across the 65 miles to Cherbourg. On 3 October, it was decided to increase the pumping pressure to 1,000 lbs. per sq.in. but in the middle ofthe night pressure fell away to nothing and it was clear that the line hadfailed.

Now it became the turn of the Conundrums, those fabulous monsters that produced wonderment and sheer incredulity in people who saw them for the first time. When it was known that wrapped round these huge cylinders was some ~~90~~ 70 miles of perfectly ordinary mild steel pipe and that it was proposed to lay this across the Channel like a deep sea cable, the reaction was one of sheer disbelief. "Utter madness" was the least of the criticisms.

In view of the decision to lay from France to England, the fully loaded Conundrum had to be towed from Southampton to Cherbourg previously. That this was accomplished without any difficulties being reported is strange in the light of what happened later. There was no enemy activity and, indeed, throughout the Pluto operations the actual laying was completely ignored by the enemy. Possibly because he did not know what was going on, or more likely because he had more urgent business elsewhere.

When the Conundrum was positioned ready for the lay considerable difficulty was experienced in hauling the pipe off the drum in order to make the connection to the shore. It was then found that the submerged half of the drum was covered in weed and barnacles which had grown during the time it was moored in Southampton Water. This almost certainly must have meant that it did not revolve on the journey across the Channel, in which case it is surprising the tug masters did not report the fact. Or, perhaps, they did and it did not reach the right ears.

As it would obviously be impossible to lay the steel

pipe with the drum badly out of balance, it was put back on mooring buoys and the weed and barnacles removed - a job which must have been both difficult and dirty, not to say exhausting. But it was done and a length of pipe, damaged in the attempt to haul it ashore, was cut away.

Once more preparations were made to start the lay and the versatile 'Steve' successfully hauled the end of the pipe ashore. Mr. Geoffrey Lloyd had joined Captain Hutchings in his 'flagship' Campanula as had Mr.Hammick, co-founder of the Hamel pipeline.

The Conundrum was slipped from the buoys and began to revolve sedately as the tugs went ahead, the steel pipe disappearing into the depths with smooth precision. For some three miles all went well and no doubt all concerned were beginning to congratulate themselves when a sharp crack was heard and the drum ceased to turn. The pipe had broken.

The feelings of Mr. Hammick must have been akin to those of a father at the failure of a favourite child. Mr. Geoffrey Lloyd can have been hardly less concerned and Captain Hutchings, who for many months had been willing every aspect of Pluto to succeed, must have felt it a body blow.

Every ten turns of the pipe on the drum there was a coloured marker, which allowed the tug masters to determine how much pipewwas left. A quick calculation made Hutchings decide that there was plenty of pipe still on the drum to allow another attempt to be made and the Conundrum was

once

once more returned to her mooring. The piece of pipe on the drum side of the fracture was removed for examination, which proved it had parted at a weld. The thought that this might happen at any one of the thousands of welds involved in all the Hamel lines was far from encouraging, but it did not daunt S.N.O. Pluto and, indeed, appears to have been the one and only case of a weld failure in the pipes.

Eventually on 14 September another start was made (H.M.Tugs Marauder and Bustler towing ahead and Danube V trailing). Whether this was timed for high water slack, as originally planned, is not known, but later the drum began to sheer to one side of the line of the lay and was soon lying at an angle of 40 degrees to the tugs' course with the pipe coming off over the flanges. Not surprisingly at 2100 that night, about 30 miles from Cherbourg, the drum ceased to revolve. Another break had occurred. This time the cause was plain and so the first attempt to lay a Hamel line from a Conundrum had failed. A contributing cause of the failure may well have been the fact that, to carry the necessary seventy odd miles of pipe for the Cherbourg - Isle of Wight c crossing, the drums were heavily overloaded and down to their axles in the water. Nevertheless, the system came very near to being a success.

On 29 September the second Hamel line was laid, towed by tugs Marauder and Growler, with Danube V again trailing. The duty of the trailing tug being partly to assist in steering and partly to be able to

act as a brake on the forward motion of the drum.

As with the other lays, the course lay along a predetermined swept channel, two miles in width and the Pluto craft were navigated by an M.T.B. fitted to use the Gee or QH system, developed during the war, which gave an extremely accurate position. Its present day equivalent is the Decca Navigator system.

Inspite of the fact that the weather was far from good and the seaworthiness of the Conundrums an unknown factor, the second Hamel lay went off virtually without a hitch. The connection of the shore end in Sandown Bay was also made without some of the previous difficulties and having tested the line with water first, petrol was put through the line with pumps working at 750 ~~lb. sq.in.~~ p.s.i. It might be thought that at such pressures the flow of spirit would be considerable, but in fact, owing to the friction in the lines, the delivery on the far shore appeared to be little more than a trickle. Or, as one naval observer put it, about as much as ~~coming~~ would come out of a watering can! However, as long as a line was intact, the flow was constant and cumulative and, to a large extent, quite safe from enemy attack.

The arrangements at Sandown Bay end were extensive and ingenious. During the training of Force Pluto a number of Hais and Hamel lines had been laid across the Solent from Lepe to Gurnard and from these laid lines carried the fuel to the storage and pumping stations at Sandown and Shanklin. The two pumping stations were some three miles apart to insure against the whole

installation being knocked out in an enemy raid and they were connected laterally by two Hamel lines laid across the bay by H.M.S. Persephone. Inland, a 620,000 gallon storage tank had been constructed in a small wood, all the work of the installation being carried out under a huge netting camouflage. The actual pumping stations were constructed in the ruins of sea front hotels and houses, casualties of a low level air raid. To ensure their anonymity when viewed by high level air reconnaissance, the pumping stations had been carefully blended into the ruins, even to the extent of having the remains of a shattered ballroom replaced over the roof of one.

But the trials and tribulations of Force Pluto and its leader were by no means over. On 3 October it was decided to increase the pumping pressure to 1,000 lbs. per sq.in. and at first all went well as the pressure climbed steadily. Then in the middle of the night the pressure on the Hais line dropped to nothing and a little later the Hamel line also failed. There was an air of despondency which could almost be felt and once more, had it not been for the confidence and enthusiasm of Geoffrey Lloyd, Sir Donald Banks, Jock Hutchings and the inventors of Hais and Hamel, it is more than likely that Pluto would have ended there with "I told you so" from various sceptics as an epitaph.

In fact, large tankers had been discharging their cargoes in the port of Cherbourg since early September, including delivery from across the Atlantic and during the month the whole of the Channel coastline fell into Allied hands. It would seem that in delaying Pluto

operations, other than Tombola, until Cherbourg had been cleared virtually undermined the whole conception of Pluto, in view of the lack of enemy air activity. Cherbourg was not a big oil port and had little white oil storage capacity. In fact, the situation was one of precisely the type Pluto was designed to deal with. It seems strange today that the pipelines were not laid before the port was cleared, using prefabricated tankage, 30 ft. x 9 ft. cylindrical tanks and the concrete barges designed for storage, if necessary. There have been suggestions from people present at the time that there was opposition from American - and possibly British - authorities to Pluto being brought to Cherbourg at all. One correspondent described a dinner party given on board one of the Pluto ships with the idea of 'softening up' some of the opposition. There was no indication of how successful the party was, but certainly the go-ahead for Pluto was given shortly afterwards.

The failure of the Cherbourg - Sandown lines spelt the end of the Bambi operation and the scene shifted to Dungeness, where all arrangements for lines to be run to Boulogne had been prepared many months earlier. Here the pumping stations were also concealed in existing bungalows and if the enemy knew anything about them they did nothing about it.

There is reason to believe that the inhabitants in the region of Dungeness were fully aware of the purport if not the importance of the installations on that rather desolate bit of coastline. A stranger having a drink in a local pub heard the matter being discussed quite openly. It is possible that from the enemy's point of view the secret was not so much kept as ignored. In which case there were obviously sceptics on both sides.

The conventional deep sea cables, needed to ensure proper communications between both sides of the Channel, were ~~presumably~~ laid by Post Office cable ships commencing on D + 2 and these vessels were not so lucky as Force Pluto. A sapper in the Royal Engineers was killed and many wounded in getting the end of the first cable ashore. No doubt mines were responsible. The ship herself was lost by enemy action before the end of the war and her captain was killed. The second cable ship, operating on D + 10 was attacked by planes in mid-channel and her captain and chief engineer were killed.

Certainly the Pluto protagonists could not have complained at a verdict of 'Too little and too late' for the amount of petrol delivered to Cherbourg was negligible. But there is more than a possibility that, had the operation started earlier, more lines could have been laid successfully and the faulty lines repaired, had it been necessary. There was nothing wrong with the system - only with the circumstances and lack of experience.