

# Nevil Shute and the DMWD

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## Introduction

In most of the biographies of Shute, given at the front of his published novels, the part about his service in the Second World War reads "... During the War Nevil Shute served in the Navy doing secret work for the Admiralty. He still found time to write however..." Those interested in Shute's life wonder what this secret work was and what was his part in it. Shute's own biography "Slide Rule" is no help since he chose to finish it in 1938 when he left Airspeed. Julian Smith's biography contains one chapter about his war service, but as with much of this book it is primarily about the novels he wrote during the period. Gerald Pawle's book "The Secret War" (now out of print) which has a foreword by Shute, tells the story of the Department of Miscellaneous Weapons Development, the DMWD, the Naval department in which Shute worked for four and a half years. The book is interesting for the glimpses it gives of the work Shute did, but from this point of view it gives a slightly disjointed account. Shute's names crops up quite often, sometimes in connection with specific projects he was involved with, but also in other connections so that it is difficult to get a clear picture of his work during this wartime period. Edward Terrell who also worked in the DMWD wrote "Admiralty Brief" in the 1950s and this contains a few reference to Shute.

At the beginning of the war Shute was working with his old boss Dennistoun Burney and with Sydney Hansel on gliding torpedoes, devices that could be dropped from aircraft and attack enemy ships and submarines. However June 1940 was a critical time for Shute and also for his country. In May, the previous month, Churchill had become Prime Minister, declaring in his famous speech "I have nothing to offer but blood, toil, tears and sweat" For Shute the time for theoretical work was over. The survival of his country required practical action. Having sailed all his life he applied to join the Navy as an officer in the Royal Naval Volunteer Reserve (RNVR), expecting at the age of 41, to be put in command of some small Naval vessel. Off he went to HMS King Alfred for officer training. He had only been there for a few days when he was sought out for an interview with Commander Goodeve who was looking for technically able men to staff his embryo department. Shute records that he was furious; he had just abandoned research work to join up and here he was being asked to go back to it. To refuse to join Goodeve might have risked being cashiered, of ending his Naval career before it had even begun. He joined Goodeve's team.

## The DMWD.

What was this department that the newly commissioned Lieutenant Norway joined in 1940? Originally it was part of the Inspectorate of Anti-Aircraft Weapons and Devices (IAAWD) which gives a clue to its original purpose - to devise methods of countering attacks by enemy aircraft. Under Goodeve were Lts. Dennis Richardson, Edward Terrell and Nevil Shute Norway, respectively responsible for Projected Wire Devices, Plastic Armour and Engineering. In 1941 the Department was renamed the DMWD and grew rapidly so that by the end of 1942 there were 160 officers and seconded civilian scientists working in the DMWD.

The driving force behind the DMWD was undoubtedly Charles Goodeve and the Technical History that details the projects DMWD undertook contains an interesting quote "*The tradition (of the DMWD) has been never to take 'no' for an answer and of never accepting without question the opinion of generally recognised authorities on any matter*" I also have a letter from Mr James Close who worked in DMWD in which he writes "...we were given our individual projects and ordered to get on with it and only report back when we had success or final failure. We were on our own and had very little contact with what else was going on but would consult if we needed help or advice"

DMWD was Goodeve's baby with teams of qualified scientists and engineers but they were kept in check by a regular Naval Officer as Director. The first was Captain G.O.C. Davies (known as Jock Davies) and he was succeeded in 1943 by Captain F.W. Jeans. Such officers knew the Naval system, the correct channels etc and how to obtain the right facilities, supplies and contacts. They provided the guiding hand to the sometimes errant and wayward boffins.

Norway, Richardson and Terrell were heads of sections and all three were promoted to Lieutenant Commanders in March 1941. Significantly Richardson and Terrell had further promotions during the course of the war. Norway remained as Lt. Commander until he left the DMWD in December 1944.

DMWD had offices in London but also took over the pier at Weston-Super-Mare in February 1941 at a rent of £375 a year. The pier became HMS Birnbeck.

### DMWD Projects.

DMWD was involved in an enormous range of projects during its existence. The National Archives have a series of Technical Histories which give details of 40 of the major projects. As Head of Engineering Shute had an input into very many of them, probably more than he is credited with in these Histories which helpfully list the names of the principal DMWD personnel involved.

Projects really began with requirements, a perceived need for achieving a particular objective. For example for Panjandrum the requirement was for a device for breaching the Atlantic Wall and demolishing obstacles on invasion beaches. This means placing 1 ton of explosive by the wall. It must be launched from a landing craft and it has to be developed, tested and ready by May 1944.

### Flame throwers

Flame throwers were developed before the war and Shute adapted them for use on ships to deter attacks by enemy aircraft. He tried out a vertical firing flame thrower capable of projecting and flame up to 100 feet and trials were carried out using our own aircraft to assess the deterrent effect. One pilot reported that, although they would be able to avoid the flame the mesmerising effect would be significant. The DMWD Technical History of flame throwers does not mention Lt.Cmdr. Norway but his engineering section did the adaptation of a Bedford truck chassis on which was mounted a flame thrower. This was known as "Cockatrice" and was intended for mobile defence against airfield attack. Some idea of the grim nature of the flame thrower can be obtained from the photographs in the Technical History and from the description of the types of fuel used - mixtures of petrol and diesel oil, flammable emulsifiers and even crepe rubber particles designed to stick the burning mixture to the target.

As we all know the flame thrower is central to the story of "Most Secret" which was written in 1942 and, as with all his novels, draws on his own experience.

Shute completed "Most Secret" in August 1942 and was annoyed and frustrated by the Admiralty Censor's refusal to permit publication. It is reported that he came close to resigning from the Navy as a protest. Shute however swallowed his annoyance and continued at the DMWD until after the invasion of France in 1944. It is interesting to speculate whether his lack of promotion beyond Lieutenant Commander had something to do with this wrangle over publication. His contemporaries such as Richardson and Terrell received further promotions during the War. "Most Secret" was finally published in 1945.

### Acoustic Warning Device.

In addition to thinking up methods of deterring aircraft attacks, means of detecting approaching aircraft were also developed. Shute had a leading role in the development and trials of the Acoustic Warning Device. This device had sensitive microphones placed high up on a ships mast intended to detect approaching aircraft. Shute and his team worked with technicians from the Gramophone Company in Hayes (later to become EMI). Development began in autumn 1940 and trials occupied much of his time during 1941. The device gave, through a suitable amplifier and filter, a bell and red light warning of approaching aircraft. The problems were to filter out wind and other spurious noises. To assess wind noise effects a rig was made to whirl the microphone with various materials tested to filter out wind noise pickup. The most successful was mattress ticking. Time delay circuitry was also incorporated; noises lasting less than 3 seconds were filtered out and the amplifiers were tuned to 150-300 Hz (later changed to 130-330 Hz). Some success was achieved and ultimately some 600 merchant vessels were fitted with the device at a cost of £265,000. False alarms continued to be a problem, especially for coastal vessels, and the device was altered to a sensitive listening device without an alarm. As air attacks on shipping lessened during 1943, and more vessels were equipped with radar, the equipment was taken out of service.

### Fresh Water Stills.

DMWD became involved in this work originally in order to provide a supply of drinking water for lifeboats, and later for operational use in the war in the Far East. As the Technical History records "*The work was commenced without official requirement on the instructions of Lt. Cmdr. N.S.Norway RNVR whose foresight anticipated the arising of the requirement*". Several different types of still were developed - to distil fresh water from sea water by evaporation and also to recover fresh water from engine exhaust gases. The more conventional fuel-heated stills were designed and developed by one of Shute's engineers, Lt. J.H.G. Goodfellow, a very able engineer (who incidentally produced extremely good engineering drawings) His terms of reference were to produce a still which would convert sea water to fresh water at the rate of one gallon per hour. This was to occupy him through 1942 and 1943, producing several marks of still, steadily increasing their efficiency.

The second method, of recovering water from exhaust gases, was Shute's baby but the development was carried out at Southampton University under the direction of Professor Cave-Brown-Cave. He had been involved in apparatus to produce drinking water for exhaust gases on the R101 airship. Development made progress, but slowly, one of the problems being the filtration of the recovered water and this type of still did not come into service during the War.

### Panjandrum.

This is probably the best known of the projects Shute was involved with. Pawle devotes a chapter to Panjandrum on its own. The following details on the Panjandrum trial are provided by its Technical History:-

The officers concerned with its development are listed

Cdr. G. Williamson RNVR

Lt.Cmdr N.S.Norway RNVR

Lt. R.C.Abel RNVR

Messrs Commercial Structures Ltd. Leytonstone

Trial No 1. Westward Ho 7th September 1943

18 rockets - 20 second burning. Travelled along the beach covering 668 feet

Trial No 2. Instow Beach 9th September 1943

36 rockets 40 second burning. Poised on LCT

Trial No 3. 3 wheel Panjandrum

Swerved and tilted over - damaged

Trial No 4. 26th October 1943 Cable test

Cable broke and flipped over operators

Trial No 5. 27th October 1943 - stronger cables 36 rockets fitted

Trial No 6. & 7 26th November 1943

42 rockets. Overrun on winch wires. Panjandrum pivoted to port, the starboard wheel was distorted.

Trial No 8 12th January 1944

48 rockets 40 second burning 60-65 mph covered 550 yards.

Trial No 9 12th January 1944

66 rockets 40 seconds. Panjandrum travelled in a tight spiral and overturned.

The tests of Panjandrum were all filmed and video copies from the original film held by the Imperial War Museum have been obtained. The videos can be borrowed from the US and UK Shute lending libraries. The film shows Shute at the controls of the kite winches during Trial Nos 4 and 5 and is probably the only film footage of Shute himself. The problems of controlling the Panjandrum were never solved and it was not used in action. The photographs of Panjandrum at the beginning and end of its first trial run and taken from the Technical History of the project.

## Gliders.

### Target glider.

According to Pawle, Shute sketched out a design for a glider that could be used for target practice for guns and went with it to the firm of International Model Aircraft in Morden. The outcome of the work is recorded in the Technical History on gliders in the form of a single page history but with the inclusion of a copy of the printed instructions for the use of the Target Glider. From the original towed glider concept, the instructions describe the use of a rocket-propelled glider which was supplied complete with a portable launching catapult which could launch gliders up to a height of 200 to 300 feet. Once the rocket had burnt out the glider would spiral down to earth, taking about 90 seconds to do so and it was during this period that it was used for target practice. The Technical History records that Lt. A. Menhinick (who worked for Shute) was the principal officer involved. Pawle also records that Wrens were trained to set up and deploy the target gliders because Shute insisted that DMWD officers could not be spared for this work. Perhaps this is why a Wren is shown in the background of one of the photographs in the instruction manual! Interestingly, the gliders were made from impregnated paper with wood stiffening sections because "Timber Control would not sanction the use of a balsa" presumably because it was a scarce imported commodity during the War.

### Swallow glider.

The concept for what became the Swallow glider was dreamt up by none other than Barnes Wallis in a proposal in 1942 following the disastrous Dieppe raid. The idea was to develop a rocket propelled pilotless glider that could be launched from a ship at sea for remote laying of a smoke screen. The requirements were formally set out in June 1942 as follows:-

- (a) Should be capable of laying a smoke screen up wind to a height of 600 feet
- (b) Should travel not less than 1/4 mile before laying smoke
- (c) Turn 90 degrees after going about 1/4 mile
- (d) Emit smoke for a distance of at least 1/4 mile

The requirement also stipulated that 1000 of these gliders must be effective by 1st April 1943! another example of the over-optimism of planners.

Again the design for the Swallow was done by International Model Aircraft Ltd at Morden and was a high wing monoplane with twin booms and tail fins, propelled by four rockets and containing a smoke canister. The wingspan was 18 feet with a length of 12 feet. Initial trials in December 1942 were made on an experimental track at Worthy Down. DMWD surveyed various sites for further trials, the one chosen being the mouth of the Beaulieu River which offered "*the required degree of security and a suitable straight stretch of water*".

After initial land trials at Worthy Down there was a gap of about 7 months whilst an LCT was fitted with a launching ramp so that trials over water could be done. Trials at Beaulieu began during late 1943 and were beset by problems with the launching catapult and then with the clockwork control mechanism for the glider invariably causing the glider to crash. It took many trials in November and December 1943 to get the problems resolved. A significant date was 14th February 1944 which was the first with smoke laying. It is reported that the glider was 100 feet too high but that "obscuration at water level was excellent". Development and trials continued through 1944. At a DMWD meeting on 5th July 1944, which Shute attended, Combined Operations staff stated that the operational requirement for the Swallow no longer existed and that the project should be abandoned. However since there were several gliders already built they were used in trials, the last being on 1st September 1944. So final success came too late for operational service.

The Technical history records that RAE Farnborough were taken over responsibility for the development of Swallow. Lt A. Menhinick looked after the sea trials and Lt. Cmdr Norway acted as co-ordinator for the project.

## Rockets.

The application of rockets in various devices was to occupy much of Shute's time throughout the whole of his service in DMWD. Rockets were used for the defence of ships, in the Rocket Spear, Rocket Grapnel, Panjandrum and in the Hedgehog, Hedgerow and Grasshopper weapons. To quote Terrell, referring to Shute, "*He was learning by painful experience a lesson that we all had to learn in turn - namely that it was one thing to produce a prototype that functioned on land, but an entirely different thing to make it, with all the varied movements of the ship, work at sea... Nevertheless with dogged determination as soon as one rocket weapon failed to show enough promise he started designing and developing another and went from projectors based on land for defence against invasion to yet another system of rockets for the defence of ships. Although at first promising, once again the result was failure.*"

*Still he went on testing, trying and failing. But as a result of the groundwork of research carried out in these first few months, the Rocket Landing Craft, with its devastating power of attack ... was ultimately produced and proved successfully used both in the Mediterranean and Normandy landings".*

An early device designed by Shute was christened "Pig Trough", a pivoted launcher capable a firing up to 14 rockets vertically from the deck of a ship as a counter to aircraft attack. This was followed by the "Radiator" again a gimballed multiple rocket launcher, the Harvey Projector and the Pill Box.

The rockets themselves were developed at the Projectile Development Establishment located on the coast at Aberporth in Wales run by Dr. Alwyn Crow. It might be said that Shute became hooked on rockets, devising launchers for them and trying out all sorts of different applications, some successful, others not. Rockets or unrotating projectiles were not particularly sophisticated devices being essentially a long steel tube filled with cordite plugged with millboard at one end, fitted with guiding fins, and ignited with an electrical fuse.

Of the more successful applications the Rocket Spear must be mentioned, a rocket fitted with a cast iron spear at its head capable of puncturing a hole in a submarine's hull. This was the outcome of Shute attendance at Committee meetings chaired by Professor Blackett to consider all possible means of attacking submarines. A fleet of Swordfish aircraft was equipped with Rocket spears and achieved success against U boats in the Atlantic, and this within weeks of its introduction.

Another success in this field was the Rocket Grapnel which Shute devised in response to a requirement for cliff face assaults. Here a four-pronged grapnel was fitted to the top of the rocket with 500 feet of rope attached. Successful trials on the Isle of Wight cliffs lead on to the combat use of the Grapnel by US forces on Omaha beach on D Day.

Shute was also involved in the early development of the "Grasshopper" a landing craft adapted to fire multiple rockets. He designed the projectors for the rockets and was involved in the ripple firing system. Ultimately this became the Rocket Landing Craft which could fire over 1000 rockets in salvos. Once DMWDs development work had been completed by about the end of 1943 the Naval Ordnance Department took over production of the craft themselves.

#### Final remarks.

For four and a half years Shute worked tirelessly in the DMWD, devising, designing developing and testing the weapons described above. Some were successful but many of them were not. In many instances by the time the devices were ready for service, with the bugs ironed out, they were no longer needed or the requirement for them had lapsed. The DMWD Technical History surveying its Projects lists the following:-

1. Weapons still in service
  - Fresh water stills - electrical and fuel heated
2. Weapons and Devices in service for some period during the War
  - Acoustic Warning Device
  - Slung UP mounting
  - Gimballed UP mounting
3. Projects abandoned
  - Flame throwers
  - Fresh Water - recovery from exhaust gases
  - Swallow glider
  - Panjandrum

It was Shute's misfortune that projects he was involved with were largely abandoned. Two quotes from Shute himself will serve to sum up his feelings on his time with DMWD.

*"I have sometimes been a little despondent about my war service as we worked on such a lot of things that proved to be useless either because they would not work... or because by the time the long development was over and the thing was working satisfactorily the staff requirement had become obsolete and they were not wanted or because by the time development was completed the war had moved on and that particular device was no longer required. Some of the things of course were some good and I suppose one should be satisfied if one in ten of those projects turned out to be really useful"*

The second quote comes at the beginning of his "Journey to Normandy" article

*"My job is to produce experimental weapons for the changing needs of war; I have sat for four years in an office in the Admiralty with occasional trips to sea to see my things go wrong. Because I have been tired and weary with this work, from time to time I have amused*

*myself by writing fictional romances in my bedroom in the evenings, and these stories have pleased others besides me."*

These stories continue to please us, his readers, to the present time.

References

1. Gerald Pawle "The Secret War" Harrap 1956
2. Edward Terrell "Admiralty Brief" Harrap 1958
3. Julian Smith ""Nevil Shute - A biography" The Paper Tiger 2002

National Archive References

ADM 277/1 History of the Department, a survey of its projects and a key to its Technical History

- ADM 277/6 Acoustic Warning Device
- ADM 277/11 Gliders
- ADM277/13 Flame Thrower
- ADM 277/16 Fresh Water
- ADM 277/27 Beach Obstacle demolition
- ADM 277/38 Landing Craft Tank (Rocket) GRASSHOPPER
- ADM 1/11767 Proposals of Mr.B.N.Wallis  
Volume bombing  
Rocket propelled smoke screen glider for remote laying of smoke screens from a ship at sea

| Nevil Shute Norway - DMWD Projects Approximate Chronology |      |        |      |       | D Day<br>6/6/1944 |
|---|------|--------|------|-------|-------------------|
| Project   | 1940 | 1941   | 1942 | 1943  | 1944              |
| Acoustic Warning Device                                   |      | ←————→ |      | ..... |                   |

|                          |  |                   |                    |               |                 |
|--------------------------|--|-------------------|--------------------|---------------|-----------------|
| Flame Throwers           |  | ↔                 |                    |               |                 |
| Fresh Water Stills       |  |                   | ↔                  |               |                 |
| Panjandrum               |  |                   |                    | ↔             |                 |
| Swallow & Target Gliders |  |                   |                    | ↔ Land trials | ↔ Sea trials    |
| Rocket devices           |  | Pig Trough        | Harvey Projector   | Rocket spear  | Rocket grapnel  |
|                          |  | ↔ Radiator        |                    |               | ↔ Grasshopper   |
| Novels                   |  | writes Pied Piper | writes Most Secret |               | writes Pastoral |

June 1940 joins DMWD promoted Lt. Commander  
 March 1941  
 Dec 1944 leaves DMWD