













# THE HIGH DOWN TEST SITE, ISLE OF WIGHT ROCKET TEST SITE

## SURVEY REPORT

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ENGLISH HERITAGE

**HIGH DOWN TEST SITE,  
THE NEEDLES, ISLE OF WIGHT  
Rocket Test Site**

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*Gantry 1 looking up the efflux channel towards the gantry foundations*

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# **1 Introduction**

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The remains of the High Down Test Site are a rare example of a 1950s British rocket test facility, built at a time when the country was amongst a handful of nations at the forefront of rocket and missile technology. Internationally, large rocket testing facilities of this date are uncommon, restricted to the two Superpowers, the United States and the Soviet Union, and possibly France. It is also a visible reminder of the Isle of Wight's aviation heritage, in such specialised fields as flying boats, rocket powered interceptor fighter and hovercraft, and in particular its contribution to space technology.

Most of the site's ancillary buildings have been demolished and the metal work of the test stands removed, nevertheless, its plan form and remaining features may be used to illustrate the operation of a post-war rocket test facility. The site and surrounding down land is owned by the National Trust and is publicly accessible. More detailed records of the site's individual features are presented on record forms and may be found in the appendix.



## 2 Topography and landuse

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**Figure 1** The Needles viewed from the west with the High Down and Tennyson Down to the right. In the foreground is James Walker's 1859 Goose Rock lighthouse. To its right is Scratchell's Bay and above it New Battery and the High Down Test Site.  
(c) English Heritage  
NMR18515/30

The southwest coast of the Isle of Wight is formed of a whale-backed chalk ridge orientated roughly west to east known as Tennyson Down and West High Down (Figure 1). At its western end the ridge narrows to form a peninsular with steep cliffs to either side, to the south is the English Channel and to the north the White Cliffs overlook the western entrance to the Solent. At the western most point of the peninsular are the chalk sea stacks, known as The Needles and at their end the mid-19th century Goose Rock lighthouse. This replaced an earlier 18th century lighthouse by Richard Jupp that stood on the hilltop (Hague and Christie 1975, 220). To the south is Scratchell's Bay and above the headland Sun Corner the cliff side forms a natural amphitheatre. The Needles are regarded as one of the most picturesque features on the Isle of Wight and with the adjacent coloured sands are some of the island's most popular tourist destinations. However, offshore the gently shelving chalk has been treacherous to shipping, there are many documented wrecks and archaeological finds suggest some may be of Roman date. From the construction of New Battery in the late 19<sup>th</sup> century, the downland between it and Coastguard Cottages was intensively used for military encampments. Some may be traced as footings or earthworks, less obvious are the many buried service trenches that connected the buildings. Removal of many of these buildings, chiefly during the 1970s, involved considerable ground disturbance and re-profiling of many slopes in the area. Today the downs are open grassland and the Needles Old Battery a feature part of the island's coastal path.



### 3 History

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From at least the Roman period Southampton Water has been an important trading route with the continent (Cotton and Gathercole 1958) and from the Tudor period Portsmouth developed into one of the country's main naval bases. Control of the movement of shipping into the Solent was therefore of vital national strategic interest.

#### **The Needles Battery**

From the cliffs above The Needles there are commanding views of the western approaches to the Solent and eastwards towards Southampton Water. Prior to the construction of the first permanent battery between 1861 and 1863 historic Ordnance Survey maps show that the headland was deserted except for a track along West High Down, which is followed by the modern footpath and terminated somewhere above Sun Corner. To assist in the construction of the fort and the transport of its heavy guns a new road was terraced into the north side of the headland along the top of the White Cliffs.



**Figure 2** The  
Needles Battery.  
(c) English Heritage  
NMR.21952/15

The Needles Battery (SZ 29556 84882) was one of 76 batteries and forts constructed or remodelled in the late 1850s and 1860s under Lord Palmerston against the threat of hostile French intentions (Saunders 1989, 182: Coad 2007, 51-5). On the north shore of the Solent, Hurst Castle was modernised in the 1850s and dominated the 1.25 km (3/4 mile) channel between itself and Fort Albert and other batteries on the island. So vital was this stretch of water that by the end of the 19<sup>th</sup> century it was guarded by ten batteries and forts. The Needles Battery (Figure 2) was designed by Major James Edwards, Royal Engineers, and constructed by George Smith of Pimlico, and was originally equipped with six Armstrong 7-inch breech-loading guns (Savage c.2000, op.1: Coad 2007, 51). In 1873, these were replaced by six more powerful 12 ton 9-inch rifled muzzle-loading guns, these were arranged

in two groups, Group A with four guns and a position finder and Group B with two guns and a position finder (The National Archives (TNA): Public Record Office (PRO) WO192/134). In addition to the gun emplacements the new battery included a ditch and defences on the landward side, a barracks, officers' quarters, a Royal Engineers' office, shell and powder stores and a laboratory for shell assembly and inspection.

The end of the century brought new threats, in particular small motor torpedo boats, and in the late 1880s trials were undertaken with searchlights and quick firing guns. In 1908 a Fire Command Post was added to co-ordinate all the guns defending the Needles Passage and later in 1913 one of the country's first fixed anti-aircraft guns was tested on the fort's parade ground (Savage c.2000, 7; Coad 2007, 53).



**Figure 3** The Needles Battery, 1870s rifled 9-inch muzzle loading guns placed on replica carriages. (c) English Heritage

After New Battery (see below) received its guns the metal fittings were removed from Old Battery's guns in February 1902 and in the following year the guns were tipped over the cliff edge. Their carriages were broken up for scrap in 1905 (TNA: PRO WO192/134). Two of the guns have subsequently been recovered by the National Trust and placed on replica carriages (Figure 3). The Needles Battery is a Scheduled Monument 22017.

### **The New Needles Battery**

In the early 1890s fears that the vibrations from the discharge of the guns might hasten further cliff falls, and thereby undermine the 1860s fort, led to the construction of a new battery about 350m to the south east just below the crest line of the hill (see Figure 9) The construction of this battery also necessitated the creation of a new road and to the west of the Needles Battery a terraced track was dug into the cliff side to the site of the new battery. This comprised three emplacements at 120m (394 feet) above sea level, which dominated the northwest approaches to the Solent and the passage to the north (Figure 4). Construction begun in October 1893 of the new battery was completed by May 1895. The main contractor for the work was Mr Hill, Bungworth, Gosport, and the total cost of the work was £9821 (TNA: PRO WO 78/3949 Drwg No.2). In common with practice elsewhere it was



**Figure 4** *The New Needles Battery, looking eastwards towards Hurst Castle and the Solent .*  
(c) English Heritage

not until 1900 that it was equipped with two 9.2-inch Mark IX breech-loading guns, the third was in place by 1904. The delay in arming the new battery may in part be accounted for in contemporary perceptions about threats to the country and the competing demands on both the Treasury and gun-makers to re-equip the Royal Navy with modern battleships. At the east end of the emplacements was a position finding post with a telephone room beneath. Around 1900 a new battery command post was built on the crest of the hill. For practice use two quick firing 3-pounder guns were placed between the centre and northern emplacement, but by 1907 these had been removed. Between 1911 and 1914 the emplacements were adapted for Vavasseur Barbette (VB) mountings, which used an inclined ramp to help to absorb the recoil forces. In 1913, one 9.2 inch Mark IX breech loading gun (M1) was installed and a year later a similar gun (M2) was erected, leaving the central emplacement dismounted (TNA: PRO WO192/134). During the First World War a 6-pounder quick firing gun was emplaced to the south of the westerly emplacement for examination service use, whose role was to confirm the identities of ships entering the Solent.

Also at the end of the 19<sup>th</sup> century a row of four Coast Guard cottages were built on the northern side of High Down, partly terraced into the slope to provide some protection from the elements. The main access to these cottages was from the road along the top of the White Cliffs and up a steep iron staircase set into a concrete channel.

After the armistice in November 1918 the fort was placed on care and maintenance, but in 1926 it was reactivated for Territorial Army use with two 9.2-inch breech-loading guns. During the Second World War it once again played a vital role in protecting the Solent's western approaches. It guarded against the long range bombardment of Portsmouth, attempts to scuttle block ships in the channel or efforts by small motor boats to enter the channel and in 1943 the guns of New Battery engaged a number of German torpedo boats.

In the event of an attempted invasion it might also be used to deter landings on the north shore of the Solent. At the beginning of the war its main armament was replaced by two 9.2 inch Mark X guns, designated F1 and F2, both of which were nearly 40 years old and were erected on the VB mountings. During the war they were replaced and in February 1944 it was noted that the guns were on Mark V mountings (TNA: PRO WO192/281). At the eastern end of the battery in the command post a Mark II\*\*B rangefinder was installed. Anti-aircraft defence was provided by two elderly Lewis machine guns (TNA: PRO WO 192/134). During the war one minor improvement to the battery was the installation of electric lighting to replace oil lamps and candles. In 1941, a Chain Home Low radar station, staffed by the RAF, was set up to detect low flying aircraft (Gough 1993, 27). In the following year two 40mm Bofors guns were emplaced, although one was soon removed. The guns were manned by around 50 local troops from the 530 (Princess Beatrice's) Coastal Artillery Regiment, a further 40 infantry soldiers protected the guns, with local defences comprising barbed-wire entanglements, machine gun and spigot mortar posts, and a minefield (West Wight Beacon 2001, 22-23).

At the end of the war the battery was mothballed and as part of the general rundown of Britain's coastal defences the fort was put up for disposal in 1952 (Moore 1995). Its guns were scrapped in 1954. Beyond this date the Admiralty Surface Weapons Establishment (ASWE) retained an interest in the site, but it is unclear whether or not they maintained any dedicated infrastructure.

### **High Down Test Site**

As the old fears of a seaborne assault on the Solent receded the Cold War brought new threats and in particular the dread of attack with nuclear weapons. Western policy during the 1950s believed that the most effective and economic way to deter Soviet communist aggression was to threaten overwhelming nuclear retaliation. For this policy to be convincing the means of delivering the nuclear deterrent needed to be one step ahead of any Soviet countermeasures. As Soviet air defences improved, even before the first generation of nuclear armed V-bombers were in service it was recognised that they would soon be obsolete. The solution to this problem was seen to be an unstoppable missile. This would be invulnerable to Soviet air defences and have sufficient range to threaten Moscow and elsewhere a large percentage of the Soviet Union's urban population.

In 1954, the Air Ministry issued Operational Requirement 1139 for a missile with a range of around 1,500 miles (2413km). The air frame and engines for this missile, which was later named Blue Streak, were primarily developed by De Havilland and Rolls-Royce, who established a large test range at Spadeadam, Cumbria (Tuck and Cocroft 2004). Responsibility for the design of the warhead and the construction of its re-entry head principally lay with the Atomic Weapons Research Establishment, Aldermaston, and the Royal Aircraft Establishment (RAE), Farnborough. Two of the crucial challenges that needed to be addressed were the shape of the re-entry head and the type of material that might be used for the fabrication of its outer shield. To answer these questions scientists from the RAE needed access to a relatively cheap rocket capable of launching scale models of different shaped re-entry heads, whose re-entry through the earth's atmosphere could be

accurately monitored.

From this requirement emerged the Black Knight project. A characteristic of many post-war aerospace and defence projects was the necessity of combining cutting edge technology with complex administrative structures that needed to accommodate the working cultures of numerous public and private sector organisations. Also typical of the period were the bewildering sequence of company names as the multitude of aerospace firms were rapidly amalgamated into a few large concerns. The Black Knight project required the co-operation of five major partners, the Guided Weapons Department of the RAE, who were the design authority for the project. Saunders Roe (which in 1960 became a Division of Westland Aircraft) were responsible for the detailed design, construction, assembly and static testing, their team led by the company's chief designer Maurice Brennan. Bristol Siddeley Engines Ltd (subsequently part of Armstrong Siddeley Motors) was responsible for the propulsion system. In order to gain experience for the later Blue Streak firings De Havilland Propellers Ltd (later Hawker Siddeley Dynamics) the prime contractor for the Blue Streak missile programme, provided most of the trials team at the Australian test site at Woomera. There, staff from the Weapons Research Establishment also provided range equipment (Bristol Siddeley 1965, 26-8). In addition there were many sub-contractors who supplied both sub-assemblies for the rocket and components for the test site (Scragg 1990, 297). Saunders Roe's headquarters for the project was in parts of the former naval college at Osborne House and the main factory was close by at East Cowes, now GKN Westland. Previously the company had designed Britain's only rocket-powered interceptor aircraft, the SR-53, which used a Spectre rocket engine fuelled by kerosene and high test peroxide. The lineage of the high test peroxide/kerosene engine may be traced back to wartime German designs, which were developed by the Rocket Propulsion Establishment, Westcott, Buckinghamshire. The Saunders Roe company was also accustomed to working with personnel from the RAE, and if meetings were required the Isle of Wight was relatively close to Farnborough (Scragg 1990, 297-300). Around 240 people were employed by the testing programme, although it is unlikely that they were all at High Down at any one time (West Wight Beacon 2001, 22-3).

The High Down test site had a number of functions, in the early stages of the project it was used to aid the development of the rocket. Initially the rocket's engines, structures, electronic control and measuring systems, guidance units and other equipment needed to be brought together for testing as a single system. The ground facilities at High Down were almost identical to those at Woomera and allowed modifications to be made to equipment before it was shipped to Australia; testing, launching techniques and procedures were also perfected. However, due to the development work undertaken at High Down some of its systems were more complex than those at the Woomera launch site. Once the rockets moved into their production phase the stands were used for proof firing before they were shipped to Woomera.

The recently vacated upper battery at the Needles was chosen as the site for the test stands. The site was close to Saunder Roe's main works at East Cowes, yet it was sufficiently remote from habitation to prevent a noise nuisance or hazard in the event of an accident.



**Figure 5** The High Down Test Site , in the foreground is the headland of Sun Corner and to its left Scratchell's Bay .  
(c) English Heritage  
NMR15574/09



The site selected for the test stands was at the top of the steeply sloping cliff side between Sun Corner, at the western end of High Down cliffs, and the recently abandoned New Battery. The cliffs and hillslope above Sun Corner formed a natural amphitheatre with the test stands at the top and their exhaust, or efflux, channels facing out to Scratchells Bay (Figure 5). The tests stands were placed below the top of the cliff along the 113m (370 ft) contour at either end of a curving concrete service road. This position both gave the buildings in the preparation area some acoustic shielding and also gave them a measure of protection from flying debris should there be an accidental explosion. To the north the Needles headland provided similar protection as well as preventing observation of the site from the mainland.

The design of the road network and buildings for the test site was carried out by John A Strubbe, FRIBA, who had a long association with the Saunders-Roe company dating back to 1942. Specialist engineering support for the project was provided by Mr Dash and Partner and Messrs. Hay and Barry, Herbert Lapworth Partners also assisted the project. While Saunders Roe's works engineer detailed the two one inch thick steel exhaust ducts (pers. comm. J A Strubbe). Strubbe was also responsible for the design of a new drawing office and dining room, which was erected on the site of the former Royal Naval College, Osborne House (TNA: PRO WORK 15/157), and the replacement 40, 000sq ft (3716 sq m) Albany shop at Saunders Roe' East Cowes works. No attempt was made to conceal the activities at The Needles the majority of the structures were clad in vertically fluted aluminium sheeting.

In their heyday the gleaming silver buildings above the chalk White Cliffs stood as a vision of the space age and Britain's post-war technological revolution.

### **The Black Knight and Black Arrow Rockets**

A detailed discussion of post-war British space policy, the specifications and performance of the Black Knight and Black Arrow rockets are beyond the scope of this report. Three recent publications provide up-to-date summaries of these projects and the design of the rockets (Hill 2001, Millard 2001 and Hill 2007). The National Archives, Kew, also holds many original files relating to the role of Black Knight in the Blue Streak missile programme, post-war space policy, as well as technical reports detailing the results of the experiments carried out using these vehicles.



**Figure 6** *Black Knight rocket. W D Cocroft collection*

Nevertheless, to understand the layout and operation of the High Downs Test Site it is necessary to appreciate the basic design of the rockets tested at this site. Black Knight (Figure 6) was constructed from aluminium and measured 10.5 m (32 ft) in length and 0.9m (3 ft) in diameter. At first it was powered by an Armstrong Siddeley Motors Gamma 201 rocket engine; this used a fuel combination of kerosene and high test peroxide, with a silver-plated nickel gauze as the catalyst to decompose it to oxygen and superheated steam to power the rocket and its fuel pumps (Bristol Siddeley 1962, 31-2). Within the rocket the propellants were held in aluminium tanks carried at a ratio of eight parts high test peroxide to one part kerosene. The kerosene tank was about 1.22m (4ft) in length and was mounted

over the 5.2m (17ft 4ins) long high test peroxide tank (TNA: PRO AVIA 53/535). Initially, the Black Knight rocket was designed to launch experimental re-entry heads on a steep trajectory, at around 80 miles (129 km) the head separated reaching an apogee of around 500-600 miles (804-965 km) before beginning its ballistic descent (Tharratt 1963a, 248; Millard 2001, 9). Although high test peroxide is an unstable compound and many precautions need to take place during handling, at normal temperatures it is easier to control than other oxidants, such as liquid oxygen. In 1961, the Gamma 201 was superseded by the more powerful Gamma 301 series engine with four swivelling combustion chambers providing a 25% increase in thrust (Scragg 1990, 299; Millard 2001, 36-7). Later, a two-stage rocket was employed with downward facing solid Cuckoo rocket motor to increase the velocity of the re-entry head. The re-entry head was in turn mounted on a sabot ring with four or more Imp motors to disconnect it from the second stage, the sabot was connected to the second

stage by a lanyard that pulled it away from the re-entry head allowing it to fall freely to earth (Bristol Siddeley 1965, 27). In this configuration Black Knight was involved in two series of tests codenamed Gaslight and Dazzle to investigate the phenomena surrounding warhead re-entry heads. At a time when the Soviet Union was developing the Galosh anti-ballistic missiles system, this research was of great significance in designing decoys to accompany British warheads. These investigations were also of great interest to the United States and probably formed an important component of the exchange of nuclear data between the two countries at this date.

By the early 1960s the frantic activity to develop a whole series of indigenous British nuclear warheads was coming to an end and in future the country's needs would be met by a relatively small number of devices. With the reduction of research in this area Black Knight's role was drawing to a close.

At this time, beyond the two superpowers, Britain, through the Blue Streak missile programme was the only country with the technical expertise to consider developing a satellite programme. One option was for an all British satellite launcher named Black Prince that would use Blue Streak for the first stage, a modified Black Knight for the second stage and an un-named third stage. In parallel discussions were taking place with possible European partners to establish the European Launcher Development Organisation (ELDO). This would use Blue Streak as the first stage, with other countries contributing the upper stages. The RAE's Space Department was also investigating two satellite launcher concepts, one founded on Black Knight and the second on a new rocket based on its technology. In autumn 1964 it was decided to go ahead with the second option with a rocket that would eventually be known as Black Arrow (Millard 2001, 1-13). Westland Aircraft Ltd at Cowes was responsible for the rocket's design and manufacture in facilities previously used for Black Knight, including the High Down Test facilities. This design used the next generation of Gamma high test peroxide engines. The first launch of a Black Arrow rocket took place on 28 June 1968 and on 28 October 1971 the British satellite Prospero was placed into orbit. Despite this success a couple of months earlier on 29 July 1971 the Minister of Aerospace, Frederick Corfield, had announced the end of the Black Arrow programme (Millard 2001, 27-50).

#### **Later history of the test site**

The late 1960s saw further amalgamations within the British aerospace industry and in December 1966, Saunders-Roe's and Vickers Supermarine's hovercraft interests merged to form the British Hovercraft Corporation (BHC), in 1970 it became a wholly owned part of the Westland Group. With the cessation of rocket work the Needles site passed to the British Hovercraft Corporation, they were left with a specialised facility with no obvious future use. They attempted to market the site as the High Down Industrial Test Facilities for testing hazardous or noisy products, or perhaps radio aerials (British Hovercraft Corporation 1971). This campaign failed and in 1974 the site closed and the following year it was sold to the National Trust. Soon after the test gantries and associated posts were demolished along with 1950s structures in the preparation area. It was probably also around this time that the surviving military structures to the south of Coastguard cottages were cleared. After



the end of rocket testing a coastguard look out tower within a fenced compound was built in New Battery's western emplacement.

## 4 Description

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### The New Needles Battery



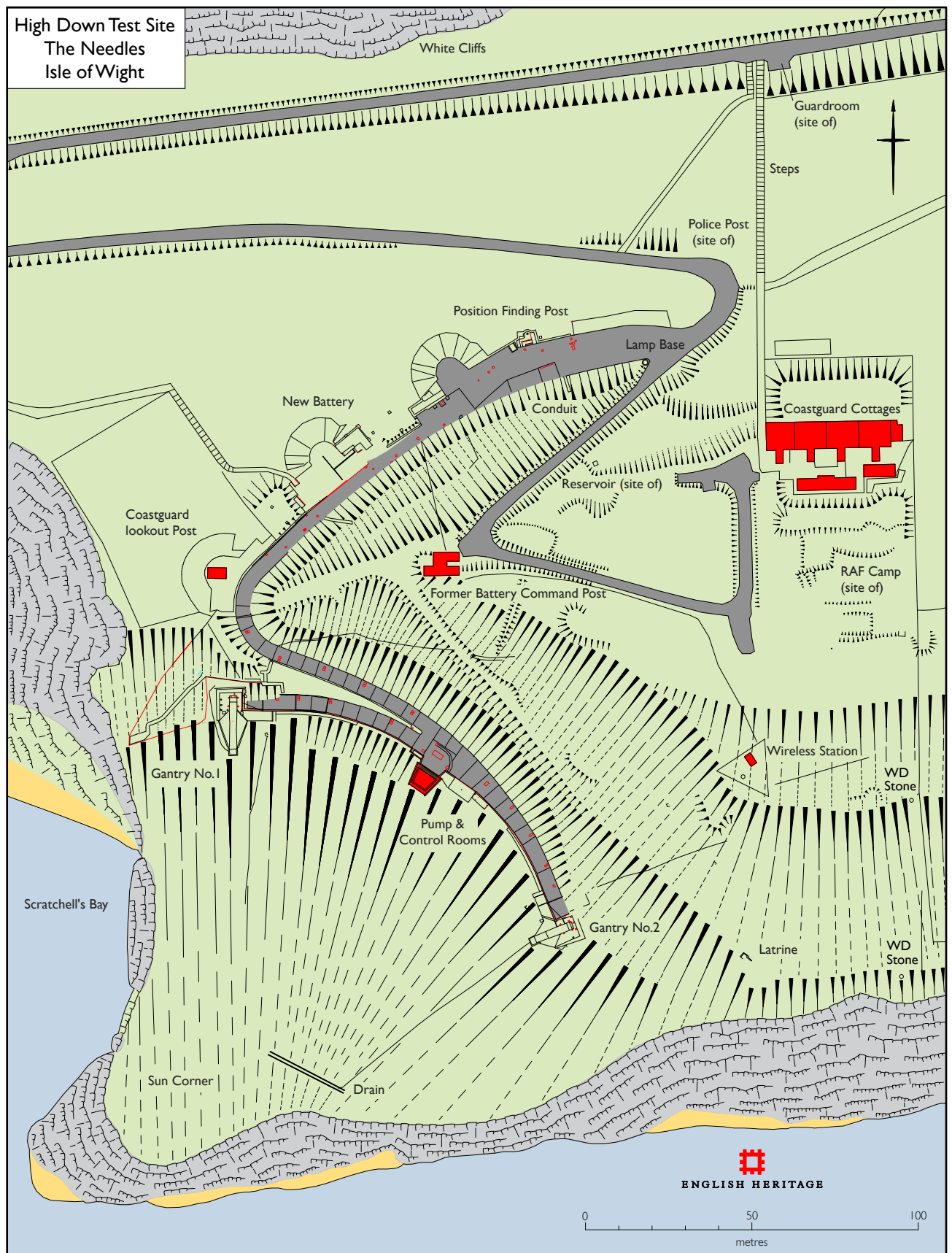
**Figure 7** The New Battery, rear side from the east .  
(c) English Heritage

The New Needles Battery (SZ 29918 84806) sits at the western end of West High Down, just beneath its crest (see Figure 9). As described above a new road was constructed to link the Old Needles Battery to the new site. To the rear of the battery an upper road led to the **Battery Command Post** and on towards the **Coastguard Cottages**. The eastern extent of the battery roughly coincided with the present north to south fence to the south of **Coastguard Cottages**, where two War Department boundary marker stones remain. The New Battery comprised three open, mass-concrete emplacements with a **Position Finding Post** at its eastern end (Figure 7). During the 1950s the emplacements were partly subsumed within Saunders Roe **Preparation Area** and a number of modifications were made to them. In the early 1970s the 1950s structures were removed re-exposing the battery.



**Figure 8** Position Finding Post.  
(c) English Heritage

At the eastern end of the emplacement a concrete stair case provides access to the open **Position Finding Post** with a central concrete column on which was mounted an instrument (Figure 8). In front of this column the position is curved to allow for easy access around the instrument. To the west of the column is a concrete locker, which was probably used for chart storage (TNA: PRO WO78/3949, drwg No.3). Below this position a flight of stairs gives access to an underground room that formerly housed a **Telephone Exchange** and was latterly used as a **Store** (Figure 13).



**Figure 9** Plan of the High Down Test Site (c) English Heritage

**Figure 10** The central emplacement, to either side are entrances to the underground magazines.  
(c) English Heritage



The three emplacements are semi-circular in shape with an outer curving concrete parapet (Figure 10). From the seaward side they presented a low profile with only their shielded guns appearing above the parapet. To the rear the gun pits were open with the guns set on a central mounting that elevated the barrels to the height of the parapet. Surrounding the gun was a raised metal platform for the gun crews. Set into the walls of the emplacements are lockers, formerly closed with steel doors, which were used to house ready-use ammunition. The eastern most emplacement (F1) has been stripped of most of its fittings, and was left as an open area when the battery was incorporated into the test site's **Preparation Area**. At this time its base was covered by tarmac thereby obscuring any surviving features of the gun mounting and supports for the surrounding deck.

In between this emplacement and the central position is an underground **Magazine**. From each of the emplacements concrete ramps lead down into the **Magazine**. On its northern side were a **Shifting Room** to the west and two **Cartridge Stores** to the east, which were used to hold ready assembled cordite charge bags. On the opposite side of the **Magazine**, to the southeast, of the access passage were three smaller rooms, one was used as a **Shell Store**, one as a small items store, the function of the small central room is unknown (TNA: PRO WO78/3949, drwg No.3). The western emplacement had its own dedicated **Magazine**, although smaller it was organised in a similar manner. Due to later alterations its access ramp to the west is no longer visible, although a concrete staircase at its east end remains open.

Cut into the hillside to the rear of the emplacements were a number of ancillary structures, moving from east to west an **Artillery Store**, **Guardhouse**, **Store**, **Canteen**, **Cookhouse** and **Shelter**. These buildings all appear to have been demolished in the 1950s and their sites re-occupied by buildings for the rocket **Preparation Area** (see below), the later buildings have also been cleared and chalk rubble dumped over the area to re-instate the slope's profile. On the level ground to the east of the emplacements was a **Barrack Hut** for 30 men, it too was cleared by the late 1950s and its site used as a **Vehicle Park**. Around the turn of the 20<sup>th</sup> century, on the crest of the hill to the south of the emplacements a **Battery**

**Figure 11** Battery Command Post, later used as a transformer house, looking west wards to the Solent's approaches.  
(c) English Heritage



**Command Post** was built with clear views of the Solent's western approaches (Figure 11). In the triangular-shaped piece of ground between it and the **Coastguard Cottages**, was another hut for 30 men, an unidentified building, and a temporary officers' mess formed from old railway carriages. Immediately to the south of the **Coastguard Cottages** was a **Semaphore** and **Watch House** (TNA: PRO WO78/4892, drwg.5). No surface traces of these features are visible.

### Upper Area

Returning to the upper road heading towards the **Battery Command Post**, on the hillslope to its southeast are the sites of various huts used as **Barracks**, a **NAAFI** and **Lecture Room**, which were in use until the end of the Second World War. Due to considerable later landscaping no traces of the platforms for these buildings survive. On the south side of the track and terraced into the hill slope was the 60, 000 Gallon (272760 litre) **Reservoir** and adjacent to it the **Fire Station** (TNA: PRO WO192/281). It is uncertain whether or not the wartime structures were retained by the rocket test site, although it was noted that an upper section was added to the **Reservoir** in 1960/61 (Strubbe 99/70R). Both these structures have been demolished and it appears that chalk rubble, or perhaps material from higher on the slope, was used to cover their platforms and to reinstate the slope's profile. At the top of the track is the former **Battery Command Post**, this was built at the beginning of the 20<sup>th</sup> century and probably extended during the late 1930s, when it was known as the **Battery Observation Post**. In the late 1950s it was enlarged and converted into a **Sub-Station and Transformer**. Close to it during the Second World War there were two light anti-aircraft positions and to its southeast a Bren gun position, of which no trace remains. To its east was a Bofors gun, which lay close to a low platform defined by a horse-shoe shaped scarp. This, however, marks the position of a rectangular concrete platform, which was probably constructed during the 1960s (OS 68103, 29 March 1968, frame 295). This may be equated with the Test Site's **R.F.** (radio frequency) **site** (British Hovercraft 1971, 4).



From the **Battery Observation Post** the track continues eastwards before turning sharply towards **Coastguard Cottages**. Beyond the outer corner of the turn is the site of the early 20<sup>th</sup> century **Watch House**, which survived into the post-war period as a roofless ruin. Its site is level and free of earthworks, however, to its rear are a series of low earthworks that mark the position of the wartime RAF compound. Its personnel were tasked with maintaining and operating the headland's radars. An earthwork mound on the fence line may mark the position of a **Spigot Mortar** (TNA: PRO WO192/281). On the cliff slope were a number of small buildings probably associated with the **Radar Station**. The building housing the radar stood just to the south of the surviving **Radio Frequency Laboratory**, now the **Wireless Station**, its site is marked by disturbed ground and low scarps on the hillslope. Air photographs (OS 68103, 29 March 1968, frame 295) show that it was standard modulator building, comprising two small square building connected by a short corridor, a hole in the roof of the southeastern building indicates that the radar head was positioned over this structure. To its east was a small building, possibly sunken, it too has been cleared and has left no surface trace. Just above the cliff edge are the foundations of another small building. Its isolated position and the presence of large quantities of cinders suggest it might be the remains of a **Latrine**. A break of slope running north-west wards towards the **Battery Commander's Post** marks the line of the path. Just to the east of the present fence, and outside of the survey area, was another small building, which has also been demolished.

#### High Down Test Site



**Figure 12** The High Down Test Site viewed from the east, to the bottom right are the Coastguard Cottages and to their right are the White Cliffs.  
(c) English Heritage

The High Down Test Site was established on the site of New Battery in 1956 and occupied 35 acres (14.16 hectares) of the downland and cliffs (Figure 12). Access to the site was from Alum Bay along the original fort road terraced into the hillslope above the White Cliffs. The test site's outer boundary fence ran from this road and to west of steps to **Coastguard Cottages**, past the cottages and to the cliff edge. On the road above the White Cliffs, at the

foot of the steps to the **Coastguard Cottages**, was the **Main Gate**. This has been removed, but is marked on either side of the road by sawn-off I-girders. Outside of the gate are the remains of an earlier **Guard Room**. Just inside the main gate was the **Inner Gate House**, this comprised a single basement room with an observation post on its roof. This structure has been demolished; its foundation slab remains partly covered by slumping. Adjacent to the **Inner Gate House** a set of concrete stairs with 33 steps leads towards the site of the upper **Police Post**. At the base of the stairs the cement is marked with a small piece of graffiti, comprising the initials 'CEL' and a broad government issue-style arrowhead. On the opposite side of the road to the **Inner Gate House** are the remains of a wartime **Spigot Mortar** position. All that is visible of this feature is a concrete block with a steel spigot at its centre. Positions such as these were built to a standard pattern with a central concrete column surrounded by a pit with ammunition lockers in its sides. From the **Inner Gate House** vehicles followed the road and made a sharp turn above the Old Needles Fort at the top of this road was the upper **Police Post**, where there was another gate. This building was also used as a **RF (radio frequency) Laboratory**, which probably occupied a cabin on the roof of the **Police Post**. This building has also been demolished, although its eastern end is marked by an earthen mound. From this gate the security fence ran about 30m (98ft) to the north of the emplacements to the cliff edge.

Beyond the inner gate vehicles made another sharp turn into the **Preparation Area**. On the southwest corner of the bend was a **Store**, whose site has been lost by later landscaping. Beyond here the road split into two, at its junction is a circular brick **Lamp Base**. The lower road leads into the rear of the emplacements which was used as the **Preparation Area** and the upper road towards the former **Battery Command Post**.

### **Preparation Area**

The **Preparation Area** as its name implies was used to receive and make the rockets ready for test firing, the control and monitoring rooms were also located in this area. Prior to a trial a rocket, or flight vehicle, was brought from Saunders Roe's East Cowes factory to the test site on a purpose-built trailer. At the entrance to the site was a 5 ton lifting gantry with a 9.1m (30ft) head room to allow rockets to be lifted on to a handling trolley. Although the rocket was checked before leaving the factory it was rechecked on its arrival in case it had suffered any damage during transport. Some of the more fragile components were also only fitted at this stage.

The **Preparation Area** was laid out over the rear of **New Battery** and also made use of some of its underground **Magazine** rooms. As described above, the **Barrack Hut** at the eastern end of the emplacements was demolished and its site occupied by a **Vehicle Park**. Also at the eastern end of the emplacement the telephone room beneath the **Position Finding Post** was reused as a **Store** (Figure 13). The easterly emplacement was cleared and its surface covered in tarmac.

In the underground **Magazine** serving this emplacement and the central emplacement the rooms were stripped and adapted for new uses and the area was known as the **Equipment**

**Figure 13** The telephone room beneath the former Position Finding Post was later used as a store.  
(c) English Heritage



**Centre.** The former **Shell Store** and **Store for Small Items** were converted into the **General Battery Room** and the **Flight Battery Room**. The **General Battery Room** is now used by the National Trust as a **Café**. To the north the large **Cartridge Room** was transformed into the **Control Room** to the west and the **Guidance Room** to the east. At the east end the small **Shifting Room** was used as the **Recording Room** (Strubbe drwg 99/11R; British Hovercraft Corporation 1971, 7-8).

The central area of the emplacements was transformed by the construction of a large structure known as the **Main Building** (Figure 14). The **Preparation or Main Building** was equipped with a wide variety of test equipment to check its electronic, pneumatic and hydraulic systems. Other smaller shops within the building checked guidance gyros, aligned monitoring transponders to the correct frequencies, and charged vehicle batteries. It was a steel-framed structure spanned by five trusses and two half-trusses at either end,

all set perpendicular to the roadway. It was clad in vertical aluminium sheeting that rose to gable height to hide the roof. Traces of brick-cavity walls foundations might indicate that the outer walls had low brick wall bases and cladding above. The building stretched from the steps leading down into the western **Magazine** to above the central **Magazine**. On the north side is stretch of red brick wall that formed the outer wall of the building and a sawn-off I-girder columns that carried the roof. The main north wall was carried over the curving pit of the emplacement which was roofed over; traces of roofing felt may be seen

**Figure 14** The Main Building lay to the right, this view shows the line of its front wall.  
(c) English Heritage





around the parapet lip. Internally the floor of the gun pit was covered by a new concrete floor providing a working area of 44ft (13.4m) x 32ft (9.8m). Within this area there was a working height of 14ft (4.3m) and a 1 ton overhead travelling hoist. Adjacent to the roadway the east and west ends of the building were of red brick cavity wall construction, the foundations of which may be traced. At its centre was a long loading bay with sliding doors, whose metal runner remains. A covered way over the road linked it to the **Laboratory** building to the south; above the covered way was a 2-ton travelling hoist, whose footings remain. At the eastern end of the building a ramp led down into the central **Magazine** and adjacent to it a flight of concrete stairs gave access to a series of gallery rooms above the **Magazine** housing offices, a records and conference room. These upper rooms are represented by a concrete floor slab, to the south it has been partly cut away. Around its eastern and northern edges are traces of a brick cavity wall and sawn-off I-girders.

To its west the underground **Magazine** was also adapted to new uses. The former **Shell Store** and **Store for Small Items** were converted into the **Instrument Laboratory** and the **Photographic Room**. To the north the large **Cartridge Room** was used as **Stores** while the central corridor was used as a **Camera Range**. In the western emplacement was the **High Test Peroxide Cleansing Department**. This was housed in the old emplacement with a wall along the roadway and a roof covering the open pit of the emplacement. This has subsequently been removed and the present **Coastguard Lookout Post** constructed. At the eastern end of this emplacement the rectangular compartment marks the position of the **High Test Peroxide Store** tank. From here high test peroxide was moved down to the **Firing Sites** by underground pipes.

To the rear of the emplacements the battery's ancillary buildings were demolished and their platforms reused for a series of support buildings. These have in turn been demolished and their rubble, or material from the hillside, used to cover their platforms and restore the slope's profile. Opposite to the former battery's **Position Finding Post** was the **Artillery Store** and **Guardroom**. These buildings were replaced by a **Workshop**, the northern side of this building may be traced as brick footings, a section of internal floor surface and a metal runner for a sliding door. Immediately to its east is a concrete conduit that originally carried a 2-inch water pipe from the battery's reservoir. From the circular brick **Lamp Post** a track led to the upper storey of the **Preliminary Preparation Building**, its line is partly marked by a break in scarp. The ground floor of this building was occupied by a workshop. To its west was another two-storey structure, its upper storey occupied by **Laboratories** and **Lavatories** and on its ground floor a **First Aid Room**. Sections of the **Laboratories** included specialist features, such as a room with filtered air and a vibration free area for checking gyroscopes. At the western end of this group of buildings was the **Canteen**, this was a double storey structure built on the site of the battery's **Canteen and Cookhouse**. On the lower floor was the kitchen and general canteen and on the upper floor the senior staff canteen, a conference room and other offices. On the crest of the hill the former **Battery Commander's Post** was extended and converted into an electrical **Transformer** building, it remains in use as an electrical sub-station.

## Services

To operate the test site needed to be supplied with a variety of services, including propellants, hydraulics, pneumatic services, electricity and fire-fighting. The propellants, kerosene and high test peroxide, were supplied from the mainland by tanker, at the test site the kerosene was stored in two 600 gallon (2728 litres) tanks. The high test peroxide was held in 4000 gallon (18184 litre) tanks, which were equipped with water sprinklers, and emergency draining and dumping facilities. Before firing the high test peroxide was piped to a 1000 gallon (4546 litre) ready-use tank on each of the gantries. Hydraulic pressure was supplied to the vehicle during testing by a portable trolley and in the absence of vehicle hydraulics was used to swivel the combustion chambers. High pressure air was required for pressurising the high test peroxide tank, the reservoir and accumulator of the hydraulic system, and for purging and starting the rocket motor. At Woomera, prior to launch pneumatic pressure was also used to operate the release jack. A bulk store for compressed air and nitrogen was located between the gantries. A Williams and James compressor unit was used to recharge the air cylinders and nitrogen was brought to the site in cylinders. These supplies were piped to regulator panels in the gantries for distribution.

For its main electrical supplies the site relied on local mains supplies with its own 500 kVA transformer, within the site power lines distributed three-phase and single-phase power. Large supplies of water were also required for safety reasons. The main water supply to the site was from the Isle of Wight Water Works pumping station, about 2km (1¼ miles) to the east. Close to the Alum Bay entrance to the site was another pumping station and 6,000 gallon (27,276 litre) **Reservoir**, additional water also available from well and pump in the Old Needles Fort. Water from both sources was pumped up to the 60,000 gallon (272760 litre) site **Reservoir**, which was connected to the test stands by a 12-inch (30cm) main. During firings, the flames, or efflux, from the engines was directed into a steel exhaust duct that effectively turned them through 90 degrees. In operation the exhaust duct was cooled by a torrent of water delivered at 1500 gallons (6819 litres) per minute. In the event of a leak or spillage of high test peroxide water is very effective in diluting this substance and the gantries were equipped with sprinkler systems, in the event of fire provision was also made to flood the engine bay with water. As a further safety precaution adjacent to each **Test Post** was a personnel tank 6 ft x 3ft 6ins x 3 ft (1.83m x 1.06m x 0.91m), into which staff could dive if there was a HTP spillage.

## Systems

A rocket is made up of a number of inter-related systems, the most important of which, include propulsion, guidance, control, and telemetry. Before a static firing or launch these units need to be tested and in some instances parameters set and synchronised. These tasks were usually carried out from consoles or racks, with leads running back to the rocket. For ease of operation most of the initial checking was undertaken from the **Test Posts** adjacent to the gantries. For firing or launch these consoles and racks were duplicated in the **Equipment Centre**. In this building, which was sited away from gantries, each of the consoles was manned by a specialist systems engineer, who was able to initiate and check his part of the operation and if necessary shut down the firing. Most of the firing or

launch sequence was, however, controlled by an automatic Sequence Console operated by the Sequence Officer. The timing of the firing sequence was crucial and the consoles were all linked to crystal controlled pulses from the Central Timing Unit, which could also be linked to the cameras and other recorders. During firing over one hundred different measurements were recorded, collecting data on, for example, pressure, voltages, and the electrical currents in components. Most of the data was collected by a 600 foot (182m) landline that ran between the rocket stands and the recording facility. The readings were recorded either on magnetic tape or photographically (Tharratt 1963a, 260). The firings were also photographically recorded, and the site was equipped with developing facilities with automatic processing machines for its oscillograph papers, and for 16mm and 35mm film.

### Firing Area



**Figure 15** The Firing Area showing the Firing Sites and the central Control Room. (c) English Heritage NMR 18516/3

To prevent transport damage to the vehicle the **Preparation Area** is generally as close as possible to the firing or launch area (Figure 15). After the test vehicle had been checked it was hauled the short distance to one of the test gantries. Here the rocket was hoisted to a vertical position before it was lowered on to the launcher. The steel-framed gantries housed hoists for raising and lowering the rockets, servicing platforms and a variety of services, including high pressure air and nitrogen, fuel lines, and water for dowsing the exhaust duct and fire fighting. On this exposed headland they also had the vital function of providing a weather shelter from salt air, high winds, rain, ice and snow. At High Down the gantries were fixed, whereas the ones at Woomera were designed to be rolled back in preparation for a launch (Tharratt 1963a, 252). Once it was secured to the launcher the final checks were made, including the mechanical and electrical stage connections, internal

systems, vehicle and ground firing systems, and tests on radio links between the rocket and ground facilities. To assist in checking and testing the rocket's systems adjacent to each of the **Gantries** was a **Test Post**. These small buildings housed consoles for controlling the electrical supplies to the rocket and for monitoring tests.

The test stands (SZ 29943 84707) were approached from the **Preparation Area** along a concrete road that turns steeply at the westerly emplacement, now occupied by the **Coastguard Station**. Steel covers along this section of track mark to the rear the line of the control and monitoring cables leading back to the **Preparation Area** and to the front the high test peroxide pipe. This track gives access to the gently curving access platform, the curve in part defined by the track following a level contour across the hillslope. At the centre, and seaward side of the platform is the reinforced concrete **Pump House** and **Control Room** and to either end the **Firing Sites**, No.1 to the west and No.2 to the east.



**Figure 16** The Control Room, the Pump House lies to the left beneath the access causeway.  
(c) English Heritage

The **Pump House** and **Control Room** (Figure 16) are accessed from the platform from a flight of stairs to their west. A door, immediately opposite to the foot of the stairs, gives access to the **Pump Room**, another opening on its south side was probably for ventilation. This building is entirely beneath the access platform, although its presence is marked by a number of Elkington Gatic (Gas and Air Tight Inspection Covers) covers on the surface of the platform. These provided access to lower the large pumps and valves into the **Pump Room**. Within in the room are a number concrete machinery mounting plinths that variously held at the centre a large pump driven by an adjacent electric motor and various pipe valves. In operation water was supplied from the site's 60, 000 gallon (272760 litres) **Reservoir** along a 12 inch (0.3m) main to the **Pump House**. From here cooling water was piped to the **Firing Sites** along a 12 inch (30cm) main and fire fighting water along 3-inch (7.6cm) pipes. In an emergency the pumps could deliver 3,000 gallons (13,638 litres) of water per

minute (British Hovercraft Corporation 1971, 9).

To the south of the **Pump House** is a narrow passage way between it and the freestanding trapezium-shaped **Control Room**. This passage way gives access to the **Control Room** through an outward opening armoured door in its rear wall. To either side of the **Control Room** concrete wing walls retain the hillslope and give access to its front. It is built on a concrete base and is separate from the main causeway and in the event of an accidental explosion it was designed to withstand pressures of up to 10lb/in<sup>2</sup>. Internally are various plinths and mounting bolts for the safety officer's console that was positioned in the centre of the room and in the northeast corner controls to engage the fire fighting system. In its eastern and western walls are armoured observation windows facing the two **Firing Sites** and single windows in its front and rear walls. At platform level the passage way is covered by wooden boarding to give access onto the **Control Room's** roof. This was previously bridged by steel plate, which allowed a rocket trailer to be reversed into this area.



**Figure 17** Facilities  
Storage area.  
(c) English Heritage

At platform height, immediately to the east of the **Control Room** are a pair of concrete slabs abutting against the platform (Figure 17). The westerly one is supported on brick foundation and on its surface are five pairs of mounting bolts. Impressions on the western side of the easterly slab show that it was shuttered using corrugated-iron sheeting, and on its surface are four sawn-off steel channels. These slabs are absent from the original design drawings, but are later shown as the site of the **Facilities Storage**, for demineralised water, kerosene, high pressure air and nitrogen (British Hovercraft Corporation 1971, 4) .

Running beneath the platform were the services for the two firing sites, including the 12-inch (0.3m) water main, to the rear the high test peroxide pipe and to the front cable ducts. The latter two marked by lines of metal covers. At either end of the platform were the **Firing**





**Figure 18** Site of the Test Post adjacent to the Firing Site No.1 (west).  
(c) English Heritage

**Sites**, No.1 to the west and No.2 to the east. Adjacent to each of stands was a **Test Post** (Figure 18) before firing these were used for the initial checking of the rockets' systems and for routing cables back to the **Preparation Area**. Adjacent to each of the **Test Posts** was a bath into which the personnel could jump if they were contaminated with high test peroxide. The sites of both these baths are now obscured by tipping. At **Firing Site No.1** a set of concrete stairs provided access from the **Preparation Area** to the rear of the **Test Post**. Its site is infilled with chalk rubble, a contemporary photograph (British Hovercraft



**Figure 19** Gantry 2 detail showing the fixing plate for the gantry and efflux duct beneath.  
(c) English Heritage

Corporation 1971, 2) shows it was a single storey brick structure, with two upper storeys clad in aluminium sheets. From the top storey a gangway gave access to the adjacent servicing **Gantry**. At the opposite end of the platform the **Test Post** adjacent to **Firing Site No.2** was a single storey structure. Its site is marked by a section of breeze block wall, chalk and building rubble interspersed with lengths of co-axial cable.

The **Firing Sites'** foundations were cast as separate structures indicated by a vertical joint on the front face of the platform. During operation the **Firing Sites** were covered by **Gantries** (Figure 19). These fulfilled a number of functions, they were used to raise the rockets over the firing position, provided weather protection for the rockets and personnel, and carried the service pipes and cables. They were steel-framed and clad in Noral aluminium sheeting. In contrast to the gantries at Woomera these ones were fixed. The superstructures of each **Gantry** were 62ft 7ins (19m) tall and internally there were six working decks, at the apex of the structure was a running beam and 'Felco' hoist which was used to raise the rocket off its transporter and position it over the firing pit. Externally the gantries



**Figure 20** Gantry 1 showing the blocked High Test Peroxide bay and the vertical joint separating the gantry foundations from the causeway. (c) English Heritage

measured approximately 20ft (6m) x 16ft (4.9m). During firing the hot efflux gases from the rocket were turned through 90 degrees by a steel exhaust duct that was constantly doused with water. The hot gases, or efflux, were directed down the concrete-lined efflux channel flame at the bottom of which was a sump to collect any unburnt fuel. Effluent from these sumps then appears to have been carried down earthenware pipes to a breeze-block channel 25.4m (83ft 4 ins) in length situated close to the cliff top. Most of the pipes have been removed, but there lines may be traced by gullies leading down from the stands. Adjacent to each of the **Gantries**, and beneath the platform, was an open bay that was used to house the **High**

**Test Peroxide Dispensing Tanks**, these bays have subsequently been blocked in brick; each tank could hold 1000 gallons (4546 litres) (Figure 20). The **Gantries** were removed and scrapped in the early 1970s and all that remains are the metal plates by which they were attached to the concrete footings.

### Conclusion

The remains of the High Down Test site reflect essentially a single phase of activity between 1956 and 1971. Any modifications that were made to facilities to accommodate the switch from testing Black Knight to Black Arrow are imperceptible to the archaeological record. The operation of most rocket test sites follow a fairly standard routine and the procedures used at High Down were typical of practices used elsewhere. In England, they represent the only publicly accessible remains of a rocket test site and therefore have high educational value

in explaining the significance of this technology against its local, national and international historical background.



## 5 Methodology

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A detailed RCHME Level 3 (RCHME 1999, 4) survey was undertaken of the late 19<sup>th</sup> century New Battery and the area of the rocket test stands. The survey was carried out using a Leica TC805L Total Station Theodolite, data collected was processed using Key-Terra Firma software and transferred to an AutoCAD electronic environment. The report was prepared in Adobe Pagemaker 7.0.

Data record sheets were compiled in Adobe Pagemaker 7.0 for all the site's main components. Professional ground photography of the site was undertaken by the Royal Commission on the Historical Monuments of England (RCHME) in 1994, job number 94/1973. Specially commissioned low level oblique air photographs of the site have also been taken and are held by the National Monuments Record.

All readily accessible secondary historical sources were consulted, including contemporary journal articles and more recent historical accounts of the Black Knight and Black Arrow projects. Relevant primary files at the National Archives, Kew, were also consulted, in particular those that shed light on the history of New Battery and the infrastructure of the rocket test site. The National Archives has many other technical files relating to rockets' technology and test programmes, which were outside the scope of this report. The architect Mr J A Strubbe, FRIBA, retains most of the original site drawings. The National Trust holds copies of a number of these and they were consulted to confirm the identification of the buildings.

The site report and copies of this report along with all professional ground and air photographs taken during this and previous investigations have been deposited with the archive of English Heritage at the National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon, SN2 2GZ, to where application to view this material or to further copies of this report should be made.

## 6 Chronology

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- 1787 Lighthouse built on the headland
- 1857 Construction of Needles Point Light begins
- 1859 22 May Needles Point Light is lit
- 1861 September construction of the battery begins
- 1863 Six 12 ton, 9-inch rifle muzzle loading guns installed
- 1893 Construction of the New Battery begins
- 1895 New Battery complete
- 1902 Metal fittings removed from guns on the Old Needles Battery
- 1903 March, guns of Old Needles battery dismounted and thrown over cliff
- 1905 Old Needles battery, carriages broken up for scrap
- 1913 Old pattern guns removed from New Battery
  - Breech loading 9.2-inch 'C' Mark IX gun erected in emplacement M1
- 1914 August outbreak of the First World War
  - Breech loading 9.2-inch 'C' Mark IX gun erected in emplacement M1
- 1917 Two Hotchkiss Mark 2 quick-firing 6-pounders installed and Maxim machine guns
- 1918 November, armistice, the batteries are put on 'Care and Maintenance'
- 1926 Guns put back into Practice and Training
- 1928 Middle Mark IX gun at the New Battery is removed and scrapped
- 1936 New Needles Battery, Battery Observation Post reconditioned
- 1938 Light anti-aircraft pits dug
- 1939 3 September, outbreak of Second World War
  - December, Battery Observation Post extended to include Section Commander's Post
  - 20 & 21 December, replacement Mark IX guns delivered

- 1940    January, replacement Mark IX guns in position
- 1941    24 February, CD/CHL radar equipment arrives
  - 29 July, radar equipment in use and manned by army
- 1942    20 February, RAF take over radar
  - 5 October, K set delivered to RAF
- 1945    May, end of the war in Europe, the batteries are put into Reserve
- 1954    The New Needles Battery guns are scrapped
- 1955    July main industrial contract for the *Black Knight* rocket awarded to Saunders Roe Limited
  - Saunders Roe leases the New Needles battery site
- 1956    April, work begins on the test stands
- 1957    January the test site opens
  - April, testing of the first *Black Knight* rocket
- 1958    7 September launch of the first *Black Knight* rocket at Woomera, Australia
- 1960    Saunders Roe Limited became part of Westland Aircraft
- 1965    25 November launch of the 20<sup>th</sup> and last *Black Knight* rocket
  - Testing of the *Black Arrow* rocket begins
- 1966    Saunders-Roe and Vickers Supermarine hovercraft interests form to create the British Hovercraft Corporation
- 1968    Launch of the first *Black Arrow* rocket at Woomera, Australia
- 1970    4 March, successful launch of Black Arrow R1 into sub-orbital flight
- 1971    The government ends the *Black Arrow* project
  - 28 October launch of the last *Black Arrow* rocket with the British *Prospero* satellite
- 1974    High Down Test Site closed
- 1975    The National Trust buys the headland

## **7 Acknowledgements**

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English Heritage acknowledges the assistance of the National Trust in granting access to the site and the local support and interest of its staff. The survey was carried out by Wayne Cocroft and David McOmish. Professional ground photography was taken by Mike Hesketh-Roberts in 1994 and Damian Grady took the recent low level oblique air photographs of the site. This slightly revised report (June 2009) has benefited from comments by the site's architect John Stubbe FRIBA.

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Tharratt, C E 1963 Black Knight support facilities *Journal of the British Interplanetary Society* **19** 178-84



## Appendix 1 The Gazetteer

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The gazetteer provides detailed descriptions of the main visible features of the New Battery and the High Down Test Site. The component sheets are arranged roughly the order which the structures are approached from the lower road above the White Cliffs. Most of the identifications have been made from the original 1950s site drawings by John Strubbe and Partners, which are held by the National Trust. A Trinity House plan of the site, also held by the National Trust, allocates numbers to some of the buildings. Where these are legible they have been noted on the sheets.

# Guard Room

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AREA/LOCATION: Lower Road

STRUCTURE No.

DATE: ?Late 19th century

NGR: SZ 30225 84951

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ORIGINAL FUNCTION: Guard Room

LATEST FUNCTION: Ruin

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS: 6.64m x 2.9m height 3.2m

DOCUMENTARY REFERENCE: NA: PRO 192/281 Guard room plan 1 May 1944

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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## DESCRIPTION:

The remains of the Guard Room comprises three mass concrete walls, the fourth and northern side was of timber. In its floor is a slot 1.78m x 0.08m and 0.01m in depth. The building had a mono-pitch roof and there are brackets on the rear wall that supported the roof plate.

# Main Gate

---

AREA/LOCATION: Lower road above White Cliffs

STRUCTURE No.

DATE: 1956

NGR: SZ 30026 84930

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---

ORIGINAL FUNCTION: Gate

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Steel RSJs

DIMENSIONS:

DOCUMENTARY REFERENCE:

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Inner Gate House

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DESCRIPTION:

The entrance to the test site was originally marked by a set of gates, sawn-off I-girders(15.2 cm x 13 cm)on either side of the road indicate their position. On the northern side of the road is a 6cm diameter gate pivot and to the east of the gate is a concrete block 53 cm x 46 cm with an 8 cm square hole at its centre, which probably held a sign.

# Inner Gate House

---

AREA/LOCATION: Lower road

STRUCTURE No.

DATE: 1956

NGR: SZ30210 84950

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ORIGINAL FUNCTION: Inner Gate House

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: J Strubbe 99/70R: British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Remains of main entrance gates

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## DESCRIPTION:

The Lower Gate House controlled access to the rocket test site. It has been demolished and its concrete floor slab is partly covered by soil slippage from the south. To the rear of the Inner Gate House a set of concrete steps led to the Police Post, on the sides of the steps traced into the wet concrete are the initials 'CEL' and a broad government arrow 'Λ'.

# Spigot mortar

AREA/LOCATION: Lower road above White Cliffs

STRUCTURE No.

DATE: 1939-45

NGR: SZ 30211 84953



ORIGINAL FUNCTION: Spigot mortar

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NMR SZ 38 SW 18

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

## DESCRIPTION:

Remains of a wartime spigot mortar position. The mortar position was probably constructed in the early years of the Second World War as part of the Isle of Wight's anti-invasion defences. It covered the approach road to the headland and the Needles Fort, on the opposite side of the road are the remains of an earlier guard post. Spigot mortar positions were of a standard design and there is likely to be back-filled pit surrounding the central pillar. The pit might be concrete or earth lined.

# The Needles Battery

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AREA/LOCATION: The Needles Battery

STRUCTURE No.

DATE: 1861-1954

NGR: SZ 29561 84884

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ORIGINAL FUNCTION: Gun battery

LATEST FUNCTION: National Trust site

CONSTRUCTIONAL TYPE: Concrete, brick

DIMENSIONS:

DOCUMENTARY REFERENCE: National Archives: Public Record Office WO78/3949 Isle of Wight Defences New Needles Battery block plan of site, etc; WO78/4892 Portsmouth Defences, Isle of Wight, Needles New Battery, 17 plans 1902-1916; WO192/134 Fort Record Book Needles Fire Command Isle of Wight 1863-1943; WO192/281 Fort Record Book Needles Isle of Wight: New Needles Battery (1863-1954); Coad, J 2006 'The Needles batteries' in Gardiner, M and Tomalin, D (eds) *The Isle of Wight: report and proceedings of the 152<sup>nd</sup> summer meeting of the Royal Archaeological Institute in 2006* 51-5 supplement to *Archaeological Journal* **163**; Savage, J E M c.2000 *The Needles Battery* The National Trust

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

This site lay outside of the survey area.



# Police Post

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AREA/LOCATION: Access road

STRUCTURE No.

DATE: 1956

NGR: SZ 30006 84872

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ORIGINAL FUNCTION: Police Post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: NA: PRO WO192/281 Plan 1 May 1944; AVIA 48/57 Hospital Block; Strubbe 99/70R; Tinity House 45/234A (1); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

Police Post and Radio Frequency Laboratory. The building has been demolished, a mound to the east marks its extent.

# Store

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AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: TQ 30025 84842

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ORIGINAL FUNCTION: Store

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Trinity House 45/234A (3); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

The Store has been demolished and there is no discernible trace of the feature on the surface.

# Lamp Base

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AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: SZ 30001 84837

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ORIGINAL FUNCTION: Lamp base

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: diameter 1.82m (6 ft)

DOCUMENTARY REFERENCE:

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

Circular, lamp base, 11 courses of single bricks with the remains of a rolled steel lamp post in the centre.

# New Battery

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AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1893-1954

NGR: SZ 29902 84808

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ORIGINAL FUNCTION: Battery

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NMR SZ 28 SE 117, National Archives WO78/3949 Isle of Wight Defences New Needles Battery block plan of site, etc Drwg No.3; WO78/4892 Portsmouth Defences, Isle of Wight, Needles New Battery, 17 plans 1902-1916, Drwg No.5; WO192/134 Fort Record Book Needles Fire Command Isle of Wight 1863-1943; WO192/281 Fort Record Book Needles Isle of Wight: New Needles Battery (1863-1954); Coad, J 2006 'The Needles Batteries' in Gardiner, M and Tomalin, D (eds) *The Isle of Wight: report and proceedings of the 152<sup>nd</sup> summer meeting of the Royal Archaeological Institute in 2006* 51-5 supplement to *Archaeological Journal* **163**; Moore, D 1995 *New Needles Battery* Fortlog 31: Palmerston Forts Society; Savage, J E M c.2000 *The Needles battery* The National Trust

PHOTOGRAPHS: BB94/16337; BB94/16350

RELATIONSHIPS WITH OTHER FEATURES:

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## DESCRIPTION:

The New Needles Battery is located at the western end of West High Down, just beneath its crest. The New Battery comprised three open, mass-concrete emplacements with a Position Finder Post at its eastern end. During the 1950s the emplacements were partly subsumed within the Saunders Roe rocket test site preparation area and a number of modifications were made to them. In the early 1970s the 1950s structures were removed re-exposing the battery.

At the eastern end of the emplacement a concrete stair case provides access to the open Position Finding Post with a central concrete column on which was mounted an instrument. In front of this column the position is curved to allow for easy access around the instrument. To the west of the column is a concrete locker, which was probably used for chart storage. Below this position a flight of stairs gives access to an underground room that formerly housed a Telephone Exchange and was latterly used as a Store.

The three emplacements are semi-circular in shape with an outer curving concrete parapet. From the seaward side they presented a low profile with only their shielded guns appearing above the parapet. To the rear the gun pits were open with the guns set on a central mounting that elevated the barrels to the height of the parapet. Surrounding the gun was a raised metal platform for the gun

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crews. Set into the walls of the emplacements are lockers, formerly closed with steel doors, which were used to house ready-use ammunition. The eastern most emplacement (F1) has been stripped of most of its fittings, and was left as an open area when the battery was incorporated into the test site's Preparation Area. At this time its base was covered by tarmac thereby obscuring any surviving features of the gun mounting and supports for the surrounding deck.

In between this emplacement and the central position is an underground Magazine. From each of the emplacements concrete ramps lead down into the Magazine. On its northern side were a Shifting Room to the west and two Cartridge Stores to the east, which were used to hold ready assembled cordite charge bags. On the opposite side of the Magazine, to the southeast, of the access passage were three smaller rooms, one was used as a Shell Store, one as a small items store, the function of the small central room is unknown. The western emplacement had its own dedicated Magazine, although smaller it was organised in a similar manner. Due to later alterations its access ramp to the west is no longer visible, although a concrete staircase at its east end remains open.

Cut into the hillside to the rear of the emplacements were a number of ancillary structures, moving from east to west an Artillery Store, Guardhouse, Store, Canteen, Cookhouse and Shelter. These buildings all appear to have been demolished in the 1950s and their sites re-occupied by buildings for the rocket Preparation Area, the later buildings have also been cleared and chalk rubble dumped over the area to re-instate the slope's profile. On the level ground to the east of the emplacements was a Barrack Hut for 30 men, it too was cleared by the late 1950s and its site used as a vehicle park. Around the turn of the 20<sup>th</sup> century, on the crest of the hill to the south of the emplacements a Battery Command Post was built with clear views of the Solent's western approaches.

# Equipment Centre

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AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1895

NGR: SZ 29911 84813

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ORIGINAL FUNCTION: Magazine and Shell Room

LATEST FUNCTION: Equipment Centre

CONSTRUCTIONAL TYPE: Mass Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NA:PRO WO78/3949 Drwg.3; Strubbe 99/11R; Trinity House 45/234A (13); British Hovercraft Corporation 1971, 7-8

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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## DESCRIPTION:

In between the eastern and central emplacements was an underground Magazine. From each of the emplacements concrete ramps lead down into the Magazine. To rear was probably a Shifting Room to the west and two Cartridge Stores to the east, which were used to hold ready assembled cordite charge bags. On the opposite side, to the southeast, of the access passage were three smaller rooms, one was used as a Shell Store, one as a small items store, it is not know what the small central room was used for.

During the 1950s the underground Magazine was stripped and adapted for new uses and was known as the Equipment Centre. The former Shell Store and Store for Small Items were converted into the General Battery Room and the Flight Battery Room. The General Battery Room is now used by the National Trust as a Café. To the north the large Cartridge Room was transformed into the Control Room to the west and the Guidance Room to the east. At the east end the small Shifting Room was used as the Recording Room.



# Store

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AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29965 84842

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ORIGINAL FUNCTION: Gun Battery Telephone Room

LATEST FUNCTION: Empty

CONSTRUCTIONAL TYPE: Mass concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: Trinity House 45/234 (3): British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

The former Telephone Room below the Position Finding Cell was reused as a Store by the test site, the room has been stripped.

# Main Building

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AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1956

NGR: SZ 29904 84803

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ORIGINAL FUNCTION: Workshop

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Steel and aluminium sheet

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/7, Trinity House 54/234A (14): British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies and cuts New Battery emplacement

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DESCRIPTION:

The main building in part used the central gun emplacement for its foundations, it was steel-framed structure with brick clad external walls which rose up to conceal its roof, which comprised mono-pitches against the northeast and southwest end walls and in-between these five gabled roofs. The main line of the building's northern wall was carried over the gun-emplacement, which was covered by a semi-circular roof. In this building the main workshop measured 13.4m (44 ft) 9.7m x (32ft); it had a clear headroom of 4.2m (14ft) and was equipped with a travelling 1 ton hoist. The second gable-roof from the western end was carried over the approach road and joined onto the laboratory and office building. The covered area had headroom of 5.5m (18ft) head room west housing a 2 ton travelling hoist.

This building was demolished during the 1970s to re-expose the 19<sup>th</sup> century gun emplacement, although some of its walls are covered in traces of white paint from its internal walls. The position of the main building may be traced by rows of cut-off 'I' section girders that mark the position of its uprights, in places sections of brick cavity-wall foundations may also be followed. At the western end of the building was the workshop described above, this was entered from the south through metal concertina doors, whose metal running rail remains set into concrete. As might be expected the floor surface of workshop in the former emplacement shows no evidence features on its floor, although at the eastside a gulley in the floor may indicate the apposition of partition. To the east a flight of con-

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crete steps led to an upper room, whose concrete floor slab remains. Next to this a set of steps descends into the former magazine area parts of which were used as a battery room and the Equipment Centre, the latter was sealed and unavailable for investigation.

# Oxidant Laboratory

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AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29868 84774

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ORIGINAL FUNCTION: Oxidant Laboratory

LATEST FUNCTION: Coast Guard Lookout

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R HTP Cleasing Department; : British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 1895 emplacement

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DESCRIPTION:

The Oxidant Laboratory has been demolished and its site is occupied by a Coast Guard lookout tower.

# Maintenance Building

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AREA/LOCATION: Preparation area

STRUCTURE No.

DATE: 1956

NGR: SZ29976 84833

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ORIGINAL FUNCTION: Maintenance building

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: 15.15m (49ft 9 ins) x  
4.9m (16ft 1 ins)

DOCUMENTARY REFERENCE: Strubbe 99/11R; Trinity House 45/234A (4)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 19th century guard room

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## DESCRIPTION:

The remains of this rectangular building comprise brick footings 35cm wide and the remains of a concrete floor slab, to the southwest the floor slab is partly buried by spoil. At its eastern end is a concrete surface 4.9m (15ft 6 ins)x 4.58m 15ft 1 ins)and on the north side of this slab is the metal rail of a sliding door.

To the east of this building is concrete tunnel 0.81m wide and 1.39m high that leads into the hillside, at its entrance is a slot for wooden door frame. This dates from the 1890s and carried the battery's water pipes.

# Laboratories

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AREA/LOCATION: New Battery

STRUCTURE No.

DATE:

NGR: SZ29949 84819

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ORIGINAL FUNCTION: Laboratory

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/71; British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 19th century Store

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DESCRIPTION:

Laboratories and mechanical workshop



# Offices

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AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1956

NGR: SZ 29894 84774

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ORIGINAL FUNCTION: Offices

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/71; Trinity House 45/234A (10); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overleis 19th century shelter and cookhouse

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DESCRIPTION:

Offices, conference rooms, first aid and canteen

# Fire Station

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AREA/LOCATION: Preparation Area/Upper Are

STRUCTURE No.

DATE: 1956

NGR: SZ 29963 84792

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ORIGINAL FUNCTION: Fire Station

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: Trinity House 45/234A (24)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Adjacent to 60,000 gallon Reservoir

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DESCRIPTION:

The Fire Station has been demolished and its site covered by chalk rubble.

# 60 000 Gallon Reservoir

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AREA/LOCATION: Preparation area/upper area

STRUCTURE No.

DATE: 1956

NGR: SZ 29980 84803

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ORIGINAL FUNCTION: Reservoir

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: NA: PRO AVIA 48/57 Static water tank 30,000 Gal's (underground); Strubbe 99/70R; Trinity House 45/234A (25)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Fire Station

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DESCRIPTION:

The reservoir originally held 60 000 gallons (272,760 litres) of water, it has been demolished and its site covered by chalk rubble.

# Transformer & RF Laboratory

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AREA/LOCATION: High Down

STRUCTURE No.

DATE: 1901-2

NGR: SZ 29939 84775

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ORIGINAL FUNCTION: Battery Commander's Post; Transformer, Sub-Station and Radio Frequency Laboratory

LATEST FUNCTION: Electricity sub-station

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: see text

DOCUMENTARY REFERENCE: NA: PRO WO78/4892 Drg 5 Needles New battery c.1908; WO 192/281 BOP plan 1 May 1944; AVIA 48/57 Central Control Room and Offices; Strubbe 99/70R; Trinity House 45/234A (8); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

This structure has been enlarged on number of occasions and used for different purposes. It was originally constructed about 1900-02 as the Battery Commander's Post a role it retained until after the Second World War. During the 1950s the building was modified and used as a transformer, sub-station and radio frequency laboratory. It remains in use as an electricity sub station.

The building comprises two parallel blocks oriented roughly east to west with a central linking passage. It is brick built, but cement rendered that makes deciphering its phasing difficult. The south range {10.42m (34ft 2ins) x 2.80m (9ft 2ins)} comprises two lower bays with a higher central section. In its south wall is a blocked opening 62m wide, possibly a former door, and to its east a window opening 85cm x 62cm. The rear range measures {7.7m (25ft 3ins) x 3.61m (11ft 10ins)} with a low roof to the west and a higher and perhaps later roof to the east, in the rear north wall is a blocked window. From the east a passage leads to present entrance to the building, on its north wall is a blocked window. Immediately to the east of the building are two sawn-off rolled steel channels (30cm x 10cm, height 116cm).

# Coast Guard Cottages

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AREA/LOCATION:

STRUCTURE No.

DATE: Late 19th century

NGR: SZ 30054 84815

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ORIGINAL FUNCTION: Coast guard cottages

LATEST FUNCTION: Holiday flats

CONSTRUCTIONAL TYPE: brick, slate roof

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: NA: PRO 78/4892 OS Hamp Sheet XCIII.3 1908; NA: PRO WO192/281 1 May 1944 plan Sgt, officers, NAAFI staff; Trinity House 45/234A Cottages 27-32,

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

Late 19th century coast guard cottages, now let by the National Trust as holiday cottages.



# Gantry No.1

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AREA/LOCATION:Firing Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29875 84734

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ORIGINAL FUNCTION: Test gantry

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE:Strubbe 99/26, 99/27R; Trinity House 45/234A (18)

PHOTOGRAPHS:BB94/16339; BB94/16341; BB94/16345

RELATIONSHIPS WITH OTHER FEATURES: Test Post

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## DESCRIPTION:

The superstructure of the gantry was formed of steel brace-work and stood about 24.3m (80ft) high with a ground plan of 6m (20ft) x 4.9m (16ft), the whole was enclosed on three sides by ribbed aluminium Noral sheeting. In contrast to the gantries at Woomera these ones were fixed. The superstructures of each Gantry were 62ft 7ins (19m) tall and internally there were six working decks.

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At the apex of the structure was a running beam and 'Felco' hoist which was used to raise the rocket off its transporter and position it over the firing pit. To service the rockets the gantry was supplied with compressed air, nitrogen, water and single and 3 phase electric power. During firing the hot efflux gases from the rocket were turned through 90 degrees by a metal bucket that was constantly dowsed with water. The hot gases, or efflux, were directed down the concrete-lined efflux channel flame at the bottom of which was a sump to collect any unburnt fuel. Effluent from these sumps then appears to have been carried down earthenware pipes to a breeze-block channel 25.4m (83ft 4 ins) in length situated close to the cliff top. Most of the pipes have been removed, but their lines may be traced by gullies leading down from the stands.

Adjacent to each of the Gantries, and beneath the platform, was an open bay that was used to house the High Test Peroxide Dispensing Tanks, these bays have subsequently been blocked in brick; each tank could hold 1000 gallons (4546 litres). The Gantries were removed and scrapped in the early 1970s and all that remains are the metal plates by which they were attached to the concrete footings.



# Gantry No.2

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AREA/LOCATION: Firing Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29972 84665

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ORIGINAL FUNCTION: Test gantry

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/26; Trinity House 45/234A (21)

PHOTOGRAPHS: BB94/16346; BB94/16347; BB94/16348; BB94/16349

RELATIONSHIPS WITH OTHER FEATURES: Test Post

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## DESCRIPTION:

The superstructure of the gantry was formed of steel brace-work and stood about 24.3m (80ft) high with a ground plan of 6m (20ft) x 4.9m (16ft), the whole was enclosed on three sides by ribbed aluminium Noral sheeting. In contrast to the gantries at Woomera these ones were fixed. The superstructures of each Gantry were 62ft 7ins (19m) tall and internally there were six working decks. At the apex of the structure was a running beam and 'Felco' hoist which was used to raise the rocket off its transporter and position it over the firing pit. To service the rockets the gantry was supplied with compressed air, nitrogen, water and single and 3 phase electric power. During firing the hot efflux gases from the rocket were turned through 90 degrees by a metal bucket that was constantly dowsed with water. The hot gases, or efflux, were directed down the concrete-lined efflux channel flame at the bottom of which was a sump to collect any unburnt fuel. Effluent from these sumps then appears to have been carried down earthenware pipes to a breeze-block channel 25.4m (83ft 4 ins) in length situated close to the cliff top. Most of the pipes have been removed, but their lines may be traced by gullies leading down from the stands.

Adjacent to each of the Gantries, and beneath the platform, was an open bay that was used to house the High Test Peroxide Dispensing Tanks, these bays have subsequently been blocked in brick; each tank could hold 1000 gallons (4546 litres). The Gantries were removed and scrapped in the early 1970s and all that remains are the metal plates by which they were attached to the concrete footings.

# Gantry No.1 Test Post

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AREA/LOCATION: Firing Area Gantry No.1

STRUCTURE No.

DATE: 1956

NGR: SZ 29880 84739

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ORIGINAL FUNCTION: Test post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: -

DOCUMENTARY REFERENCE: Strubbe 99/26; Trinity House 45/234A (17)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Adjacent to Gantry No.1

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DESCRIPTION:

The Test Post has been demolished and its site is covered by chalk rubble amongst which is a pipe with a control valve and brick rubble. To its east was a safety bath for the worker sloading the high test peroxide. To the rear are concrete steps that gave access to Gantry No.1 and back towards the Preparation Area.

# Gantry No.2 Test Post

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AREA/LOCATION: Firing Area Gantry No.2

STRUCTURE No.

DATE: 1956

NGR: SZ 29977 84674

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ORIGINAL FUNCTION: Test post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: -

DOCUMENTARY REFERENCE: Trinity House 45/234A (20)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Gantry No.2

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## DESCRIPTION:

The Test Post has been demolished, to its rear is the remains of a breeze block wall and a concrete surface, its site is strewn with rubble in which are pieces of concrete and co-axial cable. Four concrete steps to the south gave access to Gantry No.2.

# Pump Room & Control Room

AREA/LOCATION: Firing Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29932 84711



ORIGINAL FUNCTION: Pump Room & Control Room

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 24/52; Trinity House 45/234A(19)

PHOTOGRAPHS: NMR94/16338; BB94/16340; BB94/16343; BB94/16344

RELATIONSHIPS WITH OTHER FEATURES:

## DESCRIPTION:

The Pump Room and Control Room are accessed from the platform by a flight of stairs to their west. A door, immediately opposite to the foot of the stairs, gives access to the Pump Room, another opening on its south side was probably for ventilation. This building is entirely beneath the access platform, although its presence is marked by a number of Elkington Gatic (Gas and Air Tight Inspection Covers) covers on the surface of the platform. Within in the room are a number concrete machinery mounting plinths that variously held at the centre a large pump driven by an adjacent electric motor and various pipe valves. In operation water was supplied from the site's 60,000 gallon (272760 litres) Reservoir along a 12 inch (0.3m) main to the Pump House. From here cooling water was piped to the Firing Sites along a 12 inch (30cm) main and fire fighting water along 3-inch (7.6cm) pipes. In an emergency the pumps could deliver 3,000 gallons (13,638 litres) of water per minute.

To the south of the Pump House is a narrow passage way between it and the freestanding trapezium-shaped Control Room. This passage way gives access to the Control Room through an outward opening armoured door in its rear wall. To either side of the Control Room concrete wing walls retain the hillslope and give access to its front. It is built on a concrete 'floating base' and is separate from the main causeway and in the event of an accidental explosion it was designed to withstand pressures of up to 10lb/in<sup>2</sup>. Internally are various plinths and mounting bolts for the safety officer's console that was positioned in the centre of the room and in the northeast corner controls to engage the fire fighting system. In its eastern and western walls are armoured observation windows facing the two Firing Sites and single windows in its front and rear walls. At platform level the passage way is covered by wooden boarding to give access onto the Control Room's roof.



# Facilities storage

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AREA/LOCATION: Firing Area

STRUCTURE No.

DATE: 1960s

NGR: SZ 29944 84708

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ORIGINAL FUNCTION: Facilities Storage

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete base

DIMENSIONS: 7.65m (25ft)x 3.9m (12ft)

DOCUMENTARY REFERENCE: Trinity House Strubbe 45/234 not shown; British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

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DESCRIPTION:

The main concrete slab sits on a brick foundation, in its centre is a ceramic drain 18cm square, along its longitudinal sides are five pairs of sawn off bolt fixings and one at each end. These were for square fixing plates approximately 21cm x 21cm, which were probably used to support fencing.

To its south is another slab 5.25m (17ft 3ins) x 1.9m (6ft 3ins) supported on a breeze block wall, at the corners of this slab are four sawn off steels channels 17.5cm x 8cm and in its north side a slot 39cm x 30cm.

This area was described as Facilities Storage for demineralised water, kerosene, high pressure air and nitrogen.

The slab does not appear on the late 1950s design drawings and was probably added during the 1960s.



## ENGLISH HERITAGE RESEARCH DEPARTMENT

English Heritage undertakes and commissions research into the historic environment, and the issues that affect its condition and survival, in order to provide the understanding necessary for informed policy and decision making, for sustainable management, and to promote the widest access, appreciation and enjoyment of our heritage.

The Research Department provides English Heritage with this capacity in the fields of buildings history, archaeology, and landscape history. It brings together seven teams with complementary investigative and analytical skills to provide integrated research expertise across the range of the historic environment. These are:

- \* Aerial Survey and Investigation
- \* Archaeological Projects (excavation)
- \* Archaeological Science
- \* Archaeological Survey and Investigation (landscape analysis)
- \* Architectural Investigation
- \* Imaging, Graphics and Survey (including measured and metric survey, and photography)
- \* Survey of London

The Research Department undertakes a wide range of investigative and analytical projects, and provides quality assurance and management support for externally-commissioned research. We aim for innovative work of the highest quality which will set agendas and standards for the historic environment sector. In support of this, and to build capacity and promote best practice in the sector, we also publish guidance and provide advice and training. We support outreach and education activities and build these in to our projects and programmes wherever possible.

We make the results of our work available through the Research Department Report Series, and through journal publications and monographs. Our publication Research News, which appears three times a year, aims to keep our partners within and outside English Heritage up-to-date with our projects and activities. A full list of Research Department Reports, with abstracts and information on how to obtain copies, may be found on [www.english-heritage.org.uk/researchreports](http://www.english-heritage.org.uk/researchreports)

For further information visit [www.english-heritage.org.uk](http://www.english-heritage.org.uk)



## The Needles New Battery

FOR YOUR EYES ONLY

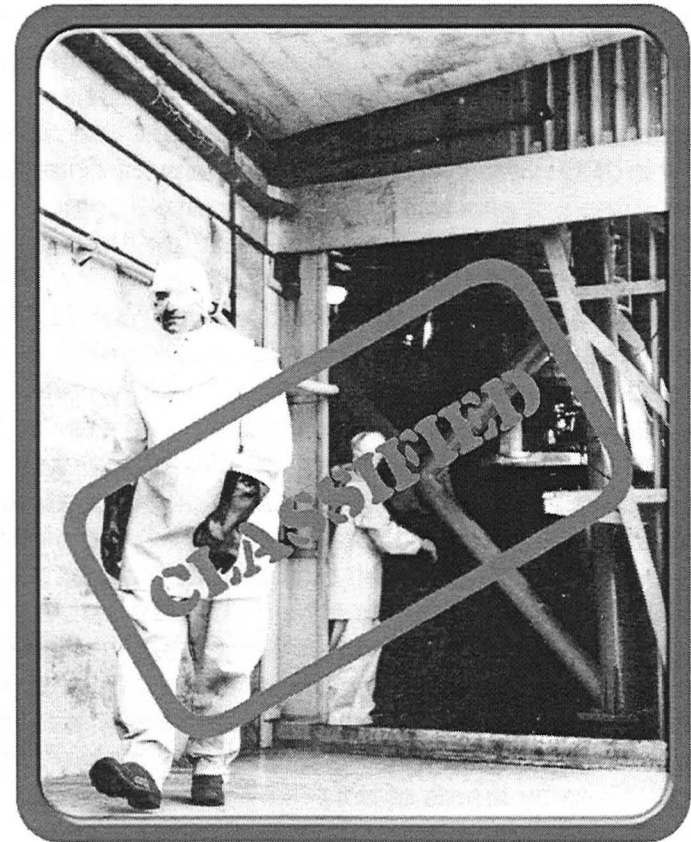


Image Courtesy of the Saunders Roe Archive



At the beginning of the war up to 80 territorial soldiers were based here but in 1940 after Dunkirk, this was reduced to 15 men due to severe shortage of manpower. By 1941 this had increased to 63 men and 2 officers but once the threat of invasion decreased in 1943 the site's garrison was reduced again to 49.

On 29<sup>th</sup> July 1941 new radar technology which increased night time accuracy was introduced at the New Battery. This was a Civil Defence/Chain Home Link (CD/CHL) radar set, manned by the RAF. Additional Huts were installed to provide extra accommodation for the RAF and the additional Gunners.

The invasion fleet for D Day could be seen from the Battery leaving the south coast shores.

In 1945 the Battery was 'mothballed' and in 1952 was listed for disposal. The guns were scrapped in 1954. However, this was not the end of the Needles New Battery's military involvement.

### **INTO THE SPACE AGE**

A new type of warfare began after the Second World War in the form of long-range missiles. These missiles were designed to travel long distances (five thousand + miles) and were based on the V2 rockets used by the Germans during the latter stages of WW2. After the war the Allies acquired and developed this technology to produce the medium range Intercontinental Ballistic Missile, Blue Streak, based in Cumbria at Spadeadam.

In 1955 Saunders Roe of East Cowes were invited by the Royal Aircraft Establishment (RAE) to produce designs for a guided weapons test vehicle. This new vehicle was named Black Knight and it would be assembled on the Isle of Wight before being sent to Australia for launching.

The rockets would first have to undergo static testing whereby they would go through every procedure except the actual launch and the New Battery was chosen as the test site for a number of reasons: it already had underground rooms, basic accommodation and the scope to be developed. The site was in a natural 'bowl' shielding the site from prying eyes and directing any noise and vapour out to sea.

John Strubbe drew up the plans for the site, which was then called High Down and work was completed in time for the first static firing of Black Knight on 16<sup>th</sup> April 1957. After further tests the first Black Knight was sent to Australia, arriving in August.

A British team accompanied the rockets to Woomera, 250 miles from Adelaide in Southern Australia. Woomera was the ideal test site as the range had already been constructed and was being used by a number of other countries. The test sites at High Down and Woomera were duplicates, both being built by Saunders Roe.

The first Black Knight was successfully launched at Woomera on 7<sup>th</sup> September 1958. Black Knight was designed to test the effect of re-entry to the earth's atmosphere on a missile and to develop the design and development of large liquid fuelled rockets. These tests provided valuable information for many western countries and Black Knight became a forerunner in the space race.

Black Knight was initially a single stage rocket propelled by four Armstrong Siddeley Gamma 201 rocket engines powered by High Test Peroxide (HTP) and kerosene.

There was intense interest in the test results from Black Knight and soon the team from High Down were collaborating with scientists from the USA and Australia. The UK provided the test vehicle, (Black Knight), the USA provided new technological equipment and

## **BUILDING THE NEW BATTERY**

The Needles Old Battery further down the headland was built in the 1860s to protect the Solent and the naval dockyard of Portsmouth from the threat of a French invasion. By the end of the 19<sup>th</sup> century it was becoming clear that the Battery had a number of problems: vibrations from guns being fired were damaging the soft chalk foundations and both the site and the guns were outdated. The parade ground and gun emplacements were not large enough to accommodate the newer mark IX guns so it was decided to construct a new Battery. The site selected was 119m (390 feet) higher up the headland on High Down

Between 1893 and 1895 three gun emplacements were constructed. Behind them were administration buildings but no barracks block was built on the New Needles site. The underground magazines (the site of today's exhibition) were constructed in 1900 when the emplacements were enlarged.

Two 9.2 inch guns were emplaced in 1900 and a third was added in 1904. The Battery Command Post (BCP) was built on the downs above the Battery and a cookhouse and shelter to hold 23 men were constructed below ground, behind the southern emplacement.

The military road linking the Batteries with Alum Bay was constructed in 1899. Before then access to the site was across the downs from the Old Alum Bay Hotel.

## **THE FIRST WORLD WAR**

Alterations were made to the Needles New Battery before the First World War. The two outer guns had new mark IX barrels installed and 6lb quick fire guns were installed to deter warships from entering the Solent. These guns were landed at Colwell Bay and dragged to the site by teams of horses.

Wartime accommodation was provided for the soldiers in old railway carriages and Nissen huts and the Battery Command Post was fitted with a protective armoured roof. Three blockhouses were built on the headland and barbed wire was rolled out between them to provide landward protection for the site. However the site saw no major action during the war.

## **BETWEEN THE WARS**

In 1919 the site was put into care and maintenance until 1926 when it was used for gunnery competitions for territorial summer camps held on the island.

## **WORLD WAR II**

During the evening of Thursday 23<sup>rd</sup> August 1939 the first soldiers arrived. They were part of 530 Coast Regiment, RA, TA. Princess Beatrice's Isle of Wight Rifles 189 Battery and were based at either Freshwater or Cowes Drill Hall. Their first task was to prevent German Blockships and escort ships blocking the entrance to the Solent.

Life at Needles New Battery at the beginning of Second World War was difficult. The site was exposed to aerial attack and incidents of strafing by enemy planes were reported which led to steel air protection covers being installed above the gun emplacements.

Accommodation was basic: two huts contained wooden trestles with planks across for beds and four blankets were provided for mattresses and warmth. It is said that these blankets were so precious that one man lost his life chasing a blanket which had been blown away; he lost his footing and fell off the cliff.

Washing wasn't much better. There were no sinks; just a trough with brass taps providing cold water. Showers were provided but the water was only ever warm at best.

the Australians provided the test range and ground crews.

At High Down work began on developing Black Knight into a two-stage rocket with a greater re-entry speed. The first of these two-stage Black Knights was launched from Woomera on 24<sup>th</sup> May 1960. Altogether 22 Black Knights were successfully launched.

The Royal Aircraft Establishment then began investigating the possibility of producing a low cost satellite launch vehicle based on Black Knight and in April 1966 the government placed the order with Saunders Roe and Black Arrow was born!

Black Arrow was a three-stage rocket designed to put a satellite into orbit. The first stage was powered by 8 Rolls Royce Gamma 2 combustion chambers, using the same fuel as Black Knight (High Test Peroxide and Kerosene). The second stage was powered by 2 Rolls Royce Gamma combustion chambers and the stages were designed to split using exploding bolts, which could be detonated remotely. Stage 3 was propelled by a solid fuelled Waxwing rocket motor developed by the Rocket Propulsion Establishment at Westcott.

The first of the development launches took place in July 1969. R0 was destroyed by ground control due to a malfunction after reaching stage two and R1 had a problem with fuel pressure in stage two and was also remotely destroyed. Neither R0 nor R1 held a satellite as the launches were designed to test the rockets' capabilities but on 2<sup>nd</sup> September 1970 a third Black Arrow, R2, was launched complete with satellite. All three stages were successfully completed but there was a problem with the payload equipment (the part that would launch the satellite) and so this too was destroyed.

However success was close at hand with R3, the fourth and final

Black Arrow to be launched! A satellite named Prospero was tucked into the nose cone of R3. Developed by Marconi, the satellite's mission was to be launched successfully and to send data back to earth.

R3 was launched from Woomera on 28<sup>th</sup> October 1971 and was a total success with Prospero being launched into a near perfect polar orbit. However the team's elation soon turned to sadness as within days of the launch the British Government cancelled the space programme.

The last Black Arrow R4 was never launched and was donated to the Science Museum in London. At High Down the buildings above ground were demolished but the bunkers and test site remained.

In 1975 the National Trust purchased the headland including the High Down site with money from the Enterprise Neptune campaign. In 2003 a team of staff and volunteers began the task of renovating the rooms to develop the Needles New Battery for an exhibition relating the history of the site and the achievements of the men and women who worked at High Down. This has been made possible thanks to a number of donations and grants.

The exhibition you see today is hopefully just the first stage in an ongoing project and if you have any information or memories to share with us about the space programme here, please contact us: tel (01983) 741020 or email: [isleofwight@nationaltrust.org.uk](mailto:isleofwight@nationaltrust.org.uk)

**To date, Prospero is the only British satellite ever to be launched by a British rocket. It is still orbiting the earth and passes overhead twice a day.**

*We hope you enjoy your visit.*



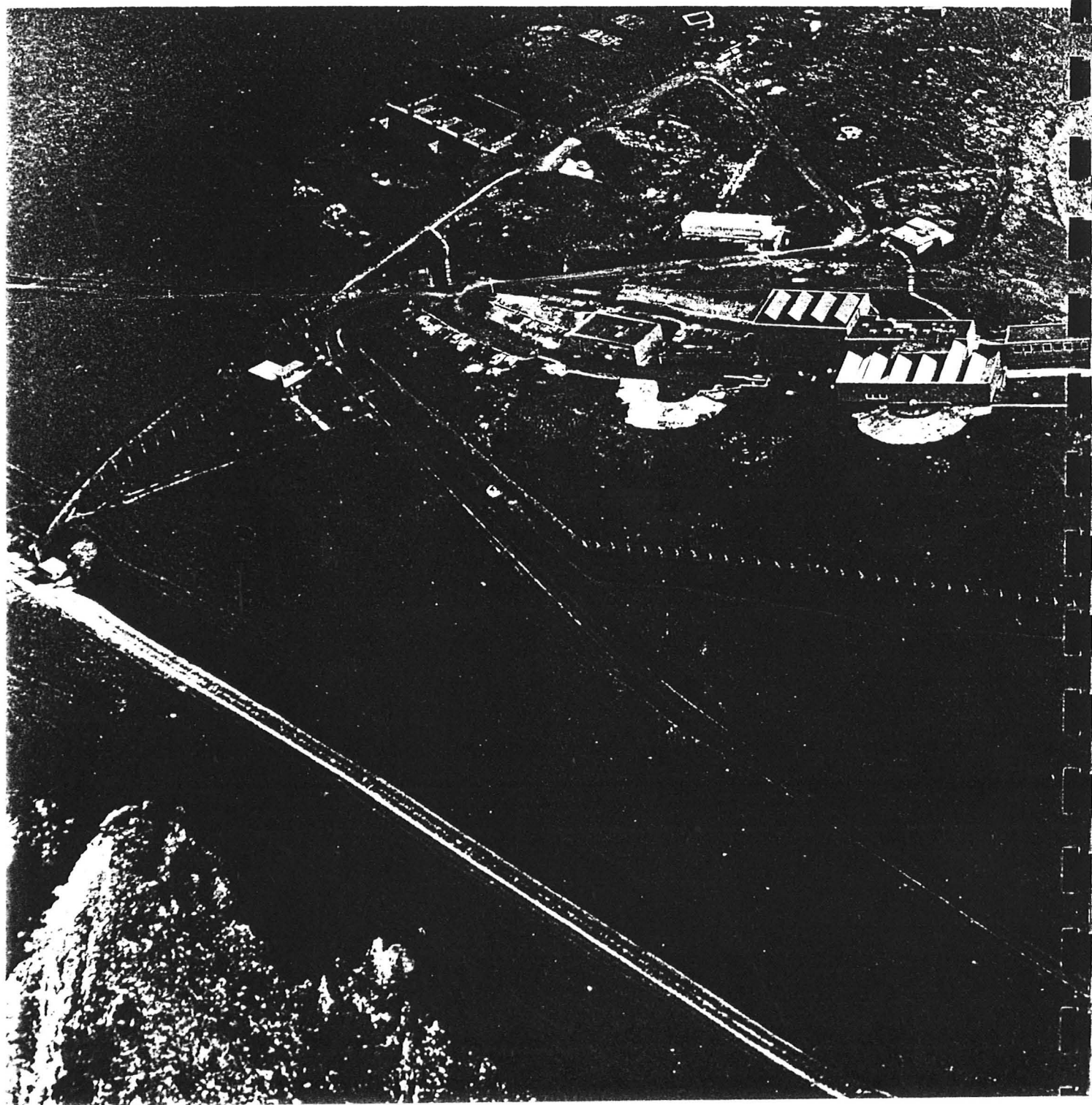
**The High Down**  
**Industrial Test Facilities**

Rocket Test Beds  
The Needles Isle of Wight

# **The High Down Industrial Test Facilities**



**british hovercraft corporation**





# INTRODUCTION

For fifteen years the High Down Facilities established by the British Hovercraft Corporation have played a vital part in the development of the successful Black Knight and Black Arrow research rockets and the equipment and skill which contributed to this success are now made available to industry for the testing and development of a wide range of products.

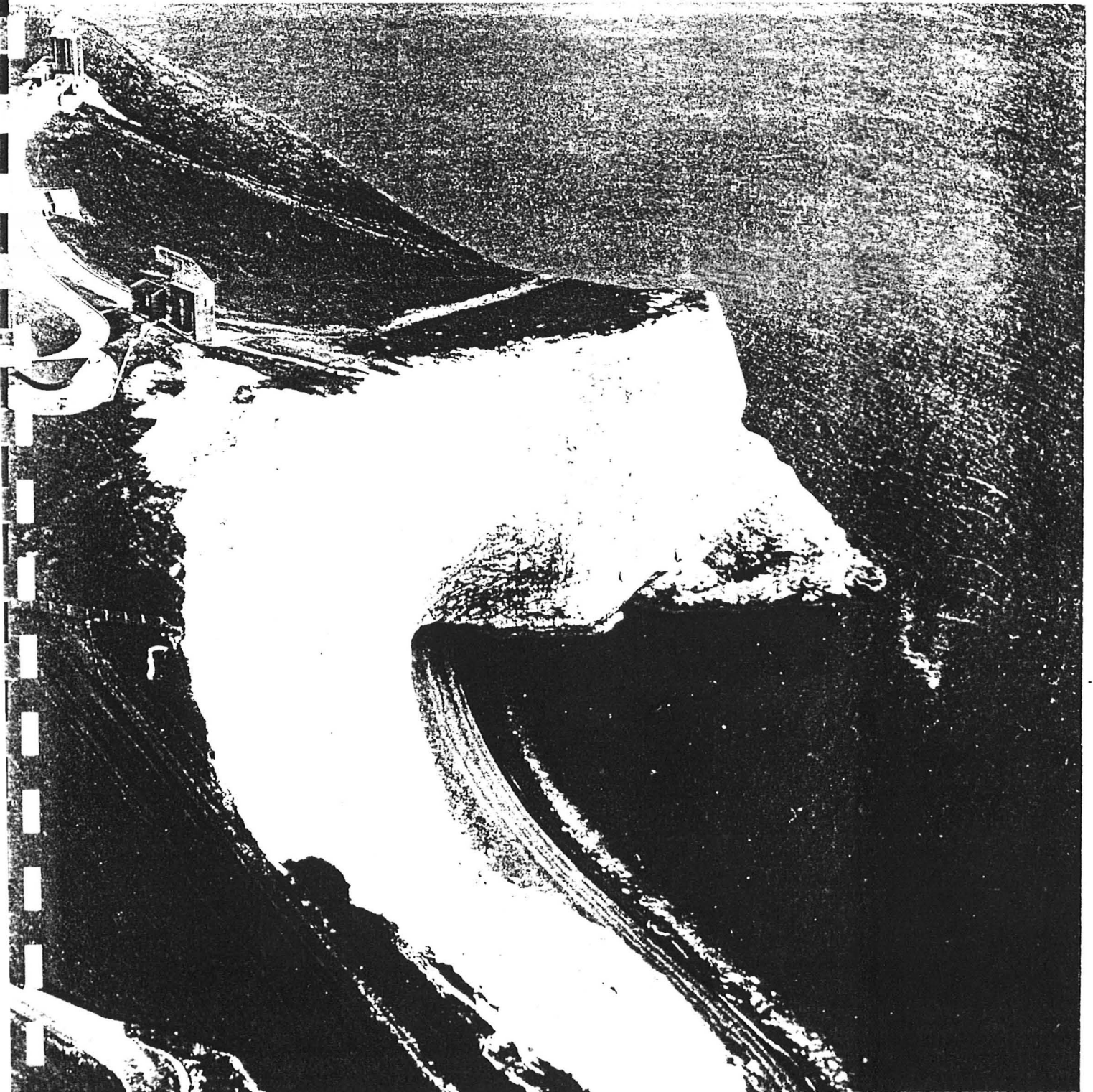
Situated at the western tip of the Isle of Wight the site is sufficiently remote to avoid being a public nuisance, and enables experiments connected with jet engine and rocket engine effluxes, explosives and propellents to be performed without inconvenience to a local population. In addition the uninterrupted view conferred by its height above the sea extends over three-quarters of the

horizon, and affords ideal 'uncluttered' conditions for the development of radio aeralis.

Details of the facilities available are given in the following pages, together with a number of typical tests to which they are suited. These tests, however, represent only a few of those possible, and the British Hovercraft Corporation will be pleased to offer advice on specific requirements.

Potential customers wishing further information are invited to address their queries to:-

The Chief Designer,  
British Hovercraft Corporation Limited,  
Osborne, East Cowes, Isle of Wight, England  
Telephone Cowes 4121 Telex 86190





# FEATURES

From 1956 to 1971, the High Down Facilities were used for the development and tethered firing of the Black Knight and Black Arrow rockets. The site, leased from the Ministry of Defence, and developed from the buildings and surrounding area of the Needles Fort, incorporates many unique features suited to a variety of other testing tasks.

## Test area

The principal test area occupies the south west face of the peninsula on which stand two rocket test gantries, with a blockhouse between them for close observation of firings. The area forms a natural amphitheatre facing out to sea, rising from 200 to 410 feet in approximately 400 ft.

The great mass of chalk that makes up this edge of the down acts both as a noise and safety screen, and provides extremely stable foundations for structures. The gantries and the roadway serving them are built on

the 370 foot contour, leaving an area further down the hill which can be used for work requiring greater protection.

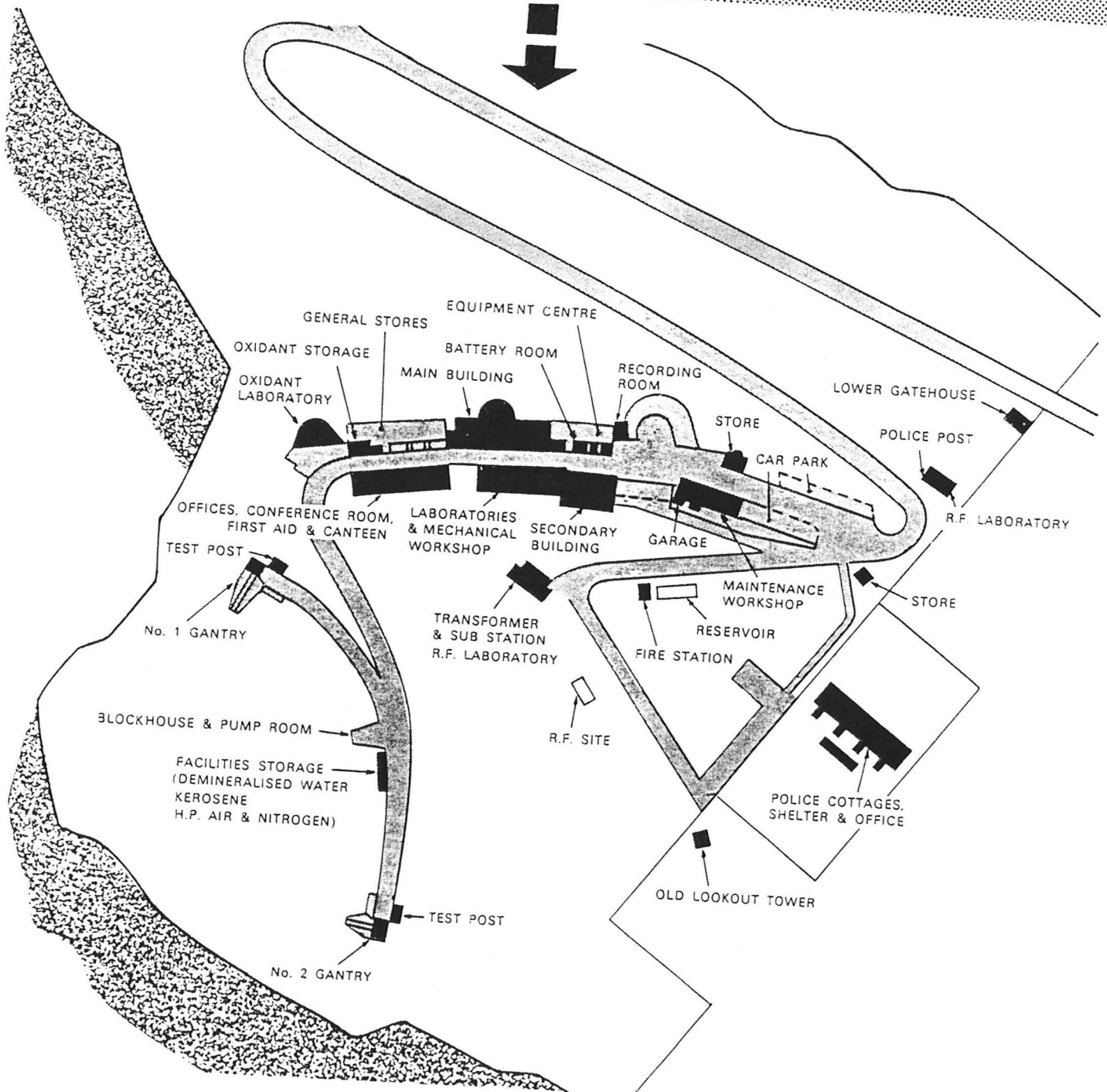
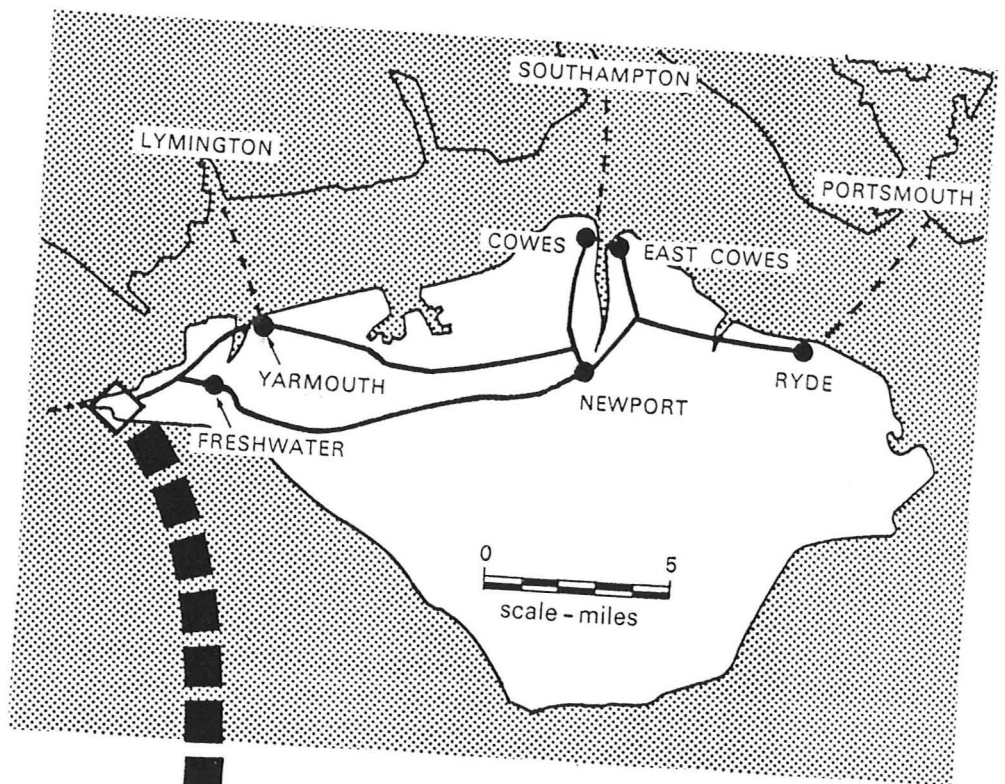
Very nearly 100 firings have been carried out without any complaints from the local inhabitants.

## Staff

An important feature of the facilities is the availability of a staff skilled in a wide range of test work. Its members are experienced in the handling of high pressure gas and hydraulic systems, and also in dealing with potentially dangerous oxidants and fuels. The establishment enjoys an excellent safety record resulting from the strict discipline enforced in such matters.

A fund of practical expertise is available in the electrical, electronic and radio frequency fields, particularly in the development of measurement and testing techniques, and running 'one off' tests to suit particular requirements.

Standing at the tip of the Needles peninsula on the western end of the Isle of Wight, the 35 acre site is isolated from urban areas, the nearest inhabited buildings being three-quarters of a mile away, and the nearest village, three miles. Access roads are suitable for the carriage of large and long objects, including standard ship containers measuring 40 ft. x 8 ft. x 8 ft. on articulated lorries. The site is six miles from Yarmouth from which vehicle ferries operate to Lyminster on the mainland, and sixteen miles from Newport, the centre of the Island road system. Frequent vehicle ferries also ply to the Island from Portsmouth and Southampton. There is a landing area for helicopters on the down immediately to the east of the site.



# TYPICAL TESTS

The test and development work that can be performed at the High Down site is so varied that the following selection must be regarded only as an indication of its wide variety. B.H.C. will be pleased to advise on specific problems.

## Engine noise testing

Large turbo jet engines can be mounted on the blockhouse between the two gantries, and noise measuring instruments positioned on the adjacent hillside either level with, or above the jet stream. The control and instrumentation equipment would be housed in the blockhouse.

## Use of rocket efflux

The efflux from the liquid propellant engines of the Black Arrow types provides a particle-free, high temperature, high velocity stream which can be used for the testing of structures and surfaces which would be exposed to similar conditions in flight. By mounting a combustion chamber at a suitable height above the cooling duct in either of the two gantries, an efflux of considerable length can be created whose temperatures can be varied, by controlling the proportions of oxidant (H.T.P.) and kerosene, from 600 to 2,500°C, and velocities of the order of 6,000 ft./sec. can be obtained. All equipment necessary for such work is immediately available and only the propellant pump arrangements would require modifying to suit particular test requirements.

## Testing of explosive and solid propellant items

As the safety considerations on the site have been based on the possibility of an explosion equivalent to the detonation of 12,000 lb. of TNT in either of the test gantries, the testing of explosive and solid propellant items of considerable size can be carried out in safety. In addition, a number of partially buried small substantial buildings is available for the testing of small explosive or propellant items of from 10 to 20 lb.

## R.F. testing

Establishment of polar diagrams of aerals for aircraft, missiles, and other vehicles can be undertaken on the highest parts of the site. By erecting full-size or scale models of the vehicle and aerals, and by suitable siting of ground signalling equipment, an 'uncluttered' background can be obtained which is essential for this work. Much experience has been obtained in the 'C' band field.

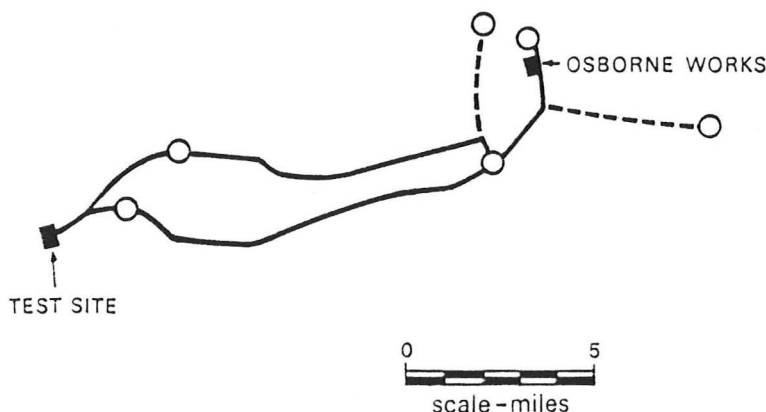
Because of the largely uninterrupted field of view over an arc of 270 deg. from the top of the site, excellent conditions exist for line-of-sight transmissions to considerable distances; the sea horizon extends over an arc of 120°. Use is already made of these facilities by the Signals Research Development Establishment who transmit directly across to Christchurch on the mainland, some 8 miles distant, and by Trinity House to supplement their Ryde transmitting station at the other end of the Island.

## Underwater tests

To the south of the site, a depth of 10 fathoms occurs at a distance of 1/5th. of a mile, and is the commencement of a submarine exercise area. The cliff height of 425 ft. facilitates the launching of test vehicles with sufficient velocity to ensure their entering deep water, the measurements being transmitted back by radio or wires. The availability of British Hovercraft Corporation's model test tanks and ditching test facilities at Osborne nearby, can provide considerable support to this type of work.

## Aerodynamic scale model tests

Models can be launched and photographed from the cliffs overlooking Scratchells Bay. This form of testing is a valuable adjunct to wind tunnel experiments and is economic of time and money. Considerable additional information can be obtained by the use of simple on-board radio telemetry systems, the signals being received and recorded on site.



# BUILDINGS AND EQUIPMENT

## Main building

### Workshop

44 ft. × 32 ft., headroom 14 ft., equipped with 1 ton travelling hoist, three-phase power outlets and mercury vapour lighting. Roof lights give easterly lighting in daylight. The workshop is separated from a secondary building by a covered way of 18 ft. headroom and housing a 2 ton travelling hoist.

### Equipment centre and recording room

This consists of a central recording facility of 92 galvanometer channels and 50 event channels, with provision for tape recording signals of up to 300 kHz on seven tracks. Additionally, up to 48 voltage channels can be handled. Information is transmitted to the recording room by land line from either gantry site selected by means of an AMP computer type patchboard. Timing is effected by crystal controlled pulses which may be superimposed on all recorders and cameras. Calibration, servicing, testing, and processing of film and records can all be performed on site; two automatic processing machines are available for oscillograph papers and one for 35 mm. or 16 mm. film.

Aerials are installed for transmitting and receiving 465 telemetry, a receiver/display being housed in the Equipment Centre.

### Stores accommodation

A former underground magazine, area 1100 sq. ft., temperature largely constant.

### Administrative offices

Five, one containing the telephone switchboard. Total area 960 sq. ft.

## Secondary buildings

### Workshop

44 ft. × 38 ft., headroom 17 ft., equipped with fixed  $\frac{1}{2}$ -ton hoists, three-phase power outlets and mercury vapour lighting. Roof lights give easterly lighting in daylight.

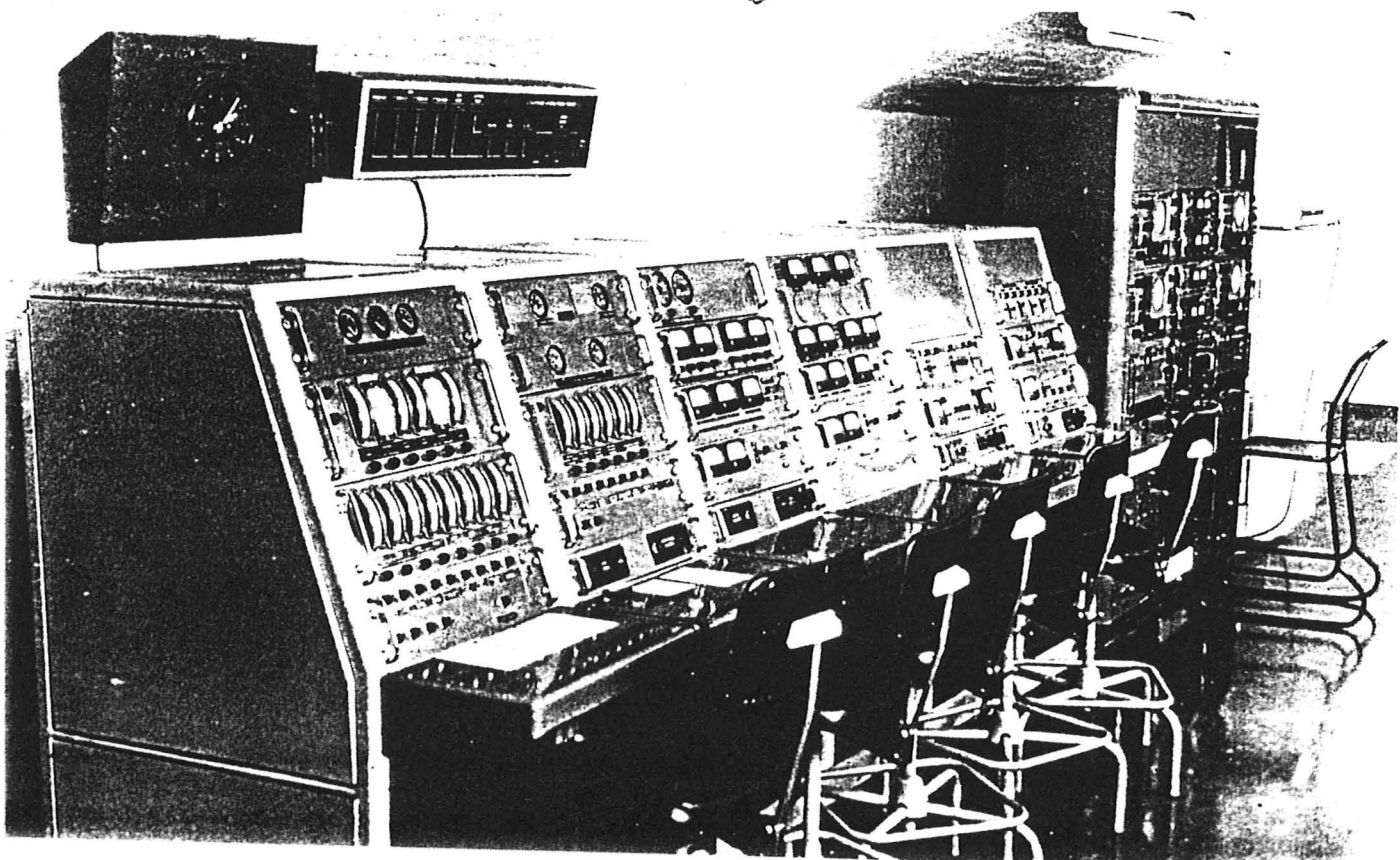
### Laboratories and offices

Total area 3300 sq. ft. on two floors. One laboratory is supplied with filtered air and embodies a vibration-free mounting for gyroscopes under test, and facilities for measurement of azimuth bearings to within one minute of arc.

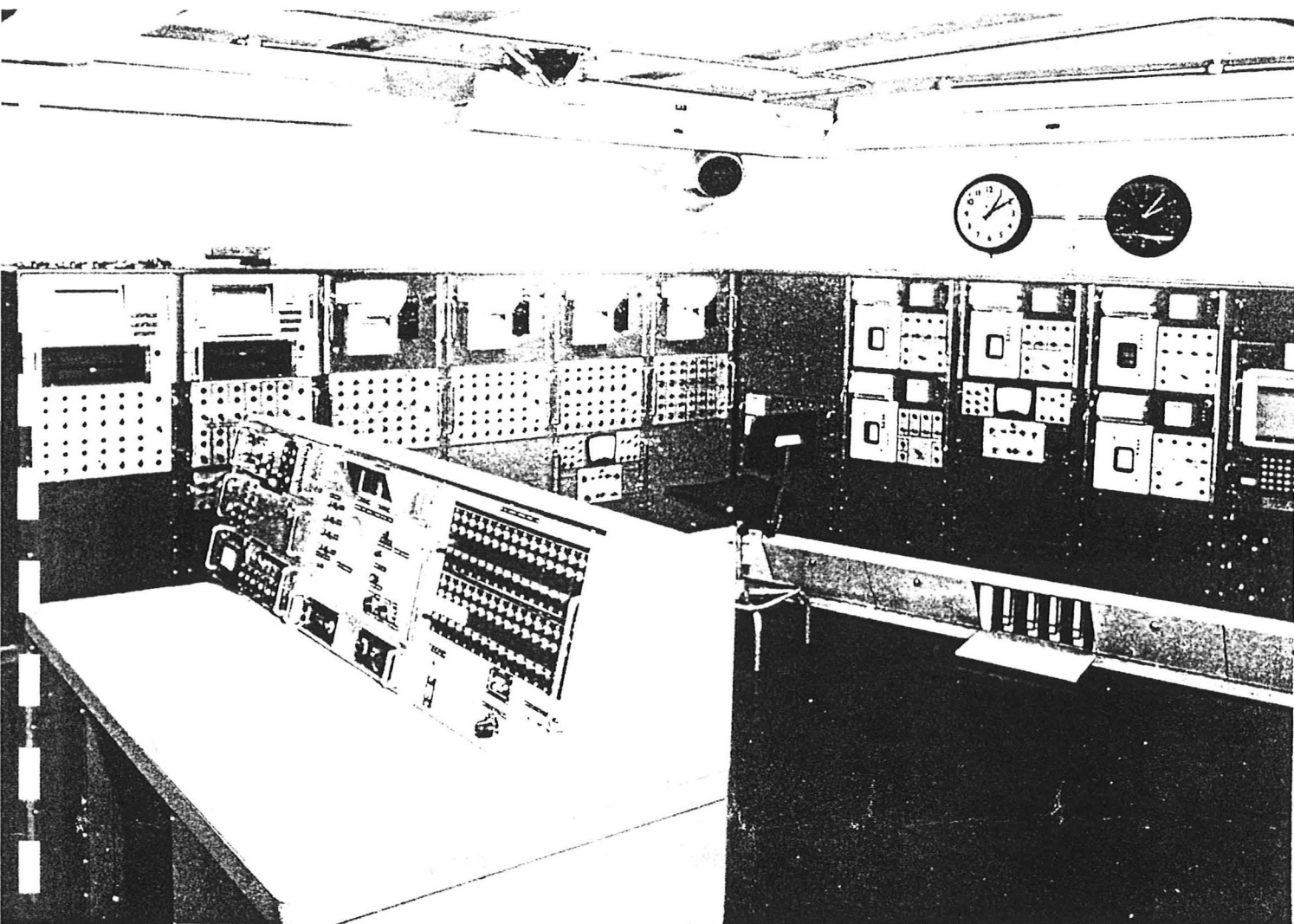
### Miscellaneous

The building contains a conference room, and electric kitchen and dining rooms for 80 people.

### Control room







*Recording room*

## tries

gantries, each with its attached test post (a laboratory) stand on the face of the down, one at a concrete promenade. Approximately 80 ft. with sides approximately 20 ft. by 16 ft., they are clad with aluminium ribbed steelwork. Metal floors at 7 ft. intervals are fitted to three gantries, and additional hinged flooring can be lowered to allow loading from the front, which opens. A crane stand and water cooled exhaust duct are positioned at the base of each gantry. 1-ton mobile hoists are installed at heights of 4 ft. respectively. Compressed air and water, and single and 3 phase electric power are

## ckhouse

ckhouse, situated between the test stands, is

from the surrounding structures and is able to withstand an ambient air pressure of 10 lb./in<sup>2</sup> in the event of an explosion. At this pressure, dwelling houses are totally demolished (0.68 Rb case).

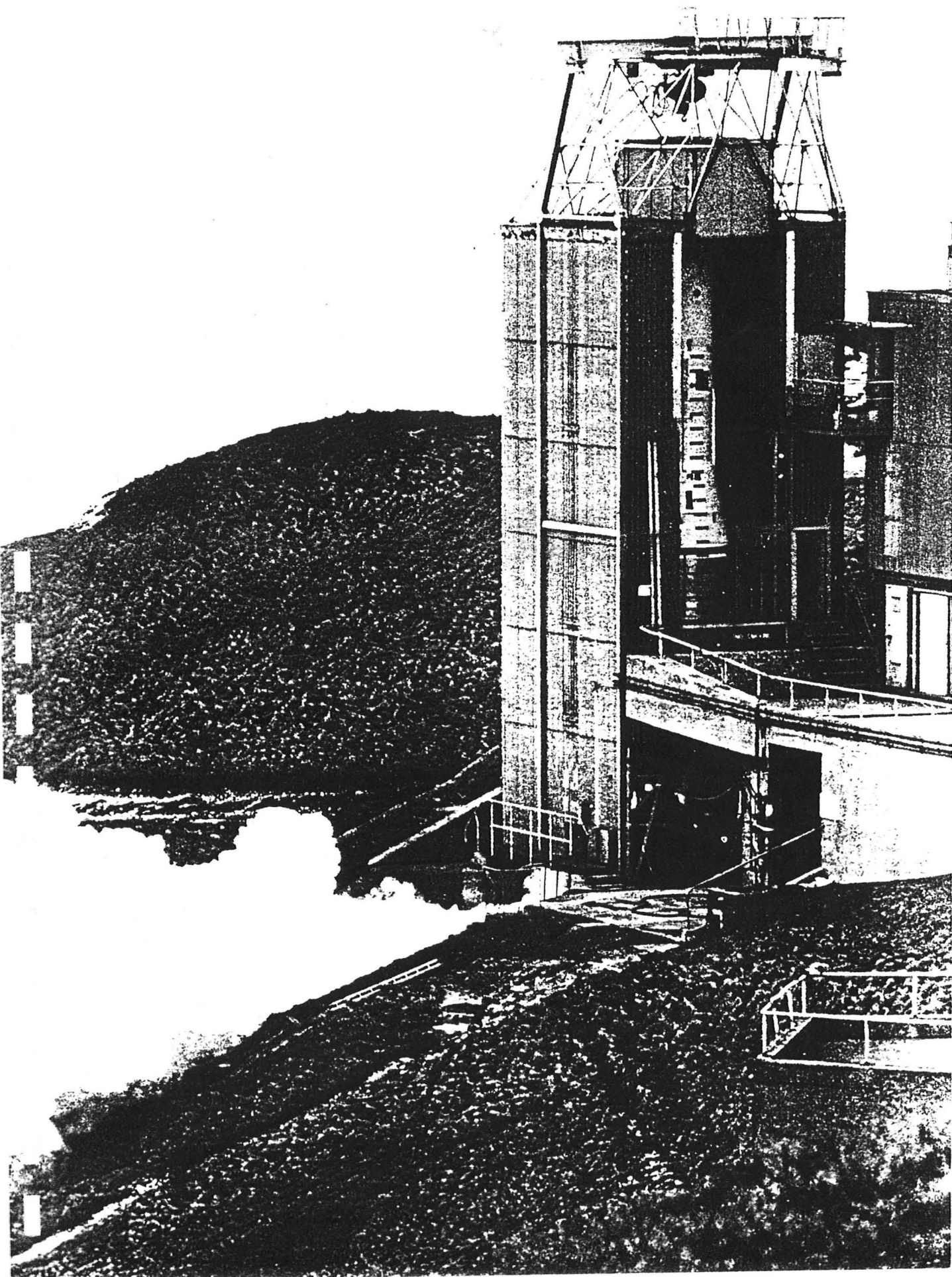
The blockhouse contains the water pump controls and safety monitoring equipment for both gantries. Safety glass viewing ports and telescopes for observation of the gantries are mounted in the walls.

## Subsidiary workshops and garage

A small machine shop, carpenter's workshop and garage occupy a separate building.

## Lifting gantry

A 5-ton fixed lifting gantry with 30 ft. headroom stands



# SERVICES

## Electric power

Power is supplied from a mains transformer of 500 kVA rated capacity. Three-phase and single-phase power and lighting supplies are distributed throughout the site.

## Water supply

The site reservoir of some 60,000 gallons capacity is supplied by the Isle of Wight River and Water Authority mains and serves all the needs of the establishment.

### Fire-fighting and efflux duct cooling

An electrically driven two-stage centrifugal pump capable of delivering 3,000 gal./min. supplies the fire-fighting/cooling water system and fine spray and sprinkler systems mounted in the gantries. Hydrants are situated about the site. All can be operated either at a low pressure provided by the static head of the reservoir, or at up to 250 lb./in<sup>2</sup> by use of the pump.

A mobile Beresford trailer pump is available for use in areas not protected by hydrants. Foam apparatus is available for oil fires.

## Air and nitrogen

A bulk store positioned between the gantries has the following capacities:-

**Air** 10 cu. ft. at 6000 lb./in<sup>2</sup>  
30 cu. ft. at 3600 lb./in<sup>2</sup>

**Nitrogen** 30 cu. ft. at 3600 lb./in<sup>2</sup>

It is charged by a Williams & James compressor unit from atmosphere or from low pressure nitrogen bottles. Air and nitrogen is supplied to regulator panels in the gantries for distribution.

## Fuel and oxidant

Kerosene is supplied to both gantries through a pump and flowmeter from two 600 gallon tanks. High test peroxide (HTP) is contained in tanks of 4000 gal. capacity, equipped with sprinklers, and emergency dumping and draining facilities. It is piped to a 1000 gal. ready-use tank in each gantry, where pumping facilities are installed.



Whilst it is believed that the contents of this document are correct at the time of going to press it must be appreciated that this publication is for information purposes only and that it does not form the basis of any Contract with British Hovercraft Corporation Limited.  
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**british hovercraft corporation**

EAST COWES · ISLE OF WIGHT · ENGLAND  
Telephone Cowes 4121





National  
Trust

hannah.griffiths@nationaltrust.org.uk  
Direct line: 01983 754772  
8<sup>th</sup> February 2010

Dear Les

This is a selection of photographs taken from the Saunders Roe Archive. All pictures should be labelled Copyright Saunders Roe Archive courtesy of National Trust. Apart from the modern colour picture of the New Battery Exhibition which is just National Trust copyright (if you were wondering I am the rather squinty looking young lady depicted!)

All pictures are named and should be easy enough to follow and I am happy for them to be labelled as such. The pictures are just scanned copies of the originals so the resolution on them is not fantastic but they serve us okay so hopefully they should be okay for you too!

If you would like to include some information about the New Battery site I have included some of the blurb below.

*The Needles New Battery along with the rest of the Headland was purchased in 1975 by the National Trust. Work began in the winter of 2002 to open the New Battery and develop an exhibition about the Rocket Testing site – Highdown which is part of the site.*

*Work began in the winter of 2003. A team of 5 volunteers plus a member of full time staff began clearing the rooms of old electrical conduit and scraping off layers of paint before installation work could begin. The rooms were lit by lamps powered by a diesel generator, and with no heating or running water on site it was a cold and dirty job. In the spring of 2004 the kiosk kitchen and an exhibition written by volunteers was installed and the kiosk was officially opened on 25<sup>th</sup> September 2005.*

*This was just the first phase of the project and the Trust began seeking funding to make a bigger better exhibition. The first funding came as prize money after winning the Marsh Christian NT award for volunteering in 2005. This money paid for installation of electricity in the lower rooms. Volunteers moved in to clear and paint these rooms. The project then received money from National Trust associations and ANOB which paid for the design and installation of the exhibition boards.*

*The New Battery exhibition and kiosk currently opens 3 days a week manned by paid staff and wherever possible the remaining days sees the site staffed by a team of dedicated volunteers including some ex Highdown employees.*

National Trust  
The Needles Old Battery  
West High Down  
Alum Bay  
Isle of Wight  
PO39 0JH  
Tel: +44 (0)1983 754772  
Fax: +44 (0)1983 756978  
www.nationaltrust.org.uk

President: HRH The Prince of Wales  
Regional Chairman: Sara Aubrey-Fletcher  
Regional Director: Patrick Begg

Registered office:  
Heelis, Kemble Drive, Swindon, Wiltshire SN2 2NA  
Registered charity number 205846

*The site has received much press attention including pieces on BBC Coast, the One Show and Country file. This has helped raise the profile of the site and increased visitor numbers with over 45,000 people visiting in the 2009 season. .*

*The New Battery will be open from 13<sup>th</sup> March 2010 (the first weekend will have 'Meet a Rocketman' sessions as part of science and engineering week) on Saturdays, Sundays and Tuesdays plus other days when volunteers are available. The site is open 7 days per week during school holiday periods and on Bank holidays. For further details please see National Trust's website. [www.nationaltrust.org.uk](http://www.nationaltrust.org.uk) or telephone the Old Battery on 01983 754772.*

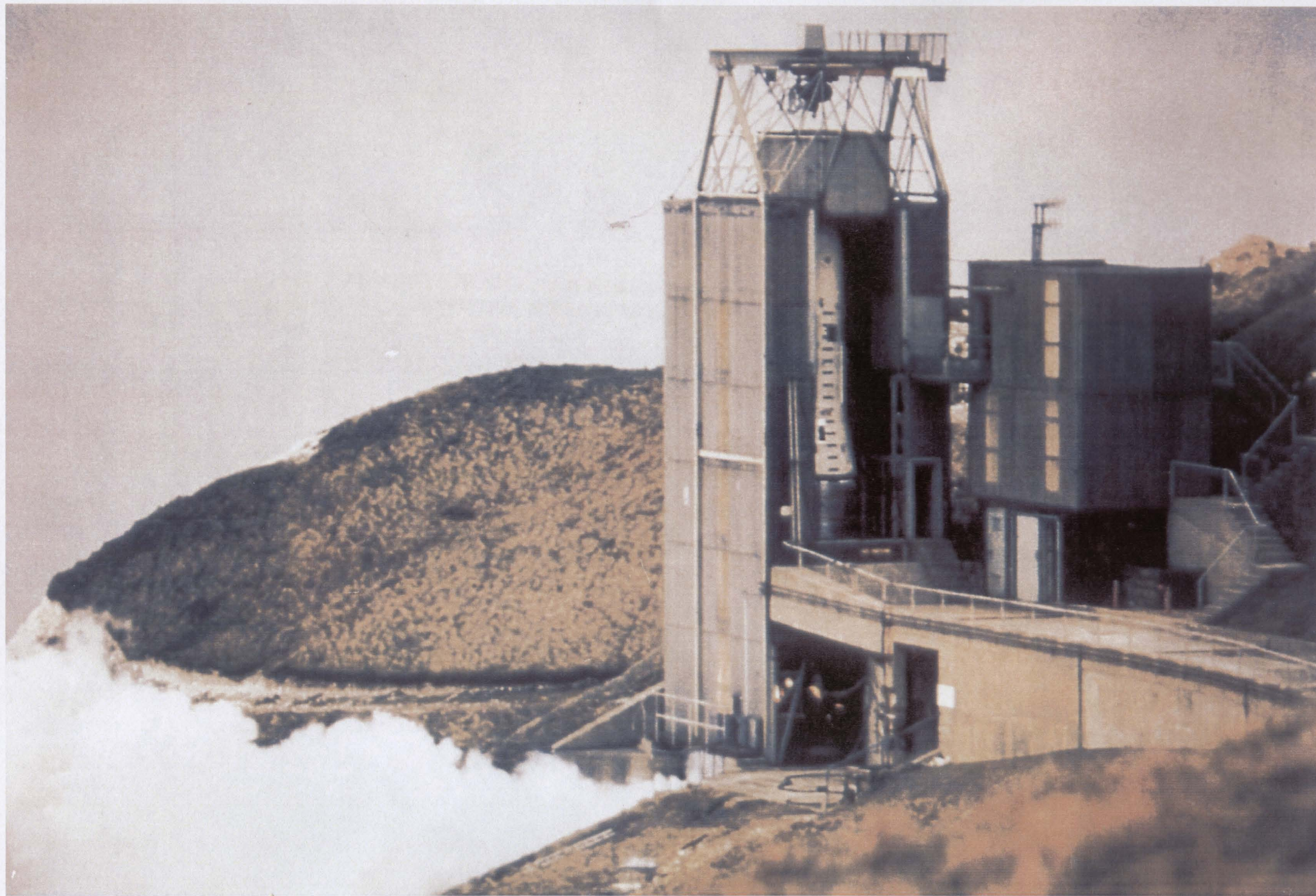
Please feel free to cut and paste this document to meet your needs or just inform yourself. If anyone has a site specific questions I am quite happy for you to pass on my email address if you think it would be of use. Best of luck with the exhibition I would be keen to receive any feedback on the conference or the interest you get for your stand, just to see if it maybe worth our while doing something there in the future.

Yours sincerely

Hannah Griffiths  
Custodian

Cont/d





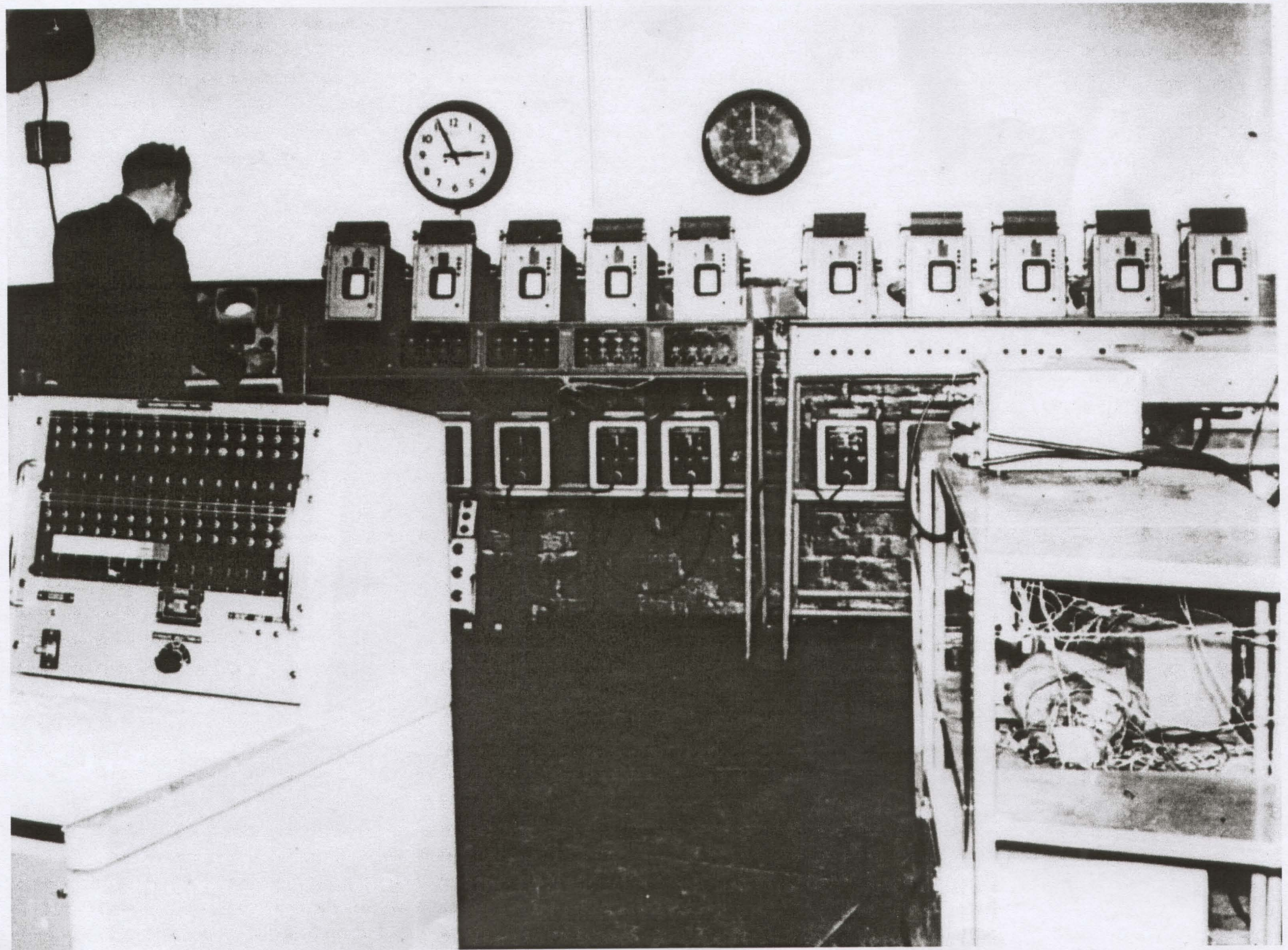










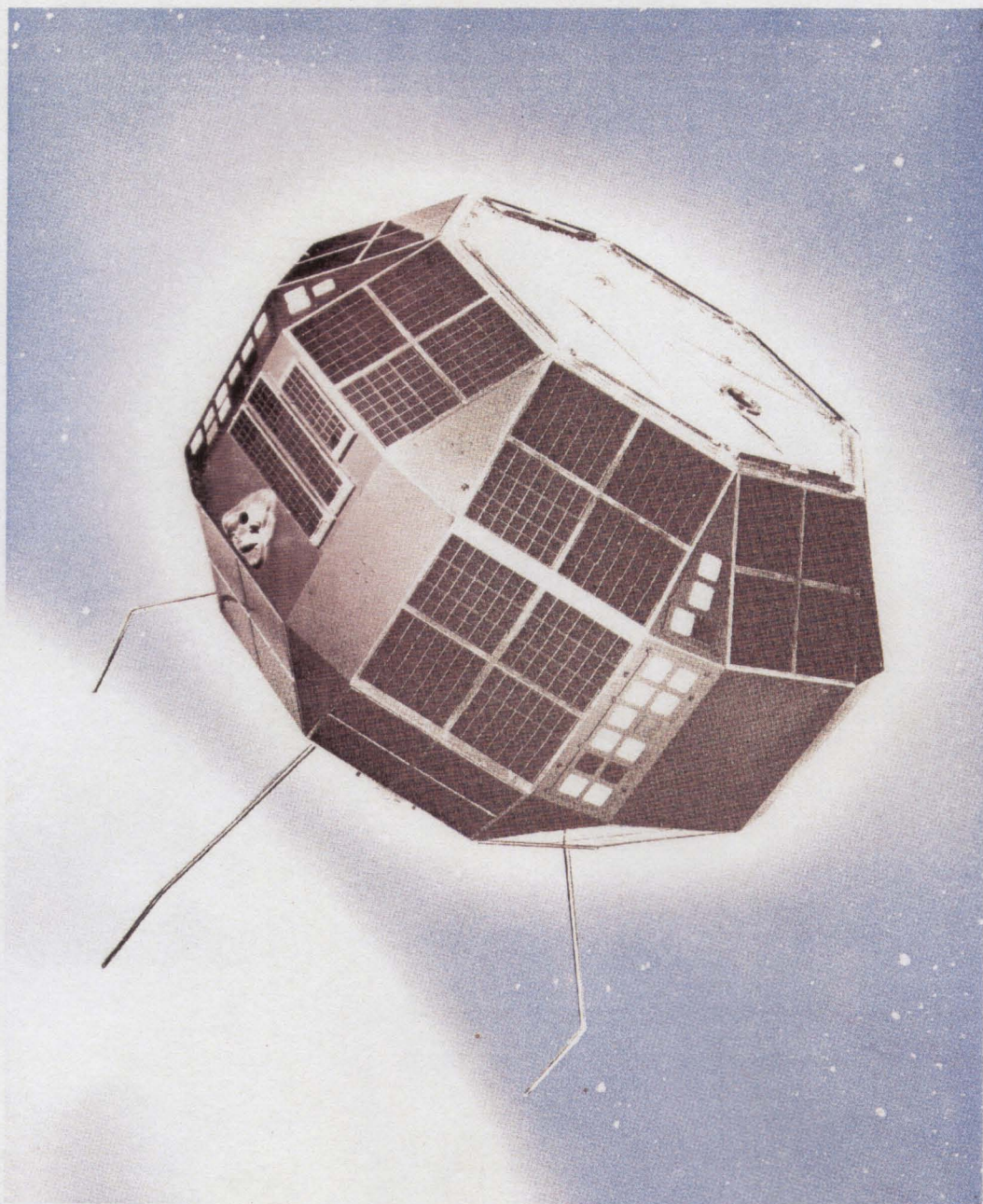








# M.S.D.S. LIMITED



**BLACK  
ARROW  
X3**

## IN SPACE



# THE COLD WAR ON THE ISLE OF WIGHT

CLASSIFIED

