ENGLISH HERITAGE

RAF Woolfox Lodge, Horn, Rutland

Roger J C Thomas, drawings by Allan T Adams

SURVEY REPORT

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

HISTORIC BUILDING REPORT

RAF Woolfox Lodge
Great North Road
Woolfox Lodge
Horn
Rutland

09 July 1998

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ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

Rutland **NBR No: 97199**

Horn **NGR: SK 9581 1312**

Great North Road

RAF Woolfox Lodge

SUMMARY

RAF Woolfox Lodge consists of a former Second World War airfield and a Bloodhound Mk I Surface to Air Guided Weapon (SAGW) station, one of eleven 'Stage 1' SAGW sites guarding the RAF's nuclear deterrent force. For the purposes of this report, only the Bloodhound 'Stage 1' station will be examined.

The site is situated adjacent to the A1 Great North Road, some 10-km (6¼ miles) northeast of Stamford. It consists of a total of forty-eight structures/features, including thirty-two missile standings and various maintenance, control, and ancillary buildings, all of which were originally enclosed by a chain-link perimeter fence, the circumference of which has been reduced in extent.

HISTORY

The wartime aerodrome at RAF Woolfox Lodge became operational in December 1940 as a Satellite Landing Ground (SLG) for No.14 Operational Training Unit, located at RAF Cottesmore, approximately 8.05 kilometres (5 miles) to the northwest. Initially, the facilities available on site were very rudimentary but gradually improved. It was closed in October 1942, in order that three concrete runways, a perimeter track and aircraft dispersals could be laid, before re-opening in June 1943 as a full station in No.3 Group, Bomber Command. After operating in a number of roles, including United States Army Air Force Station 478, the airfield was placed in a state of 'care and maintenance' in August 1945 and transferred to HQ Maintenance Command, occupied by 259 Maintenance Unit, and used as a camp for German prisoners of war. During September 1948 the airfield came under the auspices of Flying Training Command. Flying recommenced in 1951, when the site became a Relief Landing Ground (RLG), operated by No.7 Flying Training School (FTS) at RAF Cottesmore. The station was closed in April 1954.

During the 1950s a considerable amount of thought was given to the air defence of Great Britain, culminating with the issuing of the 1957 Defence White Paper. This document marked a distinct shift in British defence policy, emphasising the concept of 'Nuclear Deterrence' in preference to direct defence. It indicated the government's intention substantially to reduce the strength of Fighter Command, on account of the fact that no air defence system was one hundred percent effective, and that missiles offered the potential of considerable savings in cost. It was therefore decided to use surface to air guided weapons (SAGW) to protect the deterrent forces, in preference to fighter aircraft.

As a consequence of these proposals, the RAF went ahead with plans to use the Bristol Bloodhound Mk I surface to air guided weapon (SAGW) system to protect the V-force medium bomber stations and the Thor intermediate range ballistic missile (IRBM) bases. Trials of the complete missile system, with its attendant Type 82 tactical control radar (TCR) and Type 83 target illuminating radar (TIR), were undertaken in 1958 at North Coates, Lincolnshire.

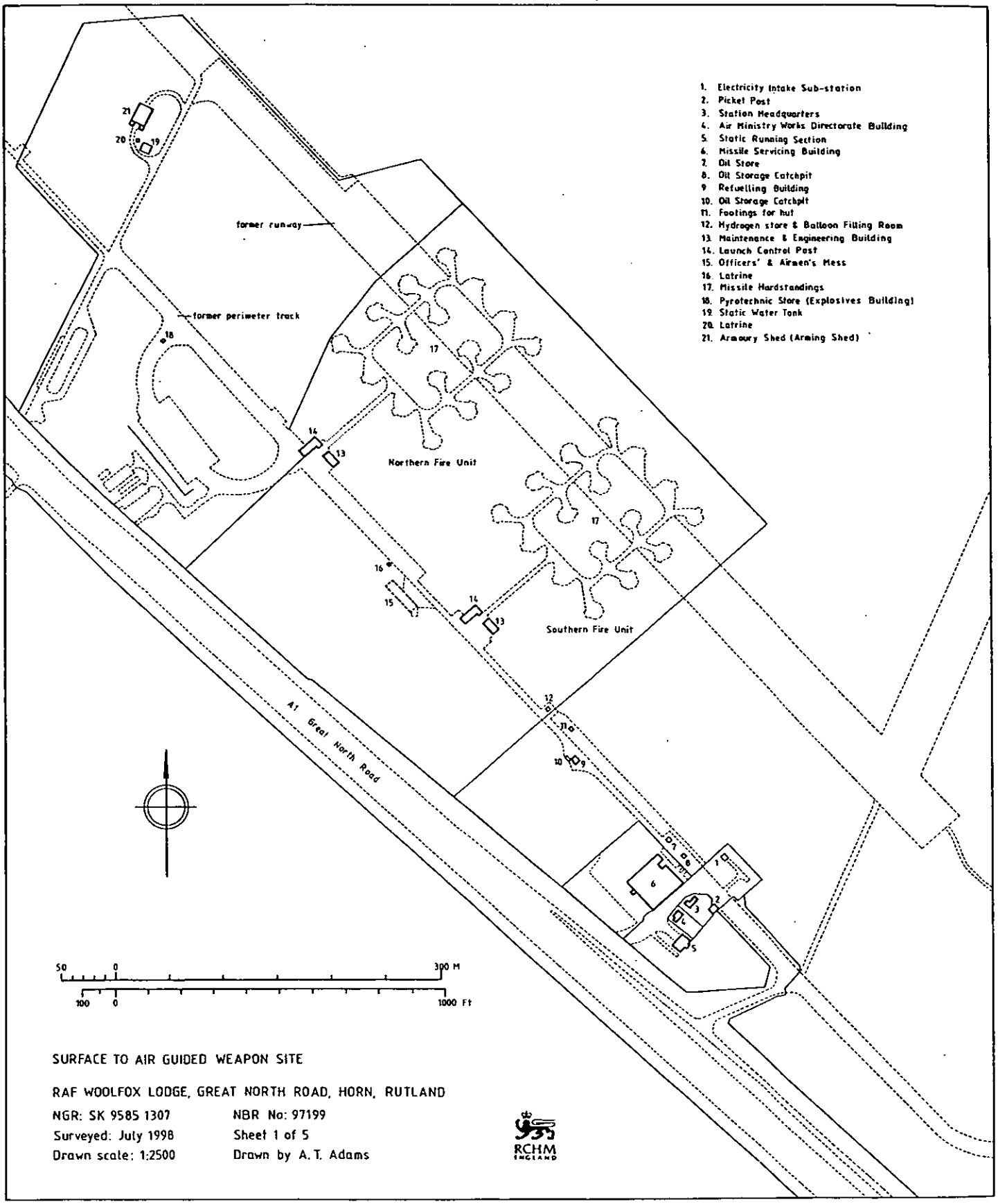
Even before the Bloodhound Mk I missile had become operational, it had become clear that the system was flawed, and development work had commenced on a Mk II version. The problem lay with the missile's pulsed radar guidance system. Pulsed radar works on the basis of an extremely short transmission, followed by a brief period of silence, in which, to determine the range of the target, the reflected signal can be detected and the time elapsed measured. Unfortunately, pulsed systems have two major drawbacks: the signal can be jammed relatively easily, and, when operating at low level, the signal tends to get broken up by ground returns (reflections from objects on the ground). As a result, the Bloodhound Mk II was designed around a continuous-wave radar system, which detects a moving target by the constantly changing frequency of the returned signal or Doppler effect.

While the development of the Bloodhound Mk II was proceeding, there remained an urgent need to provide some degree of protection for the nuclear deterrent forces and to provide operational training for the missile squadrons. As a consequence, it was decided to go ahead with the installation of Bloodhound Mk I SAGW. By December 1958, the planning stage was well advanced and three Tactical Control Centres and five missile sites had been selected, including Woolfox Lodge. Eventually, eleven missile sites were established in the eastern counties of England, stretching from Carnaby in the East Riding of Yorkshire, to Rattlesden in Suffolk.

Construction work commenced at Woolfox Lodge during 1959 and was completed early in 1960. The site was located adjacent to the Great North Road, on the southwestern perimeter of the former airfield. The station consisted of two fire units, each equipped with sixteen Bloodhound Mk I missiles and two Yellow River (Type 83) target-illuminating radars (TIR).

No.62 Squadron formed at RAF Woolfox Lodge on the 1st February 1960, becoming operational shortly afterwards, under the auspices of No.151 Wing, Fighter Command. The squadron was sub-divided into four flights; two flights forming a fire unit. The two fire units were provided with long-range target data from the Type 82 tactical control radar at No. 151 Tactical Control Centre, RAF North Luffenham (NBR No. 96324).

The operational life of the Bloodhound Mk I missile system was remarkably brief, lasting just five years and nine months. The early obsolescence of the missile's pulsed radar guidance system contributed to its demise, as did the removal of the joint US and British Thor Intermediate Range Ballistic Missile system in August 1963. The first batch of Bloodhound 'Stage 1' site closures commenced in June 1963. RAF Woolfox Lodge and RAF Marham became the last sites to close, disbanding on the 30th September 1964.



SURFACE TO AIR GUIDED WEAPON SITE

RAF WOOLFOX LODGE, GREAT NORTH ROAD, HORN, RUTLAND

NGR: SK 9585 1307 NBR No: 97199

Surveyed: July 1998 Sheet 1 of 5

Drawn scale: 1:2500 Drawn by A.T. Adams

RCHM ENGLAND

DESCRIPTION

RAF Woolfox Lodge is situated on the summit of a gently sloping limestone hill, approximately 105-m (344 ft) above Ordnance Datum. It is located approximately 10 km (6¼ miles) north-west of Stamford and 3 km (1¾ miles) south-east of Stretton. The site originally occupied a single sub-rectangular shaped parcel of land, which has since been sub-divided into three separate ownership's.

The site is screened from the A1 Great North Road by plantings of Poplar and Sycamore trees, and consists of a complex of fourteen buildings: a 68,189 litre (15000 gal) static water tank, two fire units of sixteen missile hardstandings each, and two concrete survey station pillars. The majority of the site is contained within a chain-link perimeter fence carried on cranked reinforced concrete posts topped by three strands of barbed wire. A tarmacadam road laid on the former southwest perimeter track of the airfield provides access to the site. The arrangement of the original entrance has been lost due to the construction of a transport depot at this point; however, it is safe to assume that the surviving picket post flanked the gateway to the southwest.

Picket Post

The Picket Post currently functions as a Traffic Police Office. It is a single-storey, 'L' plan structure, of fair-faced stretcher bond, brick cavity-wall construction, with a flat asphalt coated square plan reinforced concrete roof. The roof projects forward from the line of the front (NE) elevation to form a four-bay verandah carried on four square brick pillars. The northern bay of the main elevation is stepped-back to form an entry, which is protected to the northwest by two brick infilled bays between brick pillars. The interior is lit by natural lighting from three and four-light galvanized steel windows set beneath reinforced concrete steel lintels.

The Station Headquarters and the Air Ministry Works Directorate (AMWD) Building which were located adjacent to the Picket Post, have both been demolished to make way for a transport depot. The access road enters the site adjacent to the Picket Post on a northwest / southeast axis. Approximately 30-m northwest of the Picket Post a roadway branches off to the southwest to provide access to the Missile Serving Building.

Missile Servicing Building

The Missile Servicing Building is a tall single-storey, eight-bay long, rectangular plan structure, of steel frame construction clad in corrugated aluminium sheeting, with two parallel single-aisle Cambered Fink Truss roofs, divided by a central valley. The northeast wall is of fair-faced Flemish bond brick construction, with two annexes with flat roofs built in stretcher bond. The roofs of both annexes are composed of RSJ beams carrying reinforced concrete joists, infilled with concrete breezeblocks overlain by an asphalt-waterproofing layer.

The southern annexe consists of three hydraulic plant rooms, and a heating and ventilation (H+V) plant room. The rooms are entered via louvered hardwood doors in the northeast elevation and are lit by galvanized steel-framed windows with glass panes retained by clips. The most southerly room originally contained three hydraulic coolers venting through timber louvered panels in the southeast elevation. The remaining rooms originally contained three hydraulic power supply units, three missile test air-cooling and drying rigs, and a nitrogen store.

The H+V plant room occupies the northern end of the annexe. The roof over this room is approximately 1.67 m (5 ft 6 in) higher than the roof over the remainder of the annexe. Two insulated rectangular profile air-ducts emerge from the raised southeast elevation of the H+V plant room and are carried over the lower roof into the northeastern range of the Missile Servicing Building. Most of the air conditioning equipment has been removed, leaving only holdfast bolts and ducting as evidence. The doorway to the room is flanked internally by a small brick-walled air filter cubicle. Access to the cubicle is via a small gas-tight door with rubber seals, and the air filter racks remain in situ.

The northernmost annexe attached to the northeast wall of the Missile Servicing Building originally functioned as a diesel generator room and electrical switch room. The generators have been removed, but evidence, in the form of a number of cable ducts in the concrete floor and two concrete generator beds survive.

The Missile Servicing Building is entered via a pair of 3.55 m (11 ft 8 in) high rolling steel-framed doors clad with aluminium sheeting, located in the southeast gable of the southwest range. The internal floor areas have been altered by the insertion of animal feed processing and packing equipment, but the basic structure remains intact. Having passed through the rolling door, a reception handling area is entered, which is served by a gantry crane, capable of lifting a safe working load of 2,032 kg (2 tons), for the transporting of crated missile sections and parts. A doorway with a 3.35-m (11-ft) clearance permits access from the reception handling area into the missile assembly and servicing section. Single-storey brick offices, workshops, latrines and storerooms occupy the interior of the southwest wall of the southwest range. Ducting from the plant room provided ventilation. Natural lighting is provided by fixed, sixteen-light, galvanized steel framed windows in the walls and by skylights in the roof. Artificial illumination was provided by 'magazine standard' electrical lamps, but they have been replaced by conventional fluorescent strip lighting. (NB This structure is a 'mirror image' of the plan of the Missile Servicing Building at RAF Misson (NBR 95774).)

The access road servicing the missile site runs parallel to the northeast elevation of the Missile Servicing Building and is flanked to the northeast by

an Oil Catchpit and an Oil Store, both of which are built on the surface of the former south-west perimeter track. The Oil Catchpit was built to enclose the diesel oil fuel tank, which served the generator annexe of the Missile Servicing Building. It consists of a pair of concrete supports located on a concrete floor, enclosed by low brick walls built to prevent the escape of accidental spillages of fuel oil. A galvanized steel fuel pipe remains in situ at the northwest corner, though the steel fuel tank has been removed.

Oil Store

The Oil Store is a square plan '16 ft span' Nissen hut with cement rendered brick end walls. The southwest wall is blind, while the northeast wall has a centrally placed timber door. Ventilation bricks are built into both walls. No lighting was provided apart from that available when the doorway was open. The edges of the concrete floor are cambered, presumably to form a lip to contain any spillages of oil.

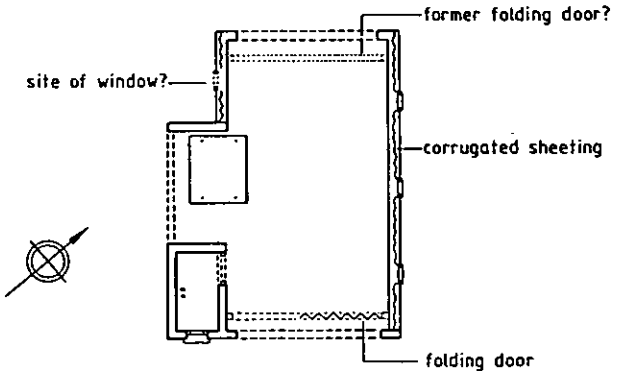
Refuelling Building

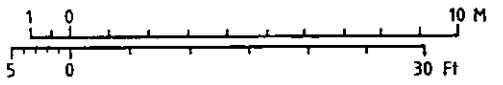
The Refuelling Building, which is currently used as an agricultural equipment garage, is located on the southern side of the access road, some 100-m (328-ft) northwest of the Oil Store. It consists of a single storey 3-bay long rectangular plan structure, built of corrugated asbestos-cement panels forming a truncated gable structure raised on brick bearing walls. The integral strength of the corrugated sheeting permits its use to form the structure without any form of framing. The slope of the roof is extended beyond the line of the southwest wall to form a cat slide annexe to the southern and central bays.

The structure forms a drive-through fuelling area, which is entered by a 2.94 m (9 ft 8 in) clearance, nine panel, folding Bolton Shutter Door in the south-east wall, which is flanked by a three-light galvanized steel window, lighting the interior of the annexe. A notice on the door reads "Keep well oiled to ensure satisfaction". The annexe occupies two bay lengths, the southern bay consisting of a small room that can only be entered from the fuelling area. No fittings remain within this room, apart from two salt-glazed pipes set in the floor. The annexe to the central bay is open to the exterior and is occupied by a 1.45 x 1.77 m (4 ft 9 in x 5 ft 7 in) raised concrete bed with holdfast bolts at each corner, possibly for a pump.

The gable end and carrier walls are laid in English garden wall bond using fair-faced LBC Phorpres bricks. The carrier walls are 1.72 m (5 ft 7 in) high with a concrete cill upon which the corrugated asbestos structure rests. The corrugated sheet structure has been removed entirely from the northern bay and no evidence was found to indicate whether a steel shutter door closed the northwest gable; this was however probably the case.

Three-light steel windows set in projecting asbestos cement surrounds in each bay of the northeast wall provide natural lighting. It is reasonable to assume that there would also have been a window in the missing corrugated wall





REFUELLING BUILDING

RAF WOOLFOX LODGE, GREAT NORTH ROAD, HORN, RUTLAND

NGR: SK 9598 1278 NBR No: 97199

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Drawn scale: 1:100 Drawn by A.T. Adams

RCHM ENGLAND

section of the northern bay. Artificial lighting was provided by Walsal protected light fittings and switches, which ensured that there was no risk of igniting kerosene vapours. Located immediately adjacent to the northwest corner of the Refuelling Building is a further Oil Catchpit which is in a very ruinous condition.

Hydrogen Store and Balloon Filling Room

Towards the missile fire units, on the northern side of the access road, are the footings of a building 4.90 x 3.07-m (16 ft x 10 ft) in plan. The first building encountered is on the same side of the road functioned as the Hydrogen Store and Balloon Filling Room. This building is a single-storey, 4.89 x 2.90-m (16 ft x 9 ft 6 in) rectangular plan structure, built of fair-faced stretcher bond cavity wall brickwork, with a flat asphalted roof. A double and a single doorway, allowing access to two rooms pierce the northeast elevation. Fragments of timber beading over each of the doorways indicate that glazed panels would have illuminated the interior of each room. Ventilation is provided by louvered hardwood openings in the remaining walls. Timber skidding remains in situ on the floor of the northern room.

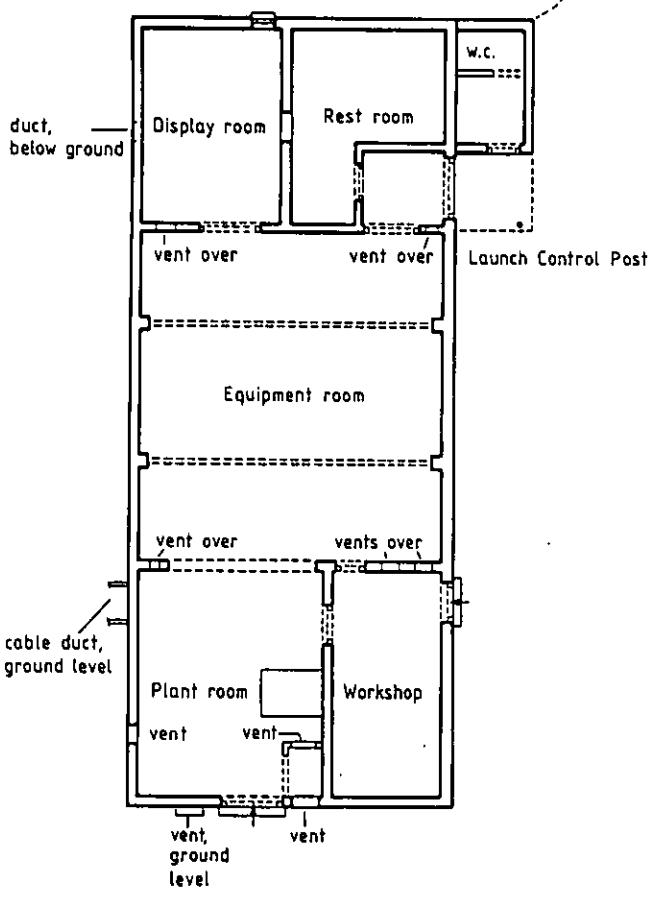
Fire Units

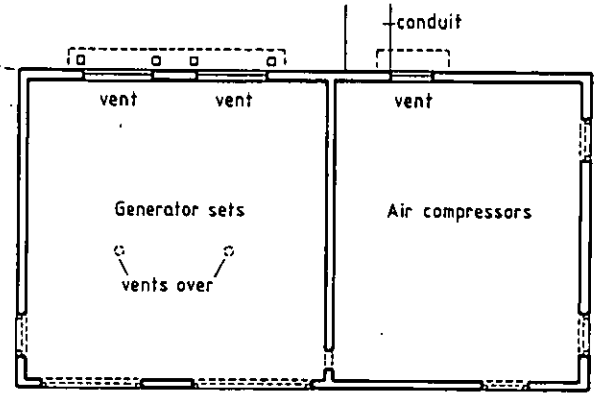
RAF Woolfox Lodge has two identical missile fire units. Each originally consisted of a Maintenance and Engineering (M+E) Building, a Launch Control Post (LCP), and sixteen hardstandings for Bloodhound Mk I SAGWs. The LCPs and the M+E buildings are of identical construction, being single-storey, rectangular plan structures built of concrete breezeblock, clad externally in fair-faced, stretcher bond brickwork. The flat roofs consist of longitudinal reinforced concrete beams with breezeblock infill, supported on transverse RSJs carried on breezeblock piers projecting from the walls. The roofs are weather-proofed with asphalt. The LCP and the M+E building serving each fire unit are located some 274-m (899-ft) to the south-west of the missile hardstandings, either side of the Fire Unit access road.

Launch Control Posts

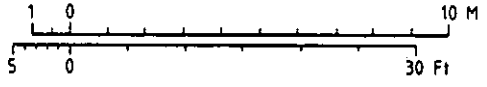
The two Launch Control Posts (LCP) are identical, conforming to a visually uninspiring design - basically a rectangular box relieved only by three doorways, two ventilator cowls, an armoured glass observation window and a projecting latrine. The latrines appear to be secondary features, as they are butted up against the LCPs and the brickwork differs in colour. An open porch with a flat felted plywood roof, supported at one corner by a plain steel tubular pillar protects the entrance to each LCP and its external latrine. A lobby is entered by a double door and gives direct access to the rest room and the electronics room.

The interior has a simple five-chamber plan: a large central equipment room, flanked on each side by a pair of rooms. The rooms to the south of the LCP functioned as the plant room and a workshop. The workshop could be accessed externally from a doorway in the southeast elevation, or internally from the





Maintenance and Engineering



NORTHERN FIRE UNIT BUILDINGS

RAF WOOLFOX LODGE, GREAT NORTH ROAD, HORN, RUTLAND

NGR: LCP; SK 9574 1308. M&E Building; SK 9576 1306

NBR No: 97199 Surveyed: July 1998

Drawn scale: 1:100 Drawn by A.T. Adams

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RCHM ENGLAND

equipment room and the plant room. The entrance to the plant room consists of a double door, located in the southwest wall, flanked on either side by ventilation grilles. The northern pair of rooms consisted of the rest room previously discussed and the launch control room (display room). An armoured glass window in the northeast wall of the launch control room, with an internal steel shutter door, provides a view of the missile fire unit. A hatch exists in the wall between the launch control room, and the rest room.

Each launch control post was built to house the electrical equipment controlling two flights, or missile sections A and B. Most of the electrical equipment was housed in two groups of ten cabinets within the central room. Each group of cabinets served one missile section, No.1 cabinet contained the electronic distribution relays, No.2 housed the relays from the Target Illuminating Radar, and each remaining cabinet served an individual missile. The missile engagement controllers for both flights would have been situated in the launch control room, which was equipped with a number of duplicate display and control cabinets. The controllers were able to view the missiles through the armoured glass window in the northeast elevation. There are no fittings or items of equipment left in either LCP. Interpretation of the location of equipment cabinets was not possible due to the floor being obscured by sheep manure.

Electrical power for each fire unit was obtained direct from the National Grid, with an electricity distribution centre, adjacent to each of the maintenance and engineering buildings. In the event of a power-cut, a pair of diesel generator sets, housed in each Maintenance and Engineering Building provided a stand-by electricity supply.

Maintenance and Engineering Building

The Maintenance and Engineering (M+E) Buildings are aligned perpendicular to the LCPs. They are basically built to an identical four-bay rectangular plan, divided internally into two rooms; however, the northern room, which housed two diesel stand-by generators, was accessed by a pedestrian door in the north-west wall and pair of large equipment doorways in the southwest wall. A pair of steel louvered radiator ventilation panels is set in the northeast wall, in-line with the engine beds in the concrete floor. A pair of openings
directly above the engine beds, would originally have allowed the generator set exhaust pipes to exit to the detuners (silencers), that were mounted on concrete beams on the roof.

The southern room housed air compressors and various ancillary equipment. A high-set, square ventilation panel is located in the northeast wall and two pedestrian doorways are located in the southeast wall. The only visible difference between the two M+E buildings at RAF Woolfox Lodge is the number of equipment doorways permitting access to the air-compressor rooms; the northern building has two, while the southern structure has one. Unfortunately, it was not possible to establish if there was any difference in the

equipment fitted, as the floors of both of the air-compressor rooms were obscured by agricultural machinery.

Returning to the main access road, there appear to have been no specific hardstandings provided for the Target Illumination Radars which would have been situated to either side of the two LCP and M+E buildings. The level surface of the former perimeter track proved sufficient for this purpose. The two Fire Units were provided with a small Officers' and Airmen's latrine and a Crew Room situated beside the access road, halfway between the two LCPs. The latrine is extant, but the Crew Room has been demolished, leaving the concrete footings in-situ.

Missile Hardstandings

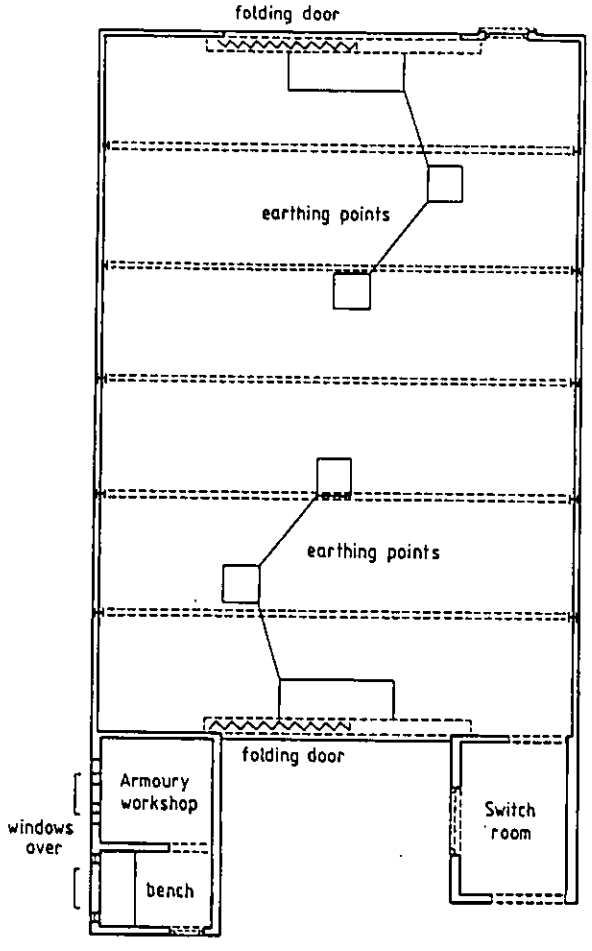
RAF Woolfox Lodge was equipped with two Fire Units. A Fire Unit consisted of two flights of eight Bloodhound Mk I SAGWs (total of sixteen missiles) arranged around a square loop-road, accessed by a central roadway, which passed between the LCP and the M+E building. The majority of the missile hardstandings are situated on the grass area between the southwest perimeter track and a former wartime runway. Four holdfasts in each Fire Unit have been built directly on the runway surface.

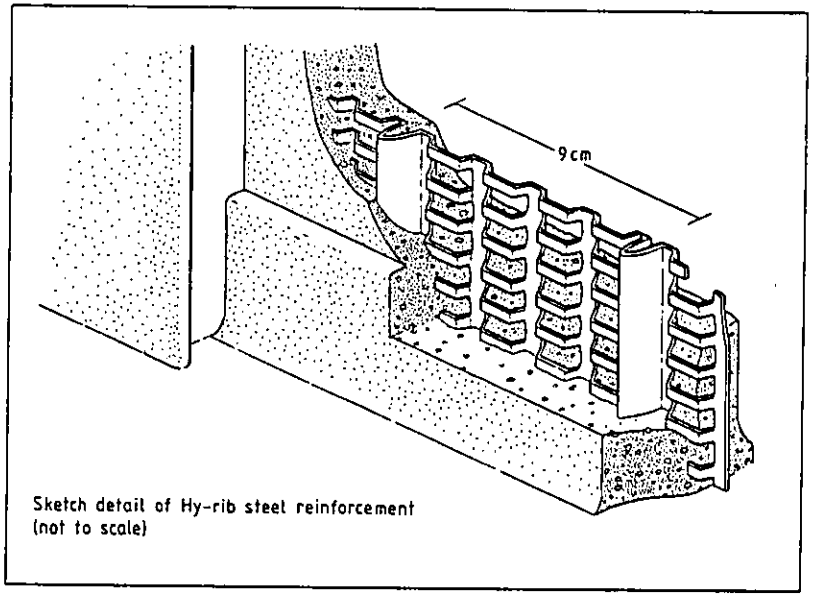
Each missile would have been mounted on a launcher, which was secured to a holdfast at the centre of an octagonal plan reinforced concrete hardstanding, accessed by a spur off the loop road. The steel holdfast sockets for the missile launchers are identical to those used by '3.7 inch' and '4.5 inch' heavy anti-aircraft guns during the Second World War. A cable duct is recessed into the floor of the hardstanding and extends back from the launcher services coupling pit in the centre of the holdfast, to a rectangular platform that projects on one side of the emplacement.

The platform has ten threaded holdfast bolts cast into its surface, which would have received a Launcher Plant Assembly (LPA) Mk 1A. The LPA was a rectangular steel box, which housed equipment that provided cooled air, electrical power and hydraulic pressure directly to both the launcher and the missile. Immediately to the rear of the LPA platform the cable duct is straddled by a pair of galvanized steel girders that originally supported a steel box called a Cable Termination Pillar. The Cable Termination Pillar contained a junction box for the 415 volt 50 cycles 3 phase electrical supply for the LPA, two 230 volt 13 amp servicing sockets, the various electrical connections linking the LCP and the LPA, and a 230 volt 60 watt heating unit. The cable duct terminates at a manhole, adjacent to the former position of the Cable Termination Pillar, which allows access to the cable ducting from the LCP and the M+E building.

Armoury Shed

The armoury shed is currently used as a farm store. It is located some 250 m (273 yds) northwest of the northern Fire Unit. It is associated with a brick-





Sketch detail of Hy-rib steel reinforcement
(not to scale)

ARMOURY SHED (ARMING SHED)

RAF WOOLFOX LODGE, GREAT NORTH ROAD, HORN, RUTLAND

NGR: SK 9568 1339 NBR No: 97199

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Drawn scale: 1:100 Drawn by A.T. Adams

RCHM

built pyrotechnic locker, a latrine and a 68,189 litre (15000 gallon) static water tank, emergency water supply (EWS). It is a tall single-storey, 6 x 4 bay rectangular plan steel-framed structure, clad with 'Hy-Rib' reinforced concrete walls, with a 30.5 cm (1 ft) thick flat reinforced concrete roof, carried on eight 50 x 16 cm (20 x 6□ in) steel girder beams. This is an unusual arrangement for a frangible building, as the roof would force the blast of any accidental detonation to radiate outwards, rather than upwards, which is the more usual practice.

The shed straddles a loop-road, which passes through it via 3.65m (12ft) high vehicle doorways in both the northeast and southwest walls. Each doorway is closed by a pair of eight fold steel shutter doors, manufactured by Dennison, Kett and Co. Ltd., London SE5. A personnel escape door flanks the doorway in the northeast wall. The interior consists of a large chamber with a grit-less asphalt, anti-static magazine type floor, containing integral earthing points. There is no natural lighting apart from that, which is provided when the doors are open. Angle plates that once carried rails for two Matterson gantry cranes project from the wall stanchions.

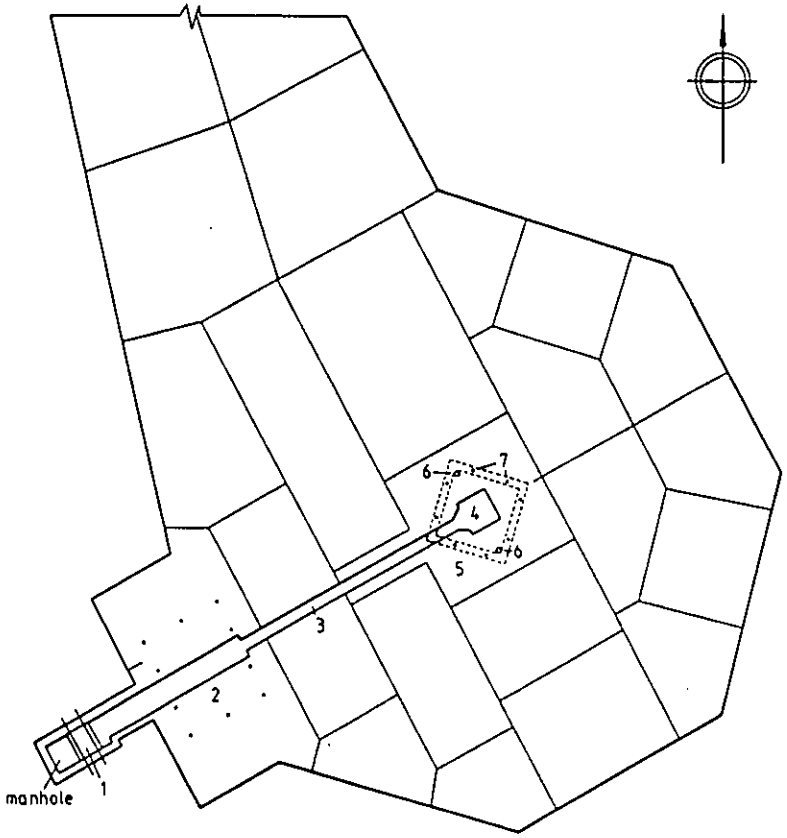
The vehicle doorway in the southwest elevation is flanked by two single-storey, rectangular plan annexes, built of fair-faced English bond brickwork, with flat asphalted reinforced concrete roofs. The roofs of the annexes are noteworthy, in that the verges that face the roadway are raised to force the fall of rainwater in the opposite direction, and the roofs project approximately 45 cm (1 ft 6 in) beyond the walls.

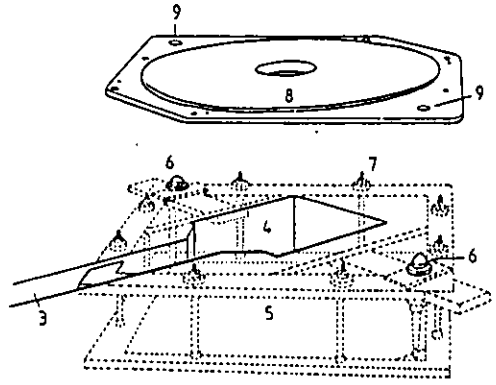
The southern annexe functioned as an electrical switch room and heating unit. It has been substantially altered by the widening of the original doorway in the northwest elevation, and by the insertion of a double door in the southwest wall. The northern annexe, which functioned as the armoury store/workshop, remains relatively unaltered. It consists of a single room divided by a projecting wall into two chambers; each lit by a high set nine-light galvanized steel window in the northwest elevation.

The annexe is entered by a hardwood door in the southwest wall, the floor is coated in a grit-less magazine standard asphalt, which extends up the wall to form a skirting, some 25 cm (9□ in) high. A timber workbench occupies the southern chamber of the annexe. Stenciled lettering survives on the three walls that enclose the bench - reading from left to right: Ramjet Prep., Warhead Prep., Ramjet Ign. 0.3, Boost Ign. 0.2, Warhead Init. Nil, Safety Prec., Ramjet Mon., Boost Mon., Warhead Mon., Ramjet Primary, Boost Primary, and Warhead Primary. No fittings remain within the northern chamber, apart from a narrow timber rail carried on four brackets, below three openings in the northwest wall.

Bloodhound Mk I Surface to Air Guided Missile

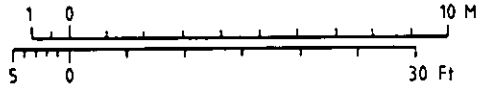
The Bristol/Ferranti Bloodhound Mk I was the first British surface to air





Sketch detail of holdfast (not to scale)

1. Site of cable termination pillar
2. Site of launcher plant assembly (LPA)
3. Duct for cables and pipelines
4. Pit housing services entry unit
5. Holdfast in concrete
6. Foundation plate locating dowels
7. Holding down bolt
8. Foundation plate
9. Locating dowel housing



MISSILE HARDSTANDING

RAF WOOLFOX LODGE, GREAT NORTH ROAD, HORN, RUTLAND

NGR: SK 9585 1307 NBR No: 97199

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Drawn scale: 1:100 Drawn by A.T. Adams

RCHM ENGLAND

guided weapon (SAGW) to enter service. The missile was originally conceived in response to a requirement issued by the Army in 1950, when contracts were placed with different contractors to develop two guided weapons, Red Duster and Red Shoes. Red Duster eventually become the Bloodhound Mk I. Both weapons were to be radar-guided, using an internal scanning receiver, which 'locked' onto a target that was 'illuminated' by a transmitting radar on the ground (ie it was a semi-active homing weapon).

The 'illuminating' radar was developed from the existing Anti-aircraft No. 3 Mk 9 Gun-laying Radar or Yellow River, known as the Type 83 in RAF service. This radar had the ability to produce a wide beam for target acquisition, and a narrow beam for tracking and illumination. With ever increasing aircraft speeds, it was essential that the Type 83 target illuminating radar (TIR) be locked onto its allocated target as quickly as possible. To achieve this aim, the Type 83 radar sets at RAF Woolfox Lodge were allocated or 'put-on' to hostile plots by the Target Selection Officers (TSO) at No.151 Tactical Control Centre, RAF North Luffenham (NBR No. 96324), using information provided by the long-range Type 82 tactical control radar (TCR).

The design of the missile was carried out by the Bristol Aeroplane Co. (absorbed into BAe) and Ferranti Ltd., the latter being responsible for the guidance systems and the launch control post equipment. The missile had an overall length of 7.06 m (25 ft 3 in); it consisted of a cylindrical body with a pointed dielectric ogival nose cone. It was divided into a forward pressurised guidance bay, containing the radar receiver dish and the missile's electronic controls and a rear section, which contained the warhead, fuel tanks, and an auxiliary equipment bay. This latter compartment housed the fuel pumps, high-pressure hydraulic accumulators, hydraulic pumps and the Mach number control unit.

Two Bristol Siddeley Thor ramjet motors were fixed on pylons above and below the missile and four Royal Ordnance Factory (ROF) Gosling solid-fuel booster rocket motors with large canted stabilising fins, were placed at regular intervals around the main body. The rocket motors were pinned down by a thrust yoke at the tail of the missile and were held in place against the centre section by ring brackets.

On ignition a total thrust of 45,360 kg (100,000 lbs.) was developed by the ROF Gosling motors, which, given that the missile only weighed 1,814 kg (4,000 lbs.) resulted in the Bloodhound shearing its launcher bolts and attaining 0 - 1,200 Km/h (0 - 760 mph), the speed of sound, within its own length. Once at Mach 1, the two liquid fuel Thor ramjet engines ignited and, four seconds after launching, the Gosling rockets accelerated the missile to Mach 2.5, by which time the boosters had burnt out.

At the end of the boost phase of the launch, the fins generated radial lift, which

forced the forward end of the rocket motors to lift away from the missile body, automatically unlocking the control surfaces. At burn-out, the aerodynamic drag on the rocket motors forced them to slide rearwards as a unit, until they separated from the thrust yoke and 'petalled' outwards to fall away. From this point onwards, to a maximum range of 80-km (50 miles), the pair of Thor ramjets powered the missile on its interception course. In reality, due to the possible evasive actions taken by the target, the range at which an interception would have taken place would have been nearer 32 km (20 miles).

While in flight, the missile was controlled by its Ferranti guidance equipment, which obtained the pitch and yaw information from the radar receiver and processed it to control the hydraulic system that actuated the all-moving monoplane wings. The wings were moved asymmetrically for roll, and symmetrically to control pitch. The Bloodhound used a proportional navigational course to intercept its target; ie the rate, at which the weapon changed its course, was proportional to the rate of change of the angle of sight between the missile and the enemy aircraft. Thus, although the radar receiver dish was pointing directly at the target, the guidance system was steering the missile to a predicted interception point along a continually adjusted course, dependant on the enemy aircraft's movements.

Although the missile guidance system had been proved to be sufficiently accurate physically to strike a target aircraft, the warhead was detonated by a proximity fuse rather than by impact. The Bloodhound missile could be armed with one of two types of warhead: high explosive (blast), or a continuous rod. Using the latter type the destructive effect was not only caused by the explosion itself, but by the scattering effect of a layer of metal rods around the warhead, which formed a 37 m (120 foot) diameter spinning mass around the point of detonation, somewhat akin to a circular saw.

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Drawn Archive:	Allan T Adams.

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Schedule of Surviving Structures / Features,
RAF Woolfox Lodge (Stage 1) Bloodhound SAGW Site

09 July 1998.

Structure / Feature	NGR
Picket Post	SK 9610 1263
Missile Servicing Building	SK 9605 1266
Oil Storage Catchpit	SK 9608 1269
Oil Store	SK 9607 1271
Refuelling Building	SK 9598 1278
Oil Storage Catchpit	SK 9597 1278
Unidentified Hut Footings	SK 9598 1281
Hydrogen Store & Balloon Filling Room	SK 9596 1283
Maintenance and Engineering (M&E) Building	SK 9591 1291
Launch Control Post (Local Control Point)	SK 9589 1292
Missile Hardstandings (feature centre)	SK 9600 1301
Crew Room (footings only)	SK 9582 1293
Officers and Airmen's Latrine	SK 9580 1280
Maintenance and Engineering (M&E) Building	SK 9576 1306
Launch Control Post (Local Control Point)	SK 9574 1308
Missile Hardstandings (feature centre)	SK 9587 1318
Pyrotechnic Store (Explosives Store)	SK 9561 1318
15000 Gallon Static Water Tank	SK 9558 1336
Latrine	SK 9558 1338
Armoury Shed (Arming Shed)	SK 9568 1339

Schedule of Structures / Features
RAF Woolfox Lodge (SAGW site), c1960

Function	AMWD Drg. No.
Electricity Intake Sub-station	.....
Picket Post	3202B-58, 13862C-58
Station Headquarters (Unit Headquarters)	7209A-58
Air Ministry Works Directorate bldg.	11314B-58
Static Running Section	13971-59G, 6747A-60G
15000 gal Fire Reserve Storage Tank (Static Water Tank)	7564A-58
Refuelling Building	2311B-58
Oil Storage Catchpit	2017B-58
Missile Servicing Building	2452B-58
Oil Store	.....
Oil Storage Catchpit	2453A-58
Pyrotechnic Store (Explosives Building)	9487A-58
15000 gal Fire Reserve Storage Tank (Static Water Tank)	7564A-58
Officers & Airmen's Latrine	7797A-58
Armoury Shed (Arming Shed)	3195B-58
Officers & Airmen's Mess	301-60G
Maintenance & Engineering (M&E) Servicing Building	6777-59G
Launch Control Post (Local Control Point)	2313B-58, 2556-61G
Latrine	7797A-58
Maintenance & Engineering (M&E) Servicing Building	6777-59G
Launch Control Post (Local Control Point)	2313B-58, 2556-61G
Standings for SAGW Fire Units	10669-59K
Hydrogen Store & Balloon Filling Room	10448-56
Electricity Distribution Centre	14610A-56
Electricity Distribution Centre	14610A-56

LIST OF RCHME B+W PHOTOGRAPHS
taken 09 July 1998.

Negative No.	Structure / Feature
AA98/12235	Picket Post, viewed from the east.
AA98/12236	Missile Servicing Building, view from the south.
AA98/12237	" , view from the east showing the three hydraulic cooler vents in the south-east wall of the southern annexe.
AA98/12238	" , southern annexe, view from the north showing the heating and ventilation (H+V) plant room in the foreground.
AA98/12239	" , interior, detail of filter racks in the H+V plant room.
AA98/12240	" , northern annexe, view from the east.
304Z/20A	Oil Storage Catchpit, view from the south.
305A/21A	Oil Store, view from the east.
AA98/12241	Refuelling Building, view from east-south-east showing folding shutter doors.
305A/22A	" , view from east-southeast.
AA98/12242	" , view from the north showing the brick carrier wall and the corrugated asbestos sheeting construction.
305A/23A	" , view from the north.
305A/25A	" , detail of window arrangement.
305A/24A	Oil Storage Catchpit and the Refuelling Building, view from the west.
305A/26A	Hydrogen Store & Balloon Filling Room, rear elevation, view from south.
305A/27A	" , main elevation, view from north.
AA98/12243	" , main elevation, view from north.
305A/29A	" , detail of hardwood ventilator.
305A/7A8	Maintenance and Engineering (M&E) Building (Southern Fire Unit), general view from the south.
AA98/12244	"
305A/30A	M&E Building, view of front elevation from the west.
AA98/12245	"
305A/34A	" , view of rear elevation from the east.
AA98/12247	"
AA98/12246	" , view of rear elevation from the north.
305A/35A	" , detail of high-set ventilator in the rear wall of the compressor room.
305A/36A	" , detail of double ventilator panels in the rear wall of the generator room.
305A/7A8	" , detail of ventilated door within the generator room.
305A/32A	Launch Control Post (LCP) (Southern Fire Unit), view from south.
AA98/12248	" , view from south-south-west.
305A/33A	" , view from the east.
AA98/12249	" , view from the north.
305B/1	" , view from the north, with the M&E Building in the background.

LIST OF RCHME B+W PHOTOGRAPHS cont'd

305A/4A5	Launch Control Post (LCP), view from the west.
305A/5A6	" , detail of the cable ducting leaving the north-west wall of the plant room.
305A/6A7	" , detail of the armoured window in the north-east wall of the display room.
305B/2	Officers and Airmen's Latrine, view from the east.
305B/3	" , view from the west.
305B/4	Maintenance and Engineering (M&E) Building (Northern Fire Unit), view of the main elevation from the west.
AA98/12251	"
AA98/12250	M&E Building, general view from south-southeast with the Launch Control Post in the background.
305B/7M&E	Building, view of the rear elevation from the north.
AA98/12252	"
305B/8	" , detail of ventilators in the rear wall of the generator room.
305B/9	Launch Control Post (LCP) (Northern Fire Unit), general view from the north with the M&E building in the background.
305B/5	Launch Control Post (LCP), viewed from the south.
AA98/12253	"
305B/6	" , south-west wall, detail of the intake ventilator.
305B/10	" , interior, detail of the shutter and armoured window in the north-east wall of the display room.
305B/12	" , interior, view of the equipment room from the north
305B/15	" , interior, view of the equipment room from the south
305B/13	" , interior, view of the display room from the s-west.
305A/0A1	Missile Hardstanding (Northern Fire Unit), general view from the north.
305A/2A3	" , view from southwest.
305B/35	" , view from northeast with the holdfast and the services entry unit pit in the foreground.
305A/3A4	" , view from southwest with launcher plant assembly (LPA) platform and the cable termination pillar brackets in the foreground.
305B/16	Pyrotechnic Store (Explosives Store), viewed from the north.
305B/17	15000-Gallon Static Water Tank viewed from the south, with the Armoury Shed and Latrine in the background.
AA98/12254	"
305B/18	Latrine and Armoury Shed viewed from the south-southwest.
AA98/12255	"
305B/24	Latrine viewed from the northwest.
305B/19	Armoury Shed (Arming Shed), viewed from the southwest.
AA98/12256	"
305B/28	" , view from north-northwest.
AA98/12257	"

LIST OF RCHME B+W PHOTOGRAPHS cont'd

305B/29	Armoury Shed, detail of reinforced concrete 'Hy-rib' wall construction.
305B/30	" , view from the northeast.
AA98/12258	" , view from the north-east.
305B/27	" , interior, view from the south.
AA98/12259	"
305B/34	" , interior, view from the north.
AA98/12260	"
305B/20	" , interior, of the southern chamber of the armoury workshop, view from the south showing wall stenciling above the bench.
305B/21	" , interior, detail of the bench in the southern chamber of the armoury workshop.
305B/22	" , interior, of the southern chamber of the armoury workshop, view from the east showing wall stenciling above the bench.
305B/23	" , interior, of the northern chamber of the armoury workshop, view from the south.
305B/36	Survey Station Pillar

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