The Witley Site – Workshops

Gwyn Griffiths with some recollections from Dennis Gaunt

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Introduction

John Gould's article "*The Witley site – What happened before NIO*?" is a fine introduction to the reasons for the Admiralty Signals Establishment (ASE) setting up a new radar department at King Edward's School, Witley in 1942, and to the work of several of the scientists who worked there that went on to achieve national and international recognition. This article concerns a group of facilities and people within the Workshops at ASE Witley in support of the scientists and engineers.

When the National Institute of Oceanography (NIO) moved to the Witley site in 1953 Mr L. A. Baxter from Group W at Teddington came first to organise the building and the equipment. The initial workshop staff comprised two draughtsmen, R. (Dickey) Dobson, who had joined from the Teddington, and Percy Woods, together with one artificer, Jim Wood[1] as workshop supervisor and an unnamed carpenter. The NIO Annual Report for 1953-54[2] did observe that, "*it has not been possible to find highly skilled mechanics for prototype engineering work*", but that it was probable that sufficient new staff could be appointed by the end of the year. In the event, Dennis Gaunt moved down from Teddington as a draughtsman in 1954 and Dennis Bookham was recruited in 1955. The NIO workshop was conceived as a tool room to work largely on prototype instruments with the people and facilities to undertake tasks from servicing and modifying watches and galvanometer to welding half-inch plate, with machines for cutting, turning, milling, grinding, engraving and die-sinking.

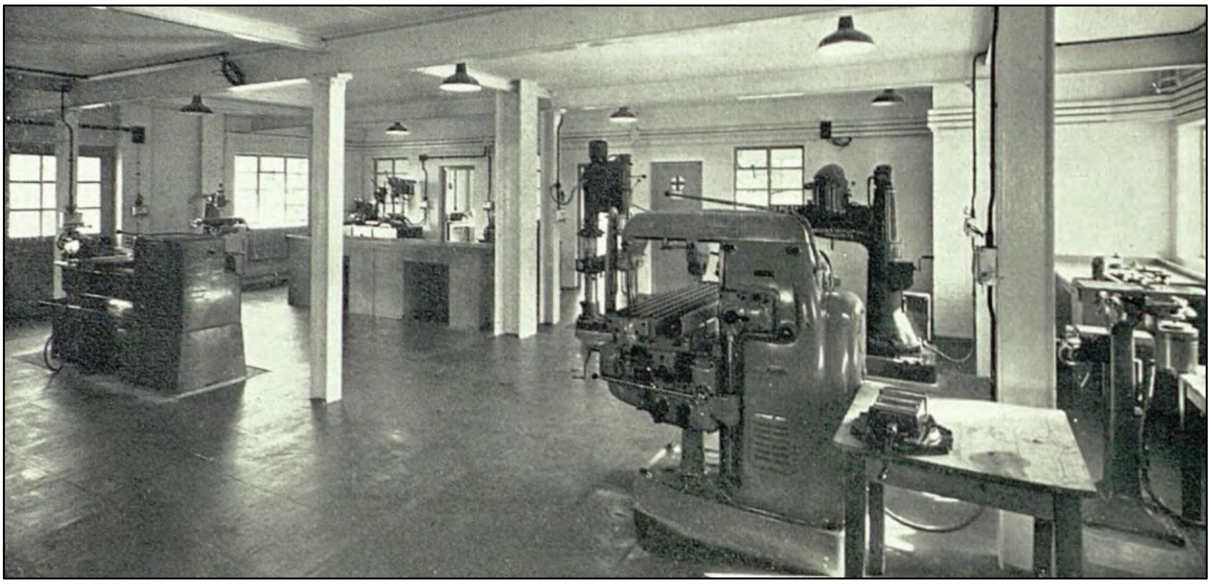

Figure 1. The NIO Engineering Workshop in 1953. Courtesy National Oceanographic Library, original at https://viewer.soton.ac.uk/nol/image/24063/14

[1] Annual Report of the National Oceanographic Council, 1953-54. Available at https://viewer.soton.ac.uk/nol/image/24064/1/LOG_0003/
Jim Wood continued working at Witley into his 70s, if not into his 80s, in Norman Smith's Instrument Workshop at the north end of the first floor of the old building.

[2] Available at https://viewer.soton.ac.uk/nol/image/24063/15/#head

Contrast this small beginning to the 159 personnel in the ASE[3] workshop on the site in 1948. What did all these people do? That's not an easy question to answer, but some insights can be surmised from the tools and facilities they used.

The Workshops of the ASE at Witley

Glimpses into the facilities and jobs within the ASE workshops are to be found in an article, "*The Witley Workshops*" in an issue of "*The Backroom Window*" of August 1948[4], from which much of the material for this piece has been drawn. The Engineering Services Division, of which the workshops at Witley formed part, was managed by Mr G.W. Birkett, with Mr G.A. Hodgson as the Principal Artificer in charge of the workshops. "*In nearly all cases*" the workshop staff had been reassigned or moved from their existing jobs, mainly at the Barracks at the Royal Naval Base, Portsmouth, as had the machine tools[5]. Consequently, most Witley workshop staff either lived in Nissen huts on site or commuted daily by train from the Portsmouth area.

The Foundry

Although the Backroom Window article stated that the workshops did, "not pretend to deal in heavy engineering" there was a well-equipped Foundry on site. Castings of up to 100lb of gunmetal or bronze or up to 50lb of aluminium alloy could be produced. Wooden patterns to hold the sand were made in the Carpenters' Shop. Complex castings with internal cavities or reflex angles would have included "cores" of sand with a binder and wire or iron rods that were made on site and literally shaken out of the final casting when turned out of the mould. Figure 2 (left) shows a trolley with moulds and cores in part of the Witley Foundry. Larger items that were needed by the Witley staff could be manufactured at the Portsmouth Dockyard.

The furnace to melt metal prior to pouring into the moulds was itself made at Witley, Figure 2 right. Originally using mains gas it was converted during the war to use diesel due to fluctuations in gas pressure. The furnace was considered economical, requiring one gallon to melt 40lb of brass.

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[3] A change of name to Admiralty Signals and Research Establishment (ASRE) happened in 1948.

[4] The Backroom Window, Vol. 2, No. 4, August 1948, pp. 433-449. Document ADM220-2442, The National Archives. This is the only known reference to "The Backroom Window" in the National Archives or the British Library. Its title suggests an internal publication for ASRE staff to give insights into the work of the less high profile departments. John Moorey, who visited the site, but not the workshops, from 1944 onwards recalls that Ron Stubbs, who came to work on sonar at NIO in ?? from ASRE Portland did have several copies.

[5] http://sussexhistoryforum.co.uk/index.php?topic=7621.msg34000#msg34000

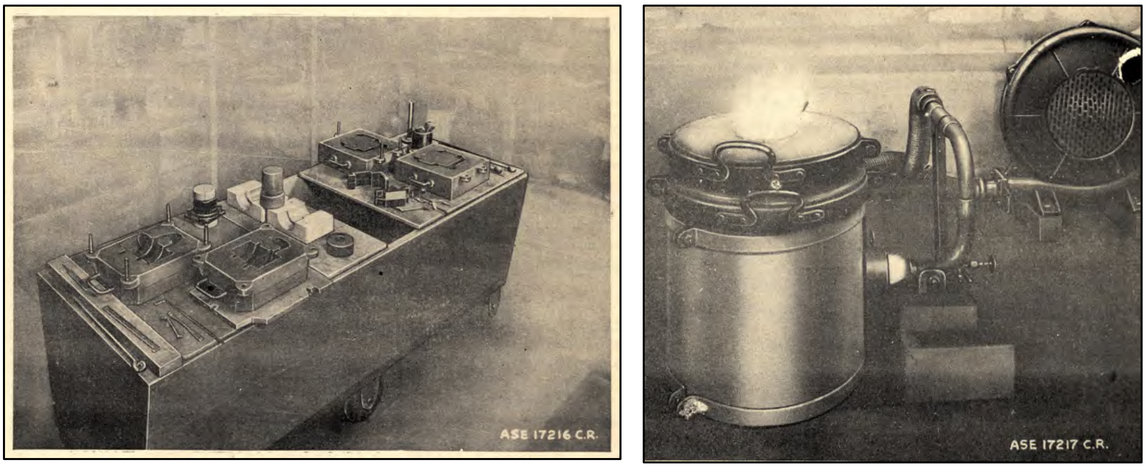

Figure 2. Left: Trolley with various moulds and cores for castings. Right: Diesel-fired furnace, the flame is the white cone at centre, top right is a centrifugal pump to atomise the diesel fuel. ASE images 17216 CR and 17217 CR from Backroom Window[4]

Sheet-metal workshops

A series of shops dealt with the manufacture of chassis, frames and equipment racks. While their tools included the usual sheet metal benders and guillotines they were clearly proud of their box-folding machine, which could make a perfect, accurate metal box in under three minutes. A comment suggests that it was not uncommon for those in laboratories outwith the workshop to construct their own chassis, "*in a 6" vice with the use of angle iron and a hammer*", the implication being that these would be far inferior to the ones made in the workshop.

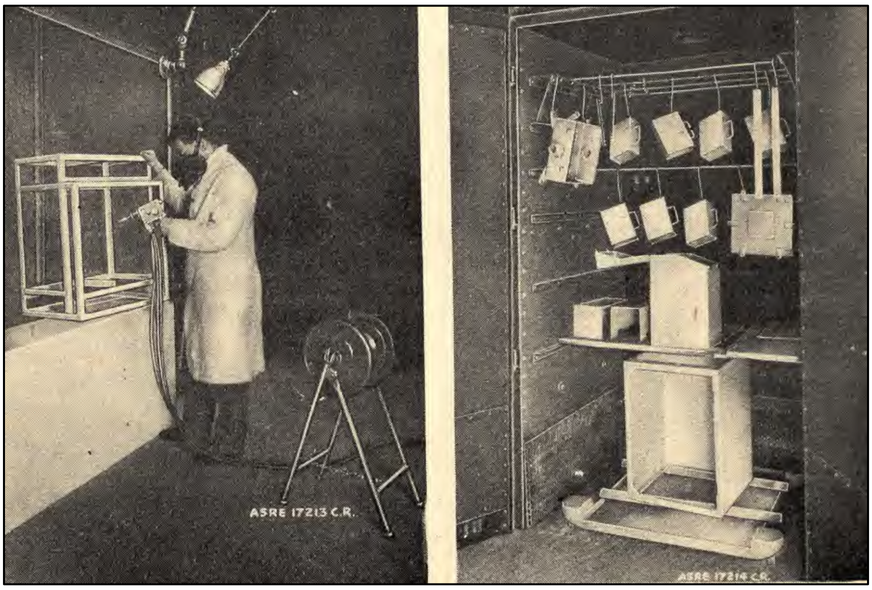

Figure 3. Left, spraying a rack with molten zinc. Right, an electrically heated baking oven. ASE images 17213 CR and 17214 CR from Backroom Window[4]

Protective finishes could be applied on site, from preparation by shot blasting to zinc plating by spraying with the molten metal, zinc wire having been melted in an oxyacetylene flame, Figure 3 left. When necessary, items could be spray painted with a Glyptal Varnish that provided electrical insulation, then dried by baking in an electric oven, Figure 3 right.

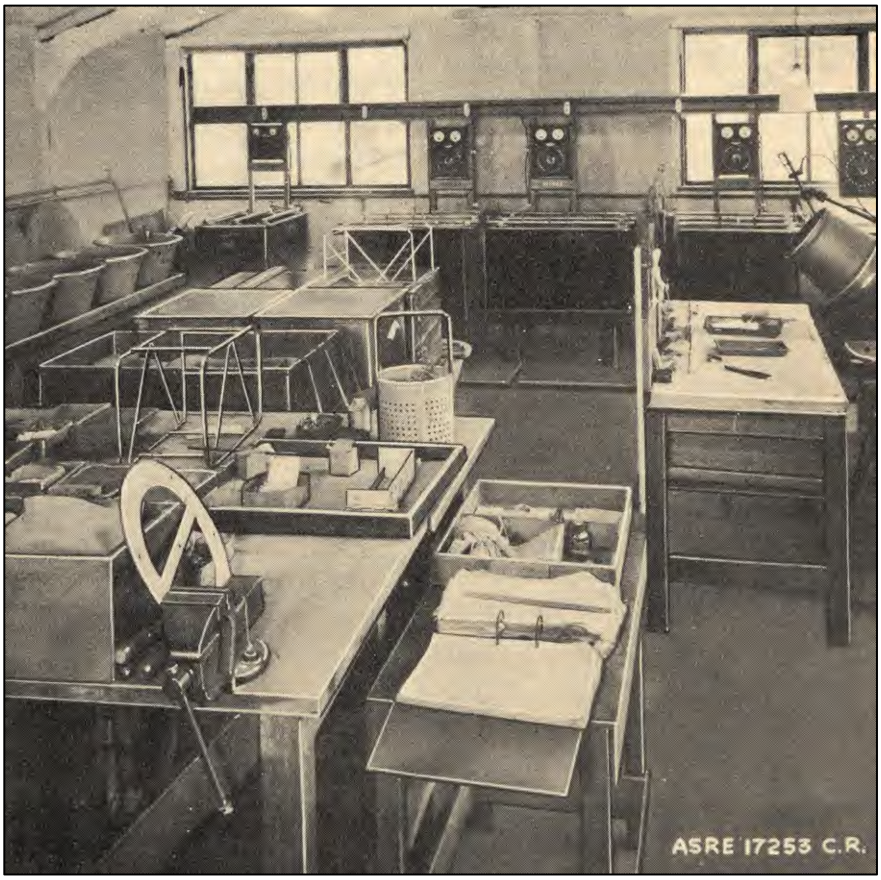

Figure 4. The Plating Shop. Along the rear wall are five floor-mounted plating baths, above each is an electrical control panel to set the plating current appropriate for the metal and surface area, drawing current from what appear to be bus-bars at mid-window level. ASE image 17253 CR from Backroom Window[4]

Lighter-duty items were protected by electroplating, with the initial cleaning in a chemical bath, in a specialised Plating Shop, Figure 4. Here, items could be electroplated with nickel, cadmium, rhodium, silver, copper, tin or zinc.

Machine shops

In 1948 there were two machine shops, the Main Shop, Figure 5, in one of the larger Nissen Huts (these 40' wide by 100' long huts were known as Elephant Huts) and a separate Light Assembly Shop. "*In almost constant use*" were Ward ((Selly Oak, Birmingham) No. 7 Capstan lathes, a catalogue entry with specifications is shown in Figure 6. Other machines included:

- A large lathe with a capacity of 14 feet between centres.
- A vertical borer with the capacity to material up to 60" diameter.
- A W.E. Sykes (Staines, Middlesex) straight-tooth-gear generator, show in an advertisement in March 1948 in Figure 7, capable of cutting external teeth on pieces up to 14" diameter, conceivably for gears in the rotating machinery of radar antennas.
- A variety of horizontal borers, the example in Figure 8 is working on the main trunnion carriage of a pedestal for a radar antenna in preparation for receiving the housing for the bearing.

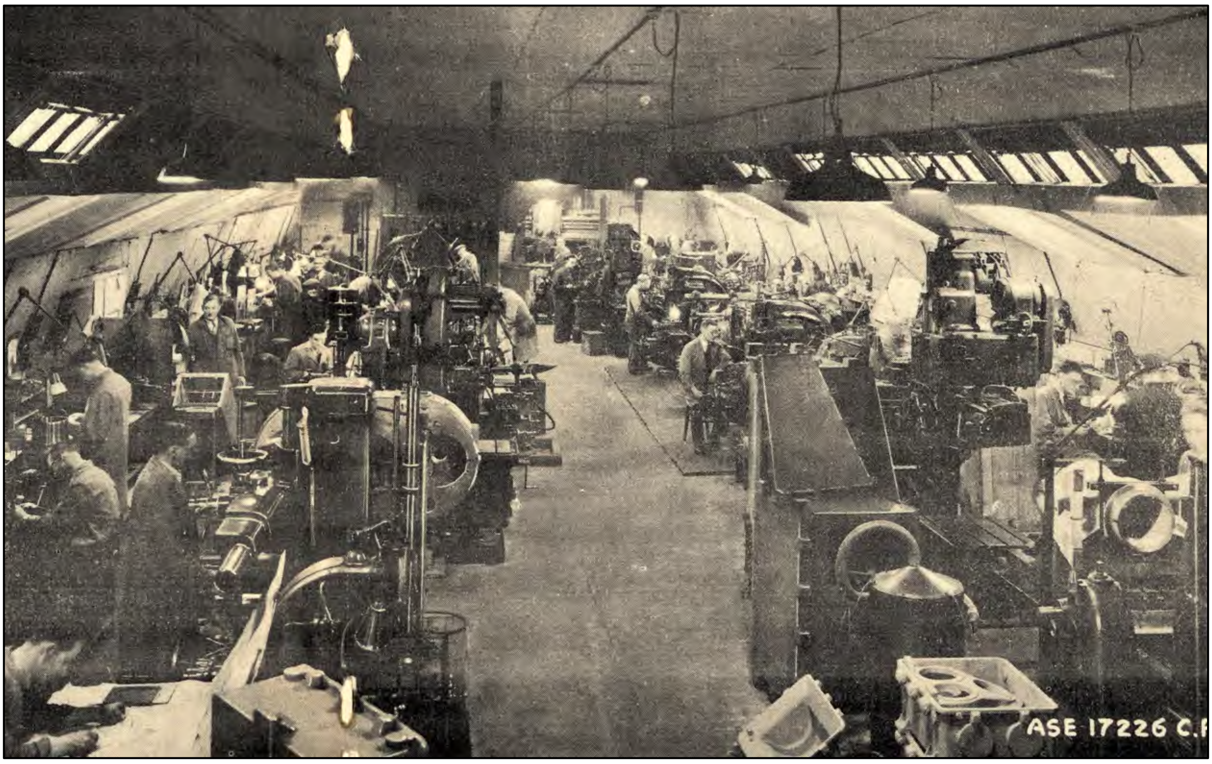

Figure 5. The main machine shop inside a large Nissen Hut, ASE image 17226 CR from Backroom Window[4]

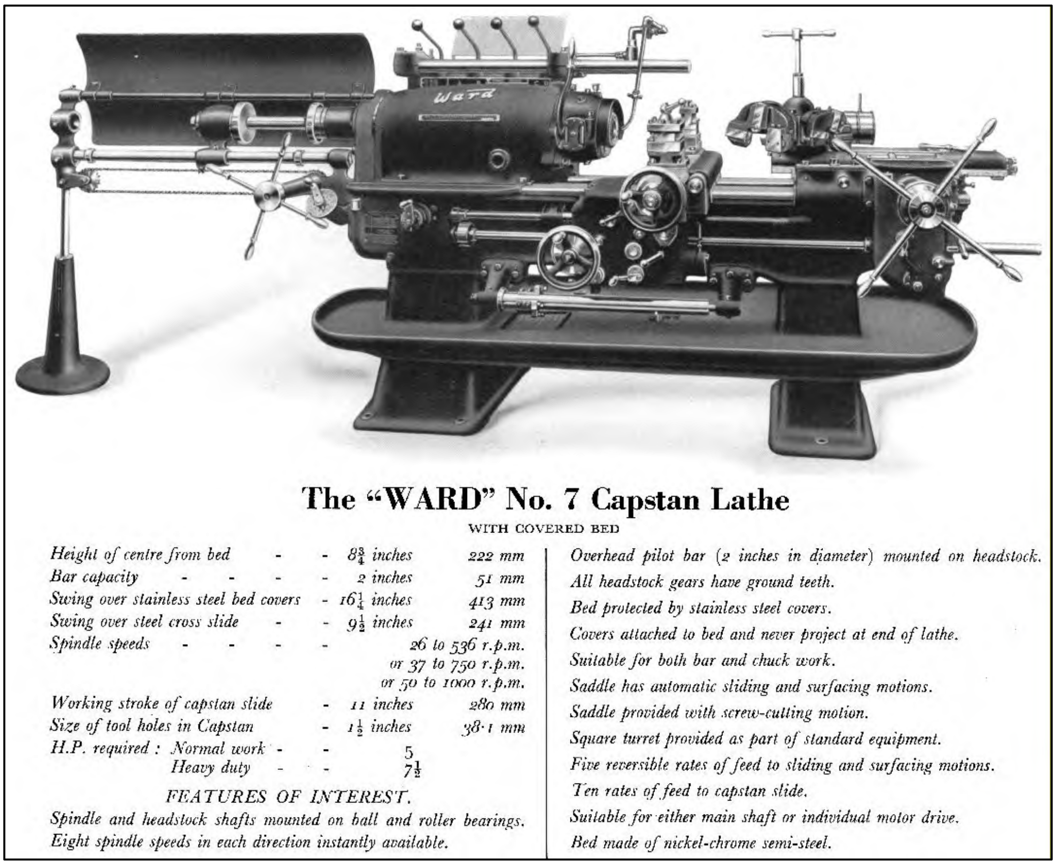

Figure 6 A Ward No. 7 Capstan lathe with specifications, courtesy Tony Griffiths at www.lathes.co.uk.

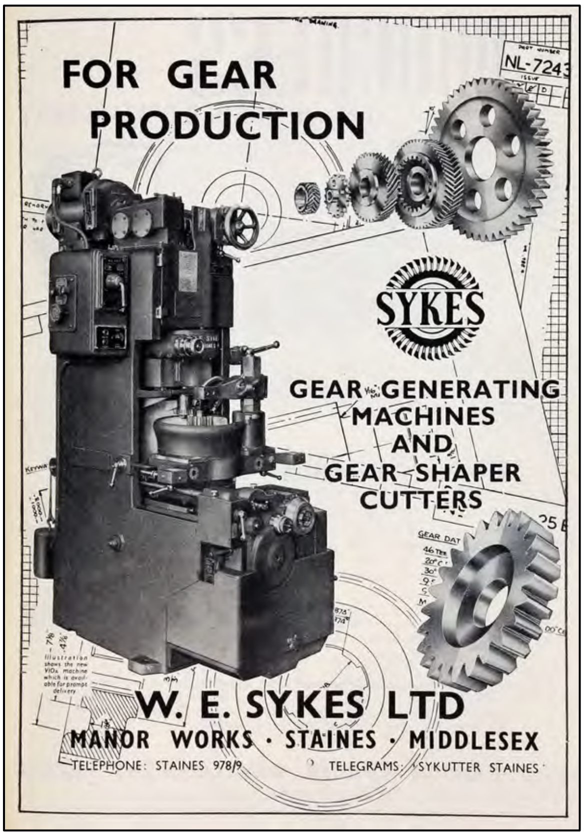

Figure 7. An advertisement for a W.E. Sykes gear generating machine, March, 1948, akin to the one shown in Figure 15 of Backroom Window[4], courtesy www.gracesguide.co.uk/W._E._Sykes Creative Commons Attribution-ShareAlike License.

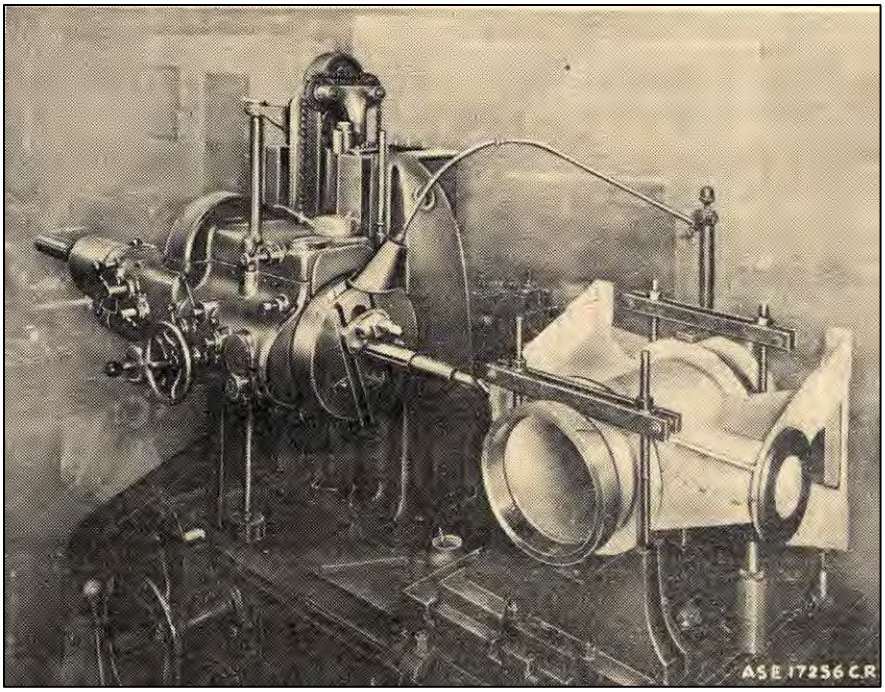

Figure 8. Horizontal borer working on a trunnion carriage of a radar antenna pedestal. *ASE image 17256 CR from Backroom Window[4]*

Constant temperature workshop

While not divulging details of the work being undertaken, the "Backroom Window" article describes a high precision, air-conditioned workshop kept at a controlled temperature of 68˚F, Figure 9. It was "*frequently necessary*" to undertake machining to an accuracy of 1/10,000 of an inch (2.54micrometres). Pride of place went to the jig-boring machine. This machine may well have been used to make drilling jigs that were then used in the Machine Shop to make multiple copies of parts, the use of a jig leading to rapid, yet accurate, placement of holes with the advantage that parts could be readily interchanged given the repeatable and accurate alignment of holes.

Precision test equipment was also kept in this room including: gear tester, a hardness tester, optical dividing instruments and a toolmaker's microscope.

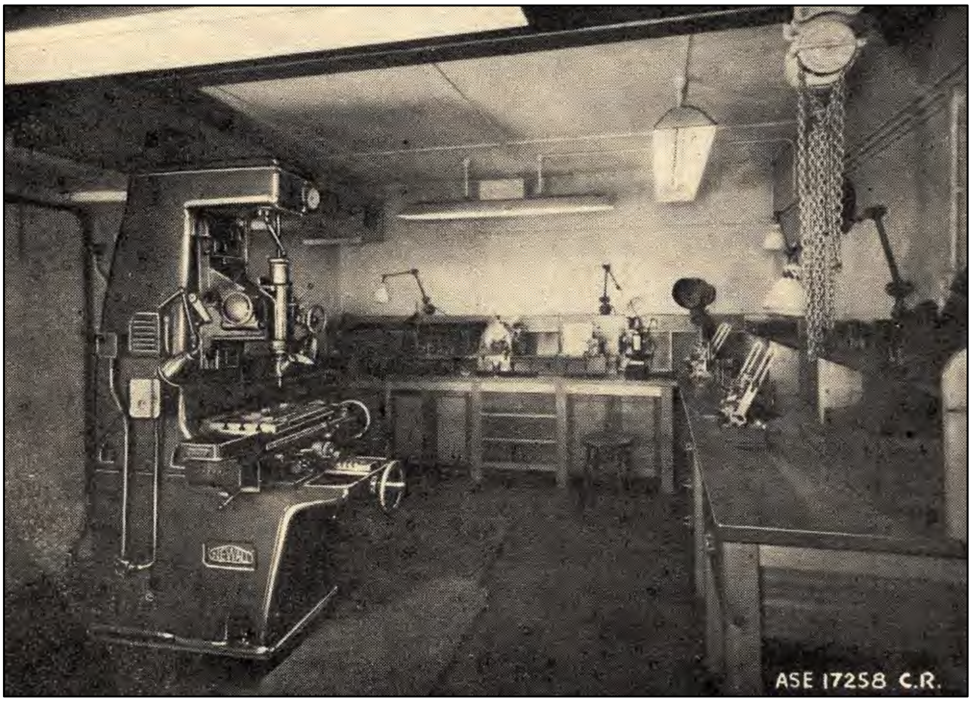

Figure 9. The Air-conditioned, temperature controlled workshop, with, left a jig borer that was used to position holes, or to check the location of holes, over an area of 36" by 24" to 2/10,000 of an inch, or to half a minute of arc on a circle of up to 16" diameter. The quill of a jig borer only moves in the vertical plane, achieving a greater accuracy over a conventional mill. ASE image 17258 CR from Backroom Window[4]

The Witley Workshop moves to Portsdown

The "Backroom Window" article on the Witley workshops concludes by looking forward to moving to a new site on Portsdown Hill overlooking Portsmouth and the sea. As it turned out, the Workshop Block at Portsdown was the first to be completed at the new site, Although the ground for the Workshop Block had been cleared in 1946 shortages of material and labour and the very harsh weather of late January to mid March 1947 further delayed progress[5]. The Controller of the Navy, Vice-Admiral Sir Charles Daniel, who had been Experimental Commander of HM Signal School, the precursor to ASE, visited the site on 3 September 1948. The Workshop Block was mostly complete with a few staff and about a dozen machine tools[5]. Through the autumn the number of workshop staff based at Portsdown increased such that a temporary canteen to seat 80 opened in November 1948. It was late spring 1949 when the Drawing Office draughtsmen moved from Witley, occupying the basement of the Workshop Block. In fact, because of the ground contours, this space had "*magnificent views* *over the valley to the north*", a great improvement on the Witley Nissen huts with their few windows of obscured glass.