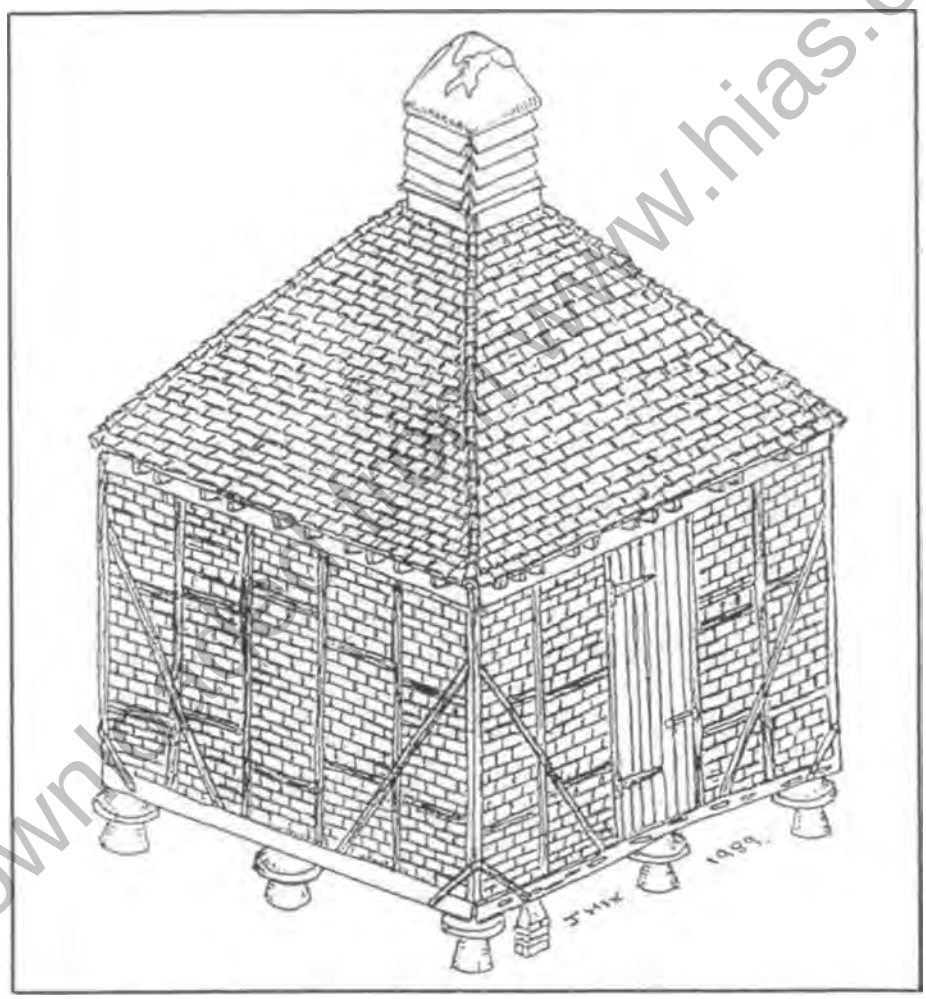
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Southampton University Industrial Archaeology Group

Journal



No. 4

1995

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The Contributors

Dr. Martin Gregory
Although noted for his work on steam engines, Martin Gregory has also acquired a remarkable collection of sewing machines and has undertaken a considerable amount of research on their history. In addition to the machines, he has studied the way in which they were marketed and the somewhat eccentric life styles of some of the entrepreneurs. Dr. Gregory is a current Vice-Chairman of SUIAG and has been a member for over 20 years.

Jon Sims
Jon Sims was born within hailing distance of the Peak Forest Canal without being aware of the fact. His teens were spent surrounded by the Birmingham Canal Navigations, a fact which he only really appreciated shortly before moving to Southampton in 1972 to take up a job at the Ordnance Survey. His introduction to the waterways was through Sea Scouts. Since hiring his first boat in 1977, he has become fully immersed in waterways and I.A.. He writes regularly for *Waterways World* on photography, industrial archaeology and waterways in general. He is a member of the IWA, the Railway & Canal Historical Society, several canal societies and is currently Chairman of SUIAG.

John Asteraki
After graduating from Cambridge, John Asteraki joined the staff of the Royal Aircraft Establishment at Farnborough. For most of his career he undertook research into guidance and navigation systems for aircraft and guided weapons, spending the last 11 years of his service as Head of the Electro-optics Division. Since his retirement in October 1990 he has been able to pursue his interest in the IA of Berkshire and is currently gathering information for a guide to that county's IA relics. With John Bagley he is also currently active in surveying Hampshire's airfields.

John Horne
John Horne is a native of Liverpool and joined the Gas Industry there in 1954, originally as an apprentice. He has worked in most aspects of the gas business, moving first to Lancaster then Manchester, Reading and finally Southampton. Commuting to a London office, he now works mostly in eastern Europe. His interests apart from IA (he is an ex-Secretary and ex-Chairman of SUIAG) include transport history, and most of his published work is about trams and buses. Another interest is Public Utility history.
A major part-time project is to produce a short history of each site within the former Southern Gas area on which gas was made. There are over a hundred of them. The object is to use official and other sources to produce a draft which can be built upon by those interested in each community. Publication, in some guise, is the aim. Salisbury, Leighton Buzzard and others have already appeared in print; here is Odiham, after John Asteraki and Tony Hine have added their contribution, gleaned from the Berkshire Record Office. Those with a particular interest in other small towns are invited to get in touch with John.

Dr. Edwin Course
Edwin Course taught at the University of Southampton from 1956 to 1988. His research and writings have been mainly in the fields of transport history and industrial archaeology. He is currently President of the Railway and Canal Historical Society, President of SUIAG and Chairman of the Twyford Waterworks Trust.

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Southampton University Industrial Archaeology Group Journal

Editorial and Acknowledgements

This is the 1995 edition of the SUIAG *Journal*, the fourth to be published. The policy of publishing pieces about the industrial archaeology and the economic history of Hampshire or, alternatively, anything written by members of SUIAG, remains unchanged. The present issue indicates the range. Hampshire has no special claim to fame for either its canals or its gas works, but the articles which follow demonstrate the interest which they provide. Again, Hampshire was not a centre for the manufacture of sewing machines, although many houses contained them. Dr. Gregory's article is timed to celebrate an anniversary. On the other hand, R.A.E. was arguably the leading research establishment of its type in the world, and the fundamental changes now taking place particularly justify our descriptive history of its buildings. Finally, the major survey of SUIAG since 1980 has been devoted to farm buildings, and its completion is celebrated with an article.

May I remind members who are considering writing for publication of the alternatives to the *Journal*? Shorter pieces may be more suitable for the newsletter, '*Focus*', while longer pieces may be published as monographs. The Publications Committee looks forward to hearing from you.

Once again we are particularly grateful to Angela Smith who designed and set the 1995 *Journal*, and to all our contributors. Acknowledgements for the provision of drawings and photographs are made as follows:–
John Asteraki (Fig 15); Edwin Course (Figs 26, 28 - 30); Martin Gregory (Figs 1 - 10); Roger Hedge (Fig 27); John Hix (cover drawing, Figs 24, 25); Ordnance Survey (Figs 13, 20, 21); Farnborough Air Sciences Trust (Figs 14, 16 - 18); John Reynolds (Fig 31); Jon Sims (Fig 12); Wiltshire County Record Office (Fig 11); Tony Yoward (Figs 22, 23).

Edwin Course
December 1995

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The 150th anniversary of the Sewing Machine

1996 sees the 150th anniversary of the first practicable sewing machine. By the end of the eighteenth century all the processes of carding and spinning thread, and weaving cloth had been mechanised and concentrated into factories. The only step in the sequence from cotton plant or fleece to clothes which was still done entirely by hand was sewing up the cloth into clothes. The Napoleonic wars created a large extra demand for uniforms (the start of the ready-to-wear clothing industry) and poems such as Thomas Hood's *Song of the Shirt* emphasised the drudgery of the life of the seamstress.

The first British patent for a sewing machine was awarded to Thomas Saint in 1790. Only the specification survives and when in the 1870s William Newton Wilson made a model of it for the Patent Museum (the Science Museum) he found that the machine, as specified, could not have worked. Others in France, Austria and America built machines to try and imitate hand stitching but all were unsuccessful in producing a commercially viable machine. The breakthrough came in 1834 when Walter Hunt, a native of Martinsburg, New York, invented the lockstitch; a stitch which could not be made by hand. Hunt made his stitch with grooved eye-pointed needle and a small shuttle. Although he built a machine to demonstrate the concept, Hunt, a professional inventor, did not patent his idea or produce a complete sewing machine to make a continuous seam.

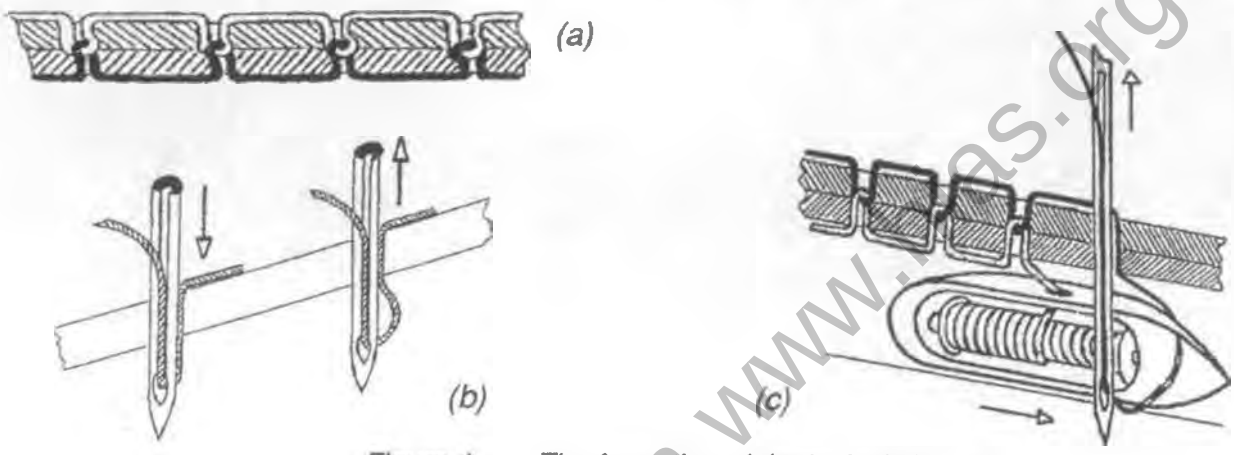


Figure 1 *The formation of the lockstitch*

The development of a *sewing machine stitch* rather than a *machine to imitate hand sewing* was the key to a successful machine. All the significant developments took place in the north east of America in the 25 years following 1846. To make the lockstitch *(Figure 1a)* a needle with an eye near the point and a groove up one side is used. When the needle is pushed through the cloth *(Figure 1b)* it takes the upper thread with it. As the needle is withdrawn the thread on one side can slip along the groove while that on the other side is gripped by the cloth and thus a loop of thread is left below the cloth. When the lower thread, mounted in a small shuttle, is passed through the loop *(Figure 1c)* the stitch is formed and is completed by pulling the slack thread back up the groove to tighten the stitch.

The man usually credited with the invention of the sewing machine is Elias Howe Jr. (1819–1867). In Elias Howe *(Figure 2)* we have an inventor who built a complete workable machine which he patented on September 10th 1846, 150 years ago. Howe's machine produced a lockstitch, used Hunt's grooved eye-pointed needle and shuttle and also incorporated shuttle drive and cloth feed mechanisms to enable the machine to sew a continuous seam. The patent models which survive show a high standard of craftmanship and although Howe demonstrated them to many people he had a singular lack of success in marketing them and therein lies a story.



Figure 2 *Elias Howe*

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Elias Howe was born on his father's farm in Spencer, Massachusetts. His father supplemented his income by running a small corn mill and making cards for the local cotton spinning industry. Elias's first job was inserting wire staples into leather strips to make the cotton cards. After several years he left home to go to Lowell, Mass, as an apprentice in a machine shop making cotton spinning machinery. Later he moved to Boston on a machinist's pay of $9 per week and got married. In 1843 his health deteriorated and his wife had to take in sewing to keep the family together. Folk lore has it that poverty and the sight of his wife sewing spurred Elias into inventing a sewing machine!

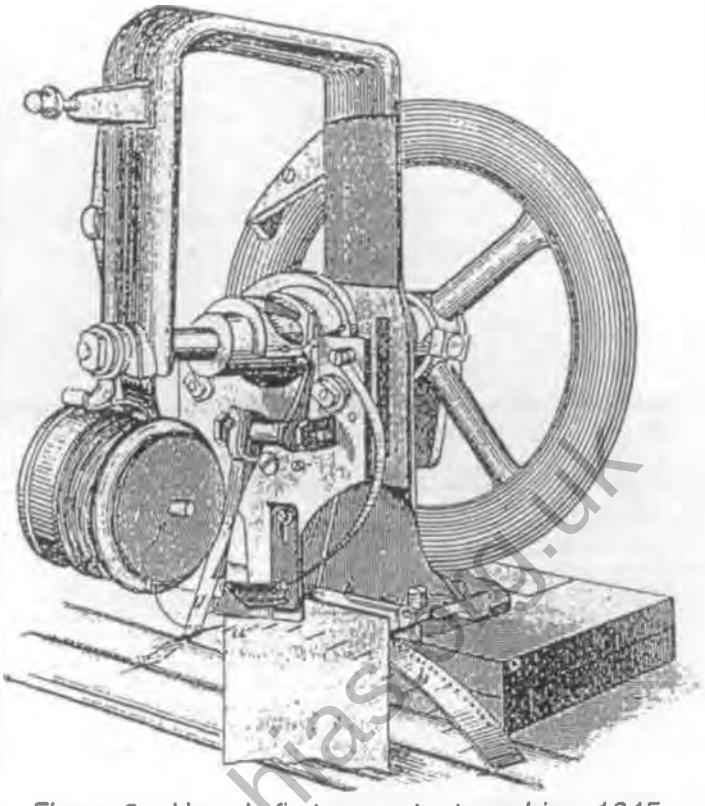
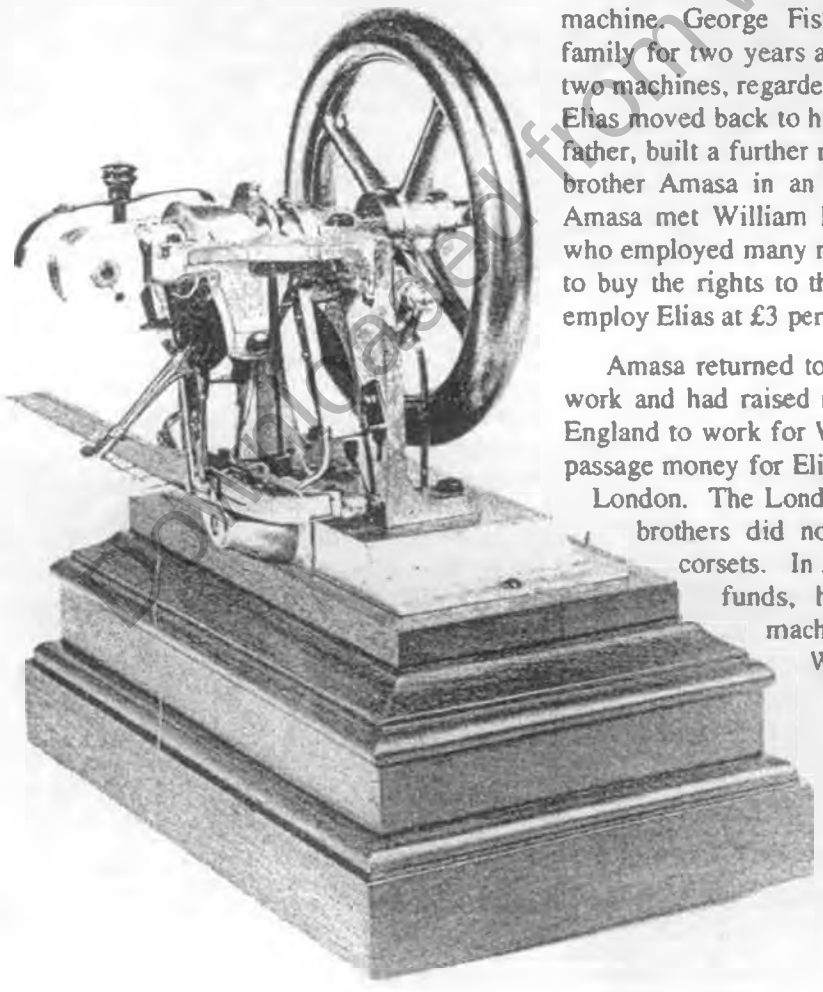


Figure 3 Howe's first pre-patent machine, 1845

We do not know whether Howe knew of Hunt's invention. Although fairly close geographically, communications were not very good and so it is quite possible that Howe thought up the lockstitch independently. Years later Howe acknowledged that Hunt's idea predated his but Howe certainly held the prior patent. Whatever his inspiration, Elias devoted himself full time to producing a working machine. A friend, George Fisher, agreed to board Howe and his family and to advance Elias $500 for materials and tools in return for a half interest in any patents Elias obtained. Within a few months he had produced his first model *(Figure 3)* and in May 1845 it sewed its first seam. A second improved machine was built in 1846 and this was the one submitted for the Howe patent *(Figure 4)*.



Elias had no success in finding finance to manufacture his machine. George Fisher, having looked after Howe and his family for two years and having paid for the construction of the two machines, regarded his outlay of $2000 as a poor investment. Elias moved back to his father's house and, using a loan from his father, built a further machine. This was taken to England by his brother Amasa in an attempt to interest British manufacturers. Amasa met William Frederick Thomas, a corset manufacturer, who employed many men hand stitching corsets. Thomas offered to buy the rights to the Howe machine for £250 and offered to employ Elias at £3 per week to adapt the machine to sew corsets.

Amasa returned to America and, since Elias was still out of work and had raised no interest in his machine, both sailed for England to work for W. F. Thomas. Thomas later advanced the passage money for Elias's wife and three children to join them in London. The London venture was not a success as the Howe brothers did not succeed in making a machine to sew corsets. In April 1849 he was back in America without funds, having had to pawn his precious first machine for £4 to pay for the passage home. William Thomas, left with the British rights, ultimately became a very rich man!

Back in America, Howe found many small manufacturers of sewing machines. All used the grooved eye-pointed needle but there were several alternative ways of making the lockstitch and of feeding the

Figure 4
Howe's machine for his 1846 patent

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cloth through the machine. The defects of Howe's machine such as its poor feed mechanism which restricted it to sewing short lengths of straight seams were being overcome by others and truly commercial machines were beginning to appear. Foremost amongst these were the machines developed by Allen Benjamin Wilson and Isaac Merritt Singer.

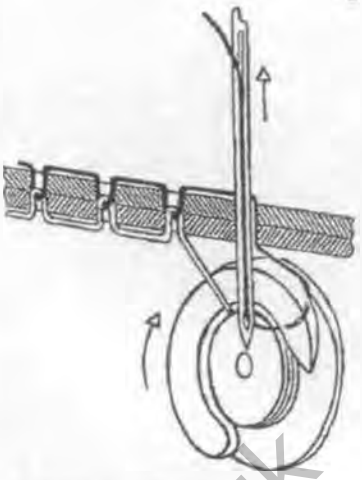


Figure 5 The formation of the lockstitch by a rotating hook

Wilson patented two major ideas: a rotary hook to form the lockstitch and the 'four motion' feed mechanism in patents starting in 1850. Howe's shuttle lockstitch drew its technology from the contemporary loom. Wilson's rotary hook *(Figure 5)* used a rotating hook to pick up the loop of top thread left by the receding needle and take it round a stationary bobbin of the lower thread. This mechanism was simpler than the shuttle and produced less vibration. The *'four motion'* feed used a spring loaded foot which held the cloth against a serrated plate. The feed mechanism moved the serrated plate up and down, and back and forth the feed the cloth through the machine. Wilson's machine *(Figure 6)* was the first really successful commercial machine and laid the foundation of the Wheeler and Wilson Mfg. company. His ideas are incorporated in nearly all of today's machines.

I. M. Singer patented his first machine in 1851 *(Figure 7)*. He called it the *'perpendicular action'* sewing machine because the needle moved vertically up and down through the cloth. Both Howe and Wilson had used curved needles moving in an arc of a circle. Singer used a shuttle, like Howe, but fed the cloth through the machine with a serrated wheel and presser foot.

Other inventors devised competitors for the lockstitch. The most far reaching was Grover and Baker's *'double thread chainstitch'* of 1851. This used the eye-pointed needle but interlocked the two threads in a chain. It used more thread than a lockstitch but both reels of thread were outside the machine and it obviated the problem of small special bobbins of thread in the shuttle. For this reason the stitch forming mechanism of Grover and Baker stitch is still widely used in industrial machines.

So what of Elias Howe? Out of work and now a widower, he managed to redeem the pledge on his machine in London and get the machine back to America. He sought out manufacturers of machines which infringed his

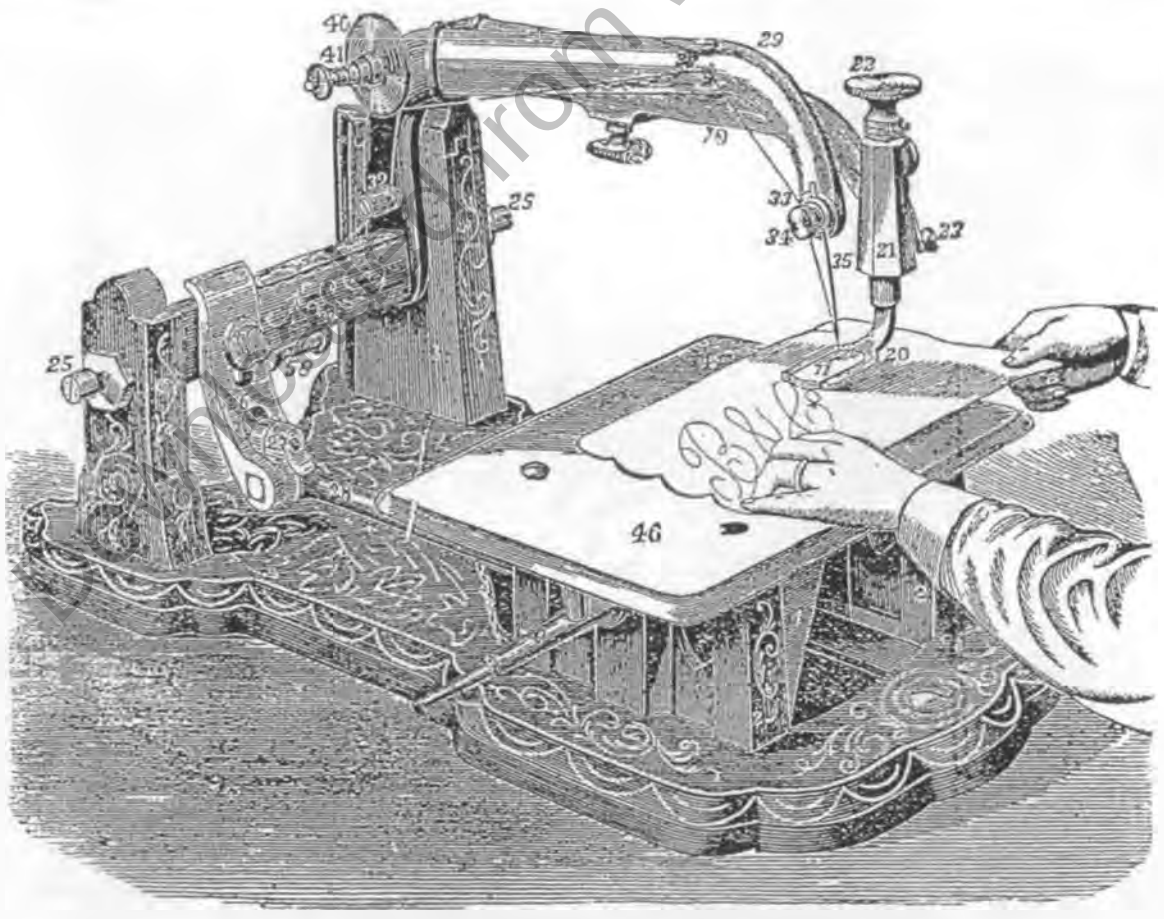


*Figure 6 Wheeler and Wilson's **"No 1"** sewing machine*

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1846 patent but had not the funds to pursue them through the courts. Fisher, by now totally disillusioned, agreed to sell his half interest in the patent. In 1852 a George W. Bliss advanced the money for legal actions to protect the patent, against a mortgage on the Howe family farm. Whilst juries found in Howe's favour in one or two cases, it became clear from the litigation that successful machines incorporated ideas protected by several patents. Even Howe himself could not make a machine which did not infringe some master patent. His brother Amasa did manufacture machines and paid up on royalties. In 1856 Orlando Potter of the Grover and Baker company suggested that Howe and the three major companies above should form a "Patent Combination" to pool their master patents. Members had free access to all the patents owned but non-members of the Combination were charged a flat rate of $15 per machine. The Combination vigorously pursued infringers of its patents and through it Elias Howe and the member companies became very rich. At the time this was breaking new ground in patent law. The Combination lasted until 1877 when the last of the patents it held finally expired.

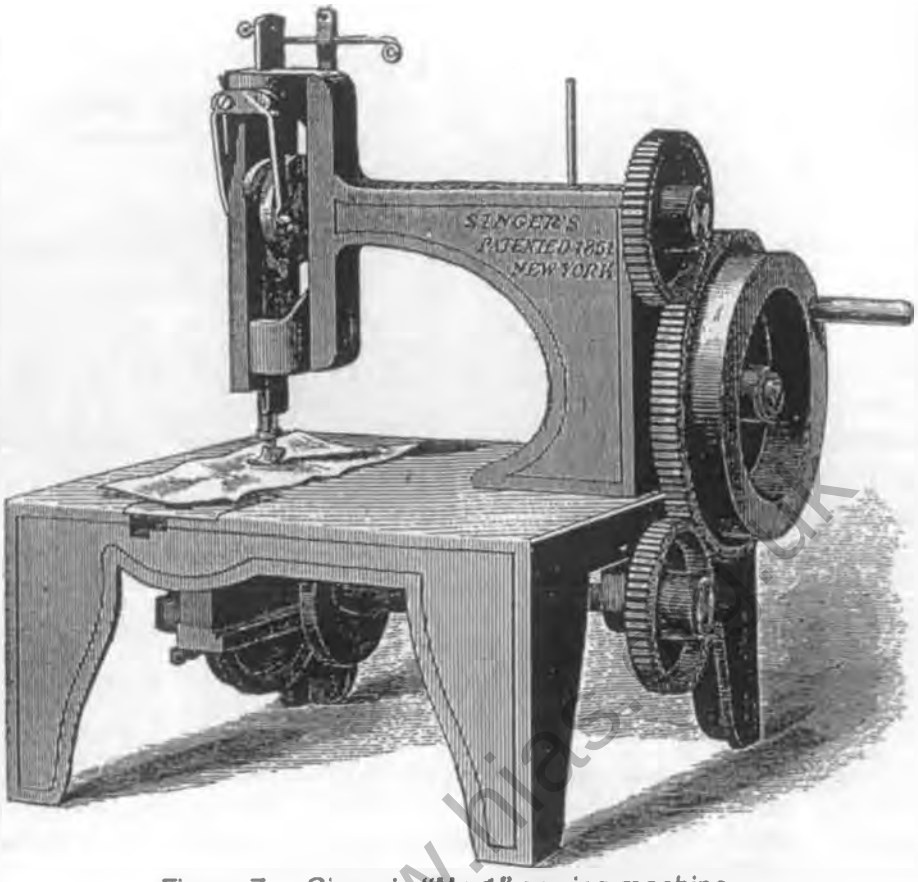


*Figure 7 Singer's **"No 1"** sewing machine*

The early machines were aimed at tailors and seamstresses rather than for family use. They were expensive, $100 to $125 when a seamstress was paid $3 per week, and cumbersome. Sales were slow at a few hundred machines per year for even a large manufacturer like Singer. Only the Wheeler and Wilson machine was light enough and small enough to be attractive for home use. On the other hand, for a factory owner they were an admirable investment. In 1860 the factory of a New Haven shirtmaker turned out 10 000 shirts per week using 400 sewing machines operated by 400 seamstresses in place of his former 2000 seamstresses. The changeover reduced his labour costs from $6000 per week to $1600 per week even though each seamstress got $1 per week more. The time taken to make a shirt came down from 14½ hours to 1¼ hours. The machines paid for themselves in three months. However, for the sewing machine business to boom both production and marketing needed a revolution.

The revolution in production came with the arrival of interchangeable manufacture, the *American system.* The spur to the development of interchangeable manufacture came from the small arms industry in America and was solved for the civil war. After the civil war, in the 1860s there was much expertise and surplus capacity; Remington, a small arms manufacturer, went into sewing machines and then typewriters, Browne and Sharp made sewing machines for Willcox and Gibbs, etc. Production rose dramatically and unit production costs fell to $10 for a basic family machine. As the master patents expired, copies of all the successful machines were made all round the world.

The revolution in marketing had several components. Edward Clark, Singer's partner, was responsible for two of them. In 1856 he wrote: *"Why not rent a machine to the housewife and apply the rental fee to the purchase price of the machine. Her husband cannot accuse her of running him into debt since he is merely hiring or renting the machine and under no obligation to buy. Yet at the end of the period of the lease, he will own a sewing machine for the money."* So was born Clark's idea of *"hire-purchase"*. Sales tripled in a year. A year later (1857) Clark launched his second boost to sales with the introduction of *"part exchange"*. He announced a *"liberal plan of exchanging Singer's new and latest improved sewing machines for old or unimproved sewing machines of every kind."* The Singer company took no risks with part exchange machines: *"The old machine will be ..... immediately broken up and destroyed."* Sales rose by another 50%. After the civil war, falling unit production costs and the enormous growth of the railroad network enabled machines and

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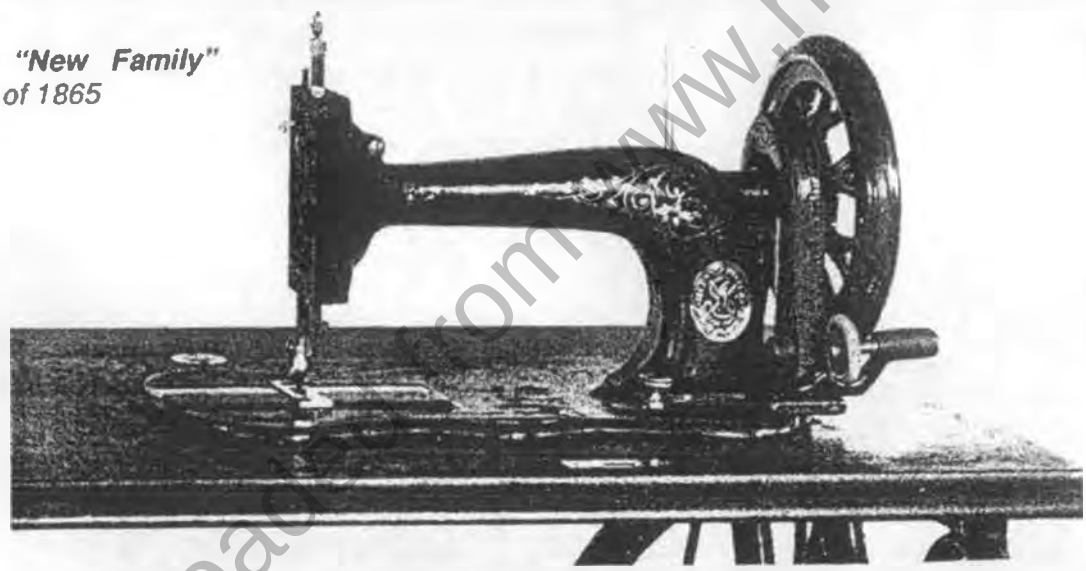
advertising to reach every small town quickly. One last component was solved in Scotland. Simple cotton thread was 'hairy' and frayed when passed through the eye of the needle and round the shuttle. A strong '6 cord' cable thread made by twisting together three two-ply yarns was developed by G. and W. Clark of Paisley to give us the machine twist of today.

Successful machines were great successes made in their millions. Poor machines were disasters. Of the first generation (pre 1861) the pre-eminent machine was the Wheeler and Wilson number 1 *(Figure 6)* which was widely copied all over Europe. It survived in production into this century. The classic machine of the 1860s was Singer's "New Family" of 1865 *(Figure 8)*. Singer made over 4 million between 1865 and 1900 and it is estimated that another 20 million copies were made around the world, some as late as the 1930 s. The Singer Manufacturing Co. took over from the Wheeler and Wilson Mfg. Co. as the world leaders and dominated the industry. To illustrate their growth, cumulative production was 100 by the end of 1851, 43 000 by the end of 1860, 1.5 million by 1875 and 20 million by 1900.

The history of the sewing machine in England is one of copying and modifying rather than totally new innovation. William Thomas, who had bought the rights to the Howe patent and registered it in his own name in 1846, did not produce a successful machine until the mid 1850s. This he produced in small numbers for nearly 30 years, long after it had become outdated. The 'oldest' sewing machine manufacturer in England was Bradbury of Oldham who started in 1852 making a copy of a Grover and Baker industrial machine. Most of their productions were copies of Howe, Wheeler and Wilson and Singer machines. The copies were close enough that parts could be interchanged and usually the copies were more successful than their own designs. They also imported American machines and 'badged' them with their own logo (a bust of the Duke of Wellington). They grew to be quite a large concern and diversified into the manufacture of small machine tools, mail carts and later, cycles and motor cycles. The company was wound up in the 1920s.

Figure 8

Singer's "New Family" machine of 1865



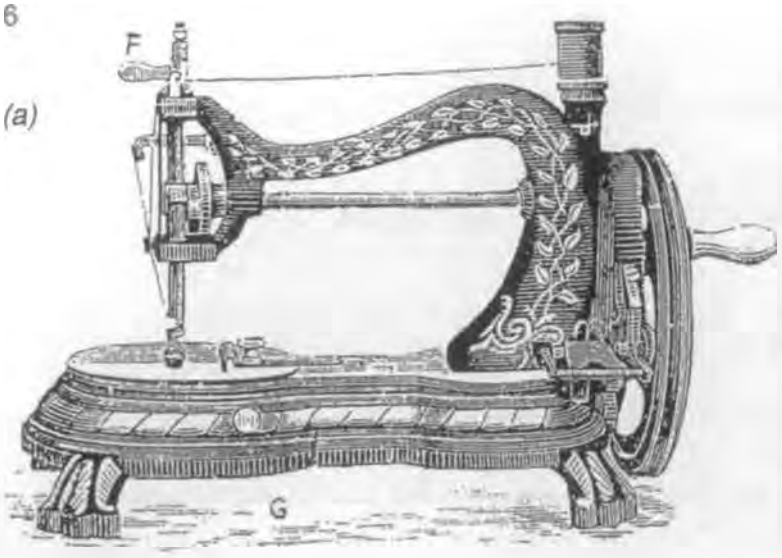
The only other English manufacturer to survive the 1914-18 war was Wm. Jones of Guide Bridge near Manchester. He started making sewing machines in 1859 and, like Bradbury, made copies of Howe, Wheeler and Wilson and Singer machines. Similarly, his own designs were less successful than the copies. The Jones company survived to be taken over by the Japanese company Brother and still markets Brother machines.

English manufacturers faced stiff competition. In 1867 the Singer company went multinational and started making machines in Glasgow. Singer and several small manufacturers sited themselves in Glasgow because Scotland was not covered by Thomas's registration of the Howe patent. The Singer company later moved to a large site in Clydebank which became, by 1900, the largest sewing machine factory in the world with a capacity of over 1 million machines per year. To sell all these machines the company opened shops in every sizeable town. There were over 400 shops in England (excluding Wales and Scotland) by 1880 with the Winchester branch being at 33 Jewry Street and the Southampton branch at 36 Bernard Street. The shop was run by a couple with the wife as demonstrator in the shop, the husband as repair man, and both as door step salesmen in the evening.

Faced with this, although many British inventors filed patents for improvements to the sewing machine and many formed companies to exploit these patents, few British sewing machine companies remained in business for very long. Some left sewing machines and made a name in another field: Gresham made sewing machines before turning, as Gresham and Craven, to railway and locomotive parts; Starley started in sewing machines

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(a)



(b)

Cheapest House in the Trade for
SEWING MACHINES,
MANGLES & PERAMBULATORS.
Sewing Machines Repaired on the Premises or taken in Exchange.
NOTE THE ADDRESS:—
R. A. MILLER,
52, ST. MARY'S STREET, SOUTHAMPTON
(OPPOSITE ALBION CHAPEL)

*Figure 9 Jones "**Hand machine**" for R. A. Miller*

before leaving to found the Coventry cycle industry. Some established companies made sewing machines for a few years at the height of the boom in the 1870s; the Britannia company of Colchester who made machine tools and cast iron furniture made a few Wheeler and Wilson copies; the Coalbrookdale company provided castings for Jones and for the hand gear on Willcox and Gibbs machines imported from America.

Many British companies which styled themselves as 'manufacturers' were in fact no more than distributors and agents for foreign machines. Singer and the other members of the Combination would not 'badge' their machines with other agent's names, but most other manufacturers would deliver machines with only the agent's name on it when the agent bought large numbers of machines. Initially these imported badged machines came from America but from the 1870s onwards more and more came from Germany which, by 1900, dominated the import market.

To take a couple of local items, I had a Jones 'hand machine' *(Figure 9a)* from which all traces of its Jones origin had been replaced by transfers and diestamps for R.A. Miller of Southampton *(Figure 9b)* who traded from St. Mary's Street in the 1880s. A little later (1899) we find Falconer and company advertising a vibrating shuttle machine manufactured by H Mundlos and Co. of Magdeburg in Germany *(Figure 10)*.

The half century from 1850 to 1900 saw the sewing machine rise from a curiosity to a familiar item in nearly every home. It was often advertised as a "servant in the house". For the first half of this century it retained its position and nearly every girl learnt at school, if not at home, to use a sewing machine. It is only the rise of cheap ready-to-wear clothes made in the third world that has given us a generation which is less familiar with our oldest precision machine in the home. By the 1880s all the types of machine:- zig-zag, button hole, blindstitch, overlocker, embroidery, etc were available in black cast iron with gilt decoration. The only change has been to cast the frame in light alloy and paint it cream. With the exception of the electric motor and electronic control, there is nothing in today's machine which would be unfamiliar to the sewing machine technician of a century ago.

Martin Gregory

FALCONER & CO., 9 BERNARD STREET, SOUTHAMPTON.

VICTORIA V.S.

The QUEEN of
SEWING MACHINES.
WONDROUS REDUCTIONS.

FALCONER & CO., 9 BERNARD STREET, SOUTHAMPTON.

V.S.

OUR CASH PRICE WITH ORNAMENTAL COVER, £7 0 0

V.S.



V.S.

USUAL LIST PRICE OF THIS V.S. MACHINE, £10 10 0

V.S.

VIBRATING SHUTTLE HAND MACHINE - - { OUR CASH PRICE - £4 10 0
- - WITH ORNAMENTAL COVER { USUAL LIST PRICE £6 7 6

LOCK-STITCH MACHINES FROM 40/-

We Exchange and Repair all kinds of Sewing Machines, Baby Carriages, &c.

PERAMBULATORS, MAIL CARTS, &c., IN NEW DESIGNS AND ARTISTIC COLOURS
WASHING MACHINES, MANGLES, AND ALL LAUNDRY REQUIREMENTS.

FALCONER & CO., 9 Bernard Street, Southampton.

WE SUPPLY ALL OUR GOODS ON THE INSTALMENT SYSTEM.

WE SUPPLY ALL OUR GOODS ON THE INSTALMENT SYSTEM.

*Figure 10 Advertisement for "**Victoria**" machine*

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The Southampton & Salisbury Canal: some answers

SUIAG Journal No. 2 contained a paper on the Southampton & Salisbury Canal at West Dean on the Hampshire-Wiltshire border. This paper raised several questions about the previously documented research on this canal, especially the book *The Bankrupt Canal* [1] by former Southampton City Archivist, Edwin Welch. These questions evoked a response from Michael Tighe, once an active member of SUIAG and now happily ensconsed in the village of Mere in Wiltshire. Mr Tighe had taken the opportunity of a visit to the Wiltshire Records Office in Trowbridge to seek out further evidence concerning the layout of West Dean prior to the coming of the railway. This he found in the form of a tithe map dated 1843, a most exciting document which clears up much of the mystery surrounding the line of the canal and how it related to the adjacent River Dun [2].

Let us begin with a brief recap. The critical passage in Edwin Welch's book is his assertion that *"...the canal has been almost obliterated by the railway and other alterations"*. Suspicions were raised by inspection of various large scale Ordnance Survey maps. These tended to suggest that the canal followed a sinuous contour course which had little in common with the arrow straight railway. Unfortunately, these maps all post-date the building of the railway. The suspected line of the canal is delineated by the course of the river as it flows through the village pond in front of the 'Red Lion' public house [3].

The 1843 tithe map *(Figure 11)* shows quite clearly that the river and canal had quite separate but parallel courses. Once the line of the railway is superimposed on this map *(Figure 12)* it becomes equally clear that the railway barely touches the line of the canal.

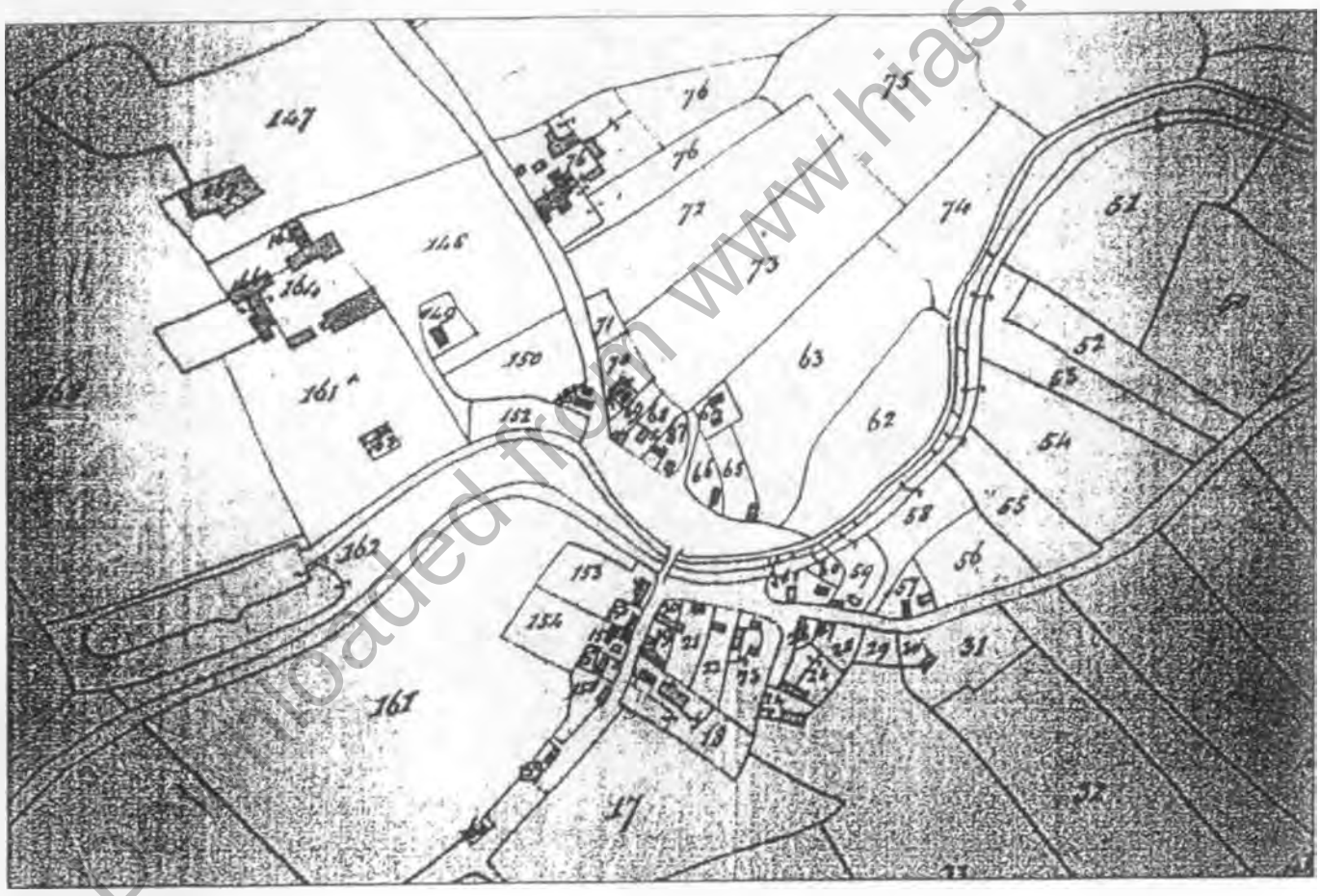


Figure 11 1843 Tithe Map (Wiltshire County Record Office)

The other great omission in *The Bankrupt Canal* is any mention of the sizable cutting alongside the large, rectangular pond in the woods to the west of the village. This cutting can readily be interpreted from the 1870s OS 6" map *(Figure 13)* as being on the line of the canal. Why such an expensive earthwork was necessary was one of the points raised in the previous paper. It was surmised that the route around the foot of the spur of land was blocked by farm land and by the water courses which supply the rectangular pond. While no documentary evidence has yet been found, the present land owner, Mr Parsons, maintains that this feature was a fish pond belonging to the church. Thus it seems that the canal was forced to take its costly route south of this pond and through a cutting which must have been of crippling expense to the penurious canal company.

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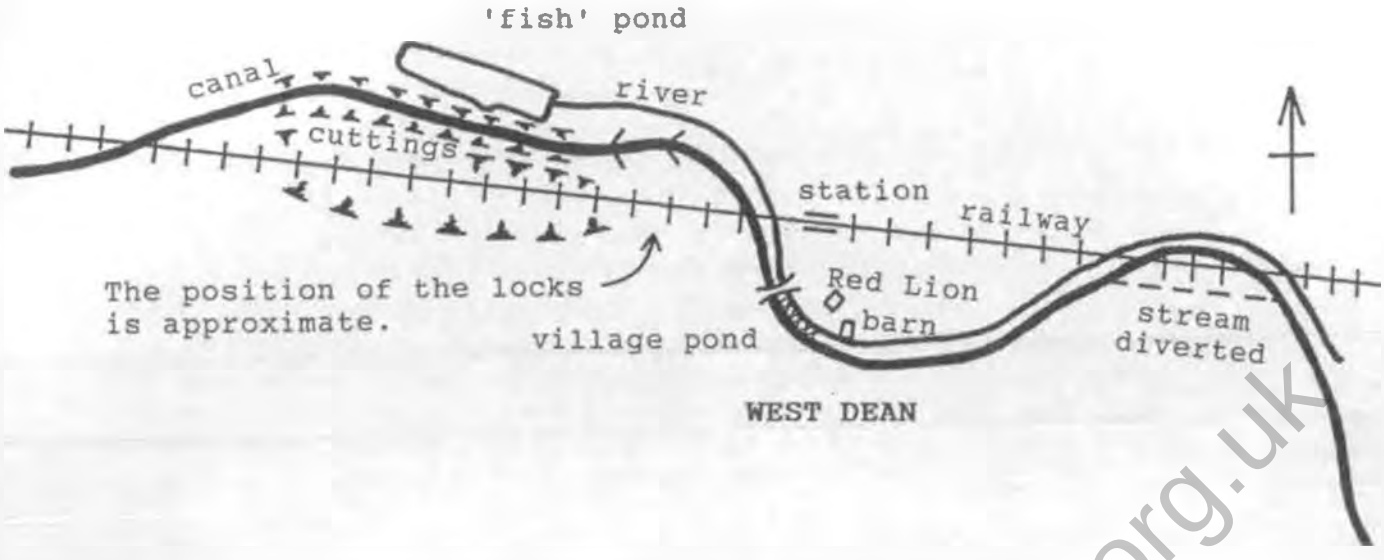


Figure 12 Positions of canal and river with railway superimposed (Jon Sims)

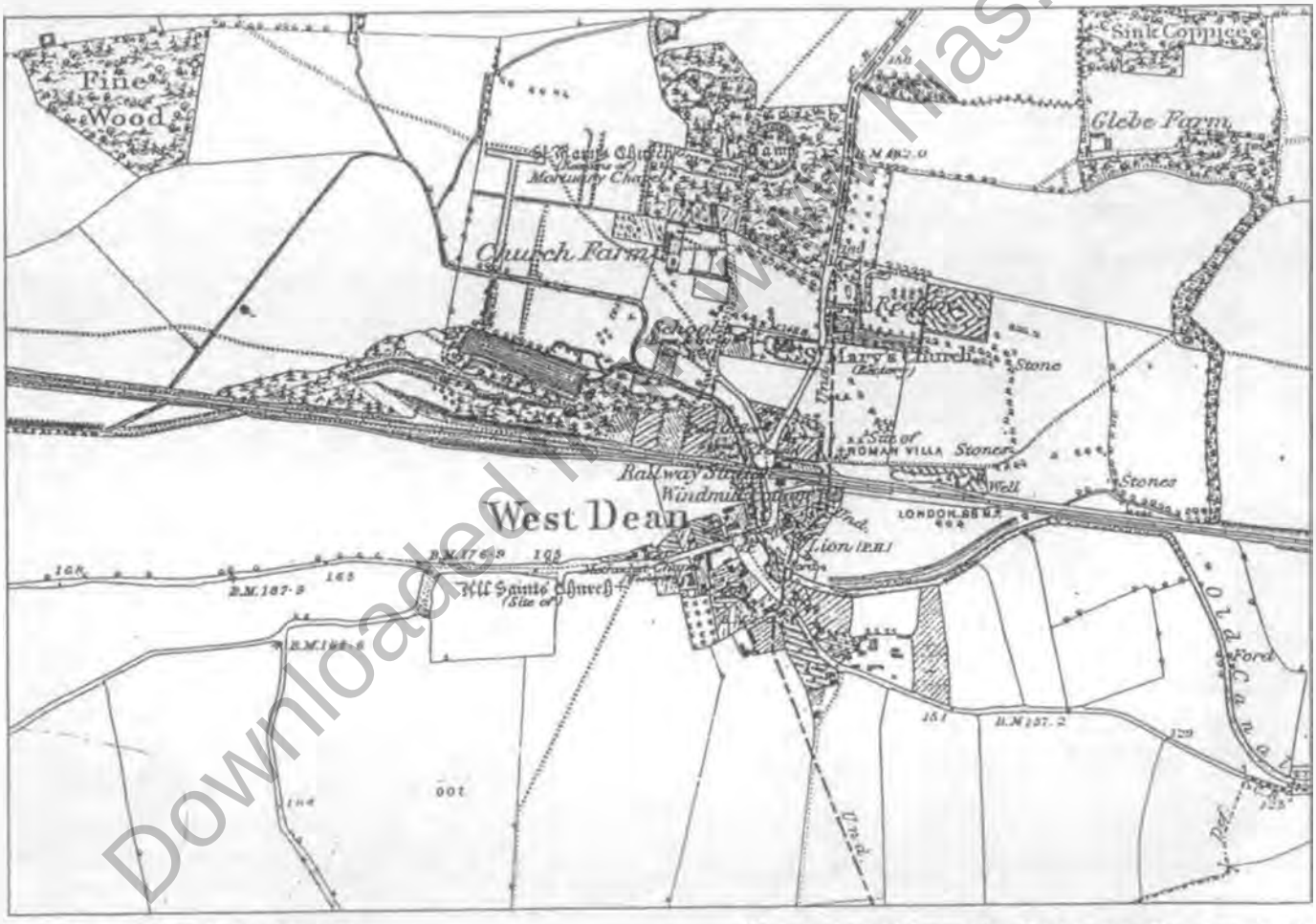


Figure 13 1870s 6" map *(Reproduced from the Ordnance Survey map)*

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The other conundrum lurking in these woods was the whereabouts of locks 7 and 8. The ground is extremely confused as a result of the railway navvies having dumped their spoil in the canal cutting and, according to the OS maps, as a result of chalk extraction. Add to this the dense tree cover, and all attempts to judge height variations by eye proved impossible. The contours certainly indicate a rise of around 5 metres, equivalent to two locks, between one end of the wood and the other. Logic would suggest that the canal should rise as high as

possible before reaching the high ground as this would decrease the depth of the cutting. On the 22 January 1995, a party from SUIAG braved some foul weather to run a line of levels through the cutting. Starting from the bench mark at the railway station, Peter Oates and Frank Shephard (both surveyors from the Ordnance Survey) ran a line of levels which proved the above supposition. The full 5 metre rise is achieved between the village pond and the bottom of the cutting. Both locks must, indeed, have been at the eastern end of the cutting.

It is now possible, in the light of this new evidence, to piece together a plausible interpretation of the alterations caused by the arrival of the railway in the 1840s. The railway builders were faced by a small stream and a derelict canal which had lain idle for over 35 years. Their relatively advanced technology was undeterred by minor changes in level and the track took a straight line through cuttings and across embankments. The cutting to the west of Dean Station is quite deep and it is fairly obvious, as previously mentioned, that some of the spoil was dumped in the adjacent canal cutting. At the western end of the woods, where the railway crosses the canal, it seems that any water still contained in the latter was diverted under the former in a ditch leading across the valley to the stream. The site of the locks disappeared under small scale cultivation. The stream passes under the railway immediately west of the station and then beneath the road bridge. [This is not an original canal bridge.] Hachures alongside may well mark the canal bed. The pond in front of the 'Red Lion' would appear to consist of the full width of both canal and stream although, beyond this, the water has been diverted into the line of the canal, with the former stream bed showing as a ditch alongside. At the extremity of the meander is the only point where the railway really interferes. The outside bend of the stream has been cut off and the line of the canal has been straightened alongside the railway.

While the more conventional history of West Dean would present a long and fascinating quest, just about all of the questions asked in the previous paper have been satisfactorily answered. By dint of documentary research, field investigation and some applied thought, this fascinating puzzle has been laid to rest and a clearer truth has been documented. Surely this is the essence of Industrial Archaeology.

Jon Sims

References

[1] EDWIN WELCH, *The Bankrupt Canal: Southampton & Salisbury, 1795-1808*. (City of Southampton 1966)
[2] 1843 Tithe Map, Wiltshire County Record Office, Trowbridge.
[3] The 'Red Lion' public house. O.S. National Grid Reference SU 257271

Note: The paper in SUIAG Journal No 2 stated that the railway opened in 1840. The date of the tithe map shows this to be an error. The Railway & Canal Historical Society Research Officer has since enlightened me. The railway through West Dean and the station both opened for goods traffic on 27th January 1847 and for passengers on the 1st March in that year.

The Buildings of the Royal Aircraft Establishment

Introduction

Much has been written about the work and the achievements of the Royal Aircraft Establishment together with its short-lived successor the Royal Aerospace Establishment, but very few descriptions of the numerous buildings in which this work was undertaken have been published. In 1993, Ministry of Defence made the decision to move the Procurement Executive (MOD(PE)) flying away from Farnborough and to dispose of the aerodrome and, in addition, the Defence Research Agency (DRA), which had been formed by the merger of the former Defence Research Establishments, decided to move the Farnborough-based part of its operation from the offices and laboratories on the historic factory site bordering on Farnborough Road, to new buildings to be erected a mile or so away on a site in the southwest corner of the airfield near Ball Hill. Access to the new site is to be from Ively Road. One of the principal motives behind the Government's action was that the land vacated could then be sold for a considerable sum. Since Farnborough Aerodrome and the Factory together occupy some 14% of the land area of the Borough of Rushmoor (as the amalgamation of Aldershot and Farnborough is now known) the future of the site is of considerable concern to the local authority. What redevelopment will be permitted is still the subject of considerable debate but several of the proposals require that most, if not all, of the oldest buildings in the world associated with aviation, which are still extant, be demolished. The recording of those buildings has thus become an urgent necessity. This paper mentions some of the buildings which seem to have merit either from their age, the method of construction used, their uniqueness in terms of the facilities provided, or for some noteworthy work which has been undertaken in them.

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History of the site

The huge military presence in the Aldershot/Farnborough area dates from 1853, when the then Government decided that the British Army should have a large, permanent camp. After a survey of possible sites, the Aldershot area was chosen, one of the prime reasons being the existence and availability of a considerable area of heath, waste land, and open common land. The project went ahead with a speed which is rare in British history, partly because of the personal interest of the Prince Consort and partly because of the pressures caused by the Crimean War which began in March 1854. A large area of land was purchased but, in the event, barracks were only built on the east side of Farnborough Road, which included part of Farnborough as well as Aldershot. This left a long stretch of undeveloped land on the western side of Farnborough Road, which was cut in two by the Basingstoke Canal. The area to the north of the canal comprised Jersey Brow, Farnborough Common, Cove Common, Ball Hill, and Laffan's Plain. Laffan's Plain is of special interest. It was an artificial clearing in a heavily wooded area and in the 1890s was Britain's national parade ground, being the scene of great military splendour, with perhaps the most splendid occasion being the review by Queen Victoria of 27,000 troops on 1 July 1897. The area was named after Major General Sir Robert Laffan who, in 1854, as a captain, had drawn up the original plans for the Aldershot camp. He later served as Chief Engineer to the Command and in that capacity went to great trouble to make Aldershot a pleasant town by planting greens and trees wherever possible. Early in the present century Laffan's Plain had become overgrown but was re-cleared on the orders of General Sir Horace Dorien-Smith. It was thus that there was a rather rough, but large cleared area.

To understand the second thread in the development of Farnborough as an aeronautical centre, it is necessary to go back to the first manned balloon ascent which took place in Paris on 21st November 1783. That balloon, manufactured by the Montgolfier Brothers, was (in modern parlance) a hot-air balloon. What is not quite so widely known is that the first flight of a manned hydrogen-filled balloon took place, also in Paris, only some 10 days later on 1 December 1783. On the continent, the military potential of the hydrogen-filled balloon was recognised almost at once, and their first recorded use in military operations was by the French during the French Revolutionary wars. By 1812 the Prussians were employing balloons and, in 1849, the Austrians tried something new – air bombing against Venice. During the American Civil War, balloons were used for observation, and balloons were used spectacularly during the Franco Prussian War, particularly by the French during the siege of Paris.

However, the British Government did not show any great support for ballooning until 1878, when the War Office allocated Capt Templer, as he then was, £150 for the construction of the first British Military Balloon, appropriately named Pioneer. From then until the end of the First World War, the government involvement in aviation was steady though hardly generous. A balloon workshop was established at Woolwich, but after 4 years it was moved to more spacious premises at Chatham. The successful use of balloons by the British Army in various campaigns led to all the ballooning activities being moved in 1892 from Chatham to Alison's Road, Aldershot, a site which later became known as Balloon Square. From this very unpromising start, by the turn of the century, Britain had become the world leader in balloon technology.

The use of balloons by the British Army in the South African War was so successful that when the war was over, there was immense public pressure on the Government for a complete re-appraisal of military ballooning, and in particular for the construction of airships. However, an airship could not be built in the cramped quarters of Balloon Square, Aldershot, and clearly a new site had to be found. Several sites, mostly in the Midlands, were considered, but all had disadvantages. In order to make progress, a proposal was made that a shed, in which an airship could be constructed, should be erected near Aldershot, with a view to dismantling it and moving it to the new permanent site, when that site had finally been chosen. In fact, many of the key workers were married women and it was very doubtful whether many of them would have been prepared to leave the Aldershot/Farnborough district. In the event the problem did not arise and it was on Farnborough Common that the construction of the first airship shed (160ft long by 82ft wide by 72ft high) began in 1905. During the latter part of that year, the main balloon house, two gas holders, and various smaller buildings were removed from Aldershot and re-erected at Farnborough alongside the airship shed. New workshops were also erected just to the east of the airship shed. All the buildings were laid out with a strong east-west axis, which has been maintained until the present day.

The first major extension of the Factory Buildings was approved in 1909; this involved substantial enlargement of the workshops (Q27 building) including the erection of the tall section at the southern end, which was intended for the construction of airship cars and aeroplanes. Most of this block was completed by March 1912. A new office block (Q1) was completed early in 1913. It acquired a new rear wing during the first war and, about 1937, a new front wing together with a third floor.

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Two new airship sheds were built in 1910-11: the first to house the Lebaudy airship which was bought by the 'Morning Post' and given to the Government, arriving at Farnborough in October 1910. These two sheds were built to the west of the existing Factory buildings, and alongside was erected the so-called 'Portable Airship Shed' *(Figure 14)*. This was designed to be easily dismantled and re-erected, and it had canvas covering which, after a fairly short time, became so badly torn that it was removed. The bare frame was dismantled about 1914, but the straight lower frames were used in 1916 as the main structure for a new fabric and balloon workshop (now Q65 building), and the curved top frames were re-erected and covered with iron sheeting to house the Factory's foundry (R51 building).



Figure 14 The frame of the 'portable airship shed', probably taken during construction. The size of the shed may be judged from the height of the various riggers working on the structure

During 1912 and 1913, new sheds to erect aeroplanes, and to house the growing fleet of experimental machines, were built between the airship sheds (now P67 building) and facing the airfield on the site now occupied by the Medical Block. At about the same time the 'Black Sheds' near Cody's Tree (G27 and G29) were built for the Royal Flying Corps; these buildings formed the pattern for the standard RFC hangars on most home aerodromes until about 1916.

The present RAF Officers' Mess was built in 1913, and the first part of the civilian Staff Mess in the same year. Specialised experimental facilities were built: the Engine Test Beds (R24 building) in 1911-13, and the Whirling Arm for propeller tests in 1913. The concrete base for this apparatus survives at the end of the Staff Mess garden, and the radius of the Arm is indicated by the banks in the lawn.

A new phase of extensions began in 1915. By the middle of the year another block of workshops had been built (R21), and the first groups of workers' houses at Pinehurst Cottages were completed.

A much larger extension of the factory was made in 1916, when large scale production of the F.E.2B, R.E.8, and S.E.5, and of RAF engines, was started. The main power station was built at this time, with massive underground ducts taking steam pipes throughout the works. The main production workshops were built on the north side of the existing Factory buildings, and covered almost all of the present built-up area. A new main entrance was constructed at the present North Gate, as was a canteen building outside the security fence on the same site as the present Assembly Hall.

Most of these buildings were demolished between the two wars, the sites now being occupied by later buildings, but R50, Q65, and P70 still survive, though all have subsequently been modified. Another aspect of this expansion of the Factory was the construction of Rafborough, a large estate of workers' houses at Cove, the first houses being occupied in 1918.

A crude 4ft wind tunnel had been built at Farnborough in 1906 and it was used briefly, but thereafter the National Physical Laboratory facilities were used until the first major RAE wind tunnels were built in 1916-17. These were two 7ft wind tunnels, which were housed in R52 building. The building remains and some of the original machinery, but the No.2 7ft tunnel was 'reconstructed' about 1936 to make the No.1 11½ft tunnel, and the No.1 7ft was demolished in 1944 to make room for the 4ft x 3ft low-turbulence tunnel.

From 1918 to the mid 1930s there was little change in the buildings at Farnborough, but the 660ft long Seaplane Tank (Q120 building) was started in 1931, and the 24ft wind tunnel, which was for the full-scale testing of aircraft and engines, was authorised in 1932 and opened in 1935. Other major facilities completed before the war were the first major structural test rigs in R50 building, and the propeller spinning tower (1935). The 10ft x 8ft high speed wind tunnel (R133 building) was started in 1939, and completed in 1942.

Armament Dept. (Q134), Radio Dept. (P160 and P161) and Engine Dept. (R141)) all acquired new office and workshop buildings during the war, and Structures Dept. (Q153), Chemistry Dept. (R178), Instruments and

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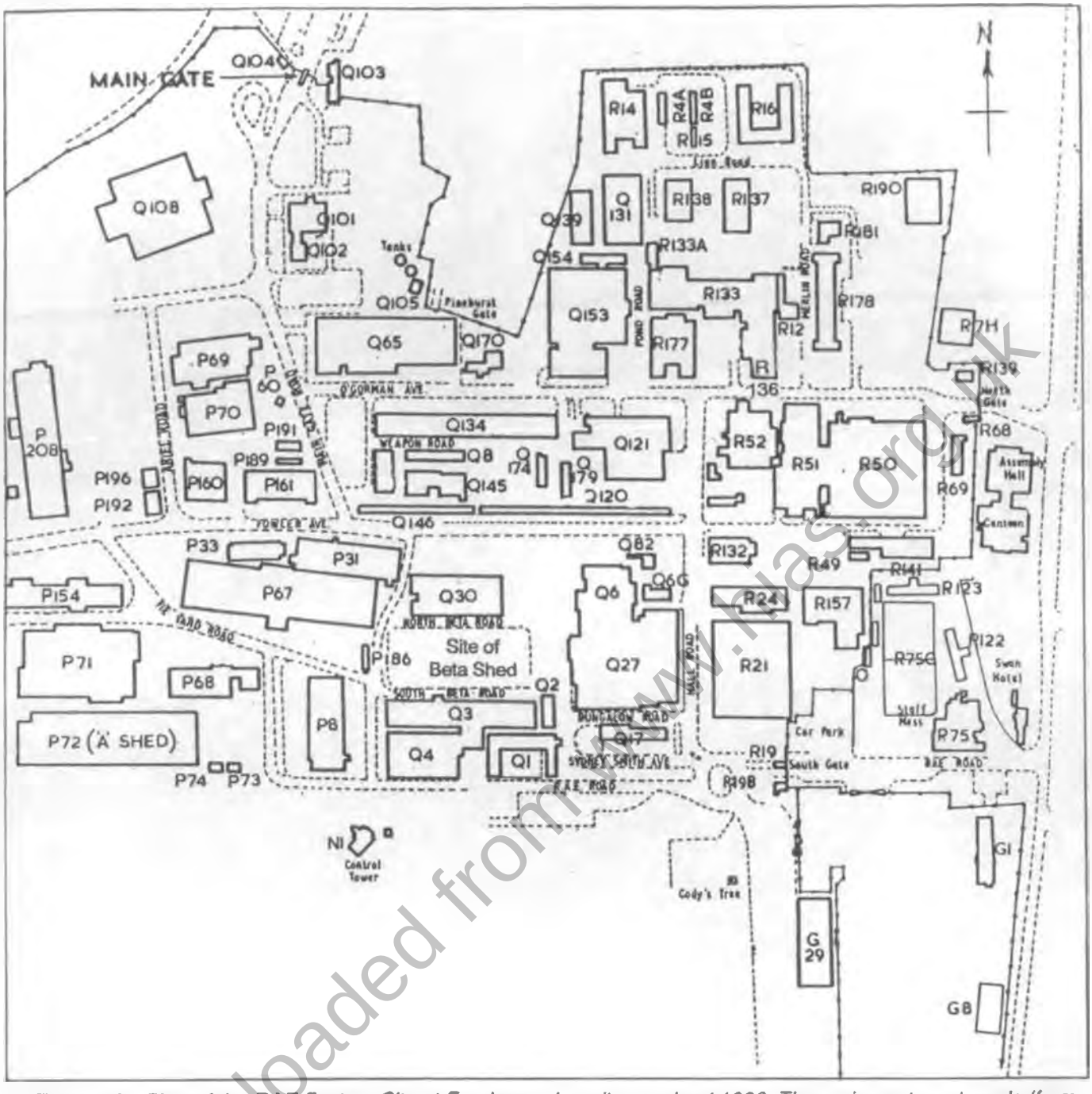


Figure 15 Plan of the RAE Factory Site at Farnborough as it was about 1980. The main east-west roads (from top to bottom) are O'Gorman Avenue, Fowler Avenue and RAE Road. The north-south road on the extreme right of the plan is Farnborough Road. Since 1980, Q3 Building (bottom middle of the plan), which was the original Balloon Shed moved to the site from Aldershot, has been demolished, as have Q2, and P208 (centre left). P208 was an aircraft hangar erected in 1915. Q101, Q102, Q103, Q104 and Q108 have all been erected within the last 20 years. R14 and R16 were erected in the 1950s and the influence of the 1951 "Festival of Britain" in their design is very clear.

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Photographic Dept. (R177), and Mathematics Dept. (R14 and R16) were re-housed in the period up to 1960 to complete the present major buildings in the central part of RAE.

Brief descriptions of the important buildings

All the roads within the Establishment site are named, the names mostly having a strong aeronautical flavour, being named after aeronautical pioneers, former directors of RAE, famous aircraft and aero engines, and so on. A few have an obvious geographical or historical link such as *Jersey Brow Road* and *Bungalow Road*. All the buildings are numbered, though the numbering system appears to defy logical analysis. In the earliest days the site was divided into four, which not unreasonably were given the initial letters of the four cardinal points corresponding to their positions with respect to the centre.

The buildings were then designated with the letter of the quadrant in which they stood and a number which it was hoped would lead to a logical progression, but in practice never did. The profusion of buildings later caused the areas to be divided. Most of the new building was in the N quadrant and this was divided to give N, O, P, Q, and R, the W area was divided to give W, X, and Y, the E area gave F, and G additionally and S spawned T, although there are now no 'S' buildings: however, a fair number of 'T' still remain. The chaos of the numbers remained, however. *Figure 15* is a plan of the factory site.

G1, Belsize Road: Initially the Balloon Factory and the Balloon School shared the buildings within the factory but, in 1909, separate accommodation for the Balloon School was authorized and their new offices, completed in 1911, survive as G1 building, the single storey extension alongside being the original Mobilisation Store. Originally the building was in a separate compound with its own entrance from Farnborough Road. In fact the boundary between the Factory and the School drawn in 1909 remained until the Second World War, with all the buildings to the south of RAE Road being occupied by the RAF, while RAE premises were all to the north. Today G1 building is still substantially as it was originally built, being of two storeys with a single storey extension, both with pitched roofs having gable ends. During its life it has had many uses, the most recent being to house the RAE museum collection. As well as being classed a *"Hampshire Treasure"*, it is also one of the three listed buildings on the site, being listed Grade II.

G29 Lancaster Road: G29 is the one remaining 'Black Shed' made famous in the many commentaries at Society of British Aerospace Constructors' (SBAC) shows. With its sister shed G27, which was alongside until it was demolished in the 1960s, it was built in 1913 for the Royal Flying Corps and these buildings formed the pattern for the standard RFC hangars on most home aerodromes until about 1916. Although many hangars to this pattern were built, few survive, there being no other in Hampshire. The construction is of a timber frame, with both roof and walls clad by painted, corrugated iron sheet. The timber roof trusses, strengthened by steel rods, span about 20 metres. It is listed Grade II.

P70 Ariel Road: P70 building was erected as part of the 1916 expansion programme. It is brick built, with north-light roof bays on steel trusses.

P160 Fowler Avenue: P160 was built during World War II specifically for research into the lay-out and operation of air operations rooms. It therefore has considerable interest in the study of the development of the control of air operations. However, by the time it was completed, thinking on the control of air operations had altered radically and it was not used for its original purpose. Basically the building consists of two 30ft cubes side by side, with three floors of offices and small laboratories one room deep along the front. The common wall between the cubes is blank but there are two galleries, one above the other on the other three sides of both cubes. The building is steel-framed with brick facing with a very shallow pitched roof. In recent years the building has sported a weather vane which was taken from the mansion at Ambarrow Court, Sandhurst, a building requisitioned at the start of World War II and which housed part of the Radio Department for many years. The mansion has since been demolished.

Q1 RAE Road: Q1 is the cream-coloured building facing the airfield which, apart from the modern control tower, is the nearest building seen from the terraces erected for the Farnborough Air Show, and is something of a landmark. An additional office block was apparently not included in the estimates submitted for the 1909 expansion although the need for such a block had become urgent. A letter asking for offices, and also stressing the urgent need to provide a Meteorological Office, was sent to the Treasury in January 1912. The arguments advanced evidently convinced the Treasury, and the new block was completed early in 1913, the Meteorological Office being constructed on its roof. In spite of its solid appearance, the construction is of wood with a stuccoed exterior. From 1913 until the construction of Q 101 building in the late 1970s, it was the Establishment's headquarters' block with the Director's office on the ground floor. It acquired a new rear wing during World War I and a new front wing together with a third floor about 1937. It achieved some fame when it featured in the film of Neville Shute's novel *"No Highway"*. The film used the building correctly as that housing the Director's Office, though for some of the interior scenes a set rather than the Director's actual office was used. This building is classified as a *"Hampshire Treasure"*.

Q6 Hall Road: Q6 is the power station and boiler house. It was built in 1916 as part of the very large extension of the factory built in that year, when large scale production of the F.E.2B, R.E.8, and S.E.5, and of RAF engines, was started. At the same time large, underground ducts taking steam pipes throughout the works were installed. The boiler fire originally exhausted into a large brick chimney, but this has recently been demolished. The building itself has recently been re-clad with steel sheet. For many years power was generated within the building, particularly at times of peak demand, to supplement power taken from the public electricity supply. As an electricity power generating station, it became disused with the opening of a new station on the Pyestock site, but the boilers have continued to supply steam for heating the buildings within the main factory area. The switchgear, mounted on slate and marble panels on an upper gallery, still remains, is in good order, and is of considerable historic interest.

Q27 Hall Road: This building has been classified as a *"Hampshire Treasure"*. The northwest corner of the building is believed to be the original workshops erected in 1904/5, in which case it is the oldest building still extant on the site. The first major extension of the Factory buildings was approved in 1909; this involved substantial enlargement of the

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workshop building including the tall section at the southern end intended for the erection of airship cars and aeroplanes *(Figure 17)*. Most of this block was completed by March 1912. The present building has a single storey under narrow north-light roof bays on either side of the main machinery bay. This bay is an impressive space with large, curved head windows in the gable ends. The floor area of the building is about 4900 sq. metres.

Q65 O'Gorman Avenue: The original portion of Q65, which still survives, is steel-framed and with both walls and roof clad with corrugated iron. The main members of the frame are the lattice box-girder sections which formed the lower part of the frame of the 'portable airship shed' of 1910/11. The frames are still in remarkably good condition and have suffered very little in the way of additional holes being drilled or portions removed to permit the routing of services. There are fourteen pairs of frame members tapering from a base of 4 ft 10 inches to 4 ft 3 inches and fourteen pairs tapering from a base of 4 ft 3 inches to 3 feet 8 inches. The two types appear to fit together to give frame members which are the same height of the frame members of the original airship shed shown in Figure 14.

Q120/Q146 Fowler Avenue: Originally this was a single building which housed the 660ft long seaplane tank. The building was started in 1931 and completed in 1932. Apart from its obvious use for testing the performance of the hulls and floats of seaplanes, it saw considerable service in establishing the ditching characteristics of land planes. Having become disused, a section near the middle of the building was demolished in the 1960s in order to allow direct access from Fowler Avenue to the complex of buildings immediately to the north of the tank. The plan for the two halves of the building was to demolish the tank and erect offices within the shell, but the concrete of the tank proved to be so strong that it was decided to leave the tank in situ and build the offices above. The tank is the oldest constructed for aviation purposes still surviving in the UK as well as being the longest.

Q121 24ft Wind Tunnel: Authorised in 1932, the 24ft wind tunnel came into operation in 1935. Its purpose was to allow tests to be made on full-size aircraft with their engines running. As well as providing the airflow, there had to be arrangements for removing the exhaust gases from the engines. Being unique, for many years it warranted description and illustration in several editions of the *Encyclopaedia Britannica*. Apart from its scientific interest the tunnel, with its public clock, is still the dominant feature of the establishment seen from Farnborough Road. The bulk of the building is single-storey, about 15 metres high, of concrete-cased, steel frame construction, infilled with reinforced concrete. There are two storeys of offices and workshops above the main test area of light-weight steel-composite cladding on a steel frame. Because it is unique it has been proposed for listing Grade I.

Q153 O'Gorman Avenue: Built in 1942, the building was used for many years for structural testing of airframes and components. In more recent years it has housed flight simulators. The front, on O'Gorman Avenue, has three storeys and is typical of the design of laboratory/office buildings of the late pre-war/early war years. At the rear is a single-storey portal frame building having 3 main bays 53 metres long by about 10 metres high.

R21 Hall Road: R21 was one of the buildings constructed during the expansion of 1915 and was completed by the middle of that year. It has a single storey with nine, identical, decorative, red-brick gable ends, with north-light roof bays on steel trusses behind. The two bays to the north cover a clear space of 45 metres long by about 16 metres wide. The seven remaining bays are 37 metres long and give a total width of about 50 metres. The most recent use was for the millwrights', metal working, and fitting shops.

R50 O'Gorman Avenue: Built in 1915/16, the single storey building has an area of about 4500 sq metres and is covered by a four-bay steel-trussed, pitched roof, about 67 metres long, clad with asbestos cement sheeting. The external

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Figure 16 (opposite). An aerial view, looking due west, of the Royal Aircraft Establishment, circa 1924. To correlate the photograph with the plan in Figure 15, the road running north/south in the foreground is Farnborough Road. The three main roads running east to west (from north to south) are O'Gorman Avenue, Fowler Avenue and RAE road, respectively. Right centre are five of the eight rows of Pinehurst Cottages, and the building with the double ridged roof nearest the southernmost row of cottages is Q65 building. Beyond Q65 are P69 and P70 buildings. On the left of O'Gorman Avenue, the building with four ridges in the roof which run east/west is R50 and the building immediately west of that with its roof-line north/south is R51, with R52 immediately further west. Immediately west of R52 and running north/south is Hall Road. The building to the west of Hall Road was demolished soon after the photograph was taken and the site is now occupied by several buildings, of which the more important are Q121, Q134, Q120 and Q145. Moving to the north side of RAE Road, the building on the corner with Farnborough Road is the Swan Hotel with the civilian staff mess immediately west of that. Next west comes the circle of the whirling arm. Beyond that are the still extant R21, Q27 and the now demolished Beta Shed. The two airship hangars in the southwest corner of the factory are those mentioned in the text and the vacant space immediately to the north side is the site of the dismantled 'portable airship shed'. The westernmost building on the south side of RAE Road is G27, one of the 'Black Sheds'. The other item of interest is the housing estate in the northwest corner of the view, which is the Rafborough estate built towards the end of the First World War to house factory workers.

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walls are of Fletton brick. There are various small extensions on the north side. The building has had various uses, one being to house the first major structural test rigs which were completed before the second world war. Subsequently the building was converted to offices and laboratories for materials research, the development of carbon fibres being just one of the notable achievements accomplished within its walls.

R51 O'Gorman Avenue: In 1910/11 two airship sheds (dismantled in 1930) were built to the west of the then existing Factory buildings, and alongside them was erected the so-called 'Portable Airship Shed'. This was designed to be easily dismantled and re-erected, and it had a canvas covering. After a fairly short time the covering was so badly torn that it was removed and, in 1914, the bare frame was dismantled and stored. With the expansion of the factory in 1916, the frames were retrieved and the straight, lower frames were used as the main structure for a new fabric and balloon workshop (now Q65 building), and the curved top frames were re-erected and covered with iron sheeting to house the Factory's foundry, R51 building. Because of this historical interest R51 is presently Listed Grade II, though curiously, Q65 is not so protected. Considerable work has been done to confirm that the structural members of the two buildings do, in fact, match and that it would be relatively straightforward to retrieve them from their present use and re-erect them in their original form as the frame of an airship shed. There were originally 14 curved members but only 13 were used in the construction of R51. Two of the members are of heavier construction and it is assumed that these are the end members. The current whereabouts of the 14th member is not known; the assumption is that it was broken up at the time of R51's construction.

The central aisle, of R51, formed from the airship-shed roof, is 15.24 metres wide but steel lean-to structures on either side nearly double the width of the building. The floor area is approximately 2300 sq metres and the ridge is about 10 metres high.

R52 O'Gorman Avenue: The first major RAE wind tunnels were built in 1916-17; a crude 4ft tunnel had been built in 1906 and used briefly, but thereafter the facilities at the National Physical Laboratories were used until Mervyn O'Gorman, who had been appointed superintendent of the Balloon Factory in 1909, was authorized to build two 7ft wind tunnels; R52 building was built to accommodate them. Later a 4 ft tunnel was added. That 4 ft tunnel was demolished in 1929 to make room for the present 5 ft tunnel, and the No.2 7ft tunnel was 'reconstructed' about 1936 to make the No.1 11½ ft tunnel, the building being extended to the south to accommodate the return air flow. This tunnel was sold to Southampton University in about 1978. The No.1 7ft tunnel was demolished in 1944 to make room for the 4ft x 3ft low-turbulence tunnel. R52 is a substantial, brick-built structure, with a steel-truss roof and brick walls. The gable ends are distinctive, having piers and a stepped coping course in a contrasting colour. The building is essentially of two bays, each about 100 ft long by 60 ft wide, with tall, flat-roofed extensions to the south and the west. This building is classified as a *"Hampshire Treasure"*.

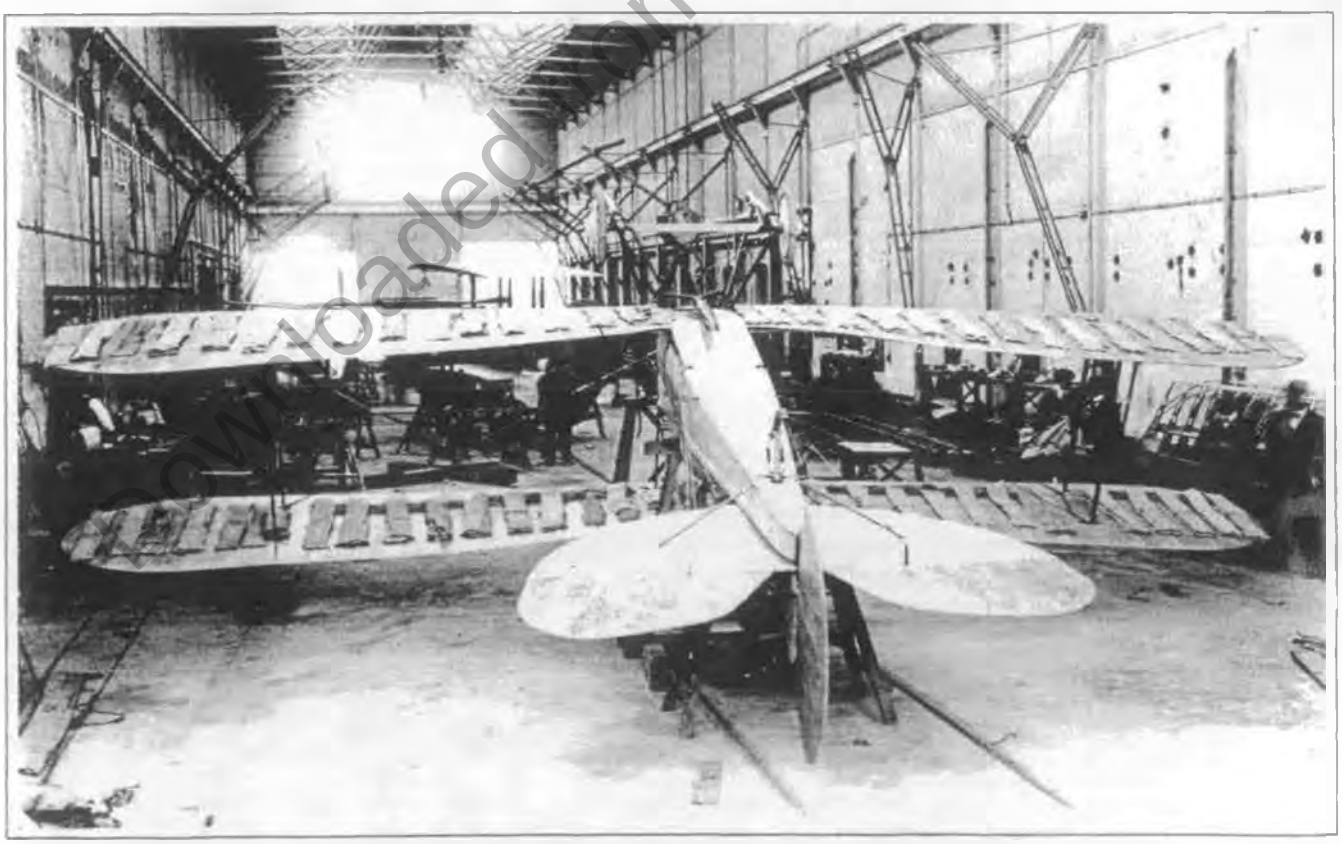


Figure 17 The interior of the tall section of Q27 building taken in July 1913. A structural test of the wing strength of an unidentified aircraft using weighted bags. Judging by the warp on the wings, the load must be very near that which will cause structural failure.

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R133 O'Gorman Avenue: The building houses the 8ft x 6ft transonic wind tunnel. Construction of what was then considered to be a high-speed wind tunnel with a working section of 10ft x 7ft started in 1939 and was completed in 1942. In the 1950s the tunnel was re-configured for operation at transonic speeds, that is speeds up to about M1.24, with a working section of 8ft x 6ft. The building is flat roofed, being of reinforced concrete frame and panel construction. The wind-tunnel itself is contained within a plate-steel pressure vessel some 135ft long by 37ft diameter with hemispherical ends. Within that outer shell is a second shell, the gradually tapered space between them being used as the return air duct. Along the centre of the inner shell runs the working section itself, being 6ft high by 8ft wide by 20ft long. Power to drive the fan is provided by an 8000 hp plus two 2000 hp electric motors all coupled together, and housed within an extension to the building on its north side, an additional 8000 hp motor driving an axial blower to pressurize the tunnel. Within that extension there is also a 2ft x 1½ft transonic tunnel. The method of construction was unusual in that the tunnel itself was constructed first and the building was then built round it.

R135 O'Gorman Avenue: This building is physically attached to R133 and is also of reinforced concrete frame and panel construction. Built in 1944 to house the 11½ft x 8½ft low-speed wind tunnel, it shares several common services with it, and could not now be reasonably removed without affecting the integrity of R133.

R75 Civilian Staff Mess, R122 and R123: The first part of the civilian Staff mess (R75) was built in 1913. It is mostly of timber construction with asbestos cement panels. Originally it contained several separate messes for the various grades of employees but, apart from the Director's Mess, which continued as a separate entity, the other messes were amalgamated during a refurbishment programme in the late 1950s. R122 and R123 are brick-built buildings with mansard roofs. They provided bed-sit accommodation for single staff on three floors, with communal staircases, bathrooms and toilet facilities. A corridor ran along one long side of each floor with the rooms off. When they were built is a little uncertain but there was a presumption that they were built by German prisoners of war during World War I.

R75G The Whirling Arm: In its time, the whirling arm was the largest piece of equipment within the factory, having a working radius of 140 feet. It was used from 1915 until the early 1920s for testing propellers. It could be revolved at speeds of up to about 7 revolutions per minute, which gave a speed at the periphery of about 70 mph. The site of the equipment is now part of the Staff Mess garden, where the concrete base still survives, the radius of the Arm being indicated by the banks in the lawn.

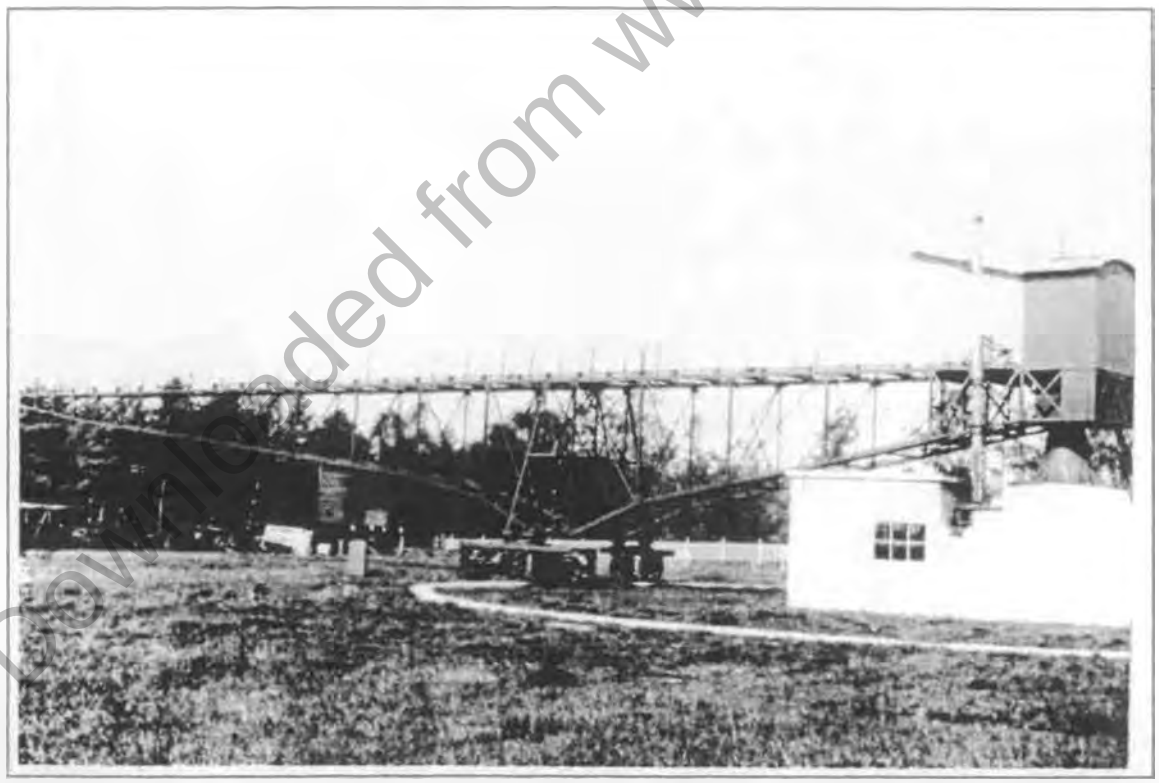


Figure 18 The Whirling Arm photographed c.1916. The main use was in testing propellors which were mounted at the end of the arm on the extreme left. The growth of the shrubs around the apparatus shown in Figure 16 suggests that by 1924 it had already been out of use for several years.

Cody's Tree: In front of the 'Black Sheds' on the edge of the airfield is *'Cody's Tree'*. It is believed that Cody used the tree in two ways during the experiments which led to the first flight by an aeroplane in Britain. On calm days the aircraft was tethered to the tree by the tail via spring balance in order to measure the thrust from the propeller and on days when there was a strong wind from the west, the aircraft was tethered by the nose and Cody was able to gauge the

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effectiveness of the controls. The part it played in early aviation is thus undeniable. The original pine tree died many years ago and every effort was made to preserve the dead skeleton. However all attempts were unsuccessful and eventually it was decided to make a replica from aluminium and glass fibre resin. This was erected exactly on the spot of the original tree and is supported by a stone plinth, which bears an inscription recording the historic flight on 16th October 1908.

Site of Beta Shed between North and South Beta Roads: Beta Shed itself was demolished in the 1960s and its site was first a car park and then more recently occupied by a temporary building. However, when the foundations for Beta Shed were being dug, it was found that under a very hard top surface, the subsoil was a bog. Sufficient firmness was eventually obtained by making a large excavation and filling it with old gun carriages. Being made of teak, these are not likely to have rotted and are presumably still there. If a new, permanent building is erected on the site, it will be interesting to examine the state of the wood after 90 or so years of burial.

No. 1 RAF Officers' Mess: Designated the No.1 RAF Officers' Mess to differentiate it from the No. 2 RAF Mess further South along Farnborough Road, the No. 1 Mess was built in 1913. It is unusual in design for a mess in the United Kingdom, having verandahs and other features more reminiscent of buildings of the tropics. The oft repeated story is that the design was intended for a mess to be constructed in India, the intended design for Farnborough being in a more traditional English style. However there was a muddle and the drawings for the Indian Mess were sent to Farnborough and vice-versa.

Pinehurst Cottages: Pinehurst Cottages are a group of eight terraces of cottages built during the First World War to house factory workers, the first cottages being occupied in 1915. The individual terraces are built at right angles to Pinehurst Avenue. Built originally as accommodation for families, many were converted in the 1980s to provide accommodation for unmarried, newly recruited staff working at RAE.

Summary

The buildings at Farnborough chronicle the development of aviation in the 20th century. In the earliest days, getting any sort of aircraft to fly was a great achievement and the concentration on the development of airframes and engines was necessary. However, as the development of aircraft progressed, it was soon recognized that aircraft were not an end in themselves and that to perform a useful role they needed a variety of equipment, such as radio communication sets, navigational aids, landing aids, equipment for night and poor weather operations, and in the military field, gun and bomb sights, carriage and release mechanisms for all types of stores, cameras for reconnaissance, guided weapons, and so on. The buildings at Farnborough reflect that changing perception and in the most recent years, the research effort expended on devising the equipment exceed that spent on the aircraft themselves by a substantial margin. If future generations are to understand how in the space of a single lifetime, aircraft developed from little more than a powered kite carrying only the pilot, to being capable of sustained supersonic flight carrying passengers and cargo, the Farnborough buildings need proper records to be made and hopefully the more important buildings preserved.

John Asteraki
John Bagley

Acknowledgements

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Gas in Odiham

As a 1930s advertisement for the George Hotel, High Street, states, Odiham is an interesting old-world town forty miles from London and 36 from Southampton. More prosaically in view of the later history of the Odiham Gas and Coke Company, Odiham is 8 miles due west of Aldershot. The town is mentioned in the Anglo-Saxon Chronicles and features in the Domesday Book where, as the largest of William the Conqueror's holdings in Hampshire, it is listed first in the entries for that county. The excellent agricultural land in the vicinity ensured the town's prosperity and, in the first half of the nineteenth century, the population of the town increased rapidly (at more than twice the national average). It is not, therefore, entirely surprising that the town was provided with a supply of coal-gas for lighting at a relatively early date. The opening of the Basingstoke Canal in 1794 had already reduced the price of coal in the area considerably, and the opening of the London and Southampton

Railway as far as Winchfield in September 1838, and slightly later to Hook, provided a competitive source of transport. All that was needed was someone to take initiative to build a gas works.



Figure 19

The Early Years

A public meeting to consider the erection of a gas works in Odiham was held in 1846. That meeting gave sufficient encouragement to the sponsors, and a provisional certificate of registration for the Odiham Gas and Coke Company Limited was obtained on 26 November 1846. The Provisional Committee were mostly local men but the Acting Engineer was Mr Robert Paulson Spice, of Fakenham, Norfolk and the Promoting Engineer was Mr John Ormsby Culyer, of Wokingham, Berkshire. The authorised capital was £2,000 in £10 shares and the company prospectus said that the work would proceed when 180 shares had been taken up. In order to save the expense of an Act of Parliament, Odiham, like very many small undertakings, began as a "non-statutory" company. The main disadvantage of such status was that the company had to rely on the goodwill of the local authority for permission to dig up the roads to lay the pipes but, in a small community like Odiham, where the proprietors were also prominent local citizens, that, presumably would not have been a problem.

By the Spring of 1847, all 200 shares had been taken up, the original list of the 48 shareholders still being extant. Two people held 12 shares each, and six held ten shares each, the remainder holding five or less. They were most local tradesmen, though one of the more interesting was Thomas Brown, servant at Herriard Hall, who took five shares. The contract with Robert Spice to construct the works was signed on 27 July 1847. The contract specified that the works was to be complete by 29 September, or in the event of inclement weather by 10 October 1847 at the latest. On behalf of the company, the contract was signed by W.H. Prickett, J. Bartholemew and Henry King, Directors. Prickett held five shares, Bartholemew, a grocer, also held five, and Henry King, brewer, held two.

The works was completed by the beginning of October and the final cost, including a supply of coal and evidently running the plant for a test, was £2,200. Some mishap must have happened to Spice about this time because a letter dated October 1848 from the Gas and Steam Apparatus Manufactory, of 55, High Holborn, says that they are the Trustees of Robert Spice's estate and requests that the outstanding amount for the building of the works be paid immediately.

The Odiham Company's books are known to have been destroyed during the Second World War and the earliest detailed information on its operation now available is believed to be an article in the April 1852 edition of *'The Journal of Gas Lighting'*. By fortunate chance, the editor chose Odiham as a typical, small-town gas company to compare with that at Southport, where the shortcomings of a novel gas-making system were, in his view, in need of exposure. The business at Odiham was then tiny but already profitable.

The 1851 census gave the population of Odiham as 2,811 but, surprisingly for that size of population, the total gas sales for that year were only 625,760 cubic feet. Of this, the 55 private customers and one chapel consumed 378,550 cubic feet and the rest was burned in 19 public lamps, two of which were lighted by the gas company without charge. At that time, almost all the gas would have been used for lighting, rather than heating or cooking and the demand varied widely between the seasons. The most that was sold in a summer quarter was 55,200 cubic feet whereas in winter the demand went up to 150,800. At that time the price of the gas was 10 shillings (50p) per thousand cubic feet, quite a reasonable price for those days; it later reduced a good deal. The price of coal was about 19 shillings (95p) a ton delivered and the cost of coal for the year's operation was £81 4s 0d (£81.20), which, offset by sales of coke and residuals of £14 10s 5d (£14.52), gave a net cost of coal per 1000 cubic feet of gas sold of about 2s 1½d (10.7p). The outgoings were summarised as:-

	s	d	
Net cost of coals	2	1½	(10·7p)
Wages	1	10	(9·2p)
Repairs (tradesmen's bills)	1	2¼	(6p)
Sundries		5¾	(2·4p)
Superintendent's salary		5¾	(2·4p)
Interest @ 5%	3	2¼	(15·9p)
Total	9	3½	(46·6p)

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Quite how the company's finances were arranged is not entirely clear. The debt, calculated from the interest paid divided by the interest rate, would appear to be £1,990, though why the company should have needed a loan of that magnitude so soon after commencing operation is something of a mystery. In spite of that debt, the company felt able to pay a 3½% dividend in the first half year and 4% in the second. From the above figures, the calculated profit on the year's operation was just £21 5s 6¼ (£21·28). The cost of the dividend would have been £150, and how that was provided is also unclear. The Superintendent, sometimes referred to as the Secretary, was evidently employed only part-time, as his salary was only £15 p.a. (White's *Gazetteer of 1859* names the Secretary as Mr John Hornsby, who was also the local chemist and vet, which perhaps confirms the part-time nature of the post. Mr Hornsby was a member of the original organising committee and had probably served as Secretary from the start. Craven's Directory also lists him as *"Agent for the Union Fire and Life Office"*). The wages bill seems high for that period and suggests that there must have been two full-time employees. In later years, works of this size would be run by one man for most of the year. Craven's *Directory of Hampshire* for 1857 names Benjamin Blake as the works manager.

On the basis of the price paid for the fuel @ 19s per ton, the quantity of gas produced per ton of fuel consumed may be calculated at 7,320 cubic feet, a very reasonable figure for the technology employed in those days.

In 1859 the price of gas had fallen to 7s 6d (37½p) per 1000 cubic feet and evidence of the growth of the company is given by an advertisement placed by the company in 1863. It sought a set of condensers *"for 10,000 cubic feet in 24 hours, with or without a scrubber"*. Although this figure would be a maximum rather than an average day, it suggests a considerable growth in business since 1851.

A report of the company's annual meeting in 1872 mentions a dividend of 6% and also *"the debt remaining on the loan for the new works"*. The first edition of the Ordnance Survey map covering Odiham at a scale of 1:2500 was published in 1871 and shows the site on the west side of London Road, next to Albert Terrace, but otherwise surrounded by vacant fields (see map). There is no evidence to say what the *"new works"* were; it is thought unlikely that it was a complete new gasworks and it may just have been replacement of the retorts, etc. The 1896 edition of the map does not show any further change in either size or plan of the gasworks. Referring to the map, the building on the eastern corner of the plot and next to Albert Terrace was the manager's house, and this still stands. The building on the southern corner of the plot was the retort house. Of the two round objects, it is probable that one was the gas holder and the other some form of tank which would be needed in the gas-making process. When gas-making stopped in Odiham about 1910, the retort house was converted to a workshop.

Gas managers were sometimes very mobile in order to gain more lucrative or more congenial posts, although others might spend the their whole career in the service of one company. Joseph Rann was certainly one of the former. Born in Liverpool in 1859, he was taken to Normanton as a boy, where he was taught smithery. It is not known when he entered the gas industry but he became manager of the Odiham works in 1882 and is said to have had a busy time there. His next move (post-1888) was to Dorking and finally he moved to Normanton, a relatively large gas company, from which he retired in 1924. Three sons and a half-brother managed various other gas works in their time.

Joseph Rann is known to have made visits to the Isle of Wight when living at Odiham. Quite possibly this was in connection with a system of tar firing for gas retorts developed by Mr A. Thomas, the manager of the Cowes Gas Works. Tar was then difficult to sell; its valuable contents were only just being discovered and, in any event, the quality and quantity produced by a small country gasworks would have been unattractive to the refineries. One solution was to use it as fuel to heat the retorts, which also released for local sale the coke which would otherwise have been burned in those same furnaces.

An advertisement published by Thomas in the Journal of Gas Lighting included this letter:-

Gas Works, Odiham,
Jan. 5, 1888

Dear Sir,

I am pleased to inform you that I have now had some weeks experience of Tar Firing upon your principle, and find that your Patent Strainer and Regulator do very well indeed.

I am able to burn all my Tar, for which we cannot even get an offer, and have maintained good heats throughout. I have had no smoke at the chimney and am turning into profit what, for a long time, had been quite a nuisance. I feel sure that if managers of small works would only try your apparatus for Tar Firing, they would find it a pleasure, as well as a profit to their companies.

Yours respectfully,
Joseph Rann

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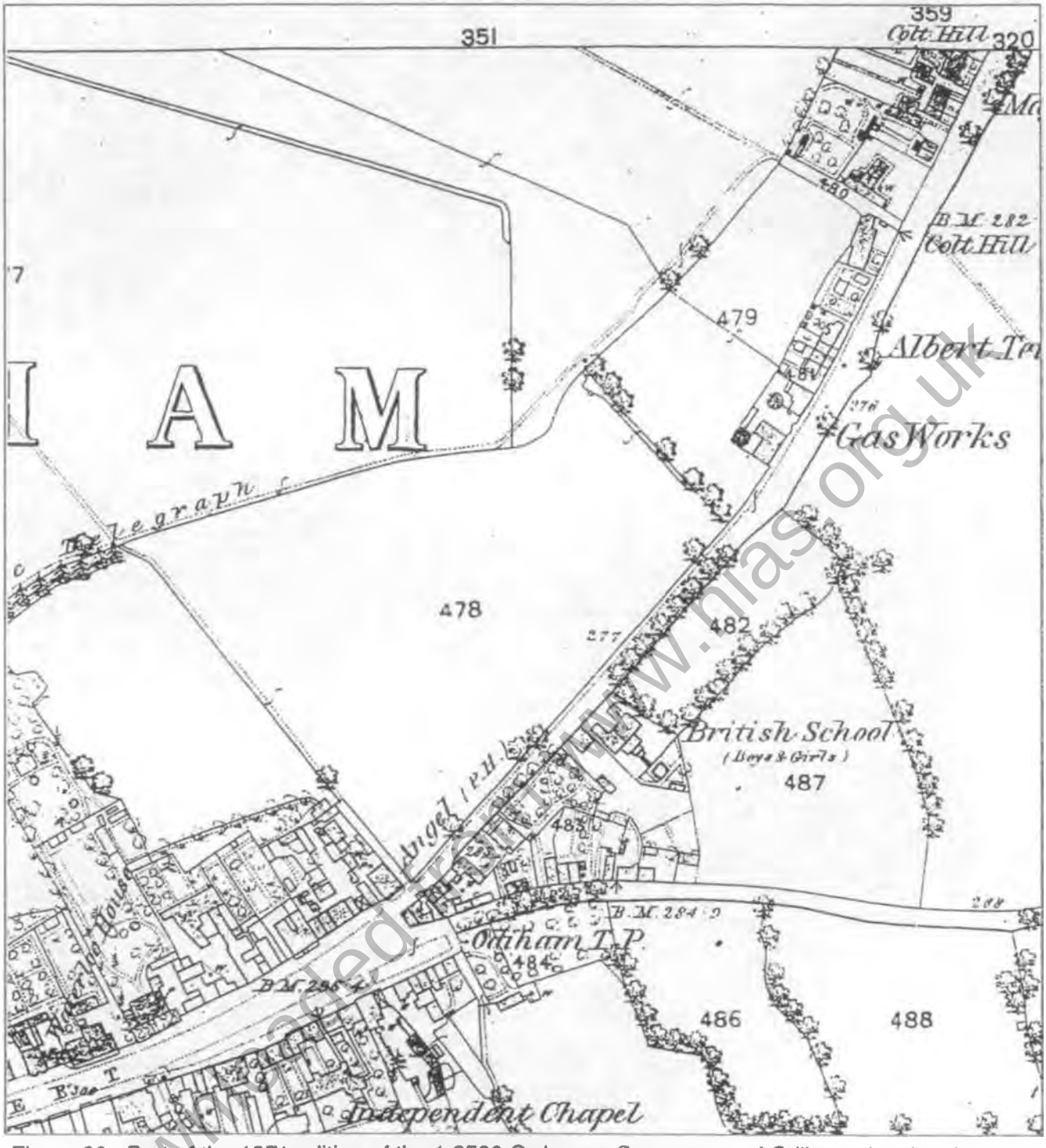


Figure 20 Part of the 1871 edition of the 1:2500 Ordnance Survey map of Odiham showing the position of the Gas Works in London Road.
London Road crosses the Basingstoke Canal, where there is a wharf, just off the top of the map

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So glowing was this testimonial that one wonders if Rann had become involved in selling the equipment. It cost only 27s 6d (£1.37½) per bed of retorts, so profits shared with Mr Thomas would have been modest. The components came with do-it-yourself instructions for installation.

Rann's predecessor is likely to have been appointed in June 1876 if an advertisement placed in the *Journal of Gas Lighting* was successful. Typically it asked for a "Working Manager" who thoroughly understood the working of retorts, could lay service pipes and *"keep account of the meters"*. The Company's Secretary at that time was named Hornsby, presumably the same John Hornsby named in the 1859 gazetteer.

The Company was not registered until May 1891 when the title became *'The Odiham Gas and Coke Company Limited'*. Surprisingly the capital was still only £2,000 in shares of £10 each.

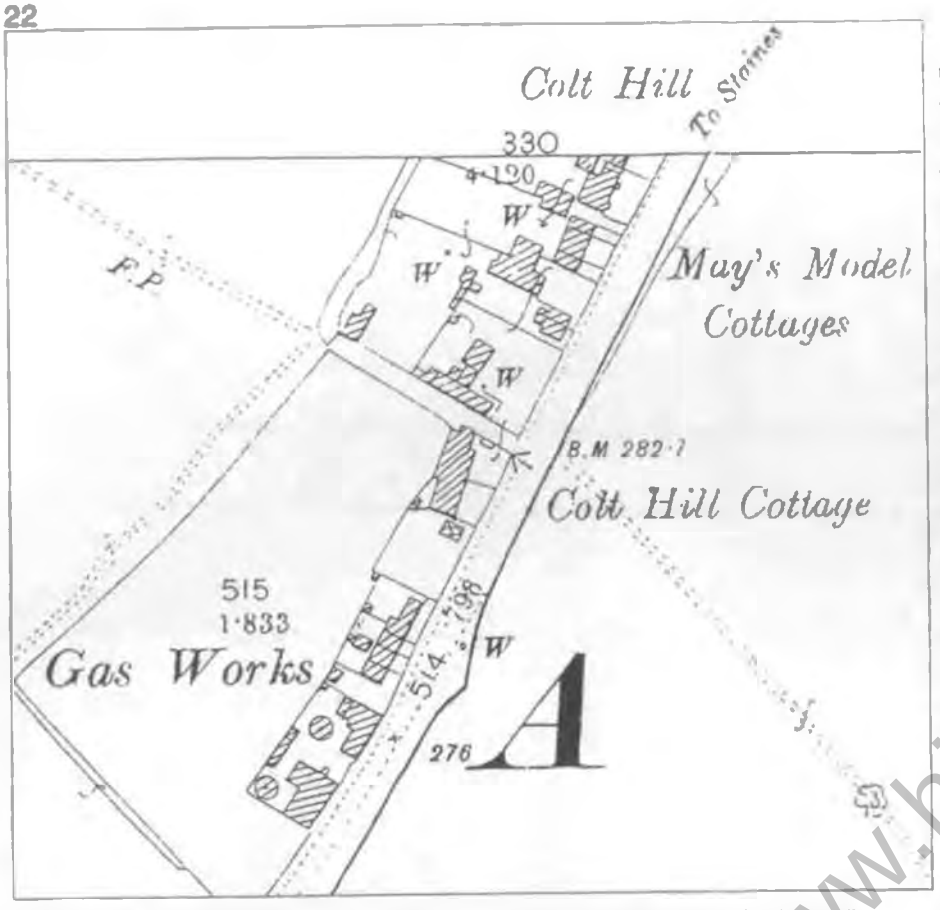


Figure 21 Odiham Gas Works from 1896 O.S. 1:2500 map (enlarged)

By 1900, the annual production of gas was still only 1.5 million cubic feet. At that time H. Gotelee was Chairman of the Company, W.H. Wright, the Secretary and F. Jeffery was Manager. There were just 62 customers and the price of gas was rather high at 6s 3d (31p) per thousand cubic feet. Five years later H. Salter had taken over as Manager and the price was down to 5s 10d (29p), or 5s (25p) to those who used gas in stoves or engines. Whether any gas engines were connected is not known but there were two cookers! Odiham's business refused to grow, whereas at nearby Hartley Wintney the much lower price of 4s 6d (23.3p) applied and production had risen from 1·893 million cu ft in 1900 to 2·273 in 1905.

At the time that the Odiham gas works was established, Aldershot was still a village with a population of just under 1,000. However, in 1853, the then Government decided that the British Army should have a large, permanent camp, and the Aldershot area was chosen. As the 'Home of the British Army', the town grew rapidly, soon overtaking Odiham in terms of population, and its Gas Company, which was established in 1867, prospered greatly. The Aldershot Gas and Water Company supplied water in its home town only but its gas network covered a much wider area. Later it supplied electricity also, a feature of several gas companies in the district.

On 15 January 1909, the Odiham and Aldershot Companies signed an agreement under which the Aldershot Company would pay the somewhat low price of £1,600 for the entire Odiham business, plus the stock at valuation. This was less than the nominal value of the Odiham Shares, and suggests that the company may have been in some sort of trouble.

The three directors of the Odiham Company who signed the agreement were Alfred Kitt, Arthur Gotelee, and F.G. Williamson. The Secretary, W.H. Wright also signed. Alfred Kitt was also a director of the nearby Hartley Wintney Gas and Coke Company, and probably Chairman of both. The only person who had served for any time with either the Odiham or Hartley Wintney companies was W.H. Wright; the directors were all newly appointed. An H. Gotelee had been Chairman at Odiham in 1900. Kelly's Directory of 1903 lists William Henry Wright as Clerk to the Guardians and Assessment Committee of Hartley Union, Clerk to Hartley Wintney Rural District Council, as well as Secretary to the Odiham Gas and Coke Company Ltd.. Arthur Gotelee was *"stationer, printer, and Registrar of Births, Deaths, and Marriages [at Odiham]"*. At about the same time, the Aldershot Company bought the Hartley Wintney Gas and Coke Company also; perhaps this had been Alfred Kitt's plan.

Under New Management

The next move by the Aldershot Company was to Parliament with a Bill which became the Aldershot Gas, Water, and District Lighting Act, 1909. Apart from changing its name by adding "District Lighting", the Aldershot Company confirmed its two purchases, the Act including both purchase agreements as schedules. The company also obtained powers to supply electricity, hence the change of name. However, it was 1915 before electricity was generated. Curiously, in Aldershot electricity was supplied by a municipal power station and the Aldershot Company only supplied electricity outside the town. Electricity did not become available in Odiham until 1936 when a sub-station was erected on the former gasworks site.

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However, as far as the supply of gas was concerned, the new owners energetically set about expanding the gas supply throughout Odiham and its surroundings and consumers were encouraged to use a great deal more gas. Much information about this activity is available since the minute books of the Aldershot Company survive and are well indexed. In 1910 a single 8" gas main was laid from Fleet, which was already supplied with gas from Aldershot, through Hartley Wintney into the centre of Odiham, which allowed gas production at the two small works to be discontinued. In passing it may be noted that the 'trunk main' from the Odiham works to the town had only been a 4". In addition to increasing the size of the main, the gas was delivered at the relatively high pressure of 16" water gauge, the pressure being boosted by a compressor in Elvetham Road, Fleet. The building housing the compressor still stands. The gas pressure supplied to consumers was about 6" WG, which was achieved by a pressure reducing valve being fitted to each gas meter, a practice reintroduced by British Gas within the last few years. The later extension of the gas main to Hook was with a 6" pipe. It is likely that Mr Salter remained in charge at Odiham, possibly until he retired. It is known, however, that Harry Feltham,, with the rank of Inspector, was in charge in 1911 and was living in the manager's house.

The Aldershot Company changed its name again in the mid-1930s, this time to the *"Mid-Southern Utility Company Limited"*, reflecting its widespread growth, particularly into the supply of electricity.

A personal view of the gas supply in Odiham in the 1920s has been provided by Mr R.H. Nevill. Mr Nevill was born in 1906 in a part of Odiham known as Whitehall. In an article published in the Spring 1991 edition of the *Journal of the Odiham Society*, Mr Nevill records that when he started work as an apprentice at the gasworks site in London Road, in November 1921, the gas holder and the gas making equipment had, by then, been removed, and in a recent conversation he said that he believed that the gas holder had been demolished as soon as the new supply from Fleet had been installed. A showroom was built on to the side of the manager's house as a single-storey extension, the entrance to the showroom being through the front door of the house. Originally the showroom had a single plate-glass window (much cleaned by Mr Nevill) but, although the main part of the showroom still stands, the front has been altered to three bricked-in panels with small windows at the top. The retort house, cleared of the gas-making equipment, became a workshop. As an apprentice, Mr Nevill's duties for the first hour of each day were to clean and polish in the show room. He described how in 1922/23 the street lamps, which had been taken down and stored during the first world war, were refurbished and refitted. The pre-war lamps had a long mantle suspended on a porcelain fork. The new lamps had two inverted mantles and a superheater, with a pilot light, which saved the lamplighter having to carry a torch. There were then 27 lamps compared to the 19 in 1851. Mr Nevill was engaged to light the lamps half an hour after sunset and to extinguish them at 10.15 pm for a fee of 12s 6d (62½p) a week, a sum which nearly doubled his wages.

Much later a new form of gas storage was installed at Odiham comprising two, high-pressure receivers with (presumably) compressors to charge them during off-peak periods. These were dismantled in the 1950s.

The gas supply was extended to the neighbouring village of Greywell in 1927, all the small houses being fitted for three gas lights and a cooker free of charge. A prepayment meter was provided and all the householder had to do was purchase the lamp burners, the globes and mantles, at a cost of 3s 9d (17p) each.

One aspect of nationalisation in the late 1940s was that the combined gas and electricity supply companies, which were fairly common in this part of the country, were dismembered. The electricity supply side of Mid-Southern passed, in 1948, to the newly-formed Southern Electricity Board and with it, what had been part of the Odiham gasworks, for it was now an electricity sub-station. The gas interest was vested in the Southern Gas Board with effect from 1 May 1949 and later the water supply operation became part of the Mid-Wessex (now Mid-Southern) Water Company. By that time little of the old Odiham company survived although it is possible that parts of its main may still be buried under Odiham's roads, leaving only those portions of the showroom and office in London Road. In recent years the site was occupied by Dean Reels, a company manufacturing, amongst other things, fire hoses. However at the time of writing (January 1996) that activity had ceased and the site was being offered for sale. As far as British Gas is concerned, they seem to have sold the site about 1959, and it is believed that the old retort house was demolished at about that time.

Natural gas came to Odiham in the 1970s and, in 1986, British Gas, the successors to the Southern Gas Board, returned to shareholder ownership. Fortunately, the new shareholders have fared better than did their Odiham predecessors in Edwardian times.

John Horne
John Asteraki

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for sharing his memories of Odiham, to Mr. A.B. Hine, for his assistance and advice in the search for information and to the Staff of the County Record Office for their help in retrieving documents from boxes of deposited documents.

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The Hampshire Farm Survey 1981-1995

Looking back over the thirty years during which SUIAG has been active, industrial archaeologists of the future may well decide that its most important achievement was the carrying-out of surveys. Most of them were initiated by the Hampshire County Planning Department in response to particular developments.

In the mid 1960s many applications for the adaptation of water mills were being received, but there was no record of the mills surviving in Hampshire. To provide this, in 1968 SUIAG produced its first survey. Others followed, each in response to a particular need. The road furniture survey was a response to an increase of theft and damage to milemarkers and road signs; the brickworks and breweries surveys each reflected the closure of nearly all the best examples after 'takeovers'. The airfield exercise was in time to record aircraft landing places, many of which were re-used for other purposes. Most of the surveys were accomplished in the 1970s, and had two features in common – they were carried out by groups of members and they were published.

By 1981, it had become apparent that farm buildings were undergoing adaptation or demolition at an increasing rate, and it was decided that this should be the next subject for survey. The plan was to visit about 300 farmsteads in Hampshire to provide descriptions of the way they appeared in the 1980s. The project was usually called *"The Farm Survey"*, which was misleading in two ways.

First it was restricted to recording farm buildings and, second, the level of detail was not that of an architectural survey. All the visits were made by amateurs and, inevitably, the levels of recording have varied. However, checklists were used and records were only included if they reached an agreed standard. They reflected the aim of the project which was to provide basic information for a possible researcher of the 2080s. With this in mind, the master copies of the reports for each farm visited are to be deposited in a library or record office where they will be accessible to anybody who wishes to see them. Photocopies for the 306 farms visited have already gone to those living in the farms, to the Hampshire County Planning Department and, with the agreement of the owners, to some District Planning authorities. Temporary confidentiality was offered to those allowing access and, in the very few cases in which this has been requested, the descriptions have not been circulated. Otherwise, they have been freely available and the first presentation took place at a meeting of the Historic Farm Buildings Group at Singleton in the early days of the project.

An immediate problem was the composition of the sample. In order to gain experience and, in particular, to evaluate the checklist, it was decided to visit all the premises marked on the Ordnance Survey 1:2500 plans as "farms" in the Civil Parish of Durley. 41 establishments were identified and copies of the 1:2500 plans were provided by the County Planning Department. Introductory meetings were held in July 1981 for the 30 SUIAG members interested, including visits to farms. Of the 41 premises, 36 were visited, three refused access and two had already lost their farm buildings. This comprehensive coverage provided the experience on which the rest of the project was based.

For a geographical basis, it was decided to use Civil Parishes and the 13 Districts of the County. The original plan was to visit a number of Districts in each year in order to complete the survey by the end of 1990. Clearly more rural Districts, such as Winchester, would have far more farms to see than more urban Districts, such as Southampton. There were to be seven phases, with the nucleus of SUIAG volunteers being joined by local volunteers who would make records in their respective Districts. Usually they came from local

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archaeological societies – North East Hampshire and Basingstoke were particularly helpful. In the event there have been six phases and, instead of 1990, the final report was not completed until 1995. Random sampling proved ineffective for the crucial task of selecting the farms. [On the basis of our Durley experience we endeavoured to visit about a quarter of the farms in each District].

It was decided to convene *ad hoc* advisory panels for each phase. In addition to the County Planning Department we had the advice of the Fareham and Hants Farmers Club, the National Farmers Union, the Ministry of Agriculture, Fisheries & Food and the Country Landowners Association. We were able to consult the Hampshire Treasures Survey and also the descriptions of Listed Buildings. These drew attention to noteworthy buildings, mainly farmhouses, barns and granaries but, if accepted as the only basis for our sample, would have given a very biased view of the farm buildings of the 1980s.

In the earlier stages we avoided contact with the District Councils for fear that we should be regarded as agents of the Planning Authorities. This was a mistake as owners and occupiers who had things they wished to conceal from the planners normally refused access in any case. In the very few cases where our offer of confidentiality was taken up, this reflected such things as the use of buildings for industrial purposes, or of land for the storage of motor vehicles. Refusal to grant access was usually from affluent owners who feared intrusion from the *hoi polloi* and, unfortunately, from a very few "peasant" farmers who viewed us with mistrust. One particular example was a tatty farmstead where such maintenance as had been attempted was executed mainly with re-used corrugated iron. Our visitor was asked for the purpose of his visit and, in particular, what he hoped to gain from it. Reference to historical value failed to carry conviction and was followed by an enquiry as to whether our visitor was from an oil company. After a lengthy attempt at amelioration, the owner finally gave his consent, only to have it vetoed by one of his middle-aged sons. However, refusal for access was so rare as to be insignificant, and certainly did less to reduce the value of the survey than possible shortcomings in the selection of examples to visit.

For the final phase, which covered Basingstoke and Deane District, no advisory panel was convened. Instead, the organiser consulted the District Planners and members of appropriate local societies. As usual, an attempt was made to include a mix of types of farm with an appropriate division between the various Civil Parishes. As in the other Districts, O.S. 6-inch and 25-inch plans were used, but by this time the 3½-inch County Street Atlas was available and proved particularly useful. However, even with the most careful preparation, it was found that there was no substitute for the organiser taking a quick look at all the farms in the preliminary list before they were selected for a visit.

The proportion of farms on the preliminary list, but not selected for a visit, increased over the years. This reflected the increasing rate at which farmsteads have been demolished or have undergone drastic alteration. From 1989 we divided farmsteads into three categories – working farmsteads, those with limited agricultural use, and those no longer in agricultural use. Limited agricultural use covered farmsteads where some of the buildings were in use for such purposes as retailing or accommodating horses for riding; for example, the barn of Fernhill Farm at Titchfield, used mainly as a sales centre. The most common form of non-agricultural use was residential, but other examples included a training establishment for a computer company (Home Farm, Eastleigh, for IBM) or a combination of public house, community centre and doctor's surgery (Lychpit Farm, Basing). Perhaps the most unusual re-use was a farm being adapted to provide livestock and, if required, setting for the making of television programmes (Folly Farm, Bramley). The proportion of working farms varied from District to District and also tended to diminish during the 15 years of the survey. To some extent this reflected a decline in the acreage devoted to agriculture, but also a degree of concentration on fewer farmsteads.

The proportion of farms on the preliminary list that were omitted after superficial inspection increased with each phase of the survey. In the last District visited – Basingstoke and Deane (1992-1995) – 97 farms were on the preliminary list of which 60 were visited (26 working farms, 15 with limited agricultural use and 19 no longer used for agriculture). This may be compared with Winchester (1985-1986) with 73 farms on the preliminary list of which 60 were visited. For Eastleigh (1990-1992) 37 were viewed and 23 visited and for Fareham (1990-1992) 31 were seen and 22 were recorded. The proportion of farms out of those which were judged by the advisory committees or the organiser to be worth recording compared to those actually visited was as follows - Winchester (1985-1986) 83%; Fareham (1990-1992) 71%; Eastleigh (1990-1992) 63%, Basingstoke and Deane (1992-1995) 67%. In 1990-92, of 9 sites viewed in the City of Southampton, only 2 had remains worthy of record; in Gosport, out of 5 sites, the buildings of one remained but demolition was imminent and in the City of Portsmouth, Green Farm remained but planning permission had been granted for demolition of all the buildings except the farmhouse (to be adapted for staff accommodation), the granary (to be moved) and the barn (to be incorporated into a restaurant). These three Districts, together with Rushmoor (mainly consisting of Aldershot and Farnborough) were the only four out of the 13 Hampshire Districts in which we found no working farms. Our selection of farmsteads to stand as examples was not random or arbitrary, but will

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we have failed to make any record of a farmstead which the student in the 2080s might wish to know about? This is bound to be the case.

However, not only did we endeavour to visit both working and non-working farmsteads, but also a cross-section of different types of farm. We gave more detail of traditional buildings - particularly farmhouses, barns and granaries – than of the prefabricated buildings, particularly associated with the 1950s and 1960s. Records consisted of description, drawings and photographs, the amount of detail depending on the visitor and his assessment of the significance of the building. The checklist favoured classification according to the original function of a building – crop storage, eg barns; animal housing, eg stables; shelter for equipment. eg cart sheds; initial processing, eg dairies; and dwellings, eg farmhouses. [We did include houses, cottages or any other accommodation for those working on the farm – there seemed to be no reason for excluding accommodation for people when we included that for animals]. However, we did exclude portable equipment such as old ploughs or new combine harvesters.

There were problems of classification with buildings whose functions did not reflect any particular original function. Animal shelters such as pigsties or stables were sufficiently distinctive but some buildings, including those used for housing cattle, were not so specialised. One problem arose from the re-use of buildings, including barns. We described a barn as a barn, even if it had been used as an animal shelter or for housing a grain drier. More extreme cases were a barn used as a Reception Centre (Manor Farm Museum, Botley) or as a public house (Lychpit Farm, Basing). Other barns were in use as dwellings, workshops, restaurants or swimming pools. Timber framed free-standing granaries mounted on staddle stones were a common feature on Hampshire farms and, partly because many of them were Listed, as an alternative to demolition, a number had been moved. As the original position – usually separate from other buildings but in view of the farmhouse – was significant, where possible both the original and present positions were recorded. The official description of Listed Buildings in most cases was written over twenty years ago, so it was of interest to note any changes, particularly in the case of barns.

Volunteers visited 306 farms between 1981 and 1995, the distribution between the 13 Districts being as follows: 1981/83 – "Control" reports on all 36 farms in the Civil Parish of Durley; 1982/85 – 39 selected farms in New Forest and Test Valley Districts; 1985/87 – 60 selected farms in Winchester District; 1987/89 – 48 selected farms in the East Hampshire, Hart and Rushmoor Districts; 1989/92 – 63 selected farms in the Eastleigh, Fareham, Gosport, Havant, Portsmouth and Southampton Districts (only 16 sites were viewed and 4 recorded in Gosport, Portsmouth and Southampton); 1992/95 – 60 selected farms in the Basingstoke and Deane District. The visits were undertaken by about 40 members of SUIAG, 13 members of the Basingstoke Archaeological Society (in Basingstoke and Deane), 7 members of the North East Hampshire and Historical Society (in Hart) and Mr T. Childerhouse (in Rushmoor). The volunteers paid all their own expenses except for the photographic work. They received a standard package which included a checklist, a 1:2500 plan of the farmstead and a letter of introduction. They made their own appointments. Inevitably the amount of detail in the reports varied, including the quality and the quantity of the photographic coverage. In most cases the photographs were reproduced as 3½" x 5" black and white positives, the negatives being retained with the master copies. Some volunteers returned coloured prints, which were fine for the master copies, but not so good for the photocopies.

As already mentioned, for fear of being associated with the Planning Authorities, in the earlier stages there was no communication with the Districts, the 1:2500 plans being provided by the County. However, by the time we reached Basingstoke we found that this degree of independence was unnecessary, and Basingstoke and Deane Planning Department provided both the plans and the relevant extracts from the Listed Buildings file. The main cost of the survey, including the travelling expenses, has been borne by the SUIAG and other volunteers. Support in the form of the provision of plans and other information has come from the county and from Basingstoke and Deane District. Financial support came exclusively from the County, specifically for photography and the cost of producing the six reports covering the 13 Districts. Over the 15 year period, this amounted to £2250.

Although this piece is about the Survey and not the farmsteads, six examples have been chosen to indicate the varying character of the reports. Extracts have been taken from Durley Hall Farm, Durley (22 December 1981), St Clairs Farm, Droxford (February 1987), Lodge Farm, Odiham (14 May 1989), Home Farm, Eastleigh (3 September 1990), Fernhill (Titchfield Abbey) Farm (3 June 1991) and Upper Woodcott Farm, Litchfield and Woodcott (4 September 1993). It would have facilitated the rate of progress if the Districts had been brought in at an earlier stage. Another factor which led to the work being completed in 1995 instead of 1990 was the use of volunteers, including a volunteer organiser. The length of time taken meant that possible comparisons between Districts were less valid. For instance, farmsteads in the New Forest in 1983 cannot be directly compared with those in Basingstoke and Deane in 1993. Using Districts for staging the work proved effective,

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despite the fact that District boundaries were not based on agricultural areas. The survey did not include documentary research, although some of the reports included notes on the history of the farm. In a way, the survey was introductory and may be followed by detailed documentary research in some cases, and architectural studies in others. The main argument against the work having been done by amateurs was the time it took and, less significant, the variation in the styles of reporting. In favour was the low cost to the public. A valuable aspect of the survey was not reflected in the financial accounts. For the most part, the farming community welcomed our sympathetic interest and we are most grateful for their contribution. The volunteers acquired knowledge and appreciation of farm buildings which they felt to be of value. On balance, the SUIAG Farm Survey proved to be worthwhile.

Dr. Edwin Course

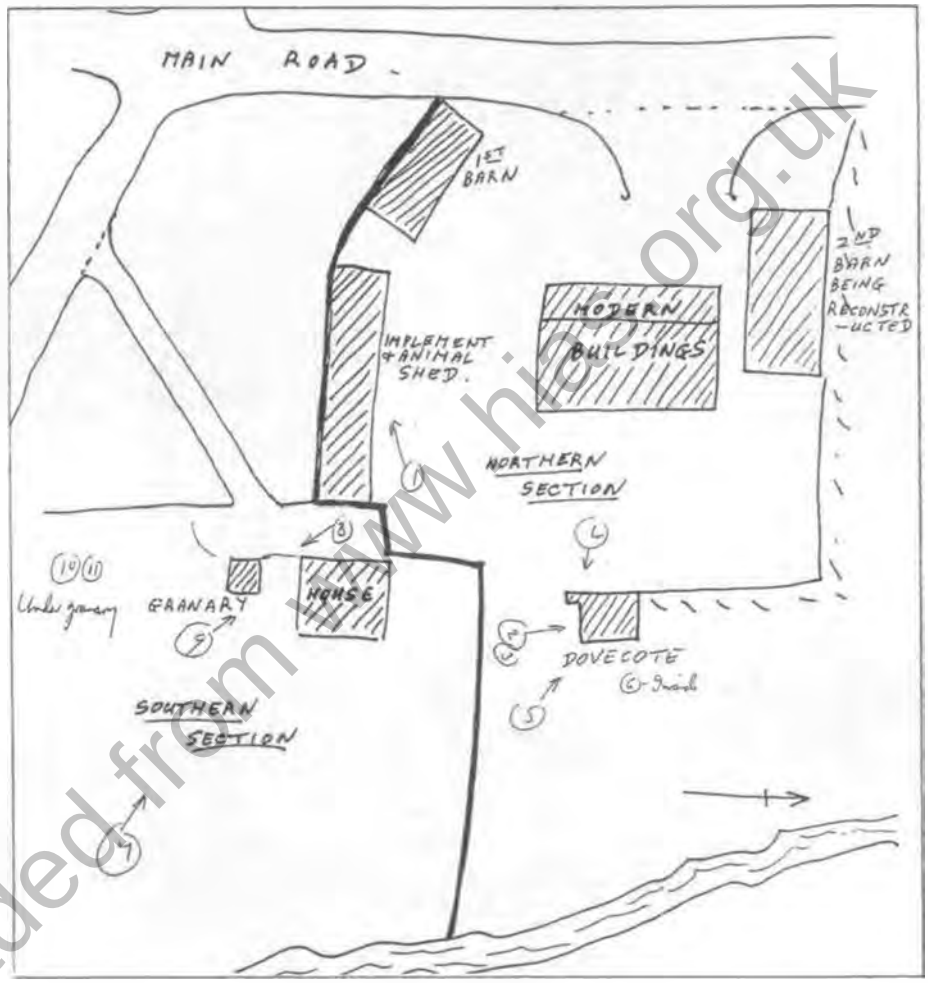
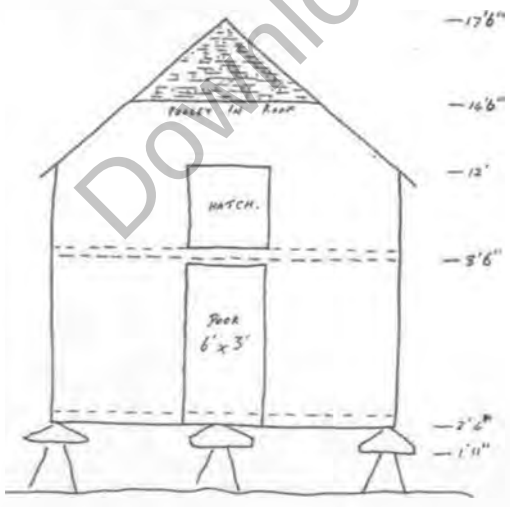
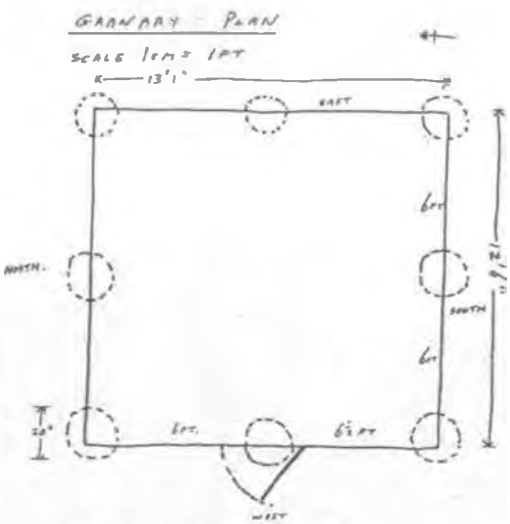


Figure 22
St Clair's Farm, Soberton/Droxford
Plan of Farm

Figure 23
St Clair's Farm
Plan of Granary



GRANARY
Scale 1cm = 1Ft.



BLACK - WOOD - TWO STOREY - DOORS.
TIMBER FRAME
CONDITION GOOD - NOW STORE
ROOF - SMALL FLAT TILES - WALLS BOARDING
HALF HIP BOTH ENDS
ROOF CLASP PURLIN -

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Figure 24 Plan of Lodge Farm, Odiham

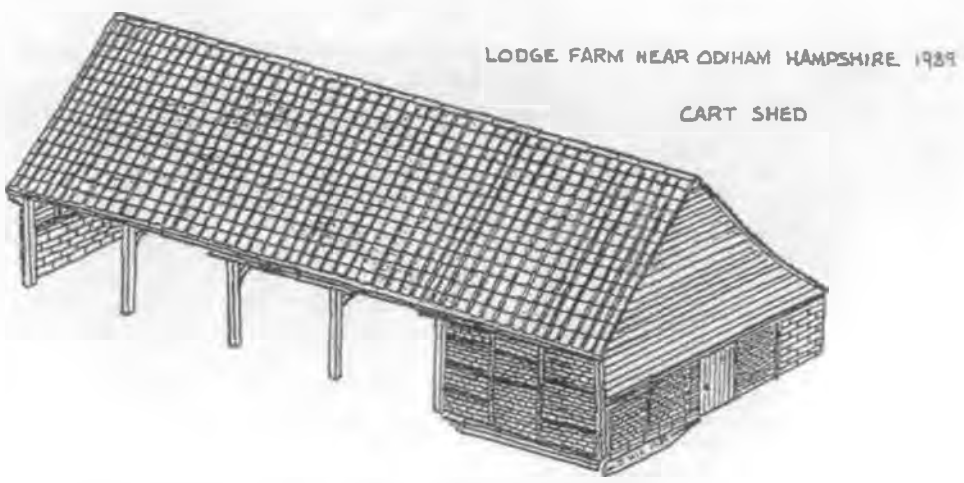


Figure 25 Cart Shed at Lodge Farm viewed from north east

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Figure 26

Durley Hall Farm, 22 December 1981

A	Cow Pens
B	Stables
C	Piggeries
D	Poultry House
E	Barn
F	Dutch Barn
G	Granary
H	Cart Shed
J	Farm House
K	Pond

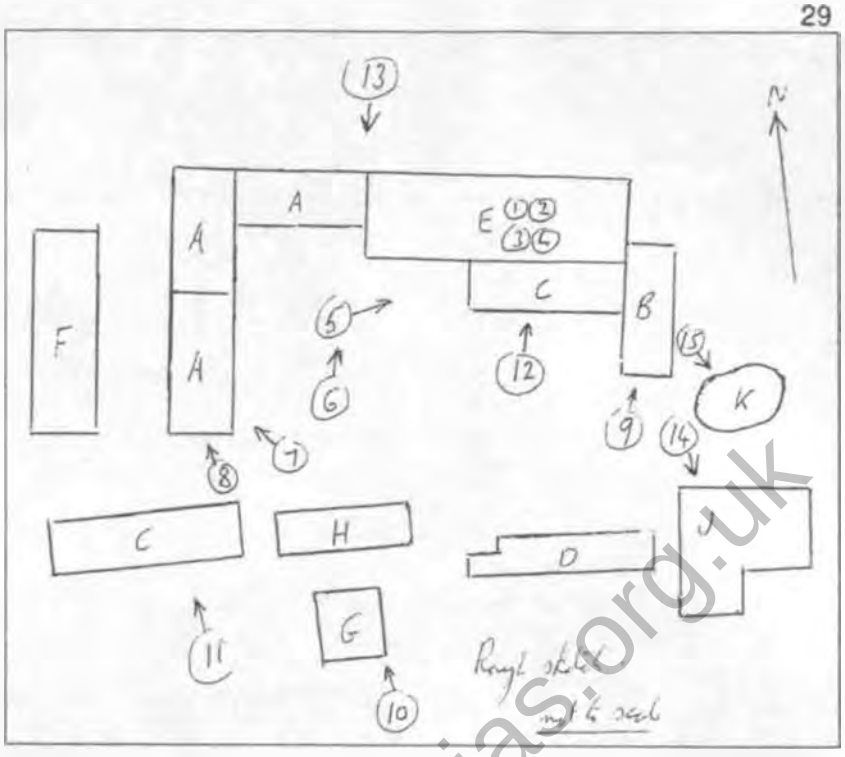


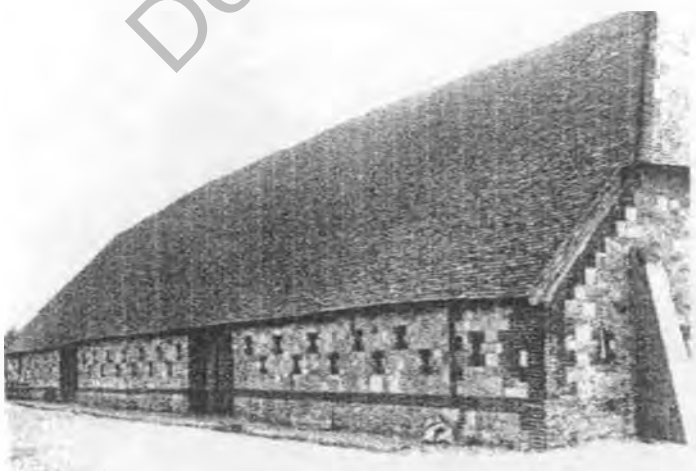
Figure 27 (below) Granary at Upper Woodcott Farm, Litchfield. This granary is listed Grade II. Timber frame on 9 staddles with a (red) tiled roof and (horizontally) boarded walls. The tiles are laid on tarred felt, showing the degree of restoration. (1993)





Figure 28 Home Farm, Eastleigh. Barn from ENE direction. (11 November 1975)

Figures 29 (below left viewed from SW) and 30 (below viewed from NE). Tithe Barn at Fernhill (Titchfield Abbey) Farm. (3 June 1991)





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SUIAG Publications

Monica Ellis *Ice and Icehouses Through the Ages* (with Hampshire gazetteer) 1982 **£2.25**

Edwin Course *The Itchen Navigation* 1983 **£1.95**

Pam Moore (ed.) *A Guide to the Industrial Archaeology of Hampshire and the Isle of Wight* 1984 **£1.80**

Corrections and amendments to I.A. Guide **50p**

Edwin Course and Pam Moore *The Changing Railway Scene in Hampshire* 1991 **£4.50**

Adrian Rance (ed.) *Seaplanes and Flying Boats of the Solent* 1981 **£3.95**

Edwin Course (ed.) *SUIAG Journal No.1* 1992 **£4** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.2* 1993 **£1.50** (to non-members)

Edwin Course (ed.) *SUIAG Journal No.3* 1994 **£1.50** (to non-members)

All the above are obtainable from Eleanor Yates, *Publications Officer, SUIAG*, 66 St Cross Road, Winchester, Hampshire, SO23 9PS (postage and packing extra). Other publications, including *Shipbuilding in Victorian Southampton, Water and Windmills in Hampshire* and *A Souvenir of Southampton Docks* are out of print.

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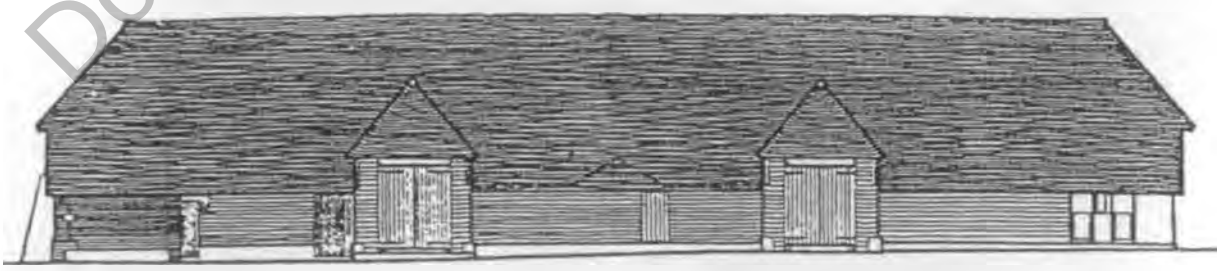


Figure 31 East elevation of the Tithe Barn at Fernhill (Titchfield Abbey) Farm
This 15th century barn has a timber framework carrying a tiled roof. The western wall is of flint, but the eastern side is wooden clad, with two deep canopies above the waggon doors. On the east side the waggon doors have been sealed off.

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Contents

The 150th Anniversary of the Sewing Machine
The Southampton & Salisbury Canal: Some Answers
The Buildings of the Royal Aircraft Establishment
Gas in Odiham
The Hampshire Farm Survey 1981 - 1995

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Cover: The Granary, Lodge Farm, near Odiham, Hampshire