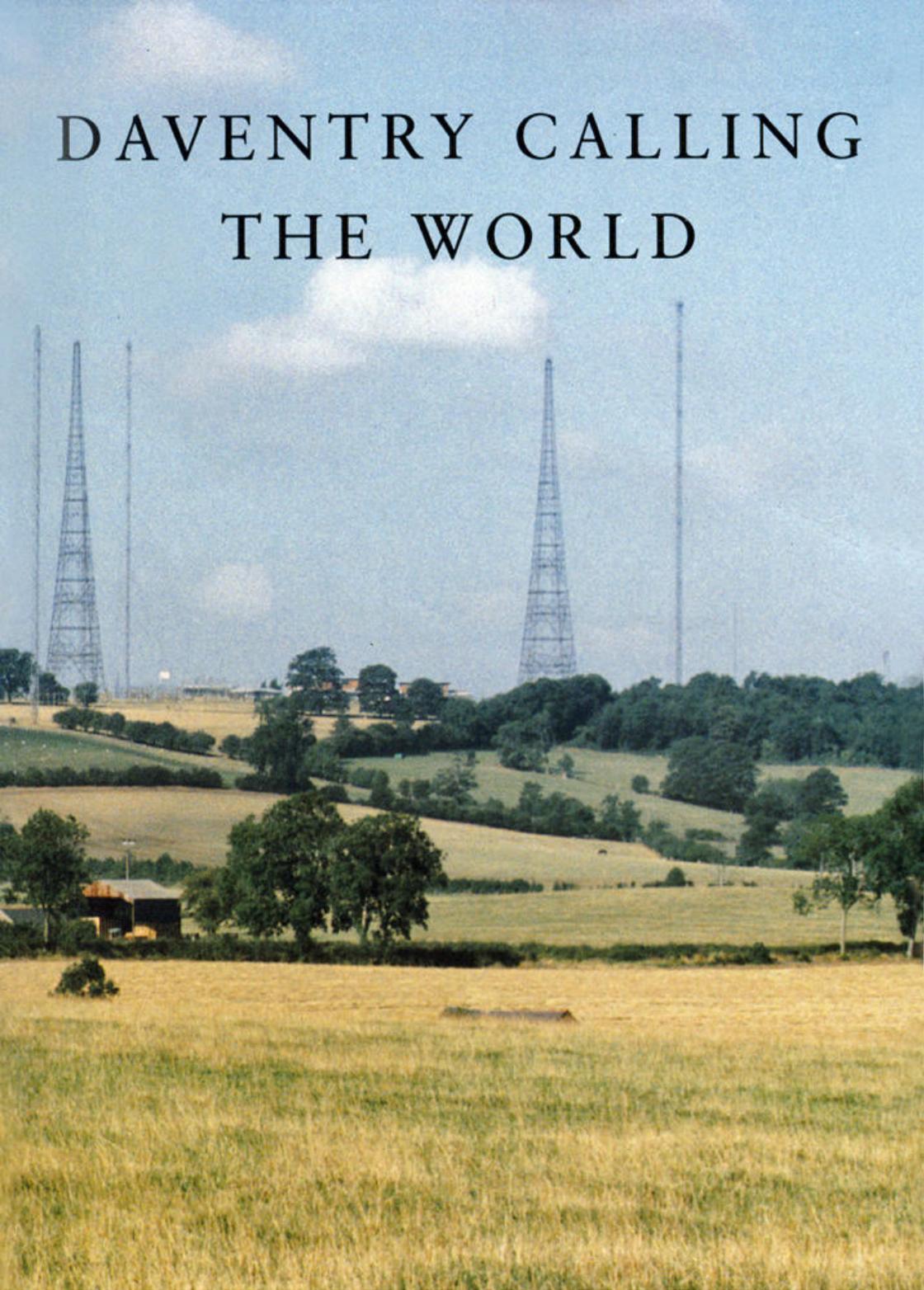


DAVENTRY CALLING THE WORLD



From its inception in the days of 2LO during the 1920s until its final demise in 1992, Daventry Wireless Transmission Station and its well remembered host of aerial masts became much more than a Northampton landmark. The name itself was known world-wide to crystal set owners and wireless listeners.

Norman Tomalin, who was a senior maintenance engineer and training officer there for over forty years, tells the story of the station's sixty-seven years history, including the vital part it played in the war time by transmissions to enemy occupied countries.

In another sense, the town of Daventry was also 'occupied' by the many members of the station staff, whose happy memories of those days remain.

COVER: General view of Daventry Station from Norton to Dodford road.

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DAVENTRY CALLING
THE WORLD



The author, Norman Tomalin, a Senior Maintenance Engineer and Training Officer, under the C for Charlie mast in 1992. © Stephen Shepherd.

DAVENTRY CALLING
THE WORLD

NORMAN TOMALIN

CAEDMON OF WHITBY
PUBLISHERS

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*To Mildred with my love and gratitude
for her patience while I was
absorbed in authorship.*

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FOREWORD

During the exciting days of amateur wireless, enthusiastic set builders could be a navvy, train driver or perhaps an office worker. To those of us connected with this new industry, the name DAVENTRY was immediately linked to principal stations in the world such as Schenectady New York, Paris, radiating from the Eiffel tower, Koenigswusterhausen Germany and Hilversum Holland.

In the early thirties, I recall each midday, Daventry 5GB giving us lunchtime music from Frank Cantell and the BBC Midland Light Orchestra. Thrilled as we were, to be involved with this exciting and popular hobby, little did we think that some of us would find employment on the very site from whence programmes came and would eventually have such global importance.

The sudden exodus from industry and subsequent appearance in the various departments of the BBC contained a considerable variety of applicants via the advertising columns of the *Daily Telegraph*. This was evident particularly in the BBC Engineering Division and I recall colleagues staffed at Daventry coming from Australia, Canada, New Zealand and India, as well as from the whole of the British Isles. It was a great feeling of 'togetherness' enhanced by the many dialects in our daily conversation.

The old 5GB Sender was rather special in that the valves could be dismantled for refurbishment and Worn filaments, grids and anodes replaced. The necessary air evacuation of these valves was effected during the maintenance period by a variety of pumps; a rotary noisy one and another using mercury vapour. Then it was necessary to condition the stage to accept a constant feed of ten kilovolts operation. This was done by incremental steps using a 'conditioner' which supplied a voltage at least double that of normal operation, namely twenty two kilovolts, when much crackling of sparks could be heard as the voltage was increased.

Much of this work is well documented in this historical record which also covers the pre-transmission days and the reasons for Daventry being first chosen as the site for the EMPIRE SERVICE of the BBC.

All of us at Daventry belonged to the Home Guard, having daily drills and rehearsals for potential air raids. A password was given each time a shift changed. I recall early in 1940, an accident involving a brush with a platoon of soldiers reporting for duty, causing them to fall in a ditch. It was followed with the password "bruises". The small guard hut was placed immediately under the two tallest masts at Daventry which radiated the Home Service. When the kettle was boiling, it emitted a ring of sparks underneath and the news or programme events could be heard quite clearly, and the voice of Bruce Belfrage came out as if the kettle itself was a loud speaker! Humour prevailed by general leg pulling, and entertainment was provided by the staff for the citizens of Daventry by putting on pantomimes at Christmas, usually followed by plays such as those of J. B. Priestley or the scripts of other well known playwrights during the rest of the year.

In 1942 a daytime raiding German plane strafed the buildings where we were ensconced, causing me to dash under the desk in the transmitter room. Mr Bill Gilbert, of Middlemore Farm Daventry informed us that it was a Dornier 215 fighter bomber. During the blitz on Coventry the drone of the raiding bombers accompanied the sound of the BBC monitored programmes as the incendiary bombs illuminated the horizon. Even the buzz of falling shrapnel from the anti aircraft fire could be heard on the transmitter site.

In 1943 a small monitoring station was set up in a field about seven miles from Daventry to receive messages from points around Britain relating to possible invasion by Germany. It was staffed by four members, one for each eight-hour shift, with two present during the day shift. Banks of communication receivers monitored all the important European programmes while the shift engineer would be sending coded messages to stations situated around Britain. The farmer who owned the land ploughed an acre for us to grow vegetables and an occasional rabbit was despatched with

the aid of our 303 service rifle. An apocryphal story alleged that one crack shot arranged to kill the rabbit and clean it out at the same time. In any case, the stews were very much enjoyed. It could be lonely at nights, apart from the drone of the raiding bombers. One particular moonless night is recalled when I could see a bright ring of light around the hut door, and cautiously opening it, saw a flare suspended above the ground a few yards away. Duly doused, the silk parachute became a popular ballet dress for a young lady who later became Head Mistress of Long Buckby Infant School.

In 1943 engineers were invited to apply to join the BBC war Reporting Unit. This comprised a concentrated course of instruction on disc recording, coupled with two weeks training with Services; i.e., R.A.F., Navy and Army and with U.S. Air Force and U.S. Third Army training at Clevedon, then in Somerset. Prior to D Day, we drove to the airfields to cover as much news as would pass the censor and recorded personal messages for the families of service personel. From D Day, a point near Fareham in Hampshire was used to record dispatches and send them, together with actuality recordings, up the line to London for BBC Newsreel usage. Thus, after D Day, we met and worked with Stanley Maxted, Frank Gillard, Chester Wilmot, Stewart MacPherson and many other correspondents whose voices we had heard so often at Daventry. Now, in 1998 the sounds are mainly of mechanical diggers; The forest of masts reduced to just one. As the tide of human progress creeps over the mast foundations, let us thank the author for his timely attempts to preserve such an important Piece of broadcasting history.

*Stanley Unwin
Long Buckby, 1998*

INTRODUCTION

On Sunday 29 March 1992, when Daventry Short Wave Transmitter (Sender 24) broadcasting on 15.070 MHz was switched off, an historic era came to an end for the BBC on Borough Hill, Daventry. The event, marked by a reception for current and former staff, was a sad and memorable occasion for all those present.

For sixty-seven years the BBC had brought the name of Daventry to the Nation and the World. It began, when the Post Master General opened the Long Wave Station transmitter (call sign 5XX) on 27 July 1925. Precisely at 7.30 p.m., the Director General John Reith broadcast to the Nation, during which he read out the poem 'Danetree' by Alfred Noyes, and officially announced that the station would be called Daventry.

Throughout this period, the BBC Borough Hill and Daventry Town were closely linked. The town was made known to the nation by its broadcasts and by its name marked on the dials of crystal sets and valve receivers, over many decades.

The station made its name in Britain's history for the development of national and regional broadcasting. It was the world's first International Short Wave broadcasting station – conducted early television experiments – made a unique contribution to British Radar development – played a vital role in broadcasting to the World during the Second World War, and a major contribution to world peace during the years of the Cold War.

Now, through the development of Short Wave relay stations, the BBC World Service from Bush House, London, can reach an estimated two billion listeners.

Throughout this period, the links between the BBC and Daventry town have been strong – a part of the history of Daventry and Northamptonshire. One single mast remains, a reminder of those sixty-seven memorable years.

I

BOROUGH HILL HISTORY

Borough Hill (from the Anglo-Saxon Burh, an earthwork) is in the Jurassic period of the Earth's history, and is an area of oolite limestone, which runs the whole length of Northamptonshire (part of the belt from Dorset to Lincolnshire). It is impregnated with iron-stone to a greater or lesser degree. Hence part of its history is as an Iron-age settlement, similar to that of Hunsbury Hill, Northampton. It is probably the third largest ancient British camp in the country, and occupies the whole of the summit, which at its peak is 660 feet above sea level. It is two and one third of a mile round, enclosing an area of 150 acres, a mile in length, and one third of a mile wide. Three-quarter of the earth-works can be easily traced but the remainder, through the consequence of the plough and other activities has completely disappeared. It is difficult to give an approximate age of the camp, but it is conceded by students of archaeology and earth-works, that it belongs to the Neolithic period, and may therefore be between 5,000 to 20,000 years old. Pottery and three bronzed socket axes, found around the compound at the Southern end of the hill-fort, indicate occupation in the late Bronze – early Iron age period around the 7th century BC. The enclosure was probably constructed as a refuge for flocks and herds from the attacks of wild animals and hostile tribes. It later became a military stronghold – the most important one in the Midlands. The Borough Hill camp is supposed to have been the principal stronghold of ICENI CORITANI Britons inhabiting this area, and according to tradition was the scene of their defeat by PUBLIUS OSTORIUS SCAPULA, the Roman General under CLAUDIUS, AD51.

Morton, in his History of Northamptonshire, expressed the belief that this was the scene of the stand made by the Mercians

against the Danes in 1006. Anglo Saxon spears and battle axes having been found in the trenches.

Much of the earthworks have been destroyed by the Hill's occupiers at the North end, but evidence of a Tumulus and Roman Villa can still be seen.

In the Civil War, prior to the Battle of Naseby in 1645, at least part of King Charles's Royalist army was encamped on Borough Hill. The King slept at the Wheatsheaf Inn in Daventry. The mediaeval market town, centre of roads linking Oxford, Leicester, Coventry and London played an important role in the Civil War. Horse racing took place on the hill in the 18th century, when Daventry was the centre of the whip-making industry.

The BBC came to Borough Hill in 1925. At least six sites in the area were considered and Daventry appeared to be the most suitable. Fifty eight acres of Borough Hill were purchased from the Ecclesiastical Commissioners for £2,670. The British Broadcasting Company had arrived and soon the National Service (call sign 5XX on 187.5 KHz) was broadcast to the nation. Further additional purchases of land from different Oxford colleges and church commissioners took place over a period up to 1951, increasing the site area to about 220 acres. A twelve foot wide access road was built to link London Road, Daventry, to the site. It crossed a bridge over the Weedon to Daventry railway line, and parts can still be seen. In the post-war period, this important historic site has been under the strict control of the County Council Archaeological Department in conjunction with English Heritage.

On Sunday 29 March 1992 at 11.30 GMT the last transmission from BBC Daventry Short Wave station took place, when Sender (transmitter) 24 ceased to radiate. For 67 years, the station had been in the forefront of technical innovation and achievement brought about by the commitment and dedication of its many hundreds (over the years) of staff, male and female, from all walks of life.

Daventry, once a name on every radio dial, was no more. The BBC had closed the town's famous radio transmitting station. It came about through Perestroika, when Russian President Gorbachev ended the Cold War. *Voice of America* scaled down

its operation at BBC Station, Ludlow, Shropshire, enabling Daventry transmissions to be transferred there. Additionally, the BBC had the urgent need to fund a high cost updating programme of the masts and aerial systems on the station.

A *Daily Telegraph* article by Byron Rogers on the 25th January 1992, writing on the closure, included the comment "Mr Gorbachev won't know it, but he has changed the landscape of Northamptonshire."

In April 1995, Daventry District Council successfully purchased 148 acres of Borough Hill from the BBC, for the establishment of an informal countryside and leisure park, with freedom of access and walks within the hedge boundaries. A further 52 acres to the south of the hill bordering the Roman Settlement of "Burnt Walls" was sold to a private buyer. A small area, enclosed by a security fence was retained by the BBC (now Castle Transmission International Ltd). One mast is used for communication purposes and the station buildings are the home base of a Maintenance Team base for the BBC's Domestic Service Transmitting stations (radio and television), within a radius of 50 to 60 miles of the site. Specialist maintenance, stores and supply services also remain, together with the Radio Tape Reclamation Service located in the original 5XX building.

The well drained iron-stone soil has been let for sheep grazing, and English Heritage strictly controls the site, particularly soil disturbance. The only reminder of the silent sentinels on the hill that brought the name Daventry to the nation and the rest of the world, are the huge concrete mast stay and base blocks, that are scattered throughout the site, and are now slowly being covered by lichens. Only those who worked on the hill will recall the ghosts of the past, when gales and storm force winds created a banshee sound of whine, howl and shriek, as they swept through the aerial systems, hour after hour. It was an odd place indeed. It is hoped that a permanent exhibition of BBC Daventry memorabilia may be established locally, illustrating the 67 years of the Station's transmitting activities.

The Dane Tree

R H Cox, in his book 'Green Roads of England' wrote "A popular belief exists in the folklore of Daventry, that an oak tree on Borough Hill marks the exact centre of England". But William Edgar, a Mayor of Daventry in 1915, wrote a book about Borough Hill and was very sceptical of the Dane Tree oak which stood atop of the hill. It was he said "one of many solitary trees detached from hedgerows, and no more than an old land mark used before the enclosure act". The tree fell to the woodsman's axe to make way for the 5XX (Station call sign) building in 1925. The BBC planted a replacement tree in a location close to the main transmitting building, but sadly it became diseased and died. A plaque, made from the tree, and in its memory was placed at the outdoor swimming pool by Daventry District Council. In 1975, a replacement oak tree was planted close to the site of the original oak, to maintain the legend.

The opening ceremony of 5XX prompted the writing of the poem 'The Dane Tree' by the poet Alfred Noyes, which was recited at the opening ceremony. The prophetic concluding lines are somewhat fitting to the closure of BBC Daventry transmissions.

"Daventry calling: memory, love,
The grave beneath and the stars
above. Even in my laughter
you shall hear The power to
whom the far is near. All are in
one circle bound,
And all that ever was lost is
found. Daventry calling —
Daventry calling Daventry
calling — dark and still
The tree of memory, stands like a
sentry Over the grave on the
silent hill".

2

BRITISH BROADCASTING AND BBC DAVENTRY

It's difficult to imagine today the wireless fever that gripped the country in the summer of 1925. Broadcasting as a popular pastime was barely three years old. It was the age of the crystal set and two and three valve receivers.

In 1920, several licences were granted by the Post Office for experimental radio transmissions, but these were opposed by military and maritime bodies who were using communication point to point links.

The Marconi company, under licence, had conducted successful broadcast transmissions and on 11 May 1922 opened their London Broadcasting Station 2LO on Medium Wave. Also in 1922 the British Broadcasting Company was formed by a consortium of major radio manufacturers, and soon took over the London Station 2LO.

A succession of low power Medium Wave stations were opened in major towns and cities throughout the UK from 1922 to 1924 (eighteen in all) by the BBC.

Savoy Hill, John Reith and 2LO

The manufacturers realised they needed an appealing radio service. They made a move of historic significance, inviting a zealous, high minded, deeply religious, authoritarian, difficult, but remarkable and visionary Scot to run this start-up business from a single room in Kingsway. John Reith was 33 years old. He would define the character, ethos and ambition of the institution more than any other person in its history.

He graduated as an engineer from Glasgow Technical College, progressed in engineering through the First World War. Worked in America adopting their practice and procedure, and then moved back to England. He considered building a railway on the Amazon, but applied to run the BBC instead. About the interview he remarked 'They didn't ask me many questions, and some they did, I didn't know the answers. The fact is, I hadn't the remotest idea what broadcasting was!'

Reith gathered together his staff of 21, and began to invent broadcasting. He started with a high regard for his own abilities. He would later confide in his diary: 'What a curse it is to have comprehensive ability and intelligence, combined with a desire to use them to maximum purpose!'

No. 2 Savoy Hill (home of the Institution of Electrical Engineers), was a friendly bustling place, close to Waterloo Bridge, Fleet Street, Covent Garden and the theatres. The BBC fitted in well – the studios had signs warning 'Don't cough, you'll deafen Millions!' From there, programmes were sent to London Station 2LO, and the national transmitter at Daventry 5XX. In those early, heady days, there was a high degree of improvisation. Everyone was happy to lend a hand. Dame Nellie Melba popped in and performed for free. The Chief Engineer sang the theme tune of Children's Hour each day in a high tenor voice.

John Reith gave the BBC its ethos and purpose, and the extraordinary factors which moulded its unique character. There were four ingredients: growing independence from government: the development of a public service ethos: the ambition to be a national broadcaster: and the creation of the BBC as a monopoly.

In July 1924, the Post Master General (PMG) granted the British Broadcasting Company a licence to test long wave transmissions from a transmitter sited at the Marconi works at Chelmsford.

The objectives of these experimental transmission were to determine:

- a) The range of crystal set reception;
- b) The extent of interference of a high power LW station with other broadcasting stations; and

- c) The possible danger of interference with other radio users, such as the armed services.

Reports of good reception were received from all over the country. Subsequently the BBC requested the PMG for permission to operate a high power LW broadcasting station.

In an article headed 'The World's Biggest Broadcasting Station', Captain P P Eckersley, the BBC's first Chief Engineer stated that 'the choice of the Long Wave transmitter site (5XX) was influenced by the authorities, who had laid down that the station was to be situated north of a line between the Severn and the Wash'. The Government also stipulated that it must be placed so that as much as possible of the area served by the station would be land and not sea. This was a simple geographical problem, and there was little doubt that the station would be best placed somewhere near to Daventry, as a one hundred mile circle centred on the town included only a small area of sea. Of the six sites examined, Borough Hill near Daventry appeared to be the most suitable.

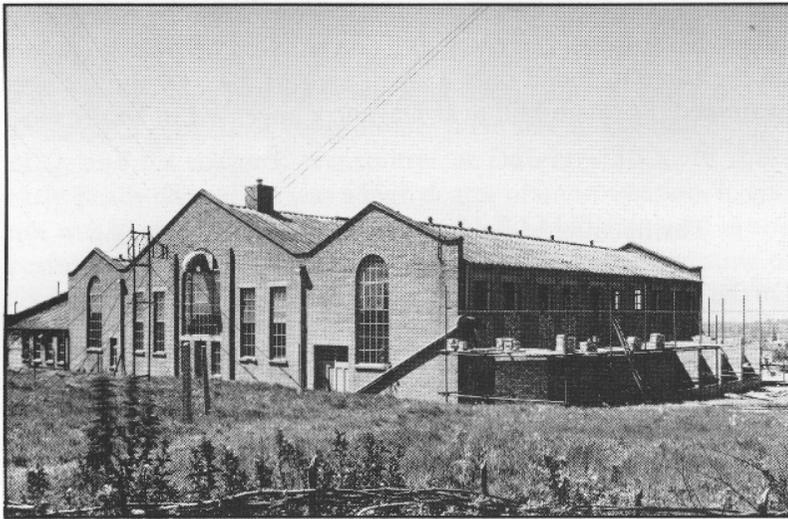
The opening of the Daventry Transmitting Station

On the 27th July 1925, the Post Master General opened the station which operated at a carrier power of 25 kilowatts on 187.5 KHz Long Wave. A special train brought the PMG along with the Chairman and Directors of the British Broadcasting Company, from London Euston to Daventry. Together with local dignitaries, they gathered at the station and crowded into the small studio. On the dot of 7.30 p.m. a red light flashed and the station identification 'Daventry Calling' was broadcast to many millions of listeners (a potential audience of twenty five million). A poem 'The Dane Tree' written by Alfred Noyes was read out by Director General John Reith, who then announced that officially the station would be called Daventry.

Lord Gainford read a letter from Prime Minister, Stanley Baldwin, who indicated that Daventry was then the highest powered station in the world. It was also, he said "A milestone

on the road to the social betterment of the people". Lord Gainford also said "Now Daventry was working, about 90% of the population was within crystal set range of one or more programmes". PMG, Sir William Mitchell Thompson, reaffirmed that the crystal set coverage of 5XX included Manchester, London, Ipswich and Cardiff. With one valve sets, the reception radius would be one hundred and fifty to two hundred miles.

Finally, Sir William declared the station open, and handed it over to Captain Eckersley, Chief Engineer. The Mayor of Daventry concluded the speeches with the prophetic words that "messages will soon be sent to all parts of the Empire".



1950 The 1920s 5XX building undergoing alterations twenty-five years later.

©BBC

3

THE 5XX NATIONAL SERVICE TRANSMITTER CENTRE

The Northampton newspapers were fascinated by the station construction and overawed by the height of the two lattice steel, stayed masts, that towered five hundred and twenty feet above Borough Hill, dominating Daventry and the surrounding countryside.

No road led to the hill, so the main contractor Sir Robert McAlpine built a light rack and pinion railway to carry construction materials to the station. A 'T' aerial was hung between the masts, and consisted of a cage of ten copper wires grouped around six feet diameter aluminium hoops.

To improve the efficiency of the aerial, a giant earthing system, consisting of heavy zinc plates, packed around with quantities of crushed carbon, was placed in the ground within a two hundred feet radius of the aerial feeder hut. For four days, a huge Union Jack hung from one of the masts, fluttering in the wind, effectively announcing the arrival of BBC Daventry.

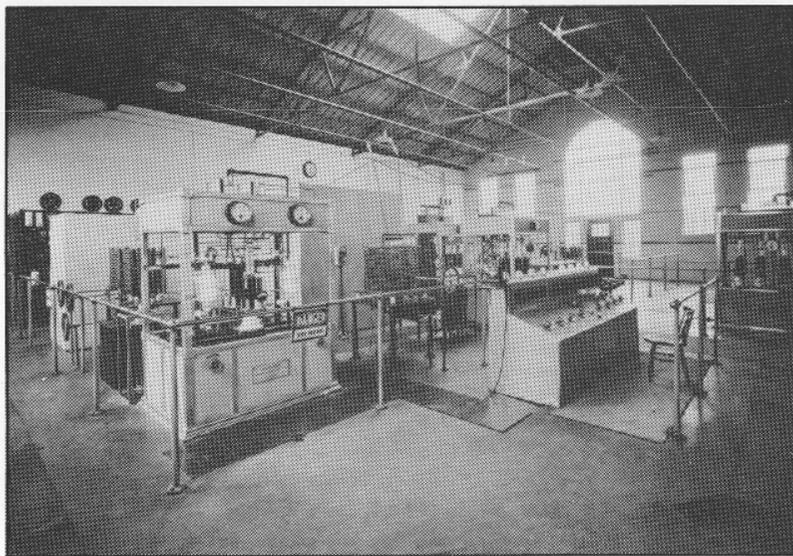
Although the station had a small emergency studio, normal programmes came from the Savoy Hill studios, fed to Daventry using high quality Post Office line.

Northampton Electric Light company power station in Midsummer Meadow, Northampton, provided the 11,000 volt power supply to the station using a three and a half inch underground cable.

The 5XX building of common brick and asbestos sheet roof was built by Daventry builders, Bowsworth & Wakeford, at a cost of £50,000, and a separate building close to the Daventry water reservoir, was built later to house the Engineer-in-Charge, Captain H Litt, and support engineers.

The 5XX transmitter was designed and installed by the Marconi Company, Chelmsford. The building was divided into three areas – front offices and studio, central transmitter hall, and a rear power room with motor generator sets which supplied valve filaments, bias and high voltage to the transmitter. A spacious high ridged roof hall with cathedral type windows (the building overall is little changed), housed the transmitter.

Modern transmitters are contained in sealed cabinets, with safety interlocks, and small inspection windows – not so 5XX. Imagine an open space, with an array of cabinets containing valves, capacitors and resistors in one section, and another open area, with cabinets linked to large copper coils and flat aluminium plate tuning capacitors. Staff protection from dangerous voltages consisted of a single metal pole barrier at waist height. Pride of place went to the amplifying valves, small air-cooled and large water-cooled.



1927 General view of the transmitter (*The Old Gentleman*).

©BBC

At night during the wartime 'blackout', the only light came from the valve filaments, acting like large glow-worms to light the area. Water gurgled and hissed around the valves, and the hall was filled with low volume speech and music, coming from the vibrating laminations of speech chokes and transformers in the transmitter. It brought an eerie sound to the ghostly and shadowy building. The term 'steam radio' was perhaps coined from the ambience of early transmitters such as 5XX – the 'Old Gentleman', as it was called by 'folks on the hill', is warmly remembered by the engineers who kept watch; they, who threw switches to startup water pumps, filament, bias and high voltage generators, coaxing it into life for another day's transmission to the Nation.

OTHER MEMORIES AND HISTORY OF 5XX

Trans-atlantic reception centre

There is evidence, recorded by the American RCA Company, of trans-atlantic tests from Daventry on long wave, prior to the official opening of 5XX. A transmission from Daventry was picked up at Belfast, in Maine, re-radiated to Van Cortland Park, New York, and re-broadcast by WJZ in New York.

Still Picture Transmissions

The first UK test transmissions of 'still' pictures by the Fultograph process (the beginnings of television), took place using 5XX. The tests started on 30 October 1928, and continued for a year. To generate the 'vision' transmission signal, one method used a beam of light to scan a picture, allowing the reflected light to operate a photo-electric cell, the signals from which modulated the 5XX signal. A receiver similar to an Edison phonograph, printed a picture on absorbent paper impregnated with an electrolyte solution (potassium iodide), when it received the varying current from the radio receiver. These tests were billed in the *Radio Times*, and by then topical news pictures, cartoons and fashion plates were also being broadcast.

Northampton – 'The Wireless Connection'

While the thousands who had brought crystal or valve sets specially to receive Daventry listened at home, a huge crowd gathered in the Masonic Hall in Princess Street, Northampton, where the five valve 'Cosmo' had been installed by Brice & Sons Limited, of the Drapery, for the opening of the station. Brices were not the only local firm to be pushing the new home entertainment. Tomlinsons of 60 Wellingborough Road, were making their own sets, under the trade name of Ideals, with prices as low as 19/6d. Two valve sets were sufficient for Northamptonians to receive most English stations, but five valves were needed for European stations. The crystal set was considered temperamental, and needed a gentle touch to locate the thin spring wire (cat's whisker) to touch a shiny granule of crystal. Slades, the well known bookshop, sold a range of sets. The Brownie crystal set cost 9 shillings, Western Electric 35 shillings, and the best a B T H Model A with alternative crystals, 65 shillings. Mundins, house furnishers of 35 Abington Street, also sold two valve sets. Lowke & Sons Limited (model makers) offered their own make of set 'The Dane Tree', made Lowkally! Tuning the valve sets was not easy, and Goldstone Limited of 58 Marefair, were agents for the reliable Tangent set, made by Gent & Company of Leicester. Fred Cave, who ran a garage at 2/24 Horsemarket, stocked a huge range of sets. In April 1929 he attracted a large crowd of shoppers outside his radio shop in Abington Street, when he relayed through a loud speaker, the Grand National from Aintree. The local press said "The broadcast came through loud and clear – a tribute to the quality of the instruments used".

It was nearly eight years before the County was heard over the air waves. In March 1933, a programme 'Northamptonshire's Broadcast Week' was transmitted with a speech by Sir Arthur de Capell Brooke, chairman of Northamptonshire County Council, followed by a pageant of the County by Mary Pendered of Wellingborough. A concert by Northampton Symphony Orchestra, and a scene from Shakespeare's King John by the Northampton Repertory, were relayed direct from the Town Hall. Talks and factory visits,

and further musical programmes completed the week's broadcast.

Regular live transmissions came from the stage of the New Theatre in Abington Street, which included many music hall stars

Jack Warner, Suzette Tarry, Nellie Wallace, Stainless Stephen, Issy Bonn, Henry Hall's BBC Dance Band and Northampton's Bertha Wilmott.

Daventry itself went "on air" in December 1948, when a series called 'microphone at large' came from The Wheatsheaf Hotel. Harry Masters (the Engineer-in-Charge, Daventry) explained the workings of the transmitting station and the senior rigger, Charles Sterret of Daventry, told listeners he could climb a five hundred foot mast in eleven minutes.

Richard Dimbleby came to Northampton in 1952 to record the 276th edition of 'Down Your Way'. Included in the programme were members of the Boot and Shoe Industry, printers Clarke & Sherwell, the Express Lift Company, and Thurstons, the fairground family. Percy Thrower broadcast from Abington Park and the park's Superintendent, J McIntosh also spoke.

In 1982, the BBC finally gave Northamptonshire its own radio station, with the opening of Radio Northampton on the 30 June. Hereward Radio operated by the IBA opened in October 1984, funded by commercials.

The Chequered History of 5XX and 5GB Buildings

It would be useful to know a little bit about the magic of radio waves, that cannot be seen or heard, invade the air and ground around us, and play such an important part in our lives.

Long Waves travel at the speed of light, hug for the most part the surface of the earth, and travel around it many times before fading into nothing. They prefer to travel over sea rather than land, and can manage large obstacles such as hills and mountains without too much distress.

Medium Waves have a more limited range – like the sea – but are seriously reduced in strength by hills and mountains, hence poor reception in some parts of the country.

Short Waves are the long distance travellers! They are aimed at

a layer in the sky called the Ionosphere, and like a light beam are reflected back to earth. This also acts as another mirror causing the waves to bounce back to the Ionosphere, and so on around the earth. The clever bit is to arrange your bounce, so that, for example your English programme from London reaches Australia and New Zealand.

Masts support the wires placed between them, and these radiate the signals, Long Wave, Medium Wave or Short Wave into space. Some masts on Medium Wave are designed to act as the radiator.

VHF (FM) and TV Services. These programmes use very short waves, and their signals travel short distances. They are seriously affected by mountains, hills, tunnels, buildings and trees. Areas of high population receive signals from aerials placed on the top of high masts - radiation is analogous to the beacon from a light house.

It was found that the sloping ground of Borough Hill was not ideal for Long Wave radiation, and in 1935 the National Service was transferred to BBC Droitwich, some twenty miles south of Birmingham. The flat ground and location of Droitwich proved a boost to reception in many of the more densely populated regions of the country.

5XX was not out of use for long. Clouds of war loomed, and on Government instruction the transmitter was rapidly converted to Medium Wave (767 KHz) and came back into wartime service in December 1939. Unfortunately, the station signal acted as a navigational beacon for enemy aircraft, and after a short period of use, 5XX was shut down. Quickly it was converted back to 200 KHz, to join a group of BBC stations, which included the most powerful of all transmitters (600 kW Ottringham, near Hull) for the European Service.

During this part of its life, until December 1944, the station made its valued and significant contribution to the outcome of the war with Germany. The ceaseless propaganda and encouragement to the enslaved peoples in the countries of Europe sustained their hope for eventual victory. Secret messages from Daventry 5XX to our agents in France and the Low countries, were also a vital role. Interesting to reflect, secret messages from Daventry were sent to

agents across the Channel, some of whom were trained in the hamlet of Brockhall, near Weedon, and who were flown from the secret airfield of Harrington, near Rothwell, Northamptonshire.

In 1987 a plaque was placed in memory and a Carpet Bagger Aviation Museum established, with photographs and exhibits showing the important work of the airfield.

For a short period, until 1945, 5XX was converted back to Medium Wave to transmit Morse Code for the Air Ministry. Finally, and sadly, it was scrapped in January 1950. The 'Old Gentleman' had come to rest.

The building also housed a low power Medium Wave Air Meteorological service, providing accurate local weather forecasts for military and civil air fields and shipping for the period 1935/1939 and 1946/1950. Farmers, contractors and holiday makers valued this service, and rued its passing.

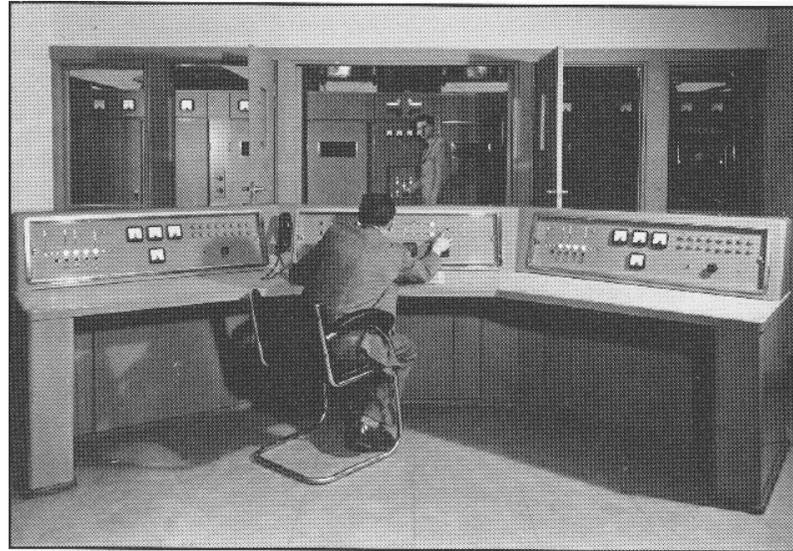
BBC Medium Wave Services

In July 1925, when Long Wave transmitter 5XX commenced transmissions, low power Medium Wave stations were already working. London Station 2LO and eighteen similar low power transmitters provided a service in towns and cities throughout the United Kingdom.

The British Broadcasting Company (changed to a Corporation on 1 January 1927) decided to establish an experimental high-power Medium Wave transmitter, call sign 5GB at Daventry, to provide a regional service covering the Midlands. A small self contained building costing £10,000 was built on a flat site further up the hill from 5XX – the running costs were estimated to be about £3,000.

The design and installation of the 50 kW transmitter was completed in six months, although some problems were experienced. In particular flash-arcs occurred in the large valves, causing spectacular failures and consternation to the design engineers. 5GB came into service on 21 August 1927 on 610 KHz, and thus provided the first alternative for the Midland region.

Two 325 feet stayed tubular steel masts supported the 'T' aerial



1950 BBC Third programme control room.

©BBC

erected to complete the transmitter installation. In the event, it was found that one of the 520 feet masts used by the 5XX Long Wave transmitter seriously distorted the horizontal radiation pattern of the Medium Wave aerial, reducing the signal strength received in Birmingham. A new aerial had to be hurriedly installed a few days before the station opened.

In consequence of the now realised problem of the mutual interference of aerial systems, and the prospective opening of a new Short Wave service on Borough Hill, it was decided to transfer the Regional Station to BBC Droitwich, and 5GB closed in February 1935.

Third Programme (Radio 3) and the 5XX Building

Within the many policy and programme changes introduced by the BBC in Domestic and Overseas Broadcasting, at the end of the war, came the commitment to create the world's first cultural

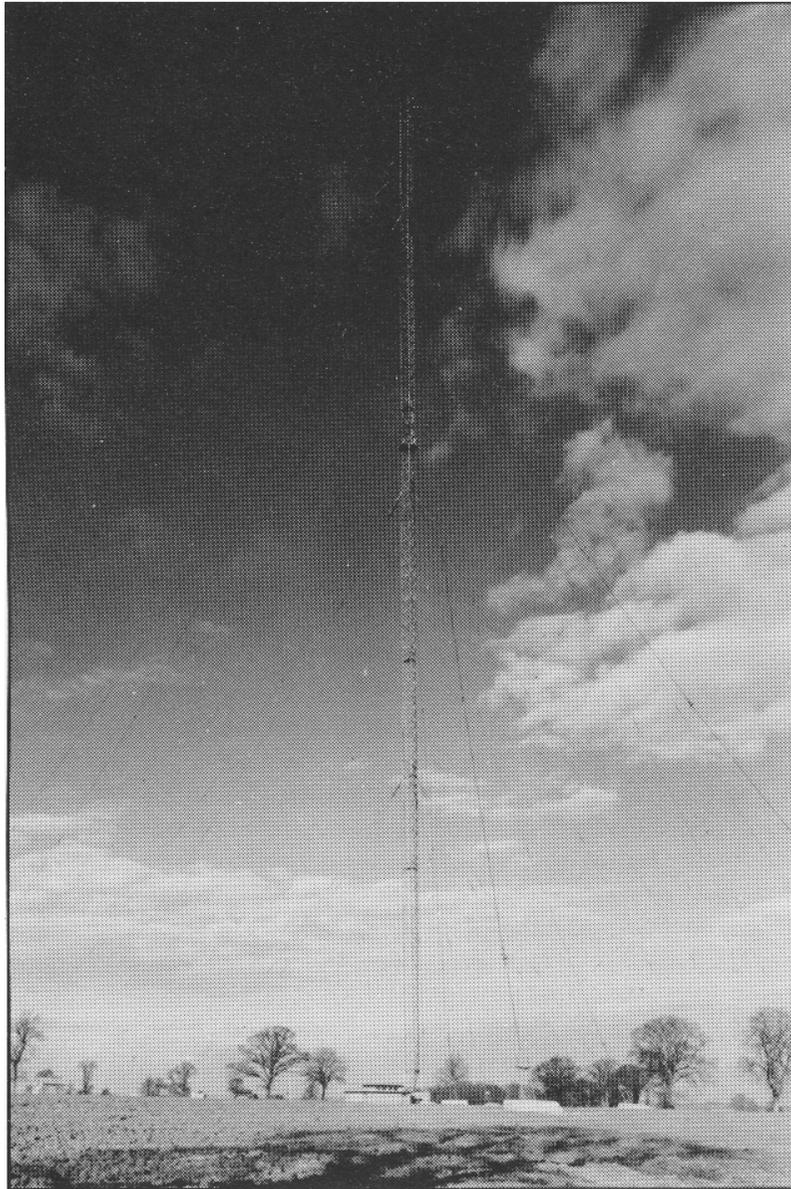
programme dedicated to the spoken word and music, which would span every aspect of the arts in our national life.

It brought about the creation of the Third Programme, and the installation of a high power Medium Wave transmitter in the 5XX building at Daventry. It was to be a National Service, and to this end low power transmitters were installed in locations of poor reception operating on the same frequency (Group frequency working).

Transmissions from Daventry on 647 KHz started on 15 March 1950. Initially the service was carried by an experimental Marconi 'Ampliphase' 60 kW transmitter housed in the old 5GB building, with a 'T' aerial slung between two on-site masts.

On 8th April 1951, the service was transferred to twin Marconi 100kW transmitters housed in 5XX building, in the space previously occupied by the 'Old Gentleman'. The transmitter installation was a world first, for it embodied the concept of two high power Medium Wave transmitters operating in parallel, remotely controlled and monitored, and without staff in immediate attendance. Much of the work that made this possible was undertaken by BBC staff, and paved the way for the wholly automatic network of BBC Domestic Service transmitters both Sound and Television, which currently operate today, computer monitored and controlled.

The appearance of the transmitter was so unlike 5XX. Its enclosed grey cabinets that lined the whole front of the transmitter had small window apertures to see inside, and the comprehensive electrical and mechanical interlock system ensured no entry into the cabinets could take place until lethal high voltages were switched off. No possibility of danger to staff now! The transmitter was a good example of the BBC's commitment to high safety standards for its staff. Manual operation of Transmitter 3 (T3 as it was known), was done by push-button control panels, with lights indicating the stepped sequence progression of the transmitter powering. Switched meters provided information of the transmitter circuitry performance. Remote control was effected in the adjacent control room, or from a panel in the Short Wave building control centre.



1951 Dodford mast soars high above the Northamptonshire landscape. ©BBC

Whereas the 'Old Gentleman' was a plumber's paradise, with a maze of copper pipes, water gurgling in and out of radio valves, hisses of steam, sounds of programme and the background noise of rotating generators – T3 embraced the art of up to date transmitter design, and was air cooled. The specification included very high quality music and speech reproduction over a wide frequency range, to meet the requirements of the most enthusiastic 'Hi-Fi' listener. It incorporated high electrical efficiency and operational reliability. Should one half of the two transmitters operating in parallel shut-down, the other would continue to radiate (reduced power). But above all the ambience was totally different. To stand in the silent hall, before the start of transmission, perhaps the warm sun shining through the cathedral windows; then, suddenly total transformation, silence shattered by sounds similar to a small cannon firing, as electrical contactors close, and massive air blowers turn, to make an ever increasing crescendo of sound. The transmitter comes alive, and the shriek of high volume air being sucked through valves and cabinets fills the hall. A following sequence of loud bangs comes from T3 as various circuitry stirs into life. The transmitter is 'On Air', awaiting programme from the Third Programme studios in London Broadcasting House.

Third Programme Dodford Mast Radiator

For many local people, it seemed odd that one tall mast should be isolated from Borough Hill, and located at Dodford, one and a half miles from the 5XX building. It was a technical necessity. The 725 foot Medium Wave mast radiator, should theoretically have had a roughly circular service area. BBC Research Department had determined that the existing masts and other metal structures on the Daventry site would have an adverse effect on the radiation pattern, if the mast was located on Borough Hill. Additionally, the very high induced voltages into adjacent Short Wave aeriels, would have presented a hazard to engineers and maintenance staff working on the feeder and aerial system.

An open stranded copper wire concentric feeder connected the

transmitter to the Dodford mast. It looped around the Southern end of Borough Hill, running close to the original public footpath, and then trailed across several fields, supported on poles twenty feet above the ground. Feeder power losses were low (about 12 kW) and acceptable. The mast was somewhat of a technical marvel, and a product of the BBC Research Department. The lattice steel structure was made in two sections, the top being separated and supported by huge white insulators that gleamed in the sun. It had an enhanced service area using an anti-fading mast. The supporting wire stays had large 'egg' insulators, to isolate the mast from the ground. In violent thunder storms, the mast seemed to attract them like a magnet. The mast would be repeatedly struck by lightning. From a distance, it was a pyrotechnic display – blue sparks from the mast and the 'egg' insulators glowing like incandescent candles for seconds at a time.



1984 The demolition of the Dodford mast was a necessary action, but a sad occasion for the engineers who had erected it.

© Northampton Chronicle & Echo

The display might last for a short period, or as on one occasion, it went on for hours, as the storm left and returned.

To improve the efficiency of the aerial, copper wires were placed in trenches below the ground extending to the edge of the site - in the form of the spokes of a wheel from the base of the mast.

Terrestrial broadcasting has a technical problem. There are insufficient frequencies available to satisfy the demands of countries in the world – it is a very crowded market place. In Europe, each country is allocated frequencies for its various services, and much bargaining takes place. In the late 1970's, an inter-governmental conference was held in Geneva, to address the issue of new frequency allocation. Unfortunately Home Office delegates to Geneva returned without gaining a frequency for Radio 3 (647 KHz).

In consequence, T3 was closed down in November 1978, and the Radio 3 frequency (647 KHz) was transferred to World Service. The transmitters were scrapped in 1983, and on Thursday 8 September 1984, the mast radiator was demolished.

It was reported in the Northampton Chronicle and Echo, 'It took seventeen seconds for one of Daventry's famous BBC radio masts - the 725 ft Dodford mast to bite the dust. At 2.13 p.m. a loud explosion ripped through the countryside, and the triangular lattice steel mast crumpled to the ground in two sections'. Seventy people watched the famous Northamptonshire landmark disappear, and many more would miss seeing a familiar face.

BBC Engineer Training and the 5XX Connection

The cry for training, more and better training, has for many years been the concern of Industry across the country, and now comparatively recently echoed by politicians of all parties.

In this area of Education and Training, the BBC has excelled. For many years, starting at the outbreak of the War, training in every area of Broadcasting is assiduously undertaken. The BBC has achieved an enviable reputation throughout the world of broadcasting. The expansion of Public Service and Commercial Broadcasting in Sound and Television, where high standards of production and presentation has been achieved, is in no small

part due to the many thousands of trainees that have passed through the BBC Engineering Training Department based at Wood Norton, near Evesham, Worcestershire.

At the beginning of the Second World War, the BBC not only had a major role to play in its prosecution, but it also had to accommodate the loss of trained staff to H M Forces, coupled with the rapid expansion of its Overseas Services and relocation of its departments from London. For the first time female staff were recruited to fill engineer posts and these, together with teenage school-leavers, were trained to cover the many vacancies in studios and transmitters.

For a short period, Engineer Training was undertaken in Maida Vale Studios in London, but the severity of bombing in the London 'blitz' necessitated the dispersal of many BBC departments, into the provinces. In consequence, Engineer Training was set up at Daventry, in the early part of 1941, and continued to the end of the war. It was based in a small purpose built lecture room close to the main Short Wave building.

Shortly after the end of the War, the BBC established a Training School at Wood Norton, near Evesham, Worcestershire. It took over premises which included a country house, the former home of the exiled Duke of Orleans, and out-buildings, which had previously been occupied by a number of BBC departments evacuated from London, during the War.

The School offered courses covering fundamental training in Broadcast techniques from microphone/camera to aerial. Specialised engineer training included practical On-Station training. To this end a Transmitter Training School was set up at Daventry (Sound transmitters) and at Sutton Goldfield, Birmingham (vision transmitters). Unoccupied front offices and store rooms of the 5XX building were converted into a classroom and practical workshop area. Substantial 'hands on' transmitter operational training was a major feature. Many hundreds of future BBC engineers passed through the doors of 5XX, during the years 1970 to 1986. Finally with equipment changes at Daventry, the school was relocated to BBC Station, Woofferton, near Ludlow, Shropshire.

Tape Reclamation Business Unit

Daventry's central location in the UK, and the expense of premises in London, resulted in the Tape Reclamation unit located at Western House, close to Broadcasting House, being relocated to Daventry 5XX buildings in December 1984. The unit covers a wide range of activities, which include the reclamation of audio-tapes, and selling tapes to BBC departments throughout the UK. Digital techniques and digital editing play an ever increasing role in the unit's operation. The debate, tape or disc continues — the jury is still out.

4

BBC DAVENTRY'S CONTRIBUTION TO RADAR DEVELOPMENT

The early development of RADAR in Britain, and its connection with Daventry, came about in 1935. It is important to say at the outset that Britain did not enter the war as the sole possessor of RADAR, as the Germans had been developing it since 1934, and other countries.

Robert Watson-Watt of the Radio Research Station at Slough was asked by an Air Ministry Committee to advise on the practical feasibility of a 'death ray'. The idea being to generate a very strong electro-magnetic wave in the form of a beam. His colleague and assistant Arnold F Wilkins proved mathematically that it was impractical and beyond current technology.

It had been observed a few years earlier by Post Office engineers, that radio reception was disturbed by passing aircraft, and it was considered that this phenomenon could be used to detect enemy aircraft.

In consequence, a brief note relating to this observation was made by Watson-Watt to the Committee for the Scientific Survey of Air Defence chaired by Sir Henry Tizard. This resulted in Watson-Watt being instructed to carry out an experimental test to confirm the theory of radio wave reflections from aircraft.

In the early hours of a cold winter morning on the 26th February 1933, a Handley Page Heyford bomber, flying at six thousand feet piloted by Squadron Leader R S Blucke, flew along the beam of a forty-nine metre transmission from BBC Daventry. The beam width of thirty degrees was at an inclination of ten degrees to the ground.

The reflected signal was picked up by a receiver in a caravan

positioned in a field located south of Weedon (Heyfordian Hills). The pulses, direct and indirect, were monitored on a cathode-ray tube by Arnold F Wilkins. The results were conclusive, the aircraft giving measurable reflected signals at ranges exceeding eight miles. Watson-Watt was so impressed by the results, that he was alleged to have remarked "Great Britain has once more become an island".

The whole exercise was immediately classified as MOST SECRET and initially was called Radio Direction Finding (R D F), later to be called Radio Direction and Ranging (RADAR).

An experimental station was then set up at Orfordness (Suffolk) which resulted in the rapid construction of a chain of R D F stations, called Chain Home (CH) placed twenty miles apart, and initially positioned on the South-East and South coasts. The early warning of incoming German bombers, given by the CH stations, played a vital part in the successful outcome of the Battle of Britain air war which saved Britain from invasion, and the eventual successful outcome of the war.

RADAR Navigational Aids

At the outset of the Second World War in September 1939, Air Marshalls in the RAF were confident that targets could be satisfactorily pinpointed at night using general instrument flying (dead reckoning), astro-navigation (stars) and ordinary radio beacons. They believed there was no need for the RADAR type aids proposed. Proof of the need to improve navigational accuracy, came to a head in the summer of 1941. An investigation into the failure of a bombing raid on a target in the German Ruhr valley, found that only one-tenth of the bombers were within five miles of their target. This proved an urgent need to set up a RADAR navigational system.

Whereas Great Britain was slow to recognise the importance of RADAR systems for aircraft navigation and precision bombing of targets in enemy territory, the Germans were more advanced. It was also true that investigations into RADAR type science had been undertaken by a number of industrial countries, including America and Japan using wavelengths down to twenty centimetres.

The German bombing of Britain in the Autumn of 1940 revealed how advanced they were in adopting RADAR technology for aircraft navigation and pin-point bombing. They had developed two systems called KNICKEBEIN and X-Gerat. Knickebein used an adaptation of the Lorentz aircraft blind-landing system. Two powerful narrow radio beams were transmitted from two halves of a focused aerial system. One aerial transmitted dashes (Morse code), the other dots. Using wavelengths of about ten metres, at a distance of two hundred miles, and at heights ranging to twenty thousand feet, the two beams overlapped. The pilot would alter course, so a very sensitive radio receiver could pick up a merged continuous note. The plane was then dead on course. An intersecting Lorentz beam from another location transmitter, would pinpoint the target at the beam's cross-over point. The Lorentz aeriels were rotatable using a turn-table, enabling different targets to be selected. Aircraft could be placed within four hundred yards of their targets, such as Coventry and Birmingham. During these raids, German bombers aimed at the Northampton to Rugby loop line passing through Long Buckby. Two attacks occurred; one stick of fifty-pound bombs straddled Station Hill, falling close to the station. Another stick straddled Brington Road, a short distance from the village. The line was undamaged, but a number of cows were killed or injured.

The X-Gerat system differed from Knickebein. It used a shorter wavelength, about four metres, and had a beam width of twenty yards at two hundred miles. The transmitters were placed at different locations, resulting in the very narrow beams creating an effective cross-over X at the target. The accuracy of this system was high - the fact that the earth is not a simple sphere, but flattened at the poles, had to be taken into account. British counter measures, ranging from the creation of false cross-over and forms of jamming signals, were introduced to combat these systems with some success.

RAF RADAR Navigational Aids

The second involvement of BBC Daventry with RADAR came

about with the recognised urgent need to improve the navigational accuracy of bombers aiming at targets in Germany and the occupied countries.

In August 1941, it was revealed that a new radio navigational aid had been developed by a team at the Telecommunications Research Establishment (TRE) at Worth Matravers (near Swanage) headed by R J Dippy, similar to one proposed by Professor R V Jones in 1938. This system was known as 'GEE' later for deception purposes also known as 'JAY'.

Trials of the system had been made over Britain and out into the Atlantic, and it worked well. Tests were also carried out over Germany, and in consequence Bomber Command became committed to 'GEE'.

The system used synchronised radio wave pulses generated by a Master Station and two Slave Stations (A and B). The pulses picked up by an aircraft at twenty thousand feet, would arrive at different time intervals. Using a TV type monitor display, the time interval between Mastere/A pulse and Master/B pulse could be determined. This information would then be transferred to a pre-prepared map with an overlay of hyperbolic time interval lines. The land position of the aircraft would be identified by the cross over point of the two particular time interval lines derived from the TV monitor.

The Eastern Chain, which covered parts of Britain and Europe had its Master Station (Daventry) and Slave Stations at Stenigot (the Wolds) and Clee Hill (Shropshire). Southern and South Western Chains covered different land areas and operated on different frequencies. GEE stations working on wavelengths of about eleven metres, provided accuracy of five hundred yards, at three hundred/four hundred miles, at heights ranging up to twenty thousand feet.

The System had the advantage that aircraft could be navigated to any target within the boundaries of the hyperbolic lattice maps, and they could also be used to help the safe return to base.

The Master Station at Daventry, with its four hundred feet lattice steel triangular mast was positioned at the northern most tip of Borough Hill overlooking the village of Norton, and on the edge

of Daventry golf course. The vertical aerials similar to those of early TV stations, were placed near to the mast head, to give greater propagational coverage. Initially three caravan transmitters (one working, two spare) supplied from mobile diesel generators were connected to the mast base feeder system. Additionally an emergency reserve transmitter and generator was installed at a location close to the Main Station 5XX building.

Large scale GEE operations started in March 1942, with Daventry having an important role. BBC staff relocated from Alexandra Palace (TV station) operated the transmitters on a 24 hour shift basis. Very important changes to the transmitter design, in its early days of operation, improving its power output and range were made by Douglas Birkinshaw and staff (ex Alexandra Palace).

At the end of the war RAF ground RADAR personnel based at the old isolation hospital Staverton took over the operation of the transmitters now housed in brick buildings. Daventry RADAR station continued to provide navigational aid to Military and Commercial aircraft until the mid 1950's, when an improved DECCA RADAR navigational system was brought into use. The mast was dismantled, but the concrete base and some brick buildings still remain.

A more accurate RADAR system called OBOE (working on a different technique) and supplementing GEE was introduced in late 1942 and fitted into the aircraft of Path Finder Force squadrons, and greatly increased the effectiveness of bombing raids on Germany.

A wide range of RADAR systems developed for the three services were brought into use. Professor R V Jones in his book 'Most Secret War' gives a fascinating account of British research into new systems and counter measures taken to combat German RADAR also developed during the war.

The historian A J P Taylor in his review wrote "The most fascinating book on the Second World War that I have read".

5

BBC SHORT WAVE BROADCASTING - THE EMPIRE SERVICE AND WARTIME EXPANSION

Origins

As far as the British public were concerned, Saturday 19 December 1932, was an unexceptional broadcasting day. The BBC was operating two Radio networks - the National and Regional programmes, starting with the Daily Service at 10.15 a.m. But that morning, at the early hour of 9.30 a.m., one studio in the newly built Broadcasting House was busy. Sir John Reith, the Director General, was there with senior colleagues. The occasion was the start of the Empire Service, the BBC's venture into international broadcasting. The first transmission lasted two hours, and was beamed to Australia and New Zealand.

For some years, Short Wave communications had been pursued by amateur radio enthusiasts. In 1921 British radio amateurs, using two valve radios were in touch with American colleagues 7,000 miles away. In October 1924, communication was established between F Bell of New Zealand and C W Goyden, a London school boy. Other countries were also experimenting with Short Wave radio. American cities, such as Pittsburgh and Schenectady had Short Wave transmitters. In Holland, the electrical company Phillips, had a regular daily service to the Dutch East Indies, a distance of 9,000 miles.

In 1924, Sir Edward Appleton and Dr Miles Barnett, demonstrated that the reflecting ionosphere layer (sixty miles above the Earth's surface) truly existed.

Pressure began to build for the BBC to develop a Short Wave

service. The Colonial Conference of 1927, left the BBC in an awkward position. Put simply, Reith and Chief Engineer Eckersley, were eager to get on with building an experimental Short Wave station at Daventry, but the question of funding the project, hopefully from the Government, had not been resolved.

Some support came from Leo Amery, Secretary of State for the Colonies, who suggested that the service would be widely appreciated in these countries, but indicated it would be premature to expect their funding support, until the completion of experimental work.

By the mid-twenties, Short Wave broadcasting had not gone beyond the experimental stage. Fading, distortion and interference were common problems. Also the complexities of the ionosphere, with the seasonal effect due to the sun's radiation were not fully understood.

In early September 1927, the Post Office formally authorised the BBC to start experimental transmissions. To save time, the BBC initially decided to hire an adapted Short Wave telephony transmitter from Marconi's at Chelmsford, using an aerial slung between two masts. On the 11th November 1927, the first transmission started, in the form of an Armistice Day outside broadcast, using call sign G5SW in the 12 MHz band, with a power output of 10 kW. The broadcasts were popular with overseas listeners, but it was immediately apparent, that greater signal strength was required. Changes in the ionosphere, due to the eleven year sun-spot cycle, also meant any prospective twenty four hour service would require changes in transmission frequencies.

Political, Financial and Technical Constraints

At this point, it is important to understand the various problems which beset the early days of the Empire Service. Sir John Reith, the Director General, was fully committed to its future development, as were the BBC Board of Governors. At the formal opening of the service in December 1932, he said "Radio was an instrument of the most incalculable importance in the social and political life of a community. Now it becomes a connecting and

co-ordinating link between the scattered parts of the Empire".

Neither Chief Engineer Eckersley or Reith envisaged the service would have more than a handful of enthusiastic amateurs listening to London. But, from the outset of the first experimental broadcasts from Chelmsford, albeit with an omni-directional aerial and low power, the service was ardently received in many parts of the world, other than the dominions and colonies. Listeners were captivated by the exciting prospect of listening to London, in the farthest outposts, the strength of spirit of Empire was still at large.

For the service to succeed, Eckersley and Reith realised the transmissions must have clarity and reliability and reach audiences throughout the Empire at suitable local listening times. Initially they considered the Empire Service as a system of transmitter relaying posts, set up by dominion and colonial governments. To overcome the 'on air' commitment for twenty-four hours, Eckersley conceived the idea of 'bottled' programmes (recordings), that could be used in the studios or transported to the Empire countries. Edward Pawley, historian of BBC Engineering, pointed out that no practical recording equipment was available until 1930. Interesting to note, that the BBC Transcription Service now brings the best of BBC radio to audiences in 100 countries.

The debate within the BBC continued as to how best to proceed, with no money to extend their commitment to the Empire Service. At that time the main players involved, in addition to the BBC, were the Colonial Office (Secretary Lord Passfield), the Post Office and the Treasury. The BBC argued that some of the £400,000 licence fee held back by the Treasury, should be released to expand the service. They counter-argued, the domestic listener should not pay for a Colonial Service. A proposed Colonial Radio Licence was also turned down. Thus in May 1931, a possible expansion scheme was dropped for the lack of £22,000 a year.

It was a 'chicken and egg' situation. Until a 'beam' system of transmission was introduced to provide perfect reception, the Colonial office would not be pressured by the Empire countries to provide the money or bring sufficient weight to bear on the Post Office and Treasury.

Finally, the BBC Board of Governors accepted Reith's

recommendation, that the BBC should go it alone. On 28 October 1931, they agreed to the erection of a high power transmitting station at the Daventry site. Construction of a new Empire Building commenced, sited close to that housing Medium Wave Transmitter 5GB. Two Standard Telephone and Cable transmitters were installed (Senders 1 & 2), and twelve directional and six omnidirectional aerials erected.

With the introduction of the new service on the 19th December 1932, the two transmitters were able to provide four two hour services daily, to targeted areas of the Dominions and Colonies. These were:

Australia and New Zealand	9.30 to 11.30 a.m.
India	2.30 to 4.30 p.m.
East and Southern Africa	6.00 to 8.00 p.m.
West Africa and Canada	8.30 to 10.30 p.m.



1932 Sir John Reith and the Rt Hon J. H. Whiteley on the occasion of the opening of the Empire Broadcasting Station. ©BBC

Later a fifth service was introduced – West Indies 1.00 to 3.00 a.m. The Broadcasts were in English, and targeted at White listeners. It became clear, that more than two transmitters would be needed to carry an effective service, and the G5SW transmitter, previously used at Chelmsford, was re-engineered and assembled in the empty 5GB Medium Wave building. It operated on several frequency bands, with an output of 20 kW.

The size of the BBC's mailbag from abroad, made it clear there was a genuine demand for the service. In the first year, 11,250 letters were received, and each year they increased. What helped to give the service a flying start, was King George V's eventual acceptance to broadcast to the Country and Empire on Christmas Day 1932. It was the most spectacular success in BBC History. The King was heard all over the world with surprising clarity. *The New York Times* wrote "Distant Lands Thrill To His God Bless You"!

Each of the five two hour transmissions with 'Big Ben' prominent, were a repetitive mixture of music (mostly gramophone records) – light classics – talks – book reviews – foreign affairs. Captain G G Graves was placed in charge of the Empire Service, and had £10 a week to spend on early programmes.

Further expansion

A BBC memorandum fed to the Government, noted that Short Wave stations were springing up everywhere, some under the control of their Government.

Their objectives were to keep in touch with their Nationals, and provide a world presentation of viewpoint and culture. The Dominions also began to establish their own radio service, and would only participate in radio relays of great ceremonies and empire events.

In April 1934, the limit of expenditure from existing funds was reached, and in February 1935, the Post Master General authorised an increase in Daventry's capital expenditure to £180,000 plus £80,000 running costs, which allowed the start of the construction of the Main Short Wave building, and on the 25th September 1935 the acquisition of a further 95 acres of land. The aerial

system was completely redesigned, to include new masts, twenty five aerials, fourteen of which had reversible reflectors. Twelve frequencies were assigned to the BBC, in six Short Wave bands. It was a far cry from the rudimentary installation at Chelmsford - one transmitter, one omni-directional aerial, two frequencies.

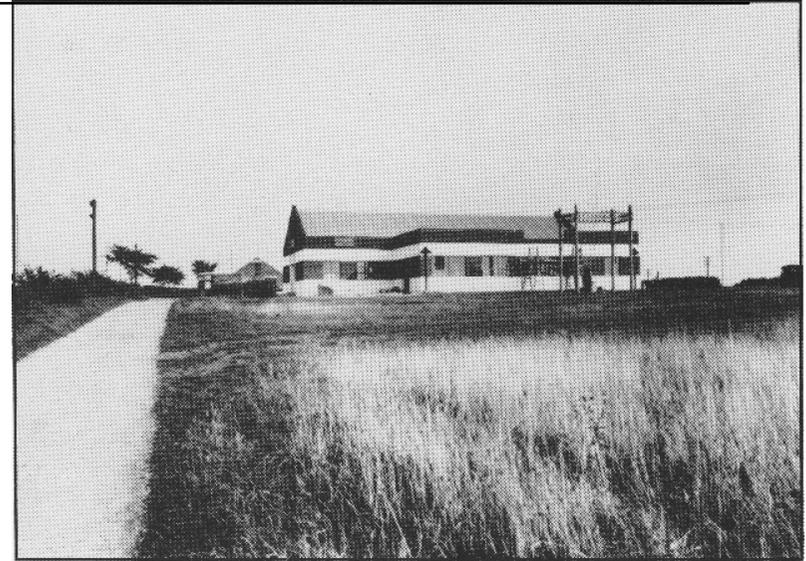
King George V's Jubilee in May 1935, was an ideal event for the Empire Service. But, in the BBC's annual Report in 1935, it projected that the service was imperceptibly moving from its original objectives, to a broader conception of its role in the world, involving the dissemination of British views and British values, to a wider public, which was already being exposed to the propaganda effects of Germany and Italy.

At this point, it is necessary to clear up some possible confusion in respect of the words transmitter and sender. In the early days of Short Wave telephony and Morse-code transmissions, the transmitter was called the 'sender' of signals, and in consequence all BBC Short Wave transmitters were dubbed 'senders'.

Also, it is useful to have some idea of the function of a transmitter. First, it needs programme from a studio in London. Electrical currents from the studio are fed to the station using British Telecom (PO) lines. To transmit signals around the earth, a transmitter needs an aerial (hung between masts), to radiate energy. Inside the transmitter a carrier (frequency) and the programme need to be combined. An apt analogy is - think of the carrier as a 'man' and the programme 'boy'. The man 'carries' the boy, and together they are fed to the aerial. Here the marvel of electro-magnetic radiation takes place. Together man and boy are launched into space (ether), unheard and unseen to reach the listener thousands of miles away.

The Empire Service building (still standing) was a low profile quality structure, built by Henry Martin of Northampton. The red brick walls had a feature of white stucco rendering above and below galvanised metal windows, under a pitched asbestos roof. From a distance, the building made little impact on the surrounding countryside.

Inside the building, beyond the front offices, was the transmitter hall. It gave an immediate impression of hospital cleanliness, with



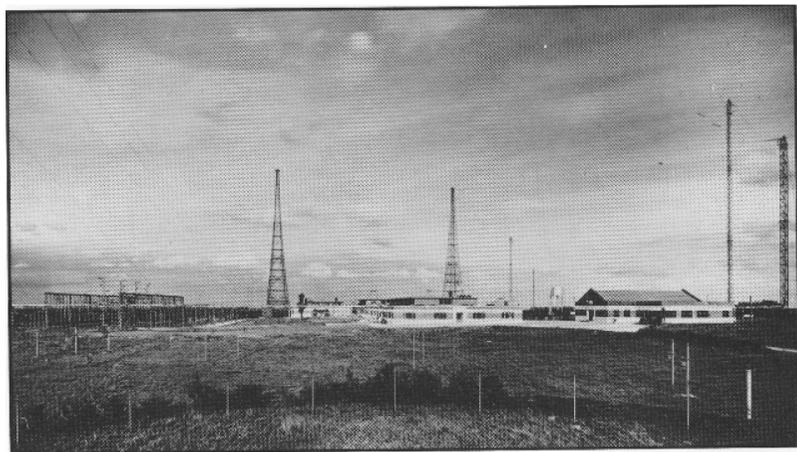
1932 Senders 1 & 2 building housing the Empire Service Station.

©BBC

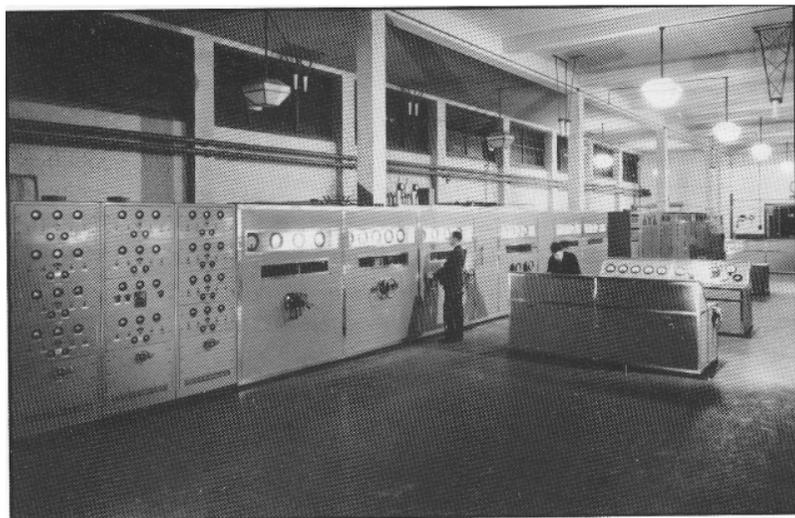
the smell of polished cork floor tiles, and shiny black panelled transmitter cubicles, that lined each side and the rear of the hall. The ambience and smell, would long remain in the memory of those who worked on Senders 1 and 2. When 'on air' the transmitter hall was quiet, apart from the gurgle of pumped cooling water passing to the anodes of the glowing valves, sound of programme and noise of rotating generators and pumps in adjacent supply rooms. Little outward indication that inside the black cubicles, programme from London was mixing with carrier (frequency) to pass to aerial and then into space.

Clouds of War

In 1933 Adolf Hitler seized power in Germany, and both Germany and Italy rapidly increased their broadcasting coverage on Short Waves. The International Broadcasting Union, which tried to



1938 *The New Building, switching gantry and Towers A & B.* ©BBC



1938 *General view of the Transmitter Hall showing two of the 50kW transmitters.* ©BBC

regularise the material used in foreign broadcasts, did not have Germany and Italy among its signatories. Both countries used aggressive propaganda, mis-statements and incitements to war. The German station Zeesen was particularly troublesome, and received a subsidy of £3 million from the German government, who were giving high priority to their Short Wave operations. Similarly the Italian station Bari, was conducting a strong propaganda service in Arabic, which was causing serious concern in Cairo and the Gulf States.

The Government in 1936, was pressured into responding to the need for broadcasts in foreign languages. A poll of British diplomatic posts was carried out by the Foreign Office, and British missions in the Arab world were unanimous in the call for broadcasts in Arabic. In consequence of Government pressure, and the Post Master General allocating additional funds for the expansion of Daventry, work on the new building started in early 1936, to house three high power transmitters. By the time of the coronation of King George VI, on the 12th May 1937, two of these transmitters had been commissioned.

It wasn't until the 3rd January 1938, that the Arabic Service started (the wheels of BBC and Government grind slowly). This was followed by the Latin American Service in Spanish and Portuguese – French, German and Italian services started in the Autumn of that year.

The construction of the new Short Wave building was again undertaken by builders Henry Martin of Northampton. It had similar external features to the Empire Building, with white stucco rendering, on the brick work front and sides. Above the imposing front pillared entrance doors, was the Latin inscription *Quaecunqve* (Whatsoever).

The single storey structure had a flat roof, which over the years supported the adage 'Flat roofs leak!' Its low profile architecture kept it well hidden from the surrounding countryside, effectively pre-dating regulations under the Town and Country Planning Act. One feature, common to many BBC stations built in that period, was the excavation of a deep crypt into the ground beneath the Transmitting Hall. The space (warm in winter, oven hot in

summer), was filled with enormous cylindrical water tanks, which supplied cooling water to the transmitter valves. It had an impressive impact. The noise of high output pumps and air blowers filled the crypt. Talking was a challenge – 'top voice', almost sign language. Miles of grey painted pipes inter-connected tanks, pumps and air blowers, here and there polished brass and chromium meters. Then, for the unwary, at head height, metal trays carrying a mass of lead covered cables.

Into this building, two high power Standard Telephone and Cable (STC) transmitters were installed, called Senders 4 and 5 followed later by another, Sender 6, made by Marconi. The light grey panelled transmitters were outwardly similar in appearance. About thirty-five feet long and seven feet high, and placed on each side of the hall. The control desks for each transmitter, were centrally positioned between the transmitters, for ease of control and monitoring performance when 'on air'.

These pre-war transmitters were an impressive example of British Engineering excellence, in structural, mechanical and electrical design. A tribute to the design engineers and factory technicians, who made, tested and installed them. Along the front of the transmitters inspection windows allowed visual checks of the transmitter – glowing valves, copper coils of all shapes, burnished aluminium capacitor plates, white porcelain valve support insulators, and a maze of water cooling pipes. Along the front of the transmitter, impressive large electrical meters, placed behind glass protective panes, allowed the duty engineers to check the transmitter operation.

Staff safety and related precautions is a BBC priority. Senders 4 and 5, as with all transmitters, had elaborate mechanical and electrical interlocks. These ensured no entry could be gained to enclosures containing lethal voltages, without them being isolated. The 'clunk' and feel of the electrical/mechanical door and earthing switch will remain in the memory of the many engineers who manned the station.

Steps down from the transmitter hall, led to machine rooms. Noisy areas, where motor generators 'whirred', producing current to light valve filaments and other supply voltage.

The clouds of war in 1938, and the Government's grave concern about the aggressive radio propaganda of Hitler and Mussolini, brought about a rapid expansion of foreign broadcasting by the BBC. Government money was advanced to expand Daventry's Short Wave broadcasting operation. In consequence, the main Short Wave building was extended in 1938, together with additional masts and aerials. Concern for the security of the power supply to the station resulted in the construction of a separate Power House, which housed two huge English Electric diesel alternators for emergency supply, and a low voltage switch room. On completion of the extension, the building consisted of three distinct areas – West Hall (original), East Hall, and placed between them two separate Mercury Arc rectifier rooms, supplying high voltage to their respective transmitter halls. These much higher roofed areas contained metal meshed enclosures, housing massive transformers, round tanked rectifiers and control equipment. It was the power area of the building, and it had an impressive ambience of strength and danger. Easily moveable steel girders, mounted on rails, spanned each room to allow chain operated pulleys to lift out faulty equipment, weighing many tons, for repair or replacement.

The final transmitter complement, with power outputs ranging from 50 to 90 kW, consisted of Senders 4 and 5 and Sender 7 (Standard Telephone & Cable) and Sender 6 (Marconi) in the West Hall, and transmitters Senders 8 and 9 and Senders 10 and 11 (Marconi) in the East Hall.

BBC Independence from Political Control

From the inception of the Empire Service in December 1932, the BBC's thinking about its role in international broadcasting, was only slowly moving from its original concept of an Empire Service. Director General Reith, saw the Service as a means of holding the empire together, but a growing body of evidence suggested it could not pick and choose the audience, and non-whites were also listeners. The international climate of the mid-thirties, into which Germany and Italy were putting significant

effort into Short Wave radio, compelled the BBC to think its role afresh. Reith was no slower than his contemporaries, in appreciating that if Britain was to make its voice heard effectively, then language other than English would have to be introduced. In 1935, the newly appointed Colonial Secretary, Malcolm MacDonald, brought an imaginative and keen interest in broadcasting and at his request, the BBC submitted a memorandum on broadcasting to the Government Broadcasting Committee, chaired by Lord Ullswater. They were then made aware of the various forces within and outside the BBC, who were debating its commitment to the Empire Service, but also the pressure to initiate foreign language broadcasts, particularly Arabic. During this vital year of 1935, Reith gave verbal evidence to the Broadcast Committee, chaired by Lord Ullswater, on the subject of foreign languages. Finally, they recommended "In the interests of British prestige and influence in world affairs, we think the use of languages other than English should be encouraged!" The report, drafted by J B Clark who subsequently moved to the BBC and became Empire Service Director, divided foreign languages into three categories – Latin American, European and Arabic. Throughout 1937, a protracted and at times confused series of exchanges on the subject of foreign languages, and how to combat increasing propaganda from Germany and Italy ensued.

On 4 October 1937, an important mile-stone in the history of the BBC's independence and freedom of editorial control from Government, took place. The Government's Arabic Broadcasting Subcommittee accepted the BBC's terms for undertaking Arabic broadcasts. Six conditions were listed all important, but the most far reaching set out "The BBC should have the same freedom vis-a-vis Government departments, as in the Home Service." A further pronouncement by Reith, on the central issue of control was "The effect of a news service carried out by the BBC in any language, would be based on telling the truth. Prestige depended on truthful and comprehensive broadcasts. People should feel that a statement on British wireless was correct."

Early Wartime Expansion

Up to 1939, the BBC had developed smoothly, and within a strong unitary framework. Its total staff was about 3,500, By the middle of 1941, it had risen to nearly 9,000 – a significant number of whom were associated with foreign language broadcasts. If this war was indeed the BBC's finest hour, just as it was the nation's, it was not achieved by design, but the outcome of improvisation. The basic trouble, as historian Asa Briggs put it "both the government and the BBC had gone into the war uncertain of what their future relationship would be". Despite pleas to the Government, the BBC's place was not recognised, until well into the second year of the war.

As early as 1938, the Government set up planning for a new Ministry of Information. Reich was offered the job as Director General, but declined. The Imperial Defence Committee had determined, that it would be responsible for censorship control over the BBC. With the outbreak of war, the Ministry and BBC were inextricably involved in the prosecution of 'white' programmes (virtually propaganda free) and 'black' programmes (one of deception and psychological warfare). A Department for Enemy Propaganda, under the Ministry of Information, was established at an indoor riding school at Woburn Abbey in Bedfordshire – the location was a military secret. Woburn guided 'white' and 'black' broadcasts. There were frequent grumblings and reluctance, for BBC European staff to take their instructions from Woburn. It was the commencement of a battle over what degree of autonomy the BBC would retain over its services, particularly the European broadcasts. The Foreign Secretary, Anthony Eden, would have the last word on propaganda policy, and the Ministry of Information would be in charge of day to day running.

With the expansion of foreign language broadcasting, came the urgent need to find a suitable building to house the many studios, and conglomeration of nationals of different countries. The home found for foreign broadcasting was Bush House (Aldwych), London. It was a remarkable polyglot community. Allen Bullock (European Talks Editor), remembers it as "the shadowy world of

Europe. When you entered, you stepped out of the streets of wartime London, and entered basement studios, from which the voices of hope and freedom went out into the night, to the unknown millions waiting on the other side of the Channel".

It wasn't until 1941, when Brendan Bracken was appointed as Minister of Information, and a change of leadership took place within the BBC, when joint Director Generals, Robert Foot and Cecil Graves were appointed, did the fear of Government control pass.

Attending a BBC Board meeting in August 1941, Brendan Bracken said "he saw no difficulty at all in working in co-operation with them on the basis of existing arrangements". He felt "it was undesirable in the National interest for the BBC to be taken over by the Government".

Wartime Monitoring

With the serious threat of imminent invasion by German forces in 1941, the Government instructed the BBC to establish a chain of emergency low power Medium Wave transmitters, in towns and cities throughout the country, to broadcast the Home Service, in the event of Broadcasting House being seriously damaged.

The so called 'Group H' stations would provide local inhabitants with news of the war and Government promulgations. They were set up, where possible, in secret and innocuous locations at high points in a locality - local garages, water towers, Council buildings. Northampton's Group H station was located at Stimpson Avenue water tower.

BBC Daventry played an important part in this 'secret war' An out-station of Daventry (a receiving post) was set up in a hut adjacent to farm buildings close to the village of Priors Marston, south of Daventry. It was established in 1941 with a staff of four, and was continuously manned throughout the twenty four hours. In the calamitous event of the destruction of Broadcasting House, emergency studios located in Wood Norton, near Evesham, would originate an emergency Home Service and Government announcements. The receiving station at Priors Marston, tuned

to the Wood Norton signal, would pick up the programme, and using a low power transmitter, re-radiate the Home Service to Daventry, and the rest of the country. Fortunately for Britain, the hut in the field at Priors Marston was never needed.

To prosecute the war effectively, it was essential to monitor all enemy broadcasts and communication traffic. Bletchley Park, the secret decoding centre, was the most famous. But also of great importance, was the little known monitoring service of the BBC; the Ministry of Information, formally asked the BBC to undertake monitoring of enemy broadcasts. From 26 August 1939, a receiving station on a hill top overlooking the exiled Duke of Orleans' mansion at Wood Norton was set up. The recordings were made on wax cylinders, and monitoring staff had to scramble up and down the steep wooded hill, with the cylinders in wicker baskets. By October 1941, the material monitored was averaging daily 100,000 words, involving thirty languages and 250 bulletins.

War Time Transmitter Expansion

Before 1938, the BBC's engineering forward planning concentrated on the Empire Service resources for transmitters and aerials. At the start of the war, only five of the nine Short Wave transmitters had powers which were comparable to the German station of Zeesen. It was not until February 1941, when a new station at Rampisham, near Bridport, Dorset came into service, did the BBC have comparable power output. During this vital period of the war, from September 1939 to February 1941, Daventry provided the only Short Wave broadcasting link with the rest of the world, when the country's fate could have been so very much different. Rampisham had four Marconi 100 kW transmitters installed together with masts and aerials, and able to cover many regions of the world. In order to meet a Ministry of Information expansion programme, set out at the end of 1940, eighteen more high power Short Wave transmitters were needed. Two stations were built within a mile of each other at Skelton, near Penrith, Cumbria, and another station, funded jointly with the Voice of America was established at Woofferton, near Ludlow, Shropshire. By

November 1943, the BBC had at its disposal thirty three Short Wave transmitters in the United Kingdom.

One other feature of war time broadcasting, was the RAF's insistence that all Medium Wave transmitters should operate on a common synchronised frequency, to prevent individual transmitters acting as navigational beacons. In the expansion scheme, more powerful Medium Wave transmitters were built on existing stations, but one at Crowborough in Sussex, code-named 'Aspidistra', was jointly controlled by the Foreign Office and the BBC. The Prime Minister, Winston Churchill, took a strong personal interest in the station, which broadcast a significant amount of 'black' programmes and coded messages. As far as 'white' broadcasting to enemy and enemy occupied countries was concerned, the BBC European Service, whilst remaining an integral part of an autonomous BBC, received guidance from the Government's 'Political Warfare Executive', which was effectively a branch of the Ministry of Information.

6

THE BBC AND DAVENTRY IN THE BRAVE NEW WORLD

The BBC emerged after the war with a unique reputation for the quality and objectivity of its programmes, and with immense prestige, as the prophet of victory and freedom. As early as 1943, the possible scope of the BBC's Overseas Service was debated within the Corporation. The BBC's continual problem, was to convince successive Governments of the case for Britain to retain a major voice in International Broadcasting. Funding for the Overseas Service, was by a 'Grant in Aid', voted annually by Parliament. Successive BBC Year Books indicated that it was funded reluctantly by each government. Lord Strang, former Head of the Foreign Office, in a House of Lords debate, summed up the situation succinctly, saying "the art of hobbling an organisation, without entirely crippling it, is one which is well understood and practised in Whitehall".

The Cold War

History will judge the Second World War, and the Cold War, that followed as the greatest ever threat to freedom and the democratic way of life in the world. Whereas the BBC and Daventry's contribution to the war was universally acknowledged, their contribution in the battle to win the hearts of Russians, the Eastern Bloc countries, and the Far East, has not been so recognised or acclaimed.

Radio Waves Don't Go to War to Cross Frontiers!

Although the outcome of the Second World War was of supreme importance to our democratic way of life, the proliferation of

nuclear weapons brought the prospect of planet Earth being involved in Armageddon. In this period the part played by Daventry and the other Short Wave stations was of immense importance in the battle of words between Russia and the West, during the critical years of the Cold War. In 1949, the Cold War reached its peak, and in response the BBC increased its Russian service by one hour a day, taken by Daventry and other stations, including the Voice of America using BBC Woofferton. The effectiveness of the transmissions was such, that the Russians launched an intensive and prolonged 'Jamming' campaign. Low power transmitters were built to encircle Moscow and major cities. They sent out obliterating signals on the same frequencies used by the West for Russian programmes. It was an expensive, and almost impossible task for the Russians to jam these broadcasts, and there was strong evidence fed back from our embassies, that many people in Russia and the Eastern Bloc were listening illegally to the programmes. One method used by the West to overcome 'jamming' was the use of 'Barrage Transmissions'. This involved simultaneous broadcasting in Russian on many different frequencies, which were changed on a daily basis. In the battle of words which continued for many years, the BBC had little support from Governments. Director General Ian Jacob said "The BBC should be in the vanguard of the struggle for men's minds in Europe. It is an asset of tremendous value to this country and the free world. We are in danger of throwing it down the drain". The expansion of the overseas services of other countries continued — America, Russia, China and even Albania The *Daily Mail* leader in 1951 wrote:

Voice of America	Booms
Voice of Stalin	Roars
Voice of Britain	must Whisper

The final success of the war of words came about with the election of President Gorbachev, and the collapse of Communism through Perestroika.

The Suez Crisis and its effect on the BBC

In 1956, British and French forces invaded Egypt to regain control over the Suez Canal. The Government fully expected the BBC to support them in their fight, just as it had done in 1939. The fact of the matter was, the British nation was fundamentally divided on the issue of the Suez invasion, as demonstrated in Parliament and the newspapers. The BBC took an impartial view in National news bulletins, and the Overseas news service. In consequence, the relationship between the BBC and Government became bitter. As historian Asa Briggs put it "Eden in 1956 expected the BBC to rally to a nation virtually at war". Several important results emerged from the Suez conflict. First, the BBC's stand on being impartial and detached from Government control, was advantageous to the BBC's reputation and credibility. Second, the long term relationship between the Government and the BBC External Services was never the same again.

In the post war period, through four decades until the present day, the BBC External Services were influenced in their operation and development by a number of controlling bodies.

Firstly, the Government, and their perception of how valuable they believed the BBC's voice and influence in the World to be.

Secondly, the Treasury, with their tight control over Government spending, particularly in an area which they judged to be peripheral.

Thirdly, Parliament, and the three year funding vote taken in the House of Commons to set the Grant-in-Aid figure to service the External Service budget, and fourthly, the Foreign Office, with its ultimate control over the hours of transmission time devoted to a particular language, or when the need arose to increase or re-establish a language service to cover a World event, when it was judged important for the British voice to be heard, the Suez War for example.

The Grant-in-Aid dominated the development of Bush House, where the External Service studios are located, and the Short Wave stations in the UK and overseas.

The fight to retain or increase the Grant-in-Aid, was an ongoing

battle. Much dependent upon Britain's economic strength, which over four decades had a chequered history, meant the External Services either maintained their status or suffered cut-backs. For example:

In 1951/2 the Grant-in-Aid was cut from £5.3 to £4.7 million;

In 1979, it suffered a cut of £4 million which was 10% of operating costs;

In 1996, the current Grant-in-Aid figure was about £160 million.

And so it will continue, as long as the financing of the External Services is under Foreign Office and Treasury control, and *not* part of the licence fee.

Transmitting Station Improvements

In the 1950's, the war of words between the West and Russia and its satellites was at a critical stage. The BBC pointed out to the Government that, with the exception of two new Short Wave relay transmitters at Tebrau, Malaya in 1949, no modernisation at Daventry and the other stations had taken place.

If from the point of view of the External Services, the 1950's will be regarded as a period of decline and lost opportunities, the 1960's were marked by a distinct reversal of the trend. Whereas in fifteen years after the war, the BBC barely succeeded in keeping its head above water, and lost effectiveness through successive governments failing to provide monies for capital investment, the next decade brought about a radical change in official policies.

Developments in Africa and Asia where decolonisation was proceeding apace, and the Third World gaining consciousness and discovering a voice, drove home to Britain that it was now in a competitive radio wave market place.

Prime Minister Harold Macmillan's 'Wind of Change' speech in Cape Town in 1960 set the tone for the decade.

Successive official reviews in 1961, 1965 and 1967 reiterated the need for the replacement of obsolete transmitters, and the setting up of new relay stations overseas.

The contribution made by successive Director Generals and

Senior BBC management in pressing the Government for increased resources to fund the External Services — now World Service, is recorded in great detail in Gerald Mansell's book 'Let Truth Be Told' (fifty years of BBC External Broadcasting). It would seem few politicians, irrespective of party were strongly and openly supportive of the BBC's arguments for the need to maintain and improve the External Service.

At this point, it will be helpful and instructive to understand the function of a Short Wave Station. As previously explained, Long Waves travel along the surface of the Earth, and Medium Waves similarly radiate, although part of the signal is reflected from the ionosphere, which can cause distortion of a programme. Short Waves are bounced off the ionosphere and Earth, to reach their listeners by one, two, three or four hops. The aerials hanging between the masts aim the signal in a narrow beam, to reach European countries, Southern Africa, India, Australia, North America. Daventry External Service programmes were originated in the studios located in Bush House, and their Schedule Unit was responsible for the twenty four hour daily schedules, which specify sender time, frequency, aerial (array), number and programme. Four schedules were prepared each year to accommodate changes in world time, frequency variation due to ionosphere day/night height, and the eleven year sun spot cycle. Engineers staffing Daventry worked a three shift system to meet scheduled changes. It was a skilled and demanding job (where the clock was King) to maintain the twenty-four schedule throughout the year, with day to day changes and many technical problems to overcome, particularly in severe Winter conditions causing damage to aerials and feeder wires, on the wind swept hill.

Increased competition from other countries, in the restricted Short Wave bands ranging from 3/26 MHz created an urgent need for modernisation. Higher power transmitters, greater automation of programme, aerial and frequency to match competitors in the field was the driving force. The increased crowding of broadcast bands is analogous to a cocktail party, at first quiet, and then louder and louder as more guests arrive; a babble of languages in the world competing for limited frequencies. The main players in

the field were the UK, Russia, America, Albania and later China. In 1949, the weekly output of the External Services was 687 programme hours, Russia 434 and Voice of America 214.

Without doubt, the biggest impact on Short Wave broadcasting, was the development of the transistor receiver. In 1945, it was estimated that the figure was 150 million. At the start of the 1980's the world figure was approaching 1,500 million.

Modernisation of Daventry

With Treasury and Foreign Office approval, the first phase of re-engineering work at Daventry started in April 1961, with two Marconi 100 kW dual channel transmitters replacing the pre-war S T & C, transmitters Senders 4 and 5. By 1963, two more Marconi 100 kW dual channel transmitters were installed in the West Hall, and Senders 1 and 2 in the original Short Wave building were taken out of service after 30 years. The modernisation work included aerials and an Automated Switching Unit for programmes and monitoring. The second phase quickly followed and during the period 1964 to 1966, four 250 kW Marconi transmitters were commissioned. Additionally, the aerial site was transformed, with the automation of array selection to each sender. In consequence, Borough Hill became adorned with eight gleaming metal sheds called switch stations, spaced at intervals from the Main building and running North almost to the golf course. During the low angle sun months of the year, their sparkle brought curiosity to the landscape, for distant observers.

It is useful to have some understanding of a fundamental part of a transmitter – the tuned circuit – which enables the carrier frequency of the transmitter to be tuned and amplified to its optimum peak. The tuned circuit has two components – capacitor (fixed or variable) and inductor (fixed or variable). A simple inductor could be a coil of wire, a capacitor, two metal plates air spaced. In practice, the appearance of coils varies greatly. Early transmitter coils were changed in value by metal straps adding or reducing turns. Marconi 100 kW transmitters had pre-formed coils ingeniously mounted on movable trucks, using a railway



1963 The newly installed Marconi 100kW transmitters.

©BBC

track with handle operated points, to move them in and out of the transmitter. The plates of variable capacitors were moved by external tuning wheels with mechanical or hydraulic linkages. Tuning some transmitters was a work of art, like riding a temperamental race horse. The latest 300 kW and 500 kW transmitters use microprocessors to initiate changes in the frequency of tuning circuits, using motor controlled variable vacuum capacitors or a variable inductor with a motor driven contact wheel moving on the inside of a five inch diameter chromium plated copper tube, formed into a circle, six feet in diameter.

Early transmission schedules allowed fifteen minutes for a transmitter to change frequency, aerial and programme. Later, with successive phased equipment improvements, and with the introduction of solid state circuitry, a transmission change could be achieved in twenty seconds. Automation brought about a significant reduction in the number of operational engineers on each shift, falling from a war-time peak of twenty to three at the time of the station closure.

A description of all transmitter components would be somewhat lengthy. But not to mention the valve and its importance to the development of radio, television and a vast range of electronic equipment would be inexcusable. The Triode valve could be considered as having its birth in 1883, when Thomas Edison tried to produce a longer life lamp. From his early experiments, came the development of the glass vacuum valve with internal metal electrodes, cathode and anode, and one or more metal mesh grids placed between. If an external voltage is applied positive to anode, negative to cathode, electrons will pass from cathode (heated) to anode, and a metal grid placed between them will control the flow. The triode valve acts as an amplifier. Very small voltages applied to the grid varies the electron flow to the anode, resulting in large voltage swings on the anode, which are then fed to the grid of the next valve, for further amplification. In this way, programme (audio frequency) and carrier (radio frequency) signals can be amplified in the transmitter. Then in the output stage they are combined together and finally fed to the aerial, where magically they are radiated into space as a radio signal. So, the valve and its replacement solid state component the transistor, are a fundamental part of circuitry enabling all communication links on our planet. Unfortunately the valve is not 100% efficient. When the electrons hit the anode, they dissipate heat. Early triode valves glowed cherry red during transmission, and the heat would warm the air in the units, quite cosy in winter, but oven hot in summer. With the increase in transmitter powers, valves were placed in water jackets, and water circulated by pumps. A major feature of Daventry, and all large transmitting stations, was the diverse and complex ancillary water cooling systems. These included large cylindrical tanks, holding thousands of gallons of distilled water, positioned in underground crypts. External fan assisted cooling radiators blasted waste heat into the atmosphere.

In 300 kW and 500 kW transmitters their valves are cooled using the principle of converting water into steam (vapour phase), like boiling water in a kettle, except here, the valve anode acts as the heating element.

A further development in transmitter technology, was the use

of forced air cooling of valve anodes. The two parallel operated Marconi 100 kW transmitters, installed in the 5XX building, used this technique. The remotely controlled, un-attended Radio 3 (Third Programme) transmitter was a world first, and pioneered the way for the eventual complete automatic and remote control of all domestic radio and television transmitters, which are now monitored and controlled at BBC Transmission HQ (now Castle Transmission International Limited) in Warwick.

The third and final phase of modernisation was brought about by the changes in the International political climate, and the BBC's concern regarding their relative audibility. Increased interference, due to the global trend for higher and higher transmitter powers, was a major concern. In the mid 1970's, Russia Germany and France were all re-equipping with 500 kW transmitters. In consequence the Government released more money, to allow the purchase of six fully automatic 300 kW Marconi transmitters, which were brought into service between 1987 and 1988 in the East Transmitter Hall. Additionally, a new Control Centre, using microprocessors was installed to control programme, sender, frequency and aerial selection, plus visual display monitors, located at different points in the building showing the schedule status.

The importance of relay stations placed close to their target areas, was also a major feature of the BBC global strategy to combat interference, and improve audibility. The Tebrau station built in Malaya in 1949, with eight transmitters had already proved its value in targeting South East Asia and India This was followed by Ascension Island station (south Atlantic) in 1967, aimed at West Africa and South America. Then in the early 1970's, a station was built on the Caribbean island of Antigua, jointly funded by the BBC and Deutsche Welle (Germany), to serve South and North America. For over two decades a number of Daventry staff were posted for short and long term contracts on these relay stations, for pleasurable detachment from the UK weather.

As previously outlined, the Foreign Office has strong links with the BBC External Service, and they had independently established relay stations in different countries to put the British view point, where for diplomatic reasons, it was 'out of bounds' for the BBC.

Their stations in Cyprus and Masirah island (Oman) were two examples. From their inception, they were controlled by a Section of the Foreign Office called Diplomatic Wireless, later called Communication Engineering. In the early 1980's BBC Transmission took control over their operation, which resulted in a significant increase in the BBC's global involvement. Further expansion of relay stations took place in the early 1990's in new locations, Hong Kong, the Seychelles (Indian Ocean) and Thailand. Initially, programmes from Bush House were sent by specific radio links using two Marconi single-side band transmitters installed in Daventry's West Hall. These were withdrawn from service in 1985, when satellites were brought into use.

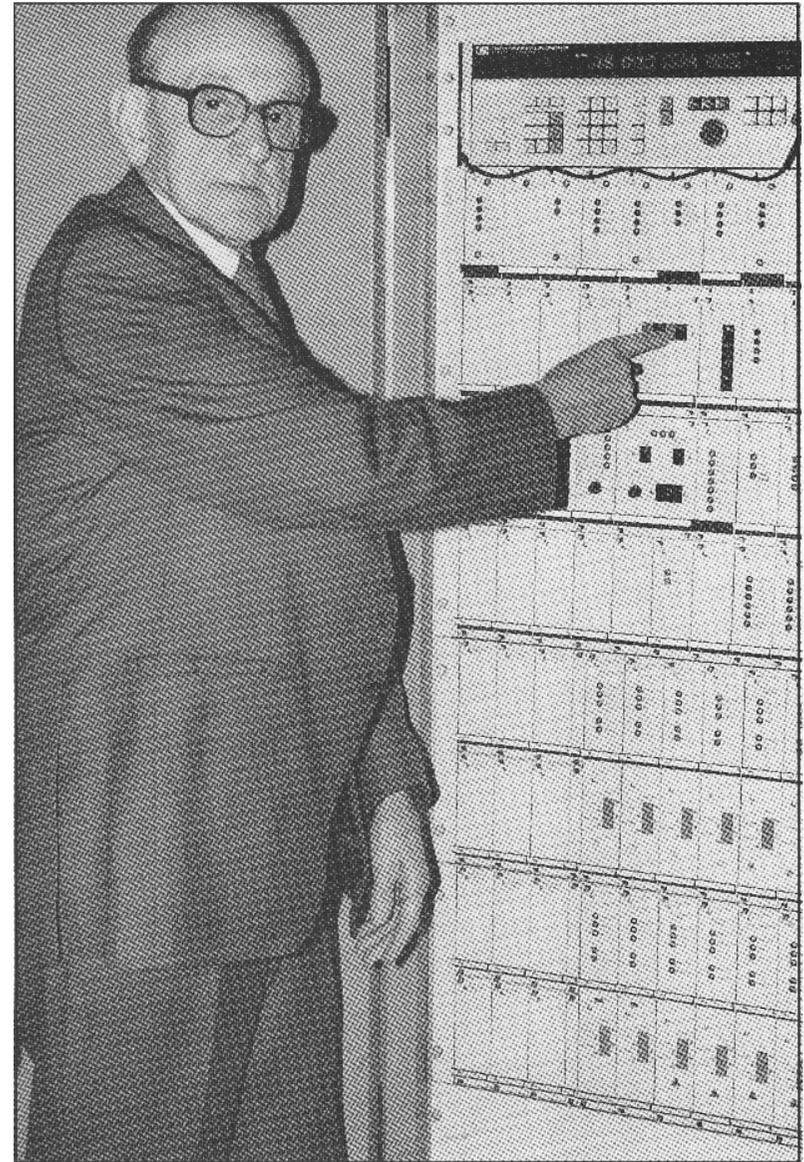
It would be incomplete not to mention the development work done at Daventry in improving the efficiency and effectiveness of its aerial and feeder systems. Early aerials were designed to work on one frequency. These were superseded by dual-band (frequency) aerials, after much pioneering work on Borough Hill. Then finally, the four-band (frequency) aerial was developed at Daventry. The new aerial was placed between two self-supporting towers overlooking Daventry, not quite so conspicuous as the taller masts. This was the fore-runner of aerial systems on all new BBC stations and the re-engineering of existing short-wave stations.

The closure of Daventry

And so it all came to an end, when it was decided to close Daventry as an operational Short Wave station. One reason was the cessation of the 'Cold War', resulting in the Voice of America vacating broadcasting facilities at BBC Woofferton (Shropshire), enabling Daventry transmissions to be transferred there.

Also, and probably the main reason, the high cost to the External Services of re-building Daventry's mast and aerial system, which would have involved the construction of a large number of self-supporting towers on Borough Hill, rather than stayed masts. Perhaps it would have been a contentious impact on the Hill skyline.

The closure took place at 11.30 GMT on Sunday 29 March



1992 Bill Bird performs the closing down ceremony at the Daventry transmitter.

1992, when Sender 24, transmitting on 15.070 MHz to South West Europe and North Africa was switched off. Bill Bird, who joined Daventry staff in 1928, and worked on the Hill for 49 years was given the honour of pressing the button to signal the end of nearly 67 years of BBC broadcasting from Borough Hill. The event was marked by a reception for current and former Daventry staff.

It was a sad and memorable occasion for all those present. The poem, the 'Dane Tree' recited by Lord Reith at the opening of Daventry 5XX, has prophetic concluding lines:

"Daventry calling ... Dark and still ...
The tree of memory stands like a sentry
Over the grave on the silent hill'

7

67 YEARS ON TOP OF THE WORLD

New faces

And so they came to the hill on 27 July 1925. Fourteen dignitaries including Lord Reith (Director General), Post Master General Sir William Mitchell-Thomson, and the Mayor of Daventry, Councillor I Johnson. A rainy day, befitting raincoats, umbrellas, top hats, bow ties and spats. They were indeed different from previous inhabitants of the Iron Age hill fort Borough Hill. The stronghold of ICENI CORITANI Britons, Roman legionnaires under General Claudius in AD 51, Mercians against Danes in 1006, and of course King Charles 1's Royalist army, encamped prior to the Battle of Naseby.

Bow-ties and spats, commonplace in London, established standards of dress for early Daventry staff, recruited mainly from the merchant navy and armed services. It was expected that staff should dress smartly, a suit, bow tie and perhaps even spats. Captain H Litt, the first Engineer-in-Charge, and his engineer support staff, were housed in the Staff Quarters building, close to the 500 foot 'N' mast. They maintained 5XX on a shift basis, ready to spring into action in an emergency. Naval terms, and the discipline of shift keeping of transmitters, set the tone of operational and maintenance duties on the station. Mess-room rather than canteen, quarters for staff, shift logs for most transmitter and auxiliary equipment, rather than record books. Memos for internal and external communication, very much Civil Service. Annual reports, disciplinary procedures, equipment reports, shutdown reports, and most of all log books for each operational



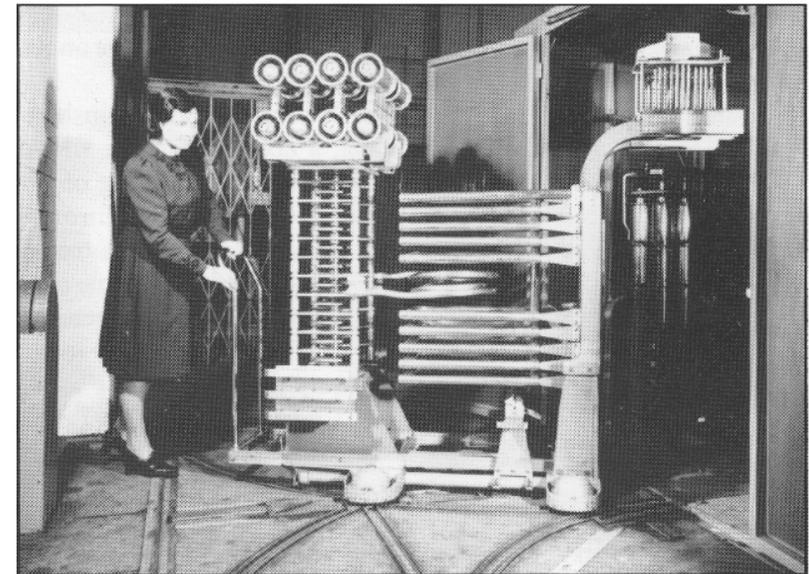
1925 The opening of Daventry 5XX. Sir William Bull, Captain P. P. Eckersley (BBC Chief Engineer), Lord Gainford, Sir W Mitchell-Thomson (Postmaster General), and Sir John Reith (Director General). ©BBC

position including the senior maintenance engineer on duty. Paper ruled the day.

The increase in the number of transmitters prior to the War in September 1939, brought attendant increases in staff, which meant more engineers, and people recruited in Daventry and neighbouring villages, to fill posts in office, workshop maintenance, aerial rigging, transport and cleaning. New engineers mostly settled in Daventry and the immediate locality. Transport had to be provided to make the short, but often hazardous journey from the town to Borough Hill, with its own climate, often obscured by fog and low cloud. The dark green Bedford bus, with the BBC logo, was a familiar sight in Daventry. At least eight times a day, it turned left off London Road on to the private single track concrete road with its passing places, over the railway bridge, to then crawl in bottom gear up the final winding slopes to the summit.

The gentle pace of the station was disturbed by the clouds of war, and then with its outbreak in September 1939, caused the main building to become a heaving mass of contractors involved in the expansion of buildings, masts and aerials - the building echoed to a frenzy of activity of all descriptions.

National Service call-up reached into the BBC resulting in a staff shortage. Only engineers over the age of 26 were placed in a reserved category. Women for the first time, were recruited to fill vacancies in Studios and Transmitters. Older engineers were also recruited through an advertisement in the *Daily Telegraph*. They came from all walks of life in the UK and Commonwealth countries. War-time Daventry engineers had a wealth of experience and talents, and additionally, women in the category Technical Assistant Females (T A F's) were posted to Daventry for transmitter shift duties. They all brought a refreshing impetus of life and excitement to the previous, perhaps staid community. Ladies on



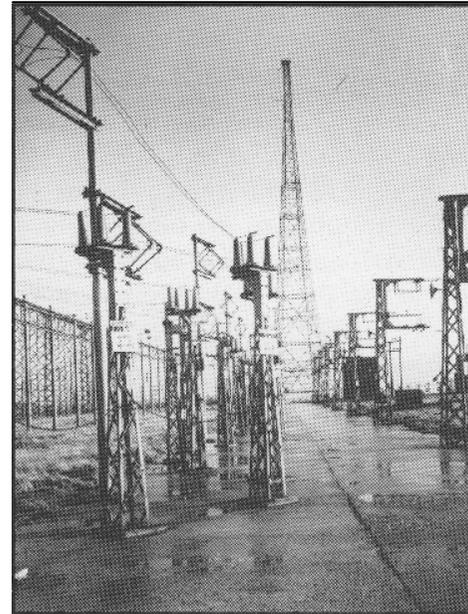
1942 Vera Bartle, one of the many TAFs (Technical Assistant, Female) recruited in wartime. ©BBC

transmitters were different. Particularly on Senders 1 & 2, where to change frequency in 15 minutes was hectic – a scramble of copper straps and wing nuts. It was said the sight of skirts being hitched up to retrieve copper straps dropped into the trenches under the Final Amplifier stage, was a sight worthy of memorable recall. TAF's, with the minimum of training, worked on all duty positions, apart from aerial switching duties, and their work was greatly valued. In 1940, even greater change took place. The television transmitter at Alexandra Palace was closed on the orders of the RAF and many staff were relocated to Daventry. Shortly after their arrival, the incumbent Engineer-in-Charge, F N Calver, was transferred to the new Short Wave station at Rampisham, near Bridport, Dorset, and replaced by D C Birkinshaw, Alexandra Palace's many talented Chief Engineer. One of Daventry's engineers Bill Adams had the bright idea of writing a pantomime, to be performed by the staff, and staged at the Regal Cinema, Daventry. It was an excellent script, full of good gags and house jokes. It was 'Jack and the Beanstalk', and the first of three pantos performed in Daventry during the war, some of which were broadcast live on the General Overseas Service radiated from Daventry.

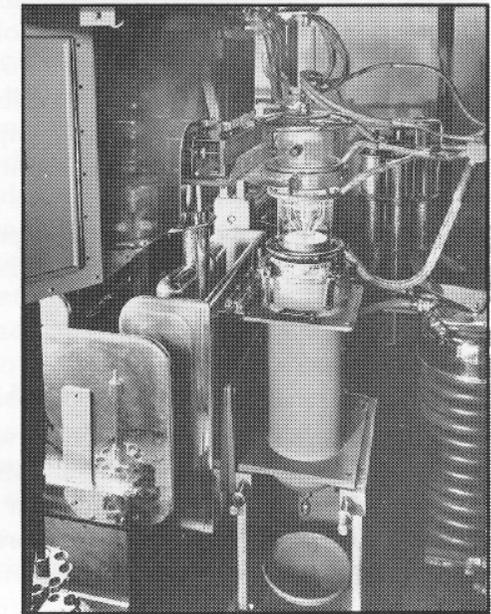
The music for the panto was composed by Douglas Birkinshaw, DCB as he was affectionately known, a congenial man, whose enthusiasm for the panto as well as the efficient running of the station was reflected throughout the staff. Once walking through the station building, he saw an engineer about to strike a match on the front panel of his control desk. A horrified look came over DCB's face, and he ran towards the pipe smoker with outstretched hands saying "No! No! Please, please"! He could not bear to see even one small scratch on his lovely equipment.

In the summer of 1941, the Eastern Chain Master GEE station was installed on Borough Hill, close to the fourth tee of Daventry Golf course. Douglas Birkinshaw's engineering expertise, together with other ex-TV staff, in modifying the transmitter to extend its range was of major significance to the prosecution of the war, and was one of the many unsung contributions made by BBC Daventry in the war effort.

In addition to the recruitment of older engineers and female



1942 Switching gantry and B Tower. ©BBC



1938 Water-cooled triode valve (C.A.T 14 SW) in sender 6 ©BBC

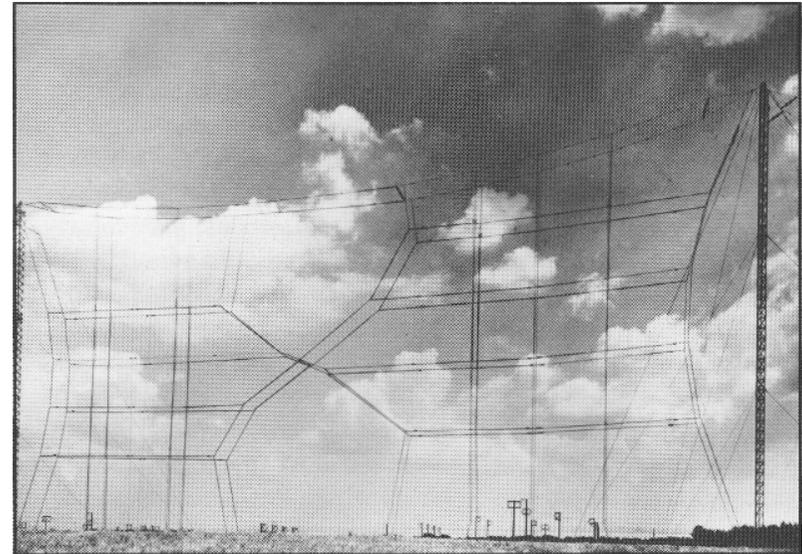
technical assistants, many school leavers were engaged, not only at Daventry but throughout the BBC. They were initially trained in basic radio techniques, in the station mess-room, and for practical training, were 'double banked' with an experienced engineer on shift, to learn the skills of operating a high power transmitter. Although they were called up into the services at the age of 18, they made a valuable contribution to war-time Daventry. For a short period they were housed in a hostel set up by the BBC at Murcott, Long Buckby, and ferried daily by the green Bedford bus.

Later in the War, the BBC purchased Welton Manor, to replace Murcott. Then for a number of years after the War, the Manor played an important role in providing cheap accommodation, and an alternative to Bed and Breakfasts, which were hard to find.

As the years passed by until Daventry's closure, the station saw many changes in staff, from Engineers-in-Charge (later Station Managers) downwards. TAF's were absorbed into Studios and other posts, some married Daventrians old and new. Technical Assistants were trained at the Evesham Training School to be Engineers. But the most important policy change in the BBC's Transmission Department, was to automate all its UK stations, and train future engineers to be broadband – knowledgeable of TV short wave and medium wave equipment. Hence Daventry, as with other short wave stations became a Team Base, covering many locations in a large area of the Midlands. Out in their Range Rover they go, to maintain or repair transmitters and other faulty equipment, to provide viewers and listeners with an uninterrupted service.

Magic Aerials

Without aerials, communications as we know it, wouldn't take place. The short telescopic rod of a mobile is the key to its usage. On Medium Wave, it could be a mast 725 feet high, as Radio Three – now no more. But with Short Wave, the aerial hangs between support masts – one or two curtains of horizontal copper wires, taut on still days, billowing on stormy days. The World is



1937 Aerial curtains supported by mast halyards.

©BBC

a small place if you have the privilege of standing between two masts to look up at the dangling wires, and then line your eyes on a distant object at right angles to the curtain. For that particular aerial, you would then perhaps be on a journey to India, Australia and New Zealand. Another aerial could take you to Europe or Africa. As the sun rises on horizons all over the globe, so services could come from Daventry.

One of the hazards and more physical work from the early years of Short Wave broadcasting, was aerial switching. First, a transmitter might need to be connected to different aerials, and second, an aerial might need to have its beam direction changed. This could be done by reversing the beam from say 80° to 260° , or slewing - slightly changing the beam direction. At Daventry, selection of an aerial to a transmitter was done in the 'Gantry'. A large open concreted area, close to the Main Building, consisting of a mass of interconnecting two-wire copper feeders, supported by pylons and poles reaching to heights of 30 feet. It was an area

of danger and hazard to even the most experienced engineer. Selecting a transmitter to one of six aerials, was done using an 8 foot wooden pole, to which flexible transmitter feeder wires and connecting hooks were attached. Moving the pole from one aerial termination point to another, placed in an arc of a circle, was a struggle. In the war-time blackout, driving rain in a howling gale, with a dim torch, it was difficult and dangerous, particularly if the wrong 100 kW transmitter was unhooked. Changing the beam direction was achieved by moving ground work switches, using wooden poles fitted with hooks. In all hours of the day and night, and in all weathers, engineers with hand held torches could be seen cycling like mad along narrow concrete paths, dodging steel posts, sleeping sheep and security gates to complete in 15 minutes several field changes at different parts of the site. To locate, perhaps 16 switches, and to know which to open or close, took experience. Were the switches always changed correctly, did perhaps a Russian language head for North America, or Arabic to South America – no one will ever know. Was it perhaps to fool the Russians into thinking it was some dastardly British plot?

The hill has its own micro-climate – invariably windy, very windy, or a howling gale, that might last for hours on end. Banshee shrieking in the aerial curtains, then a lull, before it started again. After a storm, in the first light of day, an inspection of the aerial system would take place. At least no masts on the ground. But many broken aerial wires and insulators, that might take weeks to repair.

Most staff viewed each winter with foreboding. Days, perhaps a week of dense fog, blanketing the landscape. The particularly severe winters of 1940/41, 1946/47 and 1962/63 brought snow blocked roads to the Hill. No green Bedford bus to the hill top. A final walk through snow drifts to the summit – cars abandoned. Then the hazard of freezing fog, causing icing of aerials and feeders, Putting mast structures at risk, through the enormous additional weight on halyards and mast heads. If conditions became extreme, then the aerials had to be partly lowered to reduce tension. Life for the Senior Maintenance Engineer (Aerials), and his staff, could be an ongoing battle for weeks, until the weather improved to allow repair of damage to curtain wires. With a thaw, came the

danger, even with protective helmets, from 6" diameter chunks of ice dropping from 500 feet. Borough Hill was not a nice place in winter.

Perhaps it might be thought the countryside air around Daventry is pristine clean. Not so — masts and stays suffered corrosion from chemicals drifting across from the industrial Midlands. At least every four years, masts needed to be painted, and stays greased. So the Hill, periodically would echo to sand blasting of metal, and the shouts of men working on high. Grey lead paint could on windy days drift across the site, landing on buildings and parked cars — not so easy to remove.

Air is a natural insulator of electricity, and normally feeder wires can safely carry very high voltages. But sadly, there were occasions when birds, mostly hawks and owls landed on feeder wires, to cause a loud bang and flash, as they were engulfed in a feeder flashover, called a corona. There was no way of preventing this, strangely crows and pigeons seemed to know danger. Additionally, in the heat of summer swarms of crane flies rising from the ground would trigger a corona, perhaps causing a sustained arc, to damage both feeder and transmitter. A burst of high quality sound, music or speech could often be heard across the hill, to break the peace, and disturb grazing sheep.

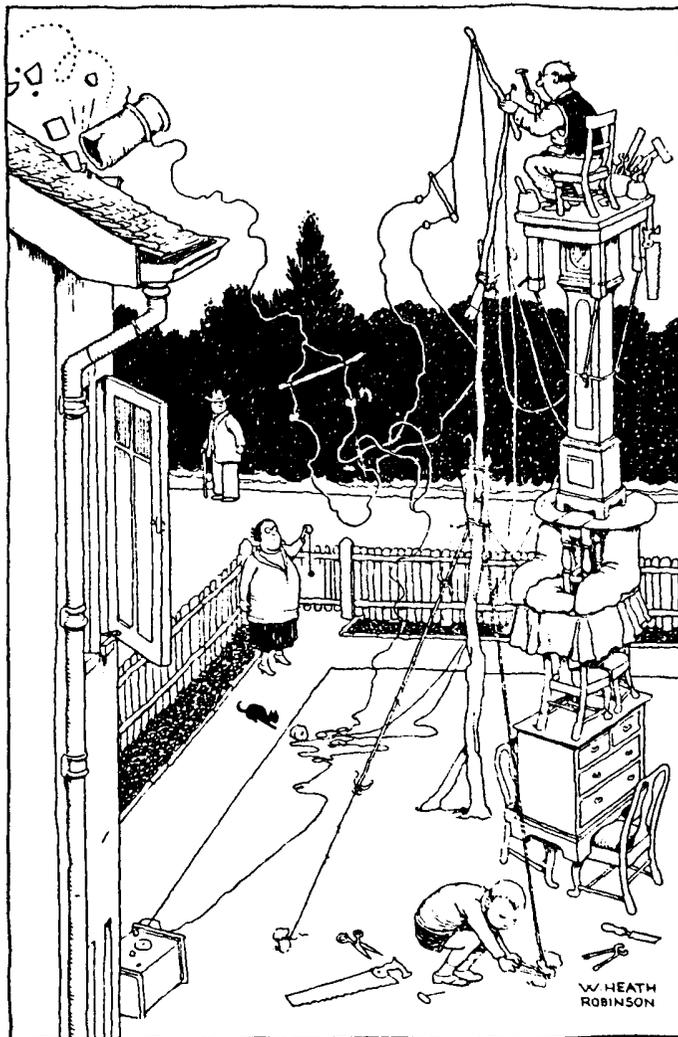
Without doubt, the period of greatest difficulty and damage to Daventry's operational schedule, for many years, was the 'scorched earth' policy of farmers burning stubble after the harvest. The months July, August and September, saw havoc created on the station. Billowing clouds of black smoke with lengths of blackened straw drifting across sausage feeders, caused coronas galore, often sustained, resulting in copper wire feeders to melt and fall to the ground. For years the black clouds of summer brought many problems and high cost to Daventry.

Finally, the station made its own contribution to Astronomy. Many local enthusiasts peering through telescopes might well have thought they were witness to a new star in the heavens! Certainly very realistic — what was the new star? It was a ceramic rod insulator, in an aerial curtain glowing and sparkling like a star some 1,000 feet above sea level.

War Time Daventry

The Autumn days of 1939 and early 1940 were called, for good reason, the 'phoney' days of the war. There was a strong sense of unreality. But, with successive events in Europe, and news bulletins pointing an even grimmer picture, there was a slow appreciation that life in the UK and BBC Daventry was going to change dramatically. Many new faces joined the staff, some to stay, others to pass through. Graduates of various disciplines from Oxford and Cambridge universities came for brief training, before going to special assignments. RAF and Telecommunication Research Establishment staff arrived to commence installation of the main and reserve GEE master station transmitters. Building, electrical and transmitter installation staff together with BBC Head Office personnel all combined to bring about a period of frenetic activity.

But for many, the blackout brought the greatest change – no mast or aerial site lights. The gloom of the first Winter, together with its severity, made an unpleasant combination. Painstakingly, the concrete approach and building site roads were camouflaged to make dreariness complete. Although throughout the war, the station was a prime target for German bombers, it was not easy to pin-point. Only one incident occurred, when a lone Dornier fighter bomber straffed the station, injuring a building contractor workman. With the imminent prospect of invasion, and the importance of BBC Daventry being the only link in broadcasting to the outside World, more changes took place. A company of the Pioneer Corps were stationed on the hill, to provide protection against enemy agents and paratroops. Barbed wire fences and the daily password became features of life. To be confronted with a perhaps trigger happy guard on a pitch black night, when approaching the guard post, was unnerving. Rumours of sightings of parachutes descending in the vicinity, made aerial switching in the dead of night, on the lonely hill top site somewhat testing, particularly when a nearby sheep gave a human like cough. Invasion threats in 1940 resulted in Home Guard units being established throughout the country including BBC Daventry, where a platoon was formed from older staff.



How not to erect an aerial.

©Estate of W Heath Robinson

Threat of the station being bombed brought further building work. All external windows were bricked up, and blast walls erected at entrances. Within the Main Station building, blast walls were built, effectively to create three isolated areas. Outside the large fan assisted water cooling radiators had blast wall treatment, as these were vital to the transmitters. Under the 1935 station expansion programme, a Power House was built, housing two English Electric diesel-alternators for emergency power. For long periods during the war, when electricity supplies were in danger, they came into use. On still days, the thunder of the engines and exhaust noise and smoke, became part of the ambience.

A transmitter cannot work without valves, small or large. It was evident that any bombing of the Marconi, (Chelmsford) valve factory could have very serious consequences for broadcasting at Home and Overseas. Bomb shelters were hurriedly built, not only for staff, but for the storage of very precious valves.

It was appreciated in the building modernisation programme, that should the war break out, then programmes from London studios could easily be lost, if Post Office line failed. To guard against this, a purpose built studio was installed, with a microphone and two turntables, for playing emergency programmes designed to cover different service areas throughout the twenty-four hours. On one auspicious occasion the wife of the Prime Minister, Clementine Churchill, arrived to broadcast to Overseas listeners. After the war, the studio was used regularly by local reporters to make contributions to the National Networks, before Local Radio arrived.

From an observation point on a neighbouring hill top, it might be thought the station would be an easy target for enemy bombers. But this wasn't the case, it could easily be missed. Unfortunately the masts and aerials were a danger to our own low flying aircraft and tragically lives were lost. Early in the war, and in conditions of low cloud and thick fog, an Avro Anson training aircraft crashed into one of the masts, killing all occupants. During the war, many other aircraft had close encounters with the aerial system. One day, in thick mist, the wing of an American B17 bomber struck a stay of one of the masts - sadly the aircraft crashed and the crew

were killed. But another B17 and British Lancaster had amazing luck, they flew through an entire curtain of aerials, amid flashes and bangs as the high voltage wires were cut, to fly home with wires dangling from their fuselage.

8

DOWN MEMORY LANE

First Impressions

For the many thousands of staff and visitors to the Station on Borough Hill, the first impressions were probably of a wind swept plateau, with a landscape and buildings dominated by lattice steel masts, aerials and feeder wires. Then perhaps to glance at the Latin mural inscription 'Quaecunq'ue' (whatsoever) placed between the white stucco pillars leading to the Main Building entrance doors, allowing access to the vestibule. All quiet, to recover from the wind outside, before passing through further swing doors into the cavernous West transmitter hall, lined with grey panelled transmitter units, with inspection windows and large chromium rimmed electrical meters. Probably the feeling and atmosphere of a hospital ward - gleaming clean, with polished floors and shining panels. Then to hear unusual sounds, noise of motor generators, pumps, hiss of steam, sounds of programme, and for some newcomers, the all enveloping sound of high pressure cooling air passing through transmitter cabinets. To remember the two large clocks placed at either end of the transmitter hall, ticking away the seconds in GMT (Daventry's schedule operated in 24 hours GMT).

Making the Station Tick

The station staff complement was divided into two categories. Management, office maintenance and support staff working a conventional 9.00 a.m. to 5.00 p.m. five day week, operational engineers working a three shift system, Day, Evening and Night every day of the year.

The four printed schedules, produced by the Schedule Unit in Bush House, The Strand, London, were the *raison d'Wre*. They set out the Daventry daily work load. Complications of urgent schedule changes to meet reception difficulties, or transmissions operating on particular days made life complicated. Additionally, the eleven year sun-spot cycle, and the ever increasing competition from other broadcasters for space in the congested frequency bands, meant the 'playing field' for Short Wave broadcasting was never settled. When the sun-spot cycle called for higher frequencies to be used up to 26 MHz, transmitter components were 'stretched' and tuning some transmitter radio frequency amplifiers needed patience and experience. Spectacular flashovers in the output stages of transmitters, particularly during Winter storms and icing of feeders and aerials, were a common experience of shift engineers, necessitating swift action to clear the fault. The ever increasing demand for higher transmitter powers to compete in the crowded 'market place' meant that Short Wave technology nudged at the edge of component strength and development design.

Clocks dominated the lives of all staff on the Hill, particularly engineers and technicians who maintained the 24 hour operational schedule, transmitting programmes all over the World. Memories of programmes might well include the Victory V signal with drums, World Service jingle 'Lily Bolero', sound of 'Big Ben', time signal 'pips' and then the announcement "This is London". Of the thirty-five or more foreign languages broadcast in a day, only a few would be recognised by the ardent linguist – Arabic, Russian, French, German, Spanish, Mandarin, Urdu and Hausa. Maintaining the daily schedule, with its many changes in a week, brought the possibility of mistakes being made, some small, some large. Fortunately, or unfortunately, a 'big brother' watchdog receiving station was employed to monitor both World Service and Domestic Service transmissions. This was Tatsfield Monitoring and Receiving Station based in Kent, later relocated to Caversham, near Reading. The dreaded sound of a Control Room voice saying "Hello tats" would herald a telephone enquiry from Tatsfield which raised the heartbeat of many shift staff. Could it be a query relating to – wrong frequency, wrong programme, wrong

day, wrong aerial, sender 'off' or 'on' in error — the permutations were endless. It meant the inevitable enquiry, written report and admonishment.

Historic Event

In October 1982, the Station celebrated the 50th anniversary of Short Wave Broadcasting. The distinguished gathering of guests included the Lord Lieutenant of Northamptonshire, Lt Col T Chandos-Pole, the Director General, Alisdair Milne, and the Director of Engineering, Bryce McCrerrick. Visitors came from a wide cross-section of society - from Daventry Town and District, County and many places in England, representing Local Government, Education, Utilities, Manufacturers, different



1982 Celebrating the 50th anniversary of Short Wave broadcasting. I to r: George MacKenzie (Chief Engineer, transmitters), Alisdair Milne (Director General), Maurice Williamson (Senior Transmitter manager, Daventry), Bill Denny (Chief Engineer, external broadcasting).

professions and BBC management. To commemorate the occasion, a plaque was unveiled at the entrance to the vestibule in the Main Building.

The 50th Anniversary effectively marked a water-shed in Daventry's technical development and staffing. At that time the total staff under Senior Transmitter Manager Maurice Williamson numbered 61, made up of shift, aerial, maintenance, administration and support staff. The team effort enabled a daily output of 37 languages, totalling 240 hours. A daily power bill to maintain 15 transmitters ran to £2,000, with an annual overall cost of £1.7 million. Over the site area of 220 acres, were 18 lattice steel masts ranging from 150-500 feet, 4 steel towers from



1983 Members of staff and wives who celebrate forty years of service. I to r: STANDING — Mrs Tomalin, Peter Arnold, Mrs Vallis, Des Vallis, Mrs Elcock, Des Elcock, Mrs Radford, Mrs Rhodes, Ken Radford, Bob Boughton, Mrs Boughton, Dennis Sheppard, Mrs Sheppard, Roy Clark, Mrs Clark. SEATED — Mrs Arnold, Mrs Williamson, Norman Rhodes, Norman Tomalin, Maurice Williamson, Mrs Cook, Ron Cook. ©Clan Blackmore

115-356 feet and 22 tubular masts from 80 to 150 feet. A total of 47 aerials hung between the masts covering 4 to 26 MHz, all directional with reversible reflectors, giving the station the capability of broadcasting to every country in the World. Daventry was the biggest Short Wave station operated by the BBC.

From 1982 to the closure in 1992, significant technical changes took place. At that time, four Marconi transmitters installed in 1939 still required manual movement of pre-set inductance trucks for frequency changing. Manual operation was also needed to change pre-set channels on one Standard Telephone and Cable 1940 transmitter, and four Marconi transmitters installed in 1962. But the most labour intensive work involved inductance changing on four Marconi 250 kW transmitters installed in 1965. At the closure in 1992, the station had been re-equipped with six totally automatic Marconi 300 kW transmitters, with micro-processor control of their operation, change of frequency, programme and aerial. Transmission schedule changes took place in twenty seconds instead of fifteen minutes, and operational staff were reduced to three on shift, compared to a war time peak of twenty.

Characters

Memories of wartime and World events were intermingled with the great mix of people who came to Daventry from all parts of Britain, and many overseas countries for short and long periods. The comedians, who kept a shift alive, with stories and jokes, helped periods of inactivity to pass more quickly. One such person, Stanley Unwin, later 'Professor' Stan Unwin of gobbledegook fame, together with other colonial recruited staff, created a legend of jokes played on other staff, particularly fresh faced youths from school

Station Rituals

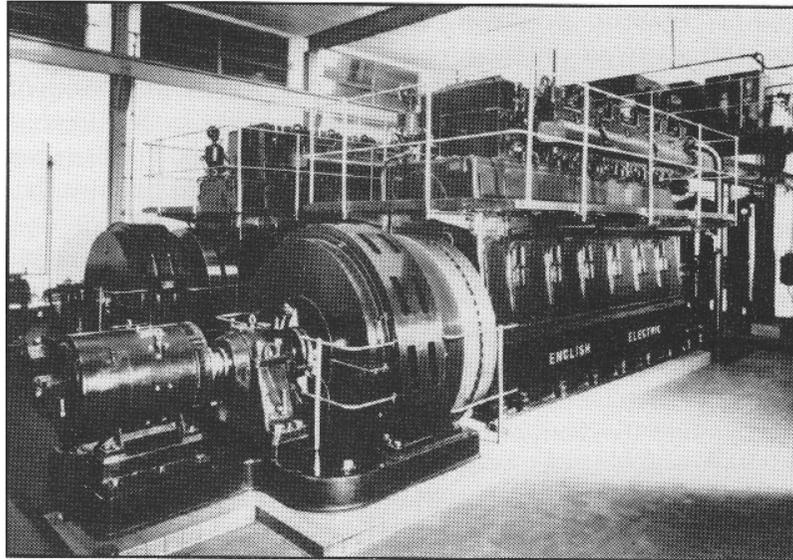
For the many thousands of staff who came to Daventry, they would probably recall the twice weekly 'mopping out' in every station building, by station attendants, with mops and buckets. Cleaning

also had to be carried out in high voltage equipment areas where for staff safety, all voltage supplies had to be removed. This was done by operating an auxiliary isolation switch to the 'off' position, which changed warning lights from red to green, indicating that it was safe to enter an area. Additionally, in some transmitter enclosures mechanical door interlocks coupled to earthing switches had to be operated.

Operational shift staff were involved in many routine tasks. Each year Bush House originated four new schedules, involving frequency and aerial changes, to take account of changes in the ionosphere due to the seasons, and the 11 year sun spot cycle. The preparation work involved power testing transmitters on each new frequency and aerial. For the Senior Maintenance Engineer (Aerials) and his rigging staff, it meant a great deal of hazardous work in all weathers to carry out re-routing of feeders and switches changes in the open wire 'Gantry'. For many years, until the early 1960's when automate aerial switching was installed, the scramble to complete the work during the one hour maintenance break was ongoing and demanding, fraught with the possibility of error.

Transmitter and other Routines

From the beginning, Long, Medium and Short Wave transmitter circuit design incorporated electrical meters to indicate not only circuit performance, but critically, to enable the correct mains, high voltage, bias and filament supplies to be adjusted to their correct value. The routine taking of meter readings, at regular intervals during transmission was a necessary chore. These readings did have value to the extent of indicating incipient fault conditions, some minor, some catastrophic. Short Wave transmitters at Daventry, as with other stations were completely dependent on the aerial 'load' (ability to absorb transmitter power). In high wind and severe winter conditions, which brought damage to aerials and feeders due to freezing fog, transmitter output amplifier stages could react alarmingly. Some more than others, but all relying on meters to help engineers to make tuning



1937 English Electric diesel alternators, emergency power supply. ©BBC

adjustments, which would reduce the risk of severe flashovers, often accompanied by speech and music, that could damage capacitors and valves.

In 1982, Daventry's annual power bill came to £800,000. Taking the weekly meter readings in the EMEB sub-stations was an important ritual. Too high or too low, explanations were demanded. Should the maximum power demand exceed the negotiated figure with the Electricity Board, it would effectively be the 'crime of the century' — the air would be 'blue' in the front office.

Diesel Alternators

From the mid 1930's until the station closure, the two English Electric ship diesel alternators (located in the Power House), played an important role in providing stand-by power in the case of mains failure. Although they provided less than a quarter of the station

load, it nevertheless enabled an emergency restricted service to operate, invaluable during the war and during the severe power restrictions in the post war period. In the bleak Winter of 1946/47, when the Industrial Midlands was shut down for weeks, the diesels pounded away to feed power into the National Grid. For many years, the routine testing of the diesel-alternators was a feature of Daventry. Paralleling the output of the alternators by the closure of an oil circuit breaker at precisely 'twelve o'clock' on the phase meter, would be remembered by many engineers who carried out the task. Easy to get it wrong, and suffer the wrath of the diesel mechanic tentatively watching developments through the diesel room door.

Distilled Water

All visitors, students and new staff posted to Daventry would inevitably be taken down the steps leading to the crypts under the Main Building transmitter halls. Faced with an overwhelming collection of massive cylindrical tanks, pumps, meters, interconnecting pipes and other equipment in wire mesh enclosures, they might be excused if their senses became deadened by sight, noise and heat. As described before, valves work inefficiently, and their anodes can glow cherry red, and need to be cooled. This was achieved in older transmitters by pumping high pressure distilled water around the valve anodes placed in water jackets. Large fan assisted external water cooling radiators ensured the water temperature in the transmitter cylindrical tanks was controlled. Every transmitting station that used water cooled valves, had a similar array of plumbing equipment. In the course of their careers, many Daventry engineers and other staff could relate to transmitter shut-downs involving a variety of water problems. Leaks, large and small, some flooding the crypt to several inches (all hands to the pump), or other incidents involving the replacement of large valves.

For many years, until the early 1960's, high grade water was produced by two distillers (periodically checked by Customs & Excise). Operating 24 hours a day, they supplied a trickle of

water into the central storage tanks in the two crypts, to replace leaks and losses. The introduction of the 'elgastat', which used a chemical de-ioniser process to produce high grade water, replaced the distillers, and thus ended another part of Daventry history.

Valves

It would be well beyond the scope of this book to detail every part of Daventry's technical history, but the valve occupies a unique place in Broadcasting. Over 67 years Daventry Station used diodes, triodes, tetrodes and pentodes (two, three, four and five electrodes) valves. Small valves used in the Programme Control Room and Central Drive Room (where the carrier signal was generated) low power amplifiers produce little heat. Water cooled valve anodes present a problem, as anodes can reach potentials of 20,000 volts, and because of impurities, tap water conducts electricity and is unusable – hence the requirement of distilled water. The manufacturers, Marconi and Standard Telephone and Cable had different approaches to the problem. Marconi pumped distilled water at high pressure to the valve anodes, through coiled rubber hoses. Standard Telephone used ceramic tubes and flat pancake ceramics to feed water to the valve anodes. New type Marconi 100 kW, 250 kW and 300 kW transmitters employing vapour phase valve boilers were insulated from ground by the use of small bore PTFE tubes through which distilled water was supplied from gravity controlled tanks. Each system met the design technology of the day, but water systems do have ongoing problems. Unfortunately they leak, suffer from corrosion, and require high levels of maintenance.

Over the years, three designs of water cooled valve/jackets were used, plus the unique demountable valve manufactured by Metropolitan Vickers installed in Sender 3 transmitter (in the old 5GB building).

S T & C valves had an integral envelope and water jacket. Marconi valves and jackets were manufactured separately, which reduced cost and made valve replacement easy. With the installation of Marconi 100 kW, 250 kW and 300 kW transmitters,

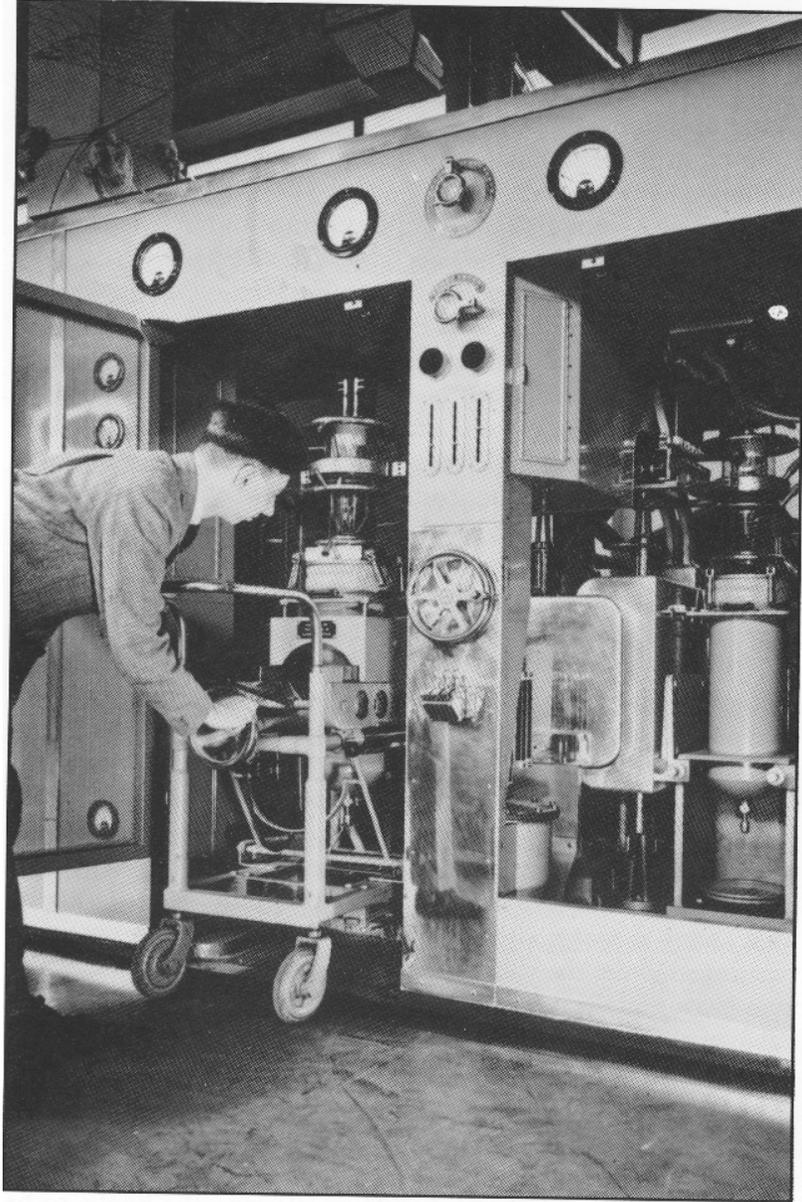
the valve jacket was replaced by the valve boiler - steam cooling had arrived.

It is of historical interest to note that the highest power 500 kW transmitters currently used in the BBC and other countries use vapour phase cooling, with hyper- vapourtron valve anodes developed by the French Thomson Co.

Valves are a weak link in high power transmitters – higher the power, shorter the life. They need to be handled with great care and attention – no prizes for breakages. For many years the routine of power testing new valves, and the hurried replacement of large faulty valves in shut-down conditions was a vivid memory of shift life. Large valves came to the Station in wooden crates fitted with long coil springs, to reduce transit shocks. Then after checking for damage, were carefully placed in valve cupboards, for later power testing. The electrode connections and protusions on valves brought the possibility of breakage. Standard Telephone lighter valves were manhandled into position, but the larger valves in Sender 7 (S17), employed a four wheel truck, which gave the feeling of instability, and was treated with caution.

Changing the Final Stage valves in the Marconi 100 kW transmitter was an engineering exercise. The manufacturer designed an ingenious 'taylor' made truck, with four pram type wheels, the rear two moveable. It incorporated a platform that could be moved backwards and forwards and raised a few inches. To remove a valve from its transmitter unit pedestal, an empty truck would be inserted into a location channel. An interlock would then allow a hand operated wheel to move the valve platform forward into the unit, using a worm drive. Once the platform was correctly positioned under the valve flange, it could be raised a few inches by a lever, allowing the valve to be withdrawn from the unit. A valve change, in shut-down conditions, might take 10 to 15 minutes or longer.

In vapour phase transmitters, valve changing was mechanically simpler. To lift the valve from its boiler, a detachable hoist with four hooks was used. The hoist, placed on a unit frame runner would be positioned above the valve, allowing the hooks to be fitted around the valve corona ring. A handle on the hoist would



1938 Changing a truck-mounted C.A.T. 14SW triode valve.

©BBC

then be turned to winch the valve from its boiler, after all connections had been released. It sounds to be an easy exercise. In fact the unit temperatures in steam cooled transmitters made it hazardous through scalding water and very hot metal work - protective arm length leather gloves had to be used. If problems were met with water sealing gaskets, a valve replacement could run to thirty minutes.

BBC 'In House' Departments

Whereas the BBC purchased transmitters, high voltage supply equipment, motor generators and cooling equipment from a wide range of manufacturers, light current amplifiers used at Daventry's Control Centre, concerned with programme source (audio), carrier source (radio frequency) and aerial selection were designed and made within the BBC.

For many years, Designs and Equipment departments based in London produced equipment for Studios and Transmitters. Additionally, the BBC Research Department based in Kingswood Warren, Surrey, also made a major contribution to new technology in all fields of Sound and Television Broadcasting.

The Drive and Control Rooms situated in the centre of the Main Building, on a first floor previously occupied by the Station Stores, were fitted with Designs Department equipment.

Control Room

For over half a century the Control Room at Daventry was the focal point of 24 hour communication with the outside world. Incoming programmes from Bush House, London, received on Post Office (later BT) lines were processed, amplified and then switched to particular transmitters as required by the printed and colour coded schedule. A dedicated chain of amplifiers would handle each language, for example Chain 3, Green for English overseas, Chain 2, Red for Arabic, and similarly for other languages.

Initially, switching different programme chains to a transmitter

was done manually. Electrical connecting cords, with plugs at each end were inserted into different sockets in a 'jack field' - not unlike an old manually operated Post Office switchboard. Changing a transmitter programme from one Chain to another at precisely thirty seconds to each quarter hour demanded concentration and experience – another place for error.

The early 1960's modernisation programme brought a significant change to the Control Room operation. BBC Designs Department produced a central control desk to enable one engineer to push buttons and control all the station transmitter schedule changes – programme, aerial, transmitter on/off. The introduction of the new Marconi 300 kW transmitters, totally micro-processor controlled, brought the demise of the Control Centre.

Drive Room

An overseas broadcasting organisation like the BBC has an international commitment to radiate frequencies to an agreed schedule. To help listeners receive programmes in different parts of the world, Bush House produces a periodical of scheduled frequencies, called 'London Calling'. The Drive Room at Daventry was the radio frequency source, using variable frequency oscillators, and the BBC took great pride in their endeavour to radiate correct frequencies. Setting the variable frequency oscillators (ranging from 0.7/1.4 MHz), which were then multiplied by Harmonic Generators, to feed each transmitter with the correct frequency was tricky. Dial readings were not accurate enough to be relied upon. The problem was overcome by mixing the output with a 'comb' of frequencies, produced by a high stability crystal oscillator, and listening to the beat on a loud speaker. Some frequencies presented a challenge, as the human ear can be deceived by the sound of an audio beat frequency. But there was help at hand. Monitoring station Tatsfield would telephone to say "Can't hear Sender 8 on its frequency in the 17 MHz band or Sender 10 on its 26 MHz band frequency". Oh dear - more paper work – off frequency was a crime.

When the transistor was invented in 1948, it heralded the end

of the valve in variable frequency synthesiser, making the Central Drive Room redundant. Finally, with the introduction of the Marconi 300 kW transmitters, all functions, including the resetting of the frequency synthesiser were micro-processor controlled.

Station Maintenance

The contribution made by the two maintenance sections at Daventry to ensure the Station operated efficiently and economically was of inestimable value.

Aerial Maintenance

Throughout the year, the Senior Maintenance Engineer (me!) and his rigging staff did battle with the elements. High winds and severe winters played havoc with aerials, resulting in broken copper dipoles, ruptured insulators, broken feeder wires, faulty switches in the field and switch stations, some requiring immediate attention. Aerial repairs could be carried out only by lowering the curtains to the ground. This was done initially with hand operated winches, which were later replaced by diesel powered winches on trailers. The spectacle of wires from two or three aerial curtains thrashing around on the grass in a high wind was a daunting sight and hard work for the riggers. Would this tangled heap ever rise in the air again?

Additionally, new aerials had to be fabricated in the workshop to drawings received from London, a precise exercise, as the 'rig' of an aerial is dependent upon copper wire being cut to the correct dimension. Four new schedules each year also generated ongoing work - re-routing feeders, and moving switches in the aerial field and switch stations. A healthy life, but not many engineers thrust themselves forward to combat with the elements on Borough Hill.

Transmitter Maintenance

The Senior Maintenance Engineer's team was divided into two sections — light current engineers and heavy current technicians.

When transmitters and their auxiliary equipment are first installed, there is a 'twilight' period when equipment operates satisfactorily, with few electrical and mechanical faults. With age, and the constant wear and tear of components involved in transmitter frequency changes, and the repeated operation of high voltage circuit breakers and their associated equipment, serviceability problems occur. Over the Station's history, the maintenance section played an invaluable role, and it would be impossible to detail the work carried out. The main tasks involved:

Cooling equipment

Maintenance and repair of a wide range of water cooling and air cooling equipment;

Rotating machinery

At its peak, Daventry had an extensive range of motor generators supplying filament current, bias and high voltage to the different type transmitters. Maintaining the machines, blowing out copper and carbon dust from the windings, plus the routine grinding of filament generator copper commutators which was a dirty and unhealthy job;

High Voltage Mercury Arc Rectifiers

For many years, from the late 1930's until the modernisation programme from 1982 onwards, Daventry used Mercury Arc Rectifiers (manufactured by the British Houston Co (B T H) based in Rugby — now GEC — to supply 11 kV and 22 kV voltages for transmitters in the West and East Halls. The maintenance and repair of the air and oil circuit breakers associated with the rectifiers required the skill and expertise of the section technicians. The unique noise of the 'arc rooms' and the explosive sound of the breakers closing, when each transmitter powered would be a strong aural memory for many staff.

Periodically, the grid controlled rectifiers gave trouble, and the

tank top had to be winched off to allow inspection, and clear the fault. Thank goodness for the Maintenance Section.

Steam Cooled Transmitters

The installation of Marconi 100 kW, 250 kW and 300 kW transmitters, steam cooled, brought the valve boiler to the station, and a great deal of additional work. Boilers suffer from corrosion, steam leaks and electrolytic action. This latter fault required the fitment of an antimonial lead target at the water input to the boiler to protect both boilers and the system. Target replacement and their manufacture was an ongoing task, a skill which Daventry technicians developed, resulting in them making targets for other UK and overseas stations.

Transmitting Tuning Circuit Coils

Copper tuning coils in high power transmitter circuits can suffer damage due to careless handling during frequency changes, and additionally suffer serious damage through overheating. On many occasions, without the expertise of the workshop technicians, it would not have been possible to maintain scheduled transmissions.

Modifications to Station Equipment

Another feature of the maintenance section's work was to undertake 'in house' modifications to a wide range of ancillary circuitry, involved with removing redundant equipment, modification and installation of new equipment schemes initiated by London's Transmitter Capital Project Department.

In Conclusion

Operational shift engineers would often be the first to meet a problem, and attempt to rectify, but quite frequently it meant Maintenance Section saved the day.

Stores

To find or not to find, that was the question posed by many shift engineers who entered the Main Building central stores, when the store keeper was away. Some achieved instant success in finding a vital spare, others were not so fortunate, and reluctant to admit defeat. In a transmitter shut-down situation, precious minutes could be lost, tempers and tension could be high.

Throughout the years until its closure, the Station had three stores – *Aerial*, under the control of the Senior Maintenance Engineer aerials, *Main Stores* and *Valve Stores* under Senior Maintenance Engineer workshop. Only the Main Stores, located on a first floor in the Main Building, and later relocated to the 1932 Empire Building, employed a store keeper, to maintain stock levels of a wide range of parts and materials. With the expansion of overseas relay stations, from the 1970's onwards, Daventry became the main base for transmitter and diesel engine spares. The introduction of computers, brought a regime of minimum stock holding, which significantly reduced capital costs. Valve and Aerial Stores were useful areas to enable new trainees and visitors to have hands on experience of transmitter parts. Valves in particular could be made 'alive' when demonstrating their component parts to enquiring eyes. A large steam cooled valve winched from its crate, and dangling in the air had particular value.

Now, the once cavernous West Hall, lined with grey panelled transmitter units has been transformed. The once noisy humming area is stacked with lines of wooden shelves, holding a multiplicity of spare components for UK and overseas stations and pride of place, refurbished 2LO, the BBC's first transmitter. Daventry has truly changed.

Administration

From the early days of the BBC at Savoy Hill, and its first transmitter 2LO, there was clear division between programme and engineering staff. The expansion of the BBC and the opening

of Broadcasting House in the early 1930's brought more change, with Administration becoming a dominant force. For many years, the Director of Engineering had a prestigious position in the BBC Directorate, under the Director General. Over a period in the late 1980's, with changes of Director General, and external competitive market forces, its importance was eroded. Now, under Director General John Birt, the BBC Transmission department has been privatised.

Engineering Division under the Director of Engineering (DE) based in Broadcasting House, controlled a number of departments, principally Research, Equipment, Designs and Installation and Transmitters. The Engineer-in-Charge (EiC) Daventry was responsible to Chief Engineer Transmitters (CET), but titles do change. At the 50th anniversary of Short Wave broadcasting, the EiC was then titled Senior Transmitter Manager (STM) and supported by a Transmitter Manager (TM). The STM directed the smooth running of the station day and shift operations, and controlled 61 staff.

Detailed administration was carried out by three office staff, who dealt with Head Office returns, payment of wages, shift allowances and other matters. An important and ongoing requirement, was the production of a shift rota wall chart. This ensured that the three shift 17 day rota (which operated for many years) had all positions filled. Allowance had to be made for annual leave, requests for shift change, training new staff and sickness. It was a constant juggling act to maintain numbers and balance experience. Not easy to keep everyone happy. The Mess Room played an important role in the history of the station, particularly during the war, when many new staff arrived. It operated a seven day week, three shift system in this period, and as rationing was a feature of life, for many staff the subsidised wholesome meals provided were a great asset. After the war, with the reduction in staff numbers, its role slowly diminished resulting in its closure. In 1996, the kitchen and restaurant area, with its magnificent view over the Daventry landscape, was transformed into an open office. Administrative staff sitting at desks with visual display monitors dealing with a multi range of

tasks associated with transmitter spares, now occupy the area. Drinks are dispensed from a machine, and pre-packed sandwiches arrive by van.

Singing Fences

"On dark nights they say you can hear metal fences talking on the hill that broods over Daventry". This story was echoed by many Daventrians who worked on or visited the hill, or came to poach rabbits from the woods and hedgerows. It was of course correct – a phenomenon particular to Short Wave stations. Electromagnetic waves radiated by the aerial system induced energy into metal objects, and their oxide crystals act as minute radio speakers. The chimneys and guttering of nearby houses could have opera singing or a news broadcast, dependent upon the transmission frequency and beam direction. Metal fences on the aerial field could literally 'make the hill alive to the sound of music'. It was said that wartime Pioneer Corps soldiers boiled their water on a kettle ring with sounds of music from the General Overseas Service.

Rolling Bars

It was not until the re-introduction of the Black and White television services from Alexandra Palace, London with BBC 1 (405 lines) on 44 MHz, followed by Sutton Coldfield, Birmingham, on 60 MHz in the early Fifties, that it was appreciated that interference by Daventry's Short Wave transmissions presented a problem. Short Wave transmitters not only radiate a fundamental carrier frequency (for example 15 MHz), but harmonics of that frequency - second harmonic 30 MHz - fourth harmonic 60 MHz. It was the harmonics of particular Daventry transmission frequencies which unfortunately matched the Alexandra Palace and Sutton Coldfield TV signals. Viewers in Daventry and District and the Northampton area in consequence had the experience of seeing 'rolling bars' and 'herring bone' patterns on their screens for a number of years.

During this period the BBC was seriously concerned about the problem, and spent a great deal of money, time and effort to modify Daventry's transmitters to reduce harmonic radiation levels.

The consequence of their research resulted in recommendations to international bodies, who then laid down very strict standards of permissible harmonic radiation from transmitters. This was an important step, as each subsequent decade has brought an ever increasing proliferation of new services and frequencies throughout the UK and other countries.

One amusing story related to a New York taxi driver who complained bitterly, in very colourful language, that his taxi radio picked up the World Service loud and clear.

Beauty and Wildlife

Beauty it is said is in the eye of the beholder. For many Daventrians and staff who worked on Borough Hill, masts, aerials and landscape were perhaps common place, a feature of the Uplands of Northamptonshire, but nothing more. To some on the Hill, the surroundings brought occasions of great beauty. In the many severe Winters, particularly 1946/47, the pristine white Arctic snow fields brought a magic carpet to reflect the sun's rays. Iced feeders danced in the wind, feeder insulators sparked and flashed across the site. Ice covered aerials hung like giant cobwebs in a grey blue sky. Winter hoar frosts made nearby trees, and those in the valleys below look like a host of Christmas decorations. The beauty of fog banks covering Daventry Town — whilst masts and hill were covered in sunshine; Silence of sunrise on a Summer's day, looking down on mist filled valleys; Clouds of smoke thrusting upwards from the Daventry Gusher (origin name of the local paper) toiling its way in the cutting beneath — heralding the start of another day; most beautiful perhaps, nights of a full moon, scudding clouds and twinkling red mast lights, accompanied with the banshee shriek of wind in the aerial rigging.

Night time silence on Borough Hill brought sounds not heard during noisy days. Hoots of owls, cry of pheasants in the boundary woods, scream of a rabbit transfixed by a stoat, playful sound of

badgers, distant cries of foxes calling to each other. In day time, one saw the dance of mad March hares, hovering hawks, flocks of migrating birds, wild pigeons. Rabbits galore, white tails bobbing to their nearest burrow. One of Daventry's many characters, Michael Leeston-Smith wrote from South Africa, to relate that Sunday papers there carried a story of rabbits attacking the BBC in Daventry. (Yes it was true rabbits enjoyed chewing cables on the aerial site). He went on to write "May I ask you to be good to the rabbits who are descendants of my good friends, who I defended from many local poachers. I spent many good years of my life living a rough but idyllic period in an ancient cottage with my wife, close to the site of the Roman villa on Daventry golf course. The cottage and the farm buildings alas no longer exist. We miss the rabbits and owls of Borough Hill, but South Africa has its compensation". Michael, probably the only one to ski to work on the Hill, had a distinguished War record, and later became an acclaimed TV producer.

Over many years sheep have dotted the landscape. The lambing season bringing renewed youthful acrobatics, and the anxious bleat of mothers will be a poignant memory for many station staff who worked on the site.

9

DAVENTRY TOWN AND THE BBC

Over 67 years until the station's closure, Daventry supplied the Station with a significant number of staff. One Daventry family was represented throughout the entire life of the Transmitting Station. James Bird joined at the very start in 1925, later joined by his son Bill in 1928, who remained for 49 years, and was then in turn joined by his son Bill junior in 1975. Many BBC new entrants started their careers at Daventry, and settled happily into the local community. Some have taken something of Daventry with them — a local girl for a wife.

Now, with the Station's role totally changed, links still continue. In April 1995, Daventry District Council's purchase of 148 acres of Borough Hill, for the creation of an informal countryside and leisure park means that they, together with English Heritage, effectively became the main guardians of the site. To illustrate their commitment, in early December 1996, Daventry District Council Chairman, John Russell, unveiled three interpretative panels on Borough Hill, jointly funded by the Council, Cummins Engine Co and the BBC depicting the origins and history of the Hill.

For the many thousands of BBC staff who briefly came to Daventry, the BBC Club, at the end of the High Street, a listed castellated Gothic structure, was home from home. It provided a central cosy meeting place, a break from the digs, a bar, billiards, table tennis and photographic rooms, and on the top floor, pride of place, a much treasured amateur radio transmitter, Call Sign 5XX

Many successful sporting activities were initiated and supported by Club members. Burton's Meadow, off the Inlands, was the venue for cricket, hockey and tennis matches and sports days.

Club members were active in supporting Stead and Simpson's Bowls Club, and this ground also hosted the annual cricket match between the Mayor of Daventry's eleven and the BBC London club team. After the war, Daventry's Golf Club was re-established, due in no small part to the enthusiasm and interest in this project by F N Calver (Engineer-in-Charge, Daventry), and a number of Club members, including Harold Harriss and Alf Gardner, both Daventrians. Members also gave strong support for a Table Tennis league, Darts matches and Billiards. The building was the venue for bridge and whist drives, Christmas and special parties.

It was a building that brought to Daventry, for at least four decades, a valued asset, which through its large associate membership, created a strong link and bond between the town and the BBC. Its eventual closure, due to reduced staffing and financial reasons, was a sad loss for many Daventrians.

Not to forget the green Bedford bus which ferried staff to the Hill every day of the year, and became part of the Daventry scene. It kept a tight schedule of pick-up points, the most notable being No 1 London Road. There were many occasions when latecomers missed the bus at No 1 and had to dash to the Inlands to climb



1955 Representatives of Daventry District Council visit Borough Hill at the time of the 350th anniversary of the Battle of Naseby.

aboard. Bill Bird and Stan Barden, drivers for many years, took the green Bedford on numerous shopping runs to Daventry shops and businesses, to Argylls (Newsagents), Meacocks (Chemist), Osbornes (Ironmonger), Bortons (Butcher), Eatons (Greengrocer), Barclays Bank, Sparshotts and Goodchilds ((Garages) and of course the BBC Club. It was a familiar face in the High Street, almost a part of the land-scape.

Daventry Calling

These words, first broadcast in the opening programme of the BBC's 5XX transmitter on Borough Hill, are now the title of Daventry District Council's news and information bulletin. These quarterly issues, will be a continual reminder of the link between Daventry and BBC Borough Hill. The Moot Hall Museum, with its collection of pottery and artefacts, gifted to the town by William Edgar, and the BBC's donated selection of transmitter parts, will for years to come be a reminder of Daventry's famous Borough Hill.

Future

Although transmissions from Daventry have ceased, the BBC link with Borough Hill and Daventry will continue. The single mast, the lone remnant of the 44 similar structures on site, will remain for communication purposes. Daventry will be the base for the maintenance of BBC Domestic Services Radio and Television transmitting stations within a 50/60 mile radius of the site. Other specialist maintenance, stores and supply services will remain, together with the Radio Tape Reclamation Service.

Ten thousand years ago, Britons first came to the Hill. The epitaph of the BBC's occupation, could for the next ten thousand years be the giant's graveyard of Ferro-concrete tombstones that are sunk into the iron stone hill. Currently the World Service standing and position in the BBC is being changed by Director General John Birt. The resolution of funding by the Foreign Office's Grant-in-Aid has yet to be agreed, and the sale of BBC

Transmission for £244 million pounds, to enhance the finances of the Corporation in order to allow its advance into Digital domestic services is now completed, and regretted by many. This now means that the US company, Castle Transmission International Limited, is the new owner of BBC Daventry and occupier of part of Daventry's historic monument.

On the 21st January, 1998, John Birt, BBC Director General gave a lecture to over 500 people at Savoy Place, London, home of the Institution of Electrical Engineers, as part of the 75th anniversary celebrations of the BBC.

He began his lecture by comparing the excitement and energy of today's Internet technologies, the move from analogue to digital, with what must have been a similar experience 75 years ago, when the BBC launched into a communications revolution.

He said 'a move of historic significance took place when John Reith was appointed General Manager of the new British Broadcasting Company.' A deeply religious, remarkable and visionary man who in John Birt's words 'would define the character, ethos and ambition of the institution more than any other person in its history!'

Through the decades the BBC had undergone immense change, said Mr. Birt 'In the early days protected from competition, it had felt no need to provide a service of wide appeal. A combination of war and social change transformed the BBC, forcing it to adjust and become an institution for all the people'.

The final vital characteristic was to see broadcasting as independent from Government. History was to lead the way, as the General Strike of 1923, the Munich crisis prior to World War 2 and the Suez war, made the BBC compulsory listening for the public.

After the war the BBC lost its monopoly, first with television and then radio, which brought a significant impact on BBC management.

The lecture concluded with a look at the BBC in the 21st century, and the possibilities that the digital age will create in the next ten years, with broadcasting becoming 'plentiful, global and interactive'. An enormous number of channels and services will

become available from any point on earth, watched on large, flat, widescreen displays, with sharp pictures and CD quality sound. He ended by saying 'John Reith created nothing less than the most successful cultural institution in the whole world, one of the great inventions of the twentieth century, in this or any other country'.

Finale

At the start of the 1990's, the BBC's hard won reputation remained untarnished, and if Lord Reith was alive today, he would see, despite the changes of the last 67 years, the vindication of his own vision and the tradition he began.

The size of the BBC's world wide following is indisputable. By the most conservative and scrupulous estimates, 100 million people all over the World are regular listeners, more than two-thirds of them in foreign languages. In 1996, the newest relay station opened in Thailand, some 200 miles north of Bangkok, and it will reach an estimated 2 billion listeners. The World Service stands on the edge of a new era, it has never been in such a position of real market strength.

During this period, the contribution made by BBC Daventry both to Domestic and World listeners has been of inestimable importance, and will be judged as a historic landmark in the history of Daventry and Northamptonshire.