Control Centre Evolution

CEB South East England

The 1926 Electricity Act created the “Central Electricity Board” (CEB) to be responsible for building a 132kV “Gridiron”. The term gridiron was later contracted to Grid. The CEB ONLY interconnected the 122 (from 437) most efficient power stations although this rose quickly to around 140. Special arrangements were made to convert some generators at non-standard frequencies and their consumers to 50Hz. This entailed conversions to some 160 generating sets, 100,000 motors and 400,000 consumers. Newcastle was noticeable amongst these as the area was predominately generating at 40Hz. In the case of Newcastle full operation on the Grid was not possible until 1935. Glasgow was first in 1931/2 followed by Leeds shortly after.

The Grid Commenced operation in 1933 as 12 autonomous regional “grids” with some interconnection available for emergencies and some ability to move limited power between regions. The Interconnections initially had a limited power transmission capability of 50MW. This was because the technical advice at the time was that full interconnection of all 12 regional grids would be unstable and unmanageable. As a result, the interconnects between regions were not built for the bulk transmission of electricity!

There were some significant benefits brought about by The Grid. By 1938 the proportion of spare generating plant having to continuously run in order to cater for faults or sudden increases in demand, had been reduced from 80 per cent to about 15 per cent (it now runs at between 5% and 7%). The resulting capital saving amounted to 75 per cent of the cost of building the "Grid"; and generation costs fell by 24 per cent.

In order to manage these 12 regional Grids, seven Control Centres were built. One of these covered the East of England and the South East of England. It was referred to as the SE England Control Room and was in London.

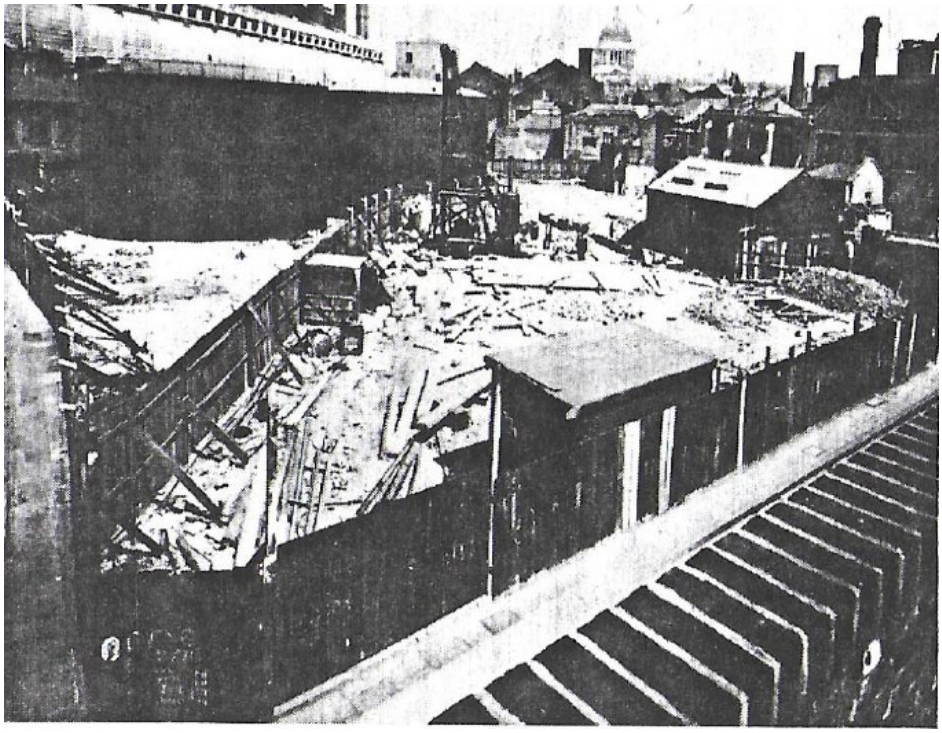
The Original Hut and Park Street

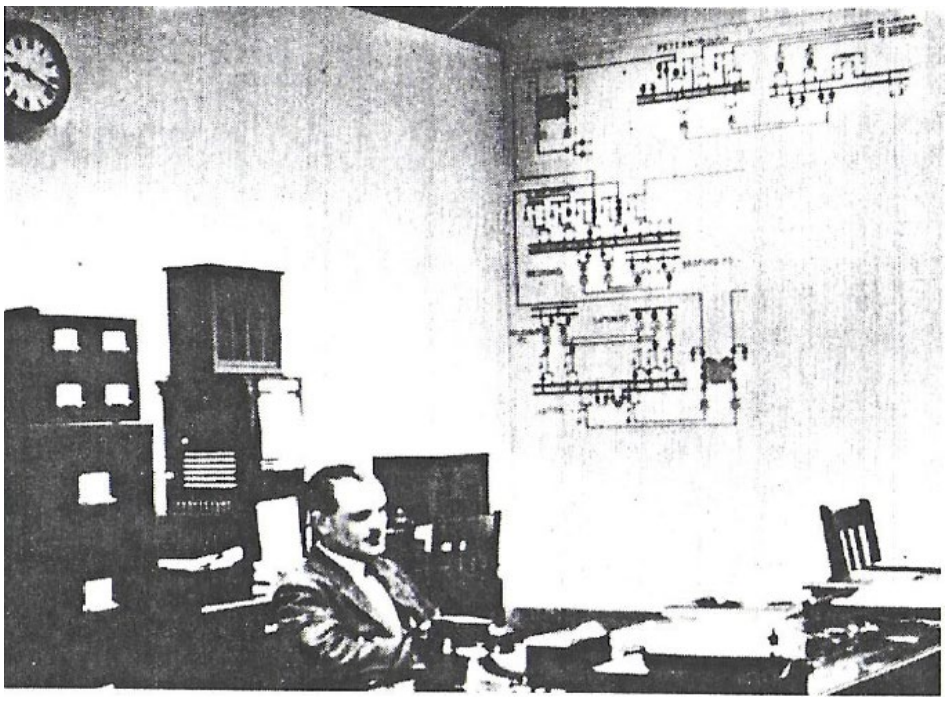
The SE England Control Room was established, in London, and thought to be on the same site as the future National Control Centre in Park Street, opposite Bankside Power Station. It is variously referred to as Bankside and/or Park Street. Having said the location was thought to be around 85 Park St. we can prove later that it was on the corner of Park St and Sumner St, on the site of the later Computer Centre.

There is a plan of the SE England control centre printed in a paper by J D Peattie, entitled “Control Rooms and Control Equipment of the Grid System”. The paper was published in the Journal of the Institution of Electrical Engineers, Volume 81, Issue 491, 1937, p. 607 – 618.

However, this control room was not the first for SE England. Within the article, in the discussion section, there is a reference to a “temporary control hut”.

The existence of this first “Hut” is confirmed by a reference in Rob Cochrane’s book “Power to the People”, published by the CEGB in 1985. In it there are two photographs, one of the Hut on a building site and one of an engineer with the DIY wall diagram behind him. This diagram was achieved by photographing a paper plan and enlarging it, a section at a time, to produce prints two feet square to a total wall coverage of forty square feet.





All the Control Room constructions were overseen by Consultants. The consultant for SE England Control Room was Merz and McLellan and they used Reyrolle for the design and installation. Reyrolle's primary business since 1906 had been the manufacture of switchgear. Originally, when the company was established in 1889, Reyrolle was a manufacturer of scientific instruments.

Of the original 7 CEB Control Rooms (Glasgow, Newcastle Leeds, Manchester, Birmingham, Bristol, London) only London was designed and installed by a contractor who was NOT part of the GPO Bulk Supply Agreement set up in 1922. All the other Control Rooms used telephony type equipment for signalling and data storage for display. Reyrolle's equipment was considerably heavier and slower to operate BUT it was considered very reliable.

There are only two known photographs of the internals of the SE England Control Room and they are shown later. There is, however, a plan of the control centre shown in Fig.1 below. This was published in a paper by J D Peattie, entitled "Control Rooms and Control Equipment of the Grid System". The paper was published in the Journal of the Institution of Electrical Engineers, Volume 81, Issue 491, 1937, p. 607 – 618.

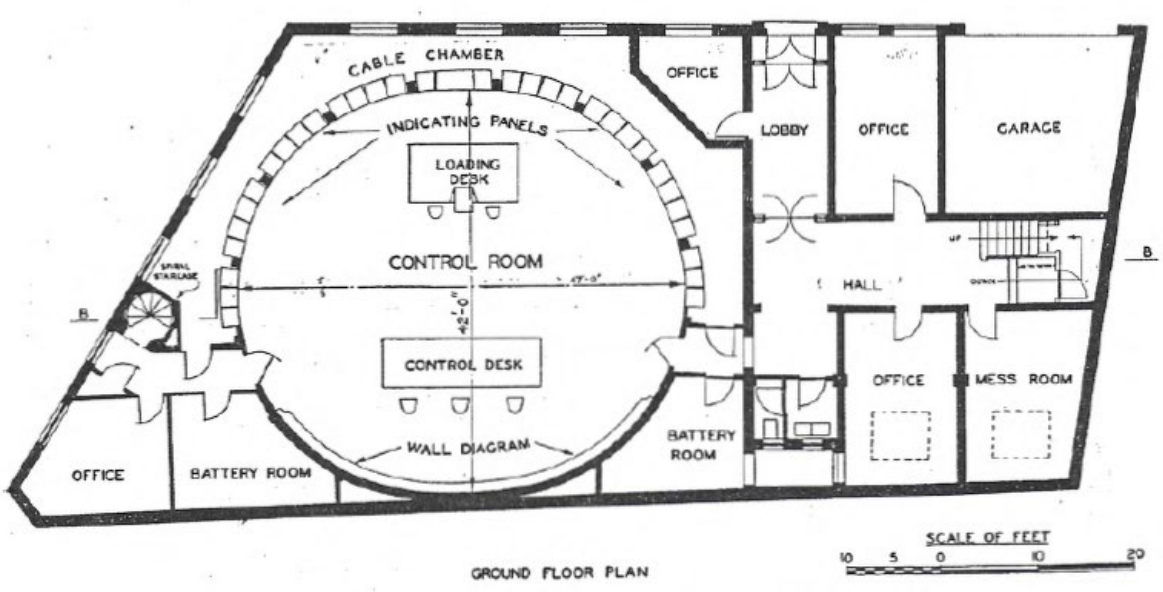
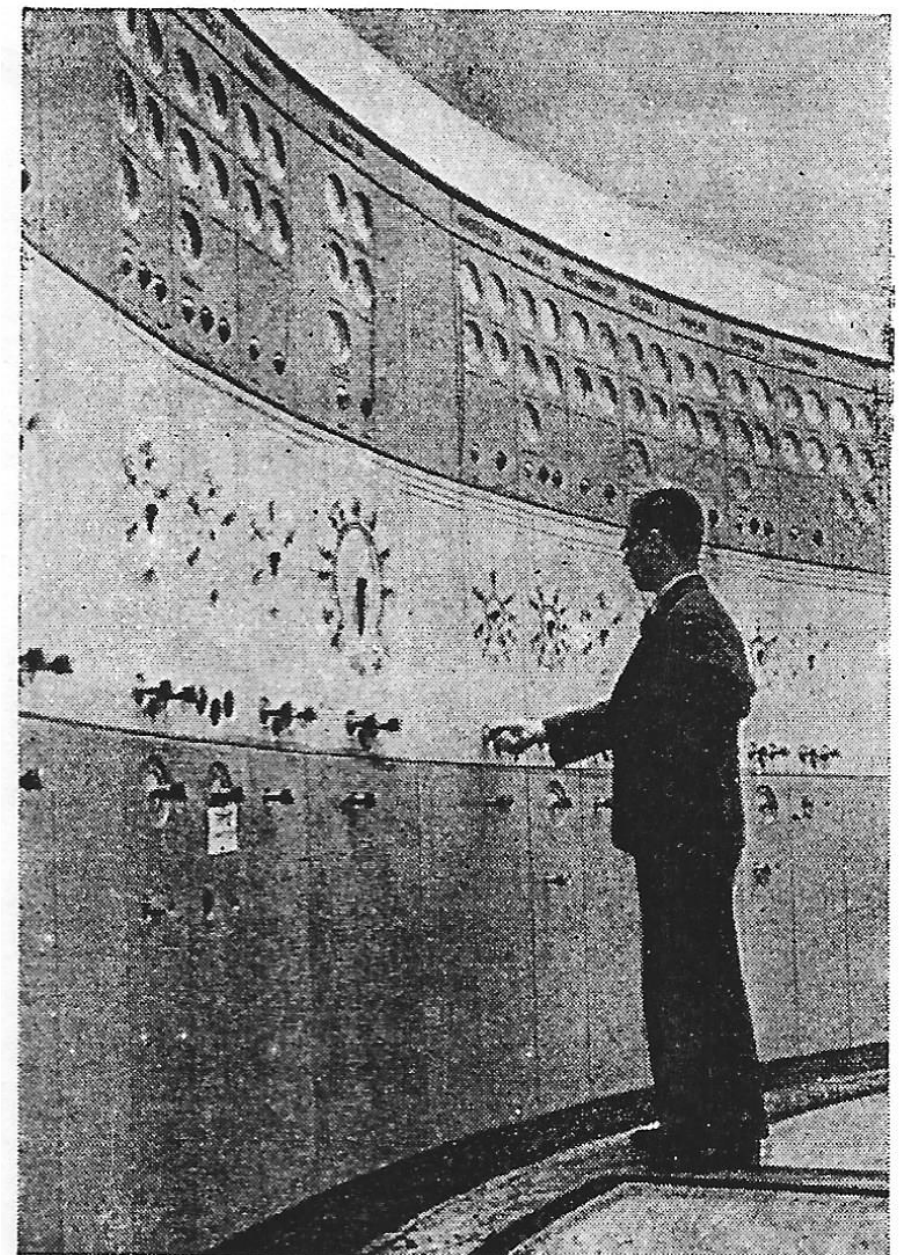


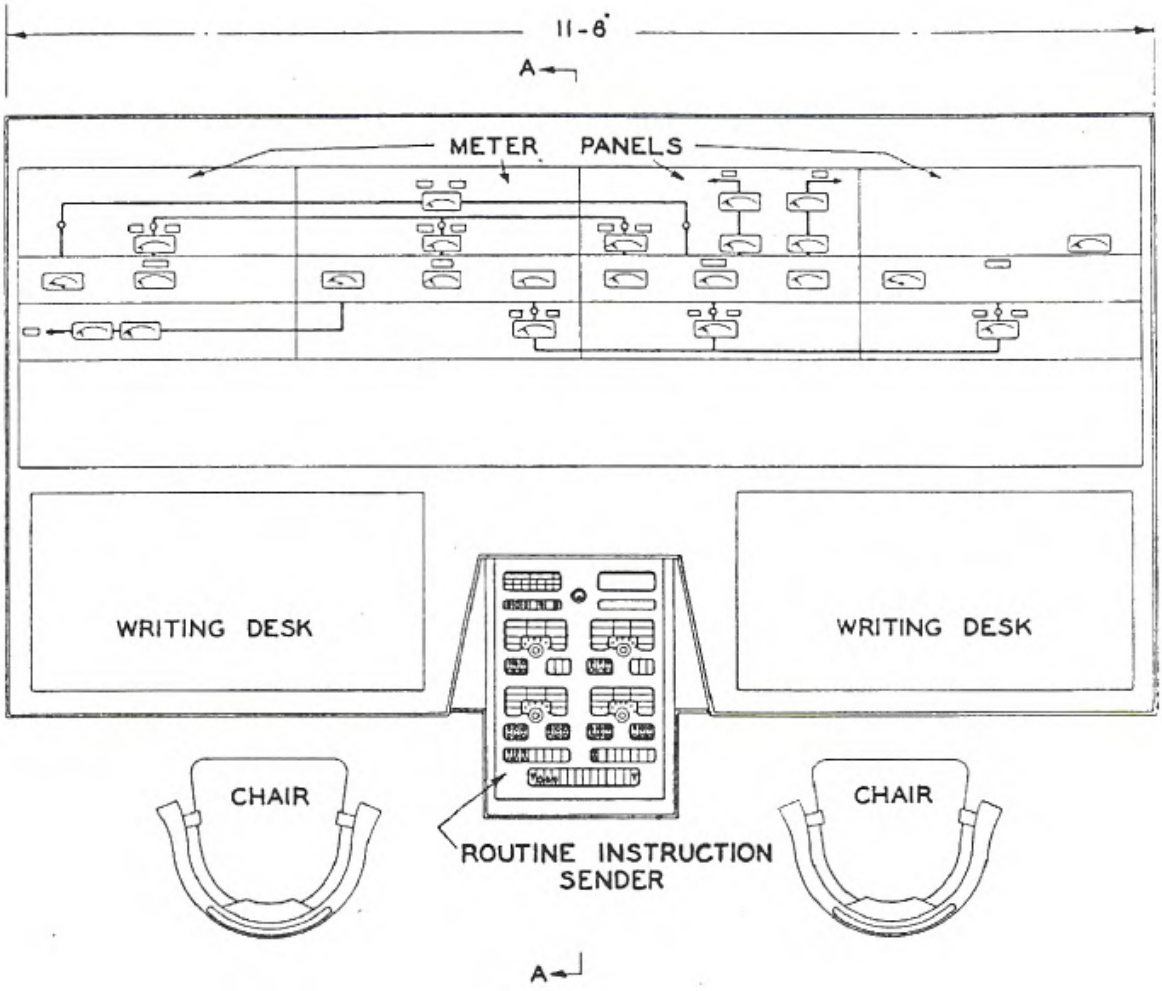
Fig. 1.—South-East England control building.

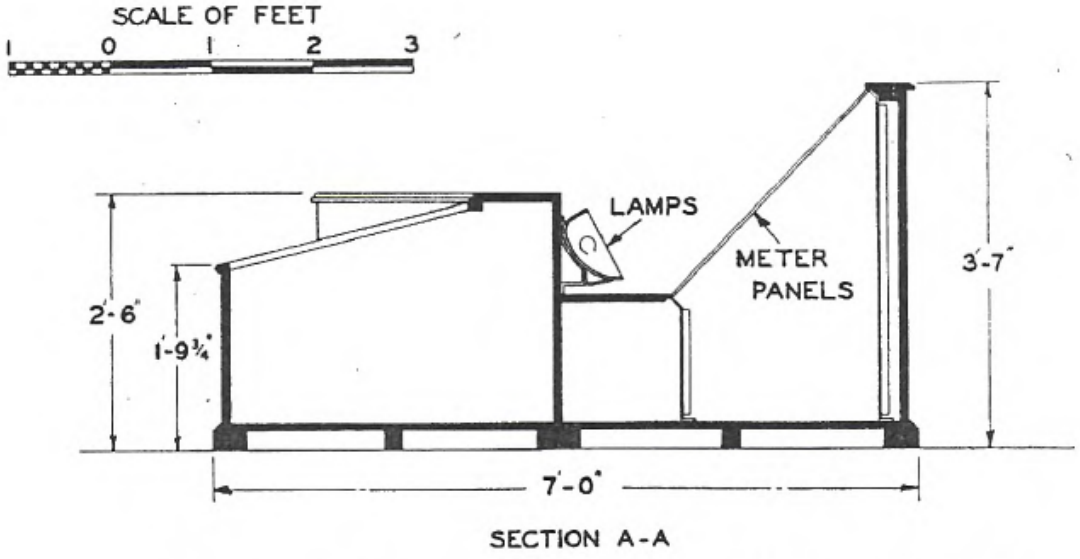
Reyrolle Centrovisory



Reyrolle Centrovisory equipment was used for the Indicating Panels. The picture here shows the suite of Centrovisory panels, each Generating or Switching Station would have been represented on a single Centrovisory panel. It is believed that the pointer in the centre of each panel was part of the selection mechanism for the collection and display of substation data.

Facing the Indicating Panel was a “Loading Desk” as shown in the drawing below.



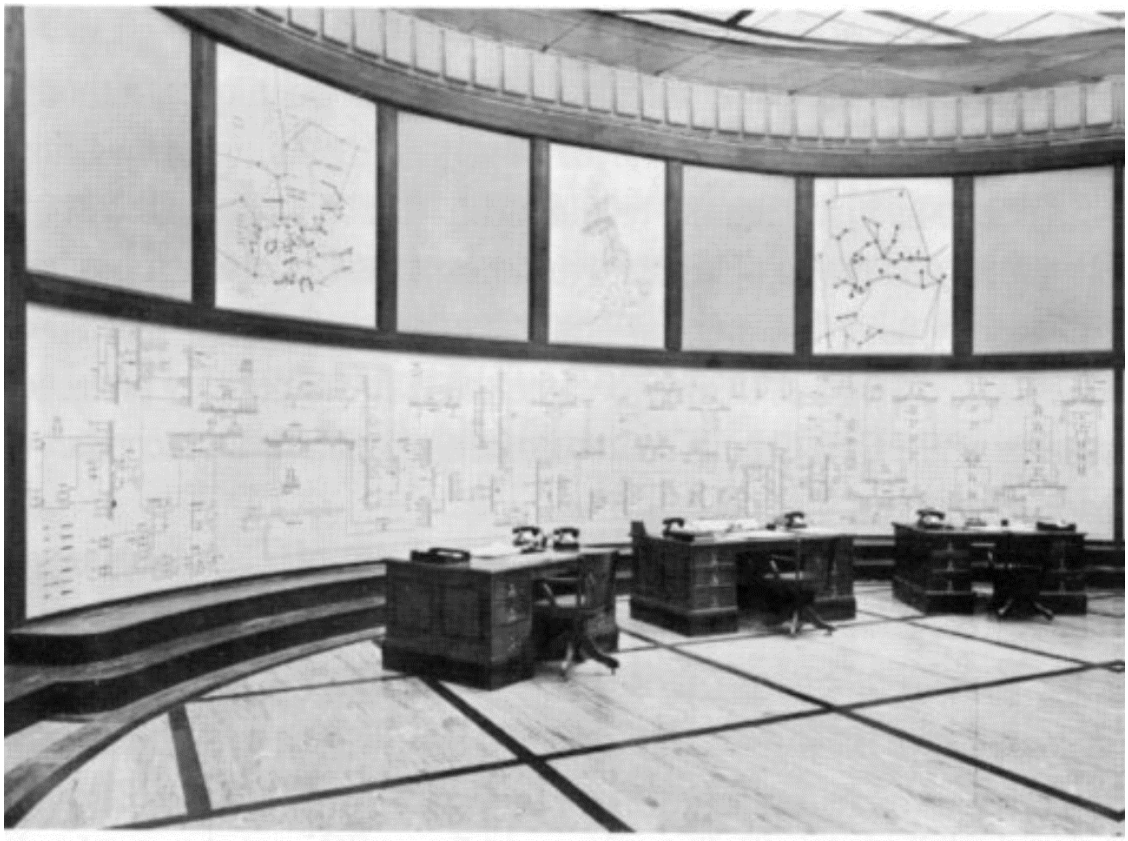


SECTION A-A

The loading desk was provided for the engineers in charge of generating station and system loading. It was mounted with continuous metering for the large generating stations together with inter-section and inter-area transfers. In general, metering at this time was on-demand and continuous metering relatively rare. The desk also included the 7-way Telegraph. The 7 options were; Control (not sure what that means), Start up, Raise kW, Steady, Lower kW, Shut down, Stand by.

On the opposite side of the Control Room was a wall diagram. This can be seen in the photograph below. This must have been taken in 1938 or later as it has the third desk that was installed for the National Control Engineer.

The wall diagram was provided by ATM, the chosen equipment supplier for Glasgow, Manchester and Bristol Control Rooms, and not by Reyrolle.



The photo shows the Wall Diagram and control engineers' desks. The lower half is the equivalent of the later switching mimic diagram and in the upper half there are network diagrams of the southern and northern parts of SE England grids either side of the national network in the centre.

Each Region managed its own generation costs and decided which power stations to schedule to generate but some needed to import power from other regions when demand was higher than the output available from its own generators. When required a regional Grid would be interconnected with another in order to import the power required but generally only for as long as was needed.

Interestingly, although there was no national control as such, prior to 1938, any instructions to interconnect regional grids were issued from the SE England Control Room in London. On one night - 29 October 1937 – the engineers on the night shift issued the instructions to couple together ALL 12 regional Grids! It remained successfully interconnected until just before the morning shift took over, when it was dismantled.

Although no formal report was made, something that was not supposed to work and did, soon became the topic of conversation and word spread. Senior staff from all Regions were summoned to London and told it would NOT happen again and that each region was to stand on its own two feet as far as was practicable. However, early in 1938, it had been predicted that there would be insufficient generation in the south to meet the winter demand. The only solution was to use the interconnectors to supply the south from the north and to operate as a single interconnected network. Despite many objections at a technical and senior level successful operation as a single network commenced in October 1938 and has remained so ever since.

A National Control facility was subsequently developed within the SE England Control Room and during 1938 the National Grid and National Control became permanent.

Emergency Control

Barely had Park Street commenced full operation than the rumblings from Germany were a cause for concern. To make matters worse, the actions of the IRA gave further cause for concern. By 1938, an Emergency Control Room (ECR) had been established as a result of an earlier CEB initiative concerning communications reinforcement which was not in itself war related. However, the usefulness of the ECRs to the CISs across the country had become more apparent as the war clouds were gathering in 1938.

The ECR had been set up at Wardrobe Court close to Faraday Building where the Bankside CIS telephone lines could be diverted to the ECR. The facilities were not luxurious in this antiquated building, the basement was a mess room whilst the ground floor accommodated a magneto (wind the handle!) telephone exchange, a few desks, a clock, a frequency meter and a system diagram. This diagram consisted of enlarged prints, of the drawings prepared for the layout of the Park Street mosaic diagram, mounted on four drawing boards and drilled so that black and white pegs could be inserted to indicate switchgear positions.

The ECR was checked regularly because the communications engineer knew that an evening BBC news bulletin containing an extract from a ranting speech by Adolf Hitler was inevitably followed the next morning by a call from the District Office asking, 'When was the ECR last checked?' At Park Street the ground floor windows, excluding the one adjacent to the main entrance door, and the first-floor windows of the apparatus gallery had been bricked up. Air conditioning and gas filtration equipment was set up in the garage. Additional garaging and transmission office facilities were provided in the grid substation area on the other side of the road.

Exercises at Wardrobe Court showed that greater value could be obtained by direct lines to the power companies' Control Centres rather than to the individual stations due to the variety of telephone systems in use. Thus, connections were established to Ergon House for the London Power Company, Valley Road for the County of London Electric Supply Company and to Northmet House for the North Metropolitan Electric Supply Company. However, direct lines **were** established to the Barking and Fulham generating stations and special multi-function telephones were ordered to deal with the variety of magneto, manual and automatic lines. As 1939 progressed, calls asking 'When did you last check Wardrobe Court?' became more frequent.

Despite its proximity to the Faraday Building, Wardrobe Court's dependence on GPO circuits did little to reduce its vulnerability and use of spare metering and protection pilots, which ran in a trunk route from Rayleigh via Barking, Islington, Lodge Road and Willesden to Watford, was urgently sought. Thus, a Control Room was established in the Islington 66kV substation cable tunnel and connections to the GPO circuits, without permission, to Wardrobe Court and Park Street were made.

The resulting Control Room had a telephone exchange, frequency meter and a diagram. The telephone exchange was connected to automatic exchanges when available and directly to instruments independent of the General Indication system in other places to give contact with all power stations and grid control points in and around London. Thus, the Islington Control Centre, whilst it lacked alarms, indications and metering, had much better facilities than Wardrobe Court and could be operated in parallel with either Bankside or Wardrobe Court."

London Bombings

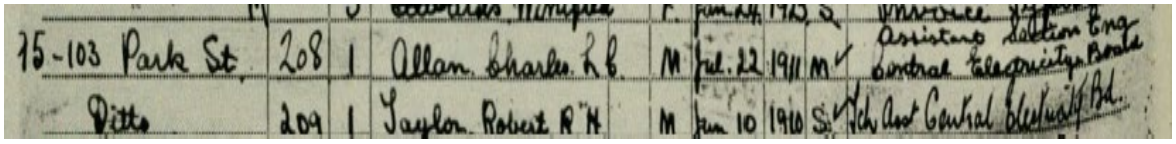
On 16 January 1939, two IRA bombs exploded in London. One of these was outside the SE England Control Room. The following news article seems to confuse generation and control!

"*In London, a bomb exploded outside the control room of a large power station, which supplied the whole of south-east England with electricity. It created a large crater in the forecourt of the building. There were no casualties and the control station was reportedly undamaged."*

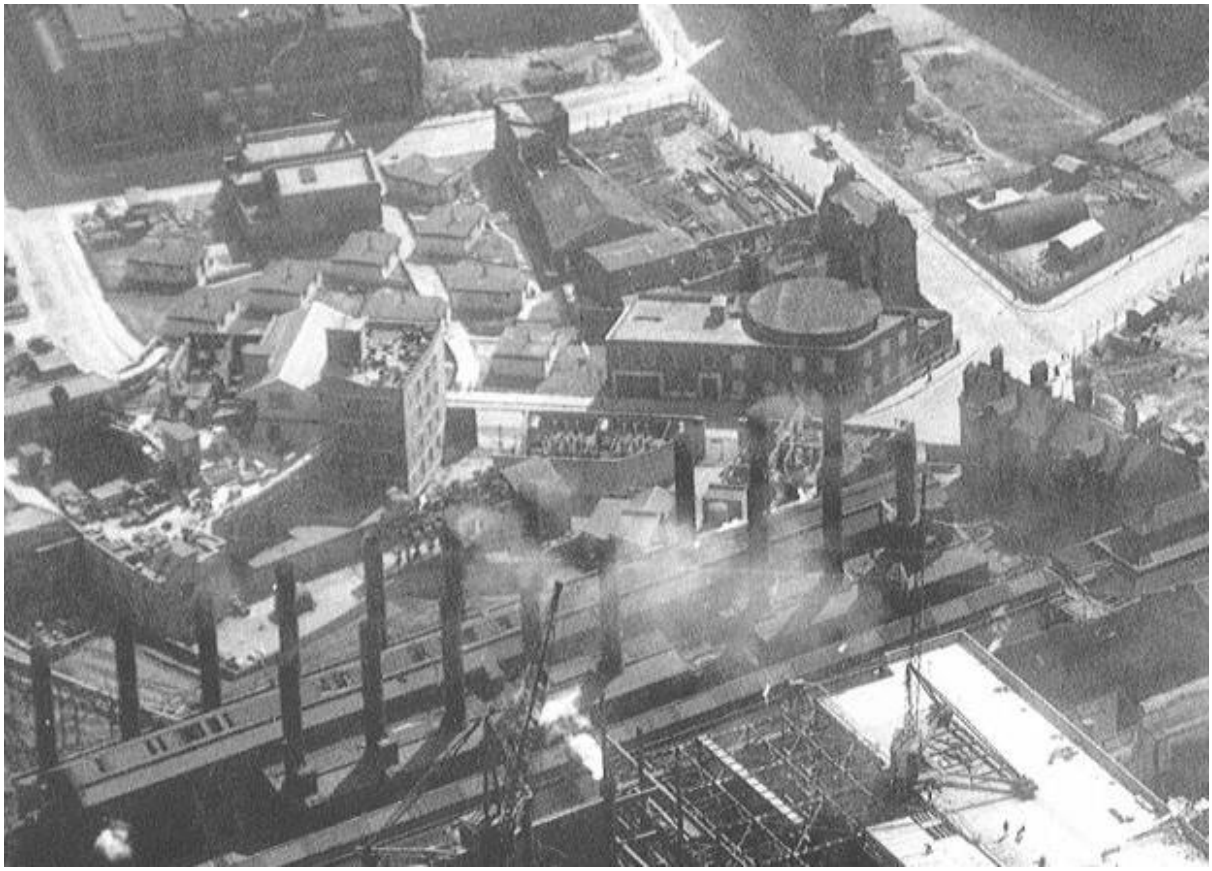
Shown below are some stills taken from a British Pathe film entitled "Bomb Outrages". The first shows the damage to a Pub called the Noah's Ark which was at 92 Park Street, the opposite side of the road to the SE England Control Room. You can see just behind the building the boiler house chimneys of Bankside Power Station. The second is of police combing through debris outside the Noah's Ark pub, the significance of which will be explained later. The third is of bomb damage to windows in Sumner Street. Both the Control Room and pub were located at the Sumner St. end of Park St.

Folklore tells that there were two control engineers on duty at the time the bomb was planted. There was a ring at the door and an argument ensued about whose turn it was to go to the door. While they were arguing, the bomb went off and a life was saved! All the windows in the surrounding streets were broken and a crater left outside the building.

We have also looked in the 1939 Register. This records a survey undertaken on 29 September 1939 of the population of England and Wales. In it we find two people at 95-103 Park St. One is Charles Allan, 28, Assistant Section Engineer, CEB. The other is Robert Taylor, 29, Sch(eduling?) Assistant, CEB. It is likely that these two individuals were on shift at the time the Register was compiled, in which case the Control Room was at 95 to 103 Park St., closer to Sumner St. than the 85 Park St. of the later National Control Centre. Perhaps on the site of the Computer Centre?



This brings us to a photograph showing the construction of Bankside B power station taken in 1952. In the background there are some buildings at the Sumner St end of Park St. Part of the photo has been blown up and it can clearly be seen that the building reflects the control centre plan shown earlier, complete with garage and front door. If a close look is taken of the second photograph of the IRA bomb scene, the SE England control centre is the building, with the white mouldings, on the right with the policeman standing at the front door. The garage doors can be seen just a little further down the road behind the parked vehicle. A crater cannot be seen outside the door though! Ironically, in 1952, the control building is still standing, among many bomb-damaged buildings, having been abandoned in 1940 in favour of a bomb proof location at St Pauls.



From Park Street to “The Hole”

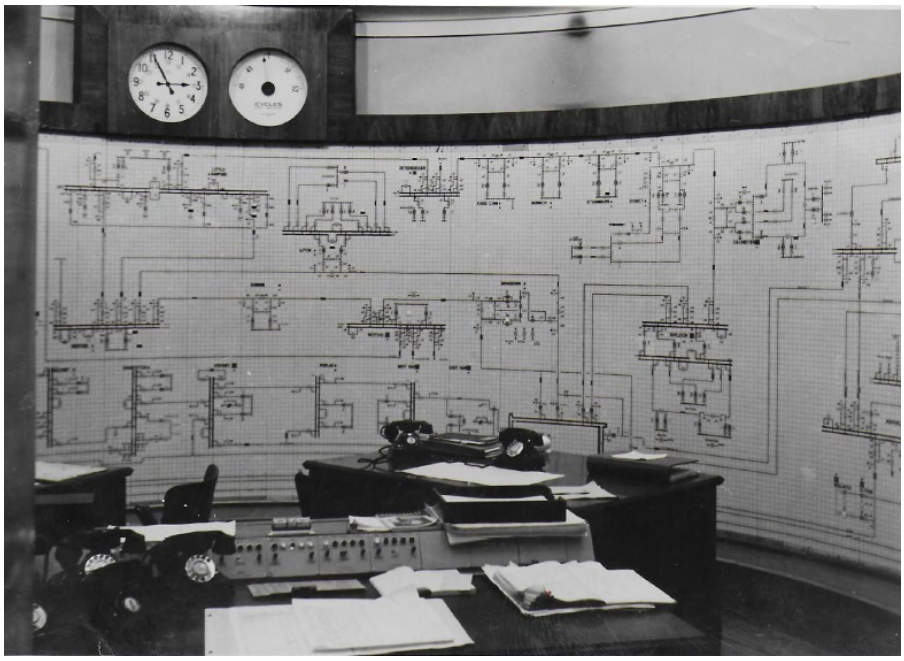
Bombings in London lead to the Central Electricity Board CEB) securing the SE England Control Room and the National Control facility by moving it into the three disused lift shafts (plus a spiral staircase) of the 'Post Office' underground station. The transfer was completed between October 1940 and February 1941. The “Post Office” underground station had been renamed “St Pauls” in 1937, a new entrance, ticket hall, and escalator had been built at the junction of Newgate Street and Cheapside. The old lift shafts at the junction of Newgate St and King Edward Street became disused and it was these shafts that were used by the CEB. The shafts were fitted out by the London Passenger Transport Board to the CEBs design and at the CEB’s expense. Arthur Hawkins was the CEB person supervising the design and construction. The contractor was Holloway Bros.

Nicknamed 'The Hole' by its workers, the control centre survived the central London devastation of December 1940 and by February 1941 the 13-room control centre was fully operational.

The Reyrolle equipment from Park Street was too heavy and bulky to transfer down The Hole but the ATM mosaic diagram was relocated. Again, there was no animation on the wall diagram. ATM also supplied the necessary Alarms and Metering equipment for the Control Rooms. As a result, ATM became the dominant supplier as they provided four out of the seven Control Rooms.

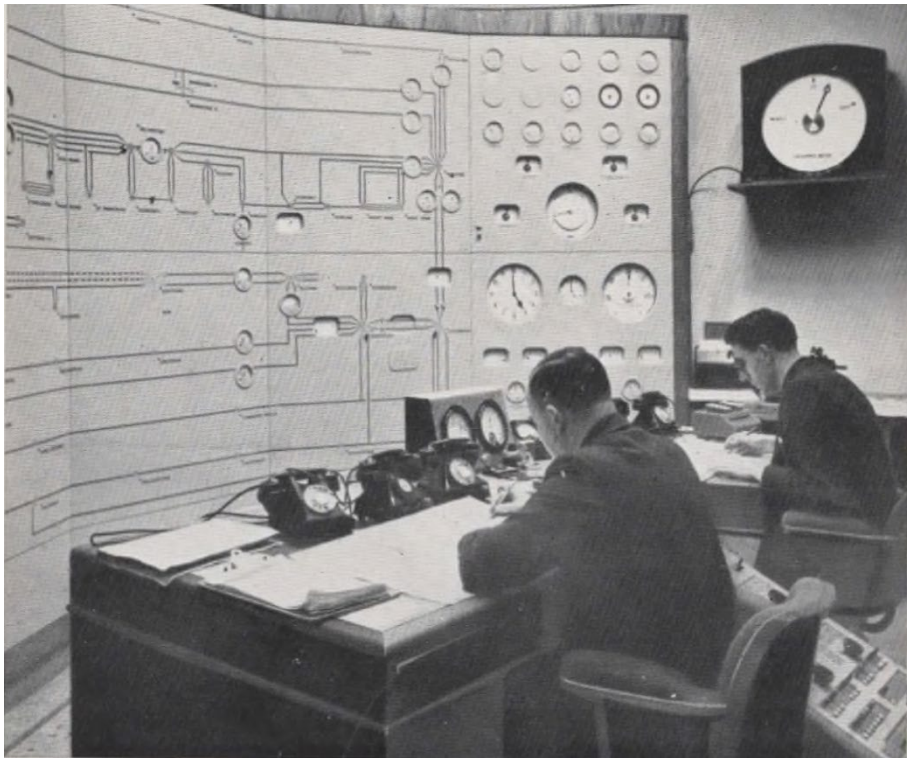
There are diagrams of “The Hole” in other records on Bygones so they will not be included here.

A view of the Apparatus Corridor. On the right, opposite the entrance to National Control are communications channels next to ATM metering panels. There is some switchgear on the left providing power to chargers and batteries located elsewhere.



SE England Switching

There were separate SE England Switching and Loading rooms.

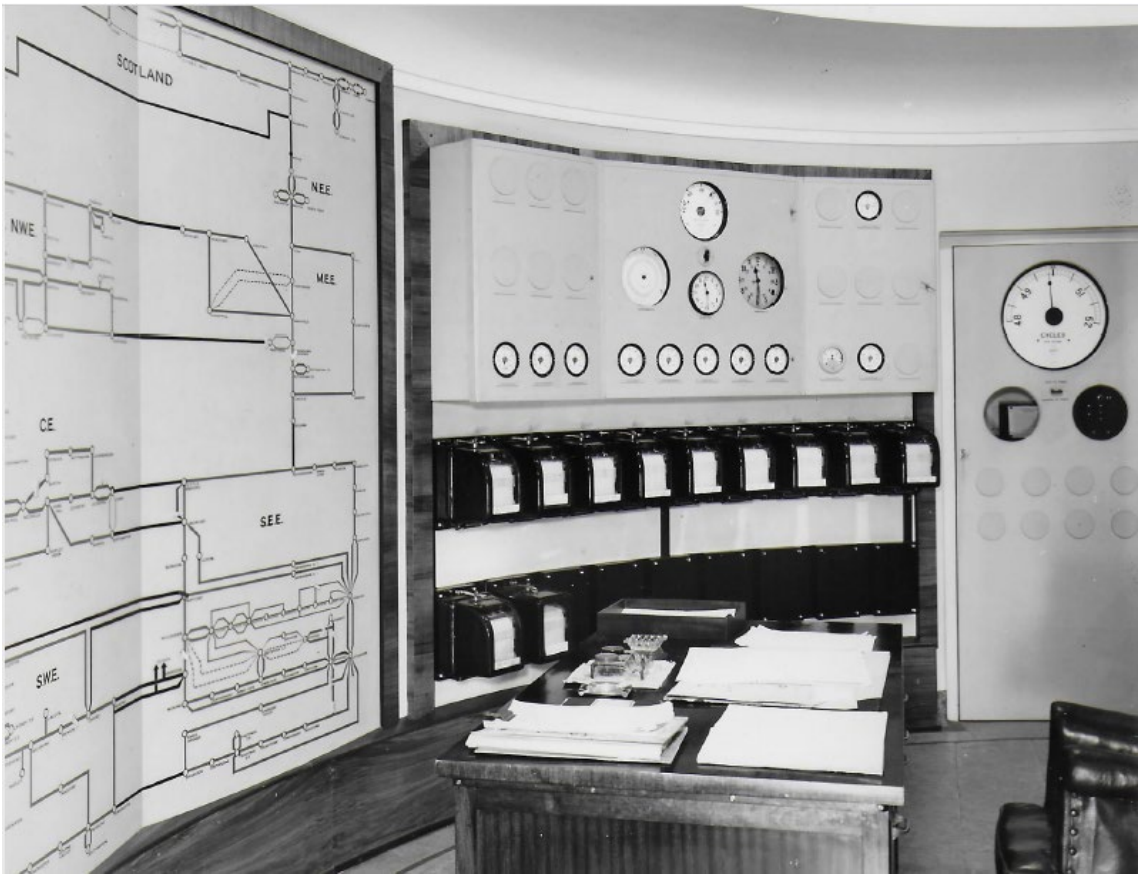


SE England Loading

The Large frequency display was a High Accuracy Frequency Meter believed to have been supplied by STC.

The Instructor Panel between the two engineers appears to be that which is previously shown in the line drawing of the Park Street Loading Desk.

There was also a National Control Room and it's adjacent Teleprinter Room



The Teleprinter Network was supplied and managed by the Post Office