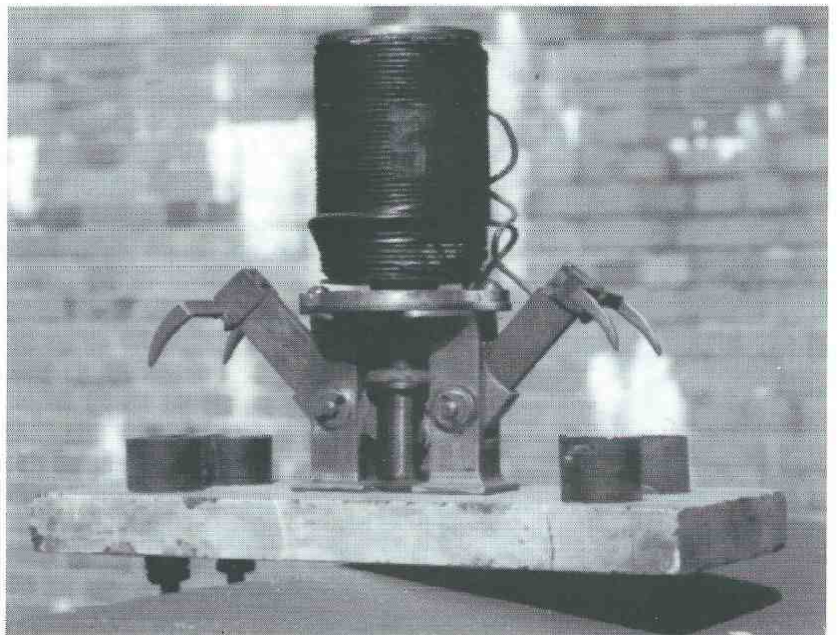


Bristol's Arc Lighting System: a technical note

Cedric Blackett

The DC system of supply was 250-0-250 volts, centre point earthed. The carbon arc lamps ran at 50 volts and therefore the lamps had to be run in circuits of ten or five lamps in series 500 or 250 volts per circuit, that is after they had been changed over from the 600 volt system. The lamps, which were of Brockie-Pell manufacture, were connected by single-core cables starting and finishing at Temple Back electricity works (*the* generating station of its time in 1893). Experience showed that the cables used (some of which were gutta-percha insulated) were not very reliable, and faults were common. For this reason, two motor-generators were available which provided 250 or 500 volts, without any earth connections. Thus with these, if any particular circuit went down with an earth fault, the circuit could be maintained until repairs could be carried out.



Arc lamp relay (mercury bath contactor) from South Western Electricity Historical Society's collection. (Photo Peter Bulley)

This method of lighting had a number of difficulties, but was the only method available at that time where a large wattage was needed. Arc lamps were 20 times brighter than the only carbon filament lamp then available and therefore were more suited for street lighting purposes.

The first difficulty was the area covered. This was fairly small initially, using ten lamps. This was overcome by having a relay at the remote part of the circuit, which, in a further circuit, picked up its supply from the local network. The early relays were designed as mercury bath dip switches, one of which can be seen in the South Western Electricity Historical Society's museum collection and is illustrated here.

The second difficulty arose from use of a series circuit: if one lamp failed, the whole circuit failed. This was overcome by having a wire wound resistor in the base of the lamp, which was switched in automatically if the lamp failed.

The arc lamp circuits were controlled from a special plug board of Ferranti design. Connection was made by

inserting the appropriate plug, so that any circuit can be connected to any source and with any polarity. Any alteration to the circuit arrangement to these circuits had to be done with the supply dead - any attempt to operate with the system alive produced a spectacular display - DC at this voltage is very nasty stuff!

Right from the start, the lamps had two pairs of carbon pencils, which automatically changed over when one pair had burnt out, thus lasting a longer time. This system of carbon arc lighting, whilst very effective, was very expensive in maintenance needing almost daily visits to replace or adjust the carbon 'pencils'. Replacement was carried out using a tower wagon, which was moved around manually. The system was altered in the 1920s using 50 volt tungsten filament lamps, as soon as these became available on the market. These remained thus until the second world war, when the blitz damaged many circuits beyond repair and the system was never used again.