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Institution of Civil Engineers
Panel for Historical Engineering Works

Newsletter

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THE 1986 ANNUAL GENERAL MEETING, COVENTRY ... John Gardiner

Panel Members and their ladies spent a pleasant two days in Coventry in September for their annual meeting. Regrettably, Maurice Barbey, the Vice-Chairman, was unable to be present (his first absence for many years), but we were pleased to see an old friend again, Richard Phelps, who used to be a Panel Member when he lived in Peterborough, and has now resurfaced from Glasgow. Bill Sivewright was attending his last meeting; now that his editing duties with Volume II of "Civil Engineering Heritage" are over he is retiring from the Panel. He was thanked for all his work, and a welcome was given to David Greenfield, from Taunton, who was attending as a new Panel Member for the south-west.

It was also the last meeting that will be attended by Bill Morris, the Institution's Archivist, who has been the Panel's indefatigable Secretary for eight years and who has ensured the smooth running of all the meetings and visits. He was presented with a piece of Caithness glass as a token of our appreciation of his past work and our good wishes for his retirement.

Reports on the publication and sales of the "Civil Engineering Heritage" books revealed that the sales of Volume I (Northern England) have now topped 1000; Volume II (Wales and Western England) is progressing faster and has reached 500 in less than 4

ACCOUNT OF A VISIT TO THE BELL ROCK LIGHTHOUSE - 19TH - 20TH AUGUST 1986 ... Roland Paxton

Latitude 50 26.1'N, Longitude 2 23.1'N
Built: 1807-11. The oldest surviving rock lighthouse in the world
Height: 118ft.
Engineers: John Rennie and Robert Stevenson

When organising the local ICE visit to the Isle of May Lighthouses with the Northern Lighthouse Board last May, I enquired about visiting the Bell Rock (which is submerged except at low tide) to complete the Institution's historical record of the lighthouse. The Engineer-in-Chief, Mr J H Williamson, indicated that a visit could be made to coincide with work about to begin at the rock, and shortly afterwards I was contacted by Mr R J MacKay, Civil Engineer to the Board, to make the necessary arrangements.

On Tuesday 19th August I reported to the offices of the Board, where I met Bob MacKay and Duncan Allan, Draughtsman of the Mechanical Engineering Department. We then left for Leith Docks, where the Board's principal ship, the Pharos, was taking on materials and supplies for the Bass Rock, Isle of May and Bell Rock lighthouses. I went aboard at 0915 hours, and was shown to a well-appointed cabin on an upper deck, accommodation used by the Lighthouse Commissioners when inspecting works. The Pharos is a 1712 ton steel, twin-screw, motor vessel commissioned in 1955, and on this occasion was commanded by Captain Norman Morrison, MBE, one of the Board's most experienced captains.

After taking several photographs and unpacking, I made my way to the smoke room at the after end of the upper deck, and during coffee was introduced to my companions for the voyage by Bob MacKay. These were Jim Ferguson, now in charge of a party of workmen from Wimpey Laboratories, Bathgate, who were to commence

strengthening and enlarging the grated landing platforms on the Bell Rock, Archie Johnston, the Board's Clerk of Works, and Ian Taylor, the Board's Superintendent, who was to carry out an inspection of the Bell Rock Lighthouse with Mr James W MacKay, the Principal Lightkeeper.

The Pharos left at 0930 hours and proceeded along the deep water channel to a point in the Firth of Forth opposite Burntisland where the crew very competently reinstated a large marker buoy by moving it along 200 feet to its correct position at the edge of the deep channel. The process began with the lowering of a dinghy and the seamen anchoring a small fluorcescent-orange marker buoy in the position to which the large buoy was to be moved. Its position was determined by the use of instruments from the bridge. The dinghy was then used to place a rope from the Pharos around the buoy anchor chain and the buoy was then dragged into its correct position.

The weather, which had started grey, brightened as we passed Fidra and North Berwick. At 1230 we anchored off the Bass Rock, and as plastic pipes and stores were being off-loaded, we were served with an excellent lunch in the upper deck dining room immediately below the bridge. The dining room is large and very well appointed, its wood-panelled sides adorned with signed photographs of leading members of the Royal Family who had partaken of the ship's hospitality.

At about 1330 hours we arrived off the Isle of May and I accompanied Bob MacKay to Robert Stevenson's 1816 lighthouse to inspect some recent pointing and usefully occupy the time whilst the crew brought a new tractor ashore. We went ashore in a small rubber dinghy with a powerful outboard motor. The pointing of the lighthouse proved to be well done. The large fog horns at each end of the island had very recently been taken out of service. We looked at the 1920's Kelvin diesel compressors used to operate them which were in good working order but for which,

unfortunately, no future has yet been found. We left the Isle at about 1500 hours and anchored about half a mile off the Bell Rock at 1650 hours where we had the pleasure of seeing the lighthouse framed by a port-hole during high tea.

By 1730 hours it was raining but the sea was fairly calm. The dinghy was being loaded with stores and materials for use in the works. Our party and the Wimpey workmen were now all clad in full protective clothing and life jackets as we descended the rope ladder into the crowded dinghy in the rain. The top of the helicopter pad on the Bell Rock adjoining and about 2ft above the landing now being visible, the dinghy set out for the edge of the rock where it had to stand-off about ten minutes for the water level to drop lower at the landing platform until we received the signal to come in from Lightkeeper Jim MacKay. We landed on the grating at 1830 hours. The water level was about 3 feet above the surface of the rock. The scene was one of intense activity: unloading materials and stores and preparing shuttering for a concrete base support to two pairs of uprights to Stevenson's cast iron railway and grating of c.1809, most of the permanent section of which still survives as the landing platform - an outstanding example of the longevity of cast iron in a hostile environment!

It was with great excitement that I fulfilled a lifetime's ambition by climbing the bronze ladder up the curved base of the lighthouse to the entrance dated 1809, 30ft above the rock, then inside through the 7ft thick wall and access shaft, passing through two engine rooms into the living quarters. The lower engine room contains Gardner Diesel engines of 15 KVA output and the upper engine room engines of 5 KVA which are sufficient for daytime use. The sleeping quarters are virtually semi-circular in plan, each with a door, giving access from the common ladder, a window and three bunks one above the other, the two tiers of bunks being separated by a thin wooden partition. For the next few days whilst work was in progress, occupation was to be "full

house" and as Jim Ferguson readily agreed, "real togetherness".

Onwards and upwards to about 90ft above the rock into what, until the renovation of 1967, used to be the lighthouse library (sometimes called the parlour), complete with Stevenson's desk and marble bust by Samuel Joseph. It is now a modern kitchen with a small library of paperbacks. The wall has now diminished to a mere 18ins in thickness supporting an elliptical cross-section domed roof. It is a testimony to the lighthouse builders that there are no apparent signs of stress in the structure even though the lamphouse platform cantilevers out at least 2ft immediately above. I left Superintendent Taylor and the Lightkeeper discussing window curtains as I ascended to the circular gallery around the 1,900,000 candlepower light from which an excellent view was obtained of the busy activity over 100ft below. Fortunately the rain was diminishing as the rock began to appear through the troughs of the waves. There were bright patches of light towards the horizon presenting the distant Pharos in silhouette. After taking photographs I descended through the lighthouse, once again momentarily interrupting the continuous conveyance of materials and stores between the rock and the cantilevered door platform, constructed as part of the 1967 improvements. Everywhere there is an indelible impression of shortage of working space. The water level had now dimished sufficiently to allow access to the surface of the rock. The men were at work on shuttering and removing bolts to be replaced in the helicopter pad.

Bob MacKay and I inspected the joints of the first few courses of masonry above the rock. Each course is lipped just ¼ - ½" above the one below, thus protecting and reducing the area of mortar joint in contact with the elements. Hard jointing was found close to the face at each point we inspected. One recalls Stevenson's use in the structure of Roman Cement, notable in the early 19th century for its quick-setting and water resisting properties. The rain had now stopped and a several-hundred-feet

length of rock about 100ft wide was now showing and I decided to inspect and photograph it whilst there was still sufficient light. I examined the sites of the forge, the scanty remains of earlier beacons and the north-east approach to the tower from Duff's Wharf, which during construction had grated cast iron platforms similar to those still existing south-west of the tower, the east railway being known as Logan's Reach (after the Resident Engineer) and the west railway, Kennedy's Reach (after Stevenson's Clerk). The early names given by Stevenson are not now used but the main approach from the south adjoining the helicopter pad, formerly Watt's Reach, is now the Fair Way and its offshoot to the east, the Johnny Gray. I then went on to what Stevenson had christened Telford's Ledge, along the east side of Port Stevenson past the Last Hope which seemed to be the highest part of the rock (and as far as I could go without getting really wet), this gaining a good view of the lighthouse and adjoining rock from the north-west.

The light was now fast diminishing and after a fleeting visit to Port Rennie and the shuttering operations near the helicopter pad (which were now floodlit from the tower), I measured up an original section of Stevenson's remarkable 32-in gauge edge-railway (as he termed it), constructed in 1809. It was now about 2130 hours and the lighthouse's three-second flashing light within its revolving bull's eye lenses falling on a light mist gave the impression of being within a giant whirling cage of several hundred yards diameter. The water level was now rising and soon waves were breaking over the newly constructed shuttering - it was planned to place 4 :1 concrete within the shuttering during the early morning shift. At 2200 hours those members of the party who were to return to the Pharos were ready at the landing stage. The water was about a foot below their feet and rising. The large dinghy then came and waited off the rock to the south. At a signal from Jim MacKay a small rubber dinghy with an outboard motor came in from the gloom and ferried the first of three small parties out to the large dinghy. A

little excitement was added to the occasion by its motor cutting out, thus requiring some exercise with paddles! This occurrence occasioned a little delay and the water was lapping the undersides of the landing grating when I left at 2234 hours.

The return to the Pharos was otherwise uneventful. After shedding our protective layers, in a markedly more comfortable environment than that we had just left, our party adjourned to the smoke room at about 2300 hours where hot tea and sandwiches were well received. The smoke room is worth a comment, being well appointed, with easy chairs, colour television, historical prints, a small library reflecting the Commissioner's tastes and a model of the Pharos' paddle-steamer predcessor of 1846. Following reminiscing into the early hours I turned in to my bunk at 0045 hours.

I awoke at 0500 hours, dressed, went on deck, and watched the next working shift depart for the rock. After returning to my cabin, I packed and went along to the smoke room where, shortly after six, I was joined by Chief Steward Tommy Devine of Musselburgh. We were discussing the almost completed Musselburgh/Portobello Bypass when we where interrupted by the noise of the anchor being lifted, and we learned that Mr MacKay and myself were being taken to Arbroath (about 12 miles away) and that we should be ready to disembark from the Pharos in about 25 minutes. Breakfast was served a few minutes later.

The Pharos arrived off Arbroath at 0730 hours at low water. We were then transported in the large dinghy to near the mouth of Arbroath Harbour when we transferred to the small rubber dinghy which scudded into the harbour between curvicular banks of soft grey mud backed by high walls and across to the north east corner of the Inner Harbour. We reached the top of the quay by clambering across two moored fishing boats and up an ashlar wall inset with iron rungs. It was 0750 hours. By this time the two weather-beaten seamen who had delivered us safely were fast

disappearing towards the Pharos with our grateful thanks. Arbroath railway station was well endowed with southbound trains at this time of day. We boarded the 0825 Edinburgh train and after passing over a silvery Tay and frowning Forth I was back in the Lothian Region Highways Department by 1015 hours.

EDITOR'S NOTE:

Readers of "New Civil Engineer" will have been mystified by the extraordinary reference (on page 36 of 2nd October) to "the cast iron railway used for the construction of the Bell Rock Lighthouse from Roland Paxton at low water". As the above article shows, Roland is never at low water but always on the high tide of enthusiasm!

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JOSEPH DAY (1855 - 1946) TWO-STROKE ENGINE PIONEER ...

H S Torrens

In 1952 staff of the Science Museum appealed - without success - for any information about an English pioneer of the internal combustion engine called Joseph Day. He designed a valveless two-stroke gas engine of considerable significance, which was patented in 1891-2. Examples survive in the Science Museum and the Deutsches Museum in Munich.

Day came from a Catholic family with long connections with Bath in Avon. He was born in September 1855 in Bayswater, London, and after school at Beaumont, Windsor, he became one of the first engineers to train at the Crystal Palace School of practical engineering. After a 3 year pupilage at Stothert and Pitt's engineering works in Bath, Day set up there as an engineer in 1878. After various partnerships and the first of a series of patents granted over 1878-1908, he built the Victoria Ironworks in Spring Gardens, Bath, in 1883. He was elected AMICE in 1887.