

Gateshead feature in the Bahrain and Hong Kong programme



The 90 ft. steerable dish aerials for the Bahrain and Hong Kong satellite stations are mounted on pivots built of concrete. The simplified form of the aerial structures, and the economy in building them, is a breakthrough in design. These reflectors, their backing structures and feed support legs were fabricated at the Marconi Gateshead works.

Dick Amos, Works Engineer at Gateshead writes: From the start Design Engineers and Works Production Engineers worked in close

collaboration; but the work in the factory really began with the receipt of a basic overall design specification for the reflector. This was translated into manufacturing information by the Template Maker and Production Engineers preparing full-size development layouts on the loft floor to provide accurate dimensions for the hundreds of steel angles and gusset plates which comprise the reflector backing structure. From these layouts templates were made to convey manufacturing instructions to the fabrication shop, where the steel angles were cut to length and fixing holes punched, gusset plates burnt to size, bent, punched and welded to form the complex corner gussets. Templates giving the compound angle settings were developed from the loft layout. Some of these gusset assemblies weigh up to 70 lb. each.

A trial assembly of a 30 degrees segment was made to check the accuracy of the loft. Any small error is difficult to detect at this stage and one error of, say, a sixteenth of an inch

in a circumferential member will multiply to three-quarters of an inch in the full circle. Later a complete trial assembly of the Bahrain reflector was made at Rivenhall.

While work on the back structure was proceeding, the problem of the manufacture of the panels was being looked at. A reflector surface built up from 189 panels in ten rings was required. Ten sets of panels each with different outline and with a surface conforming to a small portion of a modified paraboloid with a surface accuracy better than 0.020 in. r.m.s. When mounted to form the reflector it must stand up to a very high wind loading, and also the weight of personnel walking in the dish, without deformation. The approved design was for a stretch formed aluminium skin riveted to a rolled aluminium channel and cast stringer grillage.

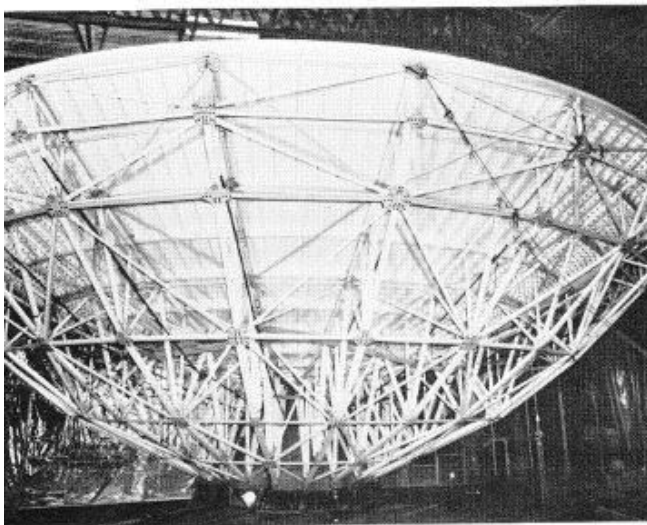
The accuracy was achieved by building each panel in a fixture which was optically checked to an accuracy of 0.005 in. designed so that each fixture could be rapidly reset to produce two different panels. Trial checks on the panels, taking up to 100 readings on the larger units, about 12 ft. x 4 ft. indicated that the majority of the panels were better than 0.015 in. r.m.s.

All the panels have to fit snugly together to form a smooth continuous surface with the minimum gaps, this called for very accurate shaping of the profile.

After the trial erection of the first reflector at Rivenhall changes were made in the design and manufacturing techniques to reduce production costs. This required a complete relayout on the loft floor and a new set of templates. This time, however, there was no time for a trial assembly, and the details were shipped direct to Hong Kong.

Our confidence in the design and our lofting technique was not misplaced, the details were manufactured, packed as sets of parts and despatched. At Hong Kong the site engineers took over and built the reflector. We were very relieved and pleased to hear that the erection proceeded without a hitch. It had not been found necessary to even open out a hole. All the panels dropped into place to produce a reflector surface with an overall accuracy within the required specification.

This reflector had provided the opportunity to prove the lofting practice established at Gateshead for this type of structure. Much credit for its success is due to the efforts of S. Leask, Senior Production Engineer, and R. Nesbitt, Template Maker, who was responsible for the layout and manufacture of the master templates.



The dish and its backing structure for Bahrain assembled at Rivenhall. This was a trial assembly to prove the technique and was done by the Chelmsford teams who have erected the aerial on site. The aerial for Hong Kong was sent from Gateshead packed as sets of parts. 'We were pleased to hear that erection proceeded without a hitch', says Gateshead's Works Engineer