"THE BANDSTAND"

by G. L. Grisdale

ABOVE: *The aerial testing equipment at Baddow Research. J. J. Thwaites and J. H. Gibson of Aerial Section are preparing to record the directional capabilities of a model aerial*

RIGHT: *Models of a hut and vehicle with whip aerial being arranged on the turntable by Peter Kightley of Aerial Section*

IN THE FIELDS at Great Baddow a great black arm can sometimes be seen moving to and fro, rather like the long neck of a prehistoric animal. It forms part of an installation which the Communication Research Group is using for measuring the capabilities of aerial systems.

Long-distance radio communications usually use the high-frequency or short-wave bands, particularly where wide expanses of sea prevent the use of intermediate repeater stations. These wavelengths have been in use since the middle 1920's, and more and more stations have crowded into the bands since that time. Some of these stations cause interference with each other; relays by the B.B.C. from distant places often have evidence of this in the form of morse and splashing noises which persist in spite of all the efforts to suppress them.

Almost the only way to improve this state of affairs is to use a directional aerial, which beams the transmitter power in the direction of the receiver; and a similar aerial used at the receiver will pick up mostly from the desired direction. On short waves these aerials are usually complicated networks of wires, supported on high towers.

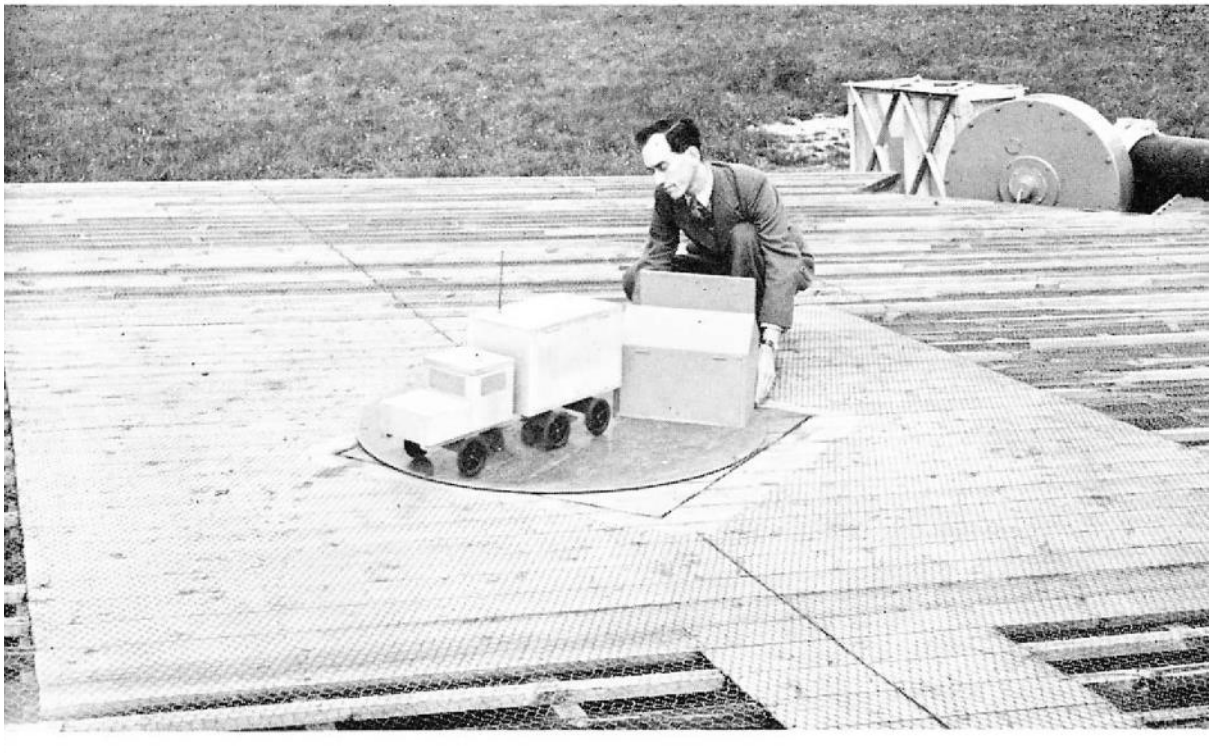
One of the aims of the research work on aerials at Baddow is to improve the properties of these directional aerials, and to do this it is necessary to find out how well the aerials beam the power in the required direction. To carry out tests on full-size aerials would require the services of an aeroplane, to fly measuring equipment round the large aerial system, a protracted and costly business. It was therefore decided that scaled-down models of aerials would give the results required and R. A. Nightingale's Mechanical Engineering Laboratory was asked to design the permanent structures for the test site.

An aerial array has been constructed about one thirtieth of the full size and mounted on a turntable, so that its directional capabilities can be measured by rotating the aerial. The model aerial is used to receive waves coming from an oscillator which can be raised in the air to simulate down-coming waves of various angles of elevation.

The oscillator, its batteries and aerial, weighing up to 100 lb., are carried in the head of an arm forty feet long which is made entirely of insulating material so that it does not reflect the waves. The arm is a thin-walled tube of Durestos and glass reinforced plastic and itself weighs about 600 lb. It is driven by a two-horsepower motor through a gearbox containing a bronze worm wheel three feet in diameter. It was designed with the gearbox by R. A. C. Hunt and H. B. Williamson.

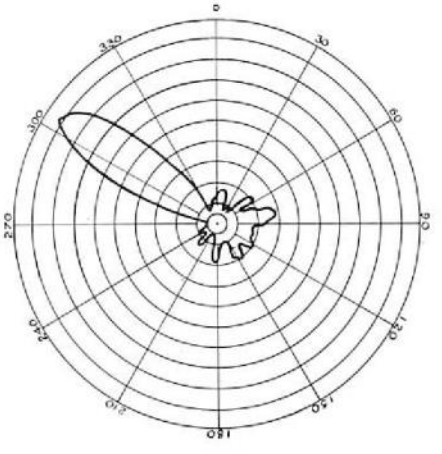
This immense tube was delivered from the makers on a large lorry one lunch-time. There were various suggestions about its possible purpose, mostly connected with the central heating system, but one engineer remarked that it was obviously the latest television zoom-lens. On the first day, after mounting, it was found that it could be raised by the motor even without the counter-balance weights, but three large blocks of concrete, of one and a half tons weight altogether, have been added to help its upward path. Starting and stopping was still rather sudden and caused vibrations in the arm, but these have been damped by a heavy flywheel which rotates in oil to reduce the over-run.

At one stage it was considered necessary to examine the inside of the arm. Ray Hunt, equipped with torch and life-line, disappeared into the twenty-two-inch diameter bore, wormed his way down its entire length and emerged safely after an hour.



ABOVE: *Inspecting the counter-weight structure of the arm are Ray Hunt and Jock Rennie of Mechanical Engineering Laboratory*

LEFT: *An aerial polar diagram being investigated by A. Kravis, in charge of Aerial Section, and, right, Dr. G. L. Grisdale, Chief of Communication Research Group*



A drawing from a polar diagram showing an aerial's directional capabilities

The whole installation is remotely operated from a building some 250 feet away; several safety devices have been included to stop the arm automatically when it reaches the horizontal position, as there were visions of it thumping the ground should the operator forget to press the "stop" button. The turntable is also remotely controlled from the desk, and can be rotated at any one of six rates from ten turns per minute to one turn in twenty minutes.

The aerial turntable sits in the centre of a flat area of wire mesh, raised about three feet off the ground which simulates the earth under the real aerial. From its appearance and the flight of steps leading to it, it has been named "The Bandstand"; rather aptly, because it seems to have become a popular rendezvous for lunch-time strollers, and it is the platform on which we conduct our experiments.