

efficient silicon rectifier, and has initiated a study on the formation of rectifying junctions in silicon by solid state diffusion and by alloying processes. Under the Computer Components Multiple Fellowship investigations were directed to a fundamental understanding of the parameters influencing the brightness characteristics of electro-luminescent phosphor screens. In addition to studies of the friction and lubrication of fine instruments, under the Watch Technology Fellowship properties such as thermal stability, low friction and wear, dimensional stability and good electrical properties over a wide temperature range are being sought in polymeric substances.

Other fellowships were concerned with heat losses through joints on high-temperature piping, due to expansion of the pipe and shrinkage of the covering, the high temperature viscosity of clays and the deleterious effect of balling in mixes used for dry-pressing refractories. Certain organic amines of high molecular weight reduced or eliminated balling of the clay by lowering its hydrophilic nature and plasticity, as little as 0.2 per cent on a small-scale plant trial reducing balling in a commercial mix by 50 per cent. The curious accelerative effects observed in an examination of the relaxative behaviour of silicon nuclear spins in silica-glass have been traced to a reaction between the silicon-spin system and the spins of hydrogen atoms present in silica through its contamination with some form of water, while considerable progress was made in determining the part which traces of contaminants play in sensitizing crystalline and glassy silica to the action of high-energy radiation. In attempts to develop an improved method for evaluating the mechanical strength of glass, evidence was obtained that the sodium-vapour technique may be a useful tool for detecting the existence of flaws invisible under ordinary optical examination. A basic study has been made of the nature of alkali attack on porcelain enamels, together with differential thermal analysis studies on such enamels and related ceramic chemicals. Deoxidation practices in basic welding processes and the way these effects may be used for influencing porosity and physical properties of metal deposited in arc-welding have also been investigated, as well as problems in building supersonic wind tunnels and the erection of the vessels for the full-scale nuclear-energy plant.

In a three-year-old evaluation of synthetic resin coatings on blast-cleaned and steam-cleaned surfaces, the systems alkyds, phenolics, vinyls and chlorinated rubbers have already exceeded the performance of conventional paints used as controls, and a new series of modified epoxide resins, the 'Capsulon' resins, complementary to the 'Stypols' in properties, is expected to find wide use in the electrical industry as impregnating, potting and casting materials. Satisfactory paper chromatographic procedures have been worked out for determining dihydric phenols and some of their derivatives, and by combining polarographic and infra-red data with chemical results, the surface chemistry of most carbon blacks has been characterized in terms of quinone and hydroquinone groups.

The report includes a general review of the achievements during the past forty-five years of the Petroleum Multiple Fellowship, which has carried out studies of the rates of oxidation of asphaltene fractions of several amides, the synthesis and properties of porphyrin-vanadium complexes, including the preparation of 2:4-dimethylpyrrole and 2:4-dimethyl-

3-ethylpyrrole, as well as devising a method of structural group analysis for oils of high sulphur content and studying the mechanism of carbonium-ion formation over acidic catalysts.

The Bone Products Multiple Fellowship has done much development work on a new granular absorbent for corn syrup refining. Use of polyoses as ingredients of prepared adhesives from cheap starches and dextrans has evoked considerable interest. Work on methyl glucoside continued to show promise, and much attention was given to the development of a preweaving size for filament acetate, using various types of 'Excello' dextrans. Data obtained from filtration tests have been correlated to assist in specifying fabric-filter media for increased efficiency, versatility and useful life, while processes have been developed for applying powdered resins to the surfaces of man-made fibres to increase their resiliency and stiffness and thus give adequate resistance to water-pressure during immersion. Efforts to improve the quality of hydraulic brake fluids have met with continuing success. The mechanism of the ester-amide exchange between methyl fatty acid esters and alkanolamides was studied and the search for heat and light stabilizers for dispersion-resin systems has been intensified. Rheological studies on silicone polymers led to a theory of association and tanglement explaining the anomalous properties of linear high polymers.

THE FORESTRY COMMISSION

REPORT FOR 1955-56

THE first planting work carried out by the Forestry Commission after its inception in 1919 was undertaken at Eggesford Forest between Exeter and Barnstaple. In May 1956 the Queen, with the Duke of Edinburgh, visited Eggesford to unveil a commemorative stone recording the planting by the Commission of the millionth acre of forest in Great Britain. A new policy with respect to planting was published in a White Paper in 1943, but it did not come into force until 1947 and proved rather too ambitious in its proposals for the acquisition of land, and planting consequently suffered.

In the new programme, an area of 900,000 acres of planting in the first ten years was prescribed. A total of 548,000 acres has in fact been planted, or 61 per cent of that proposed. For acquisition an area of 850,000 acres was proposed; actually, only 493,000 acres were acquired. The planted area excludes that acquired as the Commission has on hand a considerable area of plantable land and considerable stocks of plants available. The acquisition of land is now the main problem. For years now 5,000,000 acres of forest has been considered the proper proportion for Great Britain, and the Commission still holds to this view*; but it need not be all Government forest if private owners play their part and maintain a correct forest management.

There is little doubt that there is adequate land of relatively low agricultural value and of the right planting type. The question is whether, at present, the acquisition of land is not regarded too much from the point of view of production of marketable

* Forestry Commission. Thirty-seventh Annual Report of the Forestry Commissioners for the year ended 30th September, 1956. Pp. 94 + 4 plates. (London: H.M. Stationery Office, 1957.) 4s. 6d. net.

timber to the exclusion of land which, though not unsuitable for the growth of trees, would produce timber of poor quality and slow growth. Such trees would nevertheless give valuable protection to neighbouring and more valuable land. Land acquisition is the problem, and the Commission is quite correctly unwilling to use compulsion; nor would such action further the purpose in view. Rather, the co-operation of owners and occupiers of hill land is sought.

Private planting has been more encouraging, and for the year 1956 for the first time the area planted privately, namely, 27,100 acres, exceeded the programme of 25,000 acres proposed in the White Paper. For the first decade of the period covered by the policy outlined in the White Paper, private owners planted 165,000 acres, as against the 200,000 acres proposed in the programme. In the past three years private planting has steadily increased. The grants under the dedication scheme have been increased owing to the general increase in costs; the planting

grant has been raised from £15 to £17 per acre and the maintenance grant from 5s. to 5s. 6d. per acre. The thinning grant remains at £3 15s. per acre.

Special planting operations have been in force in crofting districts in the Highlands, where close liaison is maintained with the Department of Agriculture for Scotland and the Crofter Commission. From a report of a survey of mid-Wales, the trend toward a declining and ageing population is to be traced in a region of naturally low agricultural potential, and any development for improving agricultural conditions would result in the employment of still fewer people on the land. Many acres would degrade or fall out of production and should be available for planting by the Commission.

The markets for the thinnings, even small material, are becoming more favourable, and this should be an incentive to private planting. The protection of the forests from fire is still a matter of the gravest concern.

'ANGELS' ON CENTIMETRIC RADARS CAUSED BY BIRDS

By W. G. HARFER

Radar Research Station, Meteorological Office, East Hill, Dunstable, Bedfordshire

SINCE the inception of high-power centimetric radar, unexplained echoes have been observed which for want of a valid explanation have been termed 'angels'. They appear as small blobs on a plan-position display, are usually indistinguishable from echoes received from point targets, and occasionally occur in immense numbers. As output powers have increased, in pace with the requirements of aviation, the range of detection of these displays has also increased (reports have been received of widespread displays out to 80 miles), and they have come to present a hazard to airfield-control and military-type radars.

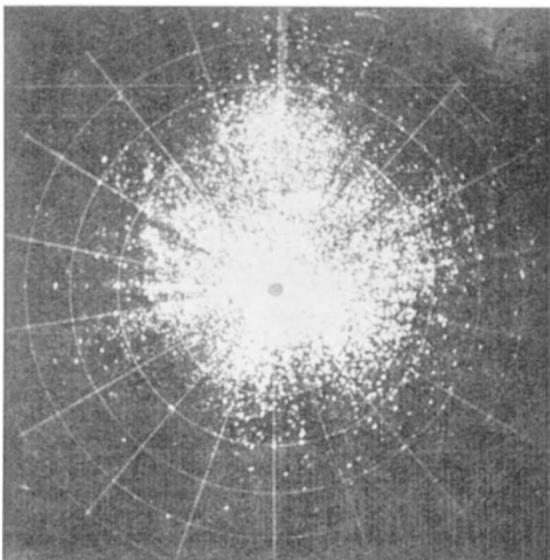


Fig. 1. Widespread display of 'angels' on 10-cm. plan-position display. Many appear as strong as echoes from aircraft. Range markers at 5-mile intervals

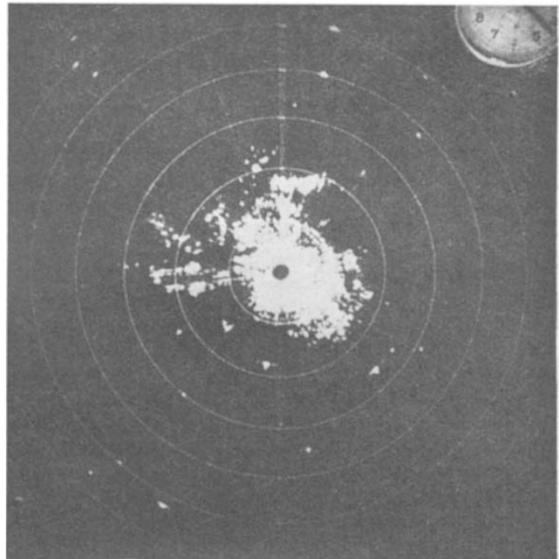


Fig. 2. Permanent echoes caused by rising ground, trees, buildings, etc., on the same scale for comparison. No 'angels' are present. The few stronger pip-echoes beyond 10 miles are from aircraft

As these effects have not been given wide publicity, examples are shown (Figs. 1 and 2) of photographic records made at East Hill, which is in open country close to the Chiltern Hills, 30 miles north-west of London. The equipment used was a 10-cm. plan-position display, peak power 500 kW., pulse-length 2 μ sec., beam-width in azimuth $1\frac{1}{2}^\circ$ to half power.

Lack and Varley¹ as early as 1945 reported that some point target radar echoes were caused by large sea birds, but it has generally been held that birds could not cause displays apparently spread uniformly over large areas. Insects have been considered², but