

attention, and Professor J. G. C. Anderson (University College, Cardiff) showed that there are large deposits of sand and gravel beneath the coastal alluvial clays of the Severn Estuary. These largely occupy buried river channels overdeepened during the glacial period. In his contribution Dr R. G. Thurrell (Institute of Geological Sciences) explained the complex procedure required for the assessment of sand and gravel resources.

ELECTRONICS

Surface Wave Filters

A NOVEL development in integrated circuit technology is the use of acoustic surface waves to make cheap and effective frequency selective filters for television amplifiers. This latest application of the newly fashionable surface wave devices is a departure from their chief use as dispersive elements in radar systems. According to a report in the Mullard Research Laboratories (MRL) annual review, the new surface wave filter can be used instead of conventional resonant circuit filters in amplifiers operating at frequencies of a few tens of MHz. At such frequencies inductors become too big to be used as part of integrated circuits and an alternative way of providing frequency selective elements has to be found.

The new MRL filter relies on the interference between acoustic waves generated on the surface of a piezoelectric crystal to provide the necessary selectivity. It consists of a pair of transducers formed as geometrical arrays of thin gold electrodes on the surface of a piezoelectric chip; one to generate and the other to receive the waves. The geometric arrangement of the electrodes determines the way in which the waves interfere, so that by careful choice of the geometry the response of the filter can be tailor made to suit a particular amplifier circuit. Using computer optimization techniques the Mullard team has designed filters which have apparently worked well in a 37 MHz colour television receiver.

The filter is small enough to be used as part of an integrated circuit assembly, but there are still problems in the way of integrating it completely with a silicon chip. The other problem in making the new device commercially viable is to find a ceramic base which is more stable against changes in temperature.

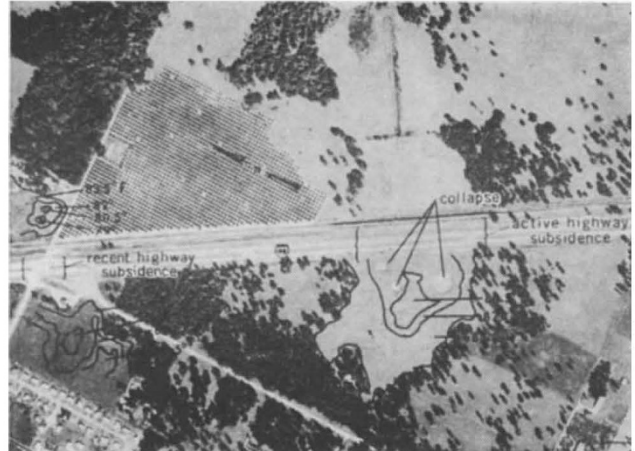
CATASTROPHES

Sources of Sinkholes

from our Geomagnetism Correspondent

NORTH AMERICA is subject to a remarkable variety of natural catastrophes—tornadoes, hurricanes, earthquakes and tsunamis, far from uncommon in one part of the country or another, are only the most devastating. Less spectacular, though equally frightening, expensive and, on occasion, fatal to those whom they afflict, are the minor geological perturbations which come under the general heading of land deformations.

"Sinkholes", or small localized regions of land collapse, are a case in point. The sudden formation of sinkholes is related to the existence of cavernous limestone, estimated to lie beneath about fifteen per cent of the forty-eight states which make up the continental United States. The most important of the areas where



A black-and-white print of a coloured infrared "thermal" map showing thermal contours superimposed on a photograph of sinkholes near Bartow, Florida. (Photo, US Geological Survey.)

sinkholes are common is thus the "Great Valley" lying east of the Appalachian Mountains and extending from New York State to Alabama, Georgia and Florida, although land collapse of this type is not unknown in Kentucky, Tennessee and New Mexico.

From now on, however, sinkhole disasters should become less frequent because of progress made in the detection of potential sinkhole positions. The Bartow-Lakeside-Winter Haven region of Florida, an area particularly prone to sinkhole collapse, has been investigated by scientists from the US Geological Survey and the University of Michigan using airborne remote sensing devices. They found that collapsed regions and areas highly susceptible to collapse have anomalous thermal and moisture characteristics which are easily revealed by infrared detection devices. It is hoped that no further development will take place within clear disaster areas although, perhaps understandably, urban planners will have mixed feelings about the introduction of yet another restriction on their activities.

SIGNALS

Improving Radio Telephones

from a Correspondent

TRANSMISSION and reception of radio telephony at h.f. and v.h.f. provided the principal theme of the conference held by the Institution of Electrical Engineers in London from May 19 to 21. The topic for discussion was signal processing methods for radio telemetry, and there was no doubt that the most recent significant h.f. advance has been the Lincomplex (linked compressor expander) system. This achieves a considerable saving in power in overcoming distortions due to multipath fading and noise. The principle of Lincomplex is to bring all speech syllables to the same maximum amplitude (compression), so that all are transmitted at maximum power. A narrow band control signal is transmitted simultaneously, defining the degree of compression. At the receiver, the control signal is used to restore the received speech signal to its original form (expansion). Technical details and operational aspects of Lincomplex were described in three contributions by a team from Marconi, GEC, STC, the Post