

# Newsletter

August 1971

News of developments in the world of surveying and mapping

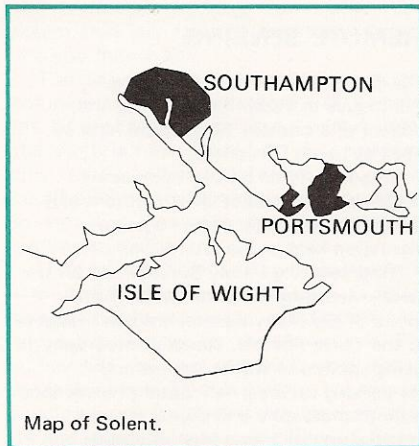
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## SOUTH COAST THERMAL STUDY

Airborne infra-red linescale (Newsletter 4) continues to prove its value — particularly in thermal distribution surveys covering large areas. The latest project was a thermal survey of the Solent and Southampton Water for the Central Electricity Generating Board.

Its aim was to map the distribution pattern of the cooling water discharges from the Fawley and Marchwood Power Stations as part of the Generating Board's research into cooling water systems and their effects on environment.



Map of Solent.

### TIMING CONTROL

Several factors affected the timing of the survey. It had to coincide with suitable tidal conditions, a period of maximum power output from the two power stations involved — and suitable weather conditions. All these came together early in May when the missions were flown.

The survey occupied a 9-hour tidal period. Six thermal surveys were made from 3000 ft. at hourly intervals and one other from 9500 ft.

Aerial photography was taken along the flight paths of the line-scan runs.

Calibration data for the airborne recordings was provided by teams of Generating Board's staff who measured sea water temperatures and tidal heights at five points at the northern and southern ends of the study area. This work was co-ordinated by radio-telephony from the Control Room at Fawley Power Station.

### FUTURE DEVELOPMENTS

The results of the survey will be analysed by the Generating Board and the information obtained will be used with other data to plan future developments and to predict the performance of cooling water systems at possible power station sites now

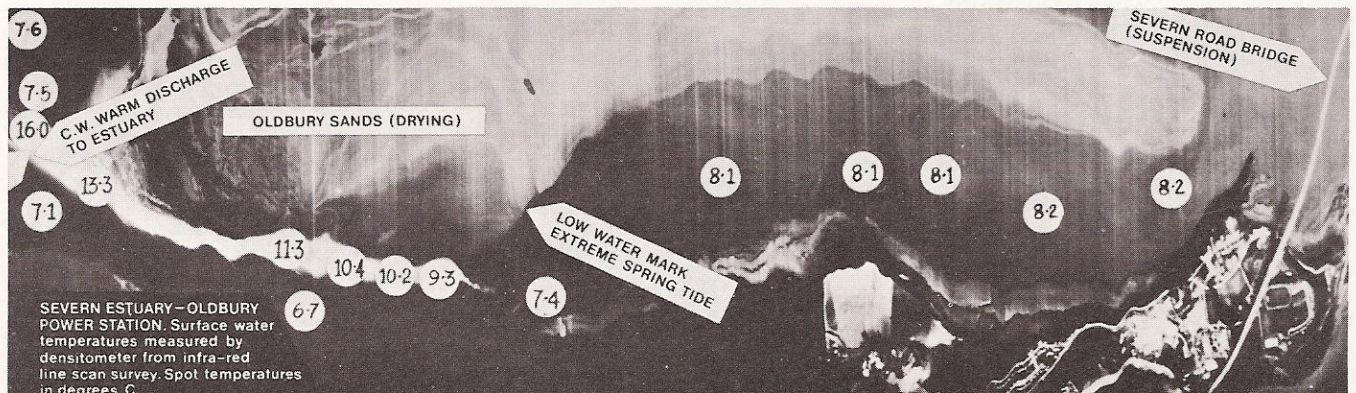
being investigated in South Hampshire.

This is the second CEGB thermal study flown by Fairey Surveys. The first was a survey on the River Severn near Oldbury in Gloucestershire.

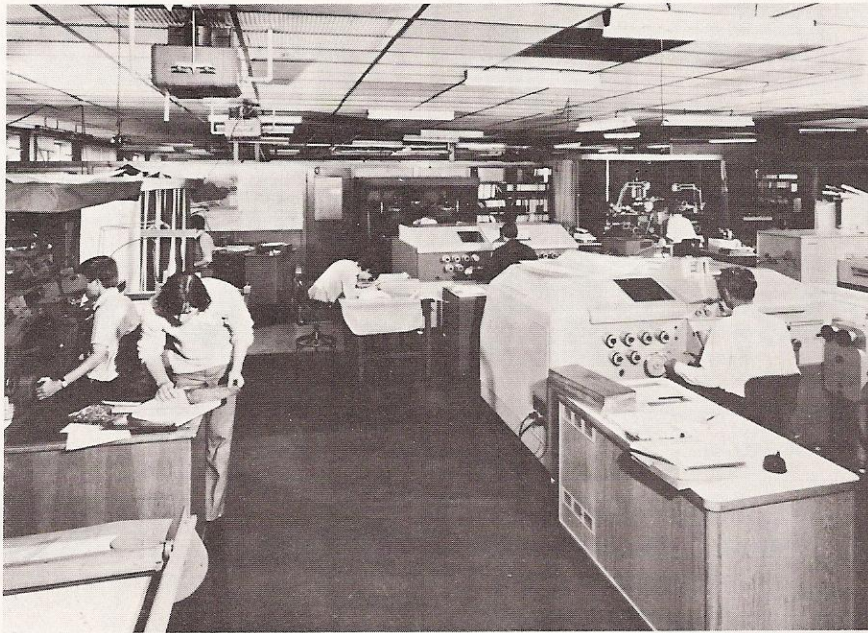
### A SPECIAL OCCASION

This issue of Fairey Surveys Newsletter is published to mark the occasion of two important conferences — the Conference of Commonwealth Survey Officers to be held at Cambridge, England from 16-25 August 1971 and the Congress of the International Federation of Surveyors (FIG), to be held at Wiesbaden, West Germany from 1-8 September.

Fairey Surveys Directors will be at both conferences and look forward to meeting old friends and making new acquaintances. If this is the first time you have seen the Newsletter, we hope you will find its news of the world of surveying and mapping of interest. Should you wish to receive future issues, and we hope you will, we will gladly add your name to our mailing list. Simply send us a sheet of your business or professional letter heading with the words "Newsletter Please", plus your name and title. We look forward to hearing from you.



## MORE CAPACITY AT MAIDENHEAD



We continue to expand our production capacity as well as maintaining our lead in the introduction of improved photogrammetric techniques. Since 1970 we have installed three new plotting instruments.

The new instruments from VEB Carl Zeiss Jena are:

- 1 Stereometrograph Model D
- 1 Stereometrograph Model E
- 1 Topocart B

(The Topocart was described in Newsletter No.5)

Stereometrograph is an extremely versatile precision plotting instrument employing a rigorous solution for both contouring and numerical analysis of photographs from most modern survey cameras.

The setting of principal distance is continuously adjustable from 87 to 215 mm and the instrument has a wide operating range in each orientation mode. The outstanding feature of the Stereometrograph is the synchro-transmitter/receiver system employed on translational and rotational movements which permits all controls to be mounted on the front panel, reduces mechanical wear and also provides greater

freedom in positioning the plotting table.

We now have 11 photogrammetric mapping machines working two shifts — a measure of the work we are handling.

In addition to our new plotting machines, other recent acquisitions include new photo-lab equipment.

**Copying camera** The new HPL Littlejohn Type 122 Mark 11 Newspeed camera is smaller than our other Hunter-Penrose instrument. Maximum film size is 24" x 20" (61 cm x 51 cm) but the apparatus weighs over 1 ton and it is highly accurate and free from distortion. Copy-holder movements, lighting, lens and shutter controls are all grouped at the operator's position at the rear of the camera.

**Rectifying Enlarger.** A new Wild E4 rectifier has been installed in our darkroom. This well-known instrument contains all the latest refinements permitting the rapid and accurate production of rectified enlargements. Suitable for 9½" wide film the enlarger is fitted with illumination corrected for black and white or colour printing. A vacuum holder ensures the flatness of the sensitized printing material.

## CHATEAU MAIDENHEAD 1971

Viticultural cowards like the Newsletter Editor (who always asks for Vin Rose at meals lest he shows his ignorance of what colour wine is de rigueur for a particular dish) will soon be able to hold their own with any wine waiter — thanks in part to Fairey Surveys. Later this year, the World Atlas of Wine by Hugh Johnson will be published with 131 maps by Fairey Surveys.

The Wine Atlas is the idea of publishers Mitchell Beazley and Partners. Hugh Johnson, well known for his articles in the Times, was commissioned to write the Atlas and came to Fairey Surveys for the cartographic design.

Initially seven maps at representative scales and densities were compiled drawn and printed.

These were wanted urgently for presentation at a meeting in France with the publishers. The deadline was achieved after our printer had been brought back from holiday in the Channel Islands for a weekend's proof printing, and the Fairey proposals accepted.

The maps are very detailed and to Fairey's usual high cartographic standards. Most are in full colour. They are, of course, based on the latest viticultural information collected and classified by the author and his helpers. Unfortunately, field verification was not included in Fairey's contract.

The maps are grouped into country maps, wine regions, large scale district maps and town plans. Information shown ranges from type of grape grown and productivity to the location of the sherry houses in Jerez.

\*The World Atlas of Wine is published by Mitchell Beazley. Price £7.95

## REMOTE SENSING

The application of remote sensing techniques to Town Planning was the subject of a one day symposium held in April at Leeds University.

Leading Aerial Survey companies exhibited examples of their methods and representatives took part in a panel discussion held in the afternoon.

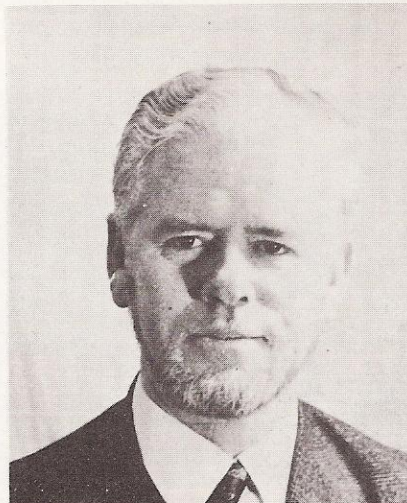
Representing Fairey Surveys Ltd on the panel, Managing Director Walter Smith spoke of the many new techniques available to the Town Planner. Aerial photography is being applied to traffic studies and car-parking surveys; helicopter photography, orthophotography and digital ground models provide a new level of speed, accuracy and convenience in volume calculations and reclamation schemes; photo-interpretation is widely used for dereliction surveys and land use classification. It is not always necessary to have special photographs taken. The "message" of the Symposium was that Planners are not taking advantage of the large numbers of aerial photographs which already exist at scales suitable for many applications. The Symposium provided an excellent opportunity for the planners to discuss their needs with specialists in the surveying profession.

Town Planners reading this article and requiring further information on the many different services mentioned above should contact Peter Forsey, our UK Marketing Manager.

Mr. Ken Pinkney has recently been appointed to our Overseas Sales team. Since he joined Fairey Surveys in 1953 he has been closely concerned with the production control of many large overseas projects. Mr. Pinkney is a specialist in photo interpretation and has wide experience of this important aspect of Fairey's work. He was responsible for the investigation of site conditions presented to the Aberfan Tribunal and recently prepared an outline scheme in connection with an earth resources satellite programme.

A Churchill Memorial Fellowship winner in 1967, he spent four months in Canada and the USA studying interpretation and mapping techniques.

Mr. Pinkney is particularly interested in the advancement of the developing nations where aerial surveying and mapping is playing such an important role.



## Tools of Surveying

# MEKOMETER PRECISION

One of the busiest areas of London — from Aldwych to the Tower — was the scene of one of Fairey Survey's most recent and interesting surveys.

The survey is required to provide planning data and precise survey information for the Consulting Engineers for Stage II of London Transport's proposed Fleet Line extension of their underground railway system.

Fairey's clients for the contract were Sir William Halcrow and Partners and Mott, Hay and Anderson in their capacity as Consulting Engineers to the London Transport Executive.

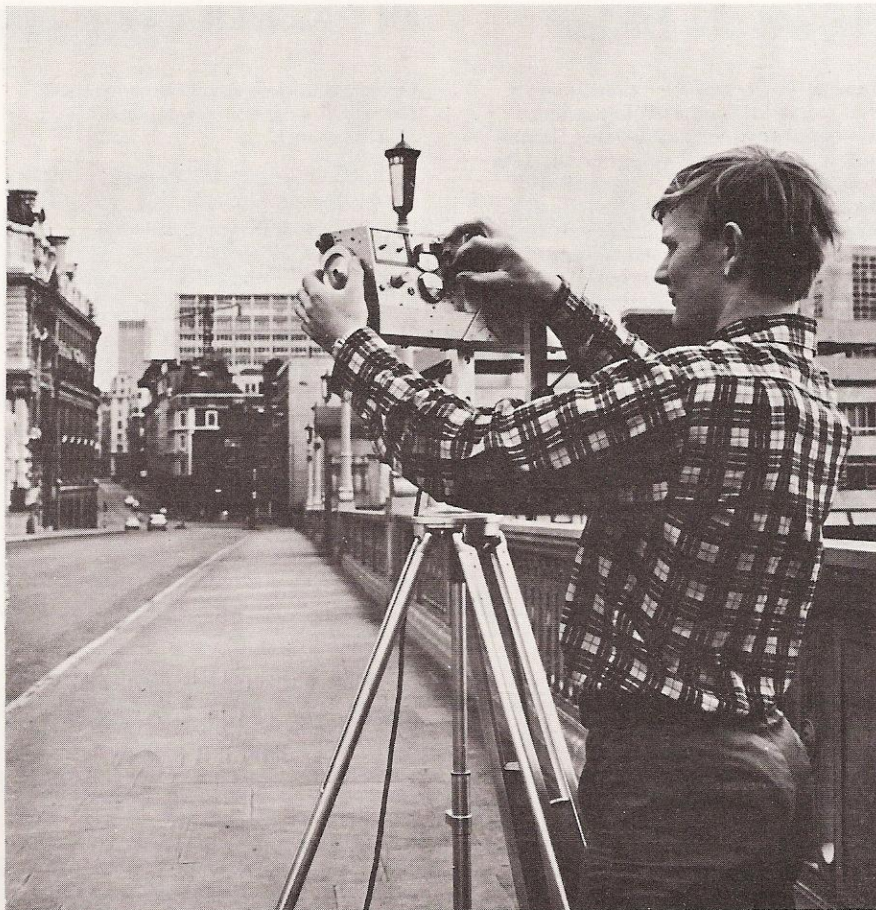
Ground verified photogrammetric mapping at 1:500 was required and the co-ordination and heighting of a large number of permanent ground-markers. A relative accuracy of better than 2 cm per kilometre had to be maintained within the survey as well as an overall closure. The high degree of precision required in this survey arises from the need of the Consulting Engineers to check the setting out of the tunnels to ensure that the lining junctions to within 2 cm.

The nature of the area meant that there was no alternative to traversing and the high precision ruled out the use of conventional distance measuring equipment. Even with the week-end working, the traffic flow meant that any form of tape measurement was also impossible.

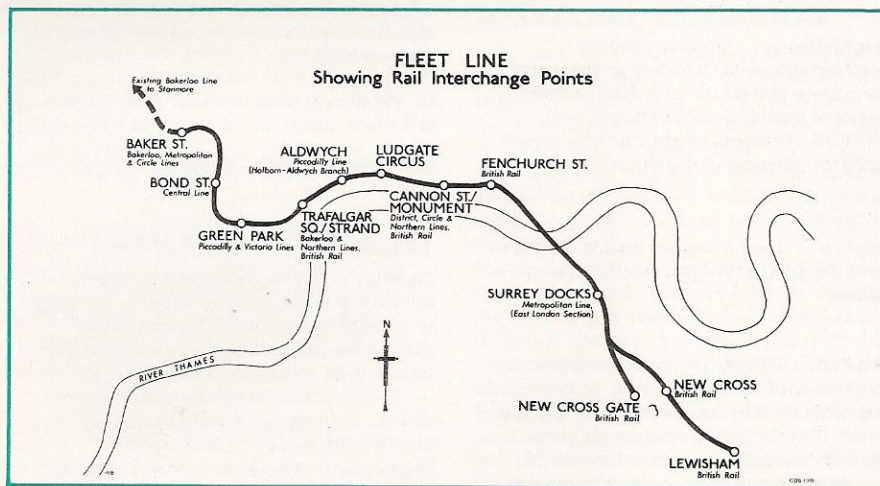
The solution to the problems was the National Physical Laboratory's Mekometer Mk III which had been used successfully on the Victoria Line Survey. At the same time this newly developed measuring device could be evaluated under service conditions in an urban area with dense vehicular and pedestrian traffic.

Most of the field work was complete in five weekends of round-the-clock working and the results more than substantiated the accuracies claimed for the Mekometer. The survey lies east-west and the overall closure in distance was 0.5 millimeters. The average misclosure of 8 traverses varying from 3 to 14 legs and with legs varying from 35 metres to 1 kilometre in length, was 3 millimetres in eastings. The overall closure of the scheme was 1 part in 136,000 and the average misclosure of all traverses in the net, 1 part in 140,000.

Our thanks are due to Dr Froome of the NPL who approved the use of the instrument on this project and to Mr Christopher St John of the Royal School of Mines who operated the instrument throughout the survey. Mr St John has been associated with the field testing of the Mekometer for a number of years. We would also like to thank the Chief Civil Engineer — London Transport Executive and their consultant engineers, Sir William Halcrow and Partners and Mott Hay and Anderson for permission to publish this article.



Photograph of Mr St John operating the Mekometer



## PORT SURVEYING IN BRUNEI

Aerial photography of Brunei has been taken by the Fairey Surveys DC3 returning from the multi-spectral project at Mount Isa, Australia (Newsletter 7).

The photography was taken for Survey Services of Singapore, Fairey's collaborator and area representative for South East Asia, as part of a surveying and mapping project in the Brunei-Muara district which will provide 1:12,500 maps of the area for development planning.

Included in the photography was a survey of the deep-water port site at Muara. This is aimed at determining the effect of the port works on the littoral drift of sand in the area.

Over the years the littoral drift built up the Pelompong spit which protects the port

from the open sea. A channel was cut in this natural breakwater to give access to the port. A bund was built to protect the channel on the seaward side. This affected the natural drift of the sand, causing awkward currents in the channel and depositing sand in it. Another bund has been built to counteract these effects.

Aerial photography at various tide states will provide a total picture of how the sand is drifting, cheaply and quickly.

Other areas include in the overall survey are a natural gas site and two new road projects.

On completion of the photography the aircraft left for Abu Dhabi before returning to the UK.

## NEWS IN BRIEF

**Zambia** – A Dove of the Fairey Survey's fleet is now in Zambia photographing a number of areas for the Surveyor General. A DC3 is also going to Zambia in August for aerial photography and Airborne Profile Recording. The technique has made possible a recent Survey in Western Zambia, where dense vegetation and absence of roads made provision of ground control too expensive. APR provides necessary accuracy at no extra cost.

**The Environment** The South Hebrides are currently being covered by IR Linescan and multi-spectral photography for the National Environment Research Council.

**Glamorgan** Photographic cover of the County at 1:5000 is being flown for Glamorgan County Council. Total area involved 2100 km<sup>2</sup>.

**Gloucester** Fairey Surveys awarded contract for surveying and mapping in connection with the new Gloucester Northern By-Pass. Client South Western Road Construction Unit. Also for this client the new Bridport By-Pass, where Faireys have already completed 1:2500 mapping with photo-geological survey and now continue with the 1:500 plans for engineering design.

**East Midlands** County cover of Northamptonshire, Nottinghamshire and Derbyshire being flown for East Midlands Regional Planning Conference. Scale 1:12000 Northants photography in colour, other counties panchromatic.

**Belgium** – Road materials testing machine commissioned at Belgian Road Research Centre.

**Pollution** – Paper presented at the recent conference of the Society of Environmental Engineers by Reg Caudle of Fairey Surveys entitled "Recent Advances in equipment and techniques for airborne methods of pollution monitoring". Copies on request.

**Orthophotography** Current projects include work for the Irvine Development Corporation and the Strathclyde Park joint committee.

**Aircraft** At the time of going to press final arrangements were being made for the delivery of our new survey aircraft – a Beechcraft B80 which will replace one or two machines from our fleet of Doves and DC3's. The B80 is capable of operating at higher altitudes than the DC3 and its superior speed will enable it to take maximum advantage of suitable weather in areas of uncertain conditions. The aircraft will be modified to take two survey cameras and comprehensive navigational and communications equipment for world wide operation. The selection and purchase of further new aircraft is in hand.

## AN ENGINEER ASKS ABOUT ORTHOPHOTOGRAPHY

Q. Surveyors talk about "orthophotos", can you give me a simple explanation of what they are?

A. A special instrument is used to rectify an aerial photograph so removing both the distortions due to camera tilt and differences in terrain elevation. The result is an orthophoto which retains all the image content of the aerial photograph but which has the positional accuracy of a line map. When the orthophoto is over-printed with a reference grid and contours (turning it into an "orthophotomap") it can be used exactly as an ordinary line map to obtain coordinate, distance, direction and height information with, of course, the enormous advantage that it contains all cultural, topographical and geological features.

Q. My budget would not cover the cost of taking new aerial photos. How can I find out if suitable photography already exists for my area?

A. Commercial and Government organisations keep records of air cover in many parts of the world. Most counties in U.K. were covered for the 1971 census. We have a full record of our own films and can usually trace existing cover owned by other organisations. Duplicates can almost invariably be obtained upon payment of a small royalty fee. Naturally the cost of orthophoto processing would be justified only if the existing photographs were of high quality, otherwise new flying would be advisable. The orthophoto process cannot significantly improve the quality of existing photography.

Q. We should need overlays showing road and place names, underground services, spot

heights, bench marks and so on – if these were based on tracing from orthophotos, how would accuracy compare with a conventional line map.

A. The positional standard error of orthophoto image in detail is of the order of  $\pm 0.3$  mm. For an overlay produced by tracing from the orthophoto the expected standard error in the position of a point of detail would be  $\pm 0.5$  mm (0.02 inches) and this is equivalent to our accuracy specification for large scale line maps produced by conventional photogrammetric methods.

Q. I understand from Newsletter No.5 that Fairey Surveys chose the Zeiss Jena Topocart/Orthophot/ograph system. This must have been an important decision – what were the main points in favour of the topocart?

A. We needed an instrument that would provide good accuracy of rectification, high image quality and was of known reliability, in order that we could offer a service at reasonable prices. The highly sophisticated computer-controlled instruments would need an extremely high through-put to keep costs at the level of line mapping and the image quality is not demonstrably better. The simple optical/mechanical instruments do not have a sufficient accuracy in rugged terrain areas nor do they yield the desired image quality. Our choice of instrument gives us the best value available at the moment and we have been told that the quality of the work we are producing with this instrument surpasses that produced at many times the cost of automatic instruments.

## DENSITY SLICING – AID TO INTERPRETERS

Density, in photographic terms, means the amount of black metallic silver in any area of a negative. It is easily measured by placing the negative between a small light focussed on to a calibrated photo cell.

To the photo interpreter, variations in density are one of his main sources of information. Colour, texture and illumination of features in the photograph he is studying give differing reflective amounts and the interpreter exploits very subtle density differences to determine soil types, crop variations and geological data.

A current research project at Fairey Surveys is aimed at automating some of the interpreter's routine work and enhancing the variations in density which can be discriminated.

The technique is known as density-slicing and uses Agfa-Gevaert Equidensity film. This enables a selected density to be isolated from surrounding areas so highlighting a particular density signature in which the interpreter is interested.

Several applications are foreseen for this technique. It makes quantitative interpretation by computer possible. For example, acreages under a given crop, patterns of water courses or areas of swamp under water could all be determined automatically once the interpreter had

established the relative density of the selected subject.

Once a particular density has been highlighted (or sliced) in this way each of the slices can be printed down in contrasting colours to produce an instant map for land use, soils or similar studies.

Tests so far have shown that very slight changes in density can be detected.

An example of this is where the change in density could be due to rain damage, disease or even courting couples.

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