

# Fairey Surveys newsletter

NOVEMBER 1972

News of developments in the world of surveying and mapping

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## New aircraft complete first contracts

The second Beech B-80 has now joined the Fairey Surveys fleet and is at present positioned in Saudi Arabia. The first Beech B-80 joined the fleet in April 1972 and has already carried out photographic contracts in Saudi Arabia and Zambia. Our front page illustration shows the two new aircraft, *Foxtrot Sierra* and *Oscar Hotel* (called after the last two letters of the registration code in phonetic alphabet), at Fairey's White Waltham flying base. On this rare occasion the aircraft were undergoing final preparations before leaving for abroad; *Foxtrot Sierra* to Nepal and *Oscar Hotel* to Saudi Arabia.

### tailored to the job

Both of the new aircraft have been extensively modified for aerial survey work. This included a twin mapping camera installation, which required two 24 inch diameter holes in the bottom of the aircraft – a major structural modification in itself, a darkroom facility in the stern of the aircraft and provision for multi spectral and infra-red linescan equipment. Mapping cameras carried are either the advanced Wild RC10 or RC8.

The second aircraft has been converted to a dual photographic/geophysical air survey configuration. As an alternative to mapping cameras Oscar Hotel carries in its geophysics role a proton precession magnetometer with analogue or digital data acquisition system, a 4-crystal spectrometer (see Newsletter 7) plus a 55 mm positioning camera and instrumentation cameras. Electromagnetic detection systems can also be carried. Accurate navigation is particularly important in geophysics surveys where much work is carried out off shore and a Doppler system is the standard fit with provision for Decca and Loran C systems for use in areas provided with the associated ground equipment.

The modifications to Oscar Hotel were carried out within the Group at Fairey Engineering's facility at Manchester Airport. Fairey Surveys own Research and Instruments Group (which has a CAA approved design office) was responsible for design work on the specialised photographic and geophysics equipment installations.

### major Nepal contract

A contract worth some £120,000 covering aerial photography of 20,000 square miles of Nepal has been awarded to Fairey Surveys. The photography, commissioned by the Forest Resources Department of Nepal, is part of the United Nations development programme in Nepal. It will be used for photographic interpretation – the determination of the total resources of an area from aerial photographs. Working from the photographs skilled interpreters will be able to classify the forests in the area. Primary forest, vital to the ecology, will be undisturbed. Secondary forest will be cropped for timber and also act as a buffer between tertiary forest, suitable for agricultural development, and the primary forest.

Chief Pilot, Captain Geoff Milsom, who is flying *Foxtrot Sierra* in Nepal, will be operating in familiar territory. One of his first flying missions after joining Fairey Surveys in India in 1947 was to provide aerial photography of the Karnali River in Nepal using a Leopard Moth with an F8 camera, in 1948, and he was back again in 1950 in a Rapide fitted with an Eagle 9 camera. In charge of preparations in Nepal is Commander Ted Allen in Kathmandu, who is acting as Fairey Surveys' agent in the country.

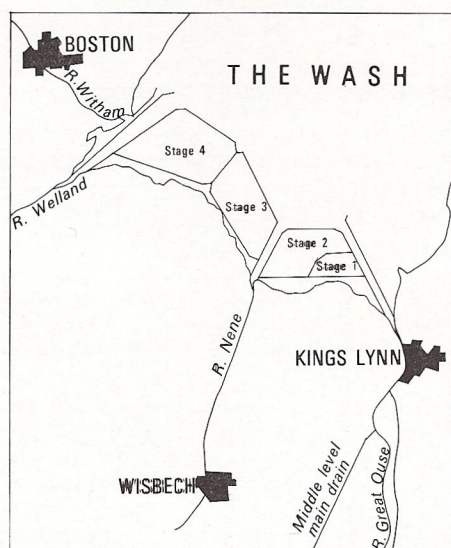




# the Wash water storage survey

During the next decade, considerable new storage will have to be provided if water supplies in South East England are to keep pace with needs.

One scheme in particular has received a great deal of attention, and this is the proposal to construct fresh water reservoirs on the foreshores of the Wash. The Water Resources Board is conducting a feasibility study into this proposal, and Binnie and Partners, the Board's consulting engineers, chose Fairey Surveys to conduct a survey of the whole of the area.



## data collection

In September 1971, photography was flown by Fairey Surveys. Black and white panchromatic photography was produced at 1:50,000 (from 25,000 ft) for the whole area and true colour photography produced at 1:10,000 (from 5,000 ft) of the sandbanks and foreshores. The high level photography was used for mapping the whole area at 1:25,000 and for a photographic mosaic. The low level colour photography was used for precise height information for the 1:25,000 mapping and for the mapping of certain areas at 1:10,000 scale.

The contours of the areas above water at low tide were interpolated from a grid of spot heights, plotted photogrammetrically, with control being provided by ground surveyors and aerial triangulation. Surveying of the water areas was carried out in conjunction with the Hydrographic Division of Wimpey Central Laboratories.

The hydrographic survey involved the use of four survey boats and a team of hydrographic surveyors. Lines of soundings were run at intervals of 150 metres where water depth was under 15 metres, at mid tide, and at intervals of 300 metres where the water depth was over 15 metres,

using Kelvin Hughes MS36 echo sounding equipment. A Decca Sea-Fix chain was used for position fixing. Wimpey measured the tides in the Wash between September and November 1971 using five Foxboro Yoxall tide gauges and one NBA tide gauge. From this data Wimpey produced digital charts with interpolated contours, reduced to Ordnance datum. The contoured charts were extended over the drying banks and the shore line by photogrammetric methods using the low level photography controlled by Fairey Surveys' ground survey teams transported by helicopter. This ground survey work proved to be the most hazardous part of the survey operation, on sandbanks which under normal conditions were only exposed by the tide for 3-4 hours each day. The correlation between the hydrographic and ground survey data has been remarkably good.

## maps for models

A combination of hydrographical and photogrammetric readings was then used to produce complete contour maps of the ground and water areas. These maps have been fairdrawn by Fairey Surveys and both the 1:10,000 and the 1:25,000 maps were delivered by the end of August.

In addition to the contour maps, cross-sections of the whole area were drawn at 250 metre intervals on grid bearings 120°/300°. From these cross-sections, the Hydraulics Research Station are building a model in their laboratory at Wallingford, Berkshire. It is being built at a horizontal scale of 1:1250 and a vertical scale of 1:100. This will be used to reproduce the tidal effects produced in the Wash by different combinations of storage reservoirs built inside the area.

The tide conditions in the Wash were observed by the Hydraulics Research Station (HRS) during September and October 1971, from 21 stations. Since April 1972, HRS and Wimpey have been carrying out an extensive current metering and float tracking survey. All this data will be used to check the accuracy of the model and to regulate the tide simulator. The information obtained on currents at the mouth of the Wash was used to fix the position of the tide simulator across the model, as, ideally, this should be at 90° to the currents flowing in and out of the Wash at all states of the tide. The line chosen traces a rough arc between Gibraltar Point and Hunstanton.

The model is being built with a fixed bed, based on the cross-sections provided by Fairey Surveys. For the river channel areas, hardboard templates have been produced from the digital map, and the concrete

filled in between the templates. Using a controlled weir tide generator, the 14-tide cycle between spring and neap tides will be simulated at a time scale of 1:125. Using the completed model, the simulated tides and currents will be proved against existing conditions in the Wash, before introducing the storage reservoirs into the model.



## soil studies

Wimpey are now carrying out site investigations in the South East corner of the Wash, to cover an area of about 15 sq. miles, taking soil samples, putting down dutch cone soundings, and collecting other geological information to determine the best positions for the bunds. They are using a hovercraft to transport personnel and equipment to and from the rigs, because of the shallow water in some areas.

The Hydraulics Research Station is also producing two mathematical models: one of the Wash, the second of the river Ouse, to cope with the special problems on this river. These mathematical models, being run on the Station's computer, as well as providing similar information to that provided by the physical model, will also be able to give indications on silt deposition in the river Ouse, and to calculate any changes for various conditions.

The collective professional disciplines within these organisations have combined to realise a scheme which may affect the fresh water supplies of the South East for many years to come.

With acknowledgements to:-  
The Water Resources Board  
Binnie and Partners  
Hydraulics Research Station  
Wimpey Central Laboratories



# PEDSS on trial

An economical and fast way of handling the survey and design stages of bing clearance schemes has been proposed to the Derelict Land Unit of the Scottish Development Department, in consultation with Fairey Surveys' staff and Midlothian County Council. Bings – the Scottish term for tips – present a variety of problems to the clearance team, ranging from the location of any hot spots to selecting the correct combination of economy and aesthetics for the final shape. The Scottish Development Department has the need to develop an economical and speedy system to expedite the survey and design stages of bing clearance schemes: the proposed system has been christened PEDSS, an acronym from – Photogrammetric Evaluation Design and Scheduling System. The proposed system will consist of some, or all of the following stages:-

- Aerial photography of bing.
- Infra-red imagery for the detection of hot areas.
- Contoured plot of bing as it is.
- Volume computation using punched tape output from photogrammetric plotting instrument.
- High density polyurethane land form model.
- Thermoplastic mould from land form model.
- Remodelling stage using modelling sand (in conjunction with the mould) to an agreed new land form.

Stereo photography of agreed land form.

Contour plot of agreed land form and volume of moved material for contractors schedule preparation.

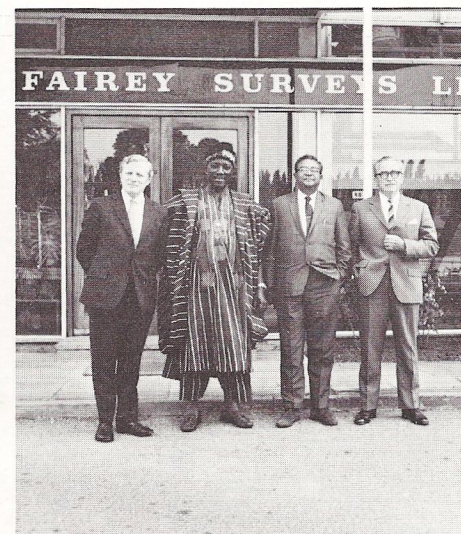
The feasibility of the PEDSS system is now being tested on selected bings in Midlothian and it is hoped to publish a more detailed report from the Derelict Land Unit in a subsequent Newsletter.

The Scottish Development Department also intends to investigate remote sensing techniques for the detection and monitoring of pollution effects on adjacent vegetation and water. This is important for the full rehabilitation of the site.

## MANCHESTER RAPID TRANSIT

Mapping at 1:500 is being prepared for the whole route of the projected Manchester Rapid Transit System plus 1:200 mapping for the station sites. Fairey Surveys' work covers both aerial and ground survey and accuracy has to be guaranteed to 1:50,000. This is being obtained using measurement techniques used on the Fleet Line Survey. All measurements are taken twice – once with the conventional MRA 100 tellurometer and once with the NPL's prototype Mekometer distance measuring system.

## NIGERIAN AGREEMENT



*The Chief Executive of Geodetic and Aero Surveys of Nigeria, Chief J. O. Laniyonu, M.B.E., F.N.I.S., visited Fairey Surveys in September to sign an agreement which will co-ordinate the work of the two companies in Nigeria. Chief Laniyonu was accompanied by the Commercial Manager of G.A.S., Mr. W. Gascoyne O.B.E. Pictured above are (L to R) Mr. W. P. Smith, Chief J. O. Laniyonu, Mr. W. Gascoyne and Col. R. T. L. Rogers.*

# Wading in the Wash

Levelling in the Wash presented several problems to the party of surveyors sent into the field, or rather onto the beach, by Faireys.

The first kilometre of ground to the seaward side of the sea wall is made up of firm mud covered with a thick layer of vegetation crisscrossed by channels often several metres wide and deep, easy to fall in to, but difficult to get out of, with their steep slippery banks.

Beyond the 'saltings' as this zone is called, is usually found a stretch of mud which has a soft upper layer a few centimetres thick underlain by darker, more solid material. In certain localised regions this surface layer is over one metre thick and impossible to traverse. The third zone beyond the mud, and reaching down to the low water mark, is sand, which itself varies in consistency from firm to quick.

If this landscape is difficult to cross, work is made more difficult by the inevitable to and fro of the sea which leaves the whole of the foreshore exposed for only two hours in the day and the inshore for about six.

Ground heights were required along lines running at right angles to the shore right down to the low water springs mark as shown on 1:10,000 aerial photography. Surveyors had to level seaward following the tide out and identifying detail on the photography as they went and then return racing the tide back to the seawall. Remembering that the sea goes out over six kilometres in places, thus requiring 12 kilometres of continuous levelling to close a loop, it can be appreciated that the surveyors had to move very swiftly using specially adapted staves and automatic levels.

In some cases two parties, about three kilometres apart, both levelled seaward to the low water mark then levelled parallel to the sea and towards each other linking up at a common point and hence closing a line of levels. Where the ground was too treacherous for walking, an helicopter was used with two surveyors, one acting as staffman. The helicopter

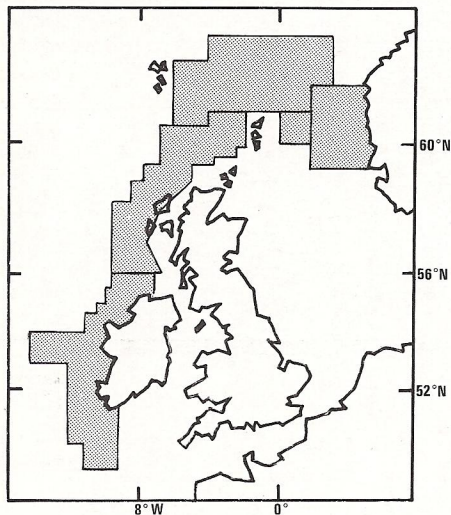
would leap-frog one man over the other in the traditional levelling manner. Sight lengths of over 500 metres were taken and radios were used between instrument and staffman. Using this method some six kilometres of levelling per hour could be covered successfully (up to 24 kilometres between tides). Points on islands could be levelled and work could continue to within two hours of high tide even though one surveyor did end up waist deep in the Wash!

The Wash is a dangerous place to work because of the great speed of the incoming tide, because of the uncertain nature of the ground, whether soft mud or quick sand. A third unexpected danger is the Royal Air Force. They use both the south and west shores for bombing and machine gun practice with an assortment of Buccaneers, Phantoms, Victors and FB11's. In spite of all these hazards our gallant team managed to work through with only a few nasty moments to look back on, but with a much greater respect for the Wash than when they arrived.



# Geophysics Group

## offshore oil surveys for sale



The results of two years of airborne aeromagnetic surveys carried out by Fairey Surveys over the continental shelf off Norway, Iceland and Great Britain are now available for sale to

interested organisations. Commissioned by groups of oil companies, the surveys were made with a proton precession magnetometer. Accurate navigation was ensured by the use of Loran C and Doppler. The data available for resale is presented in the form of aeromagnetic contour and interpretation maps with accompanying reports. The map shows the areas surveyed aeromagnetically in 1971/1972.

## guide to services

A brief guide to the activities, facilities and services of the Geology and Geophysics Group, founded and managed by Fairey Surveys, has just been published. The Group brings together under one management the skills and experience of a number of concerns and individuals needed for major earth science projects in any part of the world.

Copies of the new brochure are available on request from Mrs. G. C. Edwards.

## U.K. Market Growth

Operating in one of the best surveyed countries in the world we still find that the U.K. is an expanding market as far as Fairey Surveys is concerned. It is a highly competitive market with its own special needs which Fairey is meeting by expanding the range of services offered.



The U.K. marketing team is headed by Marketing Manager Peter Forsey who was recently elected to the Fairey Surveys Board.

Peter Forsey joined Fairey Surveys in 1953 from regular service with the Royal Engineers which included tours of duty in the Middle East and a period as an instructor at the School of Military Survey. After 13 years in the photogrammetric department of Fairey's, most of which was spent on aerial triangulation procedures, he was appointed Technical Representative in

1966 and P.R.O. in 1969 when he acted as the first editor of Fairey Surveys Newsletter. Mr. Forsey became U.K. Marketing Manager in May 1970.



Assistant Manager is Bill Clark who joined Fairey Surveys in 1947 following 6 years in R.E. Surveys and left after 10 years for work in the U.S.A. While in the States he worked for two companies in the photogrammetry field, and then returned to the U.K. in 1960 to rejoin Fairey Surveys in the Photogrammetric Section. He became Photogrammetric Section Supervisor in 1964 and transferred to U.K. Marketing as Assistant Manager in 1969.

Completing the U.K. Marketing Team are Contracts Manager Jim Hill and Gerry Jones responsible for technical appraisal and cost estimating.

## NEWS IN BRIEF

Fairey Surveys has become a corporate member of the newly formed Hydrographic Society.

Mapping at scales of 1:500, 1:1000 and 1:2500 is being provided for improvements to the A45 and A11 in the Newmarket, Stowmarket areas. Client: Eastern Road Construction Unit.

Contract awarded by Midland Road Construction Unit for 1:500 mapping in connection with Chapel-en-le-Frith and Whaley Bridge by-pass, Derbyshire.

1:5000 Mapping for feasibility studies now under way for new roads in Lake Bala area in Wales.

Orthophoto maps being produced for Aston-Clinton by-pass. Client: Eastern Road Construction Unit.

Terrestrial photogrammetry using aerial photography of stone steps of Muckle Flugga lighthouse – the most northerly in the British Isles. 1:50 plans of rock will enable accurate prefabrication of new metal steps.

Fairey Surveys Dove aircraft with crew will be flying for the Ordnance Survey throughout the 1973 season (April to September). Aircraft will be based at Blackpool.

Aerial photography of Leeds city centre taken for traffic study. Continuous cover was required from 08.00hrs. to 10.00hrs. and from 16.00hrs. to 18.00hrs. on a Thursday to record representative traffic conditions.

Current flows will be calculated using aerial photography of markers on surface of water in Poole Harbour.

Four section model of Muggleswick Grouse Moors supplied to local landowner Lord Lambton. Model will be used for planning next season's shoots.

In an exhibition of visual aids in medicine, sponsored by the Association of the British Pharmaceutical Industry, Addenbrooke's Hospital, Cambridge won an award for the outstanding exhibit in 3 dimensions, which featured work by Fairey Surveys. Contour plots of patients' faces, produced photogrammetrically, are used for orthodontic purposes (Newsletter 2).

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