



# Fairey Surveys

# newsletter

## JANUARY 1978

# 18

News of developments in the world of surveying and mapping

## BENGHAZI SURVEY

**T**HE magnitude and speed of development which has taken place in the oil producing countries since 1973 are as well known as some of the problems to which they have given rise. Whilst the need for accurate survey data will seldom make headlines, it is often a prerequisite to the solution of dramatic infrastructural problems such as port congestion, inadequate roads and water, power and sewerage services.

In the course of its rapid programme of redevelopment and expansion, the Municipality of Benghazi has encountered difficulties which can be traced back to the inadequate survey base which was established when land values were lower and development slower. However, the implementation of a city-wide plan with simultaneous construction in separate areas, demands an accurate control survey network if property disputes are to be avoided, centre lines of roads are to meet and sewers are to flow in the right direction.

Ove Arup & Co. (Libya) Ltd., in their capacity of Consulting Engineers to the Municipality of Benghazi, have recently commissioned Fairey Surveys Limited to establish such a comprehensive system of plan points and bench marks to cover the planned development area of approximately 100 square kilometers.

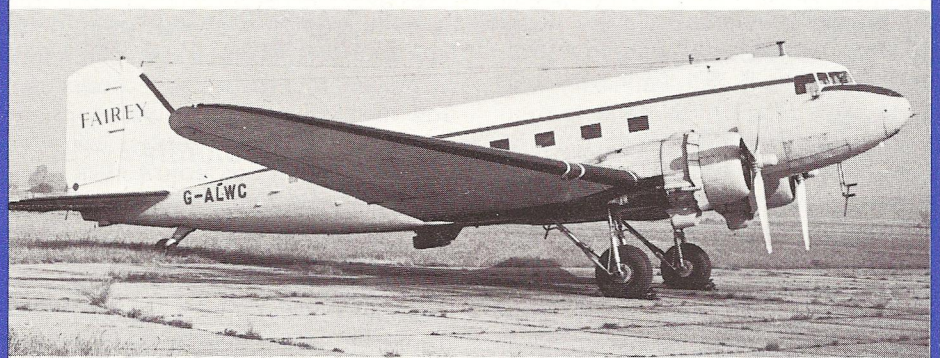
A primary planimetric network of 9 stations, a secondary network of 42 stations and tertiary network of

2,000 stations is being established. The primary and secondary networks for which the specified accuracies are 1/100,000 and 1/40,000 respectively, are being surveyed by a combination of classical triangulation procedure with laser EDM trilateration, and approximately half of the stations are at roof top level. The 2,000 stations of the tertiary network are located at ground level, and are being surveyed by simple EDM traversing methods. In addition, all the tertiary points are being incorporated into networks of precise spirit levelling of

primary and secondary standard ( $\pm 2.5\text{mm } \sqrt{\text{Km}}$  and  $\pm 7.5\text{mm } \sqrt{\text{Km}}$  respectively).

Close liaison between the Municipal Planning Department and the surveyors is being maintained to ensure that at the end of the 9 month survey programme, the Municipality of Benghazi will be in possession of a survey network which provides points of sufficient accuracy and in the right locations to enable the various developments to proceed simultaneously throughout the city on a common and accurate datum.

## *Whisky Charlie flies for Prince Charles*



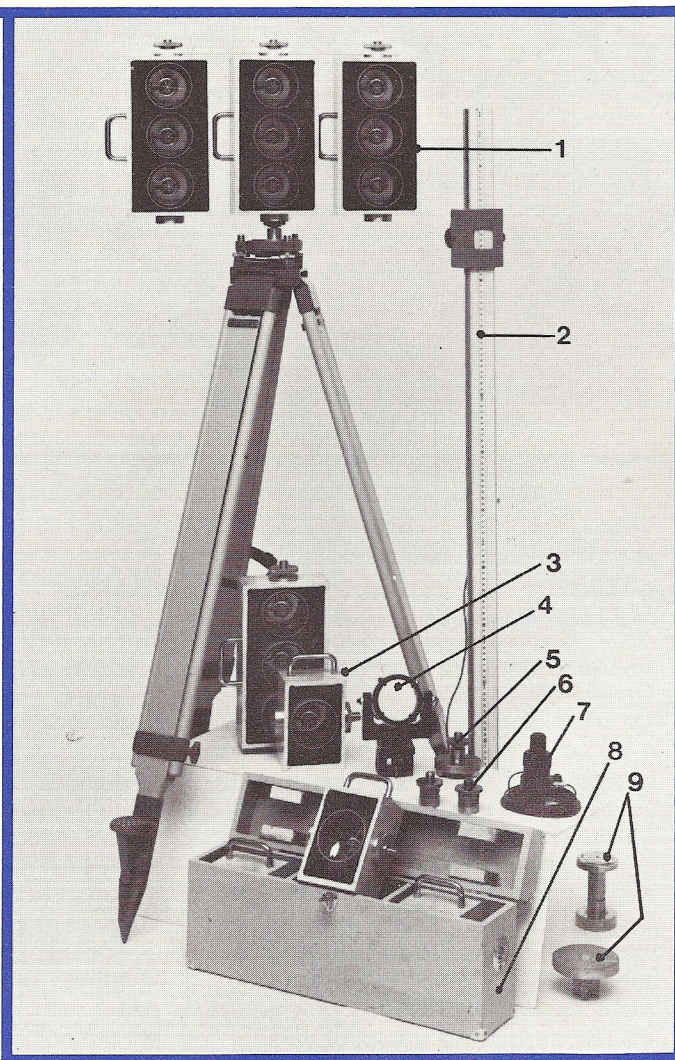
*Whisky Charlie at White Waltham Airfield.*

**W**HISKY Charlie, Fairey Surveys' Flight Trials Dakota, took a weekend away from the highly specialised work normally carried out with the Ministry of Defence, to perform a flying display in front of H.R.H. Prince Charles at White Waltham Silver Jubilee Air Pageant.

Due to the confidential nature of her work it is rare for Whisky Charlie to make a public appearance but on both days of the show, she flew an impressive four minute programme of intricate manoeuvres that were a pleasure to watch. Prince Charles showed great interest in the aeroplane and chatted for several minutes to the pilots on duty.



## FAIREY SURVEY AIDS



Key shows list of Survey Aids pictured.

**D**URING our 54 years' experience in the world of survey, we have at various times and in various parts of the world met with problems for which there has been no readily available conventional solution. At such times our Field Survey Division has turned for assistance to our Research and Instruments Group known in house as the "Think Tank".

Over the years R. & I. have produced many solutions to particular situations and now feeling that there must be other surveyors around the world wrestling with similar problems we have decided to make a limited range of survey aids generally available. All enquiries should be addressed to Mr. M. J. Wilkey, the Manager of the R. & I. Group.

### Key to photograph of Survey Aids available:

- 1) Triple retro reflector mounts (Shown adapted for a Wild tribrach on a Zeiss tripod)
- 2) Levelling staff adapted with illuminated target for use in poor light conditions. (Designed originally for ship's hull contouring)
- 3) Single retro reflector mount.
- 4) Retro reflector mount with magnetic base for clamping to metal structures for distance measurement purposes. A spike also locates directly below the retro reflector mount so that angles may be observed to the actual point of interest. (Developed for measurements of large steel structures such as ships and oil rigs).
- 5) Adaptor for Wild tribrach.
- 6) Adaptor for Zeiss tribrach.
- 7) Spinning Target. This has the ability of presenting the same target to observers from all stations at the same time. It is used for simultaneous multi-ray intersections of a point in high precision surveys over short ranges.
- 8) Transit case for retro mounts.
- 9) Primary survey marks. Any style of bronze or brass fittings for survey pillars or concrete blocks, incorporating titles of organisations, towns, countries, dates etc. can be produced in any language to suit customers' requirements.

## ADDITIVE COLOUR VIEWER

**N**EWSPLETTER readers will already be aware that for several years Fairey Surveys have been producing a four channel viewer for the visual analysis of 70mm multi-band imagery. Used for analysis, interpretation and comparison of photographic data, this piece of equipment can carry either satellite imagery, or conventional airborne multi-camera photography.

More recently Fairey Surveys has developed an additional refinement for their additive Colour Viewer, consisting of an extra dial control for each of the four channels, thus allowing quantitative recordings to be made of all control settings. This new modified version of the viewer has been well received, having already been purchased by the I.T.C. in the Netherlands, the Scientific Studies and Research Centre in Damascus, Syria, the Geological Survey in Malaysia, as well as the United Kingdom Universities of Edinburgh, Sheffield and Durham.



Viewer with illumination level recording control.

The standard model is currently in use at various institutes including the Aerial Photography Unit of the Ministry of Agriculture Fisheries and Food; The U.K. Institute of Hydrology; The U.K. National College of Agricultural Engineering at Silsoe, Bedfordshire, and the Universities of Aberdeen, Bristol and Reading in the United Kingdom and the Murdoch University in Australia.

The modified viewer most recently ordered, will be used by a United Nations team in Bangladesh.



**F**ROM Manchester to Mozambique, Birmingham to Bangkok, the acquisition of good quality Aerial Photography calls for specialised equipment and the skills and experience of a large team of experts.

The aircraft mostly used for aerial survey work must hold the balance between being capable of a relatively high performance and yet being economical to operate and maintain. Modern navigation equipment and precision aerial cameras are part of the standard "tools of the trade" of the skilled survey air crews. A crew usually comprises a trained survey pilot and tracker, a photographer and an aircraft engineer, each of whom should be versatile and psychologically capable of living "cheek by jowl" with each other, in what are sometimes difficult operating areas, for several months at a time. The crews must be prepared to put up with not only the extremes of weather but also to take in their stride the long frustrating periods of inactivity while awaiting suitable flying weather alternating with periods of intense activity when trying to ensure that the results of each day's successful photography are available before they set off to fly the next.

Before the first photograph can be exposed, however, a number of other people will have to put in a considerable effort to ensure that the operation can commence, fully equipped, and on time.

There was a time when winning a contract in say, Thailand, meant that the Dakota was loaded with all that could conceivably be needed for the project, including a spare engine, and with the full crew aboard the pilot would take off heading East with a dash of South. Landings for refuelling and night stops were made where convenient and the Immigration and Customs Entry procedures were only a formality. With modern light-to-medium twin engined aircraft and the ever increasing international red-tape, this approach is no longer possible. An operation now includes: Purchasing, Stores, Shipping, Accounts, Engineering, Market Research, Transit Route Planning and local knowledge.

**Purchasing and Stores:** Photographic materials all suffer from deterioration with time and, particularly in the case of colour aerial film, have a relatively short shelf life and a lengthy delivery period from the manufacturer. The buyers and shippers working in conjunction with marketing and Photolab have to ensure that supplies are adequate for the project and that they can be correctly stored and packed to prevent

## OPERATING A SURVEY AIRCRAFT IN THE SEVENTIES

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**"There are no problems  
only solutions"**

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premature deterioration and damage during shipment.

**Shipping:** Once the equipment and materials are available and the crews nominated, shipping expertise takes over. The task is to accurately prepare the documentation required, bearing in mind the restrictions on carriage of certain goods, the banning of some goods and some countries of manufacture. Errors in documentation can cause delays at destination of several days and as somebody once said. "Time is Money". Air freight space must be booked in advance by the most direct route, to ensure that the shipment arrives at the operating base all intact and ahead of the survey aircraft, but not too far in advance, lest it be mislaid at the destination airport.

**Immigration:** Visas for the crew members must be applied for well in advance but, again, not too far in advance for fear they may expire before they can be used. Visa application forms are as varied as the numbers of countries involved and non-one is left any sensitive areas that have not been exposed by this inquisition. The thought of having to change crew members just as you have successfully obtained visas for them all is almost too much to bear.

Health precautions are followed with great vigilance, no-one is allowed to go abroad without first checking that all inoculations and vaccinations which may be due have been carried out and any particular medicaments needed have been issued.

**Accounts:** These experts have the task of arranging funding for the aircraft crews' daily expenses having regard to currency restrictions both in and out of a country. Exchange rates now, and in the future, are assessed before deciding which currency to issue. They will avoid providing too much cash as it may not be possible to transfer the balance out of the country of operation, but equally must not allow the crew to run short

of funds. As the average air survey operation is of short duration, say three or four months, with the aircraft then moving on to another operating base possibly with different currency regulations, expertise is certainly what is required.

**Engineering:** Among other responsibilities, has charge of supplying an adequate spares back-up to ensure the continued serviceability of the aircraft during the periods of good weather. To be sure of having a spare for any piece of equipment which may fail would require a complete spare aircraft. This is obviously neither practical nor economical so, relying on their experience, items are supplied which are known to be prone to failure. This must be balanced against the high cost of spares, most of which have a limited shelf life and cannot be allowed to remain unused tying up capital which is needed elsewhere.

**Market Research:** Plays an important part in obtaining maximum utilisation of the aircraft and enabling Purchasing and Stores to provide an adequate supply of materials for follow-on contracts. Once a contract has been obtained for the aircraft in one area, it is an advantage to know of possible forthcoming Survey Projects which may involve aerial photography, to avoid moving the aircraft away from an area only to have to return later for additional work. This involves a number of Marketing visits and a fair degree of crystal ball gazing.

**Transit Route Planning:** Moving a survey aircraft from point A to point B should be a relatively simple operation but is now complicated by the many and varied regulations applicable to non-schedule flights. In some cases, a country only needs prior notification of one or two hours and this can be provided by the normal filing of a Flight Plan at the point of departure prior to take-off. At the other extreme, you can be required to request permission for an over-flight or technical landing at least fourteen days in advance with instructions not to commence the flight until permission is obtained. Simple enough; except that on many occasions no reply is received to repeated telex messages requesting the permissions. This results in a Company representative having to visit the country concerned to file an application in person.

On some of the more direct and economical routes, one would choose for a positioning flight, it may be found that two or three of the logical landing points for refuelling do not carry a supply of fuel. This means having to arrange for a special delivery of fuel and, necessarily, these



arrangements will have to be made well in advance and, again, possibly a personal visit by a member of staff.

Misunderstandings can, of course, occur. One of our aircraft crews had landed to refuel and was held captive in the aircraft for six hours by an over-zealous armed guard who insisted that the flight permission held by the aircraft captain was not the original and that verification would have to be obtained by cable from the Capital City.

**Aircraft Fuel:** Obtaining fuel can often be a major headache. For instance, on a recent contract in Zanzibar, drums of fuel had to be shipped over from the Mainland by fishermen's Dhows as the local airline and ferry boat company considered it far too dangerous to handle. Of course, the fishermen received compensation for the danger involved and for having to eat cold food during the voyages as cooking fires were prohibited. Refuelling the aircraft from drums is a long and rather warm business in a tropical climate, as it has to be pumped by hand and filtered through chamois leathers to prevent sediment entering the aircraft's system. This particular job generates such a thirst that aircrew members are often obliged to spend the rest of the evening in the bar recovering lost body fluid.

**Local Knowledge:** It has become almost essential to send a staff member to the country of operation in advance of the aircraft to arrange accommodation, transport, aircraft fuel, oxygen supplies, photolab facilities, security flight permissions within the country and international flight permission if the photography entails flying up to or over the border of a neighbouring country.

Again, misunderstandings are possible. A darkroom (photographic) was once arranged in Northern Thailand. The crew, on arrival, were shown to a large barn with a thatched roof, three-quarter height walls and square holes for windows. The owner was most insistent that, at night, it was a very dark room.

Whilst in most technical disciplines the advances in instrumentation and techniques are tending to make life humdrum for the human resources attached, this can hardly be said of flying for aerial photography. Nature and bureaucracy combine to make it as challenging as ever it was.

Those who spend their working lives trying always to find the solutions can be excused, expressing their wonderment that the aircraft, the crews, the materials, the security officers, the documents and, above all, the weather ever coincide to make for the perfect flying conditions. - If it was easy, anyone could do it.

## DUNGENESS "B" REPORT WINS PRIZE



*Jan Karalus,  
Chief Technical Representative.*

**O**UR regular readers will remember that in Newsletter No. 11. we reported on the pile cap survey carried out at Dungeness "B" Nuclear Power Station. Our Chief Technical Representative, Jan Karalus, who was Chief Surveyor at the time, presented a paper on this survey at the RICS Annual Conference in Edinburgh in July 1975. It was subsequently published in the Land,

**Hydrographic & Minerals Quarterly supplement to the "Chartered Surveyor" under the title "Precise Measurement for the Construction of Dungeness "B" Power Station."**

The Field Survey Association have awarded their civilian prize for 1977 to Mr. Karalus for this article which they judged to be the best of 23 entries from journals which included the Chartered Surveyor, The Cartographic Journal, The Hydrographic Journal, The Photogrammetric Record and The Survey Review.

We congratulate Mr. Karalus on the success of his paper and are pleased to report that the experience and benefits gained from the Dungeness "B" Survey have led to the adoption of similar high precision surveys as standard practice in the construction of 4 later reactors.

## NEWS IN BRIEF

**T**HE following list of papers by Fairey Surveys staff have recently appeared in print and copies are obtainable upon request.

- (1) 'Remote Sensing in Archaeology' by Dr. J. L. van Genderen. (Archaeological Journal No. 133.)
- (2) 'Nomograms for Morphometric Gravel Analysis' By Dr. J. L van Genderen. (Sedimentary Geology No. 17.)
- (3) 'A Land Use Survey of Developed Areas in England & Wales' by T. F. Smith, Dr. J. L. van Genderen and E. W. Holland. (The Cartographic Journal No. 14).
- (4) 'Testing Land Use Accuracy' by Dr. J. L. van Genderen and B. F. Lock. (Photogrammetric Engineering and Remote Sensing No. 43).

**T**WO members of the Mapping Division attended the 4 day Frankfurt Book Fair in October this year, the fourth consecutive year that Fairey Surveys has sent representatives. Expanding interest in small scale cartographic contributions to a variety of international publications has made Frankfurt, the acknowledged high spot in the publishing world's year, and a firm date in our calendar.

**A** TRAVELLING exhibition under the title of 'Making Maps - The Science of Cartography' was prepared by the Science Museum in conjunction with the British Cartographic Society in 1977. The complete exhibition comprises of eight stands covering most aspects of cartography, past, present and future. Fairey Surveys were invited to supply material for the 'Aerial Survey' stand, and this display includes a clever use of a Fairey Stereoviewer housed in perspex but still operational and mounted over a light table.

The exhibition was launched at the Annual B.C.S. conference held in September at Durham University. The museum have plans to update the material from time to time; the anticipated life of the entire exhibition is ten years and in this time it will visit many towns and cities in the U.K. and will possibly tour parts of Europe.

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If you require further information on items featured in Fairey Surveys' Newsletter or would like to be added to the mailing list for future issues,

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