FLIGHT

THE CRUISE OF THE R.A.F. FAR EAST FLIGHT

Group-Captain Cave-Browne-Cave's Interesting Lecture to the Royal Aeronautical Society and Inst. of Aeronautical Engineers

ON March 4, Group-Capt. H. M. Cave-Browne-Cave delivered his lecture, on the cruise of the R.A.F. Far East Flight, to the Royal Aeronautical Society and Institution of Aeronautical Engineers. We are unable to give this lecture in full owing to pressure on our space, and furthermore much of the lecture dealt with facts that have already been recorded in FLIGHT when we published the official logs of the cruise issued by the Air Ministry (see FLIGHT, April 5, August 9, 1928, and January 17, 1929), so that it will only be necessary for us here to refer to the various points in the lecture which are new or are of special interest.

In his opening remarks the lecturer explained the formation and objects of the flight—which were to give Service personnel experience in carrying out long cruises with a Flight operating independently of surface vessels and shore bases; to gain technical and operational experience of the development of flying-boats; to collect information on seaplane bases, harbours, and local conditions affecting aircraft throughout the routes flown; and to show the flag, and foster the spirit of mutual co-operation between the Mother Country and the parts of the British Empire visited.

He next dealt with the programme and route, and the preparation for the cruise and equipment used. The information available in the Directorates of Civil Aviation and Meteorology at the Air Ministry, and the pilots and charts published by the Admiralty, helped in the selection of ports to be visited and to realise the conditions likely to be met. Parts of the route—Southern India, for example—had not been visited by aircraft, but the majority of it had been flown over, and they had the advantage of the experience gained by the American Round the World Flight, the Marquis de Pinedo, Sir Alan Cobham, Group-Capt. Goble, the R.A.F. Mediterranean Cruise, and others.

It was worth remembering, said the lecturer, in planning a cruise that the information required on wind speed and direction, prevalence of heavy rain, fog, storms, etc., is often conveniently summarised on charts for various districts for each month of the year. For example, for the last stage of the cruise the information required was obtained from the November and December sheets of "Maps showing mean atmospheric pressure, wind direction and force over China Sea," published under the authority of the Governor of Hong Kong.

Aircraft

The machines used on the cruise where five metal-hulled Supermarine "Southampton" flying-boats fitted with two Series VA Napier "Lion" engines each; four boats were used for the cruise, and the fifth was shipped to Singapore as a spare. Certain modifications and alterations were made to meet the requirements for the cruise.

The standard anodically treated duralumin hull and wing tip floats that were used, were finished with white enamel inside and out, except that the inside of the hull bottom up to the chines was grey. Two scuttles were fitted on each side of the hull below the centre section, the hinges were aft, and the scuttles had side plates which made them very effective wind scoops when open. Proper stowages in the hull and centre section were arranged so that the whole of the equipment, cooking stove, food, water, clothes, spares, charts, emergency rations, medical kit, awnings, cockpit covers, tools, bilge pump, refuelling gear, etc., were stowed, and the hull was clear for the crew except for the rubber dinghy, which was deflated, folded up and stowed on the floor plates under the pilots' seats, and the anchor rope which was coiled down under the front rudder bar position. The drogues and tripping lines were stowed in pockets on the centre section so as to avoid bringing water into the hull.

The size of the two fuel tanks in the top plane was increased to 250 gallons each; they were made of tinned steel painted white; light alloy tanks would have been lighter, but it would not have been possible to repair them with the facilities available, and they might have corroded internally when not completely full of fuel—throughout the cruise they only refuelled to the amount of fuel actually required for the work in hand, and had no trouble with any of the tanks. Drains were fitted in the bottom of each tank and at the lowest point of the fuel system, and the water condensed in the tanks was always drawn off immediately before flight. The oil tanks were increased to 18 gallons each, to leave an ample air space above the 14 gallons of oil carried for flights with full fuel; these tanks were fitted with a baffle with small holes in it so that only a small quantity of oil was circulated when the oil was cold, and even in cold weather the engine could be run up safely to full power as soon as the water was warm. With these oil tanks no oil coolers were required during the cruise. The maximum oil temperature in flight was 68° C. with a strut temperature of 27° C. Oil coolers with five elements each were fitted for trial between Singapore and Perth; they reduced this oil temperature about 7° C.

The radiator surface was increased to nearly 50 per cent. more than the standard radiators used in home waters; it was found that with shutters wide open the maximum water temperature in flight during the cruise was 76° C.

Drinking and washing water was carried in two portable 5-gall. drums and one 4-gall. ready-use tank with a tap in the bottom. Light awnings were made to protect the hull forward and aft of the superstructure from the sun when on the water, and these could be pulled down to keep rain out of the hull without having to put the cockpit covers on and spoil the ventilation. They did not interfere with work on the moorings.

Gear was made and tested for getting a spare engine on to the centre section with the aircraft moored out, flying it to the aircraft requiring it, and changing engines on the water. An extensible strut was made which enabled wing root struts to be changed with the aircraft moored out. The tail trolley was redesigned so that the whole of the beaching gear could be carried inside the hull and flown to an aircraft requiring it. None of this gear was carried in the aircraft during the cruises; it was sent with the spare engine to the main depot for each stage (Karachi, Singapore, Melbourne and Hong Kong), being moved on from one to another of these as the stages of the cruise were completed.

Care was taken to ensure that every part of the aircraft, except the hull bottom, could be examined, cleaned and maintained with the aircraft moored out; and tear-off inspection patches were fitted on the fabric surfaces as necessary for the examination and adjustment of the internal wires and fittings. Steel fittings, nuts, bolts, etc., were made of stainless steel as far as possible. The streamline wires and struts were zinc-coated and painted. Light alloy parts were anodically treated, where this was applicable, and those outside the hull were painted also. Particular attention was given to preventing water getting into the fabric-covered surfaces where rods, wires and pipes came out, and to drain the inside of these surfaces completely—the drain hole being flush with the surface and not stand up above it like an eyelet.

Particular care was taken to prevent any petrol getting into the hull. All fuel tanks, pipes, cocks, refuelling gear, etc., were kept outside the hull, consequently cooking, lighting, mooring lamps and sleeping inside the hull were safe from petrol fumes—no smoking or naked lights were allowed from the time the refuelling boat approached until half an hour after it had left.

The armament gear was not fitted—it was shipped to Singapore in case of emergencies. The only armament carried was a Service automatic pistol, a Verey's pistol, and a ·22 rifle with appropriate ammunition in each boat.

Equipment

Referring briefly to the equipment, the lecturer stated that each boat carried one Mark XII.A anchor, weighing 58 lbs. The anchor line was 15 to 20 fathoms of 2½-in. Manilla rope, with a cut splice 7 fathoms from anchor-end, to which sandbags could be shackled when additional holding power was required. These were carried empty, and were filled with any suitable material when required.

Evans' jackets were used as flying and floatation jackets, and the standard R.A.F. flying topee, with sponge rubber pads and anti-glare goggles, was used. No parachutes were carried, and the thick cushions in the pilots' seats made good lifebuoys, were used as fenders, and in one emergency, to buoy the position of the moorings.

The bedding of each man was a sleeping bag—practically a large eiderdown sewn up the side with a removable mackintosh bag as a cover—a sheet sewn into a bag to act as a washable lining to the sleeping bag, a light blanket and cushion or pillow. Two of the aircraft carried F.20 5-in. by 4-in. roll film cameras when the flights were over British territory.

Turn indicators and P.4 and 0·3 compasses were used. The refuelling gear was a small aluminium hand pump with gauze suction and discharge filters; its capacity against the normal lift of about 18 ft. was about 350 gallons per hour—one 12-ft. and two to three 7-ft. lengths of flexible metallic refuelling hose, with a light stand pipe for dipping through the small bung holes of some barrels. Later in the cruise a small filter was found, which could be pushed on to the end of the stand pipe and very quickly cleaned, saving much time when the fuel was dirty. The fuel was never filtered through chamois leather, and they never had any trouble with dirty petrol in the aircraft tanks or engines.

Each flying-boat carried a rubber dinghy; two different types were tried during the first stage of the cruise, and a triangular dinghy designed and made by the Royal Aircraft Establishment was found the best.

Oil mooring lamps were used as many of the stays were over three days, and the accumulators carried would only run the boats' lighting for that time before recharging was necessary. Accumulators could only be recharged in flight or by taking them ashore where there were charging facilities. The lecturer added that they never found a satisfactory oil mooring light which was compact and light, but he understood they were being developed.

The personal kit of each crew of four weighed about 180 lbs., and it was found that anodically treated aluminium suit-cases, designed to fit between the frames of the hull, were lighter for a given capacity and more satisfactory for flying-boat work than normal suit-cases.

The spares carried by each boat consisted of one inlet and two exhaust valves complete with springs, 24 sparking plugs with washers and clips, a contact breaker for the main and for the starting magneto, an oil filter cap, 6 ft. of high-tension cable, 6-in. lengths of various sizes of I.R.P.R. tubing, ½ sq. ft. of 22-gauge copper sheet for patching water jackets, a spare drogue, an oil funnel, a Sorbo rubber pad which could be forced against the bottom between the frames (also useful as a fender or cushion), two small leak stoppers, spare parts for metal couplings, asbestos and water-pump packing and jointing material, gauze for filters, a little fabric and fabric strip with needles and thread, dope white enamel and brushes, a few short lengths of duralumin angle bar, lamp bulbs, W.T. valves and aerial weights, 8 yards of Unisheath electric cable, carbon brushes for the generator, a spare high-tension battery, an electric torch, grease, tallow, locking wire, copper wire, insulating tape, fibre and emery cloth, a selection of rivets, screws, bolts, nuts, washers, split-pins, clips, joints, control wire, and thimbles. The tools included the small engine tool kit, oil-can, small vice, soldering gear, and a small carborundum stone. Divided between the four boats of the flight were two wood airscrews with bosses (later replaced by two metal airscrew blades when all the Flight used metal airscrews), one streamline wire of each size and length used, two magnetos, one single and one duplex carburettor float, 12 piston and scraper rings, two collets for airscrew hubs, and a few special joints and tools, such as the airscrew extractors.

The total weight of each flying-boat completely equipped for the cruise with crew on board, was 14,600 lbs. when carrying the normal 400-gall. fuel load, and 15,400 lbs. when ready for the longest stages with full tanks (500 galls. fuel). The span of the "Southampton" is 75 ft., the length 50 ft., the area of the main planes 1,450 sq. ft., and the normal full power 1,000 b.h.p.

The same four aircraft, S. 1149 to S. 1152, were used throughout the cruise, except that on the arrival of the Flight at Singapore from Australia the spare Southampton (S. 1127), which had been shipped to Singapore, changed places with S. 1149 for experimental purposes, in accordance with Air Ministry orders.

The Flight had a total of 22 Napier "Lion" engines. Eight of these were used for the first three stages of the cruise, by which time they had completed over 300 hours' flying each; they were then removed for examination and refit, and the next eight engines were fitted. The remaining six engines were not used, but were available as spare engines in case of trouble.

The main supply of stores for the Flight was sent to Singapore and Melbourne; part of the former went via Karachi in case the Flight might need them there. The part of the Melbourne stores not used by the Flight and required by the R.A.A.F. for their Southampton were sold to them, and the remainder were returned to Singapore for the use of the Flight there. The stores for Hong Kong were sent up from Singapore and the unused ones were returned there.

In addition to the above, a few spares were put down at intermediate ports. For example, for the last stage (4,655 sea miles) spares were put down at Manila and Bangkok; these consisted of an oil filter cap and spring, some Jubilee clips, water-pipe connections and parts, a water-pump lubricating cup, a contact-breaker, some sparking plugs, carburettor parts, linen fabric and strip, control wire, and nuts for exhaust-pipe flanges.

The fuel supplies allowed for a possible head wind of 20 knots on any stage with a margin of 50 per cent. to cover losses by leakage, evaporation, spilling during refuelling, rejection of dirty petrol, etc. The Flight used much less fuel than this, as the wind, on the average, was slightly favourable and the losses from the causes named about 5 per cent. The oil was changed about every 20 hours' flying. The oil removed always appeared in good condition but the period between changes was not extended as many places visited were very isolated and spare engines were far away; for example, for the