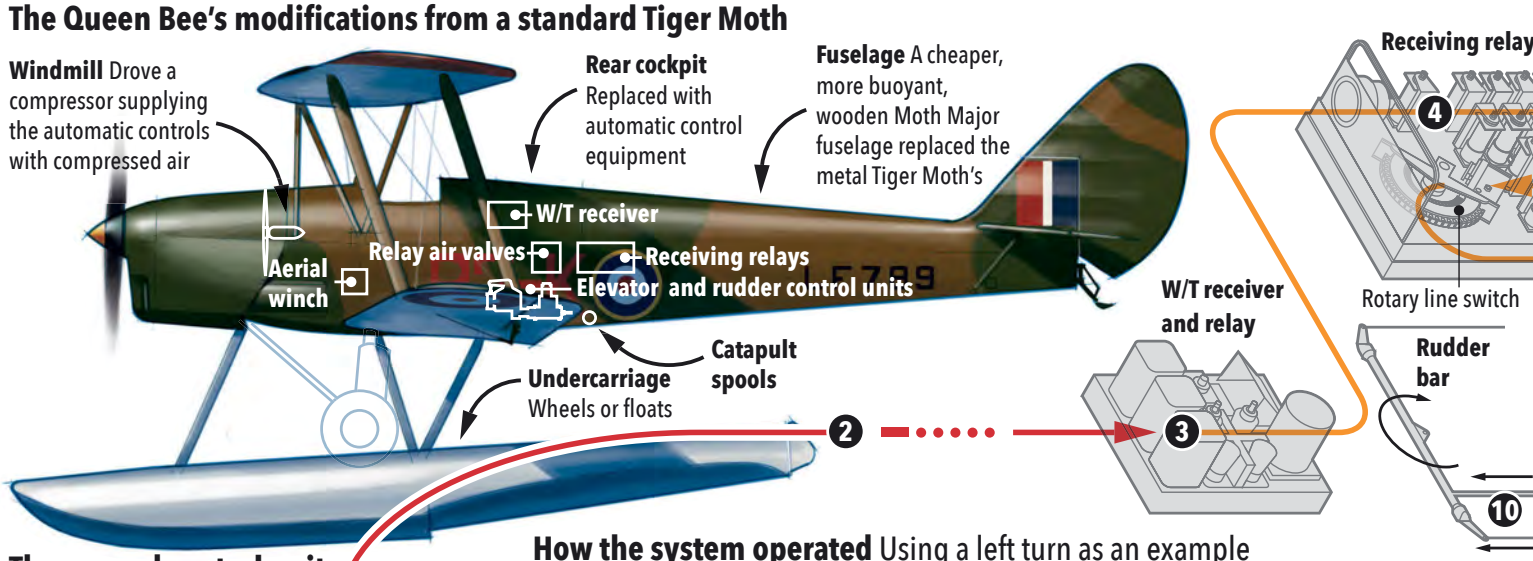
BRIEFING FILE

Under the skin of aviation technology and tactics

Used by the RAF and Royal Navy **DH82 Queen Bee** was the first

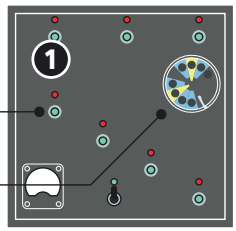
The Queen Bee's modifications from a standard Tiger Moth



The ground control unit

A series of push buttons transmitted control signals to the aircraft as combinations of dots and dashes

A rotary dial was a back-up control in case of failure of the buttons



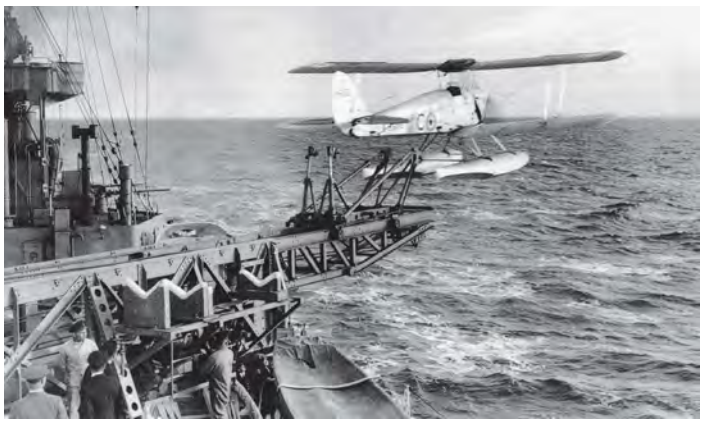
How the system operated Using a left turn as an example

1. The button for 'left' was pushed
2. This operated the transmitting relay set and a coded signal, a dash and five dots, was transmitted to the aircraft
3. The aircraft's receiver picked the signal up, operating the W/T relay
4. This operated a further series of relays and a rotary line switch which…
5. … selected a circuit that energised the 'left' relay air valve
6. The 'left' relay valve opened, supplying compressed air to a servo motor on the rudder control unit
7. The servo motor applied a torque to the inner gimbal of the control unit gyroscope and …

DH QUEEN BEE

In 1930 the Royal Aircraft Establishment (RAE) successfully used a float-equipped Fairey IIIF, fitted with automatic equipment and named the Fairey Queen, as a target aircraft. A cheaper, simpler type was, however, selected for production. A modified development of the de Havilland DH82 Tiger Moth, the Queen Bee had a cheaper, more buoyant wooden fuselage from the Moth Major, a larger centre-section fuel tank, catapult spools and strengthening, and screened ignition. A two-axis radio control system was fitted.

Launched by catapult, the initial Queen Bees could be operated on wheels or on floats. Early RAE demonstrations and operational checks were flown with a pilot on board, who could undertake a normal take-off and then allow the ground controller to take over and test the controls in flight, one pilot recalling it as "a most uncanny job at first". Operational Queen Bees were fitted with twin floats and flew from a catapult aboard ship, at a coastal base, or occasionally overseas. Later wartime examples were used with wheeled undercarriages.



Float-equipped Queen Bees were launched from shore catapults at permanent bases, and from Royal Navy ships, as here. VIA JAMES KIGHTLY

The Queen Bee was most successful, some proving hard to bring down. One survived three hours of being fired on, though some was with non-lethal 'burst shot'. On the other hand, of nearly 300 examples delivered before 1939, 109 had been 'destroyed' by gunfire or a crash-landing.

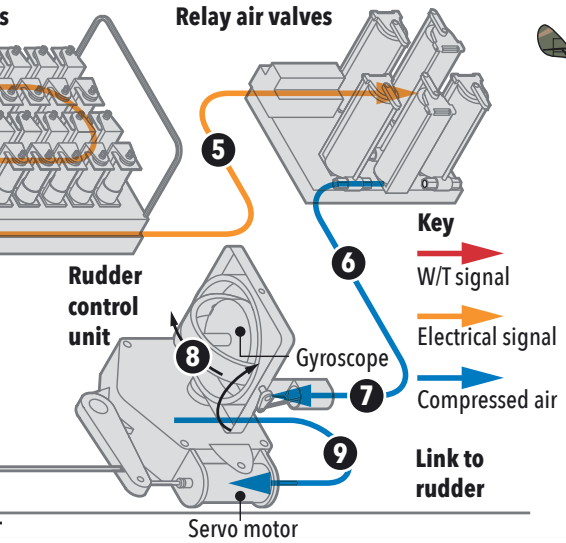
CONTROLLING THE QUEEN BEE

The take-off and landing were entirely automated. On take-off the gyro was pre-spun by a ground-based air supply to run on until the airflow turned the wind-driven compressor in flight. With controls centralised the Queen Bee was flown off — or more usually catapulted — with the trailing aerial then automatically reeled out, at which point radio control direction could be received.

Signals were sent to direct the aircraft past the artillery gunners, or to manoeuvre to make the shoot (normally flown at around 6,000ft) harder. The two RAF crew controlling the Queen Bee on land shoots were often stood near the gunners and could thus anticipate their adjusted aim, rendering the exercise still more challenging.

The signals sent worked in the same manner as the automatic

to train anti-aircraft gunners from the late 1930s into World War Two, the **de Havilland** successful production remote-control target aircraft to enter service – but how did it work?

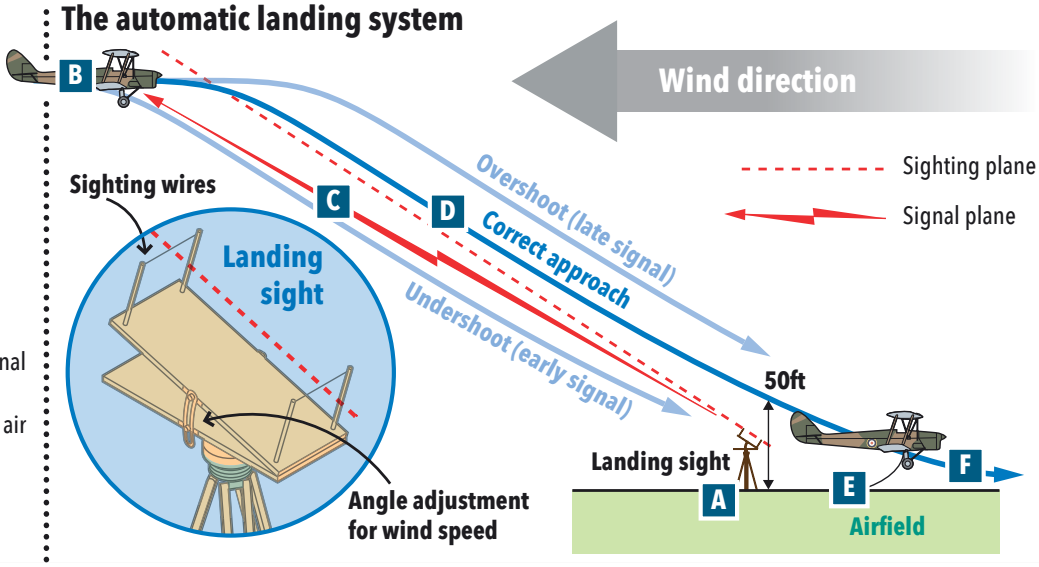


8 … the gyroscope precessed

9 The precession opened the valve to the rudder servo motor, supplying it with compressed air

10 The piston on the motor turned the rudder via mechanical links to the control lines and the aircraft turned. There were no automatic control links to the ailerons

The automatic landing system



A A landing sight is set up at the airfield boundary. Its sighting wires are inclined to the aircraft's glide angle, adjusting the angle for wind speed

B The aircraft is flown towards the sight at 1,000ft

C Just before intersecting with the sighting wires the 'glide' button is pressed and the signal is transmitted to the aircraft

D From here, the landing is fully automatic. The aircraft glides towards the ground, passing over the landing sight at 50ft

E A weight on the aerial strikes the ground

F This triggers a landing valve in the aircraft which raises the elevator, flares the aircraft, lowers the tail, turns off the magnetos and the aircraft comes to a stop

WORDS: JAMES KIGHTLY
ARTWORK: IAN BOTT

telephone dialling system, albeit through wireless transmission, and were selected by pressing one of a selection of buttons, with a back-up telephone ring dial. They were:
–• Navigation lights on
–•• Navigation lights off
–••• Right turn
–•••• Straight ahead
–••••• Left turn
–•••••• Climb
–••••••• Level flight
–•••••••• Glide
–••••••••• Dive

TECHNICAL DETAILS

The operation of the Queen Bee would be more familiar in principle to a modern UAV operator as a system than it would be to 1930s' aviators. The ground unit consisted of the control box, the only part usually illustrated, which was coupled to a 1,500lb mobile transmitting unit using a 250ft aerial array. Apart from the catapult the remaining equipment could be put on three trucks. Aboard the aircraft a gyroscope controlled two compressed air valves, which drove pistons acting on the rudder and elevators (there was no aileron control). The engine ignition and the throttle were also controllable. Air pressure was provided by the propeller-driven pump on the fuselage.

ABOVE: The Queen Bee at the de Havilland Aircraft Museum shows its pilot's cockpit, with (at top centre) a 'telephone'-type dial supervisory control that a test pilot could use to check the control signals; some of the control equipment in the former aft cockpit position; and the larger access hatch and cockpits revealing the remote control set-up. JAMES KIGHTLY

ABOVE RIGHT: A 1935 publicity image of a Queen Bee being 'flown' by ground control at RAE Farnborough. A safety pilot was usually carried for these demonstrations over populated areas. VIA JAMES KIGHTLY

WANT TO KNOW MORE?

The de Havilland Aircraft Museum (DHAM) at Salisbury Hall has a composite Queen Bee (BAPC 186), marked as 'LF789'. The museum's extensive documentation was made available to research this feature. Ian Grace's restoration of Queen Bee V4760 has a comprehensive website at www.n5490.org, while LF858/G-BLUZ is airworthy in private hands in the UK — without the radio control equipment. Thanks to both the DHAM and Ian Grace for their help with this piece.