

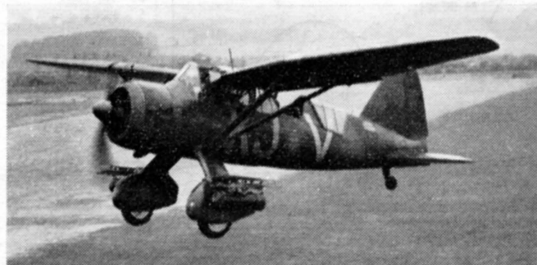
December, 1967

AIRCRAFT DESCRIBED Number 169

# WESTLAND LYSANDER

described and drawn by G. DUVAL

**T**HE LYSANDER was designed by Mr. W. E. W. Petter in 1935 to Air Ministry Specification A.39/34, which called for an Army Co-operation aircraft to replace the Hawker Hart variants—Audax,

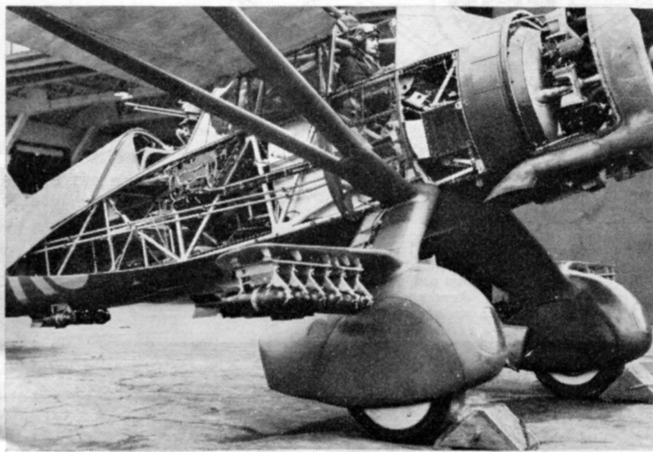


Devoid of all markings except 16 Sqdn. ident. letters, a Mk. I carrying supply canisters is trimmed for slow flight. Flight Neg. 16827.

and later Hector. An intensive study of operational requirements and discussion with Army Co-op aircrews resulted in a radical departure from the previous practice of equipping a largely standard machine for this role, producing instead an aircraft with tailor-made performance for its duties. Petters' success in this may be judged by the fact that the Lysander, a fifty-foot span monoplane weighing six thousand pounds loaded, could operate with ease from an area the size of a football pitch. The secret lay in the aerodynamically operated slots and flaps of the mainplane giving a speed range of 55-230 m.p.h.

The prototype, K 6127, first flew in June, 1936, a second machine, K 6128, following at the end of the year, both being powered by the 840 h.p. Bristol Mercury IX engine. In September 1938, a contract was placed for 144 Mk. I Lysanders to Spec. 36/36, the production machines having 890 h.p. Mercury XII engines driving a D.H. two-pitch propeller; a revised gunner's canopy, and tailplanes trimmable to large negative angles. No. 16 Squadron exchanged its Hectors for Lysanders in June 1938, followed by No. 2 Squadron in July, and tropical trials on K 6128

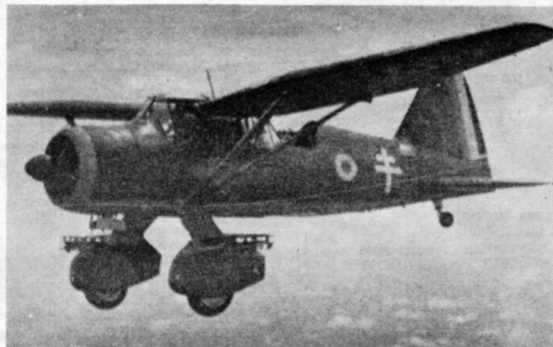
Bombed up and nowhere to go, a 16 Sqdn. Mk. I shows internal square tube structure and fuel tank in Flight Neg. 16835



225 Sqdn. Mk. IIs display some of the many fin stripe and roundel variations, note short chord unblistered cowlings for Perseus engine. I.W.M. Photo CH 1174

having proved satisfactory the next batch was sent to the Middle East for the eventual re-equipment of Nos. 6 and 208 Squadrons who later operated them, together with Hurricanes, in the Western Desert and Greek campaigns. Nos. 20 and 28 Squadrons flew Lysanders during the India/Burma campaign, receiving their machines in late-1941.

In November 1938, a decision was made to fit the remaining aircraft of the order with 905 h.p. Bristol



Free French operated Mk. III with tropical filter and rudder stripes, no rear canopy and Cross of Lorraine, flying over Lake Chad area.

Perseus XII sleeve-valve engines, and these Lysander Mk. II's, distinguished externally by short-chord engine cowlings without rocker box fairings, and by modified tailplanes, re-equipped Nos. 4, 13, 16, and 26 Squadrons by early 1939, No. 2 Squadron receiving its Mk. II's in February 1940.

In September 1939, Nos. 2, 4, 13 and 26 Squadrons joined the Air Component of the B.E.F. in France, No. 16 following later, all enduring the boredom of the so-called "Phoney War" and the bitter winter of that year, during which the wheel-spat side plates of the Lysanders were removed after several incidents caused by slush-jammed wheels. On the 10th of May, 1940, the German Army began its massive assault, and immediately the Lysander Squadrons lost the protection of air supremacy under which they were designed to operate. They fought many gallant actions, notably those in support of the besieged Calais garrison, but losses were heavy and by the end of May the survivors were back in Britain with about 50 aircraft left from the original 174.

*Continued on page 651*

The wing is made very simply from  $\frac{1}{8}$  in. sheet balsa, the upper surface curve being formed by steaming. Drop the lower surface into position, cutting where necessary to clear the bellcrank and push-rod assembly. Then add the ribs, feeding the port ones over the lead out wires. When dry, cement and strap on the upper, cambered, surfaces, and fit the tips.

Make up the tailplane and elevator, and cement to the fuselage, then position the elevator horn in conjunction with the push rod.

Sheet the under surface of the fuselage, not forgetting the tailskid. Now add all the formers. Some soft block behind the lower half of the nose former will allow the rectangular section of the fuselage to be faired into a circular section.

Carefully fit the rotor wire, with the correct amount of backsweep at the top to give a 12 deg. rotor axis angle.

Slot in the stringers, and sheet in the sides with  $\frac{1}{8}$  in. balsa. Add the tip fins, pre-cementing the joint.

If desired, an instrument panel can be stuck to former F2, and a pilot inserted in the cockpit, before fixing the windscreen.

The prototype model was fitted with an acetate cowling, held in position with snap dress fasteners secured to the cowling and engine bearers by Araldite.

A similar cowling could be built from sheet balsa. Cut out suitable holes for the needle valve and exhaust gases.

With the model structure complete, all that remains is the rotor. Select some medium hard springy balsa for the blades, and make two identical (not opposite hand). Build up the hub as shown in the sketch. A sound plan is to cover the inner third of each blade, including the hub, with glass fibre cloth, coating the whole of the blades with the resin. When dry, rub smooth and balance carefully. Screw in the bearing bush, and retain on the rotor spindle by sweating on a short length of brass tubing.

Cover the model with lightweight tissue, and decorate to choice. The finished model should balance on the wing leading edge.

Flying is straightforward, and the model will hold out on 50 ft. lines in calm conditions. A third line throttle-controlled engine would enable power-on landings to be made. As flying speed rapidly falls once the engine stops, it is advisable to fly low towards the end of the engine run, so that the model may be "wheeled on" with sufficient elevator control to keep it level.

One last word—the model is an *Autogyro*, not a helicopter, but just try explaining that to all the spectators you will have watching!

## LYSANDER

(Continued from page 647)

For all this, production of the Lysander continued, but various problems concerning the Perseus engine dictated a change back to the reliable Mercury, and the Lysander Mk. III emerged, powered by the Mercury XX or 30 driving a D.H. variable pitch propeller. A number of Mk. III's, together with some Mk. I's and II's were fitted with twin .303 in. Browning guns in the rear cockpit, others being modified for towing targets, or Hotspur training gliders.

At the beginning of the Battle of Britain, Lysanders were used for anti-invasion patrols, but at the end of July 1940 they commenced Air Sea Rescue duties and a year later four Squadrons were employed on this work, their morale uplifted by the twin Brownings and an escort of Spitfires!

On the night of 4th/5th September, 1941, the unique capabilities of the Lysander came into their own again as a black-painted specimen landed in a French field, disgorged one secret agent, picked up another, and returned to England. This single operation heralded the hazardous work of Nos. 138 and 161 Squadrons which over the next three years delivered 293 persons to torch-signalled French landing places and brought more than 500 persons out, some of whom were shot-down aircrew. On more than one occasion the Germans ambushed the Lysanders, and one pilot managed to fly a bullet riddled machine all the way back to base with one hand on the controls and the other stemming the flow of blood from a neck wound. In Italy, No. 148 Squadron carried out similar clandestine work, as did other Lysanders in the Far East, all these activities being assisted by the fitting of a 150-gallon overload fuel tank and an external ladder.

During 1940/41, some Lysanders were modified for experimental purposes, the first three being anti-invasion machines. The original prototype, K 6127, was fitted with a Delanne tandem wing and a mock-up Boulton-Paul four-gun turret. L 4673 had a four .303 in. belly gun pack, and both K 6127 (in standard form) and L 4673 (standard) were fitted with a pair

of 20 mm. Madsen cannons on the undercarriage legs, P 1723 undergoing tests with a power-driven turret aft of the mainplane. Another machine carried bench-type air brakes, while T 1443 received a Dowty castoring undercarriage for cross wind landing trials. P 9105 was fitted with a Steiger high-lift wing, incorporating full span slots and flaps without ailerons, lateral control being achieved by spoilers.

Lysander production ceased in January, 1942, after 1,368 machines had been built in this country and a further 225 in Canada. Apart from its virtually worldwide operation by the R.A.F., the Lysander served with the Air Forces of the Canadians, Irish, Free French, Turks, Egyptians, Finns, South Africans, and Portuguese. Only one example remains in this country, a Mk. III serialled R 9125 belonging to the R.A.F. Museum.

### SPECIFICATION

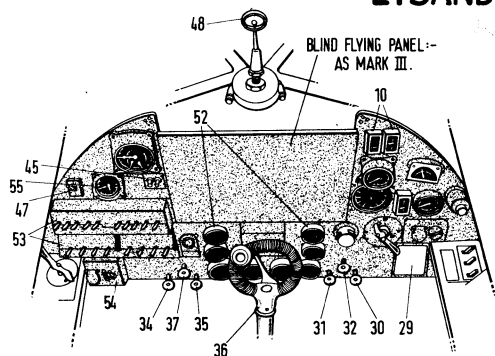
<b>Dimensions:</b>	<b>Span:</b> 50 ft. <b>Length:</b> 30 ft. 6 in.
<b>Loaded weight:</b>	Mk. I —5,920 lbs. Mk. II —6,015 lbs. Mk. III—6,318 lbs.
<b>Performance:</b>	<b>Max. speed:</b> Mk. I —219 m.p.h. Mk. II —230 m.p.h. Mk. III—212 m.p.h. <b>Min. speed:</b> 55 m.p.h. (fully loaded) <b>Take-off run</b> to 50 ft.: 250 to 300 yds. (zero wind) <b>Landing run</b> from 50 ft.: 310 to 340 yds. (zero wind)

### Acknowledgements

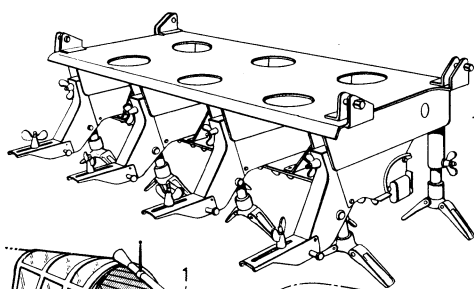
To the Staff of the R.A.F. Museum, who kindly permitted sketching and measurement of the actual machine.  
**FLIGHT INTERNATIONAL** for their photos.

The Editor and Staff send seasonal greetings and best wishes for a happy and prosperous New Year to all readers

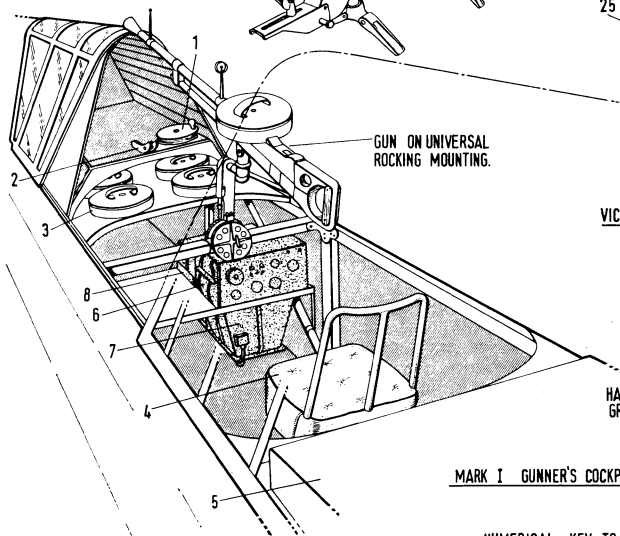
# — LYSANDER SKETCHPAGE —



MARK I. PANEL.

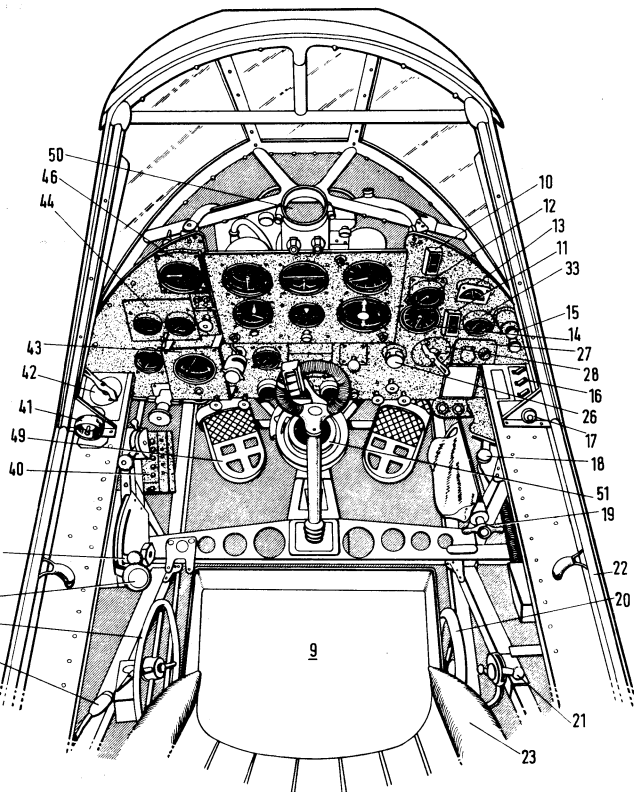


BOMB RACK DETAIL.



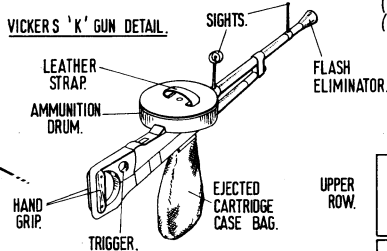
GUN ON UNIVERSAL ROCKING MOUNTING.

MARK I GUNNER'S COCKPIT.



MARK III COCKPIT.

(ALL PANELS COLOURED DULL BLACK.)  
(COCKPIT INTERIOR IS MATT LIGHT GREEN.)



VICKER'S 'K' GUN DETAIL.

SIGHTS.

FLASH ELIMINATOR.

BLIND FLYING PANEL KEY.

	LEFT.	CENTRE.	RIGHT.
UPPER ROW.	AIR SPEED INDICATOR.	ARTIFICIAL HORIZON.	CLIMB/DESCENT.
LOWER ROW.	ALTIMETER.	DIRECTION GYRO.	TURN/SLIP.

## — NUMERICAL KEY TO DRAWINGS. —

1. AERIAL WINCH. (TRAILING AERIAL.)
2. BARREL LOCK FOR M/C GUN. (STOWED.)
3. SPARE AMMUNITION CONTAINERS.
4. SWIVELLING SEAT.
5. CHART TABLE. (FUEL TANK BELOW.)
6. RADIO.
7. CAMERA.
8. BATTERY.
9. PILOT'S SEAT PAN. (NATURAL METAL.)
10. FUEL PRESSURE. (GREEN.)
11. OIL PRESSURE. (YELLOW.)
12. BOOST-MANIFOLD PRESSURE. (RED RIM.)
13. AMMETER.
14. REV. COUNTER. (BLACK RIM.)
15. COMPASS LAMP SWITCH.
16. PILOT'S SERVICES SWITCHES.
17. PUSH BUTTON FOR GUNNER'S WARNING LAMP.
18. MORSE KEY.
19. COWL GILLS CONTROL.

20. SEAT RAISING WHEEL.
21. T.R.9. RADIO CONTROL. (MK.I. ONLY.)
22. SIDE WINDOW RETRACTED.
23. LEATHER PADDING.
24. TAILPLANE TRIMMER CONTROL.
25. RADIO SOCKET FOR HELMET LEAD.
26. ENGINE PRIMER PUMP.
27. ENGINE STARTING PANEL.
28. ENGINE PRIMING COCK.
29. ENGINE DATA PLATE.
30. AIR INTAKE CONTROL.
31. COCKPIT HEATING CONTROL.
32. OIL WARMING CONTROL.
33. OIL TEMPERATURE. (YELLOW RIM.)
34. CARBURETTOR AIR CONTROL.
35. RUDDER BAR ADJUSTMENT.
36. CONTROL COLUMN; WITH BRAKE LEVER & GUN BUTTON.
37. PROPELLER PITCH CONTROL.

38. THROTTLE LEVER.
39. MIXTURE CONTROL.
40. V.H.F. RADIO SELECTOR.
41. LANDING LAMP SWITCH.
42. FUEL COCK.
43. FUEL GAUGE.
44. OXYGEN CONTROL.
45. IGNITION SWITCHES.
46. AIR PRESSURE GAUGE.
47. FLARE SWITCH.
48. REAR GUN SIGHT.
49. RUDDER PEDALS.
50. MOUNT FOR REFLECTOR SIGHT.
51. COMPASS.
52. MOUNTING POSITION FOR EIGHT 'VERY' LIGHT CARTRIDGES.
53. BOMB SELECTOR SWITCHES.
54. BOMB RELEASE INDICATOR & JETTISON SWITCH.
55. CLOCK.