

General Flying
Instruments



INSTRUMENTS.

Instruments on Dash:

- (i) Rev. Indicator for showing R.P.M. of engine.
- (ii) Air speed " " " speed through air.
- (iii) Aneroid or altimeter for showing height by atmospheric pressure.
- (iv) Pressure gauge for showing air pressure on petrol in lower tank or oil pressure.
- (v) Petrol gauge for showing amount in tank in gals.
- (vi) Clinometer for showing lateral tilt on machine or side-dip.
- (vii) Transmitting thermometer for showing temperature of water in radiator.
- (viii) Compass
- (ix) Watch.

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Air Compass type 5/17:

Consists of an adaptor plate which is a metal ring screwed to dash supported by 3 lugs. Attached to this is the compass bowl.

This rests on fault buffers to take the vertical vibration. Lateral movements are taken up by spiral springs inside each lug.

The compass bowl is partly spherical filled with pure alcohol to damp the movements of the cam. At top of bowl is an air trap. When the liquid expands under an increase of temperature the air above is compressed. The compass card is shaped like the outside edge of a saucer & is marked in degrees on both sides. It is supported by a very light skeleton framework to a centre boss underneath which is fitted an inverted agate tipped pivot. The 2 compass magnets are also suspended by the framework.

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INSTRUMENTS (2)

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The pivot rests in a sapphire cup which is supported by a stem fixed to the bottom of bowl.

A containing wire prevents said pivot from jumping off cup. Above "air trap" is corrector box with two tubes one in a fore & aft & other in transverse direction.

Deviation is corrected by suitably placed magnets which act on compass in opposite manner to the magnetism of machine. The different strengths of effect are obtained by inserting magnets of different sizes. There are two "lubber lines" for reading the compass at back & front of bowl.

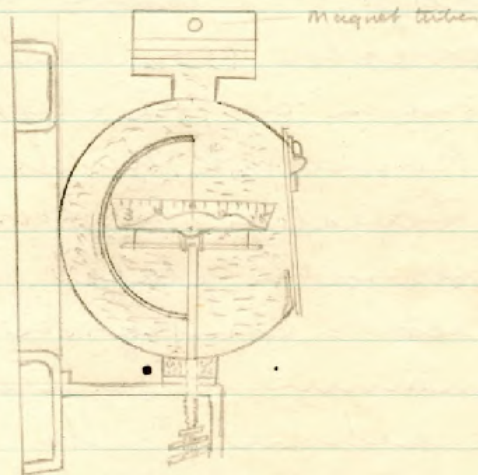
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instrument electrically
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This compass has quick
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Illustration of compass]

INSTRUMENTS. (3).

Altimeter:- Consists essentially of a thin corrugated metal box in shape like a circular biscuit which is pumped out to a partial vacuum & sealed. It is held in tension by a strong spring which tends to distort box upwards with a power which, at sea level is equal to the atmospheric pressure which tends to collapse the box. On rising to high altitudes the atmospheric pressure decreases, thus allowing spring to distort box upwards to an extent depending on height of machine. This movement of vacuum box is conveyed to pointer by a delicate & magnifying system of levers, the movement being converted to a rotary motion by means of a fine steel chain passing round a pulley on the pointer spindle where a hair-spring keeps the chain in tension. As the pressure of the atmosphere varies on the ground the zero position of pointer is not constant. To allow for this a thumb screw is provided by means of

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which the dial may be rotated until the zero mark coincides with position of pointer. The instrument is compensated for errors caused by changes in temperature by means of a piece of soft iron fixed rigidly to the compensating arm in such a manner that when change in temperature does take place, owing to the unequal rates of expansion of the two metals, the arm is distorted so that its end moves in the opposite direction to movement of vacuum chamber. The dial is graduated in 1000 ft.

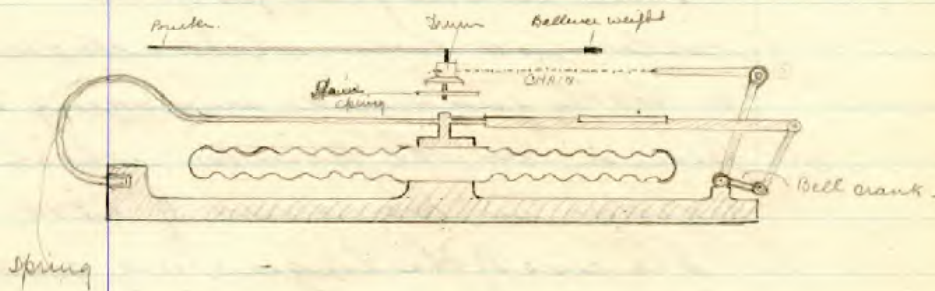
Clyno :- This instrument is simply a curved spirit level fixed to the dash in such a manner that the bubble is central when Machine is horizontal laterally. It is used to show if you are sidslipping inwards or outwards. Side slip outwards is due to too much rudder or too little bank. Side slipping inwards vice-versa. When slipping the bubble always

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moves in the opposite direction to the slip. When banking correctly, owing to centrifugal force the bubble remains central.



Revolution Indicator:— With few exceptions all rev. indicators work on the same principle viz. Centrifugal force acting on a governor weight against the power of a spring.

Watford Type:— Consists of a flywheel & governor attached to a central shaft. When rotated at high speed the governor weight moves out towards the horizontal against the power of a spring.

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[illustration of Air Compass 5/17]

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Fitted into the flanges of the collar is a lever which actuates a tooth quadrant engaging a pinion on the pointer which registers in hundreds of R.P.M.

The revs of the engine are conveyed to the indicator by a flexible drive, which is geared down to reduce wear & tear to $\frac{1}{4}$ engine speed. Another gearing on the indicator steps up revolutions of governor to engine speed.

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Ogilvie Air Speed Indicator:-

Consists of a circular metal box divided into 2 compartments by a rubber diaphragm. One compartment is connected by aluminium tubing to the Pilot Head & the other compartment to the Static Head.

The air pressure caused by the machine's speed bulges the diaphragm outwards to an extent depending on the speed. The movement on the diaphragm is taken to the pointer by a silk cord attached to it passing over a roller & round a pulley on the pointer spindle. A hair spring on the spindle keeps the cord in tension.

The air displaced by the movement of the diaphragm is released by 24 holes in the Static Head & owing to its special design the passage of air over the outside causes no change on the atmosphere inside.

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The reduction in the reading of the instrument caused by the reduced density of the air at high altitudes is roughly $\frac{1}{2}\%$ per 1000' ascent. but this error is compensated by flying speed increasing in the same ratio, so that flying speed is the same at all altitudes going by the instrument.

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