PART 2 : SECTION 4

CHAPTER 1

# ACCELEROMETERS

## Purpose

1. The purpose of an accelerometer is to indicate the maximum, minimum, and instantaneous values of accelerations along the normal (vertical) axis of an aircraft.

## Implementation

2. Basically the mechanism consists of two weights elastically suspended about parallel axes which are interconnected so that only acceleration along the normal axis of the aircraft can move the weights, such movement causing the degree of acceleration to be indicated against a scale.

3. The scale graduation represents *g* units, 1*g* being the acceleration due to the gravity of the earth (32 feet per second$^2$). Thus when the aircraft is in straight flight or standing on the ground the accelerometer indicates 1*g*. When the aircraft is inverted and flying straight and level, however, the accelerometer indicates −1*g*

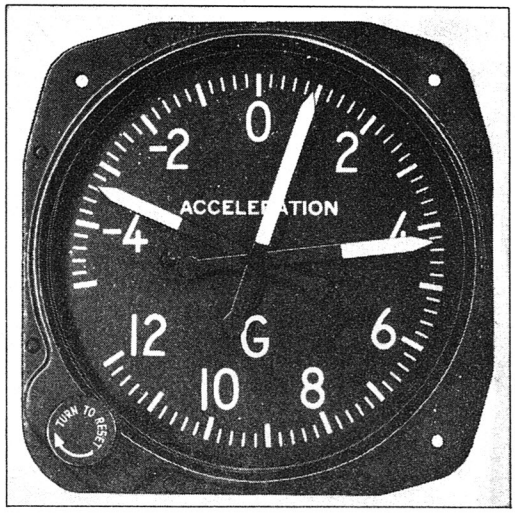


Fig. 1. Accelerometer, Type 482/01.

TYPE 482/01

## Presentation

4. The dial (Fig. 1) is graduated into equal divisions of 0·2*g* over the range −5*g* to +12*g*, with numerals marked at 2*g* intervals from −4*g* to +12*g*. There are three concentrically mounted pointers which indicate against the common scale. The largest is a normal indicating pointer (or "instantaneous" pointer) while the other two, known as auxiliary pointers, register the maximum positive and negative accelerations until reset by the knob on the bottom left-hand side of the dial (but see para. 6).

## Mechanism

5. The weights (Fig. 2(7)) are carried by two cantilever arms (5) which are rigidly attached to the parallel rocking shafts (3) and (18). Rotation of the rocking shafts is controlled by the springs (20). Each spring is anchored to the body of the mechanism at one end, while the other end is attached to the appropriate rocking shaft through a connecting link (46). Each of the rocking shafts carries a sector gear (4), the opposing sector gears being inter-meshed. An additional sector (21) meshes with a pinion (22) to the staff of which is attached the indicating pointer (35).

6. One of the rocking shafts carries a sector gear (10) in mesh with a magnetic drag damping device which prevents violent pointer fluctuation during short period accelerations and ensures that both long and short period accelerations are indicated accurately. Two toothed wheels (not shown in Fig. 2) operate the auxiliary pointers (Fig. 1) which are held at their maximum positions by a spring-loaded ratchet. When the resetting knob (Fig. 1) is operated it disengages the ratchet and allows the auxiliary pointers to rejoin the normal indicating pointer. A locking device can be attached to the resetting knob to ensure that the auxiliary pointers are not reset *by the pilot*. This enables the engineer staff to maintain a check on the maximum and minimum "*g*" loadings to which an aircraft has been subjected.

## Operation

7. Acceleration in any direction in the plane of the instrument dial may be resolved into vertical and horizontal components ; these may be considered separately. The effect of vertical acceleration on the weights, causes the rocking shafts to rotate in opposite directions and operate the indicating pointer. Horizontal acceleration components exert equal forces on each of the weights and tend to rotate both rocking shafts in the same direction but, because the forces are equal, they cancel each other, since the rocking shafts are geared together. Thus only vertical acceleration components are indicated by the instrument.

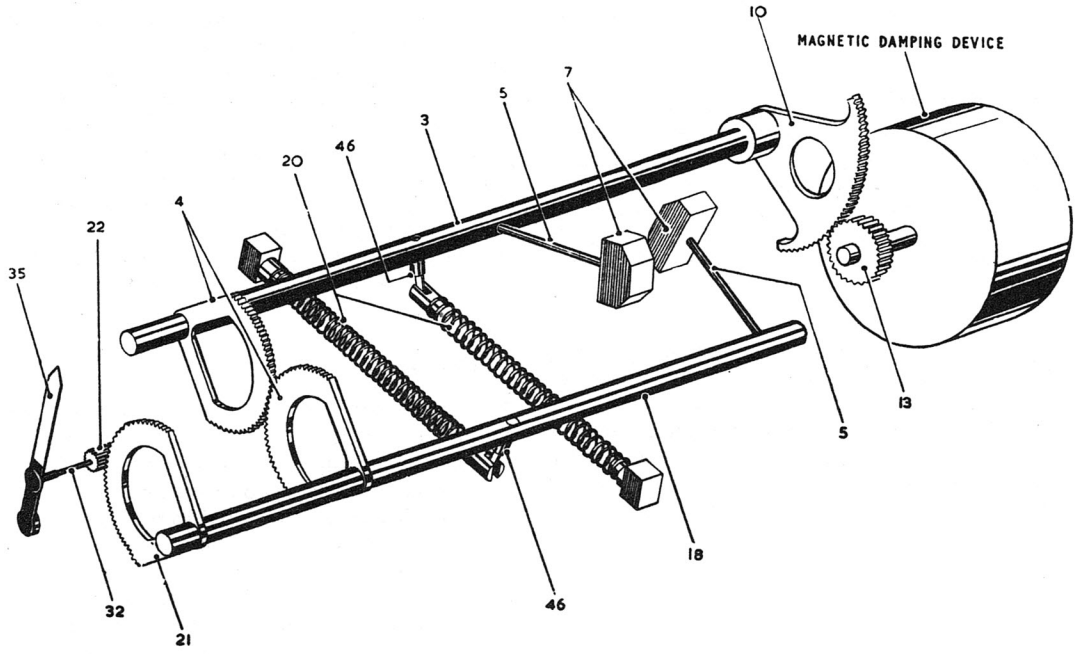


Fig. 2. Schematic Arrangement of Accelerometer Mechanism, Type 482/01.