Service Bulletin SB 09/04

Pioneer 300 Undercarriage – Mandatory Modifications to System

1. Date of Issue 5th Dec 2009

2. Applicability All Pioneer 300 and Pioneer 300 Hawks.

3. Classification Essential

4. Nature of Defect

Sound and reliable undercarriage lock on the Alpi Pioneer 300 and Hawk aeroplanes depends on each over-centre arm touching the underside of its support channel to place it in its over-centre position. If this does not happen, the right mechanism, on which the motor switch is mounted, may be correctly adjusted, while the left one is not.

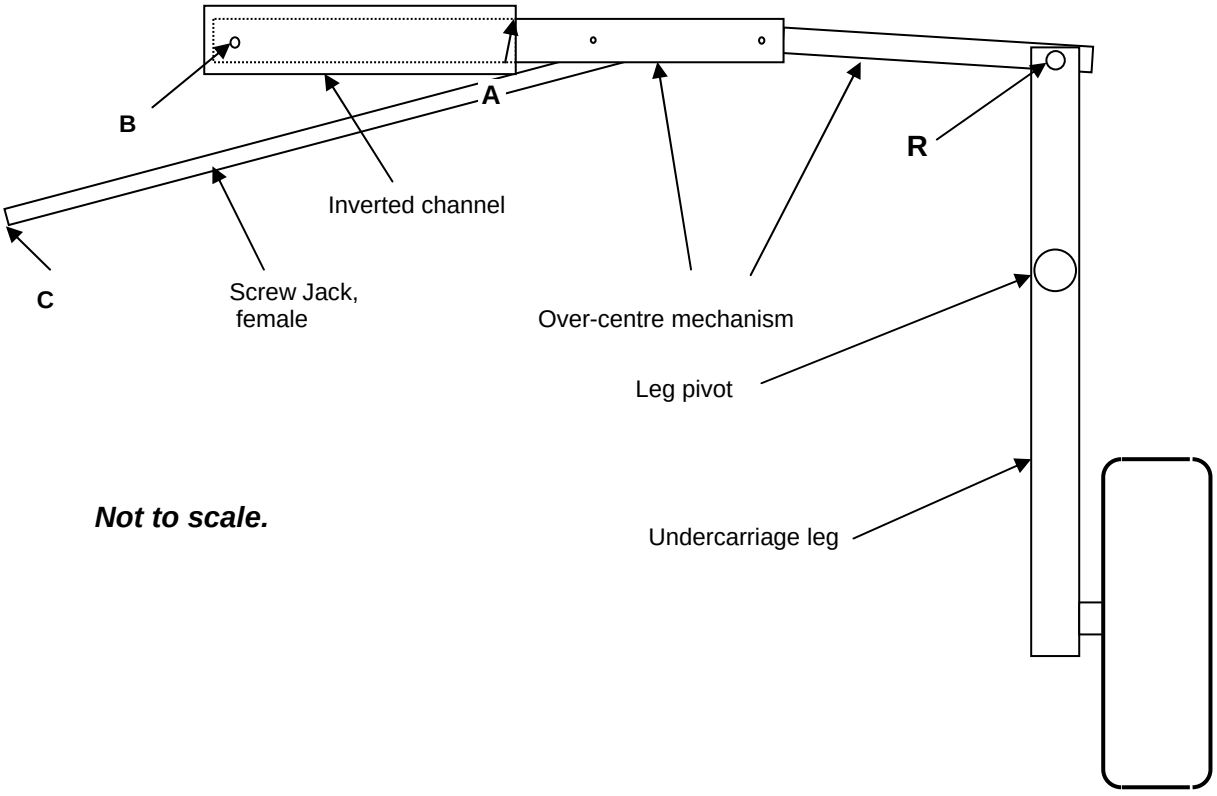
Investigations have shown that in some cases it will not be possible to achieve correct adjustment simultaneously on both legs. This bulletin explains why and defines a solution to the problem. In addition an additional safety measure using a conventional arrangement for indicating "Undercarriage Down and Locked" is described.

The 3º overcentre angle of the Pioneer 300 undercarriage is used extensively on other, certified aircraft and it is neither necessary, nor permitted, to change this.

Adjustment Limitations

The geometry of the leg's mechanism is shown below; the right hand mechanism, looking from the rear, is shown. The screw jack thread has a pitch of 4mm. Only half-turn increments can be made to the jack's extension by turning the female part of the jack screw at its bolted connection with the arm, ie. the jack's length can be adjusted by a minimum of 2mm increments only.

The effect of a 2mm extension to the jack is critical. Due to the geometry of the mechanism, in particular the



Not to scale.

angle which the screw jack makes with the over-centre arm, a 2mm change in the screw jack length results in a 3.5° change in the over-centre angle**.** Thus a correctly adjusted right hand undercarriage leg can result in a left leg which, in theory, cannot go over-centre.

In manufacture there is no control over the relationship between cross bolt attachment point and thread start angular positions on the screw jack female. Other variations such as distance between the left and right legs' mechanisms and gearbox position, are likely to produce a spread of situations over the Pioneer fleet. At one extreme this spread would permit accurate adjustment of both sides, and at the other permit only one side to be correctly adjusted while the other fails to go over centre. This leads to an unsafe condition of the undercarriage leg; it can collapse due to side loads being taken not by the over-centre mechanism, but by the screw jack and gearbox; these are not designed to take such loads.

There is some vertical compliance in both the inverted channels and their attachments to the rear face of the wood spar centre box. This allows one over-centre arm to flex the channel while the other approaches its correct position. However, an owner checking the right leg, on which the microswitch is mounted, could reasonably expect the left leg to be correct, when this is not necessarily the case. A second danger is that undue stress may be placed on the channel of one of the legs in an attempt to bring the other into adjustment.

5. Action

This bulletin requires two actions:

5.1 Over-centre Adjustment Checks

Check adjustment of BOTH left and right legs with the undercarriage down and locked. They are properly adjusted when the top edges of the overcentre arms comes up firmly against the underside of the channel on both sides at the point the undercarriage motor stops. If this is not the case, then it is permissible to remove up to 3.0mm of material from the top of the first arm to contact the channel at **A** where it stops on the underside of the inverted channel's outboard end. (This arm comprises two parallel aluminium strips, both of which require the treatment). Proceed as follows:

(i) If the adjustment is being performed retrospectively, or after the wings are fitted, access to the heads of the countersunk bolts securing the inverted channel to the rear of the spar centre box is not possible. In this case small amounts of material can be removed in situ, with the undercarriage retracted and the overcentre arms vertical.

(ii) Ensure the aeroplane is safely supported.

(iii) With undercarriage down, mark the arms at the point at which it contacts the inverted channel, retract the undercarriage, then remove material in the form of a shallow dip, around 25mm long, centred at the point of contact.

(iv) Remove material a little at a time until the two halves of the arm contact the underside of the channel simultaneously with each other, and simultaneously with the arm on the other leg, then smooth and polish the depressions.

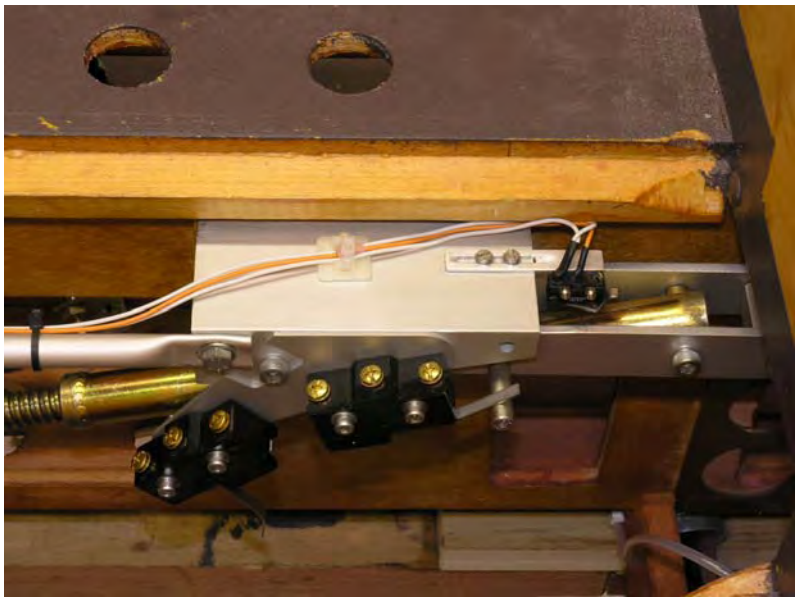
5.2 Three Greens Indication

The present indication system fitted as standard to the Pioneer's undercarriage, simply indicates when the motor has been shut off. It does not indicate that the overcentre mechanism is safely locked. The modification described below gives independent and individual indication to the pilot that each of the three undercarriage legs is down and locked.

Three separate switches are installed to detect this state and used to illuminate three green LED's mounted in the panel adjacent to the undercarriage switch.

5.2.1 Main Gear

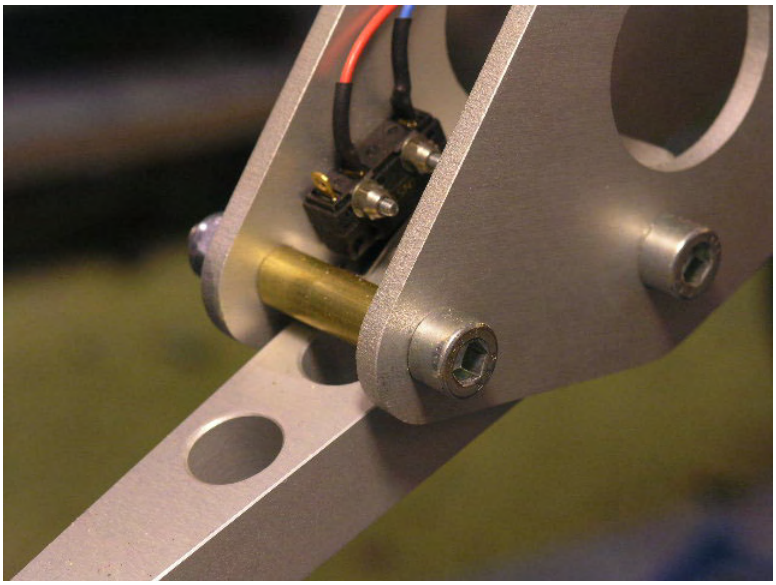
The microswitch is mounted on a carrier bracket cut from 10mm x 10mm x 1mm aluminium angle, and having a slot machined in its top surface. Two 3.0mm bolts secure this bracket and the microswitch to the top of the inverted channel.



By loosening the 3mm screws and adjusting the bracket laterally, the microswitch can be made to operate (close) just at the point at which the over-centre arm touches the underside of the channel ie. in its secure over-centre position.

5.2.2 Nose Gear

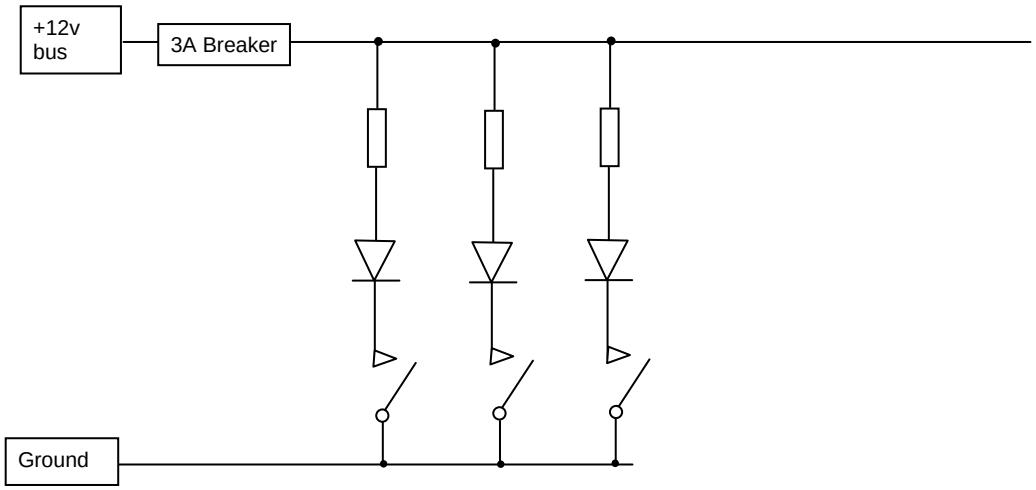
The front undercarriage microswitch is mounted at the forward end of the front undercarriage right hand plate (P/N 3AL685). Its lever bears on the top of the rear part of the forward over-centre arm as shown.



Nose Gear Microswitch Mounting

The microswitch is secured to the side plate by two 3mm bolts and lock nuts. Its lever is adjusted so that the switch operates (closes) just after the arm has moved over-centre and before it contacts the brass spacer stop. Ensure that the microswitch cannot restrict the movement of the arm.

4.2.3 Wiring



Use 20 or 22 AWG ETFE or Tefzel insulated wire only. Make soldered connections to the microswitches and protect all exposed terminals with heat shrink tubing. Secure wires to adjacent structure for support.

When wiring the front microswitch, it may arise that there are insufficient free pins available on the engine bay to panel connector. If so, it is permissible to use the frame as a ground return. Make this connection to the titanium bulkhead immediately adjacent to the undercarriage bracket fitted to the bottom of the firewall. Ensure that the wires are not under tension at any point during the undercarriage movement.

When the undercarriage is down, the front microswitch is reasonably well protected from water and mud slung out from the front wheel. However, only microswitches proofed for weather protection to IP67 must be used.

Panel LED's

The green LED's are mounted in a triangular pattern adjacent to the undercarriage switch. The top LED indicates nose wheel down and locked and the left and right lower LED's indicate left and right mains down and locked respectively.

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5th Dec 2009