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## Panther Service Bulletin – Optional

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**Issue Date:** 7/20/2016

**Bulletin Type:** Optional

**Aircraft:** Panther LS and Panther Sport

**Bulletin Name:** PSB1-O Optional HT Incidence Angle Revision

**Corresponding Attachments:** HT Incidence Revision.PDF

### Details of Service Bulletin

#### **Regarding: Optional HT incidence angle revision**

With several aircraft flying we now have a better idea of a more “optimal range” of Horizontal stab incidence settings.

The design goal, for all wing and engine configurations, is to be “trimmed” for no stick pressure in pitch, and level flight throughout the operating range (60-200 MPH IAS). If built per original BM this work well. The prototype N515XP is built per BM but has 30% smaller trim tab and is easily trimmed for all conditions.

Some operators noticed that the trim lever is well forward at higher speeds. This is normal and expected in most aircraft. You can see numerous photos of other brand X aircraft (RV) and see that the elevator is displaced downward and tab up slightly at higher speeds. The trim tab and elevator will be displaced from center at any speed other than the neutral trim speed (at that exact CG location). You have to pick where that point (speed) is and adjust the HT incidence to achieve the desired results. With the Panther’s powerful elevator and large trim tab you can optimize this position based on your preferences and opinions. Some builders want the elevator centered, and trim tab neutral at a particular airspeed. A bit of trial and error may be needed to achieve this (if desired).

Some information follows to help you decide if you want to adjust the HT incidence.

The prototype N515XP and 3 other Panthers have the incidence set  $-0.8^{\circ}$ . Two are LS Corvair powered, one is an LS 0-320 Lycoming powered, and one is a Sport with 0-320 power. All can be trimmed hands off in pitch at any speed operating speed.

This will yields hands off level flight at 140 MPH indicated and about 50% of the total forward trim at the lever (nose down). The trim tab will be displaced about  $\frac{3}{4}$  inch upward at the trailing edge of the tab. The aircraft can easily be trimmed for speeds to



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200 MPH IAS. The elevator itself will be displaced downward approx. 3/8-1/2 inch wing length, and engine (cruise speed) will have some effect on required forward trim.

Two other Panthers have horizontal stabs @ 0.25 and 0.5. Both have long wings and Lycoming 0-320 engines. Both require less forward trim than the others.

### Recommendations

SPA is revising plans sheets and BMs to include the following:

1. At initial build trim P5202/P5203 aft HT mounts to  $3 \frac{5}{16}=0.0^\circ$  (was  $3 \frac{1}{2}=0.8^\circ$ ). This is less than will likely be wanted, but will allow shimming of the HT without needing new aft HT mounts. We also recommend not fitting the intersection faring until initial flights have been made and HT angle set as desired. We recommend then adding a 1/16 shim under each aft HT mount setting angle to  $-0.25^\circ$  for test flying.  
(NOTE: you can simply do as per 1. And finish aircraft, and accept the trim position when finished)
2. Please see HT incidence revision PDF. If Horizontal Stab incidence has already been set we recommend not fitting the intersection faring and doing initial flights as built. If you decide to change the incidence setting you will need to adjust the aft spar. Moving the forward spar may appear easier, but this will move the Vertical Stab forward mount as well and affect the rudder hinge. You may also need a new down elevator stop angle as moving the stab will also change the down elevator setting. One added benefit of lowering the horizontal stab rear spar will be increased clearance for the elevator push rod tube. See Horizontal Stab Incidence Revision Drawing on Builders Cave.

SPA will be revising the appropriate plans sheets and BM to reflect these revisions. If you need any assistance in deciding if you want to adjust the Horizontal Stab incidence feel free to contact us by replying to this email and stating your questions/concerns.