GLASTAR SERVICE BULLETIN 48

Mandatory

Subject: Elevator Bellcrank Clearance Inspection and Aileron Inspection Provisions.

Applicability: All GlaStar kits

Discussion: On a recent GlaStar inspection, a builder noted that there appeared to be marginal clearance between the bolts on the elevator bellcrank and the lower aluminum angle bracket that supports the bellcrank in the tail of the airplane. Although there have been no known reports of any interference with the elevator bellcrank from any flying GlaStars to date, it is felt that an inspection and some simple adjustments would further improve the clearances. This service bulletin will also address the addition of some access holes and cover panels for the aileron controls within the wing.

Part 1 Elevator Bellcrank Clearance

Please refer to the following figures in the GlaStar Assembly Manual for additional information pertaining to the elevator controls assembly and installation:

Section VIII	Figure 82	Elevator Bellcrank Hardware Stack-up
Section VIII	Figure 85	Installing the Elevator Bellcrank Assy Between the Brackets
Section IX	Figure 52	Elevator Control Pushrod Installation
Section IX	Figure 54	Aft Elevator Cable Attachment

As the elevator bellcrank moves through its range of motion for controlling the elevator, adequate clearance should be maintained at all times between all moving parts to avoid potential interference and binding of the control system. When the builder first installs the upper and lower bellcrank brackets in the fuselage as prescribed in Figure 85 of Section VIII, the Assembly Manual does not give a controlling dimension, but rather just says to use the "clamped up assembly". If the brackets are installed properly and parallel to each other, the distance between the upper and lower brackets should be approximately 1.85 inches as shown in Figure 1 below. Since the two NAS43DD4 spacers are of equal length, the bellcrank assembly is centered between the two brackets. But when the control cable, elevator stop and elevator pushrod hardware is installed, the clearance at the bottom of the two bolts shown in Figure 1 is marginal or inadequate.

Figure 2 below gives a more optimum arrangement when installing the bellcrank assembly between the upper and lower brackets. By using unequal NAS43DD4 spacer lengths, the bellcrank assembly can be shifted up providing more clearance to the bottom of the bolts. By going to AN3-11 and AN4-11 bolts, additional clearance can be gained and still have adequate grip length for the bolts through the bellcrank assembly and the control stop. The builder should aim for .25 inches of clearance between the bolts and the bellcrank brackets. We have observed that the elevator pushrod attach bolts on the bellcrank assembly tend to deflect marginally up under a positive or tail down load (approximately .05"). Therefore, slightly more clearance should be provided between the head of the bolt and the upper bracket.

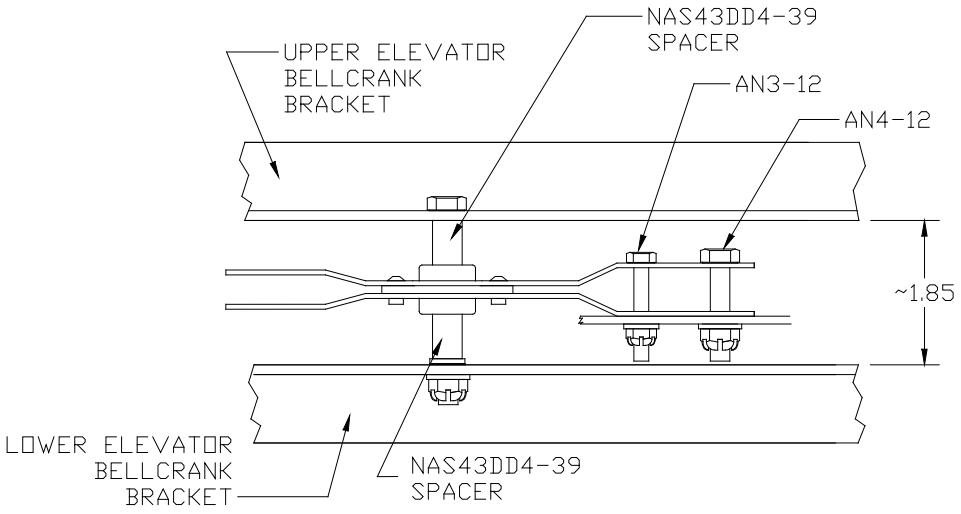

Figure 1. Elevator Bellcrank Assembly and Installation per the Assembly Manual.

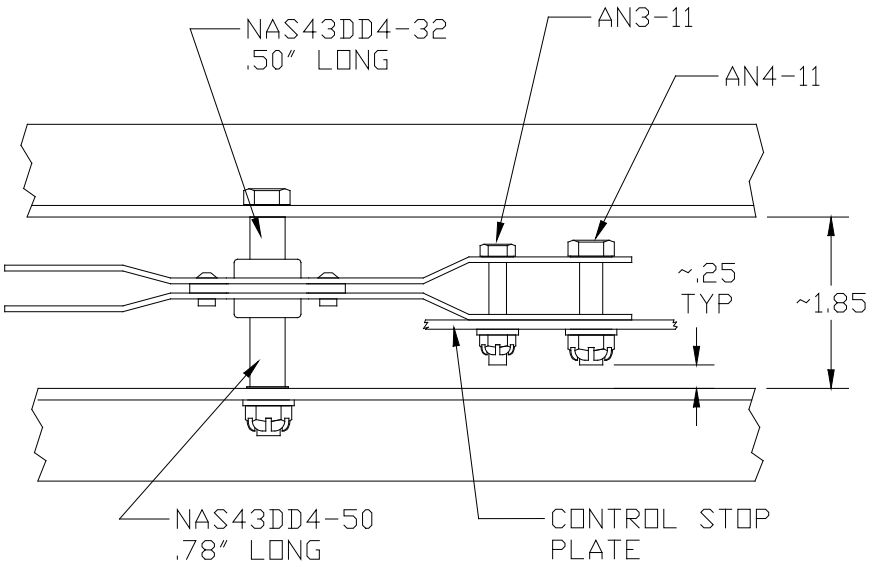

Figure 2. Modified Elevator Bellcrank Installation for Improved Clearances

For those airplanes that are already flying or which have all the control rigging done and the tail section closed out, the primary importance is an inspection of the system as you have installed it. . Remove the lower fuselage inspection cover and with a mirror and adequate lighting, move the elevator controls through its range of motion and measure the clearances between the upper and lower ends of the three bolts on the bellcrank. **The minimum recommended clearance on the lower edge of the bolt should be approximately 3/16 inch.** If you find your clearance is less than the minimum, you can gain 1/8 inch by switching the bolts over to an AN4-11 and an AN3-11 from the AN4-12 and AN3-12 as specified in the assembly manual. If you need additional clearance, then use the NAS43DD4 spacers specified in Figure 2. **Before you attempt to replace any hardware, the cable tension will have to be released on the elevator control cables.**

The NAS43DD4 Bolt Spacers can be made from 6061-T6 or 2024-T4 aluminum with an outside diameter of .38 - .50 inch. The bare material should be primed for corrosion protection. A Service Bulletin Kit **P/N GSSB48KIT-1** is available through Glasair Aviation USA, LLC. This kit includes two new NAS43DD4 bolt spacers and the AN3-11 and AN4-11 bolts.

Part 2 Aileron Control Access

As a follow up to Service Bulletin 47, it was discovered that better access to the control cables is warranted, especially in the trailing edge of the wing near the cable pulleys. The following details will provide plans to allow the addition of access panels in the trailing edge cove skins for the inspection and maintenance of the of the control system with in the wing.

Adequate access should be provided to all areas that have parts that need inspection and maintenance such as control pulleys and brackets, cable fairleads or rub strips and bellcranks. Two such areas within the trailing edge of the wing are identified as candidates for inspection areas. These would be the flap pulleys immediately inboard of the flap bellcrank and the two outboard aileron pulleys just inboard of the aileron. The trailing edge cove skin is primarily nonstructural, although it does tend to add some stiffness to the trailing edge of the wing skins. The builder can easily add some access panels in this region for the inspection and maintenance of the control system.

The flat pattern for the cover plates can be seen in Figures 3 and 4 below. The dashed line inside the perimeter is the profile of the access hole itself. (Do not cut this into the cover!) Use this template or cover when cutting the hole in the cove skin. Make sure you keep adequate edge margin for the two nut clips and number 8 screws that will hold the small cover down. The larger cover will use four screws and four nut clips each. The lower lip of the small cover is trimmed and joggled slightly to fit on the inside of the hole cut into the cove skin. The cove skins themselves are made from .016 thick aluminum skin. The covers could be made from .016, .020 or .025 aluminum. If you do not have any scrap material around to produce these covers yourself, a Service Bulletin Kit **P/N GSSB48KIT-2** can be purchased from Glasair Aviation USA, LLC. This kit includes sheet material for covers, screws and nut clips for four access panels.

When positioning the cover to the cove skin, place the bottom edge approximately .44 inches up from the corner as shown in Figure 5. Your corner fillet on the cove skin might vary slightly, so position the cover where **you** deem the best fit to access the pulleys or fairleads. Mark everything out with a felt tip marker first and make sure it will all work as planned. When you are ready to cut the actual access hole in the cove skin make sure you are only cutting the hole to the size shown by the dashed line on the cover template shown in Figure 3 and 4. Round the corners and position and or trim for the nut clips until the holes line up with the cover. (These are a 3/8 inch throat nut clip, so keep your edge margin 3/8 inch) The recommended position for the **outboard edge** of the outboard cover plate is one inch inboard of the flap/aileron cove transition or 109.50 inches from root of wing. The recommended position for the **outboard edge** of the smaller inboard cover plate is 44.5 inches outboard from the root of the wing. Deburr all sharp edges and clean up the aluminum shavings if you are working in a wing with the cove skins already installed.

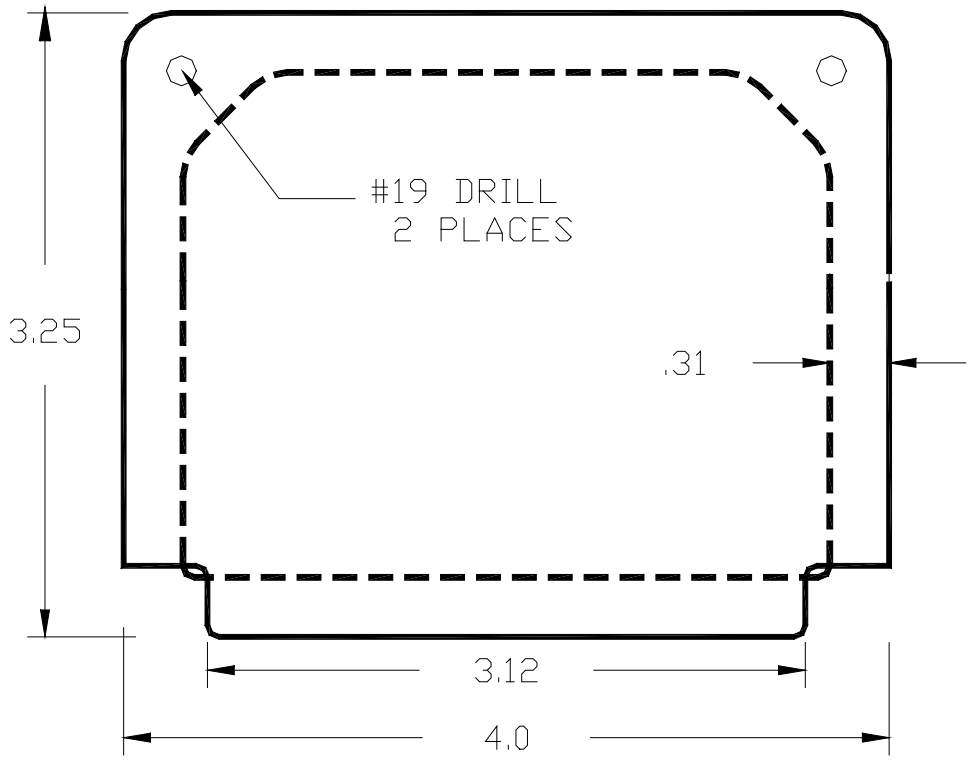

Figure 3. Small Inboard Cove Skin Cover Template

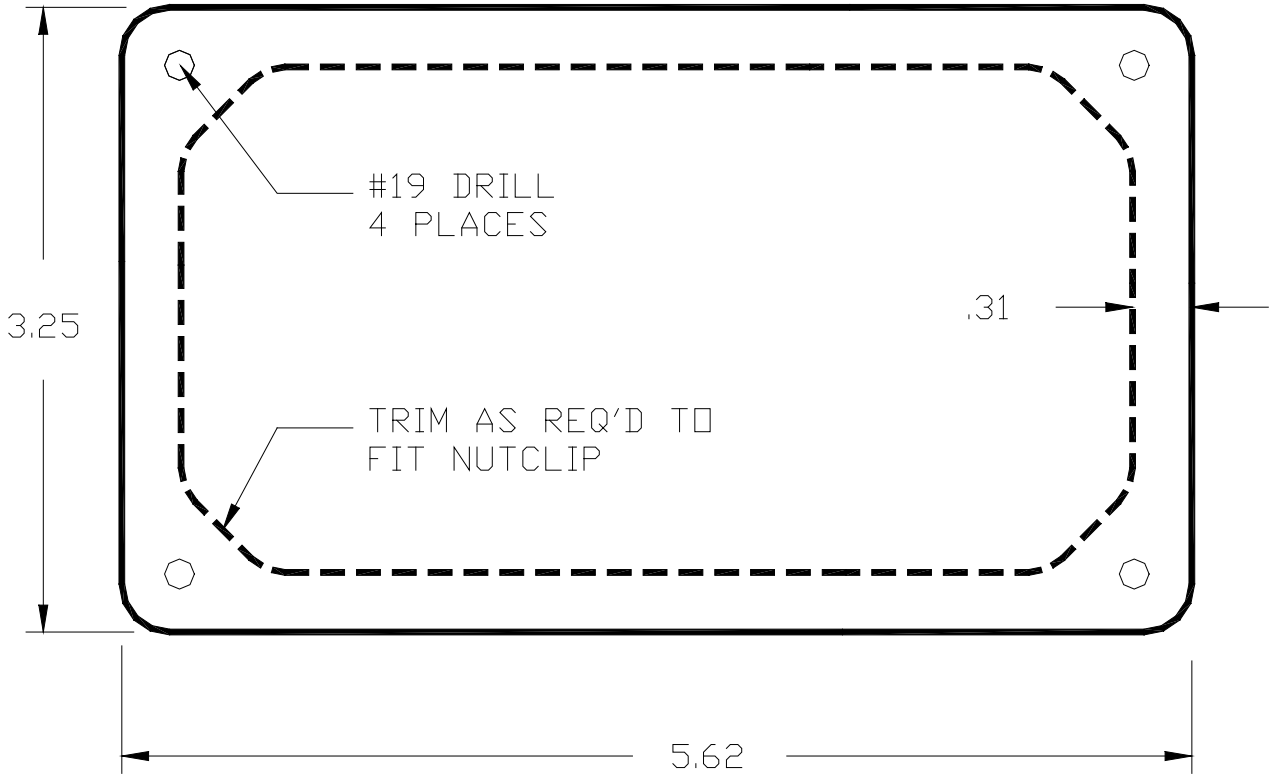

Figure 4. Large Outboard Cove Skin Template

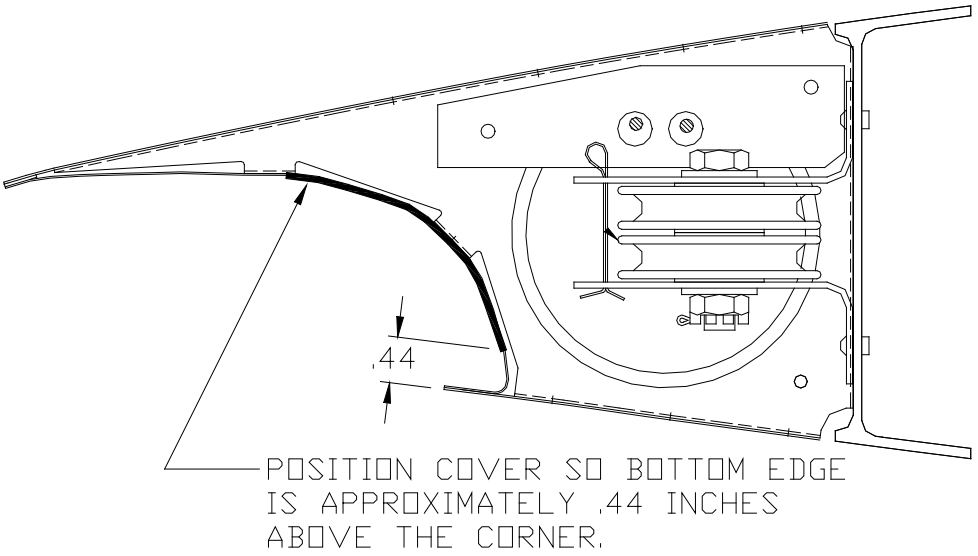

Figure 5. Position of Access Cover in Flap Cove Skin

Finally install the P/N 450-0211-081 Nut clips over the cove skin. Then secure each Cover Plate over the hole with AN526-8R6 Truss Head screws or equivalent ones of your choice.

Remember, proper maintenance and inspection is an important responsibility of each GlaStar owner. Uneven or excessive wear on pulleys, sticky or seized bearings, inadequate fairleads and improper hardware clearances can all greatly affect operation of your control system.