IMPORTANT: GROUND THE STICK MOUNTING PLATE PRIOR TO OPERATION! FAILURE TO DO SO MAY RESULT IN STATIC DISCHARGE THAT CAN DAMAGE THE COUGAR ELECTRONICS!

WARNING: THE SENSOR TUBE PORTS ON THE PLASTIC TRANSDUCERS ARE FRAGILE! AVOID EXERTING ANY UNDUE SIDE FORCES, EITHER DIRECTLY OR THROUGH THE SENSOR TUBES, AT THESE POINTS. THIS IS NOT A PROBLEM UNDER NORMAL OPERATION, BUT CARE MUST BE TAKEN DURING INSTALLATION.

INSTALLATION CONSIDERATIONS

The design of the Ribbstick places the stick in the precise location of the real side-stick when the mounting plate is mounted on the inboard side of the interior right console wall (visible on the wall between the ACESII and right console). If you choose this installation, you will need to cut openings for the upper sensor housing and lower stick mount to pass through the interior console wall. Additional bracing may be required to prevent the wall from flexing when force is applied to the stick.

It is important to note that if your interior console wall is over ½" thick, you will need to remove additional material from the outboard side of the wall to provide clearance for the sensor tubes with the installation method described. If this is the case, you may seriously wish to consider the right- hand mounting plate option described below.

If you can live with a stick centerline that is 7/8" outboard of the real stick's location (assuming you used a ½" thick console wall), you may wish to consider mounting the plate on the outboard side of the right console sidewall. This will result in a somewhat easier installation, as the need for cutting additional openings in the sidewall can all be avoided.

Another option is to request at time of order that your stick be assembled with a right-hand mounting plate configuration. With a right-hand plate design you will mount the stick on a secondary sub-wall, or septum wall, located under the right console. With this design, the stick centerline can still be located at the precise location of the real side-stick without the need for stick disassembly or the need to modify the inside console wall.

If you already have a faux side-stick transducer housing and nose piece (the piece that attaches the transducer housing to the aux panel), preinstall these first, as an aid in locating the stick mounting plate.

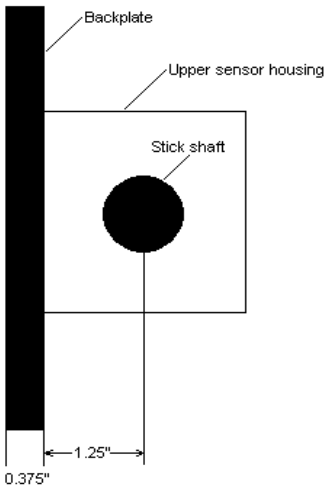

Figure 1, Plan View of Ribbstick (not to scale)

The plate must be located at the proper height and fore/aft position, plus have the proper tilt, or inclination backwards, to properly position the stick shaft through the center of a faux transducer housing. Having the transducer housing prior to installation takes all the guesswork out of locating the plate!

If you are using a real right auxiliary panel and dimensionally correct faux transducer housing, you may also need to remove a small amount of material from the back of the aux panel pocket opening to provide enough operating clearance for the stick shaft.

With any of the installations described above, remember that the stick forces are transferred to the structure through the mounting plate and therefore the structure must be robust enough to accept these without deflecting.

DESIGN CONCEPT

The stick shaft of the Ribbstick is rigidly mounted to the mounting plate assembly via a plate. When stick input forces are applied, the plate deforms, resulting in a stick displacement. This plate results in a full-unmodified stick input (as seen by the PC) at approximately 20 lbs of force, and a resultant displacement of .235". The exception to this is 'nose down', which is modified to require additional force, mimicking the F-16's design. Through the use of the Cougar Control Panel applet (described later), the user can reduce the maximum required forces.

It is worth noting that force and displacement values referred to in this document are referring to forces and displacements applied or measured at the stick grip's reference point – a point located where the middle of the user's palm contacts the grip in normal use.

With stick displacement, the sensor tubes are compressed. The increase in internal tube pressure is sensed by the pressure transducer, which varies the input signal to the PC accordingly. The stick is designed with slight pre-loading on all tubes. This insures that any movement of the stick will result in a change of the input signal. It also means that the design's very slight mechanical hysteresis (inability to repeatedly return to the exact same center resting point) is seen as an input change by software. If you see this hysteresis in your application, simply add enough software center 'dead zone' to negate it.

INSTALLATION

Prior to disassembling your Cougar for conversion over to the Ribbstick installation, confirm that your Cougar is functioning properly.

Once you have secured the mounting plate in the cockpit, find a suitable location within reach of the Ribbstick's cables to mount the Cougar's printed circuit board (PCB). You may wish to leave the PCB in the Cougar base. While it may be more difficult to secure the Cougar base than the bare PCB, the advantage is that strain relief is provided for the USB cable, rudder, and throttle connectors.

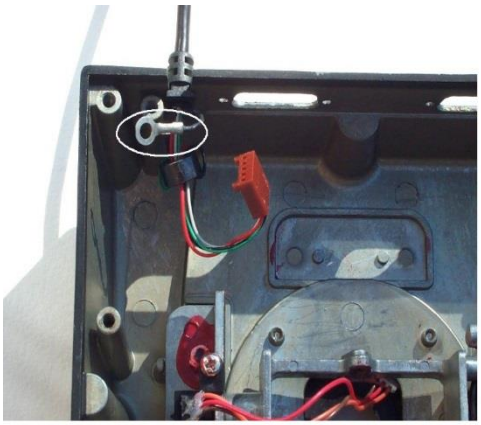

Figure 2, USB Cable Grounding Strap In Cougar Base (PCB removed)

Next, ground the mounting plate. This is an important step to reduce the chances of static discharge damaging the Cougar's electronics. To do this, run a grounding wire from the stick mounting plate to the Cougar PCB or directly to the PC case. Most Cougars have a separate ground wire coming from the USB cable that terminates under one of the four screws holding the PCB in the Cougar base. Look under the screw closest to where the cable penetrates the casing to determine if you have a cable ground (see Figure 2). If your Cougar has this feature, run a ground wire from the stick mounting plate to the USB cable ground termination point. If you have an early version of the Cougar that lacks the USB cable ground wire, you must run the stick mounting plate ground wire back to the PC! Or even better, run the grounding wire to both the PC and one of the PCB mounting screws. Termination at the PC can be made using an alligator clip or similar fastener.

You are now ready to make the cable connections to the PCB with the two 3-pin and the 5-pin female connectors coming from the Ribbstick. These connectors are polarized so you will only be able to seat them with the proper orientation. Also, you will note that one of the 3-pin connectors is tied to the 5-pin connector so there will be no confusing which of the 3-pin male headers to connect it to. Next, install your Cougar grip on the Ribbstick and make the final connections to the throttle and rudder.

Finally, plug the Cougar USB cord into the PC and confirm that the Cougar is again recognized by the Cougar Control Panel applet. Calibrate the stick as normal using the Cougar Control Panel.

FORCE ADJUSTMENT

Using the Cougar Control Panel (CCP) applet, you are able to reduce the input forces required to produce maximum output (as seen by the software). Open the CCP and click on the 'Axis Shaping' tab. Under 'Axis Settings – Dead Zones' you will note that you can adjust the upper and lower dead zones from a value of 0% to 100%. This is the setting you will change to adjust the maximum input force required. With a 0% dead zone setting, the full design force of 20 lbs (with 1/8" aluminum deflection plate) is required to generate a maximum output signal. At a 100% dead zone setting, the full design force is reduced by approximately 35%, to a value of 13 lbs. Worth noting, force and displacement are fixed in their relationship (In fact, this is close to a linear relationship and can be plotted as such). Therefore, lowering the force required to generate a maximum output signal also reduces the maximum displacement. You are in affect increasing the sensitivity of the stick.

As mentioned under DESIGN CONCEPT above, the Ribbstick is designed with an optimal preloading of the sensor tubes so the unmodified output signal is near linear and to insure a change in output with any stick movement. You may wish to introduce a small amount of center dead zone (via the CCP applet) if

you are witnessing a slight hysteresis, or non-repeatability, at the center point. Be aware that many flight simulator programs may already start with a center dead zone.

Additionally, use the curve settings to customize the response of the stick for personal preference.

TECHNICAL ISSUES

Shortly after initial use, and periodically thereafter, you will notice slight slop in the base of the Cougar grip. The higher forces of the Ribbstick work to loosen the threaded bottom adapter within the Cougar grip over time. When necessary, carefully open the Cougar grip and tighten the one remaining screw holding the adapter in the grip.

If you notice unbalanced operation in the roll axis that is not cured by software recalibration, that is, the stick requires dissimilar forces in opposing directions to generate the same output signal; look for the following two issues.

1. Distorting force on sensor tubes; check to make sure that there is nothing coming in contact with the tubes that would distort them, generating a false input.
2. Misalignment of stick; visually inspect the contact that the stick shaft makes with the sensor tubes. Do this by looking into the square sensor housing from above. The stick shaft should be making equal contact with all four sensor tubes. If this is not the case, please contact the factory.

You may also notice that a slight left roll is induced during a hard ‘nose-up’ maneuver. Pulling your arm slightly towards your body, in addition to the intended backwards pull causes this. The installation of an elbow rest changes your arm mechanics and stops this unintended input.