

● **TAILPIPE DRAG:** A rule of thumb in estimating drag of a standard exhaust pipe is to assume that the pipe extends 18" beyond its actual end. This extension allows for drag loading caused by pressure differential generated at the tailpipe end as the slipstream bends the exhaust plume.

If two 2.75" pipes exit the cowl at 45 degrees and extend 4 inches into the slipstream, the resulting drag at 170 MPH is about 24 pounds. Total drag of a clean T-18 at this speed is about 220 pounds. Those tailpipes are costing 2 MPH in drag! Reducing the angle to 30 degrees will cut drag to 14 pounds or 5 MPH.

In an effort to get the most speed from my airplane, I used "ejector stack" tailpipes on my crossover exhaust system. Use of simple ejector stacks should eliminate the drag penalty and add 3 to 5 pounds thrust. The price of ejector stacks is a bit of fabrication effort and an exhaust stained belly (my flush ejector stacks leave two trails of light grey soot back to the tailwheel).

My ejector stacks consist of rectangular tailpipes dumping into rectangular nozzles cut flush into the belly of the fuselage. The fast moving exhaust gas mixes with engine compartment air in the nozzles and exits flush from the belly giving a net jet thrust greater than that of a standard tailpipe.

The "nozzles" are rectangular ramps cut into the 523-2 forward floor skin and the firewall. The left ramp is 4.6" wide placed between the floor extrusions that are either side of the pilots left foot. The ramp ends 5.5" aft of the firewall lower corner, and is as deep as possible at the forward end, extending up to the edge of the 527-2 extrusion which runs across the firewall. The D-609 drawing top view shows such a ramp. The right hand ramp is identical, located under the co-pilots right foot.

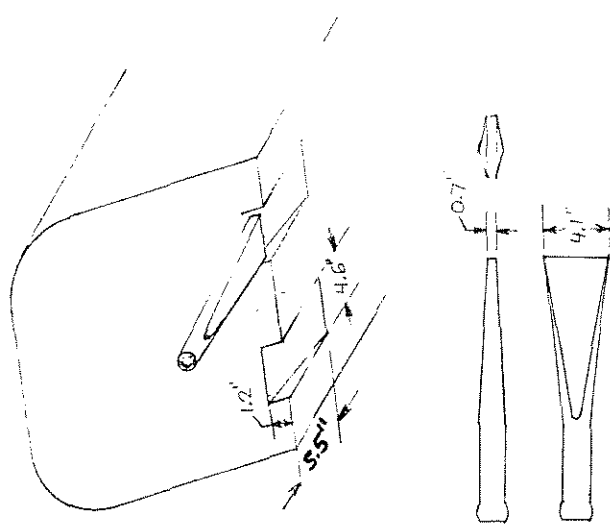
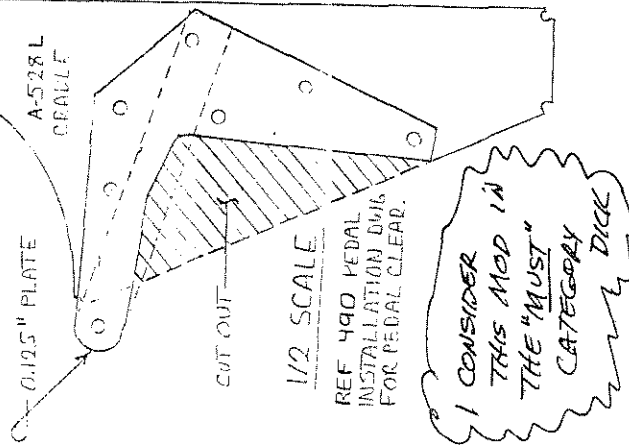
The resulting openings in the firewall are 1.2" by 4.6", and a bend in the lower cowl increases this area to 1.5" by 4.6". The 0.7" by 4.1" (I.D.) rectangular tailpipe ends are centered in the openings with ends coincident with the firewall face.

The "ramps" are extended forward of the firewall into the engine compartment by 1.5" radius .025" aluminum inlet guides to eliminate sharp corners of the firewall edges.

Heat shields for the "ramps" and the floor skin were fabricated from .016" aluminum (extending 24" aft of the nozzles). A sheet of asbestos paper between the .016" heat shields and the airframe provides insulation.

The basis of my exhaust system is a DIX crossover exhaust with ball joints connecting to my custom tailpipes. The left pipe is a straight run from the crossover to the nozzle, but the right pipe needed an 'S' curve bent into its forward end to keep the pipe exit parallel to the airplanes belly.

Thank You for the newsletter Dick!
Sam Kerns



STANDARD TAILPIPES WERE CUT LENGTHWISE, SPREAD APART, AND TRIANGULAR PLATES WERE WELDED IN TO FORM THE TOP AND BOTTOM SURFACES OF THE TAILPIPE.

NO SCALE

