COOLING THE SHREW

By S. Kreidel N888EZ

O-235

FIGURE 1

① thinned lip for more inlet area - negligible (+)

② added external lip scoop for more air - WOW! (-)

③ added air dam at sump - try to turn air up (0)

④ added air outlet flow "smoothers" each side → (0)

⑤ went from 6" to 3" prop extension to "extract" air → (0)

⑥ split upper cowl into 2 chambers → (0)

⑦ extended fwd baffle #4 down near #4 exhaust → 10° HELP

⑧ added fin shrouds on #3, #4 at fwd baffle → (0)

⑨ added air filter "platform mount" surface. This was a very significant improvement - just by chance. Idea was to re-locate air filter from firewall to allow better air flow in front to #4. As it turned out, the filter was not relocated since the platform cooled #4 to 205°C climb (good) and warmed up No. 1 which was always running cold (150°C).

⑩ added air dam (limited by fwd filter and SCAT duct) - this was not good! (Cyl's climbed ~20°C) removed.

SUMMARY O-235:

The "platform" (#9) seemed to redistribute the incoming air to acceptable temperatures. A small "tweak" or bend of the platform corners allowed tuning #1 cylinder heat temp - Hah!

TIME OUT

At this point, the O-320 was being installed and all reports said our CHT's problems were over since O-320's had B16 cooling fins. Also, we decided to go through with re-locating the air filter aft of the carb to clean up the flow of air in front of the carb, hoping to help out on #4 particularly, and #3 some what.

O-320 TESTING

The initial flights were discouraging since #4, #3 exceeded greenline (205°C) by as much as 20°C. This was bad, and the weather wasn't very warm either. So began the second chapter in our quest to get decent cooling. Almost every thing we tried for a while didn't do much, then I got mad and ducted air directly towards the #3, #4 cylinders, in desperation. It worked - but cooled #4 to much and repointing the duct as in ⑬ was very sensitive. Also, I was concerned with "cold spots" caused by the cold air jet. At this point the only thing that was consistent was the Melville "slicer" ⑪ which scooped a thin layer of air on the duct floor upwards. It was good for about 10°C, but still not enough.

In great desperation, I fashioned a flow diverter which split the incoming air and forced it upwards just after cowl entry. I was concerned it would choke the NACA inlet. Figure 2 shows the general diverter shape and location. As you can see, it helps to put the air filter aft of the carb with this rig.

FIGURE 1

(11) The Melville "slicer" - good for 10°C cooling

(12) Added fin shrouds to #3, #4 lower cowl - negligible.

(13) Added 2" dia. seat duct tubes to direct air to #3 and #4. It worked pretty good, but #1 and #2 got hotter, and the outlet location was getting inconsistent results - as usual.

(14) Went hog wild and put in an air dam - "splitter". It worked pretty good but #4 was still running warm (210° climb).

(15) Melville slicer removed, cost: + 10°C (put it back fast)!

(16) Tried the ducts again, but got scared with possible cold spots - removed it.

(17) In desperation, put in a jumbo air diverter (see figure 2) - and for the first time ever, it produced consistent results: #3 and #4 went to 150°C, #1 and #2 went to 210+°C. Now I felt I was on the right track. I found that relieving the diverter at its outboard corners (figure 2) was doing big things to #1 and #2, allowing me to shave a little at a time and "tune" in the CHT's.

As shown in figure 2, we enjoy:

cruise ~160°C (#1, 2, 4) and 175°C (#3) oil
climb 160°C (#1, 2, 3) and 175°C (#4) oil } 190°F

Considering we were seeing 225°C #4 and 245°F for temp's initially, we quit while we were ahead!

RETROSPECT:

Long EZ's need their cooling air introduced nearer their cylinder elevation. The air probably should be scooped into the cowl just under the main spar and funneled into a "ram air" boxes surrounding individual left and right hand cylinder banks (2 separate ram air boxes), SEE FIGURE 3. pg 29.

① THINNER LID

h

Δ_1

② h

③ BAFFLE

Δ_2 (PROTRUDING SCOOP)

EXIT SMOOTHERS → ④ ⑤

"SUCK AIR OUT" (SUCKS)

⑥ Δ_6

ELIMINATE CROSS-TALK/PROP INFLUENCE

⑦

FORCE AIR PAST MORE FINS (- HELPED #4 CHT ABOUT 5+ °C)

⑧ ③

MORE AIR FLOW ON FINS -

⑨ (LH ONLY)

VERY SIGNIFICANT CHANGE - CONFIRMED "JET-STREAM" IN LWR. COWL.

⑩ CYL 4

LYC O-235 L2C ABOVE

LYC O-320 D36 BELOW

⑪ MELVILLE SLICER

⑫ #3,4

⑬ 2 TUBES - (@ B. CORNER) (A) (B) 4 2 2" DIA

⑭ deleted 8 SMALL DIVERTER (8") ADDED

⑮ DELETE angle JUMBO DIVERTER (BREAKTHROUGH!)

⑯ #4 3" DIA

⑰ delete 4 tubes add side expanders + wrap exhausts

⑱ 12-26-85 ADD (W/SIDE EXPANDERS REMOVED) FINAL

.040

SLICER

APRIL/MAY '86

17 B

AGUPE 1

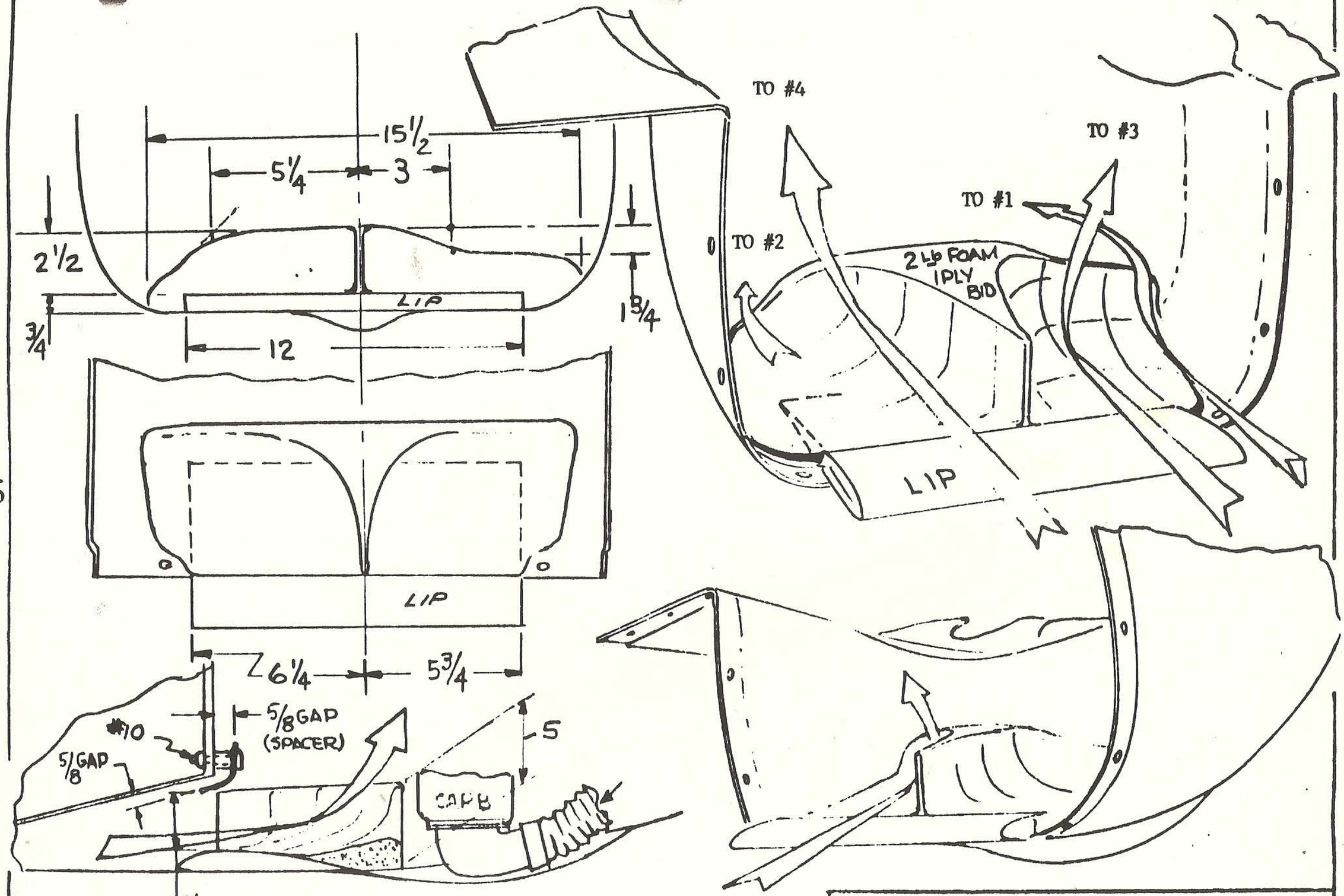

FIGURE 2

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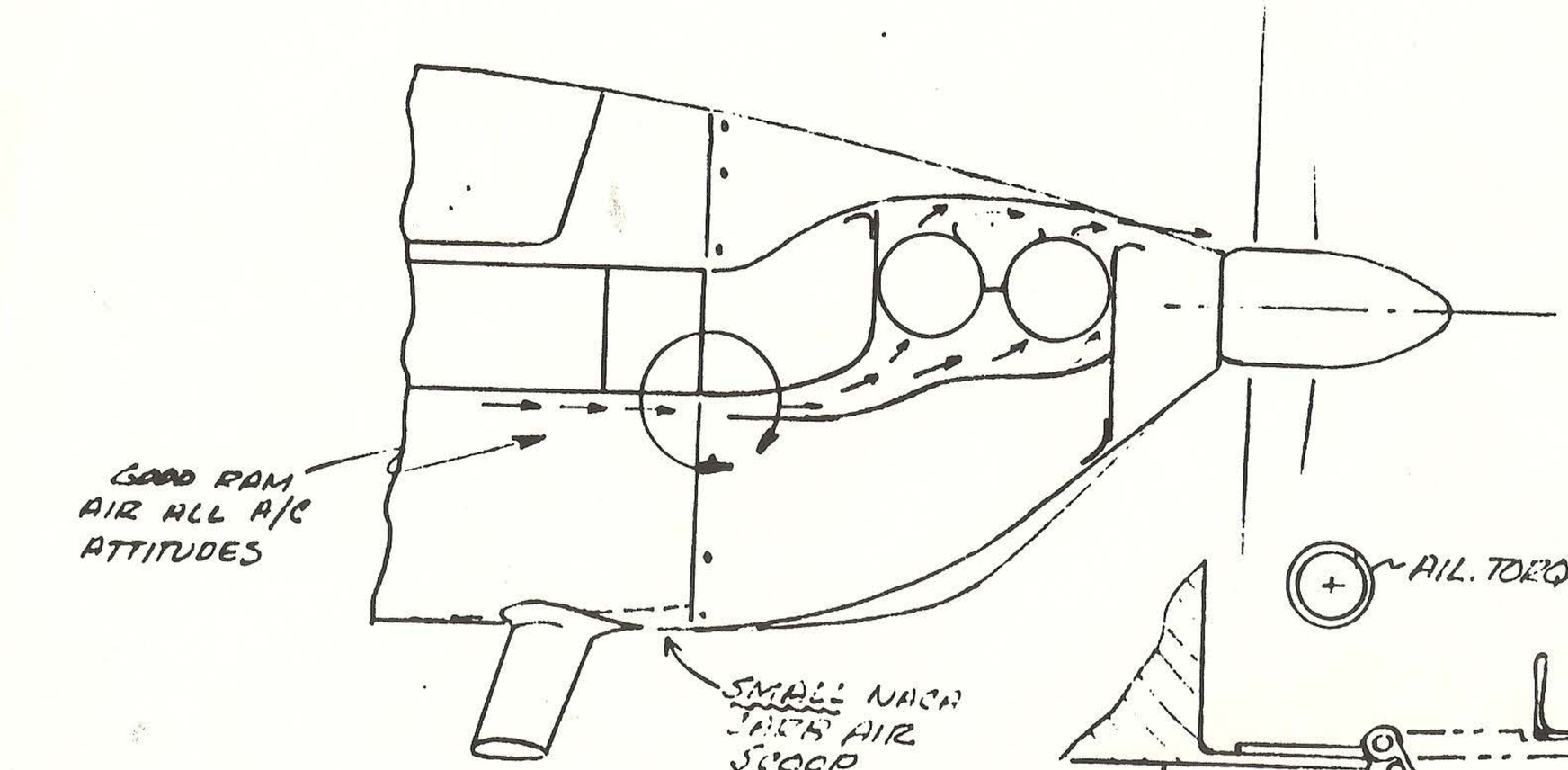
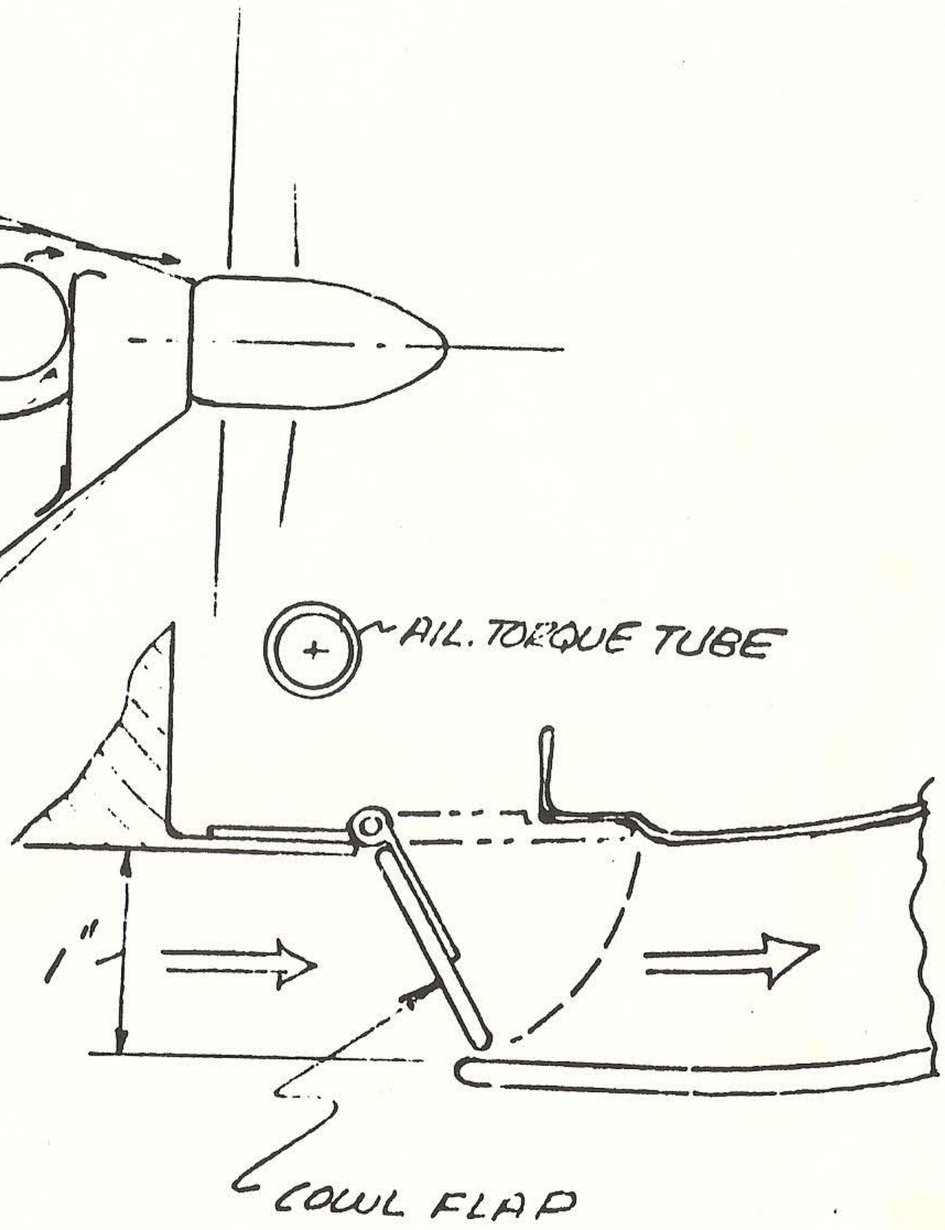
JUMBO DIVERTER N888EZ

S. KREIDEL

LONG EZ COOLING OPTION





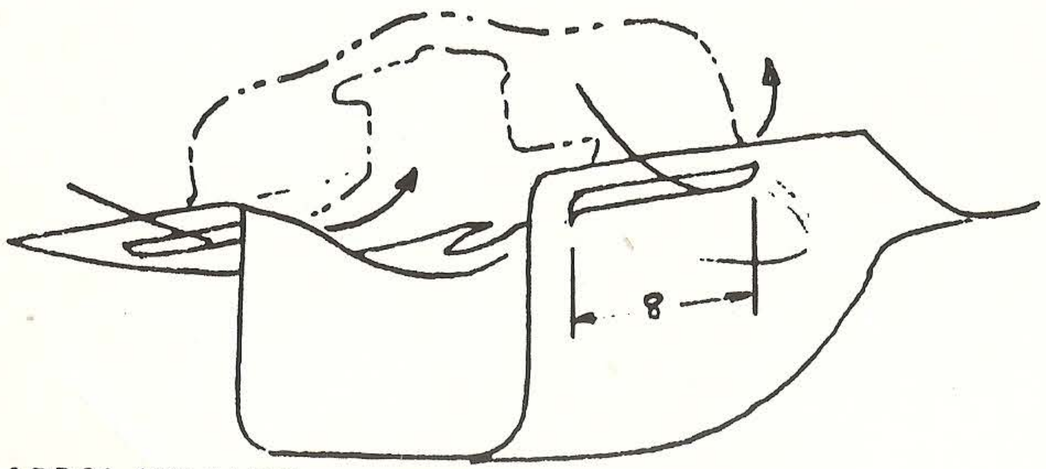


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FIGURE 3

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