FLYERS ASSOCIATION NEWS

Ellett Lawrence and Mrs. Lawrence with
Intercooled P-538

No. 89-1

Duke Flyers Association
P.O. Box 2599
Mansfield, Ohio 44906

February 1989

Financial Statement
For Year Ending 31 Dec. 1988

Receipts from memberships	$ 1,800.00
Expenses, Envelopes, Stamps, Bank Charges	$ 84.58
Bank Balance	$ 1,715.42

As you can see expenses are at a minimum as the Gorman-Rupp Co. prints newsletter. Only costs at this time are mailing and bank charges.

This turns out to be the intercooler newsletter. We have received the enclosed letter from American Aviation and have listed all comments from members.

MEMBERS COMMENTS

A - American Intercoolers

M - Merlyn Intercoolers

Belkin (A) - Mixed Opinion

Berry (?) - Cooler engine temperatures, max gross climb goes from 800' to 1200' per minute

Davis (A) - Substantial improvement in climb, no problems

Edmark (?) - Intercooling doesn't buy you anything except more drag and higher fuel burn

Gaudenti (A) - Works well, but have vibration problem that is unacceptable

Hahn (A) - Excellant cruise at 25,000' - increase 13-14 KTS climb up to 1100 FPM at gross

Hunter (A) - Units work well but a three man job to get the bottom cowling on. I would consider top mount intercooler if I were doing it again.

Jellinek (A) - I had the American Aviation intercoolers installed as soon as they were available. While American has a lot of whoopla about their product, I've found that there is "no free lunch." Yes the airplane flies faster at the same power settings, but you are burning proportionally more gas. If you dial down on the manifold pressure to obtain the same fuel flow, albeit a lower power setting, then you find yourself going at the same speed as before. They do allow you to go faster if you do not mind the bill at the next fuel stop. Also, I had a problem with the plumbing. It turns out that the ducts must be routed near to the exhaust stacks. Initially, heat shields were designed to clamp onto the manifold to reflect heat back onto the manifold and away from the intercooler ducts. That caused the manifold to warp and to separate from the turbo. The problem was corrected, but represented one more maintenance headache. If the cooler air charge to the turbocharger prolongs engine life, then perhaps the retrofit is worth it. If not, then the couple of increased knots do not seem to warrant the installation costs, increased fuel bills and maintenance problems.

Jones (A) - Would like to see cruise/performance charts for intercooled models

Kelley (M) - Recently installed

Futsko (M) -Good engine condition at 400 hrs.

Lawrence (?) - Better hot weather performance in take-off and climb. If I had it to do over would still install intercoolers

Markman (A) - Have been very happy with them. On average 8% improvement

Pozez (A) - Highly recommend them on any turbo charged engine. Greatly improved operating performance. Slightly shorter take-off run. Cool operating temps at cruise. Do not see significent improvement in speed or fuel consumption. Due to lower operating temps hope to extend engine life to full TBO.

Razook (A) - Have had for two years. 6-8 KT increase at 20,000'. Cylinder head temps seem to run cooler in climb. Increase in fuel consumption at same power settings. 30" mp same as 32" without coolers. Toss up as to benefits vs cost

Rhude (M) - No Comment

Ross (A) - About a year and ½ ago, we had the American Aviation intercoolers installed. We started having some problems immediately with the fiberglass mounting under the engine and also with the cowl flaps. The fiberglass mount seemed to be torked when it was applied, and after about 50 hours, the screw mounts started breaking loose. Also, something started causing the fiberglass to warp and twist which resulted in the cowl flaps hitting the side and not operating properly when they were being closed.

American Aviation indicated that they had never heard of this problem. Said the best way to get it fixed was to bring the plane to Spokane, Washington. They brought a pilot in who flew the plane back to Spokane. They did all repairs at their expense and then, at our expense, we went out and flew the plane home. We have not had any problems since.

We are pleased with the intercoolers and feel that it has definitely improved performance particularly during summer months. It is difficult to know exactly how performance has been improved as we did not accurately record numbers prior to installing the intercoolers so that we would have a good comparison.

We do recommend intercoolers and feel that American Aviation offers the best system for the Duke.

Schuler (M) - Runs cooler in climb to all altitudes. Increased power at cruise hardly noticeable.

Ware (M) - Careful study of the two intercooler installations shows many important difference. Merlyn Installation has:

1. STC on airplane and engine.
2. Cowl flap position does not affect flow of cooling air through the intercooler.
3. No reduction in allowance manifold pressure.
4. Scoop designed by Edgar Schmued who designed P-51- note similarity - scoop does not produce drag at high altitude and cruise power conditions.
5. No added ducting for causing circuitous flow of the induction air.

Note: Intercooled turbocharged engines are ***not new*** - P-38 had 50 years ago and value has been accepted for about that long.

Webster (A) - We like the intercoolers. Perform as advertised. Hot day performance is excellent, 1000' fpm at gross

Lund (A) - We have had no problems and I would put them on any Duke I owned.

Roger Allmand sent a set of powercharts for American units which were compared with non intercooled charts from Beech. It was impossible to exactly match power settings but we came close.

COMPARISON

INTERCOOLED **20,000'** **STD DAY** **(-20°c)**

MP	RPM	FF	HP	%PWR	TAS
30.0	2500	118	263	69	217
32.0	2500	126	275	72	225
32.0	2750	144	310	81	234
*30.0	2500	129			213

NON INTERCOOLED **20,000'** **STD DAY** **(-20°c)**

MP	RPM	FF	HP	%PWR	TAS
32.0	2500	116.4	260	68	215
32.0	2750	131.8	285	75	225
34.0	2750	140.7	305	80	231

**** Mark Markman actual flight @ 20,000'*** ***-18°c***

As you can see it appears to confirm Shaker Razook's comments regarding a 2" reduction is necessary to pull the same percent of power as a non intercooled engine.

It is difficult to offer a summary but from comments here is a try.

ADVANTAGES	DISADVANTAGES
(1) Full cruise power at higher altitudes	(1) Decreased gross by 50 lbs.
(2) Cooler running engine enhances life	(2) Increased drag
(3) Lower fuel consumption at reduced power settings. ?	(3) Possible to overboost engine at takeoff on on cold day using 41.5"
(4) Increased take-off and climb performance on hot day	(4) Little increase in cruise at same percent of power

So there you have it. Might want to write Lycoming for copies of their flyer. Issues 43, 44 & 45. Contact:

K.W. Johnson, Mgr. Advertising and Promotion
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652 Oliver St.
Williamsport, PA 17701

Marge and I would be glad to host a first Fly-In of Duke Owners, October 5-6-7 at Mansfield, Ohio. If you are interested drop us a note.

Jim Gorman