Q-200 FLIGHT TEST SUMMARY

Brian Martinez


*ed Note: Brian was kind enough to send this update of his test program so here is the current status. Probably read my comments about not hearing anything about it. >ed.

FLIGHT 03
DATE: 12 AUG 95
TAKEOFF TIME (local): 0900
MET= 1.0

Description: Regression flight to evaluate fuel system and evaluate speed performance and landing approach proficiency. Doug Shane and Bob Waldmiller again provided chase crew support with Norm Howell performing ground chase. This flight was unstructured and test cards were set aside. Prior to this flight, an transmit out problem was encountered with the VAL 760 COM and the unit was removed and sent to VAL for checkout. The unit checked good, but was not available for the flight (This problem is believed to be an antenna labeling problem in the aircraft; during flight 2 postflight the VAL was possibly hooked to a NAV antenna). The flight was performed with the ICOM handheld and associated headset interface and push to talk accessories. This was the second flight with 50 lbs of ballast in the passenger side baggage compartment. The ballast substantially improved handling. Made normal takeoff from runway 30 with climbout speeds of 85-90 MPH. Could not exceed 140 MPH in level flight. Fuel system worked properly with good continuous filling of header tank (first and second flights were aborted early due to a clogged fuel filter down stream of the facet fuel pump). Debris consisted of dark foam/resin slurry which dried to a light powder after exposure to the air. (Doug remarked that I should continue to change this filter every flight through the first 10 hours and that this condition is common even at SCALED). Made approximately 4 approaches with one bouncing touch and go and a smooth landing to full stop on runway 30. Rough landings are primarily the result of either misjudging the touchdown altitude and allowing the aircraft to flare high (with a high sink rate) or settling onto the mains with too much energy (leading to a divergent bouncing from mains to tailwheel). Speed control on final is of primary importance.Forgot to check on NAV12 operation. Main Tank gauge is still tango uniform (it's registering something...I'm not sure what). Header tank was full after landing rollout. Brakes are working predictably and with satisfactory stopping power. Still
have noise when applying left hand brake. Differential braking is not a problem if used with caution. The big tailwheel is positive... works good/sticks good. Audio recording of chase video was not successful as it was with flight 2.

**FLIGHT 04**
**DATE:** 20 AUG 95  
**TAKEOFF TIME (local):** 0910  
**MET**= .4

Description: Maintenance test flight for primary COM/NAV checkout and pilot landing confidence/proficiency. First flight without chase support. Normal climbout from runway 30 at Mojave. Sluggish climb was experienced as has been the case. Engine RPM during takeoff run and climb did not exceed 2300. Maximum rate of climb was 900 FPM at 80-90 MPH and approximately 10 degrees angle of attack as read from artificial horizon. Felt and applied aft stick, effectively balancing takeoff lift between front and back wings. This diminished excessive tail up (tail flying first) during takeoff roll. Terminated climb at approximately 7000 ft MSL due to power pulses as noted in flight 2. No large RPM transients or engine missing were noted. Engine temperatures and pressures were nominal and as observed in previous flights. Normal entry to pattern and smooth landing. No noted engine anomalies during taxi.

**FLIGHT 05**
**DATE:** 27 AUG 95  
**TAKEOFF TIME (local):** 1020  
**MET**= .7

Description: Engineering troubleshooting of engine power in climb and level flight, maintenance test flight no. 2 for NAV checkout, and pilot landing confidence/proficiency. Based upon discussions with Mr. John Sharp, this flight was run for baseline experience on possible Manifold Pressure anomalies. No manifold pressure gauge was mounted during this flight due to lack of available parts. It was believed that the geometry of the carb heat valve on the airbox might have been diverting flow from the Ellison TBI and thus reducing manifold pressure during dynamic flight. Flight Test Airbox 1 (without carb heat provision) was substituted for this test flight. This airbox was the first prototype and had been previously used for ground runs only at static conditions. There was no major improvement in maximum throttle RPM. Climb was as observed in previous flights with back stick applied to avert excessive tail up during takeoff run. Climb was initially slow at 400-500 FPM at 95-100 MPH. This was the climb airspeed recommended by Mr. Gene Sheehan. A higher rate
of climb was assumed at 900 FPM and 80 MPH. Climb RPM varied from 2200 to 2300 RPM.

Multiple attempts were made at 3000-4000 AGL to pushover slightly and normalize an airspeed condition in level flight by unloading the propeller and then letting it reach equilibrium. This was partially successful with leaning and airspeeds of 151 MPH were observed in straight away runs prior to turns with VSI showing little climb or descent indications. With these pushover runs the engine appeared to get into this mode easier and easier lending weight to the argument that the engine is still in a break-in state and may begin to improve in performance with proper coaxing.

Six approaches were made to runway 08 at Mojave. During these landing attempts there was great difficulty experienced in maintaining the visual glideslope due to thermal effects within the quarter mile final to the runway. In addition, after flight reports indicated a quartering tailwind on approach to the runway (with a shear moving in a different direction at 500 AGL), this not being visible from the traffic pattern altitude on the 08 side of the field. Observed wind socks on the other Mojave locations indicated a normal headwind approach. Two of the approaches ended in bouncing touch and goes. The final third touch down, landing, was less stable than desired, but understandable considering the quartering tailwind.

There was no indication of NAV12 operation any time during the flight. The OBS was set to 114.5 during the flight and there was no indication of station reception. During the next maintenance day this device will be OPS checked for continuity on the ground and electrical operation. If it fails these checks it will be removed permanently and replaced by a manifold pressure gauge.

On postflight, Mr. Sheehan remarked that the aircraft may need 3 quarters of a degree down incidence on the back wing. He said that it would not effect speed performance and the aircraft could be flown as is .......but made the remarks based on the pilots initial impressions of elevator position and reflexor position during the past 5 test flights. Mr. Sheehan further remarked that I might want to change the incidence of the canard or change the outboard camber of the main wing surfaces in order to reduce the amount of reflex required. This would be done by removing the aft one-third of the outboard surfaces and re-attaching at an increased trailing edge up position (My impression is that this might also be done by shortening the main wing section span). Mr. Sheehan also remarked that there was excessive play on the right hand aileron requiring attention before the next flight.
FLIGHT 06
DATE: 30 SEP 95
TAKEOFF TIME (local): 1020
MET=0.6

First flight with Crawley Prop borrowed from Gene Sheehan. Attempted to use thumb tach to verify aircraft tach rpm, but batteries were run down. Preflight engine runs showed static RPM of 2450 to 2500 on aircraft tach. Executed card 4, Takeoff/Climbout (runway 30), and noted climb at 2550 RPM and 95-100 mph/1000 fpm. Engine CHT was 400+ and EGT was 1400. Transfer pump was noisy during this flight. Acceleration and climb was much better. Could not, however, exceed 140 mph in straight and level flight. Westach Oil Pressure side of Dual Gauge failed and went negative of center....possibly related to RTV'ing of sender unit on firewall. Mechanical binding of mixture lever in quadrant noted. Narco Nav 12 again failed to operate after visual inspection. Gene Sheehan noted that the wheel pants on this aircraft are large compared to the Lamb tires and some closeoff of the well opening may be required to reduce drag (And Wheel pant drag may be a significant thing on this aircraft). Landing was smooth on runway 30.

FLIGHT 07
DATE: 7 OCT 95
TAKEOFF TIME (local): 0940
MET=0.4

Second Crawley prop checkout flight. Narco Nav 12 removed from aircraft permanently. Intended to look at top end speed again. Oil Pressure sender fix was a grounding issue due to RTV shock isolation. Normal takeoff from runway 30 with 1000 fpm climb to 8000 feet. Some light chop. Noted slightly rough sounding engine or something forward of firewall. Engine Oil Temp was 230 Deg F. Made towplane descent and landed on 30 with only slight bounce, but moderate rudder correction due to estimated 10 knot crosswind from the left. No anomalies were noted with engine on post flight, however, three cowling screws were missing on the right side of the cowl.

FLIGHT 08
DATE: 22 Nov 95
TAKEOFF TIME (local): 1416
MET=.5

Description: Manifold Pressure checkout and first flight with shortened aft wing (reduced lifting surface tip to BL101 from BL104; builder oversight).
Preflight ground testing of the engine after installation of Manifold Pressure gauge showed the following with the Crowley Prop:

<table>
<thead>
<tr>
<th>RPM</th>
<th>MANIFOLD PRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>1000</td>
<td>11</td>
</tr>
<tr>
<td>1200</td>
<td>11.5</td>
</tr>
<tr>
<td>1500</td>
<td>13.5</td>
</tr>
<tr>
<td>1700</td>
<td>15</td>
</tr>
</tbody>
</table>

Flight 8 was conducted with the PROPS INC. propeller of 58" dia and 71" pitch. Preflight testing of the engine tachometer with a hand held Thumb Tach showed the cockpit tachometer to be reporting accurate RPM. Prior to flight, the entire carburetor heat valve assembly and hose ducting to the lower cowl air inlet was removed. The only object mounted to the Ellison TBI was the air box....fully open at the front. Manifold Pressure observed for the mission were as follows:

<table>
<thead>
<tr>
<th>RPM</th>
<th>MANIFOLD PRESS</th>
<th>IAS(MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>27</td>
<td>-----</td>
</tr>
<tr>
<td>1000</td>
<td>11</td>
<td>-----</td>
</tr>
<tr>
<td>1700</td>
<td>18</td>
<td>-----</td>
</tr>
<tr>
<td>2250-2300</td>
<td>25</td>
<td>125-130</td>
</tr>
</tbody>
</table>

Maximum airspeed did not exceed 130 MPH IAS in level flight (similar to first three flights). Manifold Pressure was observed to decrease for the constant power setting with increasing altitude. The engine operated smoothly and engine oil temperature stayed at about 220-230 degrees.

There was no great improvement noted in pitch attitude nature due to the approximately 3% decrease in aft wing area. Takeoff and landings were a replay of previous flights. Takeoff was made from runway 08 and 4 approaches were made to runway 30 culminating in a landing. The first attempt at landing was abortive due to the pilots failure to achieve proper speed control. This first attempt led to a divergent bounce and the pilot elected to go around. Wind conditions were calm.

Recommendations: Continued operation of this Q-200 aircraft with the present Ellison Throttle Body Injector installed is in question. (1)The first three flights established that the Ellison could not be operated to a full throttle lever position due to non-optimal atomization characteristics
when installed on the O-200 causing rough running and loss of peak RPM. Ellison has not been very enlightening on the subject of TBI shortcomings. (2) We are now establishing that there is a manifold pressure loss outside of any detrimental effect of Carb Heat/Induction plumbing and with the air plenum essentially open to the entire cowl volume. Comparison of engine performance with a Marvel Schebler carb is necessary at this time.

Notes: In separate phone discussions, Norm Howell and Bob Waldmiller were in agreement that the indications are that the engine is short an inch or two of manifold pressure. This would be a good accounting for a significant part of the 60 MPH of performance which I appear to be missing. This is a good validation of having a manifold pressure gauge for engine troubleshooting, even when a constant speed prop is not available. It may be interesting to talk to John Sharp about what it will cost to have my Marvel Schebler carb overhauled. "Betcha that would be a good data point". On a possibly related note: Klaus mentioned to me last summer that the Ellison TBI was problematic and potentially dangerous even though he uses it on his Vari-eze, and Mike Melville recently switched to an Airflow Performance fuel injection system. So, how does Sheehan make his installation work?

The following originally published July 1997

More updates on Brian Martinez's "I love my airplane/I hate my airplane" Q-200 Flight Test Program. We've had these for a while, and there will be more as space permits. Brian has been noted by the Flight Advisor community for running an exemplary and professional flight test of his Q-200.

FLIGHT 09
DATE: 10 FEB 96
TAKEOFF TIME (local): 1120
Mission Elapsed Time (MET)=.3

Inflight engine evaluation with Marvel Schebler carburetor substituted for Ellison TBI. During the December 1995 Holiday period, I removed and replaced the TBI with the Marvel and performed a full power engine run. The propeller remained the PROPS Inc. Type previously used for flight testing. Results for the ground test were as follows:

<table>
<thead>
<tr>
<th>RPM</th>
<th>MANIFOLD PRESS</th>
<th>IAS (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>27.5</td>
<td>Static</td>
</tr>
<tr>
<td>1000</td>
<td>10</td>
<td>Static</td>
</tr>
</tbody>
</table>
This indicated an increase of 2 inches of mercury in manifold pressure. Maximum RPM was still 2300 when the carb was properly leaned.

Flight testing of the aircraft was delayed completing cowling mods required to accommodate the Marvel and associated linkage modifications. Runup was normal. During takeoff, the engine would not exceed 2300 RPM and again seemed to hit an invisible stop. Climb was approximately 90 MPH IAS with about 1500 FPM climb. Level speed did not exceed 121 MPH IAS. The takeoff was straight out from runway 30 at Mojave. I elected to turn the aircraft around and re-sequence into the landing pattern for 30 due to my disappointment with the flight performance. Landing was uneventful.

The aircraft was postflighted with no anomalies found by me. Mr. Jon Sharp subsequently checked mag timing and noted that it was normal at about 25. Mr. Sharp noted a loose AIRQUIP fitting on the intake spider for the manifold pressure tap. During a subsequent ground runup, Mr. Sharp could identify nothing out of the ordinary, but once again examined the tip flexibility of the mahogany prop...wondering if it is not permitting higher speed flight and is absorbing engine power. Mr. Sharp's conclusion was that the next step is to try a different prop. A Prince prop is on order and expected in the next two weeks.

<table>
<thead>
<tr>
<th>RPM</th>
<th>Static</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300</td>
<td>12</td>
</tr>
<tr>
<td>1400</td>
<td>13.8</td>
</tr>
<tr>
<td>1600</td>
<td>17</td>
</tr>
<tr>
<td>1700</td>
<td>18</td>
</tr>
<tr>
<td>2230</td>
<td>27</td>
</tr>
</tbody>
</table>

FLIGHT 10  
DATE: 8 MAR 96  
TAKEOFF TIME (local): 1017  
MET=.5

Flight Test Point - **Checkout of reconfigured tank venting**. Prior to flight, vinyl connection tubing from total pressure vent tube to header tank vent tube was removed and replaced with Nylon Poly Flow tubing. The vinyl tubing was installed during final construction of the aircraft over a year ago. Recent inspection showed this tubing to be swollen at the ends and somewhat pinched in the middle of the tube length. The main tank cap (which had a 1/16 hole drilled per plans) was also replaced with a cap having no hole. **I was told to checkout the vent system by Paul Fisher in a series of E-Mail exchanges. The theory in this case was that the tank vent**
line was partially blocked causing improper tank pressurization compounded by the vacuum pressure generated by the hole in the tank cap on the side of the fuselage. This resulted in a leaning effect as velocity increased.

Extended ground run was performed to gain confidence that tank venting was OK for flight. Takeoff was from runway 30 with a slight quartering tail wind from the right. This runway was used due to the closure of 08 for installation of new lighting. Max throttle RPM during takeoff was 2300 with the same Props, Inc. propeller as used before. This propeller was used for a data point in spite of the arrival of the new Prince unit. On this flight, however, the RPM did not roll off 50-100 RPM. Ambient MP reading was 27.5 in. Hg. During takeoff, 27 in. Hg MP indication was observed for the first 2000 feet or so of climb. During push over RPM climbed to 2450 or more and 150-155 MPH IAS was observed. The temperature at altitude was approximately 16C for approximately 176 MPH true. This was the first indication of "in the ball park" performance with this aircraft. Props, Inc. Propeller does work all right. I will repeat this effort on the next flight with extended performance runs to take a good look at the engine. Flight was discontinued due to low fuel. The first approach was not successful due to the quartering tail wind to runway 30 and resulting in difficulty maintaining airspeed control to ground handling. Normal landing was made to runway 12. I am continuing to observe the sashay when transitioning to the ground; with an apparent momentary control loss. Discussions with Gene Sheehan afterwards underscored observations made in post test videos of rudder control loss with weight on the tailspring. Gene Sheehan recommends cutting the tailspring to lower the angle of the rudder control wires to the tailwheel bellcrank as the big tailwheel now absorbs all of the tail shocks. I am, however, inclined to install Maule springs in the present configuration as shortening the tailspring will change the ground angle of attack of the aircraft.

Notes: Fix control play in ailerons and mount new Prince prop for next flight. Install and taxi test tailwheel assembly with Maule springs. Barry Weber stopped by and suggested that I get rid of the gascolator and that I take a good look at my fuel flow rate from the header tank (with the check valve and gascolator installed and think about how the boost pump might save me).

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FLIGHT 11
DATE: 16 MAR 96
TAKEOFF TIME (local): 1125
MET=1.2
Flight Test of Prince propeller. Preflight testing of the Prince 58”, 68” Pitch propeller indicated a maximum static RPM of 2300. This was consistent with previous propeller performance and was somewhat disappointing. Prior to flight testing, Maule springs were installed between the tailwheel bell crank and the rudder bell crank in order to prevent rudder flutter when weight is on the tailwheel. Right aileron play was also isolated to the aileron torque tube attach bolt. This bolt was tightened effectively eliminating the problem.

Takeoff was normal from runway 12. Wind was nominally 8 kt from the north. This flight was unstructured. Directional control was better with the new spring arrangement as no sashay motion was noted at high ground speeds. Better control was also noted on the landing rollout. Climbout performance was as noted in flight 10 with 2450 observed in the climb. Climb was maintained with a right turn toward Cal City and continuing to 6500 ft MSL. Upon reaching 7000 ft MSL a pushover was initiated which resulted in increased speed. RPM remained at 2500 to 2550 for over 2 minutes and through a turn to the south. After a resonant change, I noted that the RPM went to 2650-2700. After throttling back to check the condition, I resumed the max throttle position and approximately 2700 RPM. Flight from Cal City to the West Antelope Valley and aqueduct showed indicated airspeeds of 148 to 155 MPH at 8100 ft MSL and groundspeeds from GPS of 169 kt with a tailwind. True airspeed was estimated to be 174 MPH assuming an OAT of 60 deg.

Flight was made to the Tehachapi area and back to Mojave. This was followed by a racetrack course from Mojave to the West Antelope Valley again and return. One attempt at landing on runway 04 was made due to the winds. The aircraft was recovered on runway 12 with more than normal braking required to slow the aircraft down.

FLIGHT 12
DATE: 24 MAR 96
TAKEOFF TIME (local): 0915
MET=.8

Flight Test of Prince propeller. Attempted repeat of flight 11. Winds delayed an ambitious schedule of flying for the weekend. Sunday morning conditions were good locally with calm winds reported at Mojave. The windmills on the mountains toward Tehachapi were turning fast, however. Takeoff was from runway 04 with climbout at 100 MPH and varying climbs of from 500 to 1000 fpm. Doug Shane took off behind me and joined up for the trip to the West Antelope Valley. Mr. Shane RTB’d over Rosamond after confirming my airspeeds. Maximum IAS was 155 mph with the VSI showing zero. Measured outside air temp was 60 degrees F. TAS was
estimated to be 178 mph. Some engine roughness was perceived possibly due to improper leaning. Planned flight time was 2 hours, but due to engine questions, local gusts in the vicinity of rough terrain, and fuel transfer questions, I expedited return the local Mojave area and landed. During fuel transfer operations...a fine stream of bubbles was observed in the header tank sight gauge. Landing was to runway 08 from a standard left hand traffic approach. Several bounces and some gusting crosswinds down low. The whole pattern was over the field and the ground came up real fast going base to final. This was a "Dick Rutan Big Blue Approach" and I would like to keep mine a little more relaxed; Nuff said!

Squawks:

(1) Brakes would not hold aircraft at 1700 RPM for runup. Disposition - Bleed brake system before next flight.

(2) COM Radio is still difficult to read...volume is part of the issue. Disposition - OK for flight, but I can foresee replacement of the VAL COM 760 with a King or ICOM by the fall.

(3) Fuel transfer from the main to the header was less than spectacular. I am still not sure that the current Facet pump has the juice to perform reliable transfers and top off of the header with the engine running. Disposition - (A) Cleaned the in line filter during the post flight. (B) Determine the gallon per minute rating for the installed Facet pump and see if we can do better.

(4) Holding nose up trim at max power and 8000 ft MSL requires me to push my knee up to the trim wheel. Disposition - re-adjust the spring tension.

(5) Currently at maximum aileron trailing edge up reflexor position...in order to maintain straight and level trim. Neutral reflex causes steady descent. Disposition - After flight initial flight testing, cut outboard aft wing panels and reflex them x degrees trailing edge up.

FLIGHT 13
DATE: 30 MAR 96
TAKEOFF TIME (local): 1335
MET=1.0

Flight to test ground handling and braking. Preflight activity was to fill and bleed brake system after unsatisfactory braking noted on flights 10 through 12. Brake system maintenance resulted in adequate breaking.
Took off later in the day than normal with winds becoming stronger than desired. Moderate turbulence experienced in the vicinity of rough terrain. Performed Cal City to West Antelope Valley leg with area maneuvering. RTB due to fuel exhaustion in main tank. Landed on runway 12 after two attempts on runway 08 with strange winds.

FLIGHT 14
DATE: 31 MAR 96
TAKEOFF TIME (local): 1000
MET=1.4

**Routine unstructured flight test - Triangle Route.** Takeoff was from runway 08. Takeoff was with full fuel. Normal climb to 7000 ft over Cal City, turning south at the test track. Flight legs were test track to the California Aqueduct to Tehachapi to the test track. Noted smooth engine operation when properly leaned. Noted resonance in prop after reducing power from 2800 to 2500 at 8000 ft MSL, 178 MPH TAS. Need to exercise caution with resonance in the future and do some exploration of this condition (Is it spinner related?). Resolve to "S" turn to burn off speed prior to power reduction. Resolve to keep RPM at 2000 during descents with Carb Heat. Landed on runway 08 very smoothly.

FLIGHT 15
DATE: 06 APR 96
TAKEOFF TIME (local): 1030
MET=2.1

**Routine unstructured flight test - Endurance Buildup.** After fuel top off, noted fuel dribble from main tank sender terminal. This required 45 minutes of cleanup and seals the deal for expediting replacement of the automotive type tank sender with the capacitance device. Takeoff was from runway 08. Ran Koehn Lake to Fairmont/Aqueduct dogbone. Altitudes varied in cruise from 7000 MSL to 9500 MSL. Speeds were a little off. This was believed to be due to leaning difficulties as a result of the flexing of the mixture cable in the cockpit. *We will have to seriously think about reinstalling the Ellison at some future time. This may yet give us better Economy and venting may have caused the Ellison much greater problems on those early flights than it would a Marvel Float Bowl Carb. That might have accounted for the Manifold Pressure dispersions between the two also. Sorry, Ellison, its all inconclusive, but it probably wasn’t you. Had to land to relieve myself otherwise this would have been a longer flight. Good landing on runway 08. Trouble braking to the first exit.*
FLIGHT 16  
DATE: 26 APR 96  
TAKEOFF TIME (local): 0925  
MET=1.8

**Cruise condition & test of Capacitance Fuel Sender**. Flew Koehn Lake - Fairmont/Aqueduct Dogbone. Takeoff from runway 08. Takeoffs are a breeze every time. Called up Joshua Approach for a Mode C check on the KT-76A installation. The light is blinking like its getting hits, but Joshua couldn't identify me with the squawk they gave. Possibly I did not go to the proper squawk as reception was poor (even within 15 nm of Edwards and within the line of sight). Will have to do this check over on a better day.

Lots of oil on bottom of fuselage bleeding from the lower engine cowling. Still coming from the two case bolt locations on top edge of engine case (Note: to try resealing with Permatex versus RTV). Will have to reseal and clean. New fuel sender is excellent; working well, though probably needs some adjusting for precision. Had some paint flake off on the bottom of the fuselage. Paint as well as primer slid off an area as big as my hand. I think maybe the surface finish did not offer enough tooth to hold on to. Will have to degrease, rough up, and re-prime. Landing was smooth. Beginning to note that on my landings I am finding myself imaging that the main wheels are wide extensions of my legs. I am imagining that the mains are 5 feet out in front of their real location when I gently rock it back toward the tailwheel and ease the mains to the runway. This seems to work for me.

The following originally published September 1997

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FLIGHT 17  
DATE: 11 MAY 96  
TAKEOFF TIME (local): 1030  
MET=0.8

**Ballast experiment**. This flight was performed with 25 lbs removed from the passenger baggage compartment leaving a total of about 27 lbs in that location. The passenger seat was uniformly weighted with 150 lbs. Takeoff was from runway 08. This led to a takeoff run of 23 seconds with liftoff at 90 mph indicated with moderate aft stick input. VSI indications were as follows:

<table>
<thead>
<tr>
<th>MPH (indicated)</th>
<th>VSI (fpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>900</td>
</tr>
<tr>
<td>100</td>
<td>500</td>
</tr>
</tbody>
</table>
This is strange. Will have to do this one over. Maybe it’s real, maybe thermals.

Oil temp was at 230° today. About 85° this morning and climbing. Will have to really work on Sheehan’s suggestion to remove the gascolator and duct air around the spin on oil filter. I am tired of watching those temps like a hawk. Due to the more aft CG positioning, only about 5° of up elevator was required to maintain straight and level. This is down from the usual 7.5° to 8° which I usually have. This was well within the spring trim power and is a lot more relaxing than what was previously experienced. We are firming up to the idea of putting the aircraft in a two week layup in the fall, cutting the main wing out and reinstalling it at a lower angle of incidence. Sheehan agrees that this is the way to do it. Flight track was Koehn Lake to Fairmont Dogbone. Landing was very good on 08. Still showing oil drips, but no noticeable sump losses.

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FLIGHT 18
DATE: 12 MAY 96
TAKEOFF TIME (local): 1155
MET=0.5

**Hot Day with Thermals**. Due to required maintenance, takeoff was later in the morning. Wind was beginning to come up and 90° or more. Still showing some oil drips.

Takeoff was from runway 26 and flight conditions were degrading due to winds and hot desert thermals. Ride quality was not good, but much better than what would be expected in a SPAM can. Decided to cut it short and fly another day rather than submit to the punishment. Remember to FLY SCARED.

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Good landing on runway 26 after missing the first approach after being too high on initial. Still noting a slight nose to the left effect on first touchdown. Though I’m not aware of it, I wonder if I’m putting in some right aileron that’s causing me to aileron steer. I will have to watch that.
FLIGHT 19
DATE: 06 JUN 96
TAKEOFF TIME (local): 0909
MET=1.1

**Short Period Response**. Koehn Lake - Aquaduct Dogbone. Normal takeoff from runway 08.

Normal landing on runway 08. Couldn’t get the braking down to make first exit. Too far down the runway in the approach.

FLIGHT 20
DATE: 15 JUN 96
TAKEOFF TIME (local): 0904
MET=1.5

**Rudder Doublets - Pitch Response**. Koehn Lake - Aquaduct Dogbone. KT-76A checked good at the Avionics shop. Technician thinks it is the RST antenna and recommends installation of normal transponder antenna with normal coax connection. Technician believes that there is leakage at the split shield connection of the RST antenna (More things to do in the layup).

Normal takeoff from runway 08.

Header sight gauge showed meniscus at 1.3 hour point suggesting a transfer difficulty. Transfer pump was GLUB, GLUB, GLUB during taxi suggesting some problem. Was off speed on first approach to runway 08. Made approach to 12 after go around and landed normally.

FLIGHT 21
DATE: 22 JUN 96
TAKEOFF TIME (local): 1107
MET=0.6

**Post Maintenance Test/High Winds**. Performed post flight work after flight 21. Cleaned inline filter between main tank and header. Some fine debris, but no great buildup as before. Transfer pump ran clean after this cleanup. Also washed aircraft down.........specifically the underside for oil blowing. Still showing leakage from upper seam screw locations despite attempting to dab Permatex. After noting the easy takeoff of a resident Defiant and reports from a BD-4 which just landed a flight was attempted. Takeoff was normal from runway 26. Air conditions were rough and decided to RTB over Rosamond. Returned and recovered with normal landing.
**FLIGHT 22**
**DATE:** 23 JUN 96  
**TAKEOFF TIME** (local): 0806  
**MET=1.2**

**High Oil Temps and Tach Timing Notes.** Takeoff was from runway 26 with a strange drop off during takeoff which I have been briefed is normal from this direction at Mojave. Noted for the first time that flight time is significantly different from the Tach timing that is being recorded *(Note that the Tach showed approximately .8 time elapsed while the watch showed 1.2 for the flight duration.)*. Couldn’t keep eyes off the Oil Temp indicator. After completing climb to 7,000 MSL noted temps edging 230 degrees. Backed power off to show 2500 RPM and leveled off. This brought the temps down to about 225 degrees. I’m uncomfortable with what the temps are doing and probably won’t relax until providing some forced air cooling to the spin on Oil Filter. Landing was extended and a little bounce, but aircraft controlled out nicely.

**FLIGHT 23**
**DATE:** 29 JUN 96  
**TAKEOFF TIME** (local): 0816  
**MET=0.8**

**Duration Flight.** Noted excellent flying weather. Some oil runs on bottom of fuselage due to blow by from dripping. Added 10 GAL of 89 Oct Unleaded today. This brings the main tank short of full for the flight. Oil level at 5 and a quarter. Added a half quart which brought it up to six. Noted crack on top leading edge blade cutout of aluminum prop spinner. Paint was visibly cracked approximately .25 inches. Drill stopped the crack in the prop spinner. Takeoff normal from runway 08 with lowered climbout angle for temps. Noted some roughness, however, MP and RPM were normal.

Something felt wrong. Discontinued flight for cause and RTB’d from the Rosamond area. Made approach from windmills to 08. Approach was high which set up for a off airspeed condition. Made go around for the downwind and extended for a Super Viking landing number 1. This time the speeds came into the groove and landing was normal with good braking to the first exit. Post flight inspection showed propagation of the spinner crack another .125 inches beyond the drill stop. Current disposition is to replace spinner and try to fabricate a forward bulkhead for the next spinner. May also attempt to complete wheel pant mods, gascolator removal, and mixture linkage improvements while in spinner layup.
First flight since the change in angle of incidence on the back wing. The change was 2 degrees leading edge down. The aim of this change was to fix the tendency of the tail to lift early on takeoffs and of the aircraft to try to fly nose down. Corrections for straight and level flight required most of the reflex capability in the ailerons on the back wing for trim (i.e., trailing edge up) and several degrees of trailing edge down elevator on the front wing (canard). Moderate pilot compensation was required in order to correct for these discrepancies. Modifications took 4 weeks of off and on work which included wing de-mate, realignment, wing re-attach, surface preparation, and painting. Reassembly and preflight included the following:

(a) Corrosion inspection of all removed fasteners to include tail mounting brackets, aileron/reflexer linkage, aileron mass balances, rudder cable connections, and electrical cables.
(b) Installation of ACK ELT and remote switch/sender unit.
(c) Installation of extra BNC bulkhead connector to allow use of the vertical tail, VHF COM ferrite di-pole, for the ACK ELT.
(d) Re-route bundle of wiring in aft fuselage.
(e) Change linkage adjustment for aileron control up/down tubes.
(f) Clean and grease all aileron linkage.
(g) Finesse sand and polish upper surface of wing and canard.

Flight Test

Engine run-up was normal with no anomalies. No ballast was carried in the baggage compartment in order to get a good assessment of handling qualities. Two high speed taxi runs were made in order to identify any hazards to safety which might have been induced in the incidence change. No adverse changes were noted. The tail remained on the runway throughout the two test runs from 0 - 60 mph with no ballast and with the reflexer centered. This was a major improvement in aircraft handling.

Takeoff was without incident with the tail remaining on the ground for the entire takeoff run. Normal stick force was required to initiate climb. Initial climb was at 75 - 80 mph later accelerating to 90 and then 100 mph later in the climb. Aircraft rate of climb was not noted. Thumb trim switch inputs to the Stewart-Warner reflexer actuator gave immediate trim response for the climb enabling stabilized climb in the pitch axis. A slight input of elevator spring trim was used as a fine adjustment for pitch
during the climb. There was a noticeable roll to the left at full power
during the climbout which marked the shortcoming in having no roll trim.
This roll characteristic with no passenger or right side ballast was noted
during the first flights of the aircraft with the previous wing decalage
relationship. There may be a suggestion of including some form of roll
trim in the design, at some point. The reflexer trim provided a strong pitch
stable climb to 8,000 ft MSL.

Several straight and level runs were made at 7,500 - 8,000 ft MSL with
stable indicated airspeeds of 155- 159 IAS at an estimated 50 - 60 degrees
OAT. Engine leaning and aircraft trim condition was not optimized. Trim to
and stabilization at a flight attitude is significantly better. Straight and
level roll trim stability is still an area for improvement.

Two attempts were made to determine pitch buck speed. Buck on- set was
detected at 67 mph IAS and 8,000 ft MSL. Precise aircraft nose up pitch
attitude was not noted, but was significant. The pilot could not induce a
significant pitch buck on these two attempts and will revisit the issue.

Landing approaches and touchdowns were significantly improved over the
previous configuration. The aircraft approach was more predictable (i.e.,
more Cessna - Piper like) and the full range of reflexer settings provided
for much improved trim capability over and in addition to the elevator
spring trim. It is again important to note that as configured on this aircraft
(N557BM), the trim switch actuated reflexer provides gross power
trimming with the magnitude of a flap lever; while the elevator spring trim
provides a finer, though different, trimming effect. Unlike full power on
conditions, roll stability is not a factor with the power pulled back for
pattern work or power pulled off for approach. Two touch and go’s and a
full stop landing were made. The improved handling permitted left main
wheel to right main wheel to tail wheel landings. The only significant
discrepancy noted during the landing is the restriction to the right toe
brake pedal range of motion due to interference from the firewall stiffener.
The brake pedal restriction requires moderate pilot compensation and
effects initial application timing, resulting in longer landing roll out.

Post flight inspection showed no indication of delamination, flex damage,
or paint cracking at the structural attach points of the wing.

Based upon these observations of more satisfactory aircraft handling, we
can now re-examine use and completion of the performance and flying
qualities flight cards. Additionally, the improved trimming capability
should allow for off design airfoil performance such as would be the case
due to surface contamination and rain. Safe cross country performance
over a reasonable range of atmospheric conditions should be assured.