NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

June 1, 2012

AIRWORTHINESS

Group Chairman's Factual Report

WPR11MA454

Attachment 6 – Weight and Balance Information
(6 pages)

AIRCRAFT WEIGHT AND BALANCE REPORT

N79111 A/C: P-51D S/N: 44-15651
Hobbs Date: 9-14-09

Actual Empty Weight As Weighed

Location	Weight	Arm	Moment
L/H Main	2889	117	338013
R/H Main	2885	117	337545
Tail	553	306	169218
Operational Boiler Fluid Weight	147	215	31658
	6474	135.38	876434

Flight Weight & Balance

Limits 135.77" to 143.8"

Aircraft	6474	135.38	876434
Pilot	200	172	34400
Empty	6674	136.47	910834
Full	2021	142.64	1240257

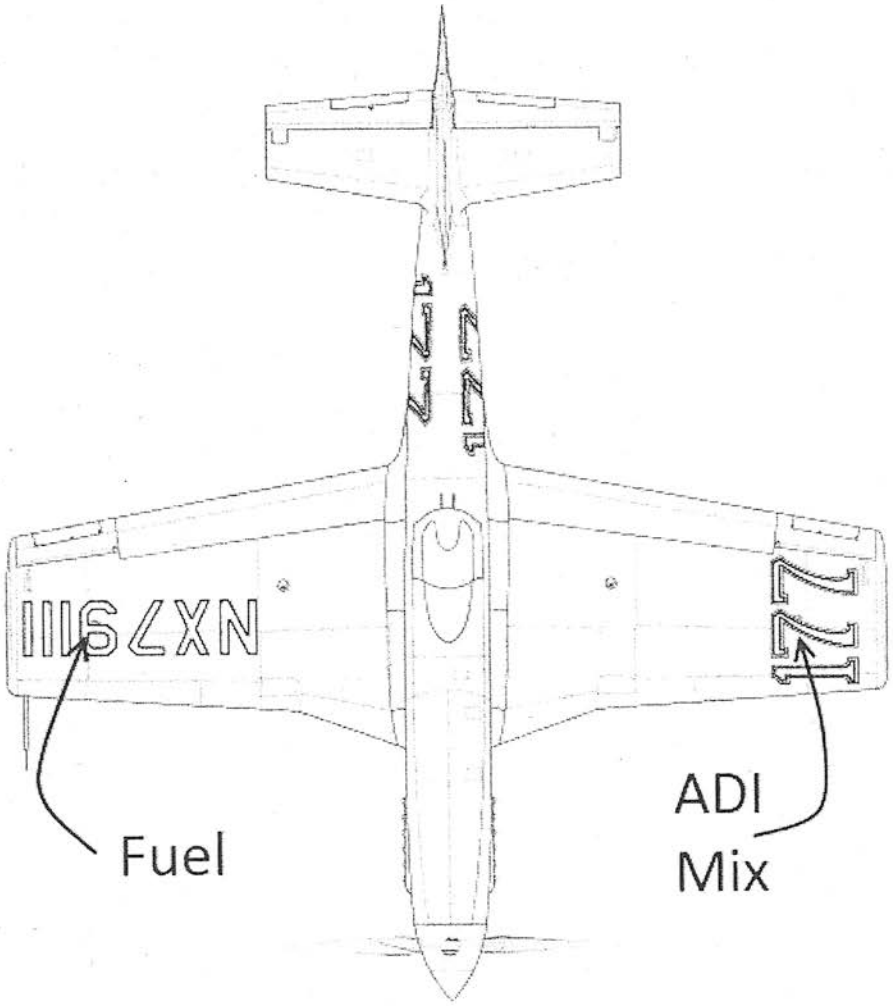
Aircraft Empty Weight - 6474 lbs. CG - 135.38

Erik Hokuf I.A.-A & P [redacted]

Aircraft Fluid Servicing Notes:

Left wing tank is used for ADI mix, water and Methanol mixed 1:1.

Right wing tank is used for fuel, 100LL or Racing fuel.



Methanol can be hazardous

Galloping Ghost capacity: ~~165~~ 150 Gallons of ADI mix, ~~165~~ 150 gallons of fuel.

Loading:

The ADI mix weights 7.45 lbs./gallon. Fuel weighs 6 lbs./gallon.

In general, the aircraft is loaded to balance the weight in each wing at takeoff. For a typical flight, significantly more water will be consumed than fuel and the aircraft will return with the right wing heavy.

The boiler itself hold between 20 and 30 gallons of water and is located on the centerline of the aircraft. Since the water in the boiler does not affect wing heaviness, boiler water is not included in the balancing calculation. Standard procedure is to fill the boiler during taxi, so if the boiler is empty at startup, the left wing will weigh between 150 and 225 lbs. less than total weight of the water added.

Determining Water Quantity.

Water should be added using measured containers and backed up by the water quantity gauge. To check the water quantity gauge:

1. Ensure area is clear and announce that you are engaging the master switch
2. Turn master switch to "ON"
3. Wait 30 to 60 seconds for the water quantity reading to stabilize.
4. Read the quantity value from the top (Water) gauge,
5. Turn the master switch off.

ADI mix is difficult to remove once it is in the tank, so check the quantity gauge often when the level nears the target. Note that due to the shape of the tanks and the tail-low stance of the aircraft, the gauges do not change linearly. Use the charts below to correct for inaccurate ground readings.

Visual Cue: When in the 3 point attitude, 125 gallons in the tank just visible looking straight down the filler.

Actual Quantity to Weight to Indicated Quantity cross reference chart:

WATER			WEIGHT	FUEL		
Indicates		Actual	Each	Actual	Indicates	
Level	3 - Point	Quantity	Wing	Quantity	3-Point	Level
0	0	0	0	0	0	0
20	8	20	150	25	13	22
40	36	40	300	50	42	47
60	55	60	450	75	65	72
82	76	80	600	100	95	93
99	100	100	750	125	122	122
120	123	120	900	150	150	150
138	140	140	1050			
150	150	150	1120			

Example use of chart: A typical flight profile would include 125 gallons of fuel and 100 gallons of water. This balances each wing at 750 lbs. Remember that this does not include the water in the boiler at takeoff. If the boiler is empty, add 20 extra gallons of water for filling the boiler on taxi out.

Fuel Servicing.

Do not mix 100LL with racing fuel. The cooler plugs installed when using racing fuel will foul when 100LL is present.

Utilize the same procedures for fuel as with water. Ensure that proper grounding procedures are followed.

** NOTE P-51 B & C ARE VERY CLOSE TO P-51 D

(-) **F.A.A. DATUM IS LOCATED 139.0" FORWARD OF 99.0" SAT - ADD 40.0"**
_ 99.0" STA / DATUM IS 1 1/2" FORWARD OF AFT FACE OF MAIN SPAR
_ CENTER LINE OF C.G. = 139.0" AFT OF DATUM

C.G. Range MAC 79.6" Leading edge MAC 119.1" aft of datum
79.6 X 21% = 16.7 + 119.1 = 135.8" aft of datum for forward C.G. limit
79.6 X 31% = 24.7 + 119.1 = 143.8" aft of datum for aft C.G. limit

** NOTE CENTER OF C.G. RANGE = 139.8" AFT OF DATUM

		NORTH AMERICAN ARM	*F.A.A. ARM*	AERO TECH	*WEIGHT*
(-)	WING MAIN FUEL TANKS	123.0	163.0	196.0 GAS	1176.0 LBS
(-)	OIL TANK AND STRAPS	76.0	116.0		
(-)	LANDING GEAR DOWN	75.0	115.0	WEIGH POINT	409.0
(-)	TAIL GEAR 7 WHEEL DOWN00	(270.0??)		(195.0??)	WEIGH POINT
(-)	PILOT	129.0	169.0		170.0 LBS
(-)	PARACHUTE	129.0	169		20.0 LBS

P-51 D

(-)	BALLAST N/A FACTORY	319.0	359.0		50.0 LBS
(-)	ENGINE MOUNT	36.0	103.0		165.0
(-)	PROPELLER / SPINNER & GOVERNOR	- 14.0	26.0		483.0
(-)	RADIATOR & SUPPORTS	192.0	232.0		258.0
(-)	HEADER TANK	- 5.0	35.0		12.0
(-)	OIL TANK AND STRAPS	76.0	116.0		29.0
(-)	MAIN WING FUEL TANKS	125.0	165.0		276.0

(-)	BOMB RACK (P-51A,B & C)	136.0		(11.0 LBS EA)
(-)	AMMO BAY TANK	150.5	24.O GAL	
(-)	GUN BAY TANK	159.5	16.0 GAL	
(-)	FUSELAGE TANK N551E 40 GAL	195.5	40.0 GAL	
(-)	BAGGAGE COMPARTMENT N-551E	236.0		

NORTH AMERICAN P-51 EQUIPMENT LOCATION

FUEL TANK LOCATIONS

(-)	℄	BOMB RACK	7.0" FORWARD OF MAIN SPAR
	℄	AMMO BAY FUEL TANK	7 ½" AFT OF MAIN SPAR
	℄	GUN BAY FUEL TANK	16 ½" AFT OF MAIN SPAR
	℄	MAIN FUEL TANK	18 ½" AFT OF MAIN SPAR

NORTH AMERICAN P-51 EQUIPMENT LOCATION