Stinson Division
C.V.A.C.
Wayne, Michigan

Serial No. _____

C.A.A. Approved
January 4, 1949
Stinson Model 108-2

CAA Identification No. _____

LANDPLANE
AIRPLANE FLIGHT MANUAL

PREVIOUSLY ENTITLED
APPROVED OPERATING LIMITATIONS

A. LIMITATIONS SECTION.

The following limitations must be observed in the operation of this airplane:

1. ENGINE.

Make: Aircooled Motors, Inc.
Model: Franklin 6A4-165-B3
Rated RPM: 2800 rpm (165 H.P.)
Temp. Limits: Cylinder Head: 530°F (Spark plug type thermocouple)
Cylinder Head: 445°F (Bayonet type thermocouple)
Cylinder Barrel: 310°F
Oil Inlet: 230°F
Fuel Octane Rating: 80 Minimum

2. PROPELLER.

(a) Fixed Pitch Wood.
Diameter: 76 inches maximum
74 inches minimum
Static RPM limits with maximum permissible throttle setting: Not more than 2270 rpm
Not less than 2150 rpm

(b) Fixed Pitch Metal.
Make: McCauley
Model: 1A170-7652
Diameter: 76 inches maximum
74 inches minimum
Static RPM limits with maximum permissible throttle setting: 2300 to 2450 rpm

(c) Two Position Controllable Pitch. (Two Blade)
Make: Sensenich
Model: C-3FR4/PC-376B3
Diameter: 76 inches maximum
74 inches minimum
Pitch Settings: Low 13.2° at 28.5 inch station
High 18.3°

Static RPM limits with maximum permissible throttle setting (Low Pitch): 2490 rpm.

(d) Automatic Variable Pitch. (Two Blade)
Make: Koppers Aeromatic
Model: F200/00-76B,
Parts List Assembly No. 4320 or 4320-1
Diameter: 76 inches max; 74 inches min.

Installation and operation must be accomplished in accordance with Koppers' "Installation Procedure and Operating Limitations No. 11C".

3. POWER PLANT INSTRUMENT MARKINGS.

(a) Fuel Quantity Indicator: Fuel remaining in tank when indicator is in the region marked in RED cannot safely be used in flight.

(b) Oil Temperature Gauge: Unsafe if indicator exceeds RED line (230°F).

(c) Oil Pressure Gauge: Unsafe beyond limits of GREEN arc. Extremities marked by RED lines at 30 and 55 psi.

(d) Tachometer: Rated engine speed (2800 rpm) marked by RED line. GREEN arc shows normal operating range (2000 to 2800 rpm). With McCauley propeller installed, YELLOW arc replaces green arc over range in which continuous operation should be avoided (2150 to 2250 rpm).

4. AIRSPEED LIMITATIONS. (MPH - TIAS)

	Category	
	Normal	Utility
Never Exceed Speed	153	164
Maximum Structural Cruising Speed. .	121	121
Maneuvering Speed.	115	117
Flaps Down Speed	88	88

5. FLIGHT LOAD FACTORS.

Normal Category Maximum Positive Load Factor: 3.8g
Utility Category Maximum Positive Load Factor: 4.4g

The maneuvering speed is the maximum speed at which it is not possible to exceed the flight load factors.

6. MAXIMUM GROSS WEIGHT.

Normal Category: 2230 Pounds
Utility Category: 1925 Pounds

7. CENTER OF GRAVITY LIMITS. (See Figure 1.)

Datum line is wing leading edge. For conversion of percent MAC to inches wing chord, multiply percent by 55.50 and add 0.52 inches to this product.

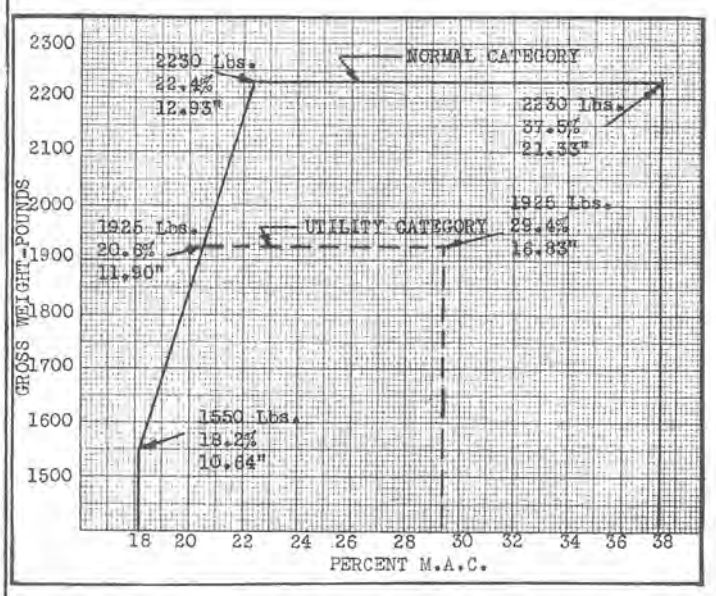

Figure 1 - Center of Gravity & Gross Weight Limitations

TABLE I (Landplane)
PERFORMANCE WITH FIXED-PITCH WOOD PROPELLER (Sensenich 76JR53)

ITEM	ALTITUDE	OUTSIDE AIR TEMPERATURES				
		0°F	25°F	50°F	75°F	100°F
Take-Off Distance (feet) Distance required to take-off and climb to 50 ft. Full Throttle -- 80 mph TIAS -- Flaps UP	Sea Level 2000 ft. 4000 ft. 6000 ft.	1653 2014 2472 3082	1818 2209 2750 3420	1992 2436 3050 3839	2189 2662 3350 4212	2361 2914 3691 4647
Normal Rate of Climb (ft./min.) Full Throttle -- 80 mph TIAS -- Flaps UP	Sea Level 2000 ft. 4000 ft. 6000 ft.	750 657 564 471	721 628 536 444	695 603 511 419	669 577 486 395	645 554 463 372
Landing Distance (feet) Distance required to land over a 50 foot obstacle and stop Approach at 74 mph TIAS -- Flaps Full DOWN	Sea Level 2000 ft. 4000 ft. 6000 ft.	1490 1582 1675 1768	1550 1650 1750 1850	1610 1718 1825 1930	1676 1790 1900 2016	1738 1858 1975 2100

TABLE II (Skiplane)
PERFORMANCE WITH FIXED-PITCH WOOD PROPELLER (Sensenich 76JR53)

ITEM	ALTITUDE	OUTSIDE AIR TEMPERATURES				
		-50°F	-25°F	0°F	25°F	50°F
Take-Off Distance (feet) Distance required to take-off and climb to 50 ft. Full Throttle -- 80 mph TIAS -- Flaps UP	Sea Level 2000 ft. 4000 ft. 6000 ft.	* * * *	**1615 **1989 * *	1791 2212 **2757 **3507	1982 2465 3070 3938	2183 2734 3425 4469
Normal Rate of Climb (ft./min.) Full Throttle -- 80 mph TIAS -- Flaps UP	Sea Level 2000 ft. 4000 ft. 6000 ft.	812 718 624 530	780 686 592 499	750 657 564 471	721 628 536 444	695 603 511 419
Landing Distance (feet) Distance required to land over a 50 foot obstacle and stop. Approach at 76.5 mph TIAS -- Flaps Full DOWN	Sea Level 2000 ft. 4000 ft. 6000 ft.	2080 2203 2326 2450	2167 2299 2432 2565	2252 2396 2540 2685	2340 2496 2653 2810	2440 2606 2772 2938

NOTES:

* At these low temperatures, take-off may be impossible because of very high ski drag.

** At these low temperatures, the take-off distance may become excessive due to increased ski drag.

8. MANEUVERS AND OPERATING PLACARDS.

The following placards must be prominently displayed in the cabin:

(a) "Normal Category - (2230 Pounds G.W.) No Acrobatic Maneuvers Including Spins Approved.
Utility Category - (1925 Pounds G.W.) No Acrobatic Maneuvers Approved Except Those Listed Below:

Maneuver	Entry Speed
Chandelle	120 mph
Lazy Eight	115 mph
Stall (Except Whip)	-------
Spin*	-------
Steep Turn	-------

No Inverted or Snap Maneuvers Approved.
*Intentional Spins Prohibited With Flaps Down.
This airplane must be operated in compliance with the Approved Operating Limitations."

(b) Voyager Cabins: "Do not place baggage under rear seat. Do not exceed 350 pounds on floor in rear of cabin with seats removed."

(c) Station Wagon Cabin: "Do not place baggage under rear seat. Do not exceed 90 pounds per square foot, or a total of 600 pounds, on floor of cabin."

(d) Baggage Compartment: "Do not exceed 100 pounds."

(e) Use when Two-Position propeller is installed: "Push for High RPM."

9. FLIGHT INSTRUMENT MARKINGS.

The airspeed indicator is marked at the speeds listed under Paragraph 4, AIRSPEED LIMITATIONS, and at the stalling speeds, 67 mph flaps up and 57 mph flaps down. The explanation of these markings follows:

(a) Radial RED lines mark the never exceed speed for each category (marked "N" for Normal and "U" for Utility) which is the maximum safe airspeed.

(b) YELLOW arc denotes range of speeds in which airplane should be operated with caution and extends from the never exceed speed to the maximum structural cruising speed.

(c) GREEN arc denotes normal operating speed range and extends from cruising speed to stalling speed with flaps up.

(d) WHITE arc denotes speed range in which flaps may safely be lowered.

B. PROCEDURES SECTION.

1. The rear seat is not to be occupied when airplane is operated in the Utility Category.

2. Do not operate engine continuously at speeds between 2150 and 2250 rpm when McCauley propeller is installed.

3. In case of Balked Landing, apply throttle and readjust trim tab settings. To obtain best rate of climb, raise flaps.

C. PERFORMANCE INFORMATION SECTION.

1. TAKE-OFF, CLIMB, AND LANDING.

(a) Performance figures for the airplane equipped with wheels are given in Table I. These figures were obtained during the CAA type tests using the Sensenich fixed-pitch wood propeller, and may be realized under conditions indicated with the airplane and engine in good condition and with average piloting technique.

All landplane performance is given for 2230 pounds gross weight, with no wind, and on level, paved runways. In using this data, allowance must be made for actual conditions.

(b) Performance figures for the airplane equipped with skis are given in Table II. These figures are based on CAA test data obtained at approximately 32°F temperature, using the Sensenich fixed-pitch wood propeller, and may be realized under the conditions indicated with the airplane and engine in good condition and with average piloting technique. It should be noted however, that ski drag on snow will increase with a decrease in temperature and will therefore tend to increase take-off distances.

All Skiplane performance is given for 2230 pounds gross weight, with no wind, and on level, crusted snow and ice surfaces. In using this data, allowance must be made for actual conditions.

(c) Performance with McCauley and Sensenich two-position propeller installations is equal to or exceeds that presented in Tables I and II herein.

With Koppers Aeromatic propeller Model F200/00-76E installation, the airplane performance is equal to or exceeds that presented in Tables I and II herein, and at altitudes this performance may be improved by increasing the flight rpm in accordance with paragraph D(3) of the CAA approved Koppers "Installation Procedure and Operating Limitations No. 11C".

2. STALLING SPEED.

(a) The following table gives the stalling speeds of the airplane at various angles of bank. The approaching stall is indicated by general tail buffeting.

TABLE III

STALLING SPEEDS

Angle of Bank (Deg.)	0	10	20	30	40	50	60
Flaps UP	67	68	69	72	77	84	95
Flaps Full-DOWN	57	58	59	61	65	71	81

(b) At full forward C.G. loading (1550 lbs. @ 18.2%) with flaps extended and power on, the stall characteristics indicate a pitch of 45° and requires approximately 200 feet altitude for recovery. In a normal unaccelerated stall, at more rearward C.G. loadings, not more than an 100 foot loss of altitude, nor a pitch greater than 30°, will be encountered.

D. WEIGHT AND BALANCE DATA SECTION.

NOTE

This section of the Airplane Flight Manual is not a part of that approved by the CAA. It is the responsibility of the airplane owner and the pilot to insure that the airplane is properly loaded. The empty weight, empty weight C.G., and useful load are noted on the attached Weight and Balance Sheet for this airplane as delivered from the factory. If the airplane has been altered, refer to the latest approved Alteration and Repair Form (ACA337) for this information.

1. STANDARD EQUIPMENT LIST.
(Cross out equipment not installed)

No.	Item	Weight	Arm
1	Propeller - Fixed Pitch Wood	14.0	-65.5
2	Spinner - Propeller Fixed Pitch	2.0	-66.5
3	Propeller - Aeromatic	32.0	-65.5
4	Propeller - Two Position	36.0	-66.0
5	Propeller - Fixed Pitch Metal	33.0	-65.5
101	Starter (Delco-Remy)	16.0	-32.0
102	Carburetor Air Heater & Control	5.0	-41.0
103	Carburetor Air Filter	1.0	-40.0
104	Cabin Heater & Control	6.0	-15.0
201	Wheels and Brakes - Goodyear	33.0	- 1.0
	- Firestone	31.0	- 1.0
202	Tail Wheel Tire & Fork	6.0	218.0
203	Parking Brake	0.5	-16.0
204	Wheel Pants	6.0	- 1.0
205	Skis (Federal AR2500 or AR3500) with axle (Stinson 108-5611001)	(Use Actual)	
301	Generator (Delco-Remy)	12.0	-31.5
302	Battery - Electric Storage Co. 6TS-9F	29.0	13.5
303	Landing Lights	1.0	4.0
304	Radio (Hallicrafters CA-2)	9.0	- 9.0

2. LOADING.

Any combination of baggage, passengers, and fuel may be carried that does not exceed the Gross Weight, Center of Gravity, or Placard Limits of the airplane. Center of Gravity limits are only a consideration with the Station Wagon airplane when used for cargo with rear seats removed. On all other airplanes and arrangements, as manufactured, it is impossible to exceed the Center of Gravity limits without also exceeding the Gross Weight or Placard limitations.

A sling is provided to secure cargo loads against forward motion. The straps on each side are attached to the rear outer seat belt lugs. Center straps attach across the load from the rear center seat belt lugs to the front outer seat belt lugs. Position sling over the upper forward corner of the cargo and draw all buckles tight. Keep load a minimum of eight inches aft of the front seat back.

3. BALANCE CHECK.

The following computation sheet is furnished to provide a quick means of checking the airplane loading to assure that the most rearward Center of Gravity position is not exceeded. Insert the airplane empty weight from the Weight and Balance Sheet and obtain the arm therefor by subtracting the arm given on that sheet from 21.32.

Item	Weight	x	Arm	=	Moment
Airplane Empty		x			
Front Seat Occupants		x	5.32	=	
Oil (9 Quarts)	17	x	70.32	=	1195
Rear Seats (Use when removed for cargo)	23	x	25.54	=	587
			Total (1)		
Rear Seat Occupants		x	26.68	=	
Cabin Baggage or Cargo		x	20.68	=	
Baggage Compartment Load		x	54.18	=	
			Total (2)		

Total (1) must be equal to, or greater than, total (2). Gross Weight must not exceed 2230 pounds.

4. LOADING CHART.

A loading chart for Station Wagon airplanes when used for cargo is shown in Figure 2. Loadings falling within the envelope will not exceed rear C.G. location of 37.5% M.A.C.. Allowance is made in the chart computation for one person only in the front seat. With two persons in front, any loading that does not exceed gross weight is permissible. This chart is based on an airplane having an empty weight of 1278 pounds with its C.G. located at 11.08 inches aft of the wing leading edge.

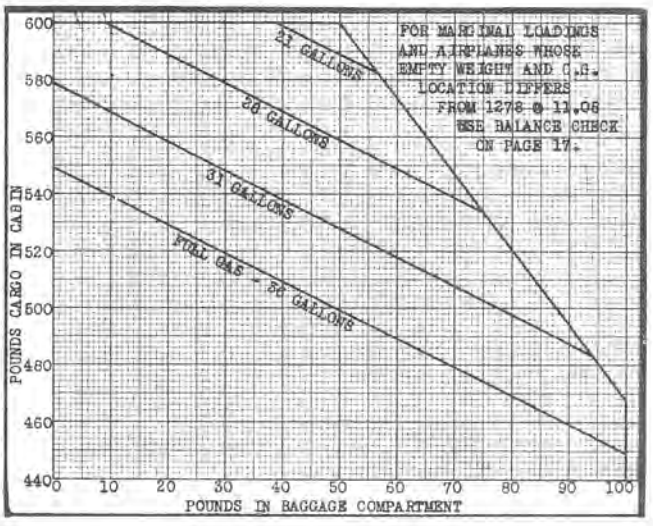

Figure 2 -- Station Wagon Loading Chart