From: Yoos, Paul
Sent: Wednesday, September 02, 2015 2:42 PM
To: Keliher Zoe
Cc: Certification
Subject: Takeoff Perormance: Re. 2015-04-10 1977 T210M 21061884 Stanley ID Accident and NTSB No. WPR15FA143 (TXTAV Letter Log No. 940201501337)

Zoe,

As requested the Textron Aviation Flight Test Engineering calculated the expected takeoff information (break ground and clear 50 foot obstacle) for the accident takeoff using flight test information and the information contained in Attachment A.

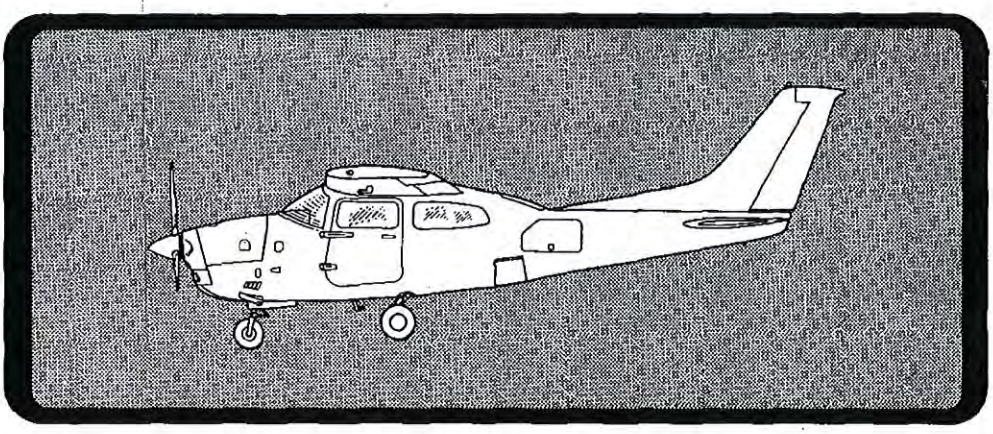
Attachment B contains the published takeoff performance pages from the Pilot's Operating Handbook that the pilot would have available to calculate his takeoff performance.

Conditions: 3,500 lbs. takeoff weight PA=5,000 ft. Outside air temp. = 10 deg. C		Corrections used: Add 15% to ground roll for operations on dry grass runway
Wind Vector	Wind corrected ground roll on Dry Grass	Total Distance +50 ft.
Zero	1,463 ft.	2,231 ft.
2.5 kt. tailwind	1,609 ft.	2,454 ft.
5.0 kt. tailwind	1,756 ft.	2,677 ft.
7.5 kt. Tailwind	1,902 ft.	2,900 ft.
10 kt. tailwind	2,048 ft.	3,123 ft.

Assuming the airplane started its takeoff roll at the beginning of the runway the calculated distances suggest the wind vector was about a 5 kt. tailwind.

PILOT'S OPERATING HANDBOOK

Cessna®



TURBO CENTURION

1977 MODEL T210M

Serial No. _____

Registration No. _____

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR PART 3

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS, USA

D1095-13—RAND—600—10/76

(6) Fuel Selector Valve -- FULLER TANK.
(7) Mixture -- RICH.
(8) Elevator and Rudder Trim -- TAKEOFF.
(9) Throttle -- 1700 RPM.
a. Magnetos -- CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
b. Propeller -- CYCLE from high to low RPM; return to high RPM (full forward).
c. Engine Instruments and Ammeter -- CHECK.
d. Suction Gage -- CHECK in green arc.
(10) Avionics Power Switch -- ON.
(11) Radios -- SET.
(12) Autopilot (if installed) -- OFF.
(13) Flashing Beacon, Navigation Lights and/or Strobe Lights -- ON as required.
(14) Throttle Friction Lock -- ADJUST.
(15) Brakes -- RELEASE.

TAKEOFF

NORMAL TAKEOFF

(1) Wing Flaps -- 0° - 10° (10° preferred).
(2) Power -- 36.5 INCHES Hg and 2700 RPM (5 minute limitation).
(3) Mixture -- RICH (186 lbs/hr).
(4) Elevator Control -- LIFT NOSE WHEEL at 60 to 70 KIAS.
(5) Climb Speed -- 80-90 KIAS.
(6) Brakes -- APPLY momentarily when airborne.
(7) Landing Gear -- RETRACT in climb out.
(8) Wing Flaps -- RETRACT.

SHORT FIELD TAKEOFF

(1) Wing Flaps -- 10°.
(2) Brakes -- APPLY.
(3) Power -- 36.5 INCHES Hg and 2700 RPM (5 minute limitation).
(4) Mixture -- ADJUST to 186 lbs/hr.
(5) Brakes -- RELEASE.
(6) Elevator Control -- SLIGHTLY TAIL-LOW.
(7) Climb Speed -- 75 KIAS until all obstacles are cleared.
(8) Landing Gear -- RETRACT after obstacles are cleared.
(9) Wing Flaps -- RETRACT after reaching 80 KIAS.

NOTE

Do not reduce power until wing flaps and landing gear have been retracted.

TAKEOFF DISTANCE

MAXIMUM WEIGHT 3800 LBS

SHORT FIELD

CONDITIONS:
Flaps 10°
2700 RPM and 36.5 Inches Hg Prior to Brake Release
Mixture Set at 186 PPH
Cowl Flaps Open
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Landing gear extended until takeoff obstacle is cleared.
3. Decrease distances 10% for each 10 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2.5 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
3800	68	75	S.L.	1010	1665	1100	1815	1200	1990	1310	2180	1430	2400
			1000	1075	1760	1170	1925	1280	2110	1395	2315	1525	2555
			2000	1145	1865	1250	2040	1360	2235	1485	2460	1625	2715
			3000	1215	1975	1330	2165	1450	2375	1585	2615	1735	2895
			4000	1295	2095	1415	2295	1550	2525	1695	2785	1855	3090
			5000	1385	2225	1510	2440	1650	2690	1810	2970	1980	3295
			6000	1475	2365	1615	2595	1765	2865	1930	3170	2115	3525
			7000	1575	2515	1725	2765	1885	3055	2065	2285	2265	3775
			8000	1685	2675	1845	2950	2020	3260	2210	3620	2425	4050

Figure 5-4. Takeoff Distance (Sheet 1 of 2)

TAKEOFF DISTANCE

3500 LBS AND 3200 LBS

SHORT FIELD

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
3500	65	72	S.L.	835	1375	910	1500	990	1635	1080	1785	1175	1960
			1000	890	1455	965	1585	1055	1730	1150	1895	1255	2075
			2000	945	1540	1030	1680	1125	1835	1225	2010	1335	2205
			3000	1005	1630	1095	1780	1195	1945	1305	2130	1425	2345
			4000	1070	1725	1170	1885	1275	2065	1390	2265	1520	2495
			5000	1140	1830	1245	2000	1360	2190	1485	2410	1625	2655
			6000	1220	1940	1330	2125	1450	2330	1585	2565	1735	2835
			7000	1300	2060	1420	2260	1550	2480	1695	2735	1855	3025
			8000	1390	2190	1515	2405	1660	2645	1815	2915	1985	3230
3200	62	68	S.L.	680	1125	740	1220	805	1325	875	1445	950	1580
			1000	720	1185	785	1290	855	1405	930	1530	1015	1670
			2000	765	1255	835	1365	910	1485	990	1620	1080	1770
			3000	815	1325	890	1445	970	1575	1055	1720	1150	1880
			4000	870	1400	945	1530	1030	1665	1125	1820	1225	1995
			5000	925	1485	1010	1620	1100	1770	1200	1935	1310	2120
			6000	985	1575	1075	1715	1175	1875	1280	2055	1400	2260
			7000	1055	1670	1150	1825	1255	1995	1370	2185	1495	2405
			8000	1125	1770	1225	1935	1340	2120	1465	2330	1600	2565

Figure 5-4. Takeoff Distance (Sheet 2 of 2)

The following is the info used to calculate the airplane accident takeoff performance:

- Airport Upper Loon Creek (U72), ID
- Weather from stations near/around U72, closest to the approx. accident time of 1315 MDT, were as follows:
  - Challis (KLLJ), ID
    KLLJ 101655Z 00000KT 10SM CLR 06/M03 A3007 RMK AO2 SLP183 T00561033=
    KLLJ 101755Z 32003KT 10SM CLR 08/M03 A3004 RMK AO2 SLP168 T00781028 10078 21044 58016=
  - Stanley (KSNT), ID
    KSNT 101651Z 36004KT 03/M05 A3008 RMK AO1 SLP162 T00331050=
    KSNT 101751Z VRB05KT 09/M04 A3005 RMK AO1 SLP143 T00891044 10089 21072 58013=
  - Bonanza, ID station (N44.372069/W114.729103, alt 6426 ft) Bureau of Land

	TMP ° F	RELH %	SKNT mph	GUST mph	DRCT °	PEAK mph	PDIR °
4-10-2015 12:50 MDT	49	33	7	15	180	15	164
4-10-2015 13:50 MDT	53	30	4	13	291	13	143

  - Little Creek, ID (N44.722833/W114.996361, alt 4575 ft) Bureau of Land

	TMP ° F	RELH %	SKNT mph	GUST mph	DRCT °	PEAK mph	PDIR °
4-10-2015 12:51 MDT	55	35	2	5	352	5	4
4-10-2015 51 MDT	58	29	2	6	112	6	51

- Land manager for U72 area stated winds were out of the southwest that afternoon at 5 to 10 knots
- The airplane takeoff weight was approximated to be 3,500 lbs. (four men – 800 lbs., 50 lbs. misc. gear, and about 70 gallons of fuel)
- Airplane CG is unknown
- The published field elevation for U72 is 5,500 ft.
- Outside air temperature used was 10 deg. C
- 30.10 inHg was used (value that was in altimeter Kollsman window)
- The flap actuator extension was measured and found to be extended about 8.66 deg. Flaps; 10 deg. flap performance information will be used.
- Pitch trim was altered by impact dynamics
- Takeoff was on Runway 04, which is actually on a heading of 050 degrees mag and is 2,500 feet in length, and is hard packed dirt/grass/gravel
- The tree that was struck was 20 degrees right of the extended centerline of Runway 04 and about 150 feet past the departure end of the runway
- The base of the 12 in diameter tree was at the same altitude as the runway end, and it was struck about 40-50 ft. above the ground
- The airplane continued about 450 ft. past the struck tree before collided with the stream bed that runs along the right edge of Runway 04;
  In a steep nose down attitude, minus the nose landing gear and the left horizontal stab and elevator
- The landing gear was down and landing gear doors were closed
- Stock wingtips installed were assumed