NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

OPERATIONAL & PERFORMANCE INFORMATION (Rev A)

NTSB Accident: WPR13FA244
Accident Date: May 28, 2013

A. ACCIDENT

Location:	Mountainaire, Arizona
Date:	May 28, 2013
Aircraft:	Beech A36, N999PK, Serial # 3380
NTSB IIC:	Michael Huhn

B. EXAMINATION PARTICIPANTS:

Michael Huhn
Air Safety Investigator
National Transportation Safety Board
Western Pacific Region

Leon "Pete" Kelley
Airworthiness Inspector
Federal Aviation Administration
Scottsdale, AZ

Nicole Charnon
Air Safety Investigator
Continental Motors
Mobile, AL

Kris Wetherell
Air Safety Investigator
Beechcraft
Wichita, KS

C. SUMMARY

On May 28, 2013, about 1143 Mountain standard time, a Beechcraft A36, N999PK, was destroyed when it impacted trees and terrain shortly after takeoff from Flagstaff Pulliam airport (FLG), Flagstaff, Arizona. A significant post-impact fire ensued immediately. The owner/private pilot and the one passenger received fatal injuries. The personal flight was operated under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the flight.

D. CHECKLISTS

Raytheon Aircraft Company

Beechcraft

Beech Bonanza® A36

(Serials E-1946, E-2104, E-2111 thru E-3629 and E-3631 thru E-3635)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

FAA Approved in the Normal Category based on CAR Part 3. This document must be carried in the airplane at all times, and be kept within reach of the pilot during all flight operations. This handbook includes the material required to be furnished to the pilot by CAR Part 3.

Airplane Serial Number:_____

Airplane Registration Number:_____

FAA Approved
by:_____
John Tigue
Raytheon Aircraft Company
DOA-230339-CE

P/N 36-590002-37B **Reissued: November, 2002**

P/N 36-590002-37B2 **Revised: January, 2006**

10. RIGHT WING LEADING EDGE
    a. Cabin Air Intake . . . . . CHECK
    b. Fuel Tank . . . . . CHECK QUANTITY; Filler Cap - SECURE
    c. Tie Down . . . . . REMOVE
    d. Navigation Light . . . . . CHECK
11. RIGHT WING TRAILING EDGE
    a. Aileron . . . . . CHECK
    b. Flap . . . . . CHECK
    c. Protruding Fuel System Vent . . . . UNOBSTRUCTED

BEFORE STARTING

1. Seats . . . . . POSITION AND LOCK; Seat Backs - POSITION FOR TAKEOFF
2. Rudder Pedals . . . . . ADJUST
3. Seat Belts and Shoulder Harnesses . . . FASTEN/ADJUST
4. Parking Brake . . . . . SET
5. Emergency Gear Handle . . . . . STOWED
6. Avionics Circuit Breakers . . . . . IN
7. Flaps . . . . . UP
8. Avionics . . . . . OFF (Avionics Master Switch - OFF, if equipped)
9. Throttle . . . . . CLOSED
10. Propeller . . . . . HIGH RPM
11. Mixture . . . . . FULL RICH
12. Cowl Flaps . . . . . OPEN
13. Autopilot Switch . . . . . OFF (if installed)
14. Electric Elevator Trim Switch . . . . . OFF (if installed)
15. Landing Gear Handle . . . . . DOWN
16. All Subpanel Switches . . . . . OFF

17. Alternate Static Air Source . . . . . NORMAL
18. Left Side Circuit Breakers. . . . . IN
19. Fuel Selector Valve . . . . . CHECK OPERATION, THEN SELECT FULLER TANK (feel for detent/confirm visually)
20. Battery and Alternator Switches. . . . . ON
21. If a Standby Alternator is Installed . . . SEE SUPPLEMENT
22. Fuel Quantity Indicators . . . . . CHECK FUEL QUANTITY

WARNING

Do not take off if gages indicate in yellow arc or with less than 13 gallons in each tank.

23. ELT Switch (if installed) . . . . . ARM, Transmit Light Extinguished
24. Auxiliary Fuel Pump . . . . . LO (listen momentarily to confirm pump operation)
25. Auxiliary Fuel Pump . . . . . OFF
26. Standby Instrument Air (if installed) . . . . . CHECK

EXTERNAL POWER

The following precautions shall be observed while using external power.

1. Never use external power without a battery installed in the system.
2. The Battery must be ON and all avionics and electrical switches OFF prior to applying external power to the airplane. This protects the voltage regulators and associated electrical equipment from voltage transients (power fluctuations).

5. ALT LOAD . . . . . CHECK
(load should decrease below 25 amps at 1000-1200 rpm after 2 minutes with no additional electrical equipment turned on)
6. BUS VOLTMETER:
   a. Before Start . . . . . 24 Volts
   b. After Start . . . . . 28.5 Volts
7. All Engine Instruments . . . . . CHECK
8. Lights . . . . . AS REQUIRED
9. Avionics Equipment . . . . . ON, AS REQUIRED
10. Brakes . . . . . RELEASE AND CHECK

CAUTION

Never taxi with flat shock strut.

BEFORE TAKEOFF

1. Parking Brake . . . . . SET
2. Seat Belts and Shoulder Harnesses . . . . . CHECK
3. Avionics . . . . . CHECK
4. Engine Instruments . . . . CHECK (within operating range)
5. Flight Instruments . . . . . CHECK AND SET

NOTE

To ensure adequate gyro pressure when operating two air-driven gyros during ground operation and/or holding prior to takeoff, maintain an engine speed of 700-800 rpm in order to hold a value of 4.3 in. Hg on the instrument pressure gage. If three or more air-driven gyros are installed, maintain an engine speed of 1200 rpm.

6. ANNUN TEST Push-Button . . . . . PRESS
(All Annunciators, Landing Gear Position Lights and Flap Position Lights should Illuminate.)
7. Throttle . . . . . 1700 RPM
8. Propeller . . . . . EXERCISE
(to obtain 200 to 300 rpm drop), THEN RETURN TO HIGH RPM
9. Magnetos . . . . . CHECK INDIVIDUALLY
   - Variance between individual magnetos should not exceed 50 rpm.
   - Maximum drop should not exceed 150 rpm.
10. Instrument Air Gage . . . . . CHECK PRESSURE
11. If equipped with a standby generator or a standby alternator . . . . . REFER TO SUPPLEMENT
12. Throttle . . . . . IDLE TO 1200 RPM
13. Autopilot and Electric Trim (if installed) . . . . . CHECK

14. Trim . . . . . SET
    a. Aileron . . . . . NEUTRAL
    b. Elevator . . . . . 3° NOSE UP
    (6° nose up if only front seats are occupied)
15. Flaps . . . . . CHECK OPERATION; SET FOR TAKEOFF
16. Doors and Windows . . . . . SECURE
   - Cabin Door Lock Indicator (On serials E-2458, E-2468 and after) . . . . . CHECK CLOSED

17. Flight Controls . . . . . CHECK FREEDOM OF MOVEMENT AND PROPER DIRECTION OF TRAVEL
18. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

NOT APPLICABLE

- FULL RICH

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- ADJUST AS REQUIRED BY FIELD ELEVATION WHEN SETTING FULL POWER FOR TAKEOFF.

19. Fuel Selector Valve . . . . . .CHECK TANK SELECTED
(feel for detent/confirm visually)
20. Auxiliary Fuel Pump . . . . . .OFF
21. Parking Brake. . . . . RELEASE

TAKEOFF

Take-off Power.....Full Throttle, 2700 RPM
Minimum Recommended Oil Temperature. . . . . 24°C

1. Power . . . . . SET
   a. Throttle . . . . . FULL FORWARD
   b. Propeller . . . . . HIGH RPM
   c. Mixture:

~~*(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):*~~ NOT APPLICABLE

~~- FULL RICH~~

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- AS REQUIRED BY FIELD ELEVATION

2. Brakes . . . . . RELEASE
3. Instruments. . . . . CHECK
(make final check of manifold pressure, fuel flow, rpm, and oil pressure at the start of take-off run)
4. Airspeed. . . . . ACCELERATE TO AND MAINTAIN TAKE-OFF SPEED

CLIMB

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

1. Power ..... SET
   (Maximum Continuous Power:)
   a. Mixture ..... SET BY ALTITUDE
   b. Propeller ..... 2700 RPM
   c. Throttle ..... FULL FORWARD
   (Cruise Climb Power:)
   a. Mixture ..... SET BY ALTITUDE
   b. Propeller ..... 2500 RPM
   c. Throttle ..... FULL FORWARD
2. Cowl Flaps ..... AS REQUIRED
3. Power ..... SET
4. Engine Temperatures ..... MONITOR
5. Auxiliary Fuel Pump ..... OFF;
   If engine roughness, fuel flow fluctuations or low fuel flow occur - LO and re-lean to the following fuel flow schedule:

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE, AND 2700 RPM

PRESSURE ALTITUDE (ft)	FUEL FLOW (gph)
SL	25.7
2000	25.7
4000	25.1
6000	24.0
8000	22.4
10,000	20.9
12,000	19.6
14,000	18.8
16,000	17.9

SVC0433

Manual leaning fuel flows for full throttle and 2500 rpm are 2 gph less than those shown on schedule.

CAUTION

Engine roughness, fuel flow fluctuation or low fuel flow can occur when climbing on hot days. These can be eliminated by switching the auxiliary fuel pump from OFF to LO and manually leaning to the applicable preceding fuel flow schedule.

Return the mixture control to FULL RICH before switching the auxiliary fuel pump back to OFF.

LEANING USING THE EXHAUST GAS TEMPERATURE (EGT) INDICATOR

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in the right side of the exhaust system. The probe is connected to an indicator in the engine instrument array. The indicator is calibrated in degrees Celsius. Use the EGT system to lean the fuel/air mixture when cruising at 2500 rpm and 25 in. Hg manifold pressure power setting or less in the following manner:

1. Slowly lean the mixture and note the point on the indicator where the EGT temperature peaks. Further lean or enrich the mixture to the desired cruise mixture. Further leaning is referred to as operation on the lean side of peak EGT. Enrichening the mixture is referred to as operation on the rich side of peak EGT.
2. At lower power settings, the engine may be continuously operated at any mixture setting from FULL RICH to 27°C on the lean side of peak EGT. At higher power settings, as indicated on the MANIFOLD PRESSURE vs RPM graph (Section V, PERFORMANCE), the engine should not be operated closer to peak EGT than 20°C (rich side or lean side).
3. If engine roughness is encountered operating at lower power settings on the lean side of peak, enrich the mixture slightly for smooth engine operation.
4. Performance Data is presented in Section V, PERFORMANCE, for mixture settings of:
   a. Cruise LEAN Mixture . . . . . 20°C below peak on the lean side of peak.
   b. Cruise RICH Mixture . . . . . 20°C below peak on the rich side of peak.

E. AIRSPEED INFORMATION

AIRSPEEDS FOR SAFE OPERATION (3650 LBS)

All airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

Maximum Demonstrated Crosswind Component	17 Kts
Take-off Speeds:	
Flaps UP (0°)	
Rotation	73 Kts
50-ft	84 Kts
Flaps APPROACH (12°)	
Rotation	67 Kts
50-ft	77 Kts
Best Angle-of-Climb (V_X)	84 Kts
Best Rate-of-Climb (V_Y)	100 Kts
Cruise Climb	110 Kts
Turbulent Air Penetration	141 Kts
Landing Approach	
Flaps DOWN (30°)	79 Kts
Flaps UP (0°)	90 Kts
Balked Landing Climb	80 Kts

F. AIR CONDITIONING SYSTEM INFORMATION

LIMITATIONS

1. The air conditioning system must be off during takeoff. The AC DOOR EXTEND annunciator must be extinguished (condenser retracted) before takeoff.

BEFORE TAKEOFF

WARNING

AC DOOR EXTEND annunciator, located in the glareshield, must be extinguished before takeoff.

The air conditioning system switch must be turned OFF before takeoff. After landing gear is retracted and airplane is clear of all obstacles, air conditioning system may be turned on as desired.

PERFORMANCE

CRUISE PERFORMANCE

NOTE

Using the power settings given in the PERFORMANCE section, with the air conditioner in operation, range and airspeed will decrease by approximately 5% due to the extension of the condenser to the flight extension position. This is to be taken into consideration during flight planning.

Before takeoff, make certain that the air conditioner is off and that the AC DOOR EXTEND annunciator is extinguished. Pressing the ANNUN TEST pushbutton on the pilot's subpanel will verify that the bulb is functioning. After takeoff with the landing gear retracted and the airplane clear of all obstacles, the air conditioner may be turned on if desired.

The A/C toggle switch should be turned OFF before engine shutdown.

The throttle limit switch is a safety device designed to operate only at full throttle with the landing gear extended, and is installed inside the pedestal by the throttle control. When the air conditioner is on during landing approach with the landing gear extended and partial throttle, the condenser is in the flight extension position. However, should a go-around be necessary, the application of full throttle will cause the throttle limit switch to shut down the compressor for maximum engine power and retract the condenser to the retracted position to minimize drag. When the landing gear is retracted and/or the throttle is retarded, the compressor, after a 20 second delay, will resume operation and the condenser will return to the flight extension position.

G. PERFORMANCE CHARTS

Except as noted, all airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

INTRODUCTION TO PERFORMANCE

REQUIRED CORRECTIONS TO PERFORMANCE GRAPHS AND TABLES

1. For the airplanes specified below, the performance obtained from the following graphs must be adjusted by the specified percentage or fixed amount at all altitudes above sea level. The resulting performance is approximate and will vary with airspeed, temperature, and other ambient conditions.

- E-3100 and after, and-
- Prior airplanes in compliance with S. B. 28-3052, or
- Prior airplanes in compliance with TCM SID 97-3, or
- Prior airplanes incorporating kit 36-9015 with s/n's 135 and after.

TAKE-OFF DISTANCE - FLAPS UP

TAKE-OFF DISTANCE - FLAPS APPROACH

-Increase Distance by 6%

CLIMB

-Decrease Rate-of-Climb by 75 FT/MIN

TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

-Increase Time to Climb by 8%

RANGE PROFILES and ENDURANCE PROFILES

-Decrease Range and Endurance by:

SL to 4000 ft	0.5%
4000 to 8000 ft.	1.0%

8000 to 12,000 ft 2.0%
12,000 to 16,000 ft. 4.0%

2. After the previous corrections have been made, the following additional corrections must be made for all airplanes when the ambient temperature exceeds that for a standard (ISA) day. Linearly interpolate to obtain corrections for other ambient temperatures between ISA and ISA + 30°C.

GRAPHS/TABLES	ISA + 10°C	ISA + 20°C	ISA + 30°C
TAKE-OFF DISTANCE - FLAPS UP TAKE-OFF DISTANCE - FLAPS APPROACH Increase Take-Off Distance by:	8%	15%	23%
CLIMB Decrease Rate-of-Climb by:	90 fpm	180 fpm	270 fpm
TIME, FUEL, AND DISTANCE TO CRUISE CLIMB Increase Time to Climb by:	15%	30%	45%
CRUISE POWER SETTINGS Decrease cruise speeds by:	4 KIAS	7 KIAS	11 KIAS

TAKE-OFF DISTANCE – FLAPS UP

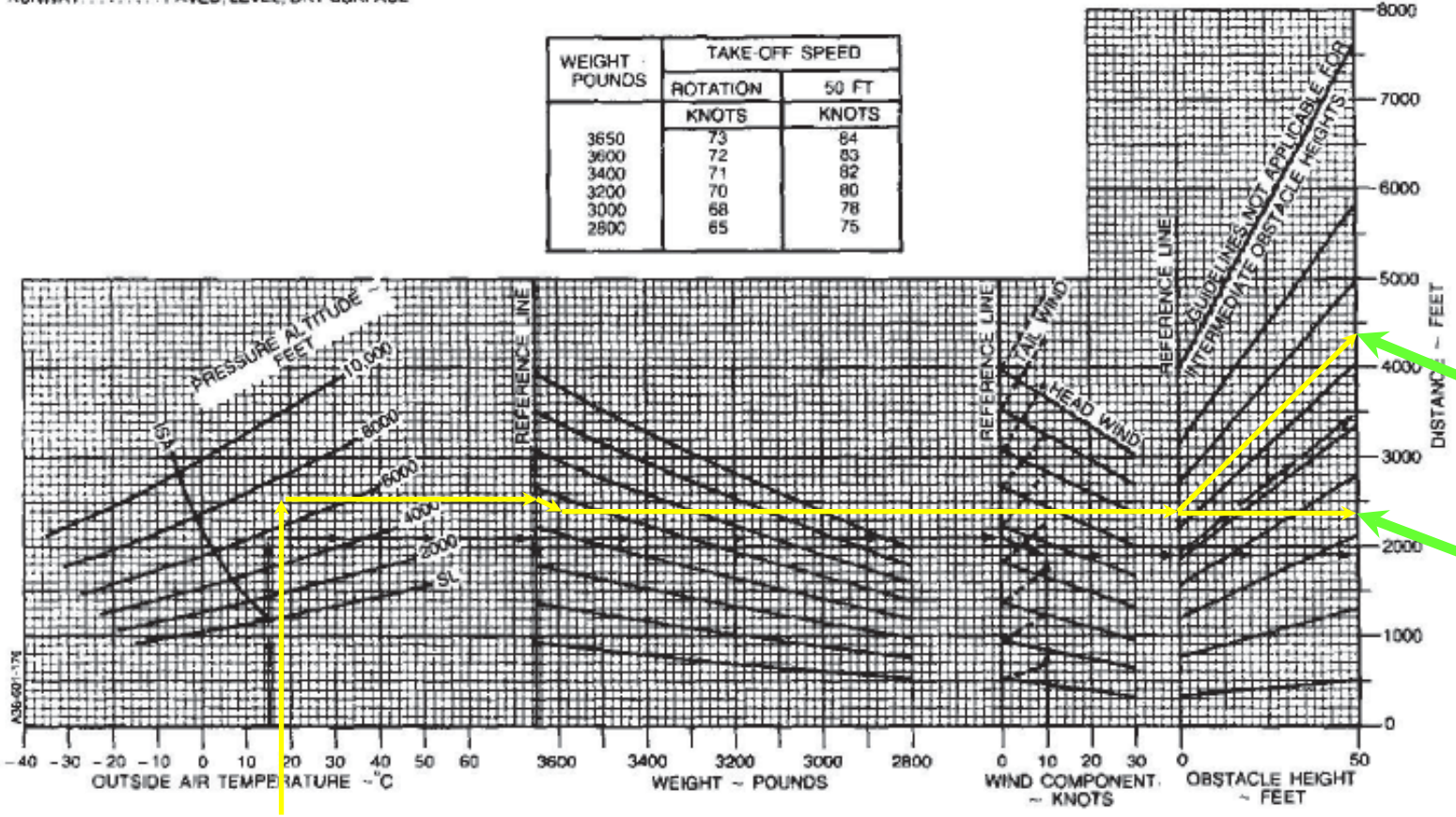
ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE	FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
LANDING GEAR	RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS	OPEN
RUNWAY	PAVED, LEVEL, DRY SURFACE

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	3650 LBS
HEAD WIND COMPONENT	10 KTS
GROUND ROLL	1900 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE	3475 FT
TAKE-OFF SPEED AT	
ROTATION	73 KTS
50-FT	84 KTS

WEIGHT POUNDS	TAKE-OFF SPEED	
	ROTATION	50 FT
	KNOTS	KNOTS
3650	73	84
3600	72	83
3400	71	82
3200	70	80
3000	68	78
2800	65	75



N999PK E-3380 3,600 lbs Elev 7,013' T = 18°C (ISA+17°) Altim 29.95" PA=6,983' DA=8,983'

Ground Roll ~ 2,400' Total Distance to 50 Feet ~ 4,400 '
(factors not applied yet)

TAKE-OFF DISTANCE – FLAPS APPROACH

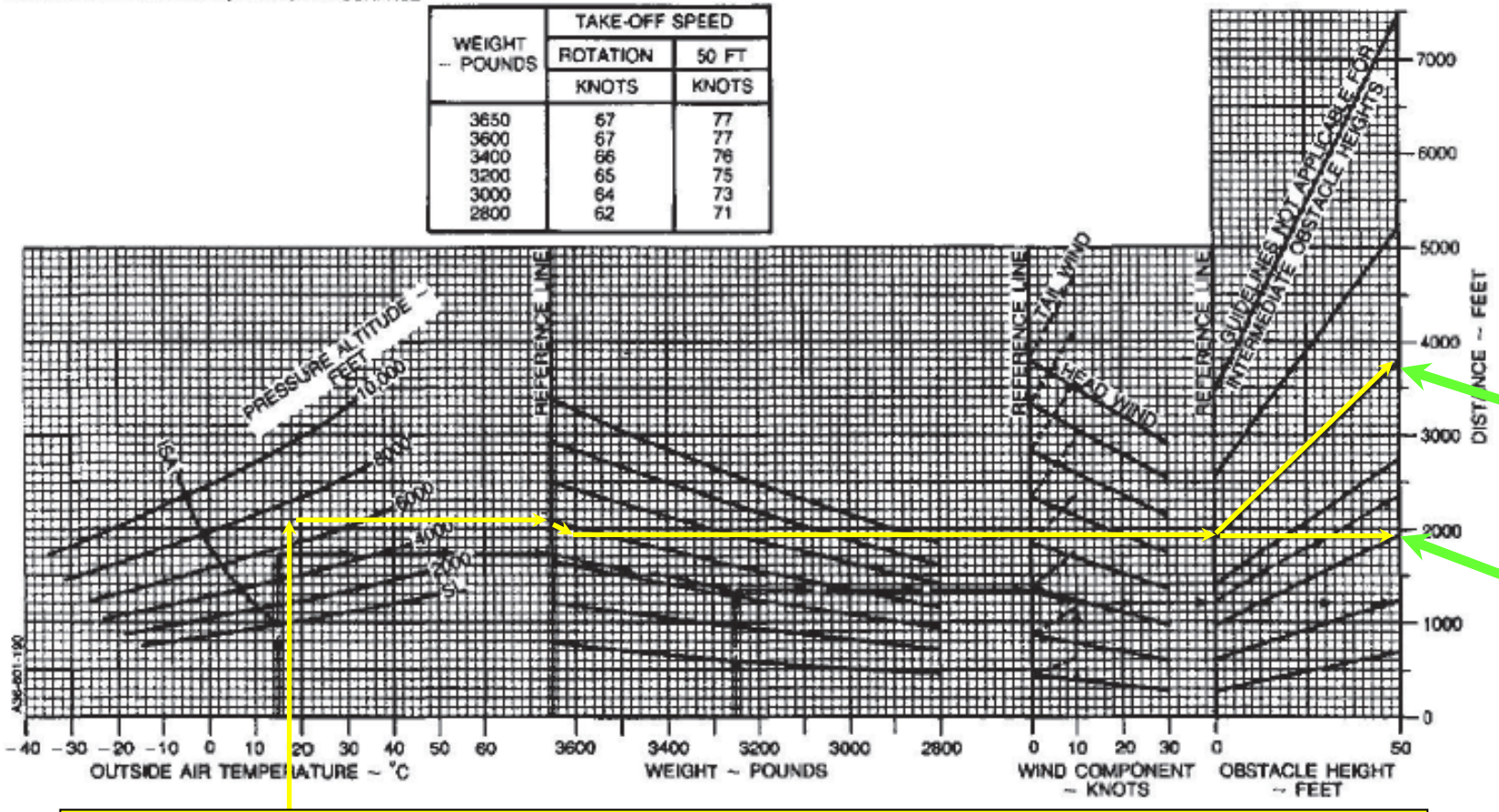
ASSOCIATED CONDITIONS:

POWER. . . . . TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE. . . . . FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS . . . . . APPROACH (BLUE)
LANDING GEAR . . . RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS . . . . . OPEN
RUNWAY. . . . . PAVED, LEVEL, DRY SURFACE

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	3250 LBS
HEAD WIND COMPONENT	10 KTS
GROUND ROLL	1200 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE	2350 FT
TAKE-OFF SPEED AT	
ROTATION	65 KTS
50 FT	75 KTS

WEIGHT – POUNDS	TAKE-OFF SPEED	
	ROTATION – KNOTS	50 FT – KNOTS
3650	67	77
3600	67	77
3400	66	76
3200	65	75
3000	64	73
2800	62	71



Ground Roll ~ 1,950' Total Distance to 50 Feet ~ 3,800 '
(factors not applied yet)

N999PK E-3380 3,600 lbs Elev 7,013' T = 18°C (ISA+17°) Altim 29.95" PA=6,983' DA=8,983'

CLIMB

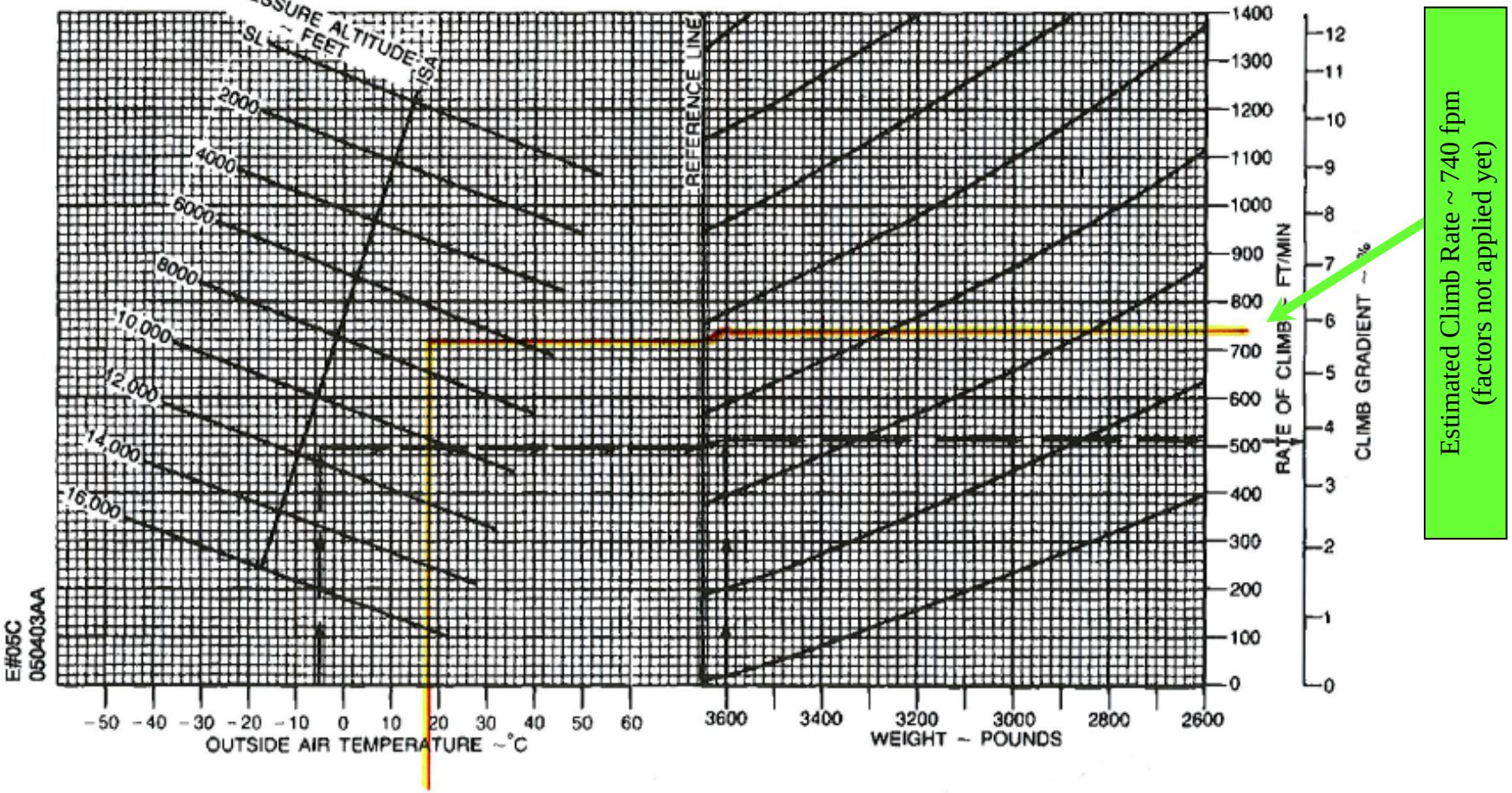
CLIMB SPEED: 100 KNOTS ALL WEIGHTS

ASSOCIATED CONDITIONS:

POWER	FULL THROTTLE, 2700 RPM
MIXTURE	AS REQUIRED BY ALTITUDE
FLAPS	UP
LANDING GEAR	UP
COWL FLAPS	AS REQUIRED

EXAMPLE:

OAT	−5°C
PRESSURE ALTITUDE	11,500 FT
WEIGHT	3600 LBS
RATE OF CLIMB	515 FT/MIN
CLIMB GRADIENT	3.8%



Estimated Climb Rate ~ 740 fpm
(factors not applied yet)

N999PK E-3380 3,600 lbs Elev 7,013' T = 18°C (ISA+17°) Altim 29.95" PA=6,983' DA=8,983'

April, 2012

H. POH Takeoff Distances and Climb Rates

	A	B	C	D	E
Parameter	**Raw Chart Value**	**Factor 1**	**Value + Factor 1**	**Factor 2 (ISA +17°C Correction)**	**Final Value**
Takeoff Distance Ground Roll (Flaps Up)	2,400'	+144' *	2,544'	+331' ***	2,875'
Total Takeoff Distance (Flaps Up)	4,400'	+264' *	4,664'	+606' ***	5,270
Takeoff Distance Ground Roll (Approach Flaps)	1,950'	+117' *	2,067	+269' ***	2,336
Total Takeoff Distance (Approach Flaps)	3,800'	+228' *	4,028'	+524'***	4,552'
Climb Rate	740 fpm	-75 fpm **	665 fpm	-153 fpm ****	512 fpm

Algorithms: 'A' is raw POH value; 'B' is calculated based on 'A'. 'A' + 'B' = 'C'. 'D' is calculated based on 'C'. 'C' + 'D' = 'E'

Factor 1 Notes (ref p 15)
* ADD 6%
** SUBTRACT 75 fpm

Factor 2 Notes (ref p 16)
*** ADD 13%
**** SUBTRACT 153 fpm