The National FAA Safety Team Presents

Federal Aviation Administration

Topic of the Month—July 2024

Short Field Operations

Presented to: Safety Minded Aviators, Everywhere…

By: Stephen Bateman, CFI, Chocks Away Aviation, LLC

Date: Tuesday 16th July 2024

Produced by:
The National FAA Safety Team (FAASTeam)

Welcome

- **Steve Bateman, CFI, LSRM**
  - Flight Reviews
  - Transition Training
  - Check Outs
  - Advanced Training
  - Selective Primary Training

- **Your monthly dose of aviation safety**
- **Earn *WINGS* knowledge credit in 33-minutes**
- **Contact Info:**
  sbateman7799@gmail.com
- ***Do not try to communicate using Reply To: from the webinar email!***

Not Recorded, But Even Better…

- PDF of these slides available for your further study and use
- Actual slides post on the third Sunday of every month (July 21st)
- https://bit.ly/ToMSafetyArticle

- Select the safety article (month) of interest
- Open and save the PDF
- I'LL SHOW THIS INFO AGAIN AT THE END OF THE PRESENTATION

- Thanks to the AOPA Flying Clubs Initiative

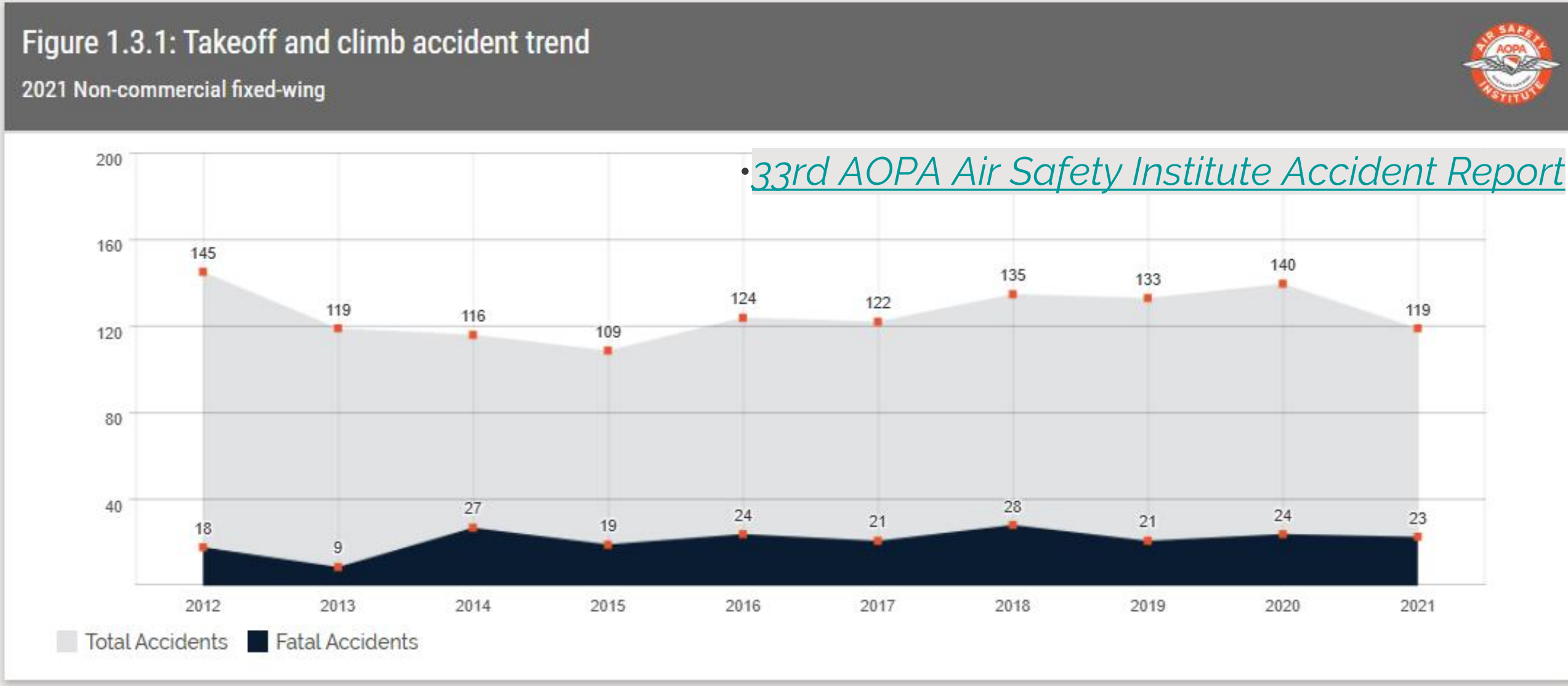
YOU CAN FLY
FLYING CLUBS

Overview

- **GAJSC states that additional training in short field operations may reduce loss of control and controlled flight into terrain accidents**
- **We'll look at:**
  - Short Field Operations
  - Planning
  - Performance (aircraft and pilot)
  - Doing it
  - Tips & Tricks

* General Aviation Joint Safety Committee

Take Off Accidents Year over Year Trend

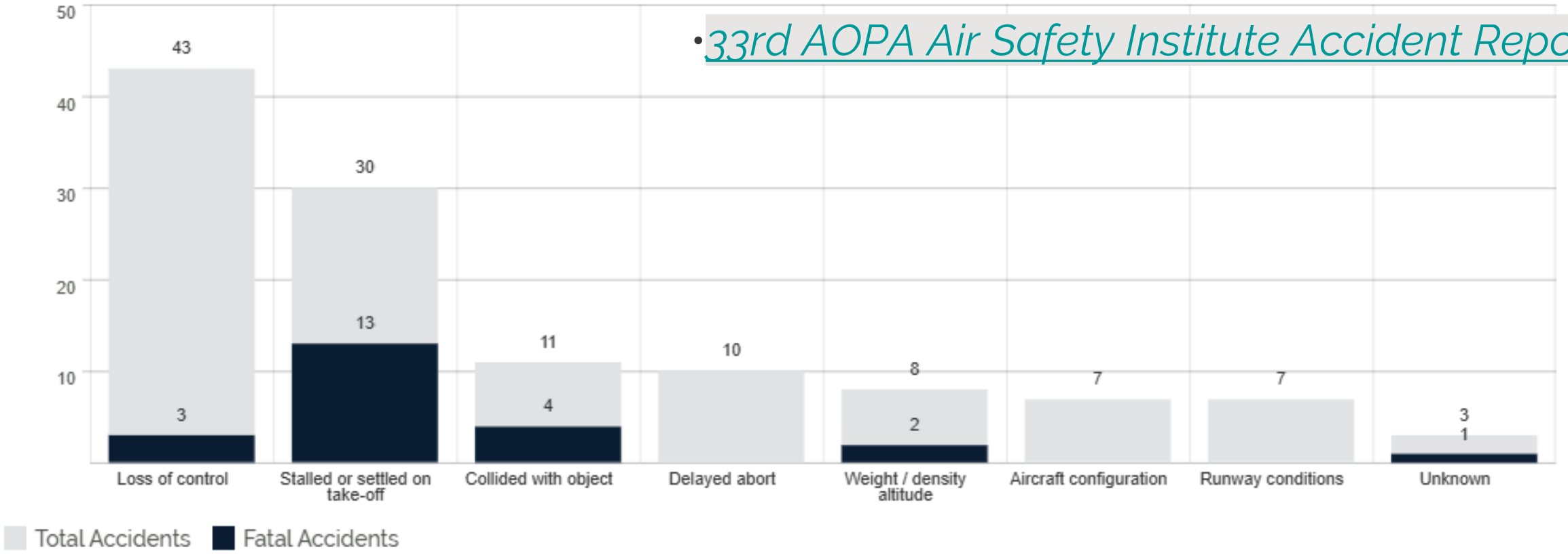


- [33rd AOPA Air Safety Institute Accident Report]

Types Of Take Off Accidents

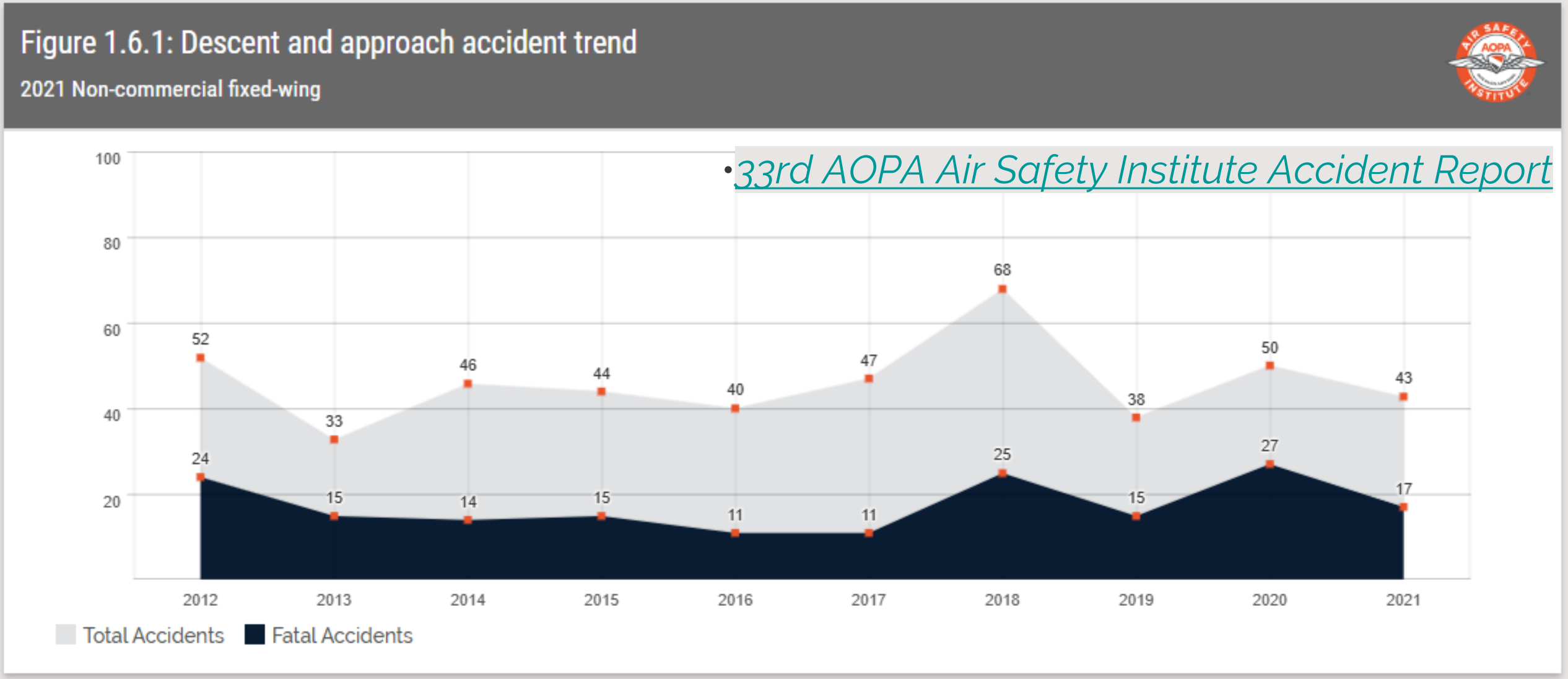
Figure 1.3.2: Types of takeoff and climb accidents

2021 Non-commercial fixed-wing



- *33rd AOPA Air Safety Institute Accident Report*

Descent and Approach Accidents Year over Year Trend

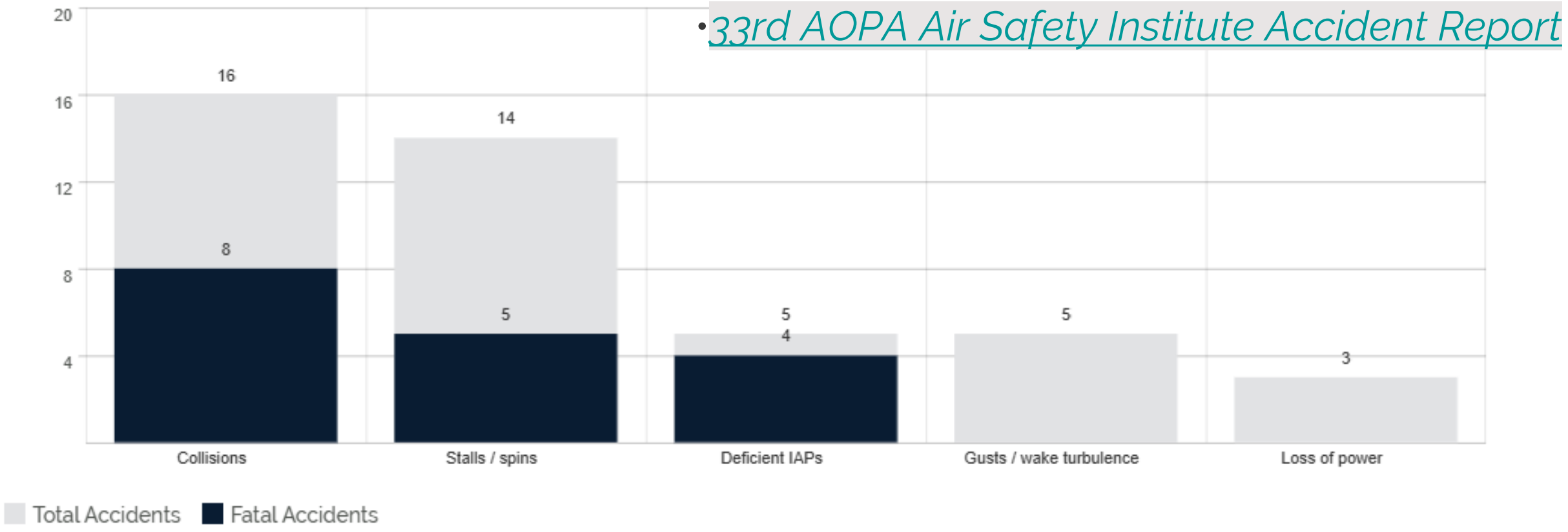


- *33rd AOPA Air Safety Institute Accident Report*

Types Of Decent and Approach Accidents

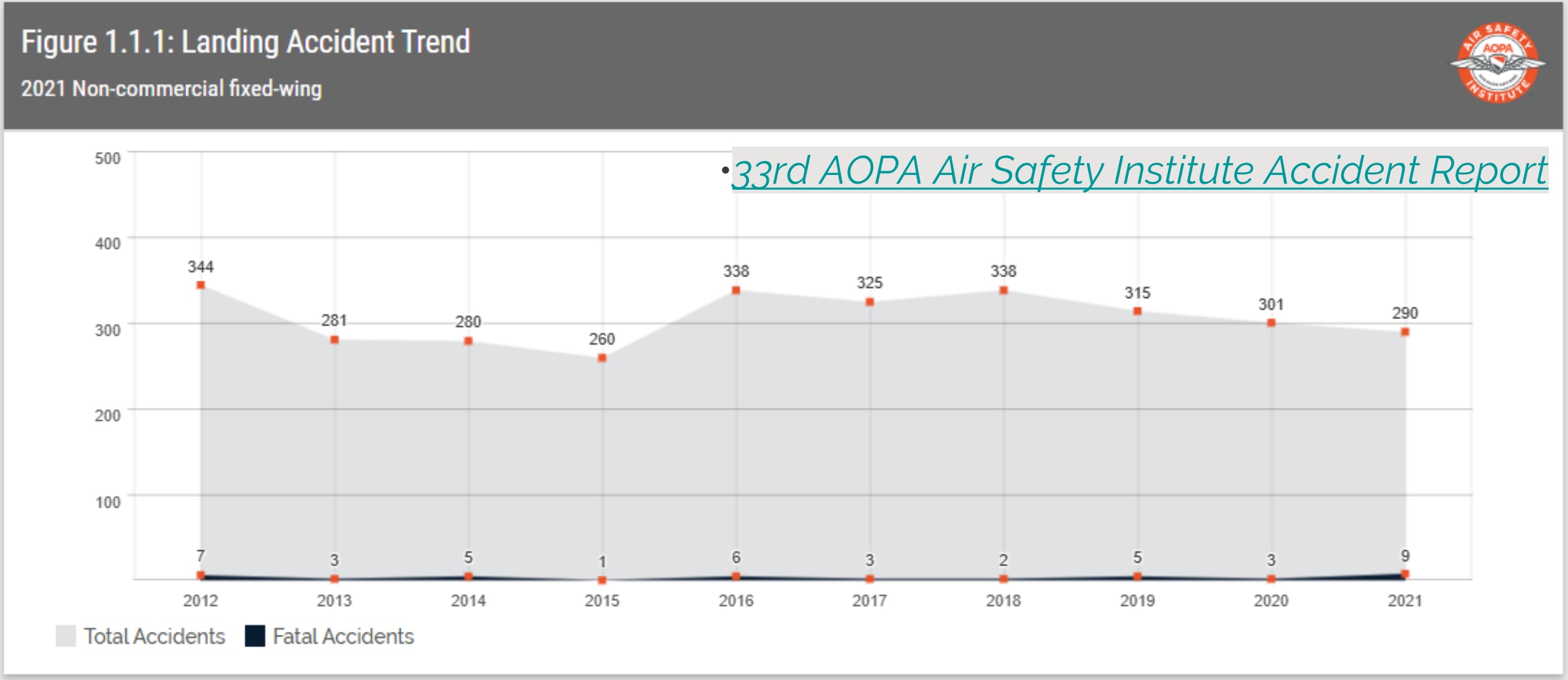
Figure 1.6.2: Types of descent and approach accidents

2021 Non-commercial fixed-wing



- *33rd AOPA Air Safety Institute Accident Report*

Landing Accidents Year over Year Trend

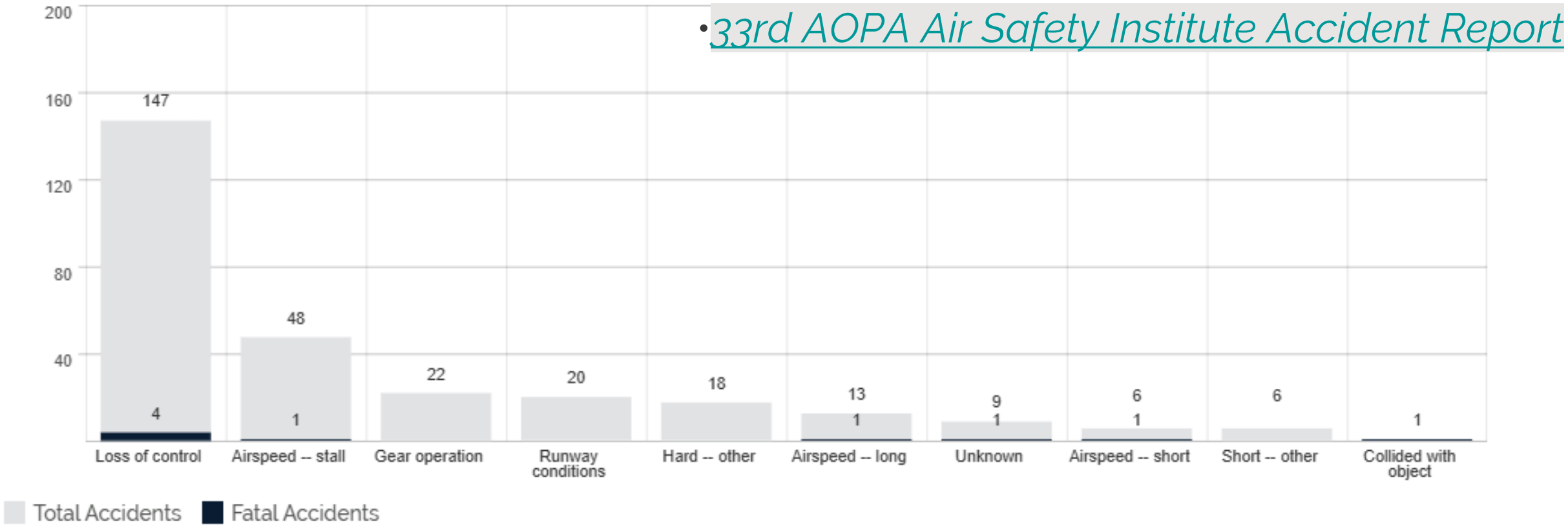


- [33rd AOPA Air Safety Institute Accident Report]

Types Of Landing Accidents

Figure 1.1.2: Types of Landing Accidents

2021 Non-commercial fixed-wing



- *33rd AOPA Air Safety Institute Accident Report*

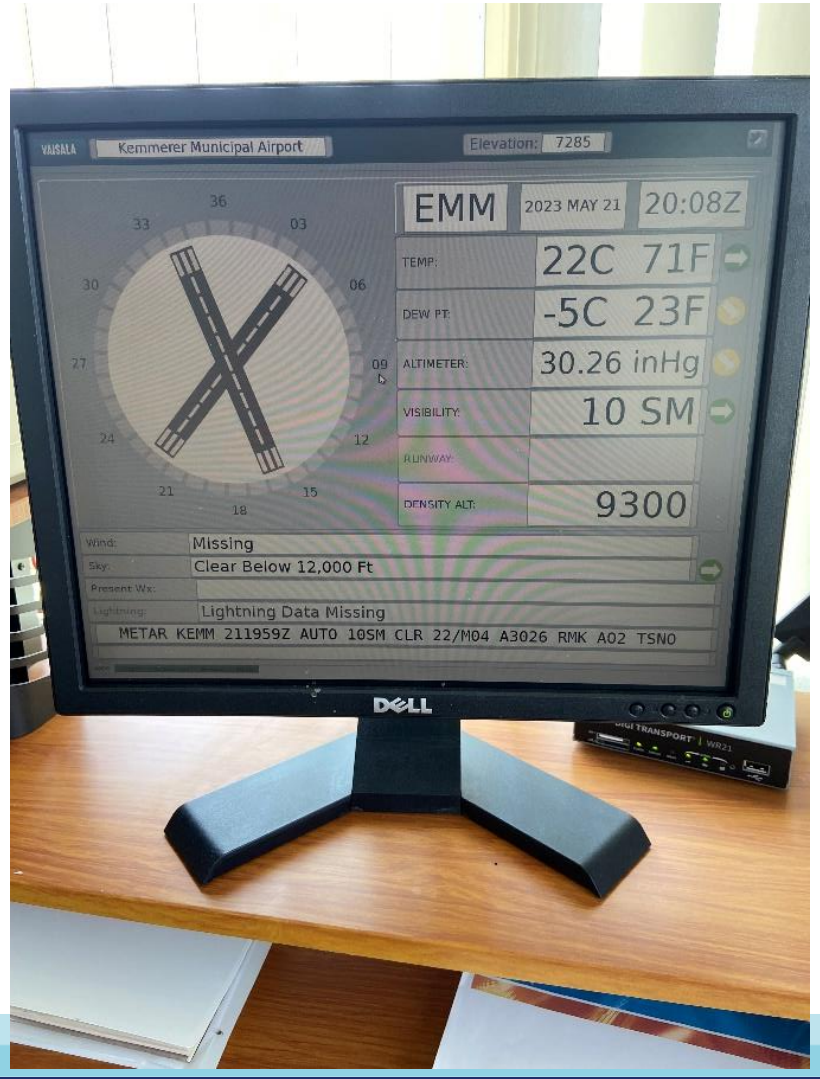
How Long Is A Piece Of String?

- **Colloquial, often humorous, rhetorical question**
- **Used as a response to a question such as "How long will it take?" or "How big is it?" when the length or size is unknown, variable, or relative.**

- **Used to describe when a thing can be any size – in terms of time, length, weight, cost, volume…**
- **Example: "Ask me how long it takes, and I will ask you how long is a piece of string!"**
- **So…**

Ponder This Question—What Is A Short Field?
(How Long Is A Piece Of String?)

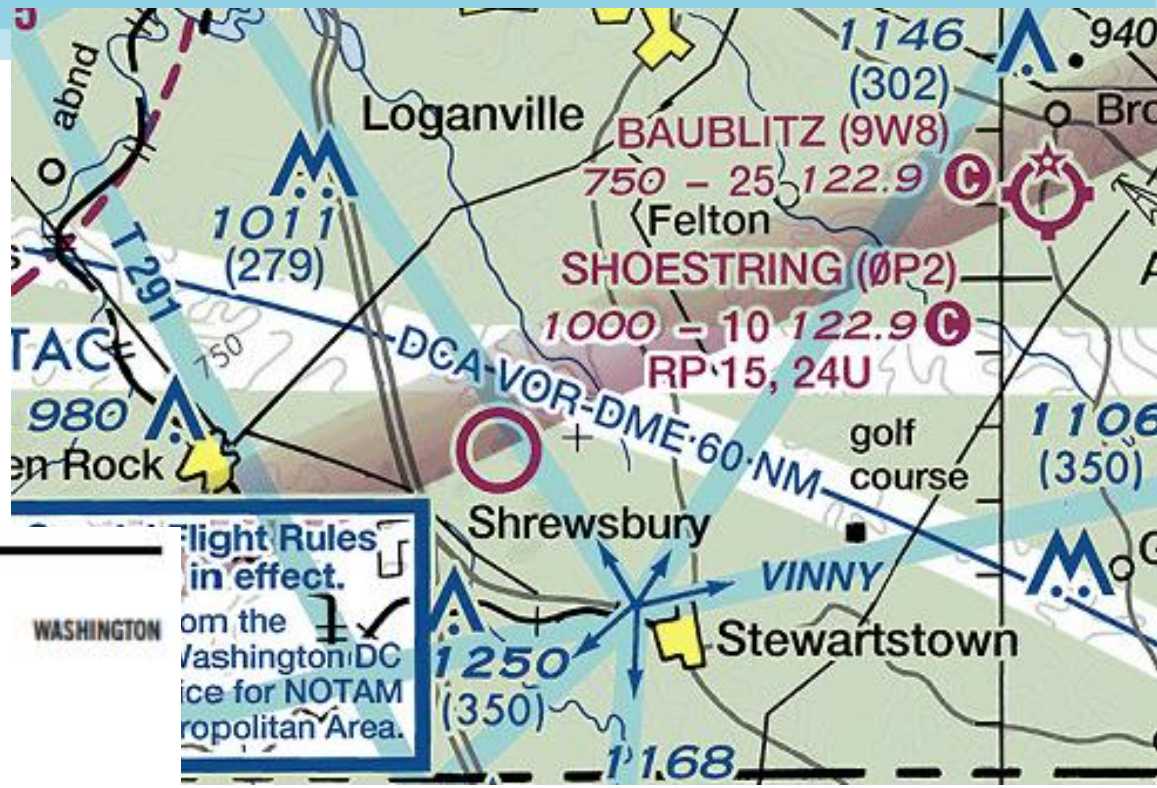
When Is A Long Runway A Short Field?



- **LAHSO shortens a runway (know ALD)**
- **When the 4-H Club are in town…**
  - Hot
  - High
  - Heavy
  - Humid
- **Kemmerer KEMM, WY:**
  - Elevation 7,285’
  - Longest runway 8,203’ x 75’
  - On this day, DA 9,300

A Short Field

- **Shoestring Airport, PA**
- **Two 1,000’ grass runways**



STEWARTSTOWN

SHOESTRING AVIATION AIRFIELD (ØP2) 3 NW UTC–5(–4DT) N39°47.78′ W76°38.78′ WASHINGTON

1000 NOTAM FILE IPT

RWY 06U–24U: 1000X100 (TURF)

RWY 06U: Tree.

RWY 24U: Rgt tfc.

RWY 15–33: 1000X100 (TURF)

RWY 15: Rgt tfc.

RWY 33: Thld dsplcd 500′. Tree.

SERVICE: S4

AIRPORT REMARKS: Attended irregularly. Extensive ultralgt activity on and invof arpt. Rwy 15–33 and Rwy 06–24 used for ultralight ops. Major airframe and powerplant repair for light sport acft only. Rwy 06, Rwy 15, Rwy 24, Rwy 33 marked with white patio blocks. Dsplcd thlds marked with three white paver each side. Rwy 24U dsplcd 183 ft.

AIRPORT MANAGER: 717-235-6724

COMMUNICATIONS: CTAF 122.9

CLEARANCE DELIVERY PHONE: For CD ctc Potomac Apch at 866-429-5882.

A Short Field

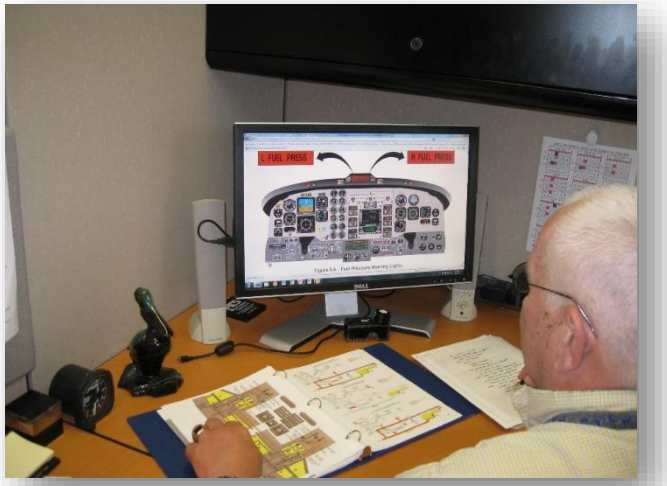
- **Shoestring Airport, PA**
- **Two 1,000’ grass runways**
- **Possible in your… RV-12…C172…C182?**
- **Are you capable…LND and TO?**

A Short Field

- Shoestring Airport, PA
- Two 1,000’ grass runways
- Possible in your… RV-12…C172…C182?
- Are you capable…LND and TO?
- Practice short TO/LNDs, on a long runway
- Say, at KDMW with distance markers
- More later…

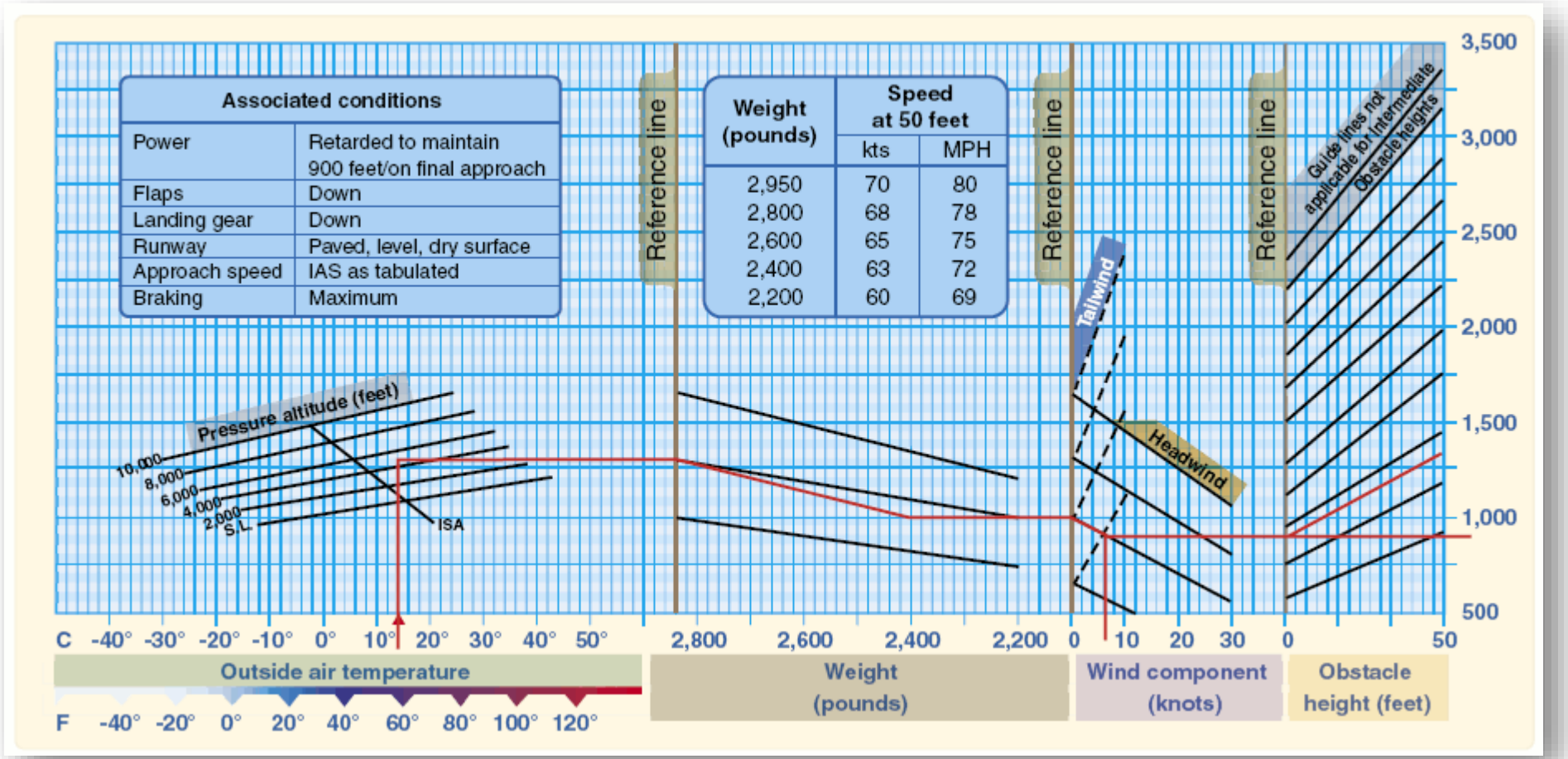
Read The Book

- **Necessary, but not sufficient…**
- **Pilot's Operating Handbook**
- **Performance charts**
- **Speeds for safe operations**
- **Normal & emergency procedures**
- **Short field TO & landing procedures**



- **But…you then need to practice it**
  - At different weights and DAs
    - Combos of elevation, temperature
  - Compare with the book values…

Know Your Numbers



Take Off Performance (Read the small print)

TAKEOFF DISTANCE
MAXIMUM WEIGHT 2300 LBS

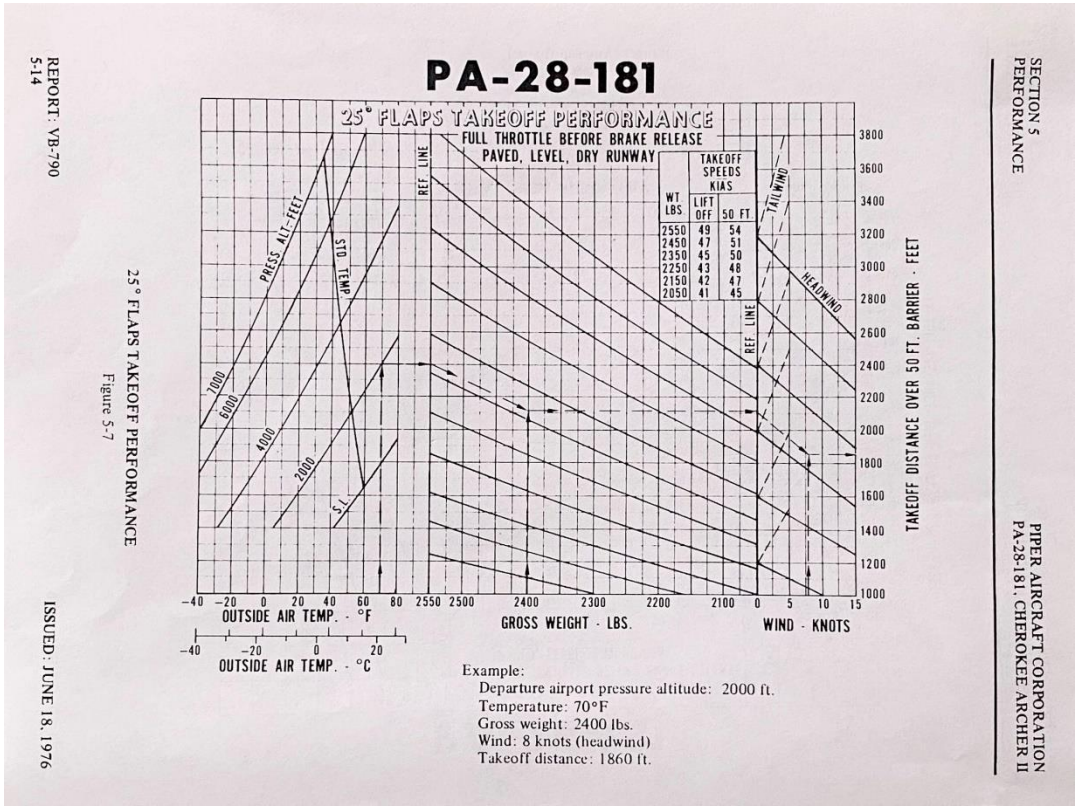
SHORT FIELD

CONDITIONS:
Flaps Up
Full Throttle Prior to Brake Release
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 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
2300	52	59	S.L.	720	1300	775	1390	835	1490	895	1590	960	1700
			1000	790	1420	850	1525	915	1630	980	1745	1050	1865
			2000	865	1555	930	1670	1000	1790	1075	1915	1155	2055
			3000	950	1710	1025	1835	1100	1970	1185	2115	1270	2265
			4000	1045	1880	1125	2025	1210	2175	1300	2335	1400	2510
			5000	1150	2075	1240	2240	1335	2410	1435	2595	1540	2795
			6000	1265	2305	1365	2485	1475	2680	1585	2895	1705	3125
			7000	1400	2565	1510	2770	1630	3000	1755	3245	1890	3515
			8000	1550	2870	1675	3110	1805	3375	1945	3670	2095	3990

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



- At sea level, standard day ~ 720' ground roll
- At PA of 3,000' at 30C, ~ 1,200' ground roll
- With this type of chart, can predict on actual weight

Take Off Calculations

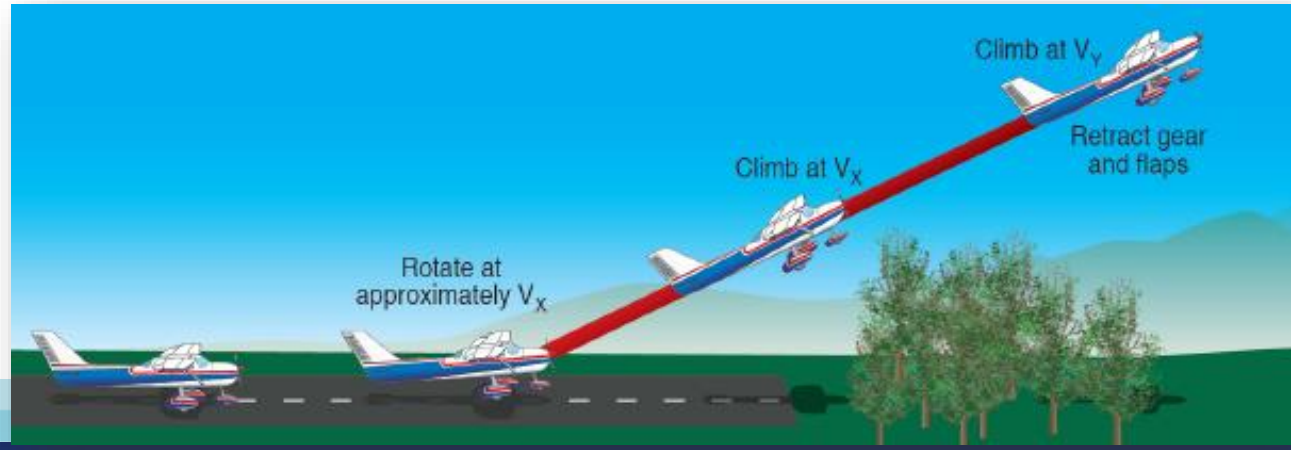
- **V_x, V_y, and cruise climb**
- **Take off distance and density altitude**
  - Fixed pitch add 15% per 1,000 feet DA to 8,000’
  - Constant speed add 12% per 1,000 feet DA to 6,000’

- **50/70 Rule – no obstruction**
  - Be at 70% of V_R by 50% of the distance
  - For a 5,000’ runway, 50% = 2,500’
  - 0.7 x 60 Kts= 42 Kts
  - Be at 42 Kts by 2,500’

- **30/70 Rule – obstruction**
  - Be at 70% of V_R by 30% of the distance
  - For a 2,000’ runway, 30% = 600’
  - 0.7 x 60 Kts= 42 Kts
  - Be at 42 Kts by 600

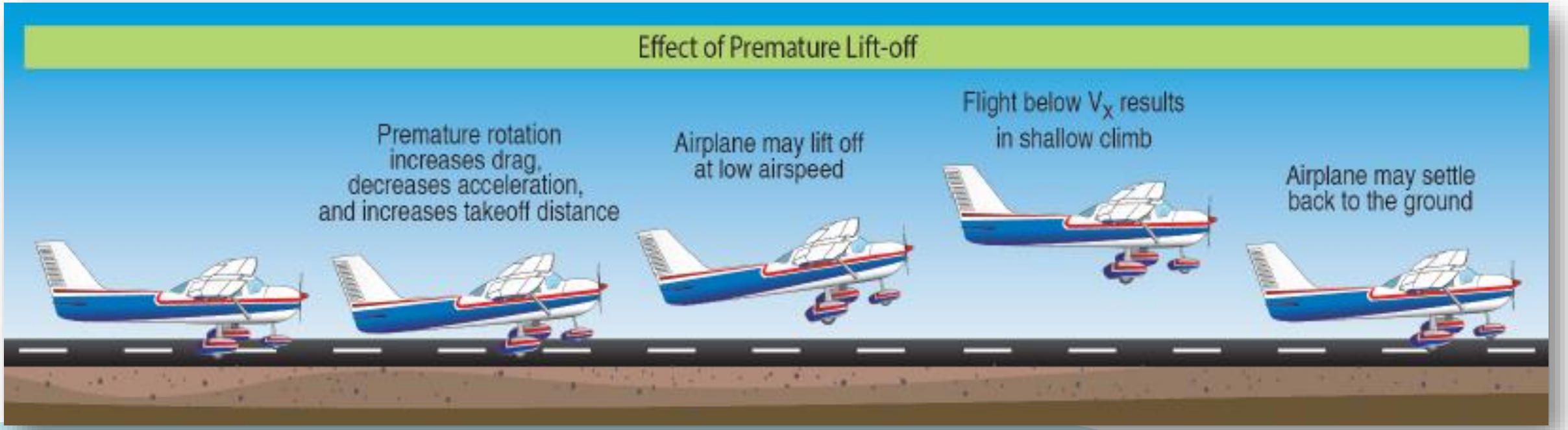
Short Field Take Off

- **Read the PoH for technique and configuration (flaps or not?)**
- **Use all the field…it is short, after all**
- **Brakes on, lean for full power, all-in-the-green, check static RPM**
- **Release—predict the left lunge…more right rudder!**
- **Rotate at and maintain Vx**
  - Until obstacles are cleared, or 100 feet above runway
- **Transition to Vy**
  - When safe to maneuver
- **Clean up for climb**



Don’t Rush—Airspeed Is King

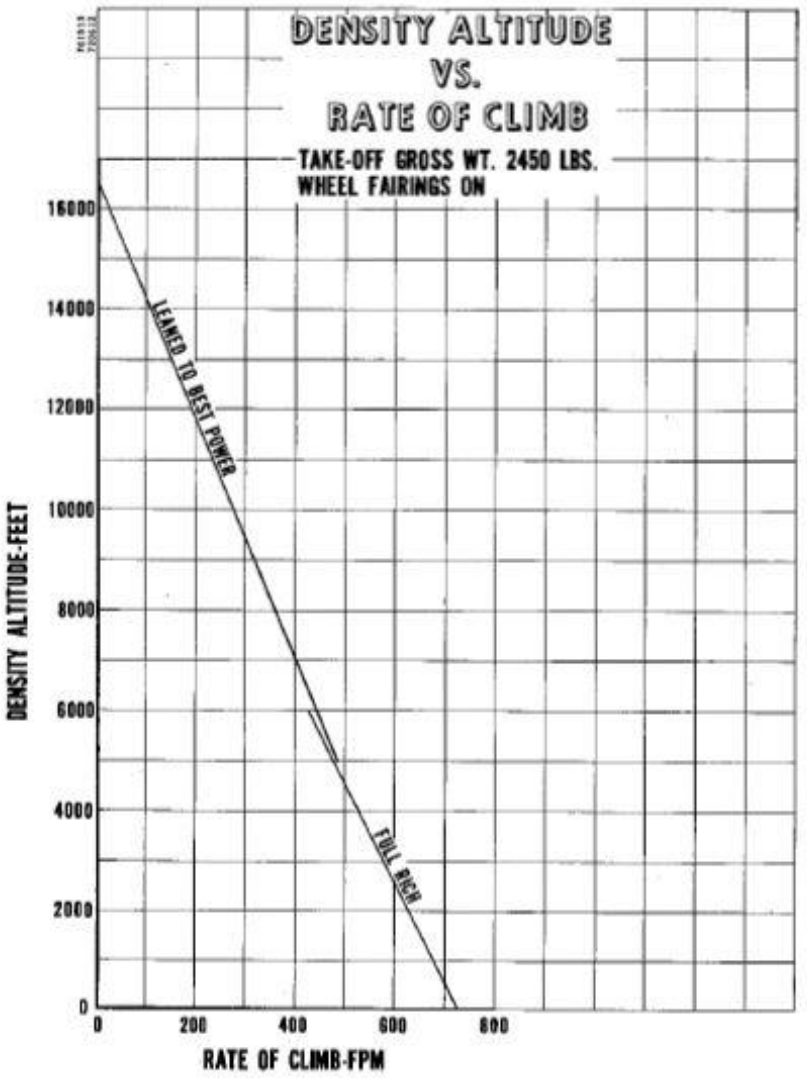
- **Fly on IAS, not how it “looks and feels”**
- **High DA, higher TAS, higher GS**
- **Know your pitch. Vx is approx. +12º and Vy is approx. +10º**



Also Need To Climb – DA and Weight

PA-28-180

PIPER CHEROKEE



MAXIMUM RATE-OF-CLIMB AT 2550 POUNDS

CONDITIONS:

Flaps Up
Full Throttle

PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
		-20°C	0°C	20°C	40°C
S.L.	74	855	785	710	645
2000	73	760	695	625	560
4000	73	685	620	555	495
6000	73	575	515	450	390
8000	72	465	405	345	285
10,000	72	360	300	240	180
12,000	72	255	195	135	- - -

NOTE:

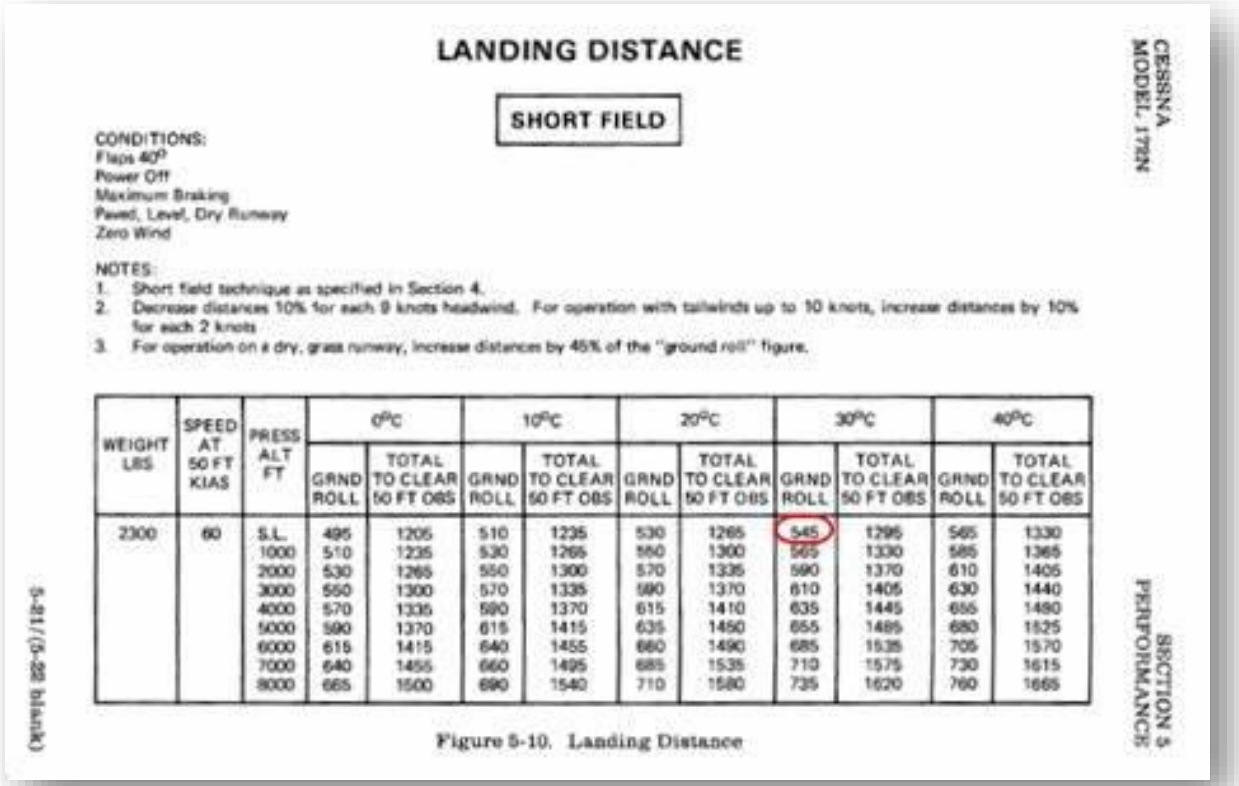
1. Mixture leaned above 3,000 feet for maximum RPM.

Figure 5-6. Maximum Rate of Climb

Notes:

- **V_Y reduces with DA**
- **Rate of climb changes are significant**

Landing Performance (Read the small print)



LANDING DISTANCE

SHORT FIELD

CONDITIONS:
Flaps 40°
Power Off
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

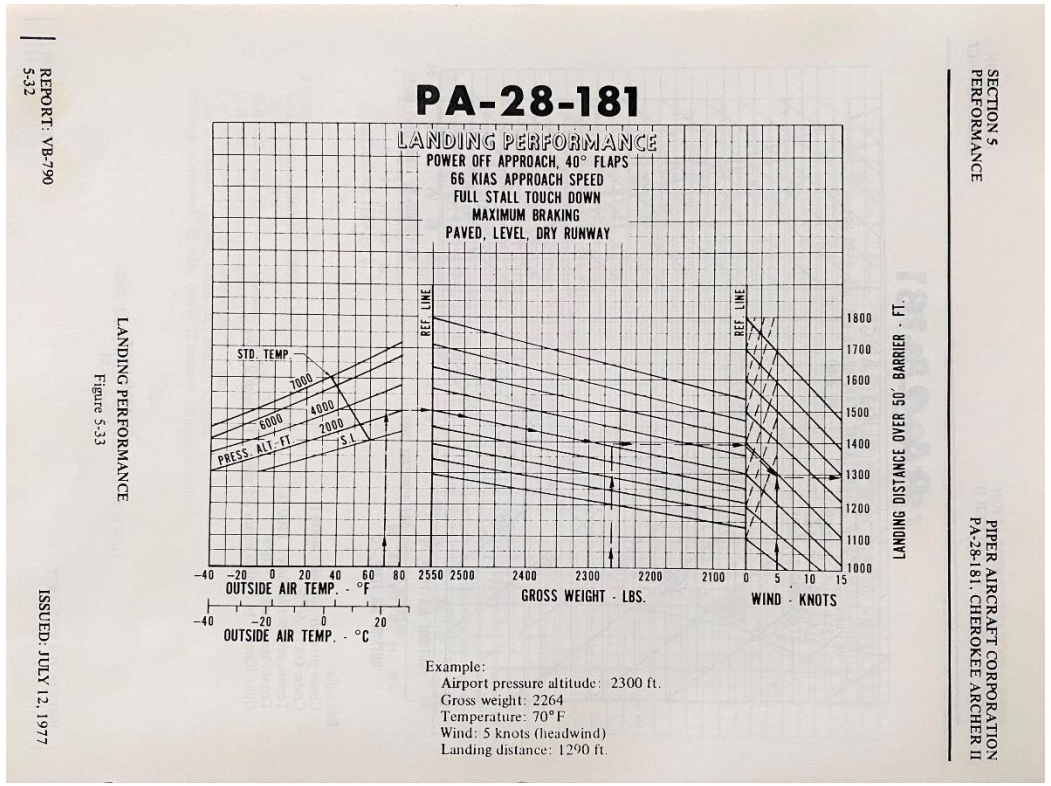
WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2300	60	S.L.	495	1205	510	1235	530	1265	545	1295	565	1330
		1000	510	1235	530	1265	550	1300	565	1330	585	1365
		2000	530	1265	550	1300	570	1335	590	1370	610	1405
		3000	550	1300	570	1335	590	1370	610	1405	630	1440
		4000	570	1335	590	1370	615	1410	635	1445	655	1480
		5000	590	1370	615	1415	635	1460	655	1485	680	1525
		6000	615	1415	640	1455	660	1490	685	1535	705	1570
		7000	640	1455	660	1495	685	1535	710	1575	730	1615
		8000	665	1500	690	1540	710	1580	735	1620	760	1665

Figure 5-10. Landing Distance

CESSNA MODEL 172N

SECTION 5 PERFORMANCE

5-31/(5-32 blank)



REPORT: VB-790
5-32

PA-28-181

LANDING PERFORMANCE
POWER OFF APPROACH, 40° FLAPS
66 KIAS APPROACH SPEED
FULL STALL TOUCH DOWN
MAXIMUM BRAKING
PAVED, LEVEL, DRY RUNWAY

STD. TEMP
PRESS. ALT. - FT.
7000
6000
4000
2000
S.L.
REF. LINE
REF. LINE
OUTSIDE AIR TEMP. - °F
OUTSIDE AIR TEMP. - °C
GROSS WEIGHT - LBS.
WIND - KNOTS
LANDING DISTANCE OVER 50' BARRIER - FT.

Example:
Airport pressure altitude: 2300 ft.
Gross weight: 2264
Temperature: 70°F
Wind: 5 knots (headwind)
Landing distance: 1290 ft.

LANDING PERFORMANCE
Figure 5-33

ISSUED: JULY 12, 1977

SECTION 5 PERFORMANCE

PIPER AIRCRAFT CORPORATION
PA-28-181, CHEROKEE ARCHER II

- At sea level, standard day ~ 500’ ground roll
- At PA of 3,000’ at 30C, ~ 610’ ground roll

- With this type of chart, can predict on actual weight

Short Field Approach & Landing

- **Stabilized short field final approach**
  - Landing configuration
  - Full flaps
  - $V_{ref} = 1.3 \times V_{so}$
- **Doesn't have to be a short approach…**
- **Go around if not stable on final**

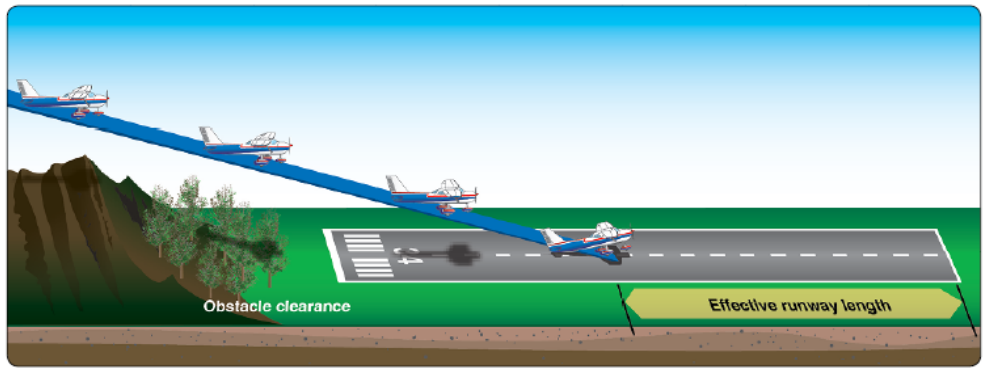


Figure 9-20. *Landing over an obstacle.*

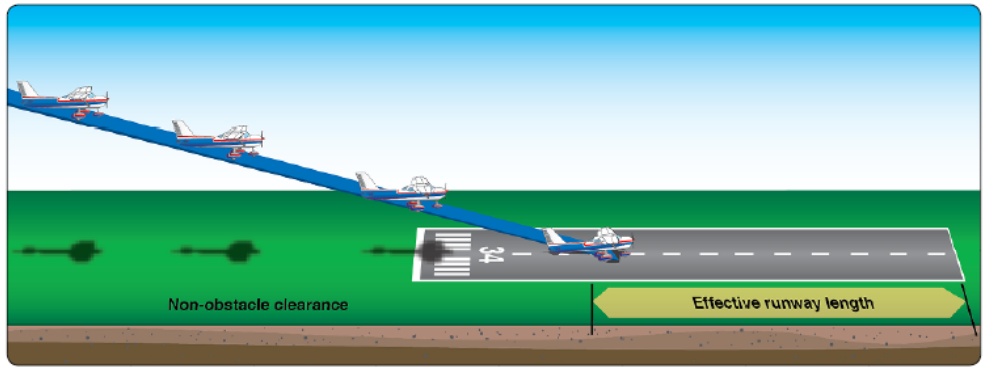


Figure 9-21. *Landing on a short field.*

How Do I Know?

1. **Some people guess. They chose poorly**
2. **Some people work it out. The chose wisely**
   - Predict performance
   - Prove your prediction
   - Practice to achieve it
   - Keep at it for proficiency

What's My Baseline?

My Short Field Performance					
Aircraft		Gross Weight		Test Weight	
Airfield		Elevation		Density Alt.	
Wind Direction		Wind Speed		X-Wind Comp	
IAS		Landing Dist.		Flap Setting	
Takeoff Flap		Rotation Speed			
Rotation Speed x.70		Vx		Vy	
Distance to Rotation		Distance to 50'			

https://tinyurl.com/yjn5kdsp

Calibrate

- **Every time you fly:**
  - Note DA, or record PA and Temp to calculate DA later
  - On take off, estimate the ground roll
  - On climb, note the FPM at book Vy
  - Change pitch slightly up and down (to change speed) and note FPM
  - Later, compare with book values
  - Continue to calibrate until you have take off and climb tables for your aircraft and you
  - Precision spot landing
  - Aiming point and actual touch down point
  - Distance to full stop

Complications (Impactors)

- **Weather**
- **Density altitude**
- **Runway slope and surface**
- **Obstructions**
- **Aircraft weight**
- **You**

A complication, by definition, is any function offered by a timepiece that is in addition to its primary function of keeping the time

Human Biases Are Real…

- **Just changing the order has a big impact…**

- **Land/not-land decision**
- **Change it to not-land/land decision**

- **Rather than “I will not land if…”**
- **Change to “I will only land if…”**
- **Plan to go around on every landing**

- **Also works for take off…I will only continue the take off if…**

A Simple Matter of Priorities

- **Aviate**
- **Navigate**
- **Communicate**

A Simple Matter Of Priorities

- **Fly the Aircraft!**

So, When Do I Go Around?

- **<u>Plan</u> to go around on every landing**
- **Whenever the approach becomes unstable**
  - At or below 1,000 ft – IFR
  - At or below 500 ft – VFR
- **Whenever a landing can’t be made (duh)**
- **Make the decision early**
  - Stick to it
    - Changing your mind is destabilizing

Go Around & Missed Approach Priorities

- **Aviate**
  - Maintain aircraft control
  - Apply power
  - Probably needs push not pull (airspeed is king)
  - Arrest descent…level off, not necessarily nose up…
  - Configure for climb when at Vx
  - Wait for positive rate climb before messing with anything

Go Around & Missed Approach Priorities

- **Navigate**
  - IFR:
    - Continue to missed approach point (no early turns) thence…
    - Fly the missed approach procedure
    - Follow ATC instructions
  - VFR:
    - Continue to runway threshold & climb to pattern altitude thence…
    - Side step for visibility
    - Maneuver to re-enter pattern or depart the area
    - Follow ATC instructions

Go Around & Missed Approach Priorities

- **Communicate**
  - IFR
    - Tower or local traffic advisory frequency
    - Approach control when advised
    - ATC – state intentions
  - VFR
    - Tower or local traffic advisory frequency

A Matter Of Priorities

- **Fly the aircraft first!**

- **High stress**
- **Short time frame**
- **Limited options**
- **Off airport landing?**

- **Can we improve or chances by training for this? YES!!**

So How Do We Prepare?

- **Consider the hazards associated with each phase of flight**
  - Think about what could go wrong
  - This is why we brief the take off and approach
  - Get it to the front of your head (from long term to short term)
- **Plan for how you would deal with the problem**
  - What would I do when…?
  - What I have learnt?
  - Ty it out in simulator = scenario training
- **Train to proficiency**
  - Practice – preferably with a CFI.
  - *WINGS* flight activities!!

Prepare, Plan, Practice

- **Prepare**
  - Performance numbers, weather
  - Pave, IMSAFE, WK-RAFT
- **Plan**
  - Route, flight plan, runway data, climb & descent profiles, escape routes, no-go/go points & alternates
- **Practice – at mission weight**
  - Short & soft field take offs and landings
  - Power off approaches and landings
    - Angles
    - Fly the wind – tailwind on base? Impact of ground speed?
    - FPM = FPNM required (gradient) x GS/60
    - On glide slope at 70 kts requires: 318FPNM; 371FPM
    - On glide slope at 90 kts requires: 318FPNM; 477FPM

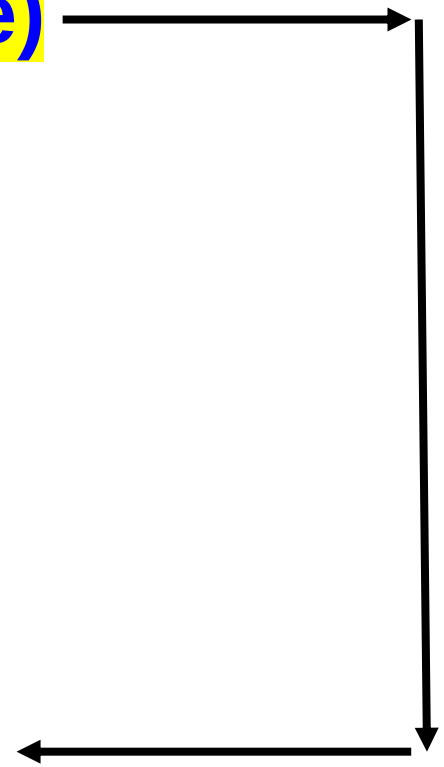
Recommendations:

- **Brief each takeoff, approach and landing**
  - Runway and available distance for takeoff or landing
  - Aircraft configuration and target airspeeds
  - Rejected takeoff or landing decision point
  - Departure/approach path
  - Return to airport altitude
    - Practice at altitude
    - Practice spiral descent to landing
    - Can predict altitude lost per turn at standard rate from best glide speed and glide rate
  - Forced landing opportunities

WK RAFT (91.103) know all there is to know…

- **W** Weather (including density altitude)
- **K** Known issues: NOTAMs, TFRs

- **R** Runways of intended use
- **A** Alternatives
- **F** Fuel management
- **T** Take-off and landing performance



T = Take off and landing performance ~ Density Altitude

- **DA is…?**
  - Pressure altitude corrected for non-standard temperature
  - Equivalent altitude in the ISA based on the combination of actual pressure, temperature and humidity
  - Is a high DA *good or bad*?

  - High DA = Bad
  - Caused by:
    - Lower pressure than standard (atmospheric and elevation/altitude)
    - Higher temp than standard
    - Higher humidity than standard

Impact of High DA

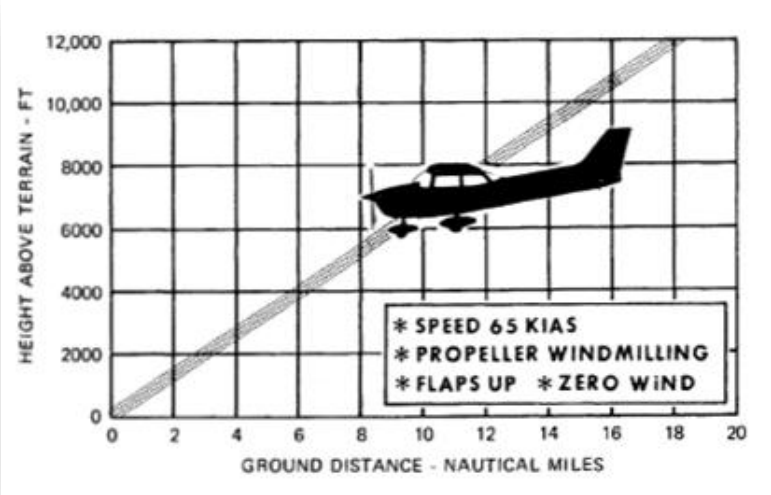
- **High DA means lower air density**
- **Impacts:**
  - Lift equation: ½ V^2 C_L A ρ
  - Engine performance
  - Climb performance
  - TAS higher than IAS
  - For given conditions, means GS is higher
  - Fly by the IAS, not what it “looks” like

TAS From CAS
At Various Density Altitudes

TAS from CAS at Various Density Altitudes (TAS = CAS*(1+0.2*DA/1000)												
CAS	40	50	60	70	80	90	100	110	120	130	140	150
DA (Feet)												
-5000	36	45	54	63	72	81	90	99	108	117	126	135
-4000	37	46	56	65	74	83	92	102	111	120	129	138
-3000	38	47	57	66	76	85	94	104	113	123	132	141
-2000	39	48	58	68	77	87	96	106	116	125	135	144
-1000	40	49	59	69	79	89	98	108	118	128	138	147
0	40	50	60	70	80	90	100	110	120	130	140	150
1000	41	51	62	72	82	92	102	113	123	133	143	153
2000	42	52	63	73	84	94	104	115	125	136	146	156
3000	43	53	64	75	85	96	106	117	128	138	149	159
4000	44	54	65	76	87	98	108	119	130	141	152	162
5000	44	55	66	77	88	99	110	121	132	143	154	165
6000	45	56	68	79	90	101	112	124	135	146	157	168
7000	46	57	69	80	92	103	114	126	137	149	160	171
8000	47	58	70	82	93	105	116	128	140	151	163	174
9000	48	59	71	83	95	107	118	130	142	154	166	177
10000	48	60	72	84	96	108	120	132	144	156	168	180
11000	49	61	74	86	98	110	122	135	147	159	171	183
12000	50	62	75	87	100	112	124	137	149	162	174	186

Spiral Descent:

- **The best landing spot may be below you:**
  - C172:
    - Glide slope = 18NM in 12,000’
    - Glide slope (ratio) = 18*6072/12000 = 9.1:1
    - Descent angle = $Tan^{-1}(1/9.1) = 6.3^{o}$
    - Feet per NM descent = 12000/18 = 667 ft/NM
    - FPM at 65 Kts = 723 FPM
    - Altitude lost in a standard rate (2-min) turn = 1,446 ft
      - Go out and test this!



The Aviation 4-H Club

- **Hot**
  - Field temperature (take off and landing performance)
  - Temp at altitude (cruise performance)
- **High**
  - Altitude = lower air density
  - Low pressure day = lower air density
- **Humid**
  - Relative humidity
  - T & DP
  - Hot air can hold more water vapor = lower air density. (Clouds are buoyant)
- **Heavy**
  - More W means more L to get up and stay airborne
  - Where does “more L” come from?
  - Lift comes from V^2 and/or C_L (airspeed and/or Aoba)

Ponder:

- Quiz: It is called the impossible turn because…?
- Quiz: Which of the five hazardous attitudes tempt us to try it?
- All of them…
- Impulsivity : Got to do something, quickly
- Macho: : Huh…I'll show them how to do it
- Antiauthority : Don't tell me what to do or not do
- Invulnerability: I'm better than everyone else…watch…
- Resignation : I can't do anything else…might as well try it

- Bonus 6th attitude - Entitlement: I deserve this…I'm #1 for landing

Calibrate Your Ability

Clearview Airpark (2W2)
1,830’ x 30’ at 2,000’ AGL
(RWY32 277’ displaced)

Carroll County Airport (KDMW)
5,100’ x 100’ at 2,000’ AGL

From C172 landing table:
PA 1,000’, T = 30º, D = 565’

“It” can do it…can you?

If you can’t get off on the first turn, don’t try 2W2!

Know The Marker Distances

U.S. Department of Transportation
Federal Aviation Administration

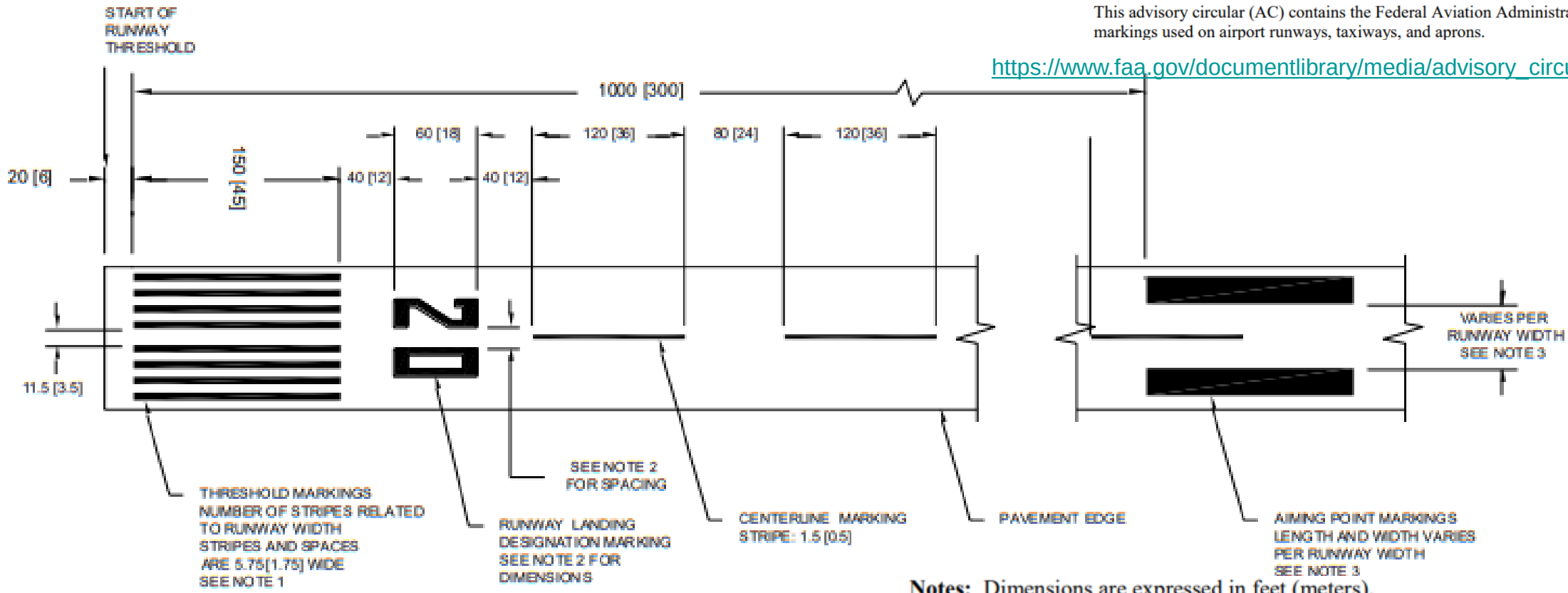
Advisory Circular

Subject: Standards for Airport Markings | **Date:** 9/27/2013 | **AC No:** 150/5340-1L
Initiated by: AAS-100 | **Change:**

1. What is the purpose of this advisory circular (AC)?

This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for markings used on airport runways, taxiways, and aprons.

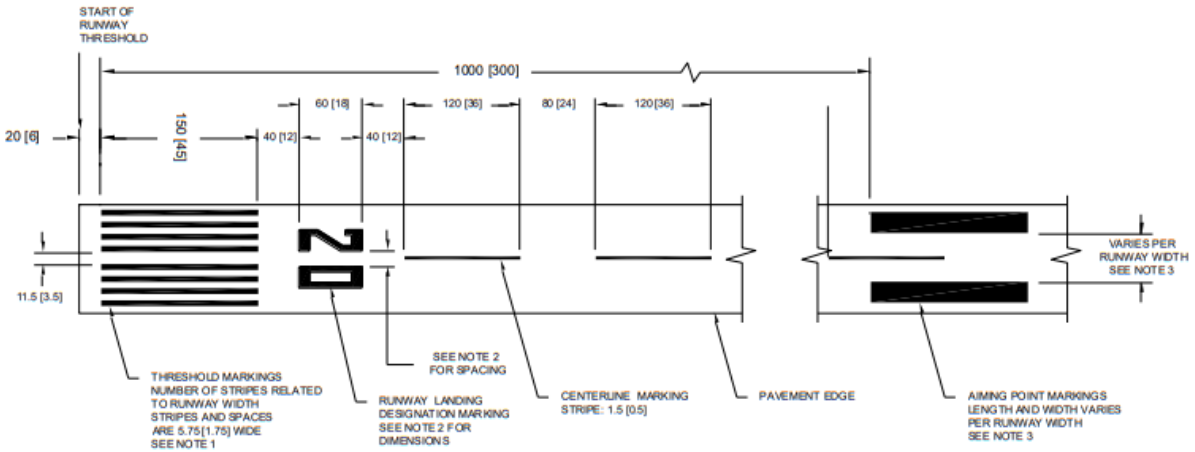
https://www.faa.gov/documentlibrary/media/advisory_circular/150_5340_1l.pdf



Notes: Dimensions are expressed in feet (meters).
1. See paragraph 2.5 and Table 2-2.
2. See Figure A-6.
3. See paragraph 2.6. See Table 2-1 for when required.

Figure A-2. Non-precision runway

Use Markings To Judge 50% Point (For Take Off)



From C172 take off table:
PA 1,000’, T = 30º, D = 800’
Rule of thumb: Add 50% = 1,200’
50/70 rule: Be at 40 kts by 900’

Where is 900 feet?

Threshold to first stripe = 310’

Each stripe = 120’

Each gap = 80’

Start of fourth stripe = 910’

It’s before the 1,000’ markers!

Take Off Tips

Takeoff Tip No. 5—Know your airport

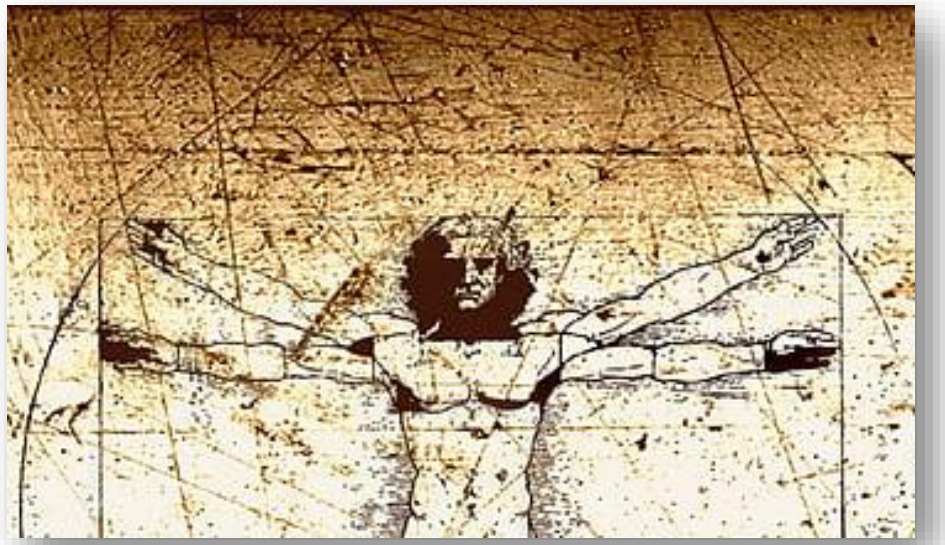
- **Field Elevation**
- **Temperature & humidity**
- **Wind speed & direction**
- **Runway length (usable)**
  - Runway composition
  - Runway slope
  - Runway contamination
- **Departure obstacles**
- **Forced landing areas**

Takeoff Tip No. 4—Know your airplane

- **Weight & balance**
  - Gross weight & C.G. at take off
- **V speeds**
  - Best angle of climb speed—Vx
  - Best rate of climb speed—Vy
  - Single-engine minimum control speed - Vmc
  - Best single-engine climb speed – Vyse
- **Expected takeoff performance**
  - Rotation point
  - Lift off speed

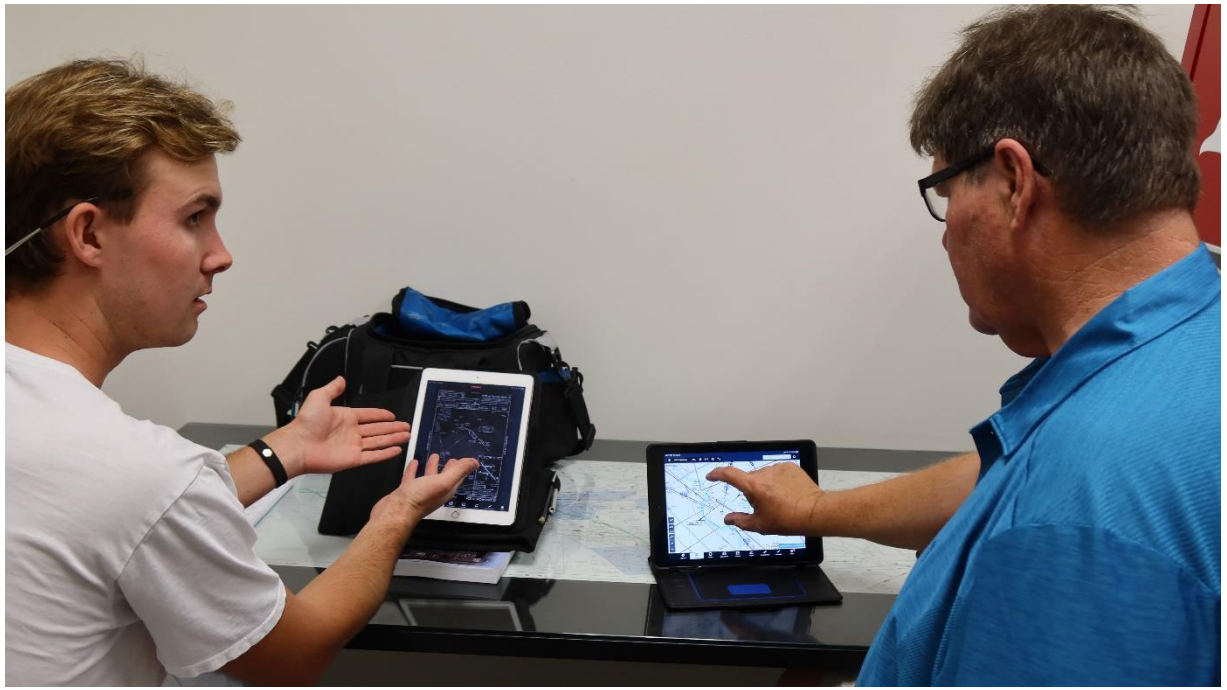
Takeoff Tip No. 3—Know yourself

- **Health, rest, state of mind**
  - Medication(s)
  - Fatigue
  - Mission Imperative
  - External pressure(s)
    - Plan B
- **Recent experience**
  - In this environment
  - In this aircraft



Takeoff Tip No. 2—Plan your takeoff

- **No-Go/Go criteria**
  - Initial instrument & power check
  - Departure path or procedure
  - Power loss before rotation
  - Power loss during climb
- **Ground roll**
  - Distance
  - Rotation speed
  - 50/70 check
  - Rotation point



Take off Tip No. 1—Brief your plan

- **Runway & aircraft configuration**
- **No-go/Go criteria**
  - Initial instrument & power check
  - 50/70 check point & speed
  - Departure path or procedure
  - Power loss before rotation
  - Ground roll
    - Rotation and V speeds
- **Emergency procedures**
  - Power loss in climb
  - Off airport landing

TO and LND Card

Take-Off & Landing Planning Card - (See DA Graph)

Airplane Type: **Tail Number:** **Date:**

ATIS/WX Data:	Value:	Comments:
Date:		
Time:		
Airport:		
Info ID:		
Mag. Wind (from true):		Headwind comp = WV*Cos(α)
Viz:		
Sky:		
Temp:		
Dew point:		
Altimeter:		
Expected runway:		
Runway length:		
Remarks:		

Calculated Data:	Value:	Comments:
Pressure Altitude.		
Density Altitude:		See DA table.
Take-off distances:		See PoH page: Take-off conditions:
a. Ground roll:		
b. To clear 50ft:		
c. TO speed IAS (V_R):		
d. V_X speed IAS (V_X):		
e. TO speed @ 50ft:		
f. Accel. stop distance: (2.5 x TO roll):		
Climb rate:		See PoH page:
a. Rate of Climb (FPM):		
b. Climb IAS (V_Y):		
Landing distances:		Conditions: See PoH page:
a. Ground roll:		
b. To clear 50ft:		
c. Landing speed @ 50ft:		
Hydroplane speed: SQRT(PSI)*9	50 40	At 30PSI. At 20PSI.

Landing Tips

Landing Tips No. 5—Know your airport(s)

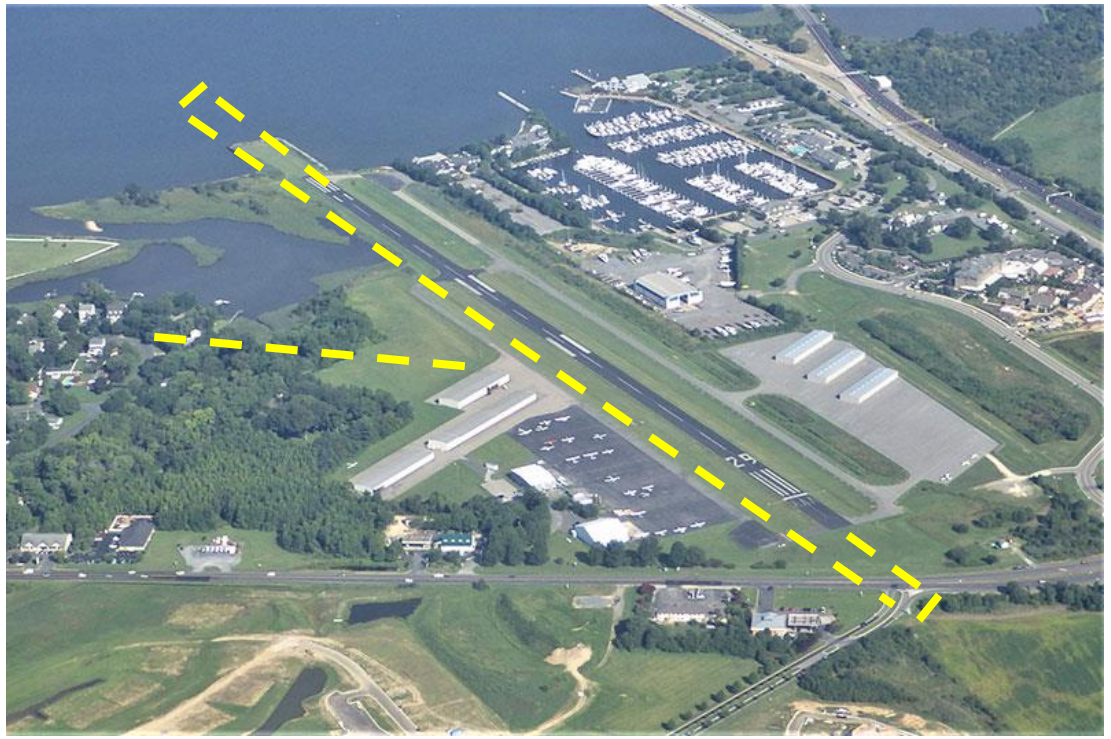
- **Field Elevation**
- **Temperature, pressure & humidity (Density Altitude)**
- **Wind speed & direction**
- **Runway length**
  - Runway composition
  - Runway slope
  - Runway contamination
- **Approach obstacles**
- **Departure obstacles**

Landing Tip No. 4—Know your airplane

- **Initial & final approach & best glide speeds**
- **Flap and gear speeds**
- **Expected landing performance**
  - Add 50%

Landing Tip No. 3—Fly the pattern

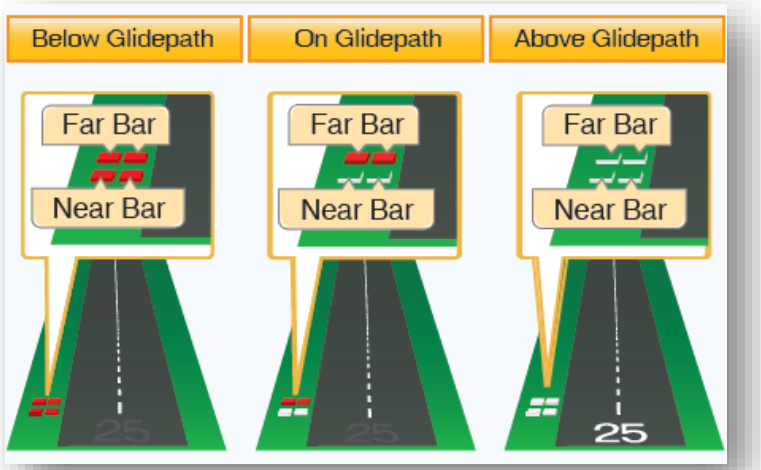
- **Pattern altitude**
  - May be different for airplanes and helicopters
- **Left or right-hand turns?**
- **Behave:**
  - Always fly a 45^{o} entry
  - Look and listen for:
  - Aircraft in the pattern
  - Aircraft on long final
    - Naughty or rude pilots
    - Instrument approaches



Landing Tip No. 2—Fly a stabilized approach

- **Brief your plan**
- **Landing configuration**
- **On speed**
- **On course**
- **On glide path**

Get the sight picture



Stabilized Approach Parameters

- **VFR - Stabilized by 500 feet above touchdown elevation**
- **IFR - Stabilized by 500 feet above touchdown elevation**
  - On correct flight path
    - Small corrections to maintain
  - On speed
    - Recommended approach speed
      - +10/-5 Knots or MPH
  - Descent
    - On Glide Slope/VASI
    - 500 fpm or less (depends on ground speed)
  - In landing configuration
  - Landing checklist complete

Crosswind Landing

- **Stabilized approach**
  - On speed
  - On glideslope
- **Aligned with runway**
  - Crab…may be…
  - Touch down with side slip

Landing Tip No 1—Be prepared to go around

- **Brief your plan**
  - Including approach, go-around and missed approach intentions

TO and LND Card

Take-Off & Landing Planning Card - (See DA Graph)

Airplane Type: **Tail Number:** **Date:**

ATIS/WX Data:	Value:	Comments:
Date:		
Time:		
Airport:		
Info ID:		
Mag. Wind (from true):		Headwind comp = WV*Cos(α)
Viz:		
Sky:		
Temp:		
Dew point:		
Altimeter:		
Expected runway:		
Runway length:		
Remarks:		

Calculated Data:	Value:	Comments:
Pressure Altitude.		
Density Altitude:		See DA table.
Take-off distances:		See PoH page: Take-off conditions:
a. Ground roll:		
b. To clear 50ft:		
c. TO speed IAS (V_R):		
d. V_X speed IAS (V_X):		
e. TO speed @ 50ft:		
f. Accel. stop distance: (2.5 x TO roll):		
Climb rate:		See PoH page:
a. Rate of Climb (FPM):		
b. Climb IAS (V_Y):		
Landing distances:		Conditions: See PoH page:
a. Ground roll:		
b. To clear 50ft:		
c. Landing speed @ 50ft:		
Hydroplane speed: SQRT(PSI)*9	50 40	At 30PSI. At 20PSI.

Want to learn more?

Airplane Flying Handbook

- https://bit.ly/3wO1wMu
- Chapters 6 and 9

FAASTeam *WINGS* Pilot Proficiency Program

- http://faasafety.gov/WINGS
- *WINGS* Flight Activities

Opportunity to Practice

❑ *WINGS* Flight Topic 1 ASEL – A070405-07

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Library Contents

ASEL - Takeoffs, Landings, and Go Arounds - A070405-07
Author: Fred Kaiser **Date:** 06/12/2019

Viewing Options: Normal

In this Activity the airman and instructor will discuss, and the airman will demonstrate takeoffs and departure climbs; tra
descents and landings, emergency operations and go-arounds under normal conditions, and under conditions which requ

This document contains the following attachment.
Click the link below or the icon to the left to view.
▸ A070405-07 ASEL-Takeoffs_Landings_Go-Arounds.pdf (198 k)

WINGS Flight Activity # A070405-07 Worksheet
ASEL - Takeoffs, Landings, and Go Arounds

DATE:
LOCATION:

AIRMAN:	AIRMAN CERTIFICATE #:	AIRMAN EMAIL:	TYPE AIRCRAFT/SIMULATOR USED	BLOCK TIME
CFI:	CFI CERTIFICATE #:	CFI EMAIL:	_WINGS_ Flight Activity Completed: ☐ YES ☐ NO	

NOTE: The Flight Instructor will ensure the airman possesses the knowledge, ability to manage risks, and skills consistent in the performance of flight maneuvers specifically listed in the Areas of Operation for Takeoffs, Landings and Go-Arounds; Emergency Operations, and Night Operations (as applicable) to the ACS completion standards. While this _WINGS_ Flight Activity targets specifically the Takeoff, Landing, and Go-Around Area of Operation, Airmen should satisfactorily demonstrate all pertinent parts of the ACS in their Preflight, Flight, and Post Flight activities consistent with their certificate or rating. For _WINGS_ credit, the airman will satisfactorily demonstrate the maneuvers and procedures listed in bold text below, using both outside visual references and cross checked with the flight instruments, for the privileges of the certificate or rating being exercised in order to act as Pilot-in-Command (PIC).

Principal ACS Areas of Operations for this _WINGS_ Flight Activity (Bold Items Required):

AREA OF OPERATION	GRADE FM	GRADE SRM	AREA OF OPERATION	GRADE FM	GRADE SRM
I. PREFLIGHT PREPARATION			V. PERFORMANCE AND GROUND REFERENCE MANEUVERS		
II. PREFLIGHT PROCEDURES			VI. NAVIGATION		
III. **AIRPORT AND SEAPLANE BASE OPERATIONS**			VII. SLOW FLIGHT AND STALLS		
1. COMMUNICATIONS, LIGHT SIGNALS, AND RUNWAY LIGHTING SYSTEMS			VIII. BASIC INSTRUMENT MANEUVERS		
2. TRAFFIC PATTERNS					
			IX. EMERGENCY OPERATIONS		
IV. TAKEOFFS, LANDINGS, AND GO-AROUNDS			**1. EMERGENCY DESCENT**		
1. NORMAL TAKEOFF AND CLIMB			**2. EMERGENCY APPROACH AND LANDING (SIMULATED)**		
2. NORMAL APPROACH AND LANDING			**3. SYSTEMS AND EQUIPMENT MALFUNCTIONS**		
3. SOFT-FIELD TAKEOFF AND CLIMB					
4. SOFT-FIELD APPROACH AND LANDING			X. MULTIENGINE OPERATIONS		
5. SHORT-FIELD TAKEOFF AND MAXIMUM PERFORMANCE CLIMB					
6. SHORT-FIELD APPROACH AND LANDING			**XI. NIGHT OPERATIONS (AS APPLICABLE)**		
7. FORWARD SLIP TO A LANDING			**1. NIGHT PREPARATION**		
8. GO-AROUND / REJECTED LANDING					
			XII. POSTFLIGHT PROCEDURES		

COMMENTS: (Use back for additional notes)

•Homework

- **Research and understand density altitude**
  - https://www.aopa.org/training-and-safety/air-safety-institute/safety-publications/density-altitude
  - https://www.youtube.com/watch?v=5yFIRHvoy4k
- **Do some performance examples**
  - **TO and LDG distances**
  - **Cruise performance**
- **Practice pattern precision**
  - **Short field TO and LND**

Practice until you don't get them wrong!

Scenario-Based Proficiency Training Works

- **Increases confidence**
- **Increases comfort**
- **Expands horizons**
- **Keeps us safe**

Earning any *WINGS* phase qualifies for a Flight Review!

•Homework-1

- **Research and understand density altitude**
  - https://www.aopa.org/training-and-safety/air-safety-institute/safety-publications/density-altitude
  - https://www.youtube.com/watch?v=5yFIRHvoy4k
- **Do some performance examples**
  - **TO and LDG distances**
  - **Cruise performance**
- **Practice pattern precision**
  - **Short field TO and LND**

Practice until you don't get them wrong!

Homework-2: Review and learn from…

https://www.youtube.com/watch?v=eYqS-j3pUHY

https://www.aopa.org/training-and-safety/online-learning/real-pilot-stories/the-heat-of-the-moment

https://www.youtube.com/watch?v=sTo4GGRExGE

https://www.aopa.org/training-and-safety/online-learning/accident-case-studies/into-thin-air

Homework-3: Performance Specific Resources

- **Spend some quality time with these resources:**

[PHAK Chapter 10: Weight and Balance]

[PHAK Chapter 11: Performance]

https://www.aopa.org/training-and-safety/online-learning/reality-check/takeoff-and-landing-performance

[Density Altitude]

[Techniques: Density Altitude]

[Density Altitude Flying]

[Density Altitude]

[Tips & Techniques: Density Altitude - Safety considerations]

[Density Altitude—The Triple H Effect]

[FAA Density Altitude]

[The EXTREMELY helpful guide to Density Altitude]

Next Month's TOM:

The National FAA Safety Team Presents

Federal Aviation Administration

Topic of the Month – August, 2024

Pre-flight & In-flight Weather Resources

Presented to: Safety Minded Aviators, Everywhere…

By: Stephen Bateman, CFI, Chocks Away Aviation, LLC

Date: Tuesday 20th August 2024

Produced by:
The National FAA Safety Team (FAASTeam)

Thank you for attending!

You are vital members of our GA safety community!

Not Recorded, But Even Better…

- PDF of these slides available for further study and use
- Actual slides post on the third Sunday of every month (May 19th)
- https://bit.ly/ToMSafetyArticle

- Select the safety article (month) of interest
- Open and save the PDF

- Thanks to the AOPA Flying Clubs Initiative

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FLYING CLUBS