

## **VFR Cross Country Flight Plan Guide Day before flight:**

1. Gather current charts, A/FD, navigation log, POH performance data, flight computer, etc.

2. Spread out charts and eyeball approximate route of flight considering the following:

- **Route:** Try to choose the most direct route but consider terrain during the climb, en route and descent. Use victor airways, obvious landmarks, and navigation aids if available. Make sure there are easily identified checkpoints along the route. Power lines, private airports, and train tracks are usually not easily identifiable!

- **Airspace:** Avoid restricted airspace and MOA's. Plan for appropriate clearances, weather minima, and equipment required for class B, C, & D airspaces.

- **Terrain:** Make sure you don't have terrain along your proposed route that is higher than the aircraft's service ceiling. For safety make sure you have at least 2000 foot obstacle/terrain clearance.

- **Airports:** Make sure there are appropriate (runway lengths & available services) airports for needed, planned or unplanned stops.

- **Fuel:** Do you need a fuel stop? At what fuel indication would you divert for fuel? How much are you landing with? Does your destination have fuel services and are available 24 hours?

- **Emergencies:** In case of an in-flight emergency make sure there are suitable landing sites (on and off airport). Don't fly long distances over lakes or open water.

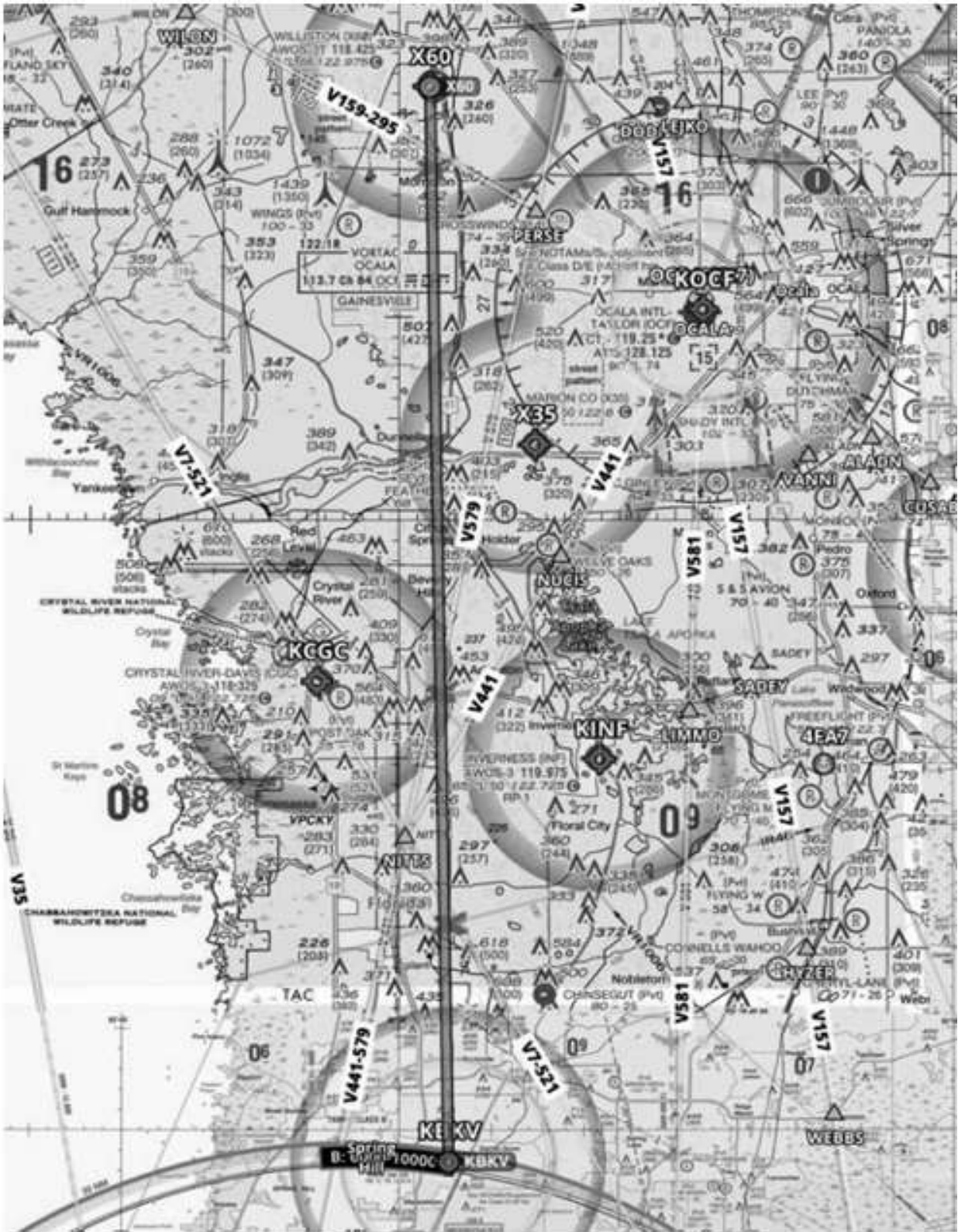
- **Night:** Cities and highways are most of your visual references at night. Be especially alert to mountainous terrain, instrument conditions, airport lighting availability, and emergency landing sites. Pack a flashlight, extra batteries, and emergency supplies.

3. Use plotter and pencil to draw the intended route of flight.

4. In your navigation log, begin to enter the structure of the flight plan. Some of the details will be added later with current weather. For now, start with the departure airport in the first “Checkpoint” box.

5. The first checkpoint should be an easily identifiable point approximately 10-15 miles from the departure airport. It usually goes along with the “Top of Climb.” The Top of Climb is the point at which the airplane reaches its initial cruising altitude. This point is determined from the climb performance charts in the POH. The Top of Climb will be determined when you get the weather for the flight, as it is determined by winds and temperatures.

6. Identify and mark an “X” at each checkpoint along the route. The checkpoints should be evenly spaced along the route and have clearly visible references (freeways, airports, tall towers, cities, etc.). The route should have checkpoints approximately every 15-20 miles. If your airplane’s airspeed indicator is in MPH instead of KTS, you should use statute miles for distance but will need to convert winds aloft from KTS to MPH.



7. In the “Checkpoint” box enter or draw a description for each checkpoint you identified, i.e intersection of roads, which airport, height of tower, etc. and the distance to the next checkpoint.

8. If the checkpoint is identified by a VOR, NDB, cross radials, etc., enter each Nav Aid name, Frequency, OBS setting, and note whether there will be a “To” or “From” indication.

9. If communications are required (transitioning airspace, flight following, flight service station, etc.), write who you’ll need to contact and the frequency in the “Comm” and “Freq” box.

10. For each checkpoint, enter the Route and Altitude you plan to fly to each checkpoint and enter that information in the “Route” and “Alt” boxes.

11. Use a plotter to find the True Course you’ll fly to each checkpoint and enter the value in the “TC” box. Use longitude lines and try to measure the True Course near the midpoint of the leg.

12. After you find the True Course to the checkpoints, use the plotter to find the distance between checkpoints and enter the value in the “Leg Dist” box. Make sure you use the correct scale (Sectional or VFR Terminal, NM or SM). You can do this for each checkpoint except for the Top of Climb (Because you don’t know where this is yet) and the checkpoint following the Top of Climb.

13. Use the chart to find the Magnetic Variation for each leg and enter that information in the “Mag Var” box. If the variation is not a whole number (i.e.  $13^{\circ} 30''$ ), round to the nearest number.

14. Choose Altitude in reference to Magnetic Course (E is odd +500’ from  $0-179^{\circ}$  and W is even + 500’ from  $180-359^{\circ}$ ), Winds Aloft, Airspace, Duration of Flight, Performance, Terrain, Emergencies etc.

15. List airport information and draw a small diagram. Write important info like “Rwy A closed,” which you found in NOTAMs. Draw traffic patterns in relation to which direction you will be arriving from. This helps you determine how to enter the pattern for whichever runway is in use.

### **Day of the flight:**

1. Go to [www.aviationweather.gov](http://www.aviationweather.gov). Under the “Tools” tab, select “Standard Briefing” and review all.
2. Use METARs, TAFs, and Winds Aloft to calculate takeoff, climb, en route and decent performance, WCA, and GS. \* Remember that winds aloft are given in True Course and in Knots. Convert to magnetic and/or miles per hour if needed.
3. Refer to NOTAMs, TFRs, Area Forecast, Prog charts, Airmets, Sigmets, Convective Sigmets, Pireps, and TAFs en route to determine if flight can be accomplished.

4. Calculate when/where TOC will occur and complete flight plan boxes for ground speed, time, fuel burn, and magnetic heading. Calculate when you will need to begin descent to TPA (TOD).
5. Once you have determined Mag Heading (MH) and know which airplane you will fly, calculate Compass Heading (CH) by applying Deviation from the “Compass Deviation Card” of that airplane.
6. Do your Performance Sheet and your Weight & Balance for each leg.
7. Calculate Ground Speed, CH, MH, time between waypoints, time enroute, fuel consumption, fuel required, etc. Note which power setting (RPM) you selected for cruise so you set it in flight.
8. Finalize your Sectional Chart by marking the route of flight in color (e.g. yellow marker). Circle your checkpoints in a different color.
9. File your flight plan and obtain a weather briefing. Review NOTAMs, TFRs, and all pertinent data.
10. If you are a student pilot, get endorsement(s) from your Flight Instructor and leave a copy of your flight plan with the office.

## VOCABULARY

NM = nautical mile

SM = statute mile TOC = top of climb (derived from POH or Aircraft Flight Manual)

TOD = top of descent (often based on 500 foot-per-minute rate)

POH = Pilot's Operating Handbook

TC = True course, the line drawn on your chart

TH = True course adjusted for wind correction angle (WCA)

WCA = wind correction angle

MH = True heading adjusted for magnetic variation (VAR)

CH = Magnetic heading adjusted for compass deviation (DEV)

MC = True course adjusted for magnetic variation; used for determining even or odd altitude to fly, and used when flying VOR courses or Victor Airways (VORs give magnetic courses)

#### FORMULAS

TH = TC +/- WCA

MH = TH +/- VAR

CH = MH +/- DEV

MC = TC +/- VAR

WCA (wind correction angle) is achieved by taking True Course and adding or subtracting based on E6B calculations of where the wind will blow you. This will give you True Heading. We apply this before variation because the winds aloft are true, not magnetic.

Magnetic variation around us is 14 degrees E, so we subtract 14 from True Course to get Magnetic Course or -14 from True Heading to get Mag Heading. These lines are long dashed magenta strewn across the sectional charts.

Wind adjustment converts the course to heading.

Variation adjustment converts true to magnetic.

Deviation adjusts for errors in the compass caused by airplane systems.



- Checkpoints: Your departure airport should be the first checkpoint. TOC (top of climb) is generally the second checkpoint. If you make a turn before TOC, then enter a location or landmark where the turn will be made and move TOC to the third checkpoint box. Checkpoints should be noted approximately every 10-15 minutes (approx 15-20 miles).
- VOR Freq/Ident: If you are using VORs for navigation, either on airways or as checkpoints, enter the VORs frequency in the top half of the box and the name of the station (i.e. SNS, SJC, etc.) in the bottom half of the box.
- Course: Magnetic course determines our altitude (E is odd + 500', W is even + 500') and is also what VORs use. Magnetic course is derived by taking true course +/- magnetic variation (TC - VAR = MC)

## WEIGHT AND BALANCE

172 SAMPLE LOADING PROBLEM	Sample Airplane		Your Airplane	
	Weight (lbs)	Moment (lb - ins. /1000)	Weight	Moment
1. Licensed Empty Weight (Sample Airplane) ...			⋮	⋮
2. Oil - 8 Qts.* .....	15	-0.3	15	-0.3
3. Pilot & Front Passenger .....				
4. Fuel- (36 Gal at 6#/Gal) .....				
5. Rear Passengers .....				
6. Baggage (or Passenger on Auxiliary Seat) .....				
7. Total Aircraft Weight (Loaded) .....				

8. Locate this point (2300 at 100.5) on the center of gravity envelope, and since this point falls within the envelope the loading is acceptable.

\*Note: Normally full oil may be assumed for all flights.

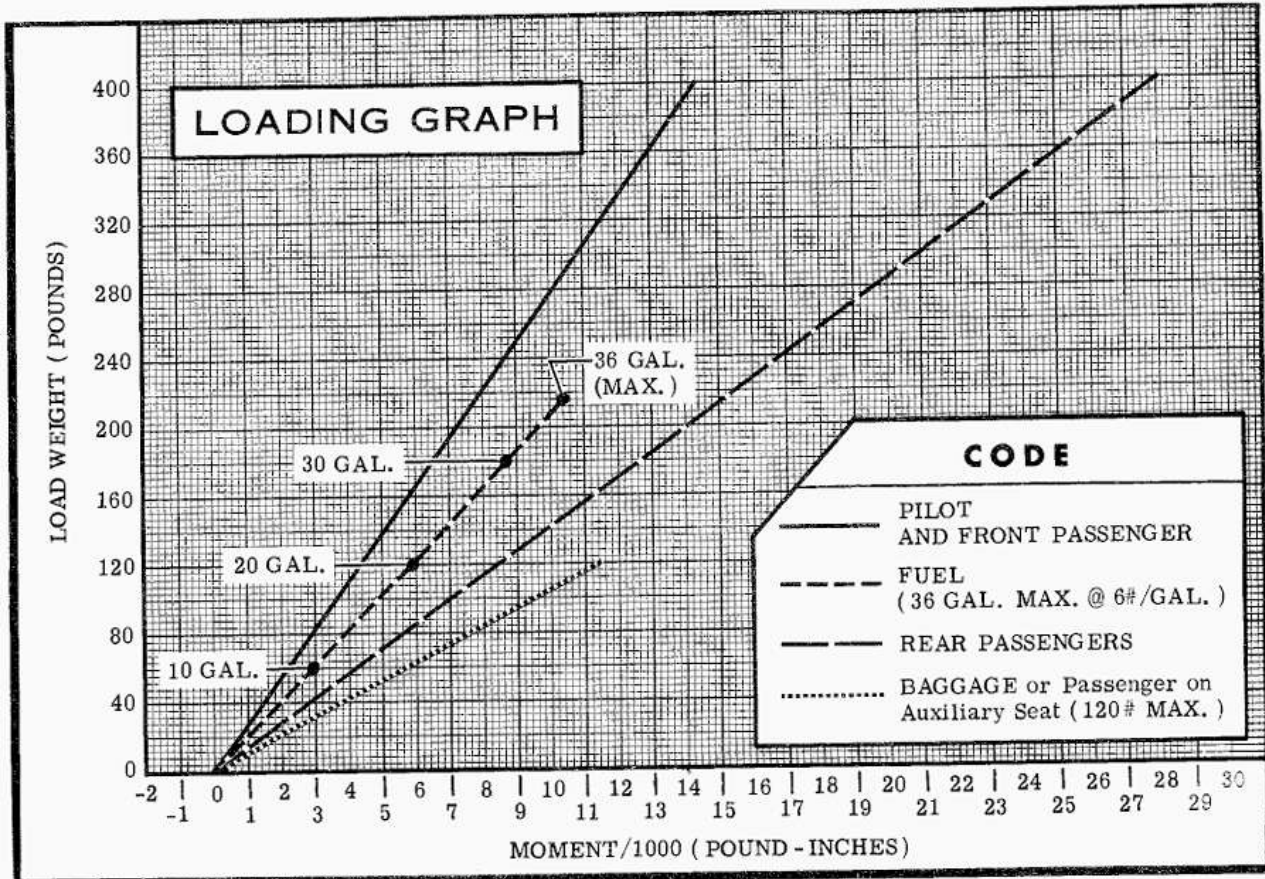
Weight x Arm = Moment

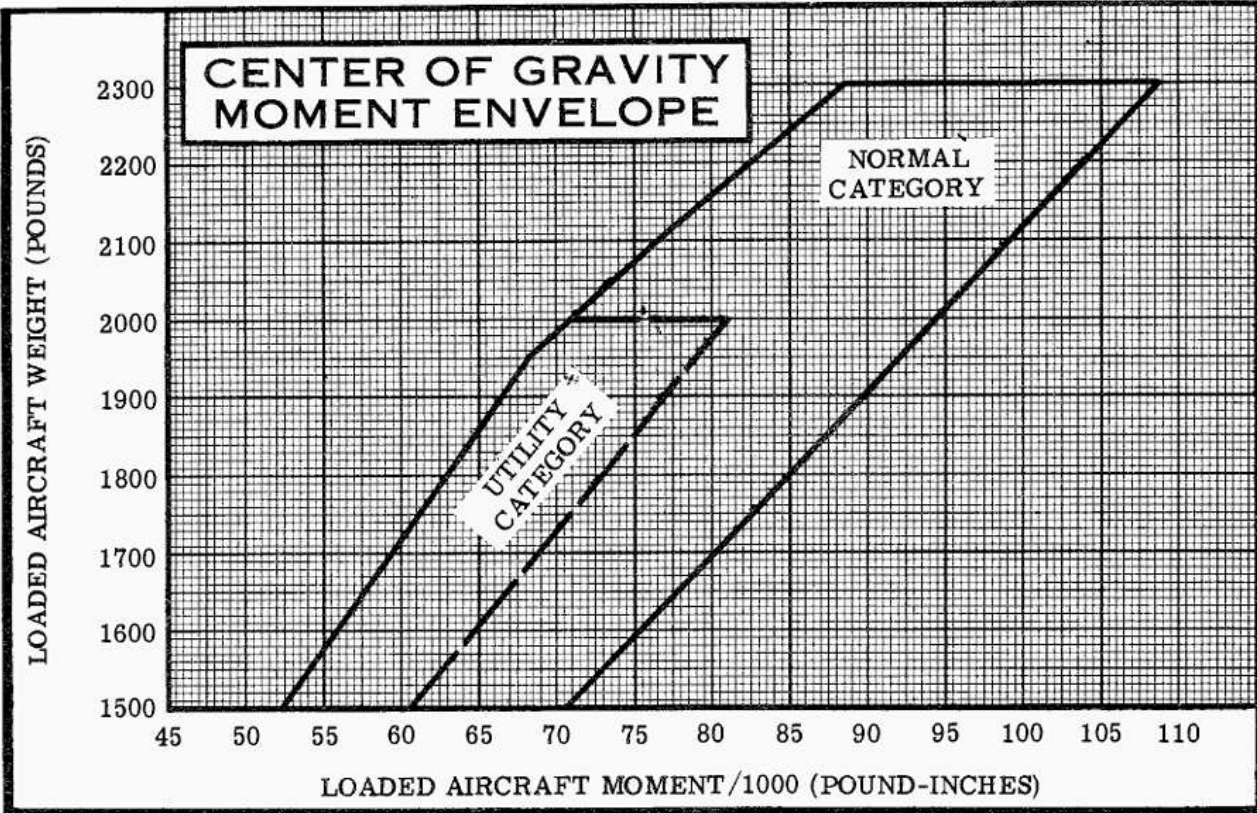
Total Moment: 99,772 / Total Weight 2,394.50 = 41.66 CG

Aircraft Loading:  X  Within Limits   Outside Limits

Maximum Useful Load: — lbs.

Maximum Take-Off Weight: — lbs.





# TAKE-OFF DATA

## TAKE-OFF DISTANCE FROM HARD SURFACE RUNWAY, FLAPS UP

GROSS WEIGHT LBS.	IAS AT 50 FT. MPH	HEAD WIND KNOTS	@ S.L. & 59° F		@ 2500 ft. & 50° F		@ 5000 ft. & 41° F		@ 7500 ft. & 32° F	
			GROUND RUN	TOTAL TO CLEAR 50' OBS.	GROUND RUN	TOTAL TO CLEAR 50' OBS.	GROUND RUN	TOTAL TO CLEAR 50' OBS.	GROUND RUN	TOTAL TO CLEAR 50' OBS.
2300	70	0	865	1525	1040	1910	1255	2480	1565	3855
		10	615	1170	750	1485	920	1955	1160	3110
		20	405	850	505	1100	630	1480	810	2425
2000	65	0	630	1095	755	1325	905	1625	1120	2155
		10	435	820	530	1005	645	1250	810	1685
		20	275	580	340	720	425	910	595	1255
1700	60	0	435	780	520	920	625	1095	765	1370
		10	290	570	355	680	430	820	535	1040
		20	175	385	215	470	270	575	345	745

- NOTES: 1. Increase distance 10% for each 25°F above standard temperature for particular altitude.  
 2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 7% of the "total to clear 50 ft. obstacle" figure.

# MAXIMUM RATE-OF-CLIMB DATA

GROSS WEIGHT LBS.	@ S.L. & 59° F			@ 5000 ft. & 41° F			@ 10,000 ft. & 23° F			@ 15,000 ft. & 5° F		
	IAS MPH	RATE OF CLIMB FT./MIN.	GALS OF FUEL USED	IAS MPH	RATE OF CLIMB FT./MIN.	FROM S.L. FUEL USED	IAS MPH	RATE OF CLIMB FT./MIN.	FROM S.L. FUEL USED	IAS MPH	RATE OF CLIMB FT./MIN.	FROM S.L. FUEL USED
2300	80	645	1.0	78	435	2.6	77	230	4.8	76	22	11.5
2000	77	840	1.0	76	610	2.2	74	380	3.6	73	155	6.3
1700	75	1085	1.0	73	825	1.9	71	570	2.9	70	315	4.4

- NOTES: 1. Flaps up, full throttle and mixture leaned for smooth operation above 5000 ft.  
 2. Fuel used includes warm-up and take-off allowance.  
 3. For hot weather, decrease rate of climb 20 ft./min. for each 10°F above standard day temperature for particular altitude.

CRUISE & RANGE PERFORMANCE			172 SKYHAWK			
			Gross Weight- 2300 Lbs.* Standard Conditions * Zero Wind*Lean Mixture * 36 Gal. of Fuel (No Reserve)			
NOTE: Maximum cruise is normally limited to 75% power. For standard 172 performance, subtract 1 MPH from the higher cruise speeds shown.						
ALT.	RPM	% BHP	TAS MPH	GAL. / HOUR	ENDR. HOURS	RANGE MILES
2500	2700	93	138	10.5	3.4	470
	2600	84	131	9.5	3.8	485
	2500	75	125	8.5	4.2	530
	2400	67	119	7.6	4.7	560
	2300	59	113	6.8	5.3	595
	2200	52	106	6.2	5.8	615
5000	2700	87	136	9.8	3.7	500
	2600	78	130	8.8	4.1	525
	2550	74	127	8.4	4.3	550
	2500	70	124	7.9	4.5	560
	2400	62	118	7.1	5.1	600
	2300	55	111	6.4	5.6	625
7500	2650	77	132	8.7	4.2	550
	2600	73	129	8.2	4.3	560
	2500	65	123	7.4	4.9	600
	2400	58	116	6.7	5.3	620
	2300	52	110	6.1	5.9	650
	2200	47	103	5.7	6.4	655
10,000	2600	68	128	7.7	4.7	605
	2500	61	121	7.0	5.2	625
	2400	55	115	6.4	5.6	645
	2300	49	108	5.9	6.1	655
	2200	45	102	5.5	6.6	670
	2100	41	96	5.2	6.8	655
12,500	2600	63	125	7.2	5.0	630
	2500	57	120	6.6	5.4	650
	2400	52	113	6.1	5.9	670
	2300	47	107	5.7	6.3	670
	2200	43	101	5.4	6.6	670
	The performance figures above apply to aircraft equipped with a standard McCauley IC172/EM7653 propeller. Refer to figure 5-5 for information concerning aircraft with an optional McCauley IC172/EM7651 climb propeller.					

Figure 5-4.

5-4

CRUISE AND RANGE PERFORMANCE	
With McCauley IC172/EM 7651 Propeller	
To obtain same % BHP as shown in adjoining figure and on Cessna Power Computer, increase RPM as follows:	
For % BHP	Increase RPM
75	+20 RPM
70	+10 RPM
65 (and lower)	0 RPM
The faster turning climb propeller gives a slight loss in cruise speed at a given % BHP as shown below:	
At % BHP	Speed Loss Differential
70 - 75	0 MPH
65 - 70	-1.0 MPH
60 - 65	-1.5 MPH
55 - 60	-2.0 MPH
50 - 55	-3.0 MPH
NOTE: When your aircraft is equipped with a McCauley IC172/EM 7651 climb propeller, the above factors should be used in conjunction with the Cruise and Range Performance on the adjoining page.	

Figure 5-5.

1. 1.

LANDING DATA									
LANDING DISTANCE ON HARD SURFACE RUNWAY									
NO WIND - 40° FLAPS - POWER OFF									
GROSS WEIGHT LBS.	APPROACH IAS MPH	@ S.L. & 59° F		@ 2500 ft. & 50° F		@ 5000 ft. & 41° F		@ 7500 ft. & 32° F	
		GROUND ROLL	TOTAL TO CLEAR 50' OBS.	GROUND ROLL	TOTAL TO CLEAR 50' OBS.	GROUND ROLL	TOTAL TO CLEAR 50' OBS.	GROUND ROLL	TOTAL TO CLEAR 50' OBS.
2300	69	520	1250	560	1310	605	1385	650	1455
NOTES: 1. Reduce landing distance 10% for each 5 knot headwind. 2. For operation on a dry, grass runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 20% of the "total to clear 50 ft. obstacle" figure.									

Figure 5-6.

# MAXIMUM GLIDE

- SPEED 80 MPH (IAS)
- PROPELLER WINDMILLING
- FLAPS UP ● ZERO WIND

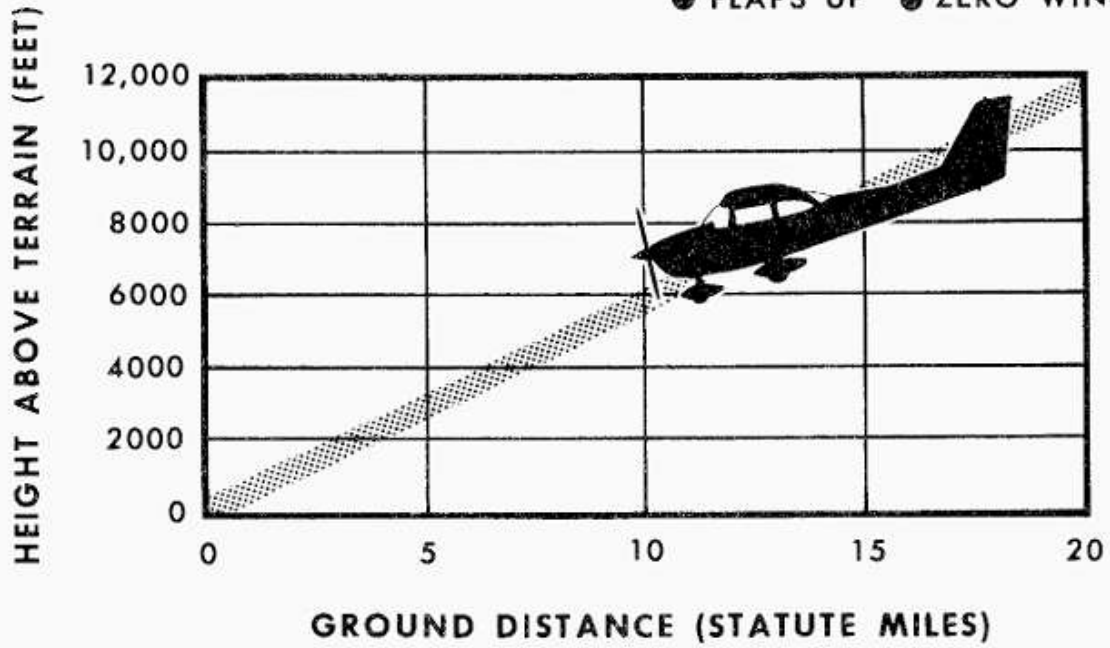


Figure 5-7.

## GO/NO-GO DECISION CHECKLIST

Consider all the factors in relation to the equipment flown, your proficiency and experience. Don't be afraid to cancel the flight or delay departure. Remember to constantly re-evaluate and adjust your plan accordingly.

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- Review of Personal Minimums for VFR/IFR**  
*Do I feel comfortable given the current weather conditions?*  
**STICK TO SET MINIMUMS**
  
- Review of Airspace / NOTAMS / TFRS**  
*Do I need Mode C or ADB-S Out?*  
*Any adjustments to route?*
  
- P-A-V-E Checklist Completed**
  
- Fuel with Required Reserves**
  
- Alternate Airports with Fuel and/or Rental Cars / Hotels / Tie Down**
  
- Weight and Balance within Limits**
  
- Performance Charts Reviewed**
  
- Runway Lengths / LAHSO / Hotspots**
  
- Weather Briefing – VFR Recommended**

**Weather No-Go Considerations:**

- **Thunderstorms**
- **Embedded thunderstorms**
- **Lines of thunderstorms**
- **Fast-moving fronts or squall lines**
- **Icing**
- **Turbulence**
- **Fog**

**I-M-S-A-F-E Checklist**

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**AS PIC YOU ARE ULTIMATELY RESPONSIBLE FOR MAKING THE GO/NO-GO DECISION. IF AT ANY POINT YOU ARE UNCOMFORTABLE DON'T FLY. SEEK THE ADVICE OF YOUR CFI OR A SEASONED PILOT.**

**LOST PROCEDURES**

1. **Circle** the area and look for the airport.
2. **Confess** to yourself that you are lost.
3. **Climb** to cope and potentially assist with locating airport.
4. **Conserve** fuel.
5. **Communicate** with ATC, Tower, Unicom, etc.
6. **Comply** with instructions, FARs, etc.