



HARBOUR AVIATION

FLIGHT TRAINING • FORT WORTH

PRIVATE PILOT TRAINING • DAY VFR CROSS-COUNTRY PLANNING

VFR CROSS-COUNTRY PLANNING GUIDE

A step-by-step plan for a day VFR cross-country in your 1976

Cessna 172M — worked end to end on the route Bourland (50F)

→ Graham (KRPH) → Bourland (50F).

PREPARED BY **ADAM FIELDS, CFI-I**

ROUTE: 50F → KRPH → 50F • 116 NM

AIRCRAFT: 1976 CESSNA 172M (160 HP STC)

CHART: DALLAS-FT WORTH SECTIONAL

DAY VFR • PILOTAGE / DEAD RECKONING

WHAT YOU'LL COVER

- | | |
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| 01 Cross-Country & the Regs | 08 VFR Cruising Altitudes |
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CROSS-COUNTRY & THE REGS

A cross-country is simply a flight to a point more than a short distance away, planned and navigated deliberately. The planning discipline below is the same whether you're building time or going somewhere.

WHAT COUNTS, AND WHAT YOU NEED

- For the **private certificate**, cross-country time generally means a landing at a point **more than 50 NM straight-line** from the departure point (14 CFR 61.1). KRPH is **58 NM** from 50F, so this round-robin qualifies.
- As a **student pilot**, every solo cross-country needs your instructor's review of your planning and a **61.93 endorsement** for that specific flight, plus the standard make-and-model solo endorsement. Carry your logbook and student pilot certificate (61.51(i)(2)).
- Know your **fuel reserves** (91.151), **preflight action** (91.103), and **VFR weather minimums and cruising altitudes** — all covered below.

THE EXAMPLE FLIGHT

We'll plan **Bourland (50F) → Graham Municipal (KRPH) → Bourland (50F)** in the 160-hp 172M, day VFR, using pilotage and dead reckoning with the nav log as backup to what you see out the window. Two 58-NM legs, roughly northwest out and southeast back.

THE ROUTE & THE AIRPORTS

Start by drawing the line. Lay a straight course on the sectional, then study what's under and around it: terrain, airspace, towers, and good visual checkpoints.

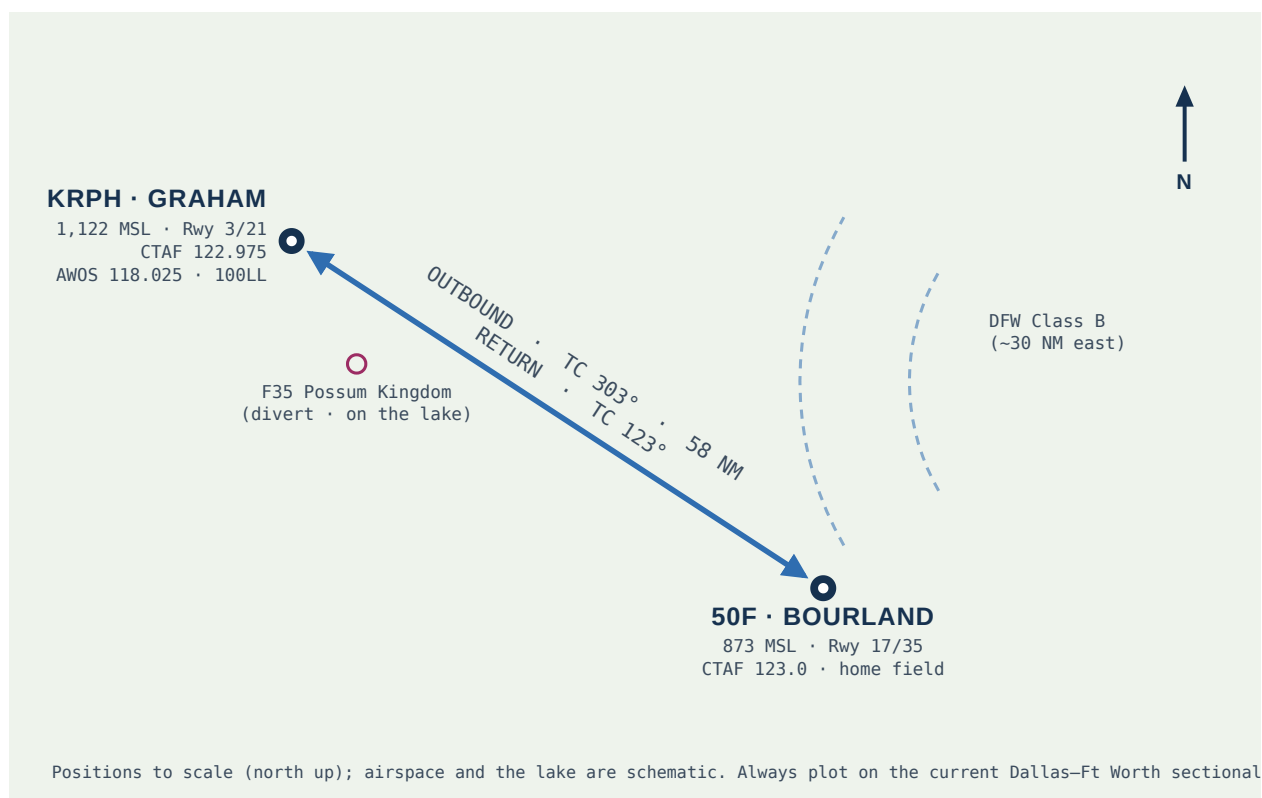


Fig 2.1 The round-robin. Outbound is a true course of about **303°** (WNW); the return is its reciprocal, about **123°**. Each leg is **58 NM** (116 NM total). The DFW Class B lies to the **east** — this route runs away from it, but check the shelves and stay clear or get a clearance.

Leg distance

58

NM each way

Round trip

116

NM total

TC out

303°

50F → KRPH

TC back

123°

KRPH → 50F

BOURLAND FIELD (50F) — HOME

Elev: 873 ft MSL • **Runway:** 17/35, 4,049 × 60 asphalt • **CTAF/UNICOM:** 123.0 • **Tower:** none • **Pattern:** ~1,000 AGL (~1,870 MSL), confirm direction per runway • **Lighting:** pilot-controlled (MIRL) on 123.0, VASI both ends • **Weather:** none on field — brief the nearest Fort Worth-area AWOS/ASOS. Class G at the surface, Class E above.

GRAHAM MUNICIPAL (KRPB) — DESTINATION

Elev: 1,122 ft MSL • **Primary runway:** 3/21, 5,001 × 75 asphalt (MIRL); crosswind 18/36, 3,317 × 60 (displaced threshold on 18) • **CTAF/UNICOM:** 122.975 • **Tower:** none • **AWOS-3P:** 118.025 (on field) • **Pattern:** left traffic all runways • **Fuel:** 100LL and Jet A • segmented circle and lighted wind indicator. Class G/E like home; sectional is Dallas–Ft Worth.

TWO NON-TOWERED FIELDS

Both ends are non-towered, so the whole flight is self-announce on CTAF plus see-and-avoid. The big difference from a local hop: KRPB has its **own AWOS (118.025)**, so you can get Graham's wind and altimeter before you arrive — 50F has none.

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PREFLIGHT ACTION — 14 CFR 91.103

The reg says that before a flight *not* in the vicinity of an airport, you must become familiar with **all available information** concerning that flight. The classic checklist is **NWKRAFT**.

N	NOTAMS — for 50F, KRPB, and enroute; plus TFRs.
W	WEATHER — a standard briefing for the whole route and time window.
K	KNOWN ATC DELAYS — not likely on this rural route, but check.
R	RUNWAY LENGTHS at the destination and alternates.
A	ALTERNATES — airports available if KRPB or 50F don't work out.
F	FUEL REQUIREMENTS — enroute burn plus the 91.151 reserve.
T	TAKEOFF & LANDING DISTANCES for the actual weight and conditions.

MAKE IT A ROUTINE

NWKRAFT isn't busywork — it's the legal and practical backbone of the plan. Everything in the rest of this guide is you actually *doing* the W, R, A, F, and T.

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WEATHER BRIEFING & GO/NO-GO

Get a complete picture before you commit: the big synoptic situation, then the details for your route and your time on it.

WHERE TO GET IT

- **1800wxbrief.com** (Leidos) or **1-800-WX-BRIEF** for a standard briefing and to file/open a VFR flight plan.
- **aviationweather.gov** and an app like **ForeFlight** for METARs, TAFs, winds aloft, prog charts, and radar.
- In the air: **KRPH AWOS 118.025**, and nearby ASOS/AWOS for 50F (it has none of its own).

WHAT TO PULL

- **METARs/TAFs** along the route (nearest reporting stations to 50F and KRPH).
- **Winds & temperatures aloft** — you'll use these in the wind triangle. Our worked example assumes **320° at 15 kt** at cruise.
- **AIRMETs/SIGMETs** and **PIREPs** — turbulence, IFR, icing, mountain obscuration.
- **Sun times** — this is a day VFR plan; keep the whole round trip well inside daylight.

PERSONAL MINIMUMS & GO/NO-GO

Set ceiling, visibility, wind, and crosswind limits *before* you look at the weather, and honor the most conservative number. The 172M's max demonstrated crosswind is 15 kt — your own cap should be lower. A round trip means the return weather matters as much as the departure: if Graham is fine but home is going down, that's a no-go.

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CHARTS, CHECKPOINTS & PILOTAGE

Pilotage is navigating by looking outside and matching the ground to the chart. Dead reckoning is flying computed headings and times. You use both, cross-checking one against the other.

CHOOSING CHECKPOINTS

- Pick features that are **unmistakable from the air** and roughly every **8–15 NM**: towns, highway intersections, rivers, lakes, and prominent towers.
- On this route, good anchors include **Lake Granbury**, the **Brazos River**, **Possum Kingdom Lake** (near F35), and the highways into Graham.
- Note **terrain and obstacles**: read the maximum elevation figures (MEF) in each quadrant and any towers near your line.

MAGNETIC VARIATION HERE

The Dallas–Ft Worth area sits near **about 3° East** variation — read the magenta isogonic line on your sectional and use the current value. East variation is *subtracted* from true to get magnetic ("east is least").

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TRUE → MAGNETIC → COMPASS

Charts are drawn to true north; your compass points to magnetic north and is nudged by the metal around it. Convert in order, every time.



Add wind correction (WCA) to the course to get the heading: $TC + WCA = TH$, then $TH - \text{var} = MH$.
This route: $TH\ 306 - 3^\circ E = MH\ 303$ (out) · $TH\ 120 - 3^\circ E = MH\ 117$ (back).

Fig 6.1 The conversion chain. Apply wind correction to the course to get the heading, take out **variation** to go from true to magnetic ("East is least, West is best"), then apply **deviation** from the aircraft's compass correction card to get what you fly on the compass.

MEMORY HOOK — TVMDC

True → Variation → Magnetic → Deviation → Compass. Going true-to-compass: **subtract** easterly variation, **add** westerly. Deviation comes from the placarded card by the compass.

For our route, after adding the wind correction angle (next section) the true headings are about **306° out** and **120° back**. Subtracting $\sim 3^\circ E$ variation gives magnetic headings of about **303°** and **117°**; apply your compass card for the final compass heading.

07

THE WIND TRIANGLE

Wind blows you off course and changes your speed over the ground. The wind triangle resolves the forecast wind into a **heading correction** and a **airspeed**.

Heading vector (TAS) + Wind vector = Ground vector (track & GS).
The angle you crab into the wind is the Wind Correction Angle (WCA). Angles drawn exaggerated.

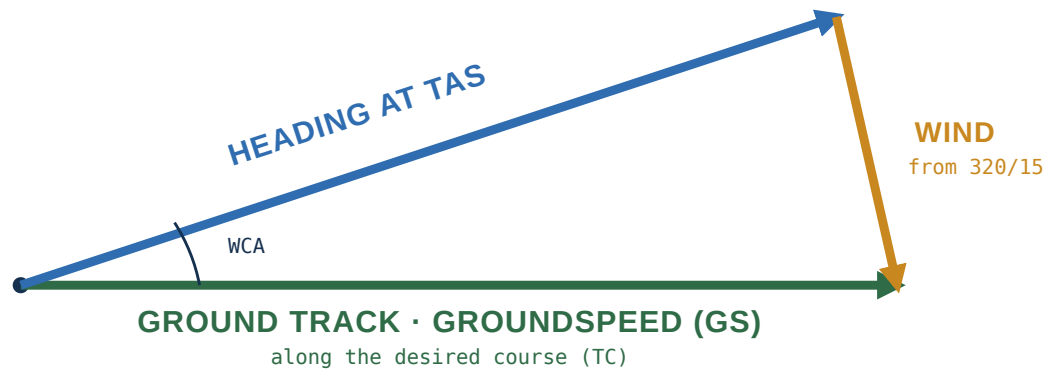


Fig 7.1 Heading vector (your true airspeed in the direction you point) plus the wind vector equals the ground vector (your actual track and groundspeed). The angle you turn into the wind is the **wind correction angle (WCA)**. Solve it on your E6B or flight app.

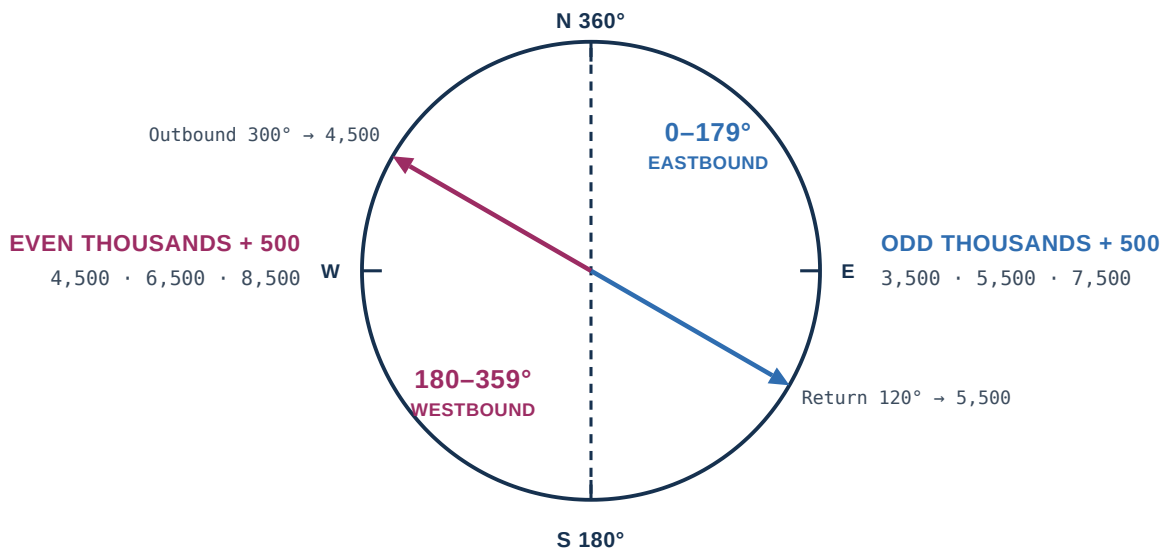
With a cruise **TAS of about 100 kt** (≈ 115 mph on the 172M's MPH airspeed indicator) and a sample wind of **320°/15**:

- **Outbound (TC 303°):** nearly a headwind — WCA about **3° right**, groundspeed drops to about **86 kt**.
- **Return (TC 123°):** nearly a tailwind — WCA about **3° left**, groundspeed climbs to about **114 kt**.

RE-RUN IT WITH THE REAL NUMBERS

320°/15 is an example. Use the actual winds-aloft forecast for your altitude and time, and remember winds aloft are **true** direction in knots — convert the resulting groundspeed and the 172M's MPH indications carefully (1 kt $\approx$ 1.15 mph).

In level cruise more than 3,000 ft above the surface, your altitude is set by your **magnetic course** — the hemispheric rule.



Applies in level cruise more than 3,000 ft AGL – 14 CFR 91.159.

Fig 8.1 The hemispheric rule. Magnetic course **0°–179°**: odd thousands + 500 (3,500, 5,500...). Magnetic course **180°–359°**: even thousands + 500 (4,500, 6,500...). It applies only in level cruise more than 3,000 ft AGL.

THIS ROUTE

Outbound MC ~**300°** (west half) → even + 500 → cruise **4,500 MSL**. Return MC ~**120°** (east half) → odd + 500 → cruise **5,500 MSL**. Both clear the terrain (field elevations 873–1,122 ft) with room to spare.

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FUEL PLANNING & RESERVES — 91.151

Plan the fuel to the destination, add the legal reserve, and confirm it fits the tanks with margin. For day VFR you must be able to fly to the first landing and then for at least **30 more minutes** at normal cruise (45 minutes at night).

ITEM	BASIS	FUEL
Taxi, run-up, takeoff	fixed allowance	~1.5 gal
Climb (both legs)	allowance	~1.0 gal
Leg 1 enroute (50F → KRPH)	41 min @ ~8.5 gph	~5.8 gal
Leg 2 enroute (KRPH → 50F)	31 min @ ~8.5 gph	~4.3 gal
30-min day VFR reserve	0.5 h @ ~8.5 gph	~4.3 gal
Total required	—	~17 gal
Usable on the 172M	standard tanks	~38 gal

COMFORTABLE MARGIN — BUT VERIFY

~17 gal required against ~38 usable leaves a wide margin even without buying fuel at Graham (100LL is available there if you want it). Use *your* POH cruise burn and a realistic taxi figure, and treat the reserve as untouchable.

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THE NAVIGATION LOG

The nav log puts it together: course, wind, heading, groundspeed, distance, time, and fuel for each leg. Fill it on the ground; verify it in the air against the clock and the checkpoints.

LEG	TC	WIND	WCA	TH	VAR	MH	TAS	GS	DIST	TIME	FUEL
50F → KRPB	303°	320/15	+3°R	306°	3°E	303°	100 kt	86 kt	58 NM	~41 min	~5.8 gal
KRPB → 50F	123°	320/15	-3°L	120°	3°E	117°	100 kt	114 kt	58 NM	~31 min	~4.3 gal
Totals									116 NM	~72 min	~10.1 gal

FLY IT, THEN CHECK IT

Start a leg timer over your departure point. If you reach the first checkpoint early, your groundspeed is higher than planned (revise time and fuel); late, and it's lower. Adjust the remaining legs from what the airplane is actually doing, not from the forecast.

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PERFORMANCE & DENSITY ALTITUDE

Run takeoff and landing numbers for both fields at the actual weight, temperature, and pressure — not the book's standard day.

- **Runways are generous** for a 172M: 50F has 4,049 ft, KRPB 5,001 ft on the primary 3/21. Length isn't the limiter here — density altitude and obstacles are.
- **KRPB sits at 1,122 ft.** On a hot Texas afternoon, density altitude can climb well above 3,000–4,000 ft, stretching the ground roll and flattening the climb.
- The **160-hp STC** gives you margin over a stock 150-hp M, but it's still a light airplane — lean for best power on a high-DA takeoff per the POH and use the full runway.

HIGH, HOT, HEAVY

Two people, full fuel, and a warm day add up. Confirm you're within gross weight and CG, and that computed takeoff and landing distances (with a safety factor) fit the runway with obstacles cleared. When the numbers are tight, offload fuel or wait for cooler air.

IN-FLIGHT, DIVERSIONS & LOST

Plan the flying, not just the route. Decide in advance how you'll stay found, who you'll talk to, and where you'll go if the plan changes.

STAY AHEAD OF THE AIRPLANE

- **Open your flight plan** after departure and **close it** on arrival (or cancel flight following). An unclosed VFR plan triggers a search.
- Consider **VFR flight following** from Fort Worth Approach for traffic advisories and a faster response if anything goes wrong.
- **Diversion options** near the line include **F35 Possum Kingdom**, **KMWL Mineral Wells**, and **KSEP Stephenville** — know a couple before you go.

IF YOU GET LOST — THE 5 C'S

Climb (better radio/radar and a wider view), **Communicate**, **Confess**, **Comply**, **Conserve**. Squawk and call for help early — 121.5 and 7700 if it becomes an emergency.

SINGLE-PILOT RISK — PAVE

Before and during the flight, weigh **P**ilot, **A**ircraft, **e**nVironment, and **E**xternal pressures. The pressure to "get home" on the return leg is a classic trap — build in an out.

ARRIVAL & OPS AT KRPH

Graham is non-towered, just like home — so the arrival is all radio discipline and a good scan.

- **Get the weather early:** listen to **KRPH AWOS on 118.025** well out, set the altimeter, and pick your runway from the wind (primary is **3/21**, 5,001 ft).
- **Self-announce on CTAF 122.975:** inbound with position and altitude, then each pattern leg, all left traffic — bookend calls with "Graham."
- Cross-check the **segmented circle** and lighted wind indicator for the favored runway.

- Plan the **return** before you shut down: refresh weather and NOTAMs, recheck fuel, and re-brief the home-field arrival at 50F (no weather on field — use the nearest station).

NOTAMS & TFRS BOTH WAYS

Check NOTAMs for 50F and KRPH and any TFRs along the route before *each* leg — conditions and pop-up TFRs can change between your outbound and return.

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PLANNING CHEAT SHEET

Pin this to your kneeboard. If you can run these from memory, you've got the cross-country planning flow.

ITEM	FOR	DETAIL
NWKRAFT	Preflight action (91.103)	NOTAMs, Weather, Known delays, Runway lengths, Alternates, Fuel, Takeoff/landing distance
TVMDC	Heading conversion	True → Variation → Magnetic → Deviation → Compass (East is least, West is best)
TC+WCA=TH	Wind correction	then $TH - var = MH$, $\pm deviation = CH$
91.151	VFR fuel reserve	destination + 30 min day / 45 min night at normal cruise
91.159	VFR cruise altitude	MC 0–179 odd+500; MC 180–359 even+500 (above 3,000 AGL)
5 C's	Lost / disoriented	Climb, Communicate, Confess, Comply, Conserve
PAVE	Risk / ADM	Pilot, Aircraft, enVironment, External pressures
ROUTE	50F → KRPH → 50F	58 NM/leg • TC 303/123 • cruise 4,500/5,500 • ~72 min • ~17 gal req vs ~38 usable



HARBOUR AVIATION

PLAN THOROUGHLY, FLY SAFE.

Prepared by **ADAM FIELDS, CFI-I**

This guide is a planning aid built around the **1976 Cessna 172M** (160 hp STC) and the example route **50F – KRPH – 50F**. Distances, courses, and the wind/fuel figures are worked examples — always plan from the **current Dallas–Ft Worth sectional and Chart Supplement**, live **weather and NOTAMs**, your **aircraft's POH**, and your **CFI's** guidance and endorsements. Verify magnetic variation, winds aloft, and all performance numbers for the actual flight.