The following compilation of rules of thumb, formulas, mnemonics, and aviation safety tips is by no means original nor is it complete and all-encompassing. Rather it is a collection of shortcuts, formulas, mnemonics, strategies, and such I have gleaned from caring and nurturing flight instructors and assorted other aviation gurus, as well as fellow pilots, over the past 42-plus years of flying. I thought it might be helpful to other aviators if these useful and cockpit-friendly tidbits were found in one spot, hence this handout.

Without a doubt, there exists countless other handy memory aids, tools, and resources and, especially with the advent and rapid evolution of the new TAAs (Technologically Advanced Aircraft), new memory devices and formulae are being created almost on a daily basis. So, fellow aviator, if you have a favorite, or two, that you feel would enhance this list, please send it on. In that way, your generosity will benefit the existing aviation community as well as those future flyers destined to follow us.

LEGAL STUFF: The rules of thumb, memory aids, mnemonics, formulas, strategies, safety tips, and such, herein contained, are for informational purposes only and are intended to be used as handy memory devices and aids to help in our flying chores. In no case are they in any way a substitute for good judgment and common sense! Nor are they meant to replace or substitute for official publications such as performance charts and manufacturers’ Aircraft Flight Manuals (AFM) or Pilots Operating Handbooks (POHs). Certainly, in all cases, should any differences or disparities exist between these pearls of wisdom (not necessarily, mine!) and recommended procedures set out by your instructor, the manufacturer of the equipment you fly, in their publications, or elsewhere, those documents and, of course, all prevailing FAA Rules and Regulations of the USA or of any governmental regulatory agency elsewhere, and procedures as set out in the Aeronautical Information Manual (AIM) should be adhered to. It is with this understanding I am happy to share the following tools and resources with you.

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INTERNATIONAL STANDARD ATMOSPHERE (ISA)

Standard Pressure: 29.92” Hg.
Standard Pressure Lapse Rate: 1” Hg per 1,000’.
Standard Temperature: 15°C/59°F at Sea Level.
Standard Temperature Lapse Rate: 2°C/3.5°F per 1,000’.

RULE OF THUMB: In the United States, barometric pressure is measured in inches as opposed to millibars typically used outside the USA. In a pressure altimeter (one adjustable for barometric pressure), one inch of mercury (Hg) equals 1,000 feet.

RULE OF THUMB: To find pressure altitude, set 29.92 in the Kollsman window of your altimeter. Indicated altitude will then be pressure altitude.

RULE OF THUMB: To calculate standard temperature (ISA), multiply the altitude x 2 then subtract 15. If the remainder is greater than 15, the remainder is a minus temperature. Example: standard temperature at 9,000 MSL equals -3°C (2 x 9 - 15°C).

DENSITY ALTITUDE

Density Altitude is pressure altitude corrected for non-standard temperature and/or non-standard pressure.

RULE OF THUMB: For each one degree Celsius (1°C) of variation from standard temperature, density altitude changes by 120 feet. Example: An airport with a field elevation of 5,050 feet with a temperature 20°C warmer than standard would have a density altitude of roughly 7, 450 feet. A higher temperature causes density altitude to be higher, reducing performance; a lower temperature would cause density altitude to be lower, increasing performance.

RULE OF THUMB: For each one degree Celsius (1°C) of variation from standard temperature, the takeoff roll will change by approximately 1%. A warmer than standard temperature would increase takeoff roll while a colder than standard temperature would result in a reduced takeoff roll.

RULE OF THUMB: Takeoff distance increases approximately 15% for each 1,000 density altitude above sea level.

ALTIMETRY

RULE OF THUMB: From High To Low, Lookout Below
Flying from an area of higher pressure to an area of lower pressure and/or from an area of higher temperature to an area of lower temperature, your altimeter will read higher than you actually are. The opposite is equally true.

SAFETY TIP: Continually updating your altimeter setting while flying cross-country and the use of a pre-approach checklist — highlighting this killer item — prior to shooting an instrument approach will minimize the prospect of collision with terrain or an obstacle!

SPEEDS

RULE OF THUMB: As you climb, each 1,000’ will result in a True Airspeed (TAS) increase of approximately 2% of your Indicated Airspeed (IAS). Example: 9,000 MSL would equal an 18% (2% x 9) increase in TAS. Thus, at 9,000, 130 KIAS would equal approximately 153 KTAS (130 + 23).

RULE OF THUMB: A good stable, approach speed for most aircraft in normal conditions is 1.3 VSO over the numbers.

RULE OF THUMB: On approach and landing in gusty conditions add 1/2 of the gust factor to your normal approach speed.

THE 10/20 RULE OF THUMB NO. 1:
On landing, a tailwind of 10% of your approach speed will result in a 20% increase in ground roll. A headwind of 10% decreases ground roll by 20%.

THE 10/20 RULE OF THUMB NO. 2: A 10% increase in airspeed will cause a 20% increase in stopping distance.

THE 10/20 RULE OF THUMB NO. 3:
An increase in weight of 10% will result in an increase of 20% of both takeoff and landing ground roll.

RULE OF THUMB: For each 1,000’ increase of field elevation, stopping distance increases by approximately 4%.
RULE OF THUMB: Expect your touchdown point to be 100 feet further down the runway for each knot of increased airspeed carried over the numbers.

SAFETY TIP: On takeoff, if you have not reached at least 70% of takeoff speed in the first half of the runway, you should consider aborting the takeoff. That should result in your being able to stop the aircraft on the second half.

RULE OF THUMB: To roughly calculate a crosswind component on landing, use the following:
A quartering headwind of 15° of the runway heading = 1/4 of the wind velocity;
A quartering headwind of 30° = 1/2 of the wind velocity;
A quartering headwind of 45° = 3/4 of the wind velocity;
A quartering headwind of 60° or more = the wind velocity. Close! And, if anything, you’re overestimating the crosswind component, which couldn’t hurt you.

“Thou shalt maintain thy airspeed lest the Earth rise up and smite thee and thou shalt surely perish”
If this is not in the Aviators’ Bible, it surely should be.

V-SPEEDS
COLOR-CODED ON AIRSPEED INDICATOR

$V_{SO}$ - Stalling Speed or the minimum steady flight speed in the landing configuration. (Bottom of the white arc.)
$V_{SI}$ - Stalling speed or the minimum steady flight speed obtained in a specified configuration. (Bottom of the green arc.)
$V_F$ - Design flap speed. (White arc.)
$V_{FE}$ - Maximum flap extended speed. (Top of the white arc.)
$V_{NO}$ - Maximum structural cruising speed. (Top of the green arc.)
$V_{NE}$ - Never exceed speed. (Red radial.)
$V_{YSE}$ - Best rate of climb with an inoperative engine (Blue radial.)
$V_{MC}$ - Minimum controllable airspeed with the critical engine inoperative. (Multi-engine aircraft — Red radial.)

NOT COLOR-CODED ON AIRSPEED INDICATOR

$V_A$ - Design maneuvering speed. (Rough air penetration speed.)
$V_{LE}$ - Maximum landing gear extended speed.
$V_{LO}$ - Maximum landing gear operating speed.
$V_R$ - Rotation speed.
$V_{REF}$ - Reference landing speed.
$V_x$ - Speed for best angle of climb (Best altitude gain in distance.)
$V_Y$ - Speed for best rate of climb (Best altitude gain in time.)

ICING

RULE OF THUMB: To approximate the freezing level en route, find the surface temperature of airports along your intended route of flight and divide by 2°C. 0°C + visible moisture (clouds) indicate the potential for icing conditions. Example: An average surface temperatures of 14°C along your route of flight would result in a potential freezing level of 7,000’ AGL along that route. Watch your OAT gauge on the way up.

RULE OF THUMB: Most airframe icing occurs in a temperature range of from 0°C to -10°C; Chances of airframe icing are thought to be minimal in temperatures at and below -20°C.

STRATEGY: Regardless of the equipment you are flying, any icing encounter is potentially lethal! Always have an exit strategy in mind. When picking up ice, exit visible moisture as soon as possible: If possible, descend to warmer (above freezing) temperatures, or change course, and never forget, unless you wait too long, the 180° turn is most always available!

SAFETY TIP: Sometimes, if descending to find warmer conditions is not an option, a climb could be a viable escape route. Cold clouds containing icing conditions are typically relatively shallow, oftentimes no more than 4,000 feet thick. Consequently, if started early enough, before turning into a popsicle precludes a climb, climbing can frequently result in extricating yourself from icing conditions. However, bear in mind, what goes up, must ... !

SAFETY TIP: Immediately tell ATC that you are in icing conditions and state your request. Nothing good can be gained by waiting.
SAFETY TIP: Always hand-fly the aircraft in icing conditions as your autopilot might mask the severity of an icing encounter by trimming the aircraft in an attempt to maintain altitude.

SAFETY TIP: When landing with airframe icing, fly a faster approach speed than normal and, if possible, land with little (or better) no flaps. Why? You are now a test pilot. Nobody in the history of mankind has ever flown with the identical wing design that you have created. Also, you might want to delay gear extension until you have the field made.

SAFETY TIP: If possible, avoid a go-around with ice on your wings.

RULE OF THUMB: Frost, the thickness of coarse sandpaper on an airfoil, can cause as much as a 30% loss of lift and a 40% increase in drag.

Children who lie to their mothers ... seem to grow up to become weather briefers!

THUNDERSTORMS

RULE OF THUMB: Rain at the surface is an indication that the thunderstorm has reached its mature stage.

RULE OF THUMB: Circumvent thunderstorms by at least 20 Miles (30 miles might be wiser still!) on the upwind side.

SAFETY TIP: Should you inadvertently enter a thunderstorm, (how else would you have gotten there?) do not try to hold altitude just concentrate on maintaining level flight while keeping your airspeed at or below maneuvering speed ($V_A$).

SAFETY TIP: Since maintaining level flight is important, the best exit strategy might not be the 180° turn but rather flying straight through which, might be a faster way out, anyway. ATC may have a suggested course to offer.

RULE OF THUMB: A thunderstorm is never as bad on the inside as it appears on the outside. Its worse!

SAFETY TIP: Do not fly under a thunderstorm that appears to be dissipating. Downdrafts can easily exceed 5-6,000 feet per minute which, unless you’re flying the space shuttle, will easily out-perform the capability of your aircraft.

SAFETY TIP: Never fly under the anvil. Hail may be found 10 or more miles downwind of the anvil.

SAFETY TIP: Maximizing cockpit lighting in a lightning-rich environment might help you reduce the impact on your vision of lightning flashes.

“There is no reason to fly through a thunderstorm in peacetime.”

Sign over squadron ops desk at Davis-Monthan AFB, Tucson, Arizona

FUEL

SAFETY TIP: The only truly accurate fuel gauge in most aircraft is your wrist watch.

SAFETY TIP: The only time you should believe your fuel gauge is when it reads “EMPTY!”

SAFETY TIP: The only time you have too much fuel is when you’re on fire! :-)
airplanes. I maintain, the critical engine, in all twin-engine airplanes, is the one still turning after the other has failed! Think about it. :-)  

BASIC AIRMANSHIP

RULE OF THUMB: From the tip to the midpoint (the bend in the knuckle) of the average person’s thumb measures roughly 8-10 NM on a sectional chart scale. Check it out. Thus, in a pinch, when a plotter is not available, you can use your thumb to approximate distance on a sectional chart. *This may very well be the only true Rule of Thumb in this whole handout!*

RULE OF THUMB: In the same vain, pressed-down, the width of the typical index finger is approximately 5 NM (sectional chart scale) wide.

STRATEGY: Avoid flying the aircraft with the trim-wheel. Try this: At cruise altitude, start with a coarse trim (approximating the amount of trim needed). Hold the aircraft level until stable. Lightly, with no more than two fingers, hold against the building pressure. Then slowly trim the pressure away. Flying a well-trimmed aircraft is far less fatiguing than fighting an out-of-trim aircraft all day long!

STRATEGY: Pitch + Power = Performance. Learn to fly by the numbers. Do you know what pitch and power setting gives you the slow cruise you want to fly in the pattern? What pitch and power setting gives you a 500 FPM descent to hold the glideslope? What gives you a best rate climb? Best angle of climb? You get the picture. Trouble yourself to learn and memorize these numbers for the aircraft you fly on a regular basis and you will experience something in flying roughly akin to being born again!

RULE OF THUMB: When leveling off from a climb or descent, lead your desired altitude by 10% of your rate of climb or descent as indicated on your VSI. To level off from a descent maintaining your descending airspeed, lead the target altitude by approximately 50 feet.

SAFETY TIP: The three most useless things in the world are, runway behind you, sky above you, and fuel left on the ground.

SAFETY TIP: Prioritize your actions in flight. The Cardinal Rule in aviation is Aviate, Navigate, and Communicate, in that order. Flying the aircraft always comes first!

SAFETY TIP: Always leave yourself an out. That means, you should always have another course of action available to you when you don’t like what you got!

SAFETY TIP: To avoid bumping into things while flying, a recommended effective scan pattern is to scan approximately 10° of the horizon from side to side remaining in each 10° segment for a second or two.

SAFETY TIP: Watch for relative movement. An object seen in the distance should be moving either up or down, left, right, or diagonally on the windscreen. If it remains fixed in one position, that is precisely where it’s going to enter the cabin!

SAFETY TIP: Many midair collisions occur from behind when one aircraft is speared by another overtaking it. While scanning, don’t ignore the area behind you.

SAFETY TIP: Periodically, making gentle banks right and left to view the airspace above, below and on all sides of you will enhance situational awareness.

SAFETY TIP: Stay ahead of the aircraft. Never let an aircraft take you somewhere your brain didn’t get to first.

SAFETY TIP: To maintain situational awareness, there are three things you must always know: what you are currently doing, what comes next, and what comes after that!

RULE OF THUMB: A 3° descent angle is a reasonable, passenger-friendly angle of descent. To approximate when to start down from cruise altitude, try dividing the required altitude loss by 300 feet. Example: From a cruise altitude of 9,000 MSL to a target altitude of 2,000 MSL requires a descent of 7,000 feet. 7,000 divided by 300 equals a little more than 23 miles. Start down 25 miles out and you’ll get to pattern altitude with a couple of miles to spare.

RULE OF THUMB: To approximate what rate of descent to use to maintain a 3° angle of descent, simply divide your ground speed in half and add a zero to the end. Example: A ground speed of 100 knots would equal a 500 FPM rate of descent. In the foregoing example, we needed 23.3 miles to lose the 7,000 feet. At 100 knots it would take us roughly 14 minutes to get there. At 500 FPM down, in 14 minutes we’d lose, guess what?
7,000 feet. Don’t you just love stuff you can do in your head?

RULE OF THUMB: An aircraft properly trimmed will descend approximately 100 FPM for each 1° pitch-down below level flight.

RULE OF THUMB: The approximate angle of bank required for a standard rate turn is 10% of your IAS in knots plus 7. Example: 140 KIAS equals a 21° angle of bank (140 x .10 + 7).

RULE OF THUMB: A 100 RPM reduction of power in a fixed-pitch-propeller aircraft will result in an approximate 100 fpm rate of descent (RoD). A one inch reduction in manifold pressure in a variable-pitch-propeller (constant-speed prop) aircraft will result in the same thing.

STRATEGY: In the event of an engine failure requiring an off-airport landing, the objective is to arrive on what would be a base leg, close in, at approximately 800-1,000 AGL.

One method to accomplish this might be, after establishing an appropriate glide speed and selecting a suitable landing area, altitude allowing, spiral down to a key point (1,500 AGL 1/3rd mile abeam the desired touchdown point) thus setting up a familiar scenario (landing at an airport with a base and final leg. Some imagination is required!). Avoid adding additional drag (flaps and gear) until landing is assured.

STRATEGY: In a forced landing caused by an engine-failure at night, at approximately 1,000 feet above the ground, turn your lights on. If you don’t like what you see, turn them off again! :-)

STRATEGY: If a forced landing is inevitable, strive to hit the softest, cheapest thing you can find, as slow as humanly possible! :-)

Forget all that stuff about Bernoulli’s Law, lift, gravity, thrust, and drag. An airplane flies because of money!

STRATEGY: Small errors require small corrections. You probably don’t need a 30° angle of bank to correct for a 5° off-course indication.

STRATEGY: With that in mind, ordinarily, unless otherwise necessary, the angle of bank should be no greater than one half the number of degrees of your turn (the heading you are currently on to the heading to which you will be turning) to a maximum of a 30° angle of bank. Example: A turn of 20° left or right should be made at an angle of bank no greater than 10°, a 40° turn, no more than a 20° angle of bank.

STRATEGY: When rolling out of a turn, lead your desired heading by 1/2 your angle of bank. Example: At a bank angle of 30° start a coordinated roll out 15° prior to your desired heading; at a 60° angle of bank, 30° prior.

RULE OF THUMB: On landing, if you’re not down within the first 1/3rd of the runway, go around. Of course, common sense is required here. If you’re flying a C150 and landing on a 12,000 foot runway, depending on where you want to go on the airport, perhaps more or less than the 1/3rd rule would be appropriate. Conversely, if your landing on a super-short runway, perhaps you’ll want to land on the numbers!

STRATEGY: On approach for landing, once the desired glide angle (and sight picture) is established in the windscreen of your aircraft, if your desired touchdown point on the runway appears to be moving up in the windscreen, you will most likely undershoot. If it appears to be moving down, you will overshoot.

SAFETY TIP: A good habit to develop in a retractable gear aircraft is, when starting a descent into an airport environment for landing, say to yourself: GO DOWN/GEAR DOWN!

SAFETY TIP: Check gear down on downwind, base, and always on short final. Develop the habit of verifying and saying out loud: “three green (if appropriate) and one in the mirror (if appropriate). If you have a passenger with you, ask that individual to verify that he or she sees the green lights.

RULE OF THUMB: It is said, the shortest step in the world is from the wing of a low-wing airplane to the surface after a gear-up landing. :-)

RULE OF THUMB: To taxi back to the ramp after a gear-up landing requires maximum power! :-)
STRATEGY: In as much as aircraft performance charts have a considerable amount of qualifying language (“new aircraft, flown by professional pilot, etc.) perhaps the data therein should be skeptically viewed by all pilots.

RULE OF THUMB: For safety-sake, add a 50% fudge-factor to POH takeoff and landing distance requirements in the event of the following:
- A field elevation of 3,000’ or higher; and/or
- An OAT of 90° F or greater; and/or
- A short field; and/or
- Tall obstacles at the departure end.
If a two or more of these factors exist, double your requirements.

SAFETY TIP: Declaring “minimum fuel” to ATC does not necessarily get your priority handling. Declaring an emergency does!

SAFETY TIP: In all cases, if a problem exists that warrants the declaration of an emergency, DECLARE AN EMERGENCY!

In spite of the fact that you may be called on to explain yourself see if you agree with this:

RULE OF THUMB: Far better it is to deal with attorneys, than undertakers! :-)

SAFETY TIP: Red-Right-Return.
When viewing aircraft position lights at night, red on the right (green on the left) means that aircraft is coming toward you.

Never fly in the same cockpit with someone braver than you!

IFR

RULE OF THUMB: Always trust your instruments.

ALTERNATE AIRPORT REQUIREMENT (IFR) FAR 91.167

1-2-3 RULE:

AIRPLANE: The forecast at your primary destination from one hour before to one hour after your ETA must call for a 2,000 foot ceiling (or greater) and 3 SM visibility (or better) or you will be required to file an alternate airport.

HELICOPTER: At your ETA and for 1 hour after your ETA at least a 1,000 foot ceiling or at least 400 feet above the lowest applicable approach minima (whichever is higher) and a minimum of 2 SM visibility.

STANDARD ALTERNATE MINIMUMS
An airport with a Precision Approach:
600’ ceiling/2 SM visibility.
An airport with only Non-precision Approach(es):
800’ ceiling/2 SM visibility.

RULE OF THUMB: While in cruise flight, when off an assigned or desired altitude by 100 feet or less, use a half bar-width (the wing on the little airplane on the Attitude Indicator) to correct either up or down; use a full bar-width for an error greater than that.

SAFETY TIP: When flying a no-gyro approach (actual or simulated) all turns should be made at standard rate (3°/second) until on final; On final, all turns at half standard rate (1.5°/second).

STRATEGY: When timing turns by magnetic compass use a standard rate turn and divide the number of degrees of turn by 3. Example: a 90° turn would required 30 seconds. To prevent overshooting, rollout about 5 seconds early to see how close you are, then resume turn, if necessary.

RULE OF THUMB: To hold a 3° glideslope divide your groundspeed in half and multiply times 10 (add a zero to the end). Example: 120 knot ground speed equals 600 fpm (60 x 10). Although not exact, a 600 fpm rate of descent should hold the glideslope nicely.

SAFETY TIP: Never depart IFR into significant IMC without knowing where VFR is.

RULE OF THUMB: Never depart an airport to which you cannot return (below minimums) unless there is a viable alternative.

SAFETY TIP: Prior to starting an instrument approach, commit the first three steps of the missed approach to memory and expect to have to fly it.

RULE OF THUMB: One of the more beautiful things about single-pilot IFR is the quality of the social experience! :-)

HOLDING PATTERNS

STANDARD HOLDING PATTERN
Right turns; and
At or below 14,000 MSL: 1-minute inbound legs. Above 14,000 MSL: 1 1/2-minute inbound legs. DME or GPS leg lengths will be given in distance.
STRATEGY: Start your outbound timing when on your outbound heading and abeam (90°) the holding fix.

STRATEGY: First outbound leg should be for one minute (or 1 1/2 minutes, as appropriate) to discover the wind affect. Adjust subsequent outbound legs so the inbound leg works out.

RULE OF THUMB: With a headwind or tailwind component, reduce your outbound timing by 2 seconds for each knot of tailwind component and increase it by 2 seconds for each knot of headwind.

RULE OF THUMB: In a holding pattern with a cross-wind, on the outbound leg, triple the wind correction angle (WCA) you were holding on the inbound leg, up to a maximum of 30°.

RULE OF THUMB: Never accept a holding clearance without an Expect Further Clearance Time (EFC).

RULE OF THUMB: Reduce speed within 3 minutes of the holding fix so as to cross the holding fix at the appropriate speed.

HANDY MNEMONICS

INSTRUMENT CLEARANCE SEQUENCE
C-R-A-F-T
Clearance limit
Route
Altitude
Frequency
Transponder Code

PRE-TAKEOFF CHECKLIST
C-I-G-A-R
Controls
Instruments
Gas
Altitude
Run-up

PRE-LANDING CHECKLIST
G-U-M-P-S
Gas
Undercarriage
Mixture
Props
Seat Belts/Speed

IFR CURRENCY REQUIREMENTS
6-6-H-I-T-S
6 Approaches
6 Calendar Months
Holding procedures
Intercepting and
Tracking using navigation aids.

LOGGING VOR ACCURACY CHECK
P-A-D-S
Place
Amount of bearing error
Date
Signature

REQUIRED AIRCRAFT DOCUMENTS
A-R-R-O-W
Airworthiness Certificate
Registration
Radio Station License (International flights)
Operating Limitations
Weight and Balance

HOLDING PATTERN SEQUENCE
6-Ts
Throttle
Turn
Time
Tune
Talk
Track

UNSURE OF YOUR POSITION
4-Cs
Climb
Communicate
Confess
Comply

LOSS OF COMMUNICATION - IFR
AVE-F
In case of loss of communication in IMC conditions, fly by the most recent of
Assigned: The route contained in last clearance; or
Vectored: If you were being vectored, by the most direct route to the that clearance point; or
Expect: By any route you were told to expect in a later clearance; or
Filed: The route you filed in your flight plan.

RUNWAY ITEMS
Just prior to takeoff:
Lights: Exterior lights on
Camera: Transponder on
Action: Line up on runway, check that the Heading Indicator (DG) conforms with the runway heading, note time of takeoff.

VFR HEMISPHERICAL RULES
At or above 3,000 AGL, on a magnetic course of from 0°-179° requires an ODD altitude plus 500 feet; from 180°-359° requires an EVEN altitude plus 500 feet.

IFR HEMISPHERICAL RULES:
An altitude assigned by ATC. Typically ATC does apply, at a cardinal altitude, the ODD/EVEN hemispherical rule used for VFR flight but they are not required to.

MAGNETIC COMPASS ERRORS:
(Northern Hemisphere)

NORTHERLY TURN ERROR
During turns through north the compass will LAG behind the turn (might even initially show a turn in the opposite direction); During turns through south, the compass will LEAD the turn.

ACCELERATION/DECELERATION ERROR
ANDS (Accelerate North, Decelerate South:)
On headings of east or west, when you accelerate the compass will momentarily show a turn to the north; when you decelerate, the compass will momentarily show a turn to the south.

PARTIAL-PANEL COMPASS TURNS
UNOS
Undershoot North; Overshoot South

MAGNETIC VARIATION
East is least, West is best.
Subtract easterly variation, add westerly.

VFR WEATHER REQUIREMENTS
In Class C, D, and E (Below 10,000 MSL):
3 - C152s
3 SM Visibility
Cloud separation:
1,000’ Above clouds
500’ Below clouds
2,000’ Horizontally from clouds

MAINTENANCE REQUIREMENTS
A - TAP
Altimeter: (Every 24 calendar months.)
Transponder: (Every 24 calendar months.)
Annual: (Every 12 calendar months; An annual can replace a 100-hour inspection; A 100-hour inspection cannot replace an annual.)
Pitot-Static System & Altimeter: (24 calendar months.)

MISSING APPROACH
UP YOU GO!
Power UP: Maximum authorized power.
Pitch UP: Establish climb attitude and speed.
Clean UP: Gear up and flaps up after climb established, cowl flaps open.
Speak UP: Report missed approach only after the foregoing priority items have been accomplished and a positive rate of climb has been established.

I'M SAFE (Personal Evaluation)
Illness
Medication
Stress
Alcohol
Fatigue
Emotions

ADF
MH + RB = MB TO
Magnetic Heading + Relative Bearing = Magnetic Bearing to the station

ROUGH CONVERSIONS

FAHRENHEIT TO CELSIUS: Subtract 30 and divide the remainder in half. Example: 68°F = 19°C (68-30 ÷ .50).

CELSIUS TO FAHRENHEIT: Double it and add 30. Example: 19°C = 68°F (19 x 2 + 30).
This simple formula is approximate. It gets you close (not exact) and it's simple enough, you can do the arithmetic in your head without a calculator.

CONVERTING NM TO SM AND BACK: Although not 100% correct either, to ballpark it, use a factor of 1.15 for both computations. To go from SM to NM multiply. To go from NM to SM divide.

STATUTE MILES TO NAUTICAL MILES:
Example: 120 SM = 138 NM (1.15 x 120)

NAUTICAL MILES TO STATUTE MILES:
Example: 138 NM = 120 SM (138 ÷ 1.15)

Learn from other people’s mistakes. Chances are you won’t live long enough to make them all yourself!
About Aviation Ground Schools

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“Reno, The Biggest Little City in The World,” that’s what the sign said. That message was, and actually still is, featured on the world-renowned Reno Arch.

I was thinking about that slogan as I was turning downwind to Runway 16 at Reno International Airport. I had moved to Reno two weeks earlier and was now finishing up a leisurely two-and-a-half day trip from Republic Airport (KFRG) at Farmingdale, Long Island, N.Y., bringing my 1964 Skylane to its new home.

That was 36 years ago, and you know what? Reno has lived up to its reputation in every way!

Reno is an amazing city. Snuggled up against the base of the majestic Sierra Nevada mountain range—you know, that formidable set of hills separating Nevada from California (or as some would have us believe, separating California from the rest of the world!) that has managed to humble many a pilot, and others ill-equipped to deal with its treachery (think Donner Party)—Reno and the Reno-Tahoe area has something for everybody. If you’re an history buff, if you’re into outdoor activities (winter or summer), or just into having fun and eating well, you are gonna love Reno-Tahoe!

Reno was originally called “Lake’s Crossing,” named for an early Nevada entrepreneur named Myron Lake, who had purchased a log toll bridge across the Truckee River which flows from Lake Tahoe, high in the Sierra, to Pyramid Lake, north of Reno, and goes through the heart of what is now downtown Reno.

It was subsequently renamed “Reno” in honor of Maj. Gen. Jesse Reno who fought and died in the American Civil War.

At 4,411 feet MSL (at the airport), Reno sits in a basin called
the Truckee Meadows and is surrounded on all sides by mountains. The ill-fated Donner Party camped in the Truckee Meadows for several days in late October 1846, while they recovered and renewed their strength from their ordeal crossing the 40-mile desert in western Utah, currently known as the Bonneville Salt Flats. They were in the Truckee Meadows long enough to get caught by early winter snow storms already brewing in the in the High Sierra. Unable to scale the summit, they returned to Donner Lake where they remained for most of the winter.

Without food and unable to hunt and fish because of the deep snow, they were forced to resort to cannibalism for survival. If you’re interested in this sort of history, “Ordeal By Hunger” by George Rippey Stewart is a great read and there is a museum and monument at the site of the Donner Party’s encampment right off Interstate 80, a couple of miles east of Truckee, Calif. at what is now called Donner Pass. Donner Lake, by the way, is an awesome destination during the summer months if you like to picnic, swim, or are into boating, fishing or water skiing.

Although flying into Reno from any direction you’ll be dealing with high terrain and mountains, getting here by air is straightforward enough. In fact, flying single-engine, you’ll be encouraged to learn that you can, if you so desire (and are smart enough!), fly the entire flight over the mountains directly over the longest emergency runway in the world: Interstate 80. I-80, as you probably know, goes from coast to coast—all the way from New York to San Francisco. In fact, someone once said, “The best thing that ever came out of New York was I-80 westbound!” Being a transplanted New Yorker, I can say that, and I do so because I suspect there’s more truth in it than fiction!.

Night falls on downtown Reno. Photo: Reno Sparks Convention & Visitors Authority (RSCVA).
Reno is under Class C airspace, so remember, you’ll need to talk to Approach Control before entering their airspace. Reno airspace is divided roughly north and south into two Approach Control sectors: you will talk to Approach on either 126.3 MHz (north) or on 119.2 MHz (south). Check the chart for the exact radials from the Mustang VOR (117.9) defining the two sectors.

There are several airports servicing the Reno-Tahoe area. You can fly into Reno-Tahoe International (KRNO); Reno Stead (4SD), home of the Reno Air Races; South Lake Tahoe (KTVL) or Truckee-Tahoe (KTRK). During Air Race time in mid-September, Carson City Airport (KCXP), which is only 30 miles away, gets a lot of the overflow traffic. Of these, Reno International is the only controlled field. The others are served by a Common Traffic Advisory Frequency (CTAF). All services are available at each of the foregoing airports but fuel prices, as you can imagine, are significantly different. I suspect the best deal on fuel of the lot would be at Reno-Stead—if anyone can consider $3.89 a gallon a deal!—but you can check fuel prices easy enough, so be sure to check it out for yourself.

Once here, depending on your interests, there are a zillion things you can do. If you’re into history, you might want to rent a car and explore Virginia City, a mere half-hour drive away. Virginia City is the home of the Comstock Lode where in 1850 gold was discovered. In the second half of the 1800s, miners took millions and millions of dollars of ore out of the mountain and the claim is that there is many more millions of dollars of ore still deep in the bowels of that hill—but it’s simply not cost effective to get at it. An amusing story goes with the Comstock Lode. Many of the miners, vastly uneducated, looking to strike it rich on the Comstock were seeking gold and many a vein was found. But while working their claims, they kept coming on this bluish mud which just infuriated them, so they tossed it aside and kept on digging. It turned out the mud was high-grade silver ore, but that wasn’t fully realized until 1859. One wonders how many millions were thrown away before the penny dropped, so to speak. Once the error of their ways was realized, most of the riches coming out of the Comstock was in silver.

An interesting bit of trivia: did you know that San Francisco, originally called Yerba Buena, was just a sleepy fishing village until the discovery at Sutter’s Mill and of the Comstock Lode.
Virginia City is a town of maybe 900 people and retains the ambiance of the days of the old Comstock Lode. While there, be sure to explore The Mark Twain Museum which is located at the Territorial Enterprise Building, the old newspaper for which Mark Twain first worked as a reporter under the name of Samuel Clemens. There you will find a host of fun antique stuff such as old Victorian-era printing presses, desks, and period pieces of Comstock era. Other historical sites you will definitely want to experience in Virginia City are The Bucket of Blood Saloon, Pipers Opera House and the Julia Bulette Red Light Museum. Bulette was Virginia City’s famous madam who imported the women necessary to, um, attend to the needs of over 30,000 miners digging away on the Comstock. As a celebration, if you will, of the history of prostitution in Nevada, the museum has on display many of the contraceptive devices and home-grown cures for diseases used on the Comstock and, no doubt, in other mining towns springing up throughout the west.

If you care to, you can also tour a mine. You can tour the Best and Becher Mine which—get this—starts at the rear of the old Ponderosa Saloon.

In the same vein (no pun intended), if the Comstock Lode stirs your imagination, in good weather, the easy drive from Reno to Coloma, Calif. on the western slopes of the Sierra Nevada will take you to Sutter’s Mill on the bank of the American River where the first gold flakes were discovered in 1848 by one James Marshall, an employee of John Sutter, the owner of the sawmill bearing his name. The discovery inflamed the minds of the common people. Ordinary people from every culture, from every walk of life, from virtually every city, state and territory throughout the land became afflicted with gold fever causing a mass migration to northern California. The “Forty-Niners,” as they became known, by the tens of thousands came and came and came, seeking their fortunes in the “Golden State.” That period of our history, of course, we know as the California Gold Rush.

On the drive to Sutter’s Mill you will pass Donner Lake and The Donner Party Museum and Monument I mentioned before, which is worth a stop.

The first settlement in Nevada, then Utah Territory, was a Mormon settlement; a picturesque little town known today as Genoa (pronounced Gen-noah), was then known as Mormon Station. Located approximately 35 miles south of present-day Reno, it was established in 1851 as a trading post to provide a resting place and a source of supplies for the myriad of wagon trains crossing to the Promised Land on the other side of the Sierra. Genoa has a special place in my heart, as my wife and I were married by a non-denominational minister at Mormon Station, outside in the barred backyard under a spreading chestnut tree. You will enjoy a magnificent drive through beautiful ranch and farm country along the base of the Sierra on your way to Genoa and while there, you might consider grabbing a bite to eat at the Pink House.

Continuing further south, just south of the Carson Valley and roughly 45 miles south of Reno, you’ll find Minden, Nev. Perhaps you’ve never heard of Minden, which wouldn’t surprise me. I do know this, though: if you were into sailplanes and soaring, you would be very familiar with Minden! The Minden-Tahoe Airport is located at the foot of the Sierras a few miles from Lake Tahoe and is the home of world-class soaring. Sailplane pilots fly in from all over the world to enjoy the magic of mountain wave soaring while seeking record-breaking thermals. Close your eyes for a moment. Imagine yourself with an instructor glider pilot being towed aloft,
above the mountain ridge which tower to heights in excess of 12,000 MSL and, after release, soaring above and enjoying the breathtaking view of Lake Tahoe and the Carson Valley below and miles and miles of mountain splendor in all directions—all this in the tranquil silence of motorless flight.

The Sierra Nevada Mountain range and the surrounding areas of Reno and Lake Tahoe offer year-round activity to be enjoyed each in their season. In the winter, with 15 Alpine resorts and eight Nordic sites you can enjoy downhill and back-country skiing, cross-country skiing, and snowboarding. You can enjoy dog-sledding tours and snow-shoeing, if you wish, or how about a nice romantic, evening sleigh ride? Reno-Tahoe even has five ice-skating rinks, for your skating enjoyment.

When the weather is right and in-season, you can enjoy hiking, biking, kayaking, boating, fishing, sailing, kite boarding, whitewater rafting, rock climbing, horseback riding, back country adventures, off-roading and motorcycle touring. Bring your binoculars for some outstanding birdwatching.

With over 50 golf courses within a 90-minute drive of Reno, you’ll surely find a course to challenge you. And don’t forget, the air is so thin up here, you’ll probably be driving your ball 100 yards farther than you’re used to.

Of course, if you want to experience some new air adventures, Reno or Tahoe is just the place to do it. For example, why not try skydiving, hot air ballooning, or hang gliding or paragliding in the beautiful Sierras? You could, if you’d like, call my friend Randy McLain at Sierra Biplane Adventures and get a tour of the area in his open-air Waco Biplane (probably not a good idea in the winter!).

Or how about getting in touch with my friend, Tim Brill, who owns Aerobatic Company and Flight School based at Stead, and go do some aerobatics with him in either his Decathlon or his Pitts? If you don’t like being upside in an aircraft, which I don’t—I’d sooner shoot an approach to 200 and ½ in a blinding snowstorm than be upside down in an airplane!—perhaps it would be worthwhile to at least learn how to possibly save yourself by getting some upset training, or maybe get yourself some mountain flying experience, both of which his company specializes in. Tim’s a mighty good instructor. By the way, for those of you into aerobatics here’s a good flight instructor tip: before doing any aerobatics it is highly recommended that you eat only bananas before the flight. Why? Because of the potassium content of bananas? No! Simply because bananas taste the same in both directions! (Sorry!)

Don’t forget when planning your trip, there is basically something going on in Reno every month. As I’m sure you know, Reno is the home of the National Championship Air Races, which will be September 10-14, 2008. Earlier in September are the Reno Balloon Races, which in 2008 will be September 4-7. You haven’t seen anything until you’ve experienced the spectacular lights and sounds of a “Dawn Patrol!” The 49th annual Virginia City International Camel Races will be held in Virginia City also in September 2008 (dates have not been confirmed prior to publication). From June 19-28, 2008 is The Reno Rodeo, touted to be the “wildest, richest rodeo in the west.”

If you’re into old classic and muscle cars, don’t miss Hot August Nights, which runs from August 2-10, 2008. Reno-Tahoe also boasts a Chili Cook-off and an Italian Weekend. And don’t forget the Lake Tahoe Shakespeare Festival at Sand Harbor Park, Incline Village, Nev. from July 1 through August 31, 2008. This is going to be their 38th season. Yes, sir… you name it, we got it! Just check with the Reno-Sparks Chamber of Commerce and the Tahoe Chamber of Commerce and ask for a schedule of events.

If you want world-class dining, Reno has that, too. Gaming and nightlife, including premier shows and cabaret entertainment is featured in abundance in the two dozen or so casinos in the area. There is even a casino for the kids, with real high-wire and other circus acts and a carnival midway. It’s called Circus-Circus. Of course, while the kids entertain themselves, so can their parents—with the traditional slots and table games.

Yes, indeed. As the sign said, Reno is without a doubt, The Biggest Little City in the World. Come visit us.

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