CONCHO VALLEY AVIATOR

President's Invitation

EAA Concho Valley Chapter 493 meets on the third Tuesday of the month at Joe's Italian Restaurant at 1601 S. Bryant Blvd in San Angelo. Most of us arrive by 6:00 pm for dining and hangar talk. A short business meeting begins at 7:00 pm followed by an aviation-related presentation. We top it all off with dessert type refreshments. We'd be happy to see all aviation enthusiasts whether you are a pilot or not.

NEXT MEETING

Our next meeting is coming up on **Tuesday, January 21. We'll be meeting again at Joe's Italian Restuarant on South Bryant.**

We still need volunteers to bring refreshments to the 2014 meetings as shown in the blue box to the right. Please sign up for your month.

The program for this meeting has not been determined as of press time.

Photo taken at Torrey Pines glider meet sometime around 1970. The sailplane in the lower right was an experimental home-built design called the Duster.

The article on the next two pages was submitted by Al Elliott and has been resized but otherwise printed as submitted. Thanks, Al!

Refreshments

2014
January - Gerry Hatch
February - Fred Jones
March - Steve Baker
April
May
June - George & Martha Spinks
July
August
September - Pierce Marschall
October
November
December - Christmas Party
Jan., 2015

2014 Chapter Officers

President:	Don Treadwell
Vice-President	Tony Marcum
Treasurer	David Dierker
Secretary	Pierce Marschall
Other Staff	
Tech Counselors:	Bob Reece and Ted Reed
Young Eagles Rep:	Don Treadwell
Flight Advisors:	??
Newsletter Editor:	Larry Wedel
Webmaster:	Bob Heiser

Minutes
There were no minutes from the December Christmas Party

WHY KNOT?

I'm one of those guys who uses *nautical miles* and *knots* for most flight applications. I don't think miles or miles per hour are wrong, but I do think that for flying, knots work better for several reasons.

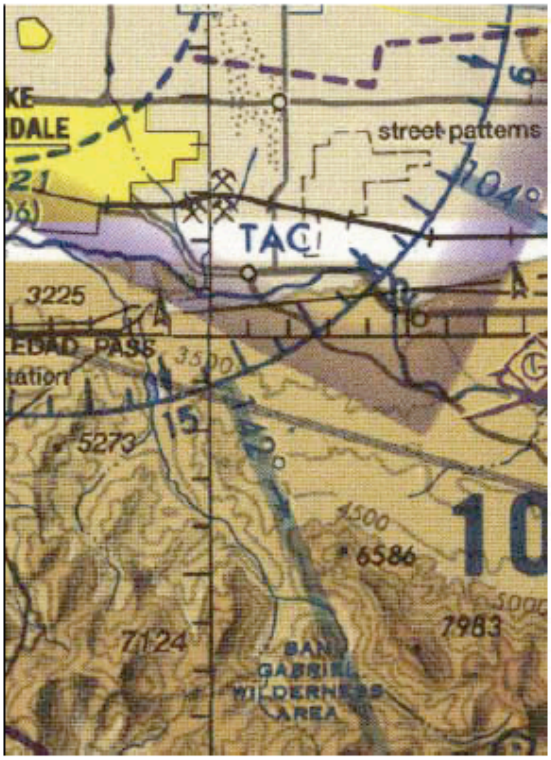
THE COOL FACTOR

First, just saying "knots" is way cooler than saying "miles per hour". Especially to non-flyers. eg. "Yeah, I was making 120 knots across the ground." [Other pilots nod knowingly.]

EASY FLIGHT PLANNING

Second, distance is easier to measure on the maps we fly with. Mark a route segment on an aeronautical chart. Measure and mark the line's length along the edge of a piece of paper. Turn the paper's edge to align with any north/south (up & down) line of longitude. The number of minute marks equals the flight segment distance in nautical miles (NM). That's it! No searching for the little white conversion diagram thingie; it's all right there. It's even reasonably easy to do inflight.

Line of Longitude
Distance between tick marks is 1 NM.



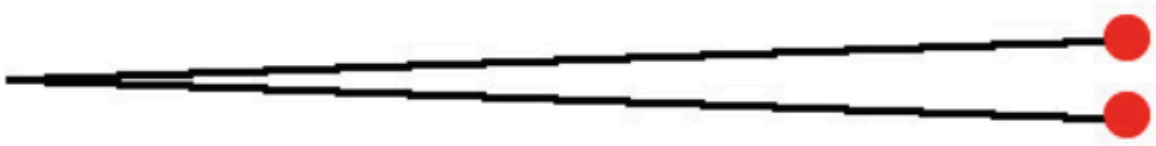
WHAT--ME E6B?

Third, Knots lets me use my MPH airspeed ring as a True Airspeed (TAS) indicator in cruise. In general, TAS increases over Indicated Airspeed (IAS) at 2% per 1000 ft of altitude increase. So, if my airspeed indicator is reasonably accurate at sea level, then at 7,500' above mean sea level (MSL), my true airspeed will be 15% faster than indicated in knots (KIAS). At 100 KIAS and 7,500' MSL, both my indicated MPH and my TAS in knots is 115. Likewise, 130 KIAS will be 150 KTAS. Just like my airspeed indicator's MPH ring shows. Slick.

Line of Latitude
Distance between tick marks is less than 1NM

60:1 RULE

The 60:1 Rule refers to the ratio between two radii separated by one degree; the length of either radius is sixty times the distance between their endpoints.



If these two lines are 60 NM long and separated by 1° then the distance between the red dots is 1 NM.

The power of this ratio/rule is based on the 6000-ft length of 1 NM[1]. This means both the distance from the focus (60 NM) and the distance along the arc (6000 ft) are divisible by 60.

Please, let's not nitpick the straight-line distance between the two red dots vs. the distance along an arc--we're flying airplanes here!

Someone is bound to point out that the length of a nautical mile seems too convenient to be true. It is. The mathematical formula for the circumference of a circle is 2πr, that is pi times twice the radius. For a 60NM circle, 2 times 3.1416 times 60 equals 376.99. 376.99 divided by 360 (degrees in a circle) yields 1.0472 NM per degree of arc at 60 NM. As you probably noticed in my "TAS on the MPH Ring" trick, I'm all for rounding numbers to make them easier to manipulate inflight. Rounding then, 1° at 60 NM = 1 NM. So, 1° at 60 NM = 6000 ft.

Divide everything by 60 and ***1° at 1 NM = 100 ft***. If you want a 3° Glide path for landing, be at 300' above ground level (AGL) 1 NM from the runway. If your heading is off by 1° for 60 NM, you will be 1 NM off course. And that is the 60:1 Rule--the fourth reason nautical miles are greater than statute miles (SM).

OTHER IMPORTANT NUMBER RELATIONSHIPS

Reason #5: Using NM makes it easier to calculate climb gradients, descent gradients, pitch changes in degrees for attitude flyers, vertical velocities, turn radii (for radial-to-arc, arc-to-radial, and procedure turn lead points), bank angles, and more. Since anticipation is key to good piloting, this is a powerful capability. All that is needed is to divide KTAS by 60 (minutes) to yield NM/Min--a very useful number.

KTAS	540	480	360	180	174	168	162	156	150	144	138	132	126	120	114	108	102	96	90	84	78
NM/Min	9	8	6	3	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3

A fear of decimals makes fighter pilots fly airspeeds in multiples of 60 knots, but we can only dream of those speeds…for us the decimals are unavoidable. I figure decimals of NM/Min the same as tenths of an hour: plus or minus 1/10th per 6 KTAS from a few easy knowns (highlighted). Stare at the chart; you'll see it.

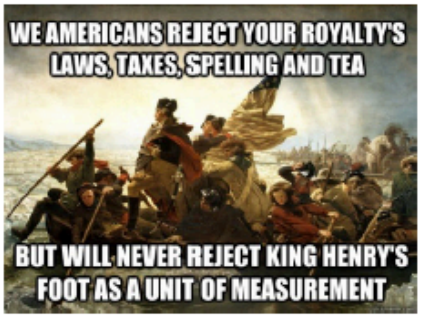
EASE IN

Don't dive in to these new calculations too quickly. The method you currently use will continue to work, but to refine your skills you do need to practice--during flight planning; during 'dead' time in cruise; after a flight. I know the math is a bit daunting, but in everyday use it becomes much easier and can make you look like a very precise pilot. I'm giving you some time to think about these reasons for using NM; next month's newsletter will illustrate some more practical applications. I'll include some memory aids and examples for using some of this math in daily flying.

REJECTED

I know many of you have flown with great success and accuracy using MPH for many years, so I'm anticipating some rejection, but really, 'Knots' sounds COOL! [Nod knowingly.]

-Al



[1] The current, most widely accepted figure for one nautical mile is 6076.12 feet. However, this is relatively recent; not that long ago 6080.2 feet was considered totally accurate and unimpeachable. Before that other figures were used, having originated with a basis in mapmaking first employed by Eratosthenes in the 3rd century BC. They are all mathematically derived from the circumference of the Earth, which can be variously calculated. Yes, Eratosthenes knew the earth was round. Anyway, 6000 feet is used solely for the purpose of making many calculations much easier without sacrificing the required level

Email your newsletter contributions to me at tinkerlarry@icloud.com . Thanks, Your Editor