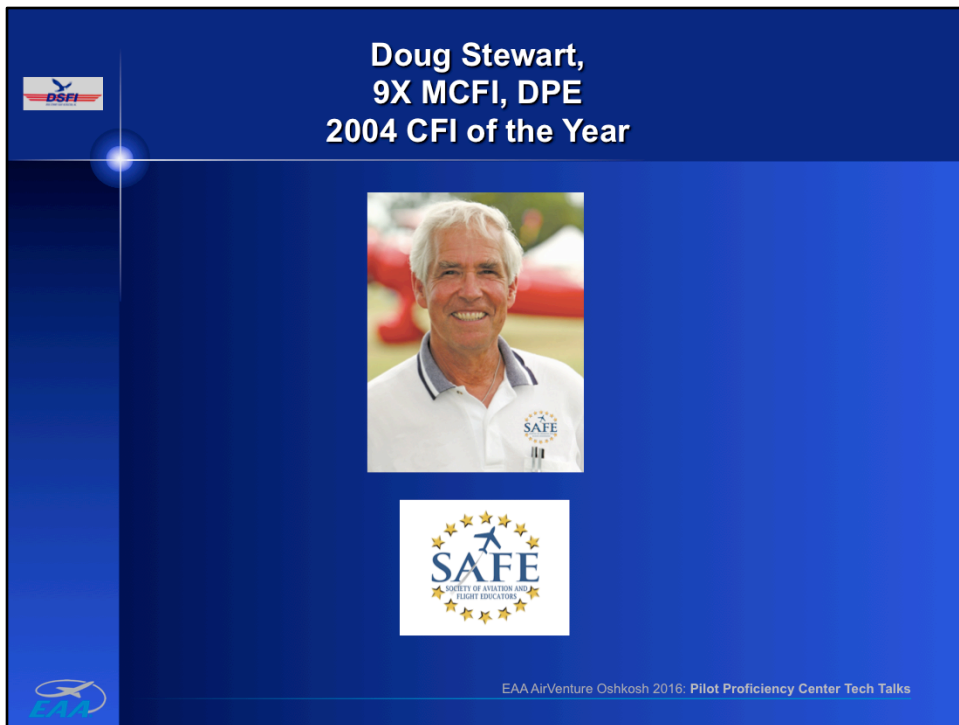




The Art of Instrument Flying : Communicating Command



With a total time of over 14.5K hours, 11.5K of dual instruction provided, and close to 5K of instrument instruction, Doug has learned a lot. In this presentation he shares his knowledge and experience of flying in the real IFR world.



IFR Flying Defined:



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks



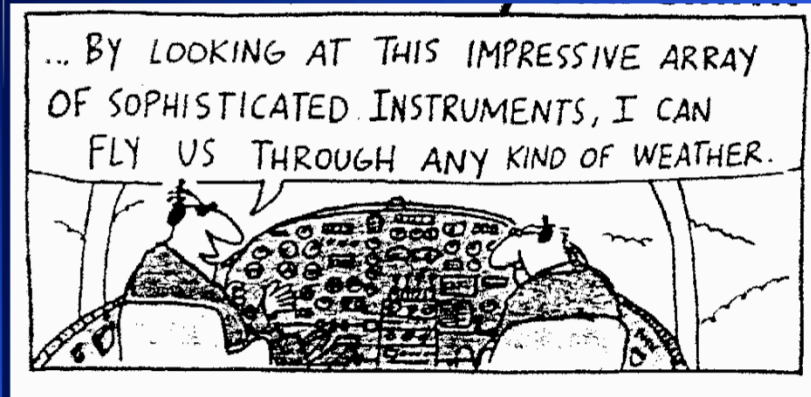
IFR Flying Defined:



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks



IFR Flying Defined:



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks



IFR Flying Defined:

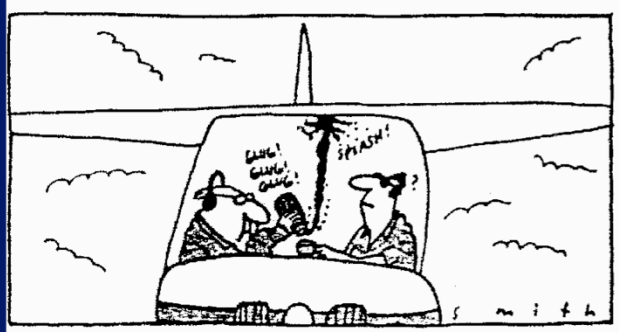


EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks



IFR Flying Defined:

- Hours of boredom, punctuated by moments of sheer terror on either end!



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks





For many pilots, the “scariest” thing about flying IFR is having to talk with Air Traffic Control. As in all of life, practice makes better. Considering that the percentage of the time we spend speaking on the radio is probably less than 1% of the time we spend flying, it’s no wonder that communicating with ATC can be intimidating. Thus the more we practice communications the more comfortable and proficient we will become. To assist in learning we can use tools like “ATC Live” on the internet, or commercially available courses like “Comm 1”.




COMMUNICATION DEFINED

- 1. To give or exchange information... by speech or writing.**
- 2. To transmit a thought by speech... so that it is clearly understood.**
- 3. To share a good personal understanding.**
- 4. To be connected or provide access to each other.**




EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

The gist of this slide is that communication is not only about speaking, but about listening. Effective communication with ATC means that we listen for our call sign and respond when and as appropriate as much as it means that we use standard phraseology when speaking.



SOME BASICS

- **Standard Phraseology**
- **We're not speaking English, we're speaking "aviation". (Grammar doesn't matter.)**
- **"To" and "For" should not be used except as numbers. (Two and Four)**
- **"Checking in" & "With You" ????**

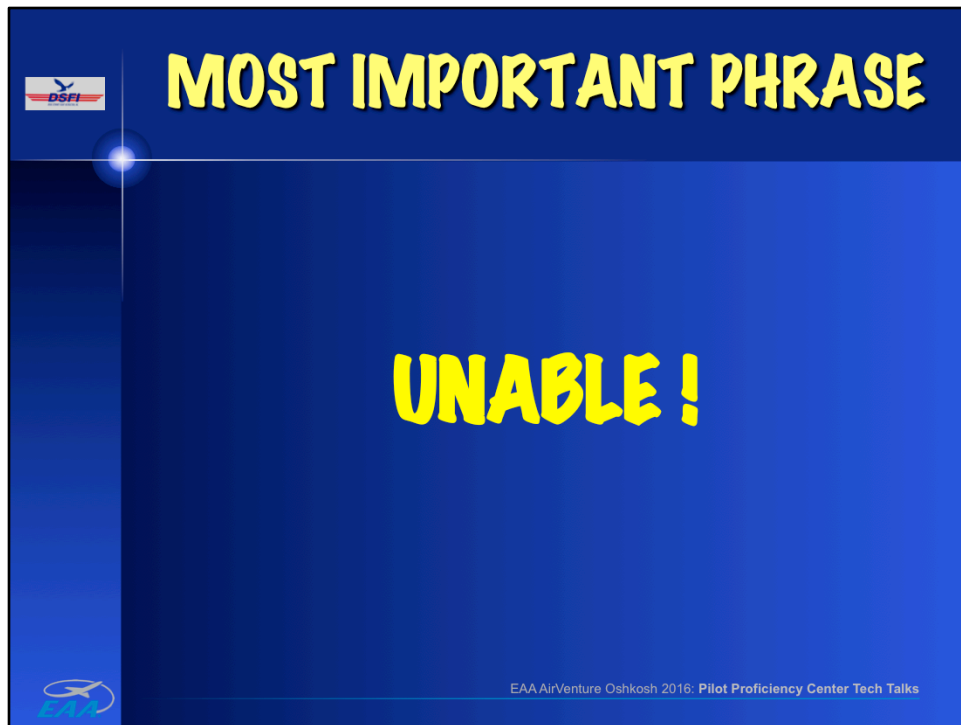


EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

You might think – “Big deal... what’s so important about standard phraseology?” When you consider that it is a major tool that pilots use to establish and maintain the role of PIC when interacting with ATC it is a big deal. I think we all know that the pilot flying the airplane is the “pilot-in-command”, the person that “has the final authority and responsibility for the operation and safety of the flight”. When interacting with ATC, the use of standard phraseology enhances our ability to maintain that command.

In addition to providing standard phraseology I will be providing the “WHY” of the use of my suggested communication.

This slide is fairly self-explanatory. We are speaking aviation, and grammar doesn’t count for beans. I so often hear pilots using “to” and “for” as words, but in aviation speak they really should only use them as numbers. (If I heard someone announce they were “climbing to four thousand” I would think they were headed to the flight levels (FL240). “Checking in” and “with you” should absolutely never EVER be used on an initial call up. When a controller hears those phrases the immediate thought is that they have missed a hand off, and they freak out. When they realize it’s a pilot making an initial call they are now less than happy with you, and if you’re hoping for a short cut or special treatment you’ll be unlikely to get it.



The most important phrase we have in our aviation vocabulary is **UNABLE!** As PIC it is our responsibility to ensure the safety of the flight. Many of the new controllers have never even been in the cockpit of a small GA airplane (let alone a large passenger jet) and might give you a clearance that would be completely impossible for you to comply with. Remember – once you have read back a clearance, you, the PIC have the responsibility to adhere to that clearance. If ATC is asking you to do something that you feel is unsafe all you need to do is reply UNABLE.



Let us not forget our priorities – AVIATE, NAVIGATE, COMMUNICATE. Remember that the Marconi principle doesn't keep airplane in the air. Too often I witness clients that feel they have to respond to ATC as quickly as they can. That is NOT the case.

Consider that you are on vectors to final, you have a tailwind, ATC is jammed up with numerous aircraft and you're less than a half a mile offset from the final approach course when ATC finally clears you for the approach with the 30° intercept heading along with "...maintain xxxx altitude 'til established, cleared ILS XX approach.". If you spend time reading all of that back before you start the turn you will probably fly through the final approach course and need another vector from the other side.

So – FLY THE AIRPLANE – PUT IT WHERE IT NEEDS TO BE – AND THEN... TALK.



AVIONICS

Comm #1:

ATC

Comm #2

- Clearance Delivery
- Ground
- ATIS
- Assos / Awos
- FSS





EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

There are many ways to manage the radios. If you have a system that works... terrific. I won't necessarily tell you to change it. FWIW, here is how I set up my radios, along with the reason why. (If I don't provide the reasons for why I do things, then how are you to decide if it will work for you?)

For me, Comm #1 is for ATC. What I mean by this is that I will use Comm #1 to contact: Tower; Departure; Center; Approach; and the Unicom CTAF. That's all! I use Comm #2 for all other frequencies: ATIS /AWOS/ASOS; Clearance Delivery; Ground Control; FSS; and Unicom (for non-CTAF calls).

The reasons: The main reason I set my radios up this way is so that I can monitor the AWOS (if flying in to a non-towered airport) while still transmitting and receiving on the CTAF. It will also allow me to check the ATIS if it changes after I have contacted either the final approach controller or tower. I have witnessed pilots who use both Comm #1 and Comm #2 for ATC get thoroughly confused, and forget which radio is the "active" radio, or even lose a frequency when switching from one radio to the other (as opposed to merely swapping between standby and active frequencies in one radio.)



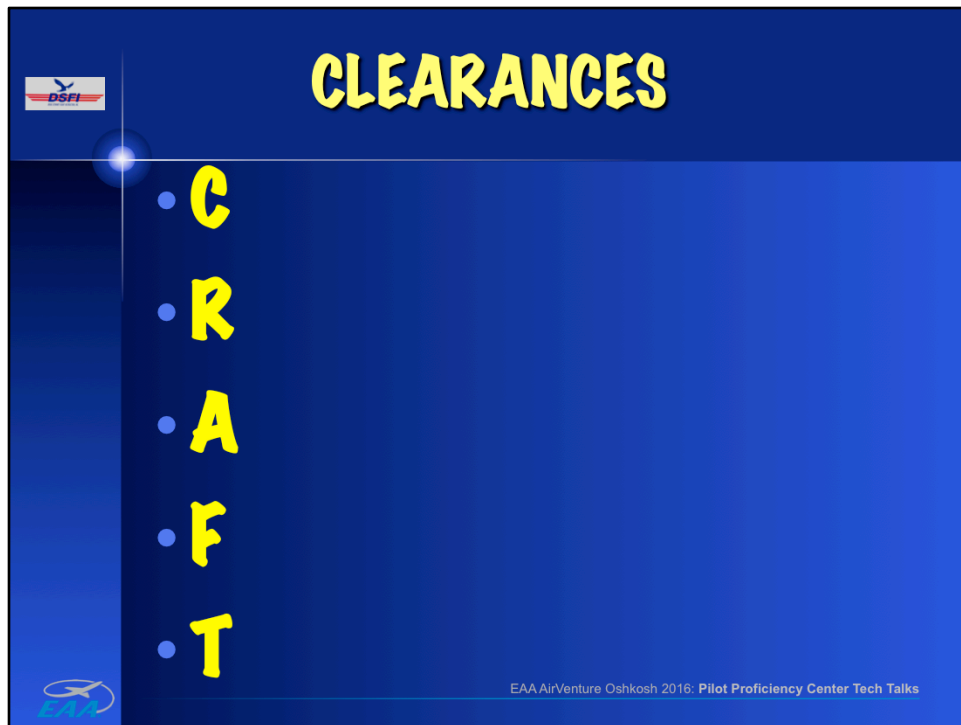
AVIONICS

- **Managing your Radios with the Audio Panel**




EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

The audio panel is the management “headquarters” for all the radios. If you own your own airplane you probably know your audio panel and it’s proper operation. But if you are a renter pilot it’s quite possible that you might find an audio panel in an airplane with which you are not familiar. Whereas the operating principles of these devices is similar, their actual operation is not. If you find an unfamiliar audio panel in a rental airplane get a few minutes of dual instruction in it’s use, rather than blasting off, thinking you’ll figure it out “on the fly”. It could save your life!




We are all probably familiar with the C-R-A-F-T acronym for copying clearances. It stands for the order in which we'll receive a clearance: The **C**learance limit; The **R**oute; The **A**ltitude; The departure **F**requency; and the **T**ransponder code.




CLEARANCES

- Clearance limit
- Route
- Altitude
- Frequency
- Transponder Code



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks


All too often I will witness pilots fixate on writing down all the fixes within the route description especially when they are unfamiliar with the VOR identifiers or intersection names, and thus miss hearing and writing the altitude, frequency and xpdr code. What I suggest is that if you don't know the spelling of any of the fixes, disregard writing the rest of the route so that you can note rest of the clearance. Then, when you read back the clearance you can say: "Cleared to the XYZ airport via the xyrzy intersection **rest of the route missing**, climb and maintain xxxx' departure frequency 123.45, squawk 1234." Now all the controller has to do is give you the remaining part of the route that you missed, with the rest of the readback "correct".



CLEARANCES


When departing a non-towered airport that doesn't have an RCO, what can you request to avoid having to rush to meet the void time?

Request a "hold for release". (This will require a cell phone.)



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

One of the worst things we can do in aviation is to be in a hurry. And one of those times would be when we receive a clearance over the telephone out of a non-towered airport that includes a void time. Rushing to meet the void time can lead to some serious mistakes not only in preflight inspections and runups, but also in data entry into avionics and GPS. One way to avoid having to rush is to request a "hold for release" as part of your clearance. This way you will receive the entire clearance before you even start the engine. You'll have time to inspect the airplane, drain the sumps not only of the airplane, but yours as well if necessary. Then you can put the flight plan into the GPS without having to rush, thus ensuring that every fix is "spelled" correctly. You can start the engine, taxi to the runup area, do your runup, and perhaps even taxi to the hold short line. From there, you can call the TRACON on your cell phone to receive your release, letting the TRACON know what runway, and that you are ready for an immediate departure. This way all the rushing to meet a void time has been eliminated.




CLEARANCES

On initial call to a FSS for an IFR clearance, what information should we state?


Identification and frequency.

"Bangor Radio, Cardinal 516AP, receiving Berlin, 110.4".



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

The important thing to remember when calling a Flight Service Station is that quite often they are monitoring numerous frequencies. If you don't let them know what frequency you are receiving them on they will have to sequence through them one by one until they happen by chance to land on the one that you are receiving. So be sure to let them know the frequency you are receiving them on, on the initial callup.




CLEARANCES

If receiving your clearance from FSS through an RCO, what information will they require?


Identification, location, destination, departure runway, how much time.

"Bangor Radio, Cardinal 516AP on the ground Berlin, IFR to Norwood, departing runway 18, we'll need five minutes."



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

When requesting an IFR clearance from an FSS remember that they will need to know not only where you are and where you are heading, but also what runway you will be departing from and how much time you will need after receiving the clearance. So after you have gotten their attention with the initial call stating your call sign and receiving frequency, upon their response, give them the requisite information.




DEPARTURE

On initial departure what information should you give the controller?


Identification, 3D position and heading if assigned.

"Boston departure, Cardinal 516AP airborne Norwood 1500 climbing 2000, heading 260 assigned."



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

On initial callup to the departure frequency, don't just state your call sign, but include your three dimensional position, assigned and expected altitudes, along with any heading (if assigned.) The reasons for this are multiple. For starters, quite often there will be many airports represented on the controllers screen. By stating the airport you have just departed from it brings the controllers eyes to where you are on their radar scope. By stating your current altitude, they will see that on their scope and it will help corroborate that they are looking at the correct target. By stating the "expected" altitude it confirms that you didn't miss-read the altitude assignment to clearance delivery (and which they missed in your read back). If you are on an assigned heading, reading that heading back will confirm that you are indeed flying the correct heading. Remember... we don't ever assume anything, and reading back the info I suggest might very well prevent you from having a pilot deviation and the enforcement action that might go along with it.




ENROUTE

If you are handed off to another sector during a descent how should you report?


Identification, current altitude, assigned altitude, and heading if assigned.

**"Boston Center, Cardinal 516AP
7200 descending 4000."**



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

As stated in the previous slide, this is to minimize the possibility of a pilot deviation. Notice as well that we have not used "to" and "for" in our description of current altitude and assigned altitude.




ENROUTE

What if the controller says: "Contact me on my frequency xxx.xx"


Repeat the frequency, make the switch, and then:

"Boston Center, Cardinal 516AP ON xxx.xx"



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks


When a controller instructs you to contact them on "my frequency", it means that they are switching you to another remote transceiver that will be in "range" of your airplane, but that you will still be speaking with the same controller. The important thing here is to confirm that you have indeed switched to the new frequency. (Remember, they already know your 3D position...)



ENROUTE


When is the best time to request a frequency change to contact flight service?

Immediately following a frequency change.



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

Have you ever requested a frequency change to contact an FSS and been granted the change with the admonition to check back on “within 5 miles”? That’s because in 5 miles you will be entering another controller’s sector and the current controller will need to hand you off. So if you wait until you get a frequency change to an adjoining sector, request the freq change to FSS once you have established contact with the adjoining sector.



ENROUTE

How will you know that the assigned frequency is the final approach controller?

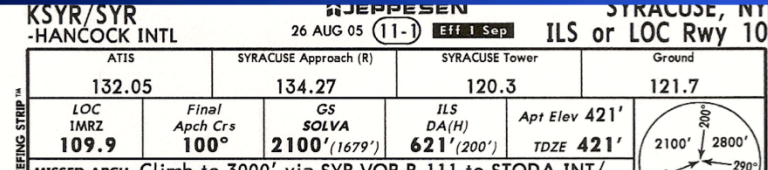


Chart Data:

KSYR/SYR HANCOCK INTL		SYRACUSE, NY	
26 AUG 05 (11-)		Eff 1 Sep	
ATIS	132.05	SYRACUSE Approach (R)	134.27
LOC	109.9	SYRACUSE Tower	120.3
IMRZ	109.9	Ground	121.7
Final Apch Crs	100°	GS SOLVA	2100' (1679')
		ILS DA(H)	621' (200')
		Apt Elev	421'
		TDZE	421'

CLIMB TO 3000' VIA SYR VOR R 111 TO STODA INT/

EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

Have you ever requested a frequency change to contact an FSS and been granted the change with the admonition to check back on “within 5 miles”? That’s because in 5 miles you will be entering another controller’s sector and the current controller will need to hand you off. So if you wait until you get a frequency change to an adjoining sector, request the freq change to FSS once you have established contact with the adjoining sector.



ENROUTE


When contacting the final approach controller, what information should you provide?

Your identification, altitude, and either the ATIS or "one minute weather requesting the _____."

"Boston Approach Cardinal 516AP, 3000, information Bravo." - or -

"Albany Approach Cardinal 516AP, 7000, we have the one minute weather @ 181 requesting direct IMERE for the RNAV 21."


There's no good reason to not know the final approach controller's frequency... it's published on the approach plate. Hopefully you also know that when contacting the final approach controller they will want to know whether you have the current ATIS, or if at a non-towered airport, the current weather, known as "the one minute weather" (because it is a one minute report updated every minute.). At a towered airport, if you will be requesting an approach other than the one "advertised" on the ATIS you should state that on the initial call. If you are landing at a non-towered airport request the approach you want on that initial call. If you don't, then ATC will have to then ask you for your request.



ARRIVAL


While receiving vectors, is there any way that we can know the final vector heading in advance?

If intercepting the final course more than two miles before the final fix, it will be a 30° intercept.



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

ATC is mandated to provide a 30° intercept angle to a final approach course when providing “vectors to final”. The only exception to that is if they are vectoring you for a “close in” approach, meaning that you will intercept the final approach course within 2 miles, or less, of the final approach fix. Further, they cannot offer a “close in” approach without the pilot’s acceptance. In the case of a “close in” approach the intercept angle will be 20°.




ARRIVAL

While receiving vectors, approach control says: "Cardinal 6AP turn left heading 020°, maintain 2000 'til established, cleared RNAV 35 to Norwood" how should you respond?


Just the "numbers" and that you're cleared.

"Turn left 020°, maintain 2000, cleared the approach, 6AP."



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks


Knowing that ATC is required to provide a 30° intercept angle, your SA should already have you anticipating what that heading will be. So it shouldn't be a surprise when ATC gives you the clearance. The most important thing to remember here are your priorities... AVIATE –NAVIGATE – COMMUNICATE. Good SA will have you knowing how close to the final approach course you are, what the wind component is (headwind, crosswind, or tailwind) and your groundspeed. It is quite possible that "Harrison's Law" (which stated... Murphy was an optimist) will have ATC giving you the clearance on the late side and to compound things you will have a kick butt tailwind. If you don't immediately start the turn to intercept, you might very well blow right through the final approach course. If you are paying attention you will be prepared to start the roll before ATC has even finished saying the clearance, and it might be that the LOC needle is halfway to centered as you roll into the turn, so you will also be prepared to continue the turn to intercept. Further, since you already anticipated what the assigned heading would be you can push the PTT switch and read back the clearance as you fly it. So often what I witness is pilots first reading back the clearance (and reading the entire thing) before they start rolling the airplane to the heading. Of course by this time the LOC needle is virtually centered and there's no way the interception can occur without exceeding 60° of bank.



ARRIVAL


At what point during the approach should Approach Control hand you off to the tower or unicom?

No less than two miles before the final fix.



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

The Controller's Handbook instructs that ATC should hand the pilot off to the tower no less than two miles before the final fix. (There can be a few exceptions to this...) So if you are approaching the final fix, or worse have already passed it, it is time to query the controller. Something like: "Uh – approach would you like 6AP over to the tower?" But what if ATC is swamped with traffic, and you can't get a word in edgewise? In this case squawking "ident" will bring their attention to your situation. Mind you, this is NOT something you should do flippantly. It is only to be used if you are inside the final approach fix and you are unable to get ATC attention with a verbal request. (The same technique could be used if ATC inadvertently flies you through the final approach course.)




ARRIVAL

When handed off to the tower what information should you give them?


Your identification, type of approach and position relative the final fix.

"Norwood Tower, Cardinal 516AP, RNAV 35 outside CUPUG."



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks


When handed off to the tower, the tower already knows you are coming, but unless they have a radar repeater in the tower cab they do not necessarily know how far out on the approach you are. Therefore it is important for you to report your position relative the final approach fix. If, in the heat of the moment you can't remember the "name" of the final fix then just replace the name of the fix with "final fix".



ARRIVAL


When handed off to the CTAF what information should announce?

- **Your three dimensional position - NOT the name of the fix.**
- **Columbia County Traffic, Cardinal, 10 to the south, 3200 descending, inbound RNAV 03, Columbia County**




EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

When handed off to the tower, the tower already knows you are coming, but unless they have a radar repeater in the tower cab they do not necessarily know how far out on the approach you are. Therefore it is important for you to report your position relative the final approach fix. If, in the heat of the moment you can't remember the "name" of the final fix then just replace the name of the fix with "final fix".



SUMMARY

- **Aviate - Navigate - Communicate**
- **Use standard phraseology**
- **Listening is as important as talking**
- **Situational awareness of frequencies**



EAA AirVenture Oshkosh 2016: Pilot Proficiency Center Tech Talks

This sums it all up...