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Just the Facts

Filtering out fluff in radio communication

By Ian Blair Fries

"If you listen, you can hear a lot."
(With apologies to Yogi Berra.) Why is it that older, experienced pilots can decipher radio communications better when hearing typically diminishes with age? Why do student pilots barely understand what controllers are saying, although they hear every word?

There is a difference between *hearing* the words, and *listening* for the words. Experienced pilots know what they are likely to hear with every communication, and do not have to hear every word in order to know what was said. Our hearing may not improve over time, but our understanding does. During an aviation medical examination, pilots are tested for *discrimination*--the ability not just to hear a sound, but to identify what word was heard. But there is more to hearing than repeating a word that was heard; a pilot must understand what the word means.

Few flight instructors teach how to listen; most expect that students will learn that over time by listening to communications. However, listening can be taught.

The first fact to learn is that radio communications are highly patterned. Most words are redundant or fillers, and only few words in each communication are truly critical. You only need to hear about half of what is transmitted to fully understand. Missing words that are critical should also be recognized.

For the purposes of this article, critical transmitted words are in **bold,** non-critical communications are in *italics,* and variables are in brackets [frequency].

The word **cleared** is critical. When used by air traffic control, a pilot must respond distinctly, confirming receipt of the instruction, and indicate that the instruction will be followed. In rare cases when a directive cannot be accepted, the pilot must so advise the controller. The critical word that a pilot should use when declining a clearance is **unable.**

When your aircraft is on the ground at an airport with an operating control tower, controllers will use **cleared** in two situations. In your initial conversation with ground control or clearance delivery, the word **cleared** is notification that what follows will be the route and altitude your flight must follow after takeoff. It may be as simple as "**Cleared** north at or below 1,500 feet," or may be a complex set of instructions. Though issued while still on the ground, these instructions apply to actions *after* takeoff. Ground movement instructions are never coupled with the word **cleared.** You will be told to "Taxi to Runway 5," or "Taxi into position and hold," without using the word **cleared.**

Cleared in tower communications is only used as an instruction to take off or land, "November Six-Tree-Niner-One **cleared** for takeoff Runway 5." Do not take off or land unless you hear the word **cleared** preceding the tower's instruction. When you hear the word **cleared,** you must respond in detail, "Cirrus Tree-Seven-Seven-One-Golf, **cleared** to land Runway 23." The controller will insist on a full response or expect a specific declination of the command. "November Six-Tree-Niner-One, unable. We have an unlatched door. Request taxi off Runway 5."

You'll quickly learn that controllers do not have a strange accent. They purposely say *tree, FOW-er, fife,* and *NIN-er*--and not three, four, five, and nine--for better discrimination (see "Talk Radio," July 2007 *AOPA Flight Training*).

Some numbers are important, but many words are not critical. Let's look at the altimeter setting. Listening to ATC or recorded weather information--such as the Automatic Terminal Information Service (ATIS) broadcast--a typical snippet is "altimeter two niner tree fife." However, only two of those five words are likely critical. Altimeter settings rarely begin with digits other than 28, 29, or 30. When you hear "two niner" or "tree zero" followed by two more digits, it is likely an altimeter setting, so the word "altimeter" is often superfluous.

If you have been obtaining altimeter settings routinely, as you should while in flight, you know the approximate setting. Barometric pressure varies relatively slowly and a change of more than a tenth per hour is unusual. So you likely know the first two numbers, and the third number is seldom more than plus or minus one or two tenths from the previous setting.

So considering all available clues, often only the last one or two words (or numbers) are significant. Other words may help, but are often superfluous: "*altimeter two niner* **niner fife.**" However, if the altimeter setting has changed drastically even with your frequent updates, it is time to check with a controller for an error--yours or theirs. If the barometric pressure has truly changed by a large amount, check the weather situation carefully. There are likely accompanying changes in wind, clouds, turbulence, and precipitation.

ATC occasionally omits superfluous words. As you clear the runway, the tower may advise you to "Contact ground on **point seven.**" It is understood the full frequency is 121.7 MHz, as most ground controls are in the 121 range, are incidentally all odd, and usually end with .1, .7, or .9. Note that only the words **point seven** are critical. When you have landed and are still on the runway, **point seven** can only mean one thing--contact ground on frequency 121.7.

Consistent sequences are excellent clues to understanding, and recorded weather is perhaps the most patterned radio transmission. This may be the ATIS at an airport with a tower, or automated weather broadcast (ASOS or AWOS) at an unattended airport.

The ATIS sequence is invariably:

- Airport name
- Information letter for ATIS
- Time in Coordinated Universal Time, or Zulu
- Cloud cover
- Visibility

- Temperature
- Dew point
- Wind
- Altimeter
- Remarks and other information
- Information letter for ATIS

A complete broadcast reads something like this: "Appleton Airport information Golf. 2356 weather. Ceiling 1,800 feet, visibility 7 miles in light rain. Temperature 27, dew point 22. Wind 220 at 9, gusts 14. Landing and departing Runway 21. Advise you have information Golf."

As the sequence is repeated over and over, it does not matter when you begin to listen, and more than half the words are superfluous. The sequence differs slightly for ASOS and AWOS broadcasts but they, too, continuously repeat.

The identification letter of the ATIS is vital, and is transmitted at the beginning and end of each sequence. You tell the controller by the phrase "with Golf" you have received all the recorded weather information. Simply saying "with the ATIS" is insufficient, as the controller will have to repeat the entire weather sequence you should have received and confirmed with two words. The letter tells the controller you have the current ATIS information; when it's updated, the letter will change, probably to Hotel. However, in large metropolitan areas with several airports, certain ATIS letters may be assigned to specific airports, and the letter identifier is a check that you and the controller agree which airport you expect to use.

You should memorize the standard aviation phonetic alphabet: AL fa, BRA vo, CHAR lee, DEL ta, ECK oh, FOX trot, etc. Avoid your own acronyms. If your tail number is N347MM, it is poor etiquette to say "Mickey Mouse" and not "Mike Mike."

The time of observation is in Zulu (coordinated universal time or UTC). Weather information is seldom more than an hour old, and most observations are taken shortly before the hour. So, if the current time is, say, 1734, the time of the current weather observation is likely 16**5**[X]. Any other time stamp is an important clue that weather changed significantly and required a special weather report between hourly updates. The exact minute (the last digit) the observation was taken is unnecessary accuracy, and can be disregarded. What is important is the age of the observation. So, only the third digit is critical. If it is not 5, then the weather has changed, likely for the worse.

The word **ceiling** is important, and if low enough will limit both VFR and IFR operations. If the word **ceiling** is not included, visual flight conditions are likely.

Temperature and dew point are each expressed in degrees Celsius by two digits, in that order. Temperature is always equal to or greater than dew point, and the spread is most important. A one- or two-degree difference suggests visibility problems, and a spread larger than five is probably not very significant. Wind direction is expressed as a three-digit number followed by "at," a two-digit speed, and then if necessary "gusts." Wind direction is the only three-digit number in the whole weather sequence. All other weather parameters are expressed in two or four digits. Remember that all broadcast wind directions via ATIS and automated recordings are in degrees magnetic, but winds in print or obtained from a flight service station are degrees true.

Transmissions from air traffic controllers also follow patterns. This is why it is helpful to listen to several transmissions to other pilots before communicating. Start listening to the control tower well before it is necessary, while you are still some distance away. You'll quickly learn how traffic is being routed – for example, a left or right pattern. The controller may repeat the landing runway, altimeter, and wind to each pilot, and you'll know exactly what to expect. You'll still need to pay attention, of course, because things can change.

If you are flying under instrument flight rules, a second radio can be used to listen to the frequency ahead. You can usually determine your next frequency by listening to those being assigned to other pilots flying in the same direction. IFR clearances are also strictly patterned, with many superfluous words.

Both VFR and IFR departure clearances typically include the phrase "contact [facility][frequency]." The frequency can be found in the *Airport/Facilities Directory* and should not be unexpected. Then, the word "squawk" is followed by a four-digit transponder code. Transponder codes do not contain eights or nines, only the digits zero through seven.

Sometimes an ATC transmission is just not understandable. A simple request, "Please repeat [frequency, altitude, etc.]" efficiently tells the controller to retransmit the specific information you missed.

Occasionally reception is erratic, and various words seem to be dropped or garbled. The request "words twice," as suggested in the *Aeronautical Information Manual,* may solve communications problems. The same words are not likely to be dropped from each repeated phrase, and you can piece together the information.

Good equipment significantly improves hearing and understanding. Overhead cockpit speakers should be considered emergency backup, as they seldom offer clear audio. Consider a headset a necessity; one with noise canceling is even better for clear communications in noisy cockpits.

For the cost of an hour or two of aircraft rental you can purchase an aviation radio receiver. Sitting at the airport waiting for your instructor you can listen to the common traffic advisory frequency, ground, tower, approach--any and all that are in use. Later, in the airplane, communications will be much easier to understand, as you already heard similar conversations.

Good pilots know what they are going to hear, and only have to "fill in the blanks" and listen for the unexpected. The more you think about what you will be hearing, the more you will hear and understand. As with any endeavor, flight communications improve with practice, and this does not have to be in a plane with the engine and Hobbs meter running. Role playing with your instructor on the ground will improve your communications when in the air.

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