COMMUNICATIONS: A Matter of Survival

■■ Communication is the fundamental tool used by man to build an advancing society. Without it, there would not be antibiotics, footsteps on the moon, or supersonic flight.

It seems incongruous, therefore, that one of aviation's most pressing problems is the often unacceptable quality of this vital necessity. For despite the marvels of sophisticated ARTS III computer technology, the weakest link in the ATC chain is the interface between pilot and controller. Because they often communicate with confusing terminology and utilize variously misinterpreted procedures, this link can stretch to intolerable limits. Occasionally, it snaps.

The result is the type of accident that occurred on Dec. 1, 1974, when TWA's Flight 514 was "cleared for an approach" to Runway 12 at Dulles International Airport near Washington, D.C. The captain interpreted this to mean that it was safe to descend to the lowest altitude published prior to the final approach fix; the controller thought otherwise and a communications gap occurred. The resultant tragedy clearly demonstrated (according to NTSB) that a major cause of the accident was a lack of understanding between pilot and controller.

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Confusion between pilot and controller can be a killer— here are some do's and don'ts for both

Although it may be self-serving to condemn the captain for having descended prematurely, it is worth noting that the approach clearance has been misunderstood by the aviation community for years.

In 1967, the Air Force requested clarification of "cleared for the approach" as it pertains to terrain avoidance responsibility. In 1970, at least one major airline repeated the need for definition. A satisfactory answer was not provided.

FAA did respond, however, to the loss of 92 lives. A few months after the TWA accident, FAR Part 91 was revised to state, in essence, that when a pilot is cleared for an approach, he shall maintain the last assigned altitude until established on a published route at which time he may descend to the applicable published altitude.

Admittedly, no one has the foresight to devise procedures that anticipate all potential problems. Even if this were possible, the resultant body of law would be impractically voluminous. But when pilots wave a red flag and admit confusion regarding a specific procedure, someone in the bureaucratic hierarchy should have the common sense to pay attention. Similar misunderstandings between pilots and controllers cannot be tolerated.

One reason for the confusion is that controllers have a lexicon and a procedures manual that is not readily available to most pilots. Occasionally this creates an impossible situation and is like playing football with one rule book while the opposing team uses another. Pilots, however, have more than touchdowns at stake.

Even a supreme authority, the NTSB, contributes to confusion by misinterpreting certain terms. Two members of the board, for example, stated officially that the TWA accident would not have occurred, "if the pilot had maintained the minimum sector altitude (MSA) as depicted on the approach plate." This is true but erroneously implies that when

a pilot is on a radar vector and is cleared for an approach, he should not descend below the MSA. Figure 1 helps to demonstrate why this is completely absurd.

The diagram is a simplified view of an ILS approach to Runway 25 at Ontario, Calif. The aircraft is on a vector to the localizer at 3,000 feet. Prior to intercept, the pilot is cleared for the approach at which time he determines that the MSA for the northeasterly quadrant is 11,900 feet because of mountains north of his position. According to NTSB's implication, a pilot should not be below the MSA. Is he expected, therefore, to climb to 11,900 feet? Obviously not.

The MSA is an emergency altitude to be considered only when a pilot is unable to determine an applicable safe altitude due to radar or communications difficulties.

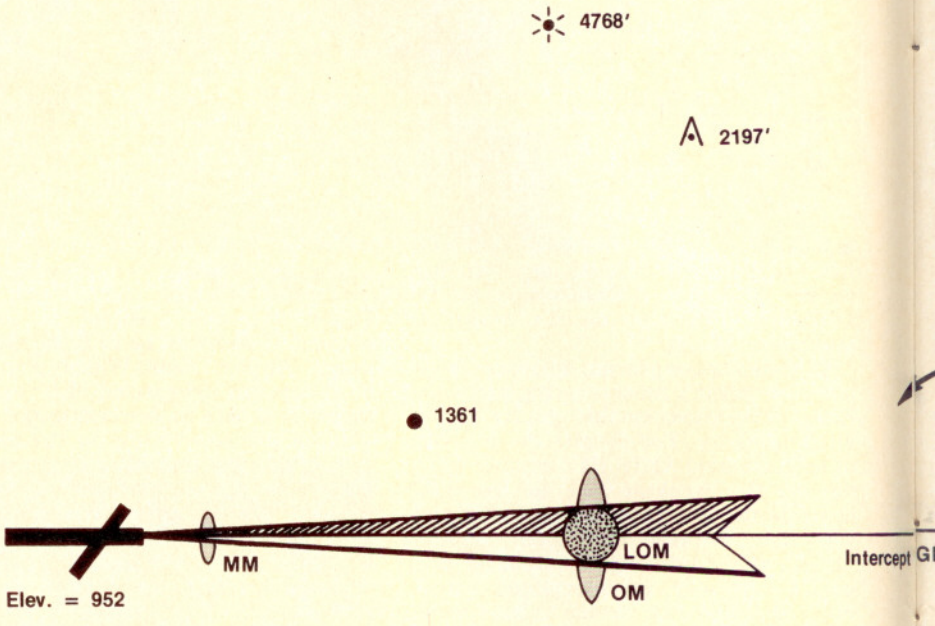
There are a host of other terms subject to misinterpretation. Take, for example, something as simple as a VFR, straight-out departure. Recently, a pilot requested and was cleared for a "straight-out." After tracking the extended runway centerline until well outside the traffic pattern (3 miles), the pilot turned right to proceed enroute. Shortly after turning, however, he had a near-miss with a helicopter.

A violation was filed against the pilot because he failed to make a straight-out departure from the airport traffic area, which has a five-mile radius. The pilot ultimately got off the hook because the FAA did not have an official definition for a straight-out departure.

There are a number of terms taken for granted that have no official status in modern, ATC jargon.

Parenthetically, the TWA accident probably would not have occurred were it not for something else that most pilots take for granted—the radar vector. Had the captain been allowed to navigate by following published routes, he never would have been in doubt as to the minimum enroute altitude for any portion of his flight. MEAs are printed plainly for all to see.

Figure 1



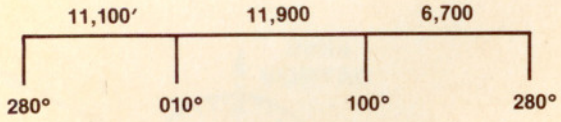
Radar vectors are usually accepted graciously by most pilots because these presumably simplify navigation and allow additional time to prepare for an impending IFR approach. But some pilots are beginning to regard radar vectors with mixed emotions. By accepting a vector, navigation and terrain clearance responsibility shifts from the cockpit to the controller. For a variety of reasons, this can result in disaster—aircraft have been vectored into mountains.

Once an aircraft is removed from a published route by a controller, it is often difficult for the pilot to determine applicable minimum safe altitudes, especially when over mountainous terrain. For this reason, some pilots attempt to refuse radar vectors. Depending on traffic volume, such a request is frequently honored. At other times, the confines of a holding pattern may be the undesirable alternative, but at least this affords a pilot the peace of mind of knowing precisely where he is at all times.

It can be discomforting to be vectored toward rising real estate. So rather than worry about being forgotten by the controller (it happens), don't hesitate to ask how long you can expect to be on the vector. In this way, a pilot has a form of "clearance limit" at which point he can ask for a new heading or, in case of a frequency jam and an urgent need, he can turn toward lower terrain (with or without permission).

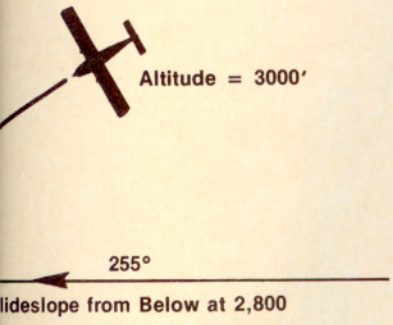
Relinquishing navigational responsibility to a controller is one thing, but allowing him to crawl into the cockpit and fly the airplane is quite another. At airports surrounded by noise-sensitive neighbors, for example, it is not unusual to hear a tower controller advising a pilot to use the "maximum rate-of-climb for noise abatement purposes." Such a "clearance" is irritating because a traffic controller does not have the right to dictate flight technique especially when using the wrong terminology, as in this case.

The controller would like the aircraft to be as high as possible above neighboring homes during the climb. But as every pilot knows, it is the best angle-of-climb that produces this result, not the best rate-of-climb. Instructing a pilot, especially a student, to climb at the maximum angle can result in tragedy. The salient point is that the pilot-in-command knows best how to fly his aircraft at any given time; he should not relinquish command authority to someone on the ground who is un-



Minimum Sector Altitudes (MSA)

These are valid only within 25 nm of the primary approach facility which, in this case, is the LOM.



familiar with both the experience level of the pilot and the operating parameters of the aircraft.

Conflicts also arise because IFR charts are sometimes misleading. An air carrier, for example, was recently cleared for a Judds One Arrival to Bradley International Airport at Windsor Locks, Conn. The captain used the STAR chart and navigated toward the Bristol Intersection (an initial approach fix on the localizer for Runway 6). Prior to reaching the IAF, ATC cleared the aircraft to "hold at Bristol."

Upon reaching the fix, the pilot entered a standard, right-hand pattern. But after the plane completed the first 180-degree turn, the controller transmitted an emergency clearance and admonished the captain for holding on the wrong side of the localizer. The puzzled crew double-checked the STAR and approach charts; there was no published pattern to indicate the use of a nonstandard, left-hand pattern. After the dust had settled, the controller advised that the enroute chart displayed a left-hand pattern. The pilots, however, were using a STAR chart (as they should) that did not (and still doesn't) contain this vital information.

Other incidents occur simply because certain dangerous assumptions are made when flying IFR. Take, for example, the case of a pilot who is instructed to "turn right heading 270° and intercept the localizer." After maintaining this heading for a few minutes, the pilot realizes that the aircraft will not intercept the localizer on the assigned heading because of a strong crosswind. Taking matters into his own hands, he turns farther right to make the intercept. This is a no-no because an unannounced turn can foul up in-trail, traffic separation. If a larger intercept angle is required, ask for it.

Another potentially puzzling situation is shown in Figure 2. Prior to departure, the pilot was cleared to the Livingston Airport, "via V26, V27, direct." While enroute and shortly after passing the Alpha VORTAC, the pilot is cleared for a VOR approach to the airport. This presents three possible courses of action. The pilot can turn directly toward the Delta VOR, he can continue along V26 until reaching Bravo (an initial approach fix) and then proceed via the published transition, or he can continue via the last assigned routing (V26 and V27). Of these choices, what is the pilot *expected* to do?

According to a recent survey regarding this problem, 41% of the participating pilots indicated that they would proceed directly toward the Delta VOR, 12% preferred the transition route, and the remaining pilots (47%) chose to fly the airways.

As far as ATC is concerned, a pilot is free in this case to fly either of the published routes. The 41% who chose to fly the direct route would have collided with a mountain not shown in enroute, IFR charts.

Pilots also get into hot water and jeopardize their certificates by requesting a controller to waive a regulation. Recently, for example, a pilot advised the tower of his intent to perform aerobatics in the control zone. The controller simply acknowledged the pilot who interpreted this as tacit approval for what he was about to do. Chalk up one violation against the pilot. *A controller does not have the authority to waive any published regulation.*

There are numerous traps in the ATC system, and even the pros get caught making assumptions that can result in accident statistics. As procedures become more complex and communications become a battle of semantics, it behooves a pilot to question anything about which he is in doubt. For many, this is a difficult pill to swallow. It is a form of ignorance they are reluctant to admit. But unless a pilot thoroughly understands what is expected of him at all times, picking up the mike and requesting clarification can be one of the most important survival techniques he'll ever use.

Pilots and controllers both are guilty of adding to confusion by using improper terminology. Air carriers, for example, have been requesting descents at "pilot's discretion." The purpose of this is to remain high as long as is practical in an effort to save fuel.

As a result, you'll often overhear something like this: "Flight 760, descend to six thousand, pilot's discretion."

The pilot gets cute and responds, "Roger, six thou, Papa Delta."

"Papa Delta," of course, has come to unofficially stand for "pilot's discretion." The controller picks up on this jargon and uses it when controlling someone unfamiliar with the phrase. A Comanche, for example, was cleared to "four thousand, Papa Delta."

Before the confused pilot had a chance to respond, another pilot piped up with, "Center, this is November Four Papa Delta, did you call?" Nonstandard terminology is easily misinterpreted and using it is a dangerous habit.

In response to NTSB's recommendations regarding the TWA accident, FAA assigned a task force to develop a "Pilot–Controller Glossary" in an effort to prevent misunderstandings caused by unfamiliar phraseology.

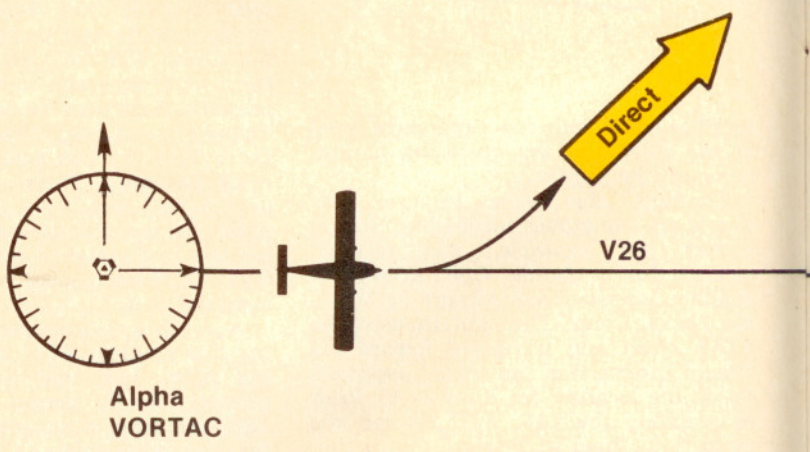
After reviewing a proposed draft of the glossary, I must admit that this is a significant step in the right direction, but am disappointed that the presentation isn't more down-to-earth—"legalese" is used profusely. Nevertheless when it is published in the AIM, the

glossary should be mandatory study for all pilots who use a radio. In addition to clarifying previously undefined terms, some new ones have been added such as "closed traffic" which means "successive takeoffs and landings without leaving the traffic pattern." Pilots will also learn that when flying a direct route (other than an airway) between two fixes, these automatically become compulsory reporting points. We're also told about special *IFR*, torching, fast filing, MVAs and what is expected of pilots as a result of various requests and clearances. Publication of the new AIM Part I is scheduled for next month.

Pilots, especially the inexperienced, often are in awe of the faceless voice that booms from the speaker. They respond to controllers' instructions as if they were commandments chiseled in stone by lightning from atop Mount Sinai. But controllers, it must be remembered, are mere mortals and, like pilots, are capable of error. When in doubt, don't hesitate to ask for clarification about a confusing clearance or phrase. Question anything illogical.

Sometimes an instruction from ATC must be placed in proper perspective. Take, for example, the case of a pilot about to execute a VOR approach. He is told by approach control to contact the tower "at the VOR." Passing the final approach fix (the VOR, in this case) is usually the busiest phase of a nonprecision approach, and the least important duty is to contact the tower. Communications should be delayed, therefore, until four of the "five Ts" have been satisfied: (1.) Time (start stopwatch); (2.) Turn (toward the final approach course); (3.) Tuck (begin descent); (4.) Tune (the proper radial); and, after these duties have been accomplished; (5.) Talk (to the tower). Numerous approaches have resulted in misses (and worse) simply because pilots were so unnecessarily anxious to report to the tower that they failed to properly exercise prudent IFR technique. Fly first; talk later.

Figure 2

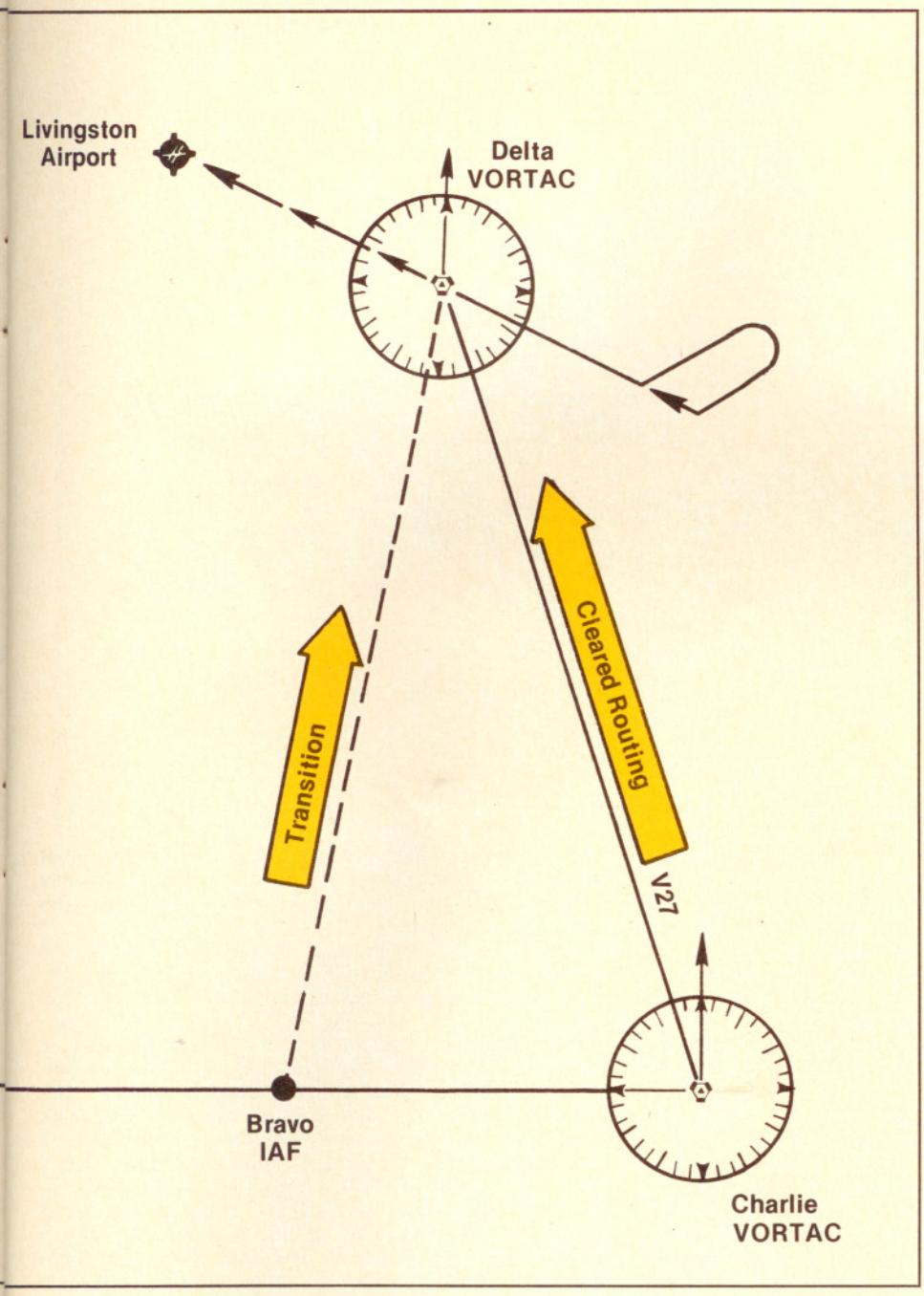


Unintentionally and occasionally, controllers make requests or ask questions during critical phases of an approach or landing. If confronted by such a distraction, ignore the controller until you feel it is safe to take the time to respond.

Pilots readily complain about being mishandled by controllers, but there are equally valid complaints on the other side of this coin.

Controllers have one particular pet peeve that pilots frequently commit, and it is something that can lead to disaster. The scenario goes like this. The controller issues a clearance to a pilot, but pauses slightly before completing the transmission. Quick to respond, the pilot begins to transmit a reply without realizing that the controller has simultaneously begun to broadcast the remainder of the clearance. The controller releases his mike button in time to hear what he assumes to be an acknowledgement of the entire clearance when, in fact, a key element of the clearance was never received by the pilot.

Other incidents are caused by: (1.) transmissions containing sound-a-like



words and aircraft identifications; (2.) transposing numbers in transponder codes; (3.) incorrectly copying a clearance containing a long string of numbers; (4.) wrong aircraft acknowledging a clearance when this goes undetected by a busy controller; (5.) a controller who forgets about an aircraft he has told to "standby"; and (6.) incorrect clearance readbacks not caught by controllers.

FAA is attempting to resolve these and other communications difficulties by improving controller training programs. But the pilot's help is needed. The ATC system cannot work without mutual respect and cooperation. When in doubt about something, ask for a repeat or a clarification. Be alert for partially blocked transmissions. Don't hesitate to speak up when you overhear someone else make a mistake (such as when the wrong aircraft responds or when a controller fails to recognize that a clearance has been read back incorrectly).

Among other items, do not be overly cooperative by accepting dangerously fast approach speeds. Alert the controller when it appears that a radar vector for an ILS approach will not provide a satisfactory intercept or when a lower altitude is needed to establish glideslope intercept prior to the outer marker.

Pilots can also assist the ATC system by exercising tolerance and constraint. It is not unusual for a pilot to misinterpret the harried, frenetic voice of a controller and take personal afront to what appears to be a curt, overbearing attitude. Generally, when a controller sounds rude it is because he is temporarily overloaded with traffic. Pilots can help by being more considerate of a controller's problems.

Unfortunately, a few controllers do overstep their authority and are unnecessarily demanding and dictatorial. Although it is human nature to use the VHF frequencies as the medium for a rebuttal, this can only lead to distractions, misdirected traffic and a generally hazardous environment. Pilots have a far more powerful weapon to use against errant controllers—the pen. Simply state your complaint and submit it along with the time of occurrence to the branch chief of either ATC Evaluations or Operations at the respective FAA regional headquarters. When your letter (or phone call) is received, the tape of the conversation (which is kept for only 15 days) will be consulted, and the misbehaving controller will be put on the carpet.

Should a controller, however, require something that a pilot considers unsafe and more immediate action is required, he can respond simply with "negative" or "unable." *A pilot is not obligated to abide by a clearance until it has been accepted.*

The purpose of this critique is not to induce confrontations between pilots and controllers. Enough of such misguided thinking has been published elsewhere. Our purpose here is to simply point out some major problem areas and emphasize that the ATC system consists fundamentally of human beings, all of whom are fallible. The common goal of safety requires alertness, honesty, and a clear, understandable channel of communications between everyone involved. □