U.S. Department
of Transportation

Federal Aviation
Administration

Air Traffic Bulletin

Issue # 2006-1
February 2006

A Communication from the
Vice President, System Operations Services

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Aerial Survey Flights – What Are They And What Do They Need From Air Traffic?

/TERF/What is an aerial survey flight? First, what it is *not* is a light aircraft with hand-held cameras with someone snapping photos out the open window of an aircraft. The flights that we are referring to are not scenic photo, press, or media flights. Instead, they are flights conducted by experienced and highly skilled flightcrews which use small aircraft modified to hold highly sophisticated survey cameras and sensing equipment which acquire imagery, data, and spatial information. The flightcrews consist of commercial pilots, a camera operator, and occasionally a Global Positioning System (GPS) technician. The camera equipment onboard is calibrated by the U.S. Geological Survey, bolted to the floor of a specially modified aircraft, and costs anywhere from $250,000 to $600,000. Precise navigation systems are interfaced with the camera.

The Management Association for Private Photogrammetric Surveyors (MAPPS) is located in Reston, Virginia, and is comprised of firms in the surveying, spatial data, and geographic information systems fields. MAPPS member firms are engaged in surveying, photogrammetry, satellite and airborne remote sensing, aerial photography, hydrographic, aerial and satellite image processing, GPS and Geographic Information Systems (GIS) data collection and conversion services. Nationwide, there are approximately 150 aircraft used for aerial survey flights by MAPPS member firms. The aircraft are high-performance piston singles, light twins, and a limited number of small turboprops as well as an occasional helicopter. These flights operate under part 91 of the Federal Aviation Regulations and most projects require ideal visual flight rules (VFR) weather conditions.

Who are the clients? Federal, State, and local Governments, as well as industrial and private companies, hire aerial surveyors. Aerial surveying for mapping and spatial data capture is the critical first step in any major project such as airports, highways, forestry, and land development. Critical flights are essential in response to natural disasters, emergencies, and acts of terrorism. The private aerial survey firm is capable of capturing a bird's-eye view immediately, providing critical information to the Federal Emergency Management Agency or the Department of Homeland Security.

Distribution: ZAT-423, ZAT-464

What goes into planning a flight? First, the area of coverage is determined. Flight lines are drawn to ensure adequate coverage with consideration given to required forward overlap and side lap. Flight altitudes are calculated based on terrain elevation and required mapping scale. The project is then digitized for compatibility with onboard camera and GPS equipment. Airspace considerations are noted and coordinated with air traffic control (ATC). It is of paramount importance to have access to airspace and maximum cooperation between flightcrews and ATC. A re-flight can be extremely costly or, in some cases, a second opportunity may not even present itself due to specific conditions such as tide conditions or empty parking lots.

What do the flight lines look like? The flight lines can be linear coverage or block coverage. Linear coverage can include various turns and circles which would be difficult to describe over the radio to a controller which is why prior coordination with a faxed copy of the map is crucial and should be available to the controller handling the flight. Block coverage has the aircraft flying lines but not necessarily the next consecutive line because the turn radius of the aircraft is limited and the pilot may skip over a line or two to make the most efficient use of available time. Flight crews are not able to deviate from prescribed flight altitudes due to scale requirements and exposures must be taken over predetermined photo centers.

What do our orders say about this?
(The Note found after Federal Aviation Administration Order (FAAO) 7210.3, Facility Operation and Administration,
paragraph 5-4-6 c 3, will be updated to reflect the change from the Legislative Council for Photogrammetry (LCP) to MAPPS. MAPPS is now the organization that speaks for the photogrammetric flight industry.)

FAAO 7210.3 says the following:

5-4-6. PHOTOGRAMMETRIC FLIGHTS

a. Except for rare instances, photogrammetric missions must be conducted on "clear days," in VFR flight conditions, and usually when the sun angle is high. Accordingly, infrequent instrument flight rules (IFR) flight plan filing can be anticipated.

b. Most missions will involve a series of overlapping photographic exposures, although some missions may involve only a single exposure. In any case, the aircraft must necessarily move precisely along a predetermined course/s at a predetermined altitude. This part of the mission is called the *flight line.*

c. Facility management personnel shall be guided by the following when handling photogrammetric flights.

1. Facilities are expected to make every reasonable effort to accommodate photogrammetric missions, but judgment must be exercised to minimize overall system impact.

2. When contacted by the pilot in advance, the controlling facility is required to secure a complete understanding of the operation to be conducted. In this regard, it must be anticipated that the operation may be delayed due to weather (this possibility should be covered in the preflight planning). Since the flight could be delayed not only for hours but in some cases for days, facility personnel must be adequately briefed to cope with such situations on a spontaneous basis.

3. When the pilot commences a flight line (the actual photographic run), every reasonable effort should be made to permit the flight to continue uninterrupted; i.e., without change in course or altitude. Should it become necessary to break the aircraft off the flight line, it should be vectored or cleared back into position for another run as soon as possible.

NOTE-
The Legislative Council for Photogrammetry (LCP) speaks for the photogrammetric flight industry. The agency has emphasized the following points to the LCP:

a. The pilot is expected to make every effort to contact the appropriate ATC facility prior to the mission to explain flight requirements and to avoid "no notice" air/ground telephone requests whenever possible.

b. That firm "hard and fast" approvals cannot be guaranteed due to the rapid changes which can occur in the ATC operational situation, but every reasonable effort will be made by ATC to accommodate pilot requests.

c. The pilot is expected to say "This is a photo survey mission" when contacting the ATC facility via air/ground communications and subsequently to inform the controller when the flight line is commenced.

Obviously, separation and safety are our first concern, but, now that you know a little more about the aerial survey flights, you should be able to better anticipate the requests and special handling of these type aircraft. If you are having a problem with a particular group or company, contact the MAPPS organization (www.mapps.org) as it is eager to have a close working relationship with the FAA to conduct aerial photography flight efficiently and safely within the National Airspace System (NAS). **(ATO-E)**

To "Taxi To" or not "Taxi To"

/***T**/ The phraseology we use in authorizing an aircraft to taxi on a movement area may play a major role in preventing misunderstandings that lead to runway incursions. Let's review FAAO 7110.65, Paragraphs 3-7-2b and c, Taxi and Ground Movement Operations.

Paragraph 3-7-2b states, "When authorizing an aircraft to taxi to an assigned runway and hold short instructions are not issued, specify the runway preceded by 'taxi to,' and issue taxi instructions if necessary. This authorizes the aircraft to 'cross' all runways/taxiways which the taxi route intersects except the assigned takeoff runway. This does not authorize the aircraft to 'enter' or 'cross' the assigned takeoff runway at any point."

Example-
"Taxi to Runway One Two."
"Taxi to Runway Three Six via Taxiway Echo."

Paragraph 3-7-2c states, "Specify the runway for departure, any necessary taxi instructions, and hold short restrictions when an aircraft will be required to hold short of a runway or other points along the taxi route."

Example-
"Runway Three Six Left, taxi via taxiway Alpha, hold short of taxiway Charlie."
"Runway Three Six Left, taxi via Alpha, hold short of Charlie."

Instructing an aircraft to "taxi to" a runway and issuing hold short instructions may lead to a "conditioned" response by the pilot, hearing "taxi to" as authorization to "cross" any runways or taxiways along the route. This does not relieve the pilot to hold short of runway(s) or taxiway(s) as instructed, but it is a misapplication of the paragraph, and may lead to a surface incident. The use of proper phraseology will prevent misunderstandings by ensuring the pilot follows instructions as you intended.

Analysis of Operational Errors

/***TER**/ Many statements are made in the air traffic management and aviation safety communities about operational errors (OE) and causal factors. This article investigates the validity of a variety of these statements. This article is intended to provide a high level overview of OEs, to provide data to help you better understand some of the factors that appear to contribute to OEs, and to dispel some common myths. The analyses are based on the en route, terminal radar approach control, and airport traffic control tower data currently available, the majority of which spans the timeframe from fiscal years (FY) 1999 through 2003.

DID YOU KNOW?

- OEs occur most frequently just past the traffic peak.
- OEs occur at higher rates (cumulatively) in smaller sectors, though this apparent correlation is driven by the centers with high OE counts.
- Regional jets and business jets are involved in fewer OEs than expected based on their percentage of traffic.
- To date, the User Request Evaluation Tool (URET) does not appear to impact the OE rate (positively or negatively). The number of OEs at the six initial URET sites prior to and post URET deployment were examined.
- OEs appear to occur shortly after position relief. There is a distinct trend showing the highest percent of OEs occur within 20 minutes of taking over a position in all three domains. However, no definitive conclusions can be made, as the data are not available for normalization of time on position.
- Transitioning aircraft are involved in OEs more frequently than aircraft in level flight. Analysis showed over 90 percent of en route OEs involved transitioning aircraft.
- Holding aircraft contribute to less than 8 percent of OEs.
- The following are the most common controller surface errors:
  1) Controller momentarily forgot about an aircraft, vehicle, a previously issued clearance, or a runway closure;
  2) Failure to receive or correct an incorrect readback;
  3) Lack of or incomplete local/ground coordination; and
  4) Misjudge aircraft separation.
- Aircraft holding in position on the runway (taxi into position and hold - TIPH) continue to be a significant component of operational errors.
- The outcome of operational errors involving intersection TIPH has had catastrophic outcomes. All fatal accidents involving TIPH occurred at an intersection. In each case, the intersection was more than 500 feet from the runway threshold. Aircraft holding at an intersection are vulnerable to collisions with aircraft taking off and landing.
- Given that the standard touchdown point for landing is 1000 feet from the runway threshold, aircraft holding in position full-length are less vulnerable to collision with landing aircraft than those holding at an intersection.
- Our data also revealed an alarming number of aircraft departing without a clearance after being instructed to "position and hold." Over 72 of these type runway incursions have occurred since the beginning of FY 2001. We realize that this situation is not an OE, but a pilot deviation; however, it could lead to a readback/hearback OE. Recently, such an event occurred at the McCarran International Airport (LAS) involving two aircraft in position on intersecting runways. The facility manager took positive action by implementing procedures to prevent simultaneous TIPH clearances on intersecting runways.

The FAA is currently undertaking a variety of initiatives related to OE reduction. New procedures and technologies are being introduced into the NAS, traffic is increasing, and the fleet mix is changing. All of these factors have the potential to influence OEs and causal factors. That is why it is incumbent upon all of us to remain vigilant, situational awareness is the greatest deterrent to operational errors. **(ATO-S)**

Visual Climb Over the Airport (VCOA)

/TREF/ "What the heck is this pilot doing?" are always good words to get a tower full of controllers to rapidly scan the sky. And, if the local controller (or watch supervisor) who just cleared the aircraft for takeoff is asking the question, perhaps all is not well. On the other hand, safety and traffic flow could well be under control. It all depends on if the controllers understand the VCOA clearance.

VCOA is a visual, IFR departure procedure. Similar to other instrument departure procedures, VCOAs are developed and published for individual locations with greater than the standard IFR (200 feet/nautical miles (NM)) climb gradients caused by obstacles more than 3 statute miles (SM) from the departure end of the runway.

The purpose of the VCOA is to provide an IFR departure procedure for aircraft that cannot meet the greater-than-standard climb gradient "specified" by the procedure. Imagine a Cessna 172 at an airfield in mountainous terrain. Having a VCOA allows the aircraft to visually spiral up to a specified altitude to cross a fix/location over the airport. Once the aircraft reaches this fix/location at the specified altitude, it can proceed on course in either visual meteorological conditions or instrument meteorological conditions via specific routing and altitude instructions to the en route structure.

The principle is a simplistic instruction: "See that obstacle? Don't hit it." Terminal instrument procedures (TERPS) specialists "build" the procedure by evaluating the airfield and the outlying areas. TERPS specialists not only determine the minimum altitude required to clear terrain, but also determine the minimum ceiling and visibility required (to "see and avoid the obstacle"). Unlike a graphic standard instrument departure (SID), the published VCOA procedure is in text format and found in the "Take-Off Minimums and (Obstacle) Departure Procedures" section of the appropriate Terminal Procedures volume. Additionally, airfields that have other than standard takeoff minimums or obstacle departure procedures (to include VCOAs) will have the ▼ symbol on the briefing strip section of their approach plates. One example is at Hemet-Ryan Airport, California. (The VCOA portion is in the underlined italics.)

> "TAKE-OFF MINIMUMS: …**Rwy 5** std (standard) with a min climb of 526' per NM to 5200, or *1400-2 ½ for climb in visual conditions*."

Other airports with VCOA procedures include: Luray Caverns Airport, Virginia; Napa County Airport, Charles M. Schulz-Sonoma County Airport, and Fullerton Municipal Airport, California; Meeker Airport, Colorado; and Gastonia Municipal Airport, North Carolina.

Knowing that the local procedure exists is part of the situational awareness; knowing what the aircraft will do is the critical part. While terrain and weather may determine the prudent course of flight, controllers should query aircrews if there are concerns of potential traffic conflict. As VCOA is an IFR procedure, IFR separation is required from inbound (and overflight) traffic. Be aware that an aircraft may fly the obstacle departure procedure (ODP), including a VCOA, WITHOUT a specific ATC clearance. For example, an aircraft "cleared to ABC airport, direct XYZ VOR, as filed, maintain 6000. . . ." may, in fact, need to fly the textual departure route (including a VCOA) for obstruction clearance. Bottom line: If controllers are unsure of the aircraft's departure path, they should confirm it with the pilot.

Thus, the three points of this article are:
1) Controllers should be aware of VCOA procedures if they are published at their location or at an uncontrolled airfield for which they provide IFR service.
2) Controllers should know that an ATC clearance is not required nor is the pilot required to notify controllers if the intent is to execute the ODP of VCOA.
3) Pilots are authorized to execute the ODP . . . unless specific navigational guidance is provided by the controller via vectors or a SID.

FAAO 7110.65, Paragraph 4-3-2c, Departure Procedures, discusses departures for both controlled and uncontrolled airfields and IFR alternate takeoff minimums. The following definition will be published in the February 2006 pilot controller glossary:

> VISUAL CLIMB OVER AIRPORT (VCOA)- A departure option for an IFR aircraft, operating in visual meteorological conditions equal to or greater than the specified visibility and ceiling, to visually conduct climbing turns over the airport to the published "climb-to" altitude from

which to proceed with the instrument portion of the departure. VCOA procedures are developed to avoid obstacles greater than 3 SM from the departure end of the runway as an alternative to complying with climb gradients greater than 200 feet per nautical mile. These procedures are published in the "Take-Off Minimums and (Obstacle) Departure Procedures" section of the Terminal Procedures Publications [See AIM].

Additional information can be found in the Aeronautical Information Manual, chapter 5; the Instrument Procedures Handbook, FAA-H-8261-1, chapter 2; and the guidance for developing VCOA procedures is in FAAO 8260.3B, United States Standards for Terminal Instrument Procedures (TERPS), change 19, volume 4, chapter 4. **(ATO-T)**

In this publication, the option(s) for which a briefing is required are indicated by an asterisk (*) followed by one or more letter designators, i.e., ***T** *= Tower, combined tower/approach control,* ***R** *= TRACON,* ***E** *= ARTCC (En route), or* ***F** *= AFSS/FSS. (Reference 7210.3, para. 2-2-9.)*

This table lists bulletins published since 2001. They can also be found on the Internet at www.faa.gov/atpubs.

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