Low-Level Route Survey of Military Training Routes for Civil Air Patrol Aircrews

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Abstract

This document outlines the process for Civil Air Patrol aircrews to conduct Military Training Route Surveys. Included are sections concerning planning, execution, and debriefing the mission.

The planning section guides the crew through the steps necessary to receive authorization to conduct a survey and coordinating with the USAF.

The execution section provides specific steps a crew would take to apply the information developed in the planning section. Suggestions are incorporated into this section to assist a crew in avoiding errors that were experienced in flight tests of this procedure.

Debriefing the mission outlines the reporting phase of this process. The sequence of providing the crew's findings to the requesting activity is described.

This document is published to assist Civil Air Patrol aircrews in conducting Military Training Route Surveys, but can be applied to other types of low-level route surveys as well.

Table of Contents

List of Tables

List of Abbreviations

AC	Advisory Circular
AGL	Above Ground Level
AIM	Airmen's Information Manual
CAP	Civil Air Patrol
DoD	Department of Defense
DSN	Defense Switched Network
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FLIP	Flight Information Publication
ft	Feet
GPS	Global Positioning System
IFR	Instrument Flight Rules
KIAS	Knots Indicated Air Speed
Lat	Latitude
Long	Longitude
MSL	Mean Sea Level
MTR	Military Training Route
NM	Nautical Miles
NOTAMS	Notice to Airmen
USAF	United States Air Force
VFR	Visual Flight Rules
VHF	Very High Frequency

1.0 – Introduction

1.1 – Purpose

The purpose of this report is to provide a source document that provides a basis for the development of training in CAP to conduct low level route surveys for Military Training Routes.

1.2 – Military Route Description

National security depends largely on the deterrent effect of our airborne military forces. To be proficient, the military services must train in a wide range of airborne tactics. One phase of this training involves "low level" combat tactics. The required maneuvers and high speeds are such that they may occasionally make the avoid aspect of flight more difficult without increased vigilance in areas containing such operations. In an effort to ensure the greatest practical level of safety for all flight operations, the Military Training Route was conceived.

According to the FAA AIM the MTR program is a joint venture by the FAA and the Department of Defense (DoD). MTRs are mutually developed for use by the military for the purpose of conducting low-altitude, high-speed training. The routes are to be flown, to the maximum extent possible, under IFR. The routes at 1,500 feet AGL and below are generally flown under VFR.

Generally, MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots. However, route segments may be defined at higher altitudes for purposes of route continuity. For example, route segments may be defined for descent, climb out, and mountainous terrain. There are IFR and VFR routes as follows:

- IFR Military Training Routes- (IR): Operations on these routes are conducted in accordance with IFR regardless of weather conditions.
- VFR Military Training Routes- (VR or SR): Operations on these routes are conducted in accordance with VFR except flight visibility shall be 5 miles or more, and flights shall not be conducted below a ceiling of less than 3,000 feet AGL. SR routes are for slower airspeeds.

Also according to the FAA AIM, four number characters (e.g., IR1206, VR1207, etc) shall identify MTRs with no segment above 1,500 feet AGL. MTRs that include one or more segments above 1,500 AGL shall be identified by three number characters (e.g. IR206, VR207, etc.)

Alternate IR/VR routes or using the basic principal route designation followed by a letter suffix (e.g. IR008A, VR1257B, etc) identifies route segments

MTRs are identified by thin gray lines on sectional charts, brown lines on en-route low altitude charts, and pink on VFR wall planning charts.

Another element of the MTR structure is the small arrow adjacent to the route number. This indicates the direction of the flight along the route. In other words, a given numbered route is always one-way. There might, however, be traffic in the opposite direction along the same route line. If so that reciprocal route would be designated by a different MTR number.

All of the above and additional information on airspace areas can be located in Chapter 3 Section 5 of the Aeronautical Information Manual.

For the operating times of an MTR, ask during your preflight briefing or contact a flight service station.

2.0 – Planning

2.1 – Planning Resources

The resources needed to plan a low-level route survey of a MTR are

- current FAA Sectional Aeronautical Chart
- current Department of Defense Flight Information Publication AP/1B (AP/1B)
- telephone
- access to the internet

AP/1B may be accessed at any military installation that has flight operations by visiting Base Ops. A military member may also be able to obtain an electronic copy of AP/1B which can be emailed to the necessary personnel.

It would be helpful, but not required, if the crew had a copy of the current FalconView charts used by the USAF, and if a USAF Navigator was able to ride with the crew on the survey. Having the FalconView charts or having a USAF Navigator on board would provide more detail to the route and obstacles than a normal FAA Sectional Aeronautical Chart. FalconView charts are updated monthly, and may include information that hasn't been updated in the current FAA Sectional Aeronautical Chart.

2.2 – Planning Process

The first step is to determine which MTR is to be surveyed. This information comes from the tasking authority. Each Originating Activity is responsible for the conduct of low-level route surveys for the MTRs under their control. The Originating Activity for each MTR is listed in AP/1B. If the tasking is from a higher authority in CAP, the MTR to be surveyed will be provided in their briefing.

The second step is to plot the borders of the route on a current FAA Sectional Aeronautical Chart. The route description can be found in AP/1B. Ensure all information about the route is briefed, and that each segment is of the MTR is identified and accessible to the crew during the survey. It should be noted that each segment of the MTR may have different dimensions from the centerline. An example is that from A to B the MTR may be 4NM to the left of centerline and 2NM to the right of the centerline, and from B to C the MTR may be 2NM to each side of the centerline.

The third step is to plot a detailed flight plan that includes at a minimum

- take-off time in Zulu
- the letter designator of the point of entry to the MTR (see AP/1B)
- the letter designator of the point of exit from the MTR (see AP/1B)
- time of arrival at the point of entry in Zulu
- time of arrival at the point of exit in Zulu

The flight plan should include loiter time to properly identify all recorded obstacles and properly mark all unrecorded obstacles. These procedures will be further explained in section 3.0 – Execution of this document. The flight plan may include flying the route multiple times at different offsets from the MTR centerline depending on the MTR boundaries. See Table 2.1 – Survey Planning Parameters below for guidance.

TABLE 2.1 – SURVEY PLANNING PARAMETERS

	Optimal Speed (KIAS)	**Optimal AGL (ft)**	**Optimal Coverage**
Day VFR	<125	1000	0.5NM to either side
Night VFR	<125	2000	1NM to either side
	Maximum Effective Speed (KIAS)	**Maximum Effective AGL (ft)**	**Maximum Effective Coverage**
Day VFR	150	2000	1NM to either side
Night VFR	150	3000	2NM to either side
	Emergency Altitude (ft)		
Day VFR	2000 AGL or as required		
Night VFR	2000 AGL or as required		

*the data on this table was developed as a result of flight testing

The final step is to schedule the MTR with the Scheduling Activity. The Scheduling Activity and a DSN phone number can be found in AP/1B. If there is no access to a DSN phone, contact the Scheduling Activity on a commercial line. Many of the Scheduling Activities are units at Air Force Bases that can be contacted by calling the Base Operator, Security Forces, or Operations. Commercial numbers for the base are usually located on the base website. MTRs must be scheduled at least 2 hours prior to arrival at the planned entry point. Many Air National Guard and Air Force Reserve units may not be staffed full

time. Once connected with the Scheduling Activity inform them

- that you are performing a low-level route survey of the listed MTR (example: VR-615)
- that you would like to schedule the MTR for the times you calculated in your flight plan (example: enter A at 1800Z, exit F at 2115Z)
- your point of entry to the MTR (example: enter at A)
- your point of exit from the MTR (example: exit at F)

Ask the Scheduling Activity

- if there is any known conflicting traffic along the MTR
- if they have any VHF frequencies that you could monitor
- who you should contact once the survey is complete to report the results

3.0 – Execution

3.1 – Task

Typically, military units that maintain low level military training routes (MTRs) will ask you to fly the route to survey for new obstructions (towers) and/or to verify airfields. When towers are removed, they often are not reported to proper authorities and should also be surveyed. GPS is essential for accurate navigation and reporting of new obstructions. The best accuracy possible should be used when reporting a new tower. Use your best judgment when estimating a tower's height. This is also essential information. The military agency requesting the survey may also ask for photographs (digital or conventional) of certain points along the route. If possible, invite a military member who is familiar with flying the route fly with you as you survey it. The Federal Communications Commission has a data base of tower locations at

http://wireless2.fcc.gov/UlsApp/AsrSearch/asrRegistrationSearch.jsp

3.2 – Identifying Hazards

The success of the survey is dependent on detailed planning and proficiency using the GPS flight plan feature. Each survey should be conducted during VFR conditions. Night surveys present a different challenge since lighted objects are easier to identify but distance is more difficult to estimate. Unlighted obstructions can't be seen. Daylight surveys should be conducted before night surveys so all hazards are verified/recorded, making the night verification easier. Using the Lat/Long of those hazards, the Observer can use the present position function on the GPS to check the location of unlighted hazards. NOTAMS must be checked prior to the sortie so that new unlighted hazards can be identified. Also be sure to plan for proper obstacle clearance at night.

3.3 – Identifying MTR Points

Once the entry point, turn points, and exit point are identified, record their Long/Lat on a planning form. The form should have blocks for recording Route number, entry and exit times, Lat/Long of entry point, turn points, and exit points. It is critical that this information be accurate and complete. Take note of crossing MTRs. They may not be controlled by the same activity that authorized your flight. Crossing traffic may not be aware of activity on your MTR. When approaching a crossing, the crew should be extra vigilant for conflicting traffic.

3.4 – Pre-locating Hazards

A description of each hazard and its distance to the next waypoint will help to identify and confirm hazards that are on the chart. The Lat/Long of hazards can be recorded on the form too, but isn't necessary for daylight flights. Night flights will require the Lat/Long because visual verification is more challenging.

3.5 – Waypoint Entry

Once the crew is aboard the aircraft, the Observer should enter navigation points as User Waypoints (entry, turns, and exit) into the GPS data base. Each of them should be recalled from the data base and the digits verified by another crew member before creating a flight plan. Next, a flight plan is created using those points in the same order you wish to fly them. If they were identified as Entry = A, Turn = B, and exit = C, the letters would be accessed and selected in that order A-B-C. The GX55 and G1000 both allow inverting and offsetting the flight plan, so flying the MTR in the opposite direction simply requires accessing that function. **Perform all GPS entries BEFORE takeoff.**

3.6 – Flying the MTR

The pilot flies to the entry point and proceeds on the flight plan with or without an offset as planned to provide appropriate scanning distance. MTRs have different widths, so scanning distances will vary and might require multiple passes in each direction to attain adequate coverage. Deviations from the course may be necessary to identify a hazard not visible from the plotted course. Some towers are very difficult to see during daylight surveys since they are unpainted and blend into the background terrain. The time of day, sun position, and cloud cover may also be factors in sighting hazards, and should be considered in flight planning. All appropriate charted hazards must be verified. None can be skipped by assuming it must be there.

3.7 – Recording Data

The Scanner should check off charted hazards on the planning form as they are identified. Uncharted hazards should be noted including their Lat/Long, estimated height (if possible), and a description of what the hazard is (tower, building etc). If a charted hazard has a unique feature, such as a tower that is unpainted and difficult to see, make a note next to it on the worksheet. If photos are taken the customer will need to know what the hazard is, its location, and the time the photo was taken. At the completion of the flight the survey results will be reported to the customer as briefed in the planning phase. HAVE A SAFE FLIGHT!

4.0 – Debriefing the Mission

The pre-flight brief and post-flight brief should be performed with the tasking authority. See section 2.2 – Planning Process for more details about the tasking authority. Upon completion of the mission the forms and data are to be forwarded to the DoD point of contact determined in the planning section and debriefed as required by the DoD. The planning section will delineate the customer requirements and the debrief content and data format needed to meet those requirements.

Debrief the crew per the CAP Form 104. The checklist items below will then be completed by the crew and forwarded as appropriate to the tasking authority. The information required by the DoD point of contact, established in the planning section, will then be debriefed using the checklist information:

1. Route Description: (Route ID, State, route width)
2. Route segment surveyed: (Coordinates of entry/exit points)
3. Type of survey route flown (spacing, distance from centerline, etc)
4. Altitude Flown
5. Airspeed
6. Day or Night Flight and Time of Flight
7. Controlling Agency DoD/point of contact
8. New Obstacles Identified:
    a. GPS Coordinates
    b. Estimate of height in MSL
    c. Description of obstacle (antennae, building, water tower, etc.)
9. Photos of obstacles
10. Obstacle lighting
11. Obstacles Removed (charted obstacle that no longer exists)
    a. GPS Coordinates
    b. Description of obstacle (antennae, building, water tower, etc.)

5.0 – References

1. Current DoD FLIP AP/1B
2. Appropriate Sectional chart
3. AIM Chapter 3 Section 5
4. Advisory Circular AC 70/7460-1K, Obstruction Marking and Lighting
5. Antenna Structure Registration Database (FCC): wireless2.fcc.gov/UlsApp/AsrSearch/asrRegistrationSearch.jsp
6. FAA Digital Obstacle File for route: avn.faa.gov/content/naco/catalog/charts/digital/DOF_README.pdf

6.0 – Attributions

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List of Tables	Capt Jason Rew
List of Abbreviations	Capt Jason Rew
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2.0 Planning	Capt Jason Rew
3.0 Execution	Lt Col Jerry Lowry
4.0 Debriefing the Mission	1st Lt Joe Kotowski
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7.0 Appendix A: Planning Form	Capt Jason Rew
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7.0 – Appendix A: Planning Form

(see Low-Level Route Survey Planning Form on next page)

Civil Air Patrol
Low-Level Route Survey Planning Form

Waypoints		Charted and Uncharted Hazards				MTR:	
		Group Number	Number of Hazards	Distance to next waypoint	Lat/Long	Description	Remarks
Letter							
Lat							
Long							
Letter							
Lat							
Long							
Letter							
Lat							
Long							
Letter							
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Crossing MTRs and notes