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Mountain Flying Certification
Recurrent Training and Re-Certification

HEADQUARTERS, OREGON WING
EUGENE, OREGON

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PREFACE

This Oregon Wing pamphlet serves as the approved guidelines for Oregon Wing Pilots, Instructor Pilots, and Check Pilots to use for recertification or recurrent training of the Mountain Flying Certification (MFC) Emergency Services Qualification.

OVERVIEW

The following guidance provides the preferred methods for ORWG Mission Pilots (MP) to complete the recurring MFC qualification. Flight training activities can be accomplished during a scheduled Mountain Flying Clinic, or by individual training accomplished with a qualified CAP Instructor Pilot holding a MFC SET qualification. MFC qualification check flights, either as part of the final check sortie syllabus at a MFC Clinic, or as part of a CAP Form 91 check sortie that will include renewal of a MFC qualification must be flown with a MFC SET qualified CAP Form 70-91 Check Pilot.

PREREQUISITES. Prior to accomplishing a MFC initial qualification or re-qualification event, the pilot must be a current and qualified CAP Mission Pilot.

INITIAL MFC QUALIFICATON. See ORWG pamphlet 60-1.01, *MFC Initial Qualification Training* for information about the initial MFC qualification.

NOTE: The ORWG recommended MFC Flight Syllabus was developed from the original 4- sortie Mountain Fury syllabus but condensed to 3 training sorties and a check ride.

PREFERRED MFC RE-QUALIFICATION.

The MFC qualification must be renewed every 36 months. Mission Pilots who were previously MFC qualified can renew their qualification by accomplishing refresher ground and flight training and a check flight with a MFC SET qualified CAP instructor pilot.

To ensure that the MFC qualification does not expire (at 36 months), ORWG/DOV recommends that MFC re-qualification training sorties be accomplished prior to the mission pilot's annual CAP Form 70- 91 (CAPF 70-91) check flight.

As part of the CAPF 70-91 check ride the mission pilot should present to the CAP Check Pilot a CAP MFC SET endorsed copy of the *MFC Re-qualification Flight #1 – Review/Training Sortie.*

During the CAPF 70-91 check flight the check pilot should use the *MFC Re-qualification Fight #2 – Evaluation Sortie* guidelines to ensure the candidate pilot can safely operate in mountainous terrain.

Completion of a combined MFC re-qualification and full CAPF 70-91 flight check will be recorded by means of both a completed CAP Form 70-91 and the MFC SQTR sign-off in eServices.

OPTIONAL MFC RE-QUALIFICATION.

A qualified MP may elect to segregate MFC certification and the CAPF 70-91 check flight. In this case the MP would complete the training and evaluation sorties with a CAP MFC SET instructor pilot. Upon successful completion of the sorties the CAP MFC SET will simply sign off the MFC SQTR in eServices.

REQUALIFICATION PREREQUISITES

- ☐ Pilot is a current and qualified CAP Mission Pilot.
- ☐ Pilot has completed the CAP Online "Mountain Flying Course and Exam" within the previous 60 calendar days. A copy of the completion certificate should be uploaded to the pilot's eServices / Operations files.

GROUND TRAINING TOPICS

- ☐ Calculate performance data at the expected actual search altitude/location, and at 6,000 ft, 10,000ft and 12,000 ft. MSL, and review effects of pressure and temperature.
- ☐ Determine max search DA (300 FPM minimum).
- ☐ Discuss the 90% max gross weight rule of thumb. (FAA-P-8740-60)
- ☐ Calculate V_a and Best Glide speeds for expected aircraft weight in the search area.
- ☐ Determine Stall Speeds for Flaps up and Flaps 10 for 0-, 45- and 60-degree bank turns.
- ☐ Discuss differences between IAS and TAS at different altitudes and the effects on turn radius and aircraft performance at high altitude airfields.
- ☐ Determine Takeoff, Landing and Climb performance at the local airfield and at a high-density altitude airfield. (If not flying to an actual mountain airfield, simulate one with a DA of 7000 ft.)
- ☐ Discuss techniques for approaching and departing airports at high density altitudes and in mountainous terrain.
- ☐ Discuss wind effects in mountainous terrain including updrafts, downdrafts, mountain waves and wind shear, plus unique weather conditions.
- ☐ Review wind speed limits for mountain searches and related flight maneuvers.
- ☐ Review downdraft detection and escape maneuvers.
- ☐ Review ridge crossing techniques.
- ☐ Review canyon search techniques, risks, emergency turns (Steep Turn vs Wing Over), airspeed vs turn radius, and "point of no return".
- ☐ Review mountain search pattern strategies and contour search method.
- ☐ Review effects of lighting and terrain in relation to ground search effectiveness.
- ☐ Review effects of terrain masking and signal reflections in relation to ELT searches.

MFC REQUALIFICATION FLIGHT # 1- REVIEW/TRAINING SORTIE

Preflight Data Calculations:

AIRCRAFT:

Registration Number: _____ CAP Callsign: _____

Basic Empty Weight: _____ Fuel Weight: _____

MP Weight _____ MO Weight: _____

MS Weight _____ Baggage Area Weight _____

TOTAL GROSS WGT: _____ MAX GROSS WGT: _____

GW / Max GW x 100 = Percent Max GW (goal is 90% GW): _____

Home Airfield/Takeoff/Landing Performance

Field Elevation (MSL): _____

Barometric Pressure: _____ OAT: _____

Density Altitude: _____

Ground Roll: _____ Clear 50 ft obstacle: _____

Total Takeoff Distance (flaps 20): _____

Rate of Climb ($V_{Y:}$) ft/min _____ V_y KIAS _____

Total Landing Distance (flaps 20): _____

Total Landing Distance (flaps 20) clear 50’ obstacle _____

Search Area Data

Search Area (CAP Grid)		Search Altitude (MSL):	
Pressure Altitude (inHg)		Winds	
Expected Aircraft Weight in Search Area (lbs)			
Expected Pressure Altitude (inHg)			
Expected Density Altitude			
Max Rate of Climb (flaps up, max power)		ft/min	
Stall Speed (0^o flaps)		KIAS	
Stall Speed (10^o flaps, 0^o bank)		KIAS	
Stall Speed (10^o flaps, 45^o bank)		KIAS	
Stall Speed (10^o flaps, 60^o bank)		KIAS	
Maneuvering Speed (V_a)		KIAS	
Best Glide Speed (V_g)		KIAS	

Additional data based on Planned Gross Weight @ Search Area:

MSL Altitude	**6,000**	**10,000**	**12,000**
Today's Temperature (C)			
Today's Pressure Alt.			
Today's Density Alt.			
V_y Speeds			
Max ROC from POH (fpm)			

Mountain Airfield/Takeoff/Landing Performance

Field Elevation (MSL) ft.	_____		
Pressure (inHg)	_____		
OAT	_____		
Winds	_____		
Pressure Altitude	_____	Density Altitude	_____
Total Takeoff Distance (ground roll)	_____	To clear 50 ft obstacle	_____
Departure ROC (ft/min)	_____	@ V_y	_____
Total Landing Distance (ground roll)	_____	To clear 50 ft obstacle	_____

In the aircraft, before engine start

Airfield Temp	_____	Winds	_____
Altimeter Setting	_____	Density Altitude	_____

☐ Aircraft Preflight Inspection Checklist – Complete.

Take Off / Departure

☐ Perform lean engine procedure before takeoff as per POH.
☐ Note estimated takeoff point before beginning takeoff roll based on density altitude.
☐ - Record actual takeoff roll distance _____ ft.
☐ On initial climb out after takeoff, note the actual ROC with flaps up using max climb power (Full Throttle). fpm.
☐ Climb to an indicated altitude that corresponds to approximately 6,000 ft. DA.
☐ Approaching this altitude, note the actual ROC performance (Full Throttle). fpm.
☐ Record actual indicated altitude: ft. and density altitude: _____ ft.
☐ Record actual Vy IAS: _____ kts. and actual TAS: _____ kts.

Air Work / Performance Demos:

☐ Climb to an indicated altitude that corresponds to approximately 10,000 ft. DA. (and a minimum off **3,000 ft. altitude above terrain**)
☐ Approaching this altitude, note the actual ROC performance (Full Throttle) _____ fpm
☐ Record actual Indicated altitude: ft. and density altitude:_____ ft.
☐ Disable NXi ESP functions, if desired.
☐ Extend flaps to search setting (10°), maintain 85 KIAS, record actual true airspeed: _____ kts.

☐ Record power settings: MP_____ RPM _____

Stall Speed Performance:

☐ Maintain wings level, reduce power to start slowing to stall speed.
☐ Record stall warning speed _____ KIAS and actual stall speed _____KIAS _____ KTAS
☐ Recover from stall by adding power and leveling wings, set 85 KIAS.
☐ Roll into 45° bank turn, reduce power to start slowing to stall speed.
☐ Record stall warning speed _____ KIAS and actual stall speed _____ KIAS _____ KTAS
☐ Recover from stall by adding power and leveling wings, set 85 KIAS.
☐ Roll into 60° bank turn, reduce power to start slowing to stall speed.
☐ Record stall warning speed _____ KIAS and actual stall speed _____KIAS _____ KTAS
☐ Recover from stall by adding power and leveling wings, set 85 KIAS.

Canyon Turn Performance - 45° bank turn:

☐ Begin with wings level, flaps 10° and 85 KIAS.
☐ (Start Timer) – Reduce power and lower 20° Flaps and slow to 60 KIAS.
☐ Roll into a 45° bank turn, hold constant altitude, set power to hold just above stall warning.
☐ Roll Wings Level after 180° turn.
☐ Record time to make the turn _____sec. _____KIAS _____ KTAS

Canyon Turn Performance - 60° bank turn:

☐ Begin with wings level, flaps 10° and 85 KIAS.
☐ (Start Timer) – Reduce power and lower 20° Flaps and slow to 70 KIAS.
☐ Roll into a 45° bank turn, hold constant altitude, set power to hold just above stall warning.
☐ Roll Wings Level after 180° turn.
☐ Record time to make the turn _____ sec. _____KIAS _____KTASMountain

Mountain Search Maneuvers

NOTE: For all demonstrated maneuvers below, choose safe altitudes and flight parameters in context with the actual winds and terrain. Training will always be done with extra margin for error and lowest possible risk during the maneuvers.

☐ Proceed to a practice search grid located in mountainous terrain.
☐ Discuss developing a strategy for locating search grid boundaries, best techniques for searching the area, emergency escape routes and best landing options.
☐ Perform a short climb to verify actual ROC meets min performance (300 fpm) _____ fpm.
☐ Note actual wind speed and direction and then discuss affect it will have on the search altitudes and techniques used.

☐ Demonstrate a ridge crossing.
☐ Demonstrate a contour search.
☐ Demonstrate a canyon search. Discuss Point of No Return and room for safe room for escape turn maneuvers. Choose very safe canyon area with ample room for turns and escape paths.
☐ Demonstrate a canyon dive ("Drainage Search").
☐ Simulate an escape from a downdraft. (maintain safe altitude and terrain clearance).
☐ Demonstrate one or more inflight emergencies including an emergency descent towards best place to land. (maintain safe altitude and terrain clearance).

High Altitude / Mountain Airfield:

☐ Proceed to an airport that serves as a relatively decent example of mountainous and/or high elevation field operations.

NOTE: Having an actual airfield that is suitable for this training may not always be available. In this case, a combination of verbal training, and simulating an airfield located in a mountainous area is a suitable alternative.

☐ Before arriving, review the calculated landing/takeoff and climb out performance values from the preflight planning, and verify/adjust for actual conditions.

Field Elevation (MSL)			
Pressure		OAT	
Pressure Alt. (inHg)		Density Alt. (ft)	
Total Takeoff Distance (Flaps 20)		Ground roll to clear obstacle	
Departure ROC V_y (ft/min)		Ground roll to clear obstacle	
Total Landing Distance (Flaps 20)		Ground roll to clear obstacle	
Total Landing Distance (Flaps 20)		Ground roll to clear obstacle	

☐ Demonstrate methods of approaching and surveying the terrain and winds, and develop a safe plan for approach and landing, as well as an aborted landing.
☐ If possible, perform a landing and then a takeoff, and note the TAS vs IAS and actual landing and takeoff distances compare to the calculated numbers.
☐ Discuss decision points and action plans for aborted takeoffs and emergencies after takeoff.
☐ Return to Base.

Post flight Debrief:

- ☐ Debrief all maneuvers.
- ☐ Review the importance of vigilant situational awareness at all times when flying in high mountainous terrain, and the need to be comfortable and proficient at calculating and verifying aircraft performance for all stages of the flight.
- ☐ Discuss the importance of always having an emergency plan of action at all times and maintain proficiency in performing associated emergency actions and maneuvers.
- ☐ Discuss and plan for Check Flight.

MFC REQUALIFICATION FLIGHT #2 – EVALUATION SORTIE

Preflight Data Calculations:

AIRCRAFT:

Registration Number: _____ CAP Callsign: _____

Basic Empty Weight: _____ Fuel Weight: _____

MP Weight _____ MO Weight: _____

MS Weight _____ Baggage Area Weight _____

TOTAL GROSS WGT: _____ MAX GROSS WGT: _____

GW / Max GW x 100 = Percent Max GW (goal is 90% GW): _____

Home Airfield/Takeoff/Landing Performance

Field Elevation (MSL): _____

Barometric Pressure: _____ OAT: _____

Density Altitude: _____

Ground Roll: _____ Clear 50 ft obstacle: _____

Total Takeoff Distance (flaps 20): _____

Rate of Climb ($V_{y:}$) ft/min _____ V_y KIAS _____

Total Landing Distance (flaps 20): _____

Total Landing Distance (flaps 20) clear 50' obstacle _____

Additional data based on Planned Gross Weight @ Search Area :

MSL Altitude	**6,000**	**10,000**	**12,000**
Today's Temperature (C)			
Today's Pressure Alt.			
Today's Density Alt.			
V_y Speeds			
Max ROC from POH (fpm)			

Mountain Airfield/Takeoff/Landing Performance;

Field Elevation (MSL) ft.	_____		
Pressure (inHg)	_____		
OAT	_____		
Winds	_____		
Pressure Altitude	_____	Density Altitude	_____
Total Takeoff Distance (ground roll)	_____	To clear 50 ft obstacle	_____
Departure ROC (ft/min)	_____	@ V_y	_____
Total Landing Distance (ground roll)	_____	To clear 50 ft obstacle	_____

☐ Calculate Density Altitude for the departure airfield and for the highest altitude in the planned search area.
☐ Determine Max Rate of Climb Performance at the departure airfield and at the search altitude.
☐ Determine Va and Stall Speeds for Flaps up and Flaps 10 for 0, 45 and 60-degree bank turns at the search altitude.
☐ If a high altitude / mountain terrain airfield is available, calculate Density altitude, and then the Landing, Takeoff, and Climb performance data for the actual conditions. If none are available, do this for a simulated airfield.
☐ Conduct a Mission Brief covering the simulated mission search grids and flight/mission goals and plans.

In-flight

☐ Fly a standard departure and route towards the planned search area.
☐ Disable NXi ESP Functions, if desired.
☐ While enroute, climb to an altitude that results in a Density Altitude of approximately 10,000 ft. (and at least 3,000 ft. MSL)
☐ Perform slow flight and a stall with 10° flaps.
☐ Recover and Set 10° flaps, 85 KIAS.
☐ Demonstrate a 60 Degree Bank simulated canyon escape turn.
☐ Proceed to the actual search area and complete the following;
☐ Identify the boundaries of the designated search grid.
☐ Identify emergency escape routes and landing options.

- ☐ Verify the actual Density Altitudes match the preflight calculations and adjust performance numbers if different.
- ☐ Demonstrate actual ROC performance matches expected values and meets minimum allowed.
- ☐ Verify the actual winds and explain how they will affect the search plans.
- ☐ Discuss the search patterns to be used to effectively search the given grid.
- ☐ Demonstrate a ridge crossing.
- ☐ Demonstrate a contour search.
- ☐ Demonstrate a canyon search.
- ☐ Demonstrate a canyon dive (drainage search).
- ☐ Demonstrate a simulated downdraft escape (maintain safe altitude and terrain clearance).
- ☐ Demonstrate a simulated emergency that involves turning to a planned escape route and flying towards a best landing spot available (maintain safe altitude and terrain clearance).
- ☐ If this flight is also a Form 70-91 check, then add the additional evaluation items required.
- ☐ Proceed to a high altitude / mountain airfield (If none available, simulate one in or near the search area);
- ☐ Verify that the actual pressure altitude and performance data planned match the actual conditions and adjust as necessary.
- ☐ Discuss the terrain and winds and define a safe approach path and safe go-around and departure path.
- ☐ (If Possible) Fly an approach and landing, then taxi back for a takeoff.
- ☐ Demonstrate briefing takeoff distance markers, abort decisions and procedures and normal and emergency departure plans and routes.
- ☐ Return to base and debrief.

CONCLUSIONS

Operating in mountainous terrain poses different and often unseen risk than flying over flatter terrain. Always have a heightened sense of awareness operating in mountainous terrain and watch for clues to changing conditions. Never be concerned about deciding that operations in or near the mountains on any particular day are beyond your or the aircraft's capabilities. While particular skills are part of this course, safe mountain flying is primarily about making good decisions and implementing them.