UNITED STATES MARINE CORPS
MARINE AIRCRAFT GROUP 12
1ST MARINE AIRCRAFT WING, MARFORPAC
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GROUP ORDER 3715.1

From: Commanding Officer
To: Distribution List

Subj: MARINE AIRCRAFT GROUP 12 (MAG-12) OUT OF CONTROL FLIGHT PREVENTION POLICY

Ref: (a) OPNAVINST 3710.7R

Encl: (1) MAG-12 Out of Control Simulator Syllabus

1. Purpose. To publish requirements for Basic Fighter Maneuver (BFM) and Fighter Weapons (FW) flights within MAG-12 in regard to aircraft configuration, refresher training and training rules.

2. Background. 13 Navy and 4 Marine Corps F/A-18s, 3 of which were F/A-18Ds, have been lost over the history of the F/A-18 due to Out of Control Flight (OOCF). Analysis of the mishaps has identified the following as common contributing factors:

a. Flight into known departure prone regions.

(1) High Angle of Attack (AOA)/low airspeed.

(2) Low AOA/low airspeed.

(3) High AOA/high subsonic mach.

b. Lack of experience in the Type/Model/Series (T/M/S) being flown.

c. Incorrect flight control inputs.

d. Improper analysis of situation and execution of procedures.

e. Aircraft configurations that have departure resistance weakened by the presence of a centerline fuel tank only and/or asymmetric loading of the wingtip stations.

3. Given the information provided above, action was initiated to mitigate the dangers associated with flying the F/A-18 into known departure prone flight regions. There appears to be a lack of knowledge and experience associated with OOCF and a lack of familiarity with OOCF characteristics of the F/A-18. Additionally, there seems to be little understanding of the relationship between aircraft configurations, airframe condition/integrity and F/A-18 departure characteristics.

4. In an attempt to decrease the likelihood of entering an OOCF situation the following procedures are directed within all MAG-12 F/A-18 squadrons:

(a) A discussion of flight characteristics relative to departures and OOCF will be incorporated into each BFM/FW brief with emphasis on the model and configuration of the aircraft assigned.

(b) The definition of "High angle of attack (AOA)/slow-speed maneuvering" quoted in reference (a), para 5.1.10.6b, shall be 150 KIAS **OR** 35 degrees AOA.

(c) BFM/FW sorties in the F/A-18D with a single wing tip station store are not authorized. The aircraft must be configured with 2 wingtip missiles loaded or no wingtip missiles loaded.

(d) BFM/FW sorties will not be flown in the F/A-18A/C/D with any air-to-ground ordnance or racks loaded.

(e) BFM/FW sorties shall not be flown in aircraft that have:

(1) Missing or damaged upper or lower wingfold "clamshells".

(2) Significantly degraded or torn leading edge tape.

(3) Significant nicks, gouges, scratches or other damage to the radome or metal radome caps.

(f) All aircrew shall receive annual OOCF training to include, but not limited to:

(1) OOCF video.

(2) Departure/OOCF simulator as prescribed in enclosure

5. This simulator may be combined with other required evaluations (NATOPS evaluation, Instrument Evaluation, or Aircrew Coordination Training simulator) and shall be documented in the individual's NATOPS Jacket.

J. D. DEWITT, JR.

DISTRIBUTION: A

MAG-12 Out of Control Simulator Syllabus

Purpose: To develop aircrew skills in recognizing impending departures and utilizing proper out of control recovery procedures once a departure has occurred.

Overview: The simulator syllabus is designed to teach aircrew to observe the clues provided by aircraft instruments and flying qualities that indicate an impending departure, and to demonstrate proper recovery techniques when the aircraft has departed. **The emphasis is on the proper recognition of indicators to prevent aircraft departures.** A variety of scenarios are provided, designed to demonstrate likely scenarios where pilots may experience departures. Pilots and instructors are encouraged to experiment and try different airspeeds, AOA, and attitude combinations to fully explore the edge of the Hornet operating envelope. Simulator flights should be flown with one pilot acting as an instructor at the console and the other pilot at the aircraft controls.

Learning Objectives:

1. Recognize signs of impending departure and learn how to avoid departing aircraft.

2. Recognize different types of out of control flight and apply proper recovery techniques.

3. Minimize altitude loss during recovery.

Required Reading prior to Simulator: F/A-18 NATOPS Chapter 11 pp. 6-14.

Scenario 1: Asymmetrical stores: Air-to-Ground

Setup:	Initialize trainer with two Mk-84 bombs on outboard pylons.
Pilot Action:	Plan on releasing two bombs in Salvo release using a 45 degree dive with 10,000 foot release at 480 kts true. At release, have one bomb not release (just release 1 since the simulator cannot simulate 1 hung) and recover aircraft with asymmetrical stores. Experiment with different pulls on the stick and examine how aircraft behaves with large asymmetry. Note how aircraft will fall off to one side at high angles of attack. Note altitude loss during recovery.
Explanation:	According to NATOPS, "The F/A-18 with large lateral asymmetry is significantly more departure prone. NATOPS AOA and Mach limitations must be honored to avoid departure."

Scenario 2: Asymmetrical stores: Air-to-Air

Setup:	Setup trainer with one Mk-84 bomb on right outboard station. Aircraft altitude is 10,000 feet.
Pilot Action:	To simulate a defensive perch setup, start aircraft in a 60-degree AOB right turn at 350 knots. Pull the aircraft using a maximum performance turn until airspeed has bled to 175 knots. Simulating an attacker overshoot, attempt to reverse the aircraft at > 30 degrees AOA and < 175 knots. Note how aircraft will enter nose slice departure into the light wing. When departure has been recognized, recover. Note altitude loss during recovery. Perform the same departure maneuver without stores and observe how aircraft reacts to control inputs.
Explanation:	According to NATOPS, "Nose slice departure into light wing is likely when maneuvering above 30 degrees AOA with lateral asymmetry $\geq$ 6,000 ft-lbs."

Scenario 3: Over the Top Maneuvering

Setup	Single centerline aircraft at 10,000 feet.
Pilot Action	At 10,000 feet and 250 knots, attempt to perform a loop maneuver using military power. Initially, perform a 25-35 degree AOA pull. At 110 degrees of pitch, release controls and observe how the AOA feedback commands nose down stabilator and will not allow the aircraft nose to continue to track down towards the horizon on its own. The pilot must hold back pressure on the stick and maintain a positive AOA in order to drive the aircraft towards the horizon. If at any time the aircraft departs during the demonstration, execute out of control recovery procedures. Attempt maneuver again at 200 knots initially and observe aircraft handling qualities.
Explanation:	According to NATOPS, "Starting overhead maneuvers with insufficient airspeed may lead to an inverted, nose high, ballistic condition. This condition most likely results in an uncommanded nose slice departure with increased probability of entering a Falling Leaf or Spin."

Scenario 4: Cross control departure from a bug (F/A-18D)

Setup:	Single centerline aircraft at 10,000 feet. Simulation is designed to simulate departure prone regions of F/A-18B/D with centerline tanks.
Pilot Action:	Simulating a bug from an engagement, start at 200 knots and 10,000 feet. Unload aircraft to near 0 degrees AOA and feed in full left or right rudder. Move stick in opposite direction simulating partial cross control while attempting to maintain sight during a bug. Observe aircraft handling and note any departure. If aircraft departs, execute recovery procedures. Note altitude loss during recovery.
Explanation:	According to NATOPS, "In F/A-18B/D centerline tank loadings at $\leq$ 250 KCAS, excessive lateral stick or rudder input at AOAs below 10 degrees may result in a nose-slice departure."

Scenario 5: Upright Spin Recovery

Setup:	Single centerline aircraft at 10,000 feet.
Pilot Action:	Establish aircraft in an upright spin by entering a gradual pull up to 70 deg nose high starting at 350 KCAS and 10,000 feet with throttles at idle. Once established nose high and airspeed reading 48 knots in the HUD, advance right throttle to MAX and retard left throttle to idle. Aggressively place stick in full rear right quadrant and full left rudder deflection while maintaining right throttle in MAX and left throttle in MIN. Hold inputs until entering left upright spin. Once spin logic appears, execute OCF procedures. Experiment with different altitude entries. Note altitude loss during recovery at each altitude.
Explanation:	According to NATOPS, "A clean or symmetrically loaded aircraft is very reluctant to enter any spin mode with the FCS in CAS." NATOPS further cautions that "With the spin switch in RCVY (SRM engaged), departure susceptibility is greatly increased."

Scenario 6: Unusual Attitude Recovery

Setup:	Single centerline aircraft at 10,000 feet.
Pilot Action:	Instructor has pilot at controls close eyes. Instructor then directs pilot to unusual attitude. Pilot at controls then opens eyes and recovers on aircraft instruments. Note altitude loss during recovery.
Explanation:	According to NATOPS, proper procedures are as follows: 1. 1 g roll to nearest horizon. 2. Throttles - MAX (MIL if altitude not critical). 3. Pull to and maintain 25 to 35 degrees AOA until positive rate of climb established (AOA configuration dependent). 4. If aircraft departs dive recovery below 6,000 feet AGL - EJECT.