



C3401 Briefing Guide (Worksheet)

Planned Route:

Takeoff: KNSE, Rwy 05
Altitude: As required (6000' AGL minimum restriction)
Route: North or South MOA, Pelican, Area1 or 3 may be utilized
Training Device: OFT



SYLLABUS NOTES:

Practice scenario-based emergency procedures and introduce students to aerobatic maneuvers.

The student shall only use the HUD to accomplish the SSR within this block of training.
(HUD Training is currently waived by CNATRA)

No strap-in required for student. Need to have gloves, kneeboard, NATOPS PCL for this event.

Student will use Abbreviated Simulator checklist to expedite becoming airborne. Once airborne all applicable checklist will be conducted from the quad-fold version.

Special Syllabus Requirement

OCF Recovery

Ejection Seat Sequence Mitigation Procedures

Discuss (If time becomes a factor, finish discussion items during event or debrief)

a. Anti-G Straining Maneuver (AGSM)

- When is it required
- FTI procedures

b. Maneuvering Speed

- Maximum Operating Airspeed (Vmo)
- Maneuvering Speed (Vo) limitations
- Time Limits

c. Aerobatics

- Flight Manual G limits for aircraft
- FTI definition
- Restrictions
- Aerobatic Maneuvers
 - Loop
 - Cuban Eight
 - Immelmann
 - Split-S
 - Aileron Roll
 - Barrel Roll
 - Wingover
 - Cloverleaf

FWOP IFG Aerobatic Training Rules

d. OCF Recovery Procedures

- Definition
- Critical Action Items

e. Contact Unusual Attitudes

- Nose High
- Nose Low
- Inverted

f. Airborne Damaged Aircraft

- Procedures

T-6B CONTACT C3400 BLOCK

STUDENT GRADE SHEET DATE _____ INSTRUCTOR _____

MEDIA: OFT VT- _____ BRIEF TIME: _____ NAME: _____ EVENT: _____

#	MANEUVER	MIF	C3401	C3402	
1	GEN KNOWLEDGE / PROCEDURES	4+	X	X	
2	EMERGENCY PROCEDURES	4+	X	X	
3	HEADWORK / SITUATIONAL AWARENESS	3+	X	X	
4	BASIC AIRWORK	4+	X	X	
5	IN-FLIGHT CHECKS / FUEL MANAGEMENT	4+	X	X	
6	IN-FLIGHT PLANNING / AREA ORIENTATION	3+	X	X	
7	TASK MANAGEMENT	3+	X	X	
8	COMMUNICATION	4+	X	X	
9	MISSION PLANNING / BRIEFING /DEBRIEFING	4+	X	X	
10	GROUND OPERATIONS	4			
11	TAKEOFF	4+	X	X	
12	DEPARTURE	4			
13	G-AWARENESS EXERCISE	4			
17	POWER-ON STALL	4			
18	LANDING PATTERN STALLS	4			
19	EMERGENCY LANDING PATTERN STALLS	4			
20	SPIN	3			
21	CONTACT UNUSUAL ATTITUDES	3			
22	LOOP	2+	X	X	
23	AILERON ROLL	2+	X	X	
24	SPLIT-S	2+	X	X	
25	BARREL ROLL	2+	X	X	
26	CLOVERLEAF	2+	X	X	
27	IMMELMANN	2+	X	X	
28	CUBAN EIGHT	2+	X	X	
29	WINGOVER	2+	X	X	
30	SLIP	3			
31	POWER LOSS	3+	X		
32	PRECAUTIONARY EMERGENCY LANDING	3+		X	
33	PEL/P	3+		X	
34	ELP LANDING	3+	X	X	
35	ARRIVAL / COURSE RULES	3			
36	LANDING PATTERN	4			
37	NO FLAP LANDING	3			
37	TAKEOFF FLAP LANDING	3			
37	LDG FLAP LANDING	3			
37	FULL-STOP LANDING	3			
38	AOA PATTERN	2			
39	WAVEOFF	4			
	SPECIAL SYLLABUS REQUIREMENTS	1	X	X	

SSR's : C3401 OCF recovery

C3402 HUD introduction (aerobatic maneuvers and landing pattern) and windshear recovery.

DISCUSS ITEMS:

C3401: Aerobatics, OCF recovery procedures, Contact unusual attitudes, airborne damaged aircraft, maneuvering speed, and AGSM

C3402: Combination maneuvers, windshear recovery, HUD, and any emergency procedure.

DEPART _____ ARRIVE _____ SIDE # _____

SIM TIME _____

JPPT 1542.166A Ch-2 01/29/2014

Most T-6B G-LOC episodes occur during rapid G-loading of 3 to 5 G's over 2 to 5 second intervals. Pilots can prepare themselves for the physical stress of rapid accelerations and therefore prevent G-LOC by taking certain precautions:

1. Learn and use the proper Anti-G Straining Maneuver (AGSM), more commonly called the "HICK Maneuver." There are two components to the recommended AGSM:
 - a. The first component is a continuous and maximum contraction (if necessary) of all skeletal muscles including the arms, legs, chest, and abdominal muscles. This tensing of the skeletal muscles restricts blood flow in the G-dependent areas of the body and thereby assists in the retention of blood in the thoracic region (including the heart) and the brain.
 - b. The second component of the AGSM involves repeated closing of the respiratory tract at 2.5 to 3.0-second intervals. Its purpose is to counter the downward G force by expanding the lungs and increasing the chest pressure, thereby forcing blood to flow from the heart to the brain.

The respiratory tract is an open breathing system which starts at the nose and mouth and ends deep in the lungs. It can be completely closed off at several different points, the most effective of which is the glottis. Closing the glottis (which is located behind the "Adam's Apple") yields the highest increase of chest pressure. The glottis can be closed off by saying the word "HICK" and catching it about $\frac{3}{4}$ of the way through the word ("Hiii-"). This should be done after a deep inspiration, followed by forcefully closing the glottis as you say "HICK." Bear down for 2.5 to 3.0 seconds, then rapidly exhale by finishing the word HICK ("-ka"). This is immediately followed by the next deep inhalation, repeating the cycle until the G-loading is discontinued.

The exhalation and inhalation phase should last for no more than 0.5 to 1.0 second. Since the blood pressure falls dramatically during this phase, its duration must be kept to a minimum.

WARNING

Do not hold your respiratory straining too long (more than five seconds) since this will prevent the blood from returning to the heart properly and may result in loss of consciousness.

Anticipate the onset of high G forces whenever possible. Skeletal muscles should be tensed prior to the onset, coupled with the "HICK" respiratory cycle as the G-loading increases. Initiating the AGSM too early can inhibit the body's natural cardiovascular reflex responses, while beginning too late creates a deficit situation which may be difficult to overcome.

NOTE

If properly performed, the AGSM should provide adequate protection against G-LOC while performing the various aerobatic maneuvers. If you experience difficulty, or are in doubt as to whether or not you are executing the maneuver correctly, see your squadron flight surgeon or wing Aeromedical Safety Officer.

2. Inter-cockpit communication between aircrew is imperative. Both individuals must rely on the other not to apply high G forces without first giving prior warning. Historically poor crew communication has been a major causal factor in G-LOC episodes. During high G maneuvers, G-suit inflation can inadvertently key the radio transmit switch on the PCL. Take care to position your leg to prevent this from occurring and blocking communications with your IP.

3. Be prepared physically.

- a. Avoid flying if ill or extremely fatigued.
- b. Maintain an adequate fluid intake and do not skip meals.
- c. Stay in shape. The optimum fitness program for increasing G-tolerance is a combination of moderate weight training and cardiovascular aerobic exercise (running, walking, swimming, etc.) 2-3 times weekly. Avoid excessive long distance running (more than 25 miles per week) or overly intense weight training. These will typically result in lower blood pressure and heart rate which may decrease G-tolerance.

4. **G awareness Exercise/G warm-up maneuver:** Accomplish a G-awareness exercise on sorties that include maneuvers that require or may result in 3 or more Gs. This may be accomplished by performing the following procedures:

- a. Complete the Pre-Stalling, Spinning, and Aerobatic Checklist. Notify the other crewmember that you are going to commence the G-awareness Exercise.
- b. The G-awareness exercise should be a level or slightly descending turn, using maximum power. Begin the maneuver with sufficient airspeed to sustain 4 Gs. For planning purposes, use approximately 200-220 knots minimum for a level to slightly descending turn where the nose remains within 10° of the horizon.
- c. The G-onset rate should be slow and smooth, allowing sufficient time to evaluate the effectiveness of the AGSM and determine G-tolerance. Increase Gs to approximately 4 Gs and maintain for approximately 4 to 5 breathing cycles in order to allow full cardiovascular response (approximately 180° of turn).
- d. For advanced aerobatic and formation training, the G-awareness exercise should be flown to G-loads of 4 - 5 Gs.

905. CONTACT UNUSUAL ATTITUDES

1. **Description.** Recovery may be required due to an improperly flown maneuver, disorientation, area boundaries (lateral or vertical), an aircraft malfunction, or traffic conflicts.

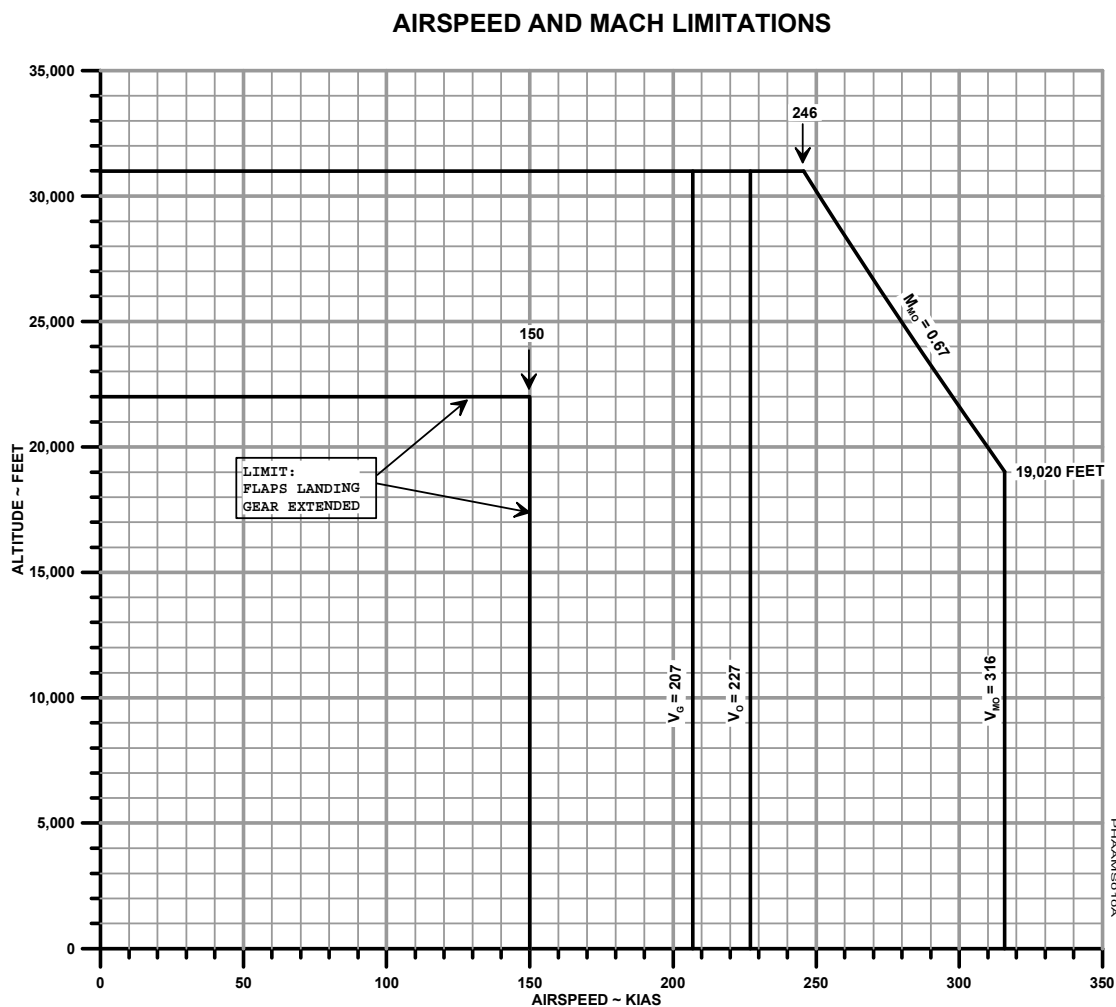


Figure 5-3. Airspeed and Mach Limitations

PROPELLER ROTATIONAL OVERSPEED LIMITATIONS

The propeller overspeed limit is 110% N_p .

AIRSPEED AND MACH LIMITATIONS

Refer to Figure 5-3 for airspeed and Mach limitations.

MAXIMUM OPERATING AIRSPEED/MAXIMUM OPERATING MACH NUMBER (V_{MO}/M_{MO})

Maximum operating airspeed (V_{MO}) is not to be intentionally exceeded in any phase of flight (climb, cruise, descent, maneuvering). V_{MO} is 316 KIAS up to and including 19,020 feet MSL.

Maximum operating Mach number (M_{MO}) is not to be intentionally exceeded in any phase of flight (climb, cruise, descent, maneuvering). Above 19,020 feet MSL, M_{MO} is 0.67 indicated Mach number (IMN). The airspeed in KIAS which corresponds to M_{MO} varies with altitude.

WING FLAPS LIMITATIONS

Maximum airspeed with the flaps extended (V_{FE}) or during flap operation is 150 KIAS.

LANDING GEAR LIMITATIONS

Maximum airspeed with the landing gear extended (V_{LE}) or during landing gear operation is 150 KIAS.

TURBULENT AIR PENETRATION SPEED LIMITATIONS (V_G)

Maximum airspeed for flying through turbulence is 207 KIAS. Recommended airspeed in turbulent air is 180 KIAS.

MANEUVERING SPEED LIMITATIONS (V_O)

Operating maneuvering speed (V_O) is the speed above which full or abrupt control movements in one axis can result in structural damage to the aircraft. V_O is 227 KIAS. Full rudder deflection above 150 KIAS, however, will exceed the limits for the rudder control system.

FLIGHT MANEUVERING LIMITATIONS

TIME LIMITS

CAUTION

Holding a zero G-loading for over 5 seconds can cause engine damage and possible engine failure, regardless of oil pressure indications.

Inverted flight - 15 seconds

Intentional zero-G - 5 seconds

PROHIBITED MANEUVERS

Inverted stalls

Inverted spins

Aggravated spins past two turns

Spins with PCL above idle

Spins with landing gear, flaps, or speed brake extended

Spins with PMU off

Spins below 10,000 feet pressure altitude

Spins above 22,000 feet pressure altitude

Abrupt cross-controlled (snap) maneuvers

Aerobatic maneuvers, spins, or stalls with a fuel imbalance greater than 50 pounds between wings

Tail slides

ACCELERATION LIMITATIONS

The operating flight strengths are shown in Figure 5-4.

SYMMETRIC

Clean +7.0 to -3.5 G's

Gear and/or flaps extended +2.5 to 0.0 G's

ASYMMETRIC (ROLLING G'S)

Clean +4.7 to -1.0 G's

Gear and/or flaps extended +2.0 to 0.0 G's

For uncoordinated rolling maneuvers initiated at -1 G, the maximum bank angle change is 180 degrees.

NOTE

Exceeding the acceleration limits locks the max (or min) G reading on the PFD at the exceeded value in red text and cannot be reset without maintenance action on the ground.

CENTER OF GRAVITY LIMITATIONS (LANDING GEAR EXTENDED)

The center of gravity (CG) limitations are shown in Figure 5-5. When a solo pilot weight (including gear) exceeds 260 pounds, when rear pilot weight (including gear) exceeds 260 pounds, when combined crew weight exceeds 480 pounds (with gear), when overwing refueling is accomplished over 1100 pounds, or when baggage weight exceeds 10 pounds, the weight and balance of the aircraft shall be checked to determine that gross weight and CG limitations are not exceeded.

Allowable forward CG limit up to 5850 pounds is 18.8% MAC (164.7 inches aft of datum).

Linear variation forward CG limit at 5850 pounds is 18.8% MAC (164.7 inches aft of datum).

Allowable forward CG limit at 6900 pounds is 20.0% MAC (165.5 inches aft of datum).

Allowable aft CG limit at all weights is 26.0% MAC (169.3 inches aft of datum).

NOTE

The reference datum is located 16.46 inches forward of the tip of the propeller spinner.

CHAPTER NINE AEROBATICS

900. INTRODUCTION

Aerobatics is any intentional maneuver involving an abrupt change in aircraft's attitude, intentionally performed spins, or other maneuvers requiring pitch/dive angles greater than 45°, bank angles greater than 60°, or accelerations greater than two Gs.

You will be receiving training on the Anti-G straining maneuver (AGSM) and the physiological effects of increased G loads. Review the aircraft G limits.

Refer to Figure 9-1 for aerobatic maneuver configuration parameters.

Aerobatic Maneuver	Entry Airspeed	Gs Required	Altitude Change	Exit Airspeed	Energy Classification	Power
Loop	230 – 250	High	NC	230 – 250	Neutral	MAX
Wingover	200 – 220	Low	NC	200 – 220	Neutral	~70%
Barrel Roll	200 – 220	Mod	NC	N/A	Neutral	~80%
Aileron Roll	180 – 220	Low	NC	N/A	Loser	~80%
Split S	120 – 140	High	- 3000 feet	< 250	Neutral	Idle-80%
Cuban Eight	230 – 250	High	NC	230 – 250	Neutral	MAX
Immelmann	230 – 250	High	+ 3000 feet	Flying A/S	Gainer	MAX
Cloverleaf	200 – 220	High	NC	200 - 220	Neutral	MAX

Figure 9-1 Aerobatic Maneuver Parameters

Prior to performing aerobatic maneuvers, complete the Pre-Stalling, Spinning, and Aerobatic Checks per the NATOPS PCL and accomplish clearing turns. For the clearing turns, use a minimum of 45° AOB and turn for a minimum of 180°. Throughout the turn thoroughly check the area for other aircraft.

Start your aerobatic maneuvers from an altitude which will permit a complete maneuver and a return to straight and level flight at or above 6000 feet AGL. You must not exceed the maximum altitude permitted for your operating area. The maneuvers performed require approximately 3000 feet vertically.

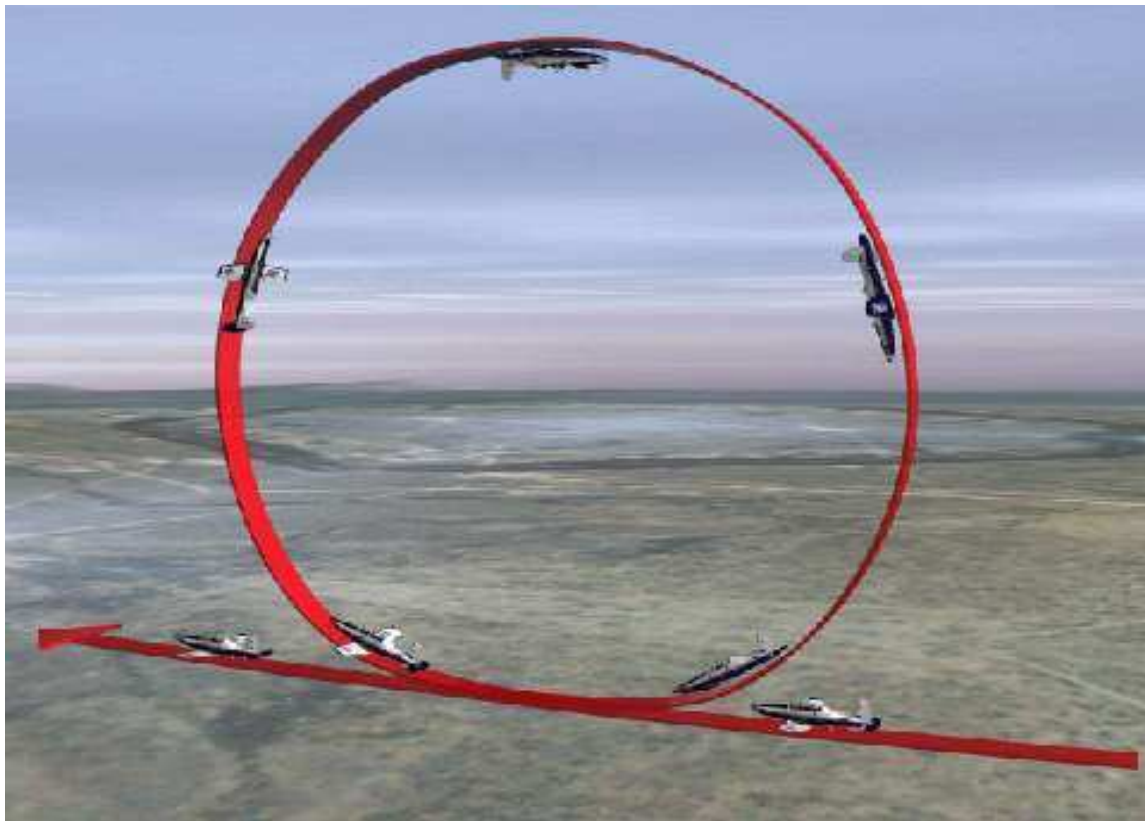
901. RULES AND PRECAUTIONS FOR AEROBATIC FLIGHT

Due to their unique nature, there are certain rules and precautions you must observe prior to performing any aerobatic maneuver. Flight Rules and Regulations (FRR) and local SOP will prescribe restrictions governing the airspace within which you may perform aerobatic maneuvers. Ensure that you are thoroughly familiar with these regulations. Strict compliance is mandatory.

Loop: The loop is a 360° turn in the vertical plane with constant heading and nose track.

- 3C's
- Set Power to MAX, 230-250 KIAS
 - Clear overhead, report entry altitude.
 - Pull 4 G's in 2-3 seconds.
 - Check wings in vertical and horizontal.
 - Add right rudder to maintain alignment.
 - Acquire horizon/reference line and pull through with 4 G's.

CAI VIDEO



Cuban Eight: Modified Loop and Immelmann, first part is 5/8th's Loop followed by half roll.
Repeat in opposite direction.

- 3 C's
- Set Power to MAX, 230-250 KIAS
 - Clear overhead, report entry altitude.
 - Pull 4 G's in 2-3 seconds.
 - After passing through the vertical, acquire opposite horizon.
 - As nose approaches 45° below horizon, relax backstick and roll wings level.
 - Maintain 45° nose low until commencing 2nd half.

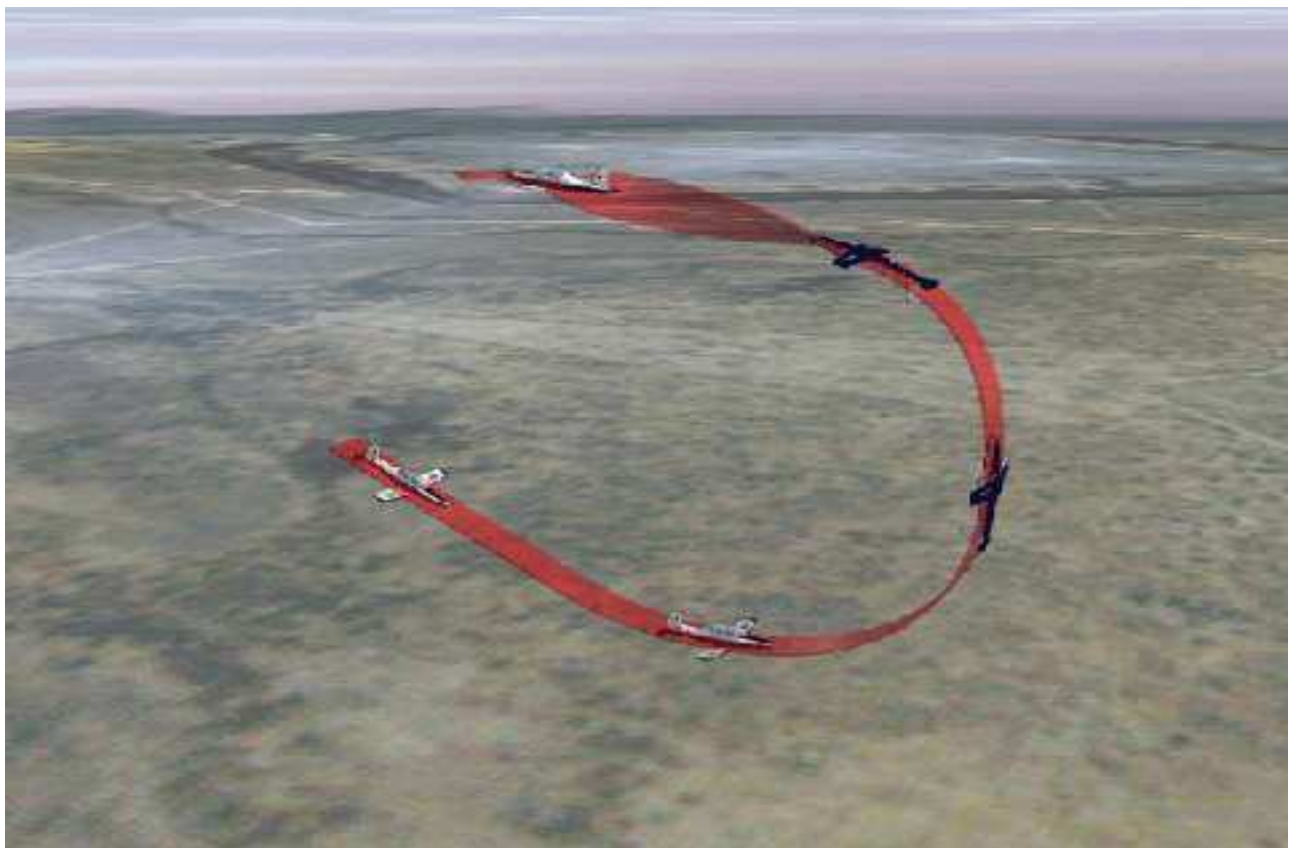
CAI VIDEO



Immelmann: Is a half loop followed by a half roll, 180° reversal in heading with approximately 3,000 gain in altitude, all flown in the same vertical plane.

CAI VIDEO

- 3C's
- Set Power to MAX, 230-250 KIAS
 - Clear overhead, report entry altitude.
 - Pull 4 G's in 2-3 seconds.
 - Check wings in vertical and horizontal.
 - Add right rudder to maintain alignment.
 - As nose approaches 10° above opposite horizon, relax backstick and roll wings level.



Split-S: Combines the first half of an aileron roll with the last half of a loop. Aircraft climbs during entry and descends during recovery.

- 3 C's
- Set Power to IDLE and decelerate to 140 KTS.
 - At 140 KTS raise nose to 5-10° up.
 - Roll inverted, neutralize ailerons, apply slight forward stick momentarily.
 - Pull straight out 4 G's.
 - Check oil pressure within normal limits and report on ICS, reset power as required.

CAI VIDEO



Aileron Roll: It is a 360° roll about the longitudinal axis of the aircraft.

CAI VIDEO

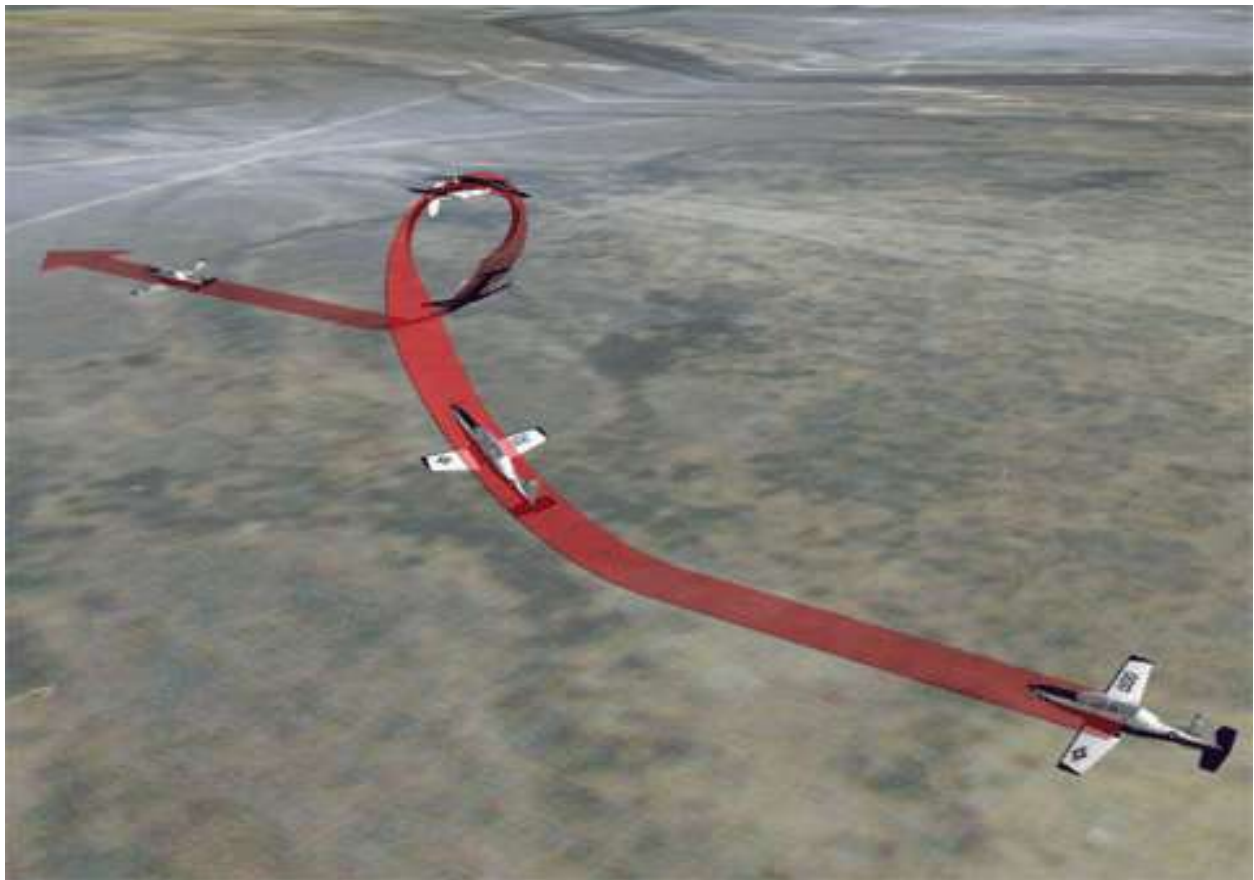
- 3 C's
- Set Power to approx 80% TQ, 180-220 KIAS
 - Raise nose approximately 10° above horizon.
 - Relax backstick.
 - Roll the aircraft left or right using aileron.



Barrel Roll: Aircraft is rolled 360° about an imaginary point which bears 45° off the nose. Definite seat pressure should be felt throughout the roll.

- 3 C's
- Set Power to approx 80% TQ, 200-220 KIAS
 - Clear overhead, report entry altitude.
 - Raise nose while keeping wings level.
 - As nose passes 20° above horizon begin gradual roll to arrive at 45 position 55-60° nose up and 90° AOB.
 - Increase lateral stick in direction of roll to arrive at 90° position inverted.
 - Go through the horizon looking over opposite shoulder to pick up section line.

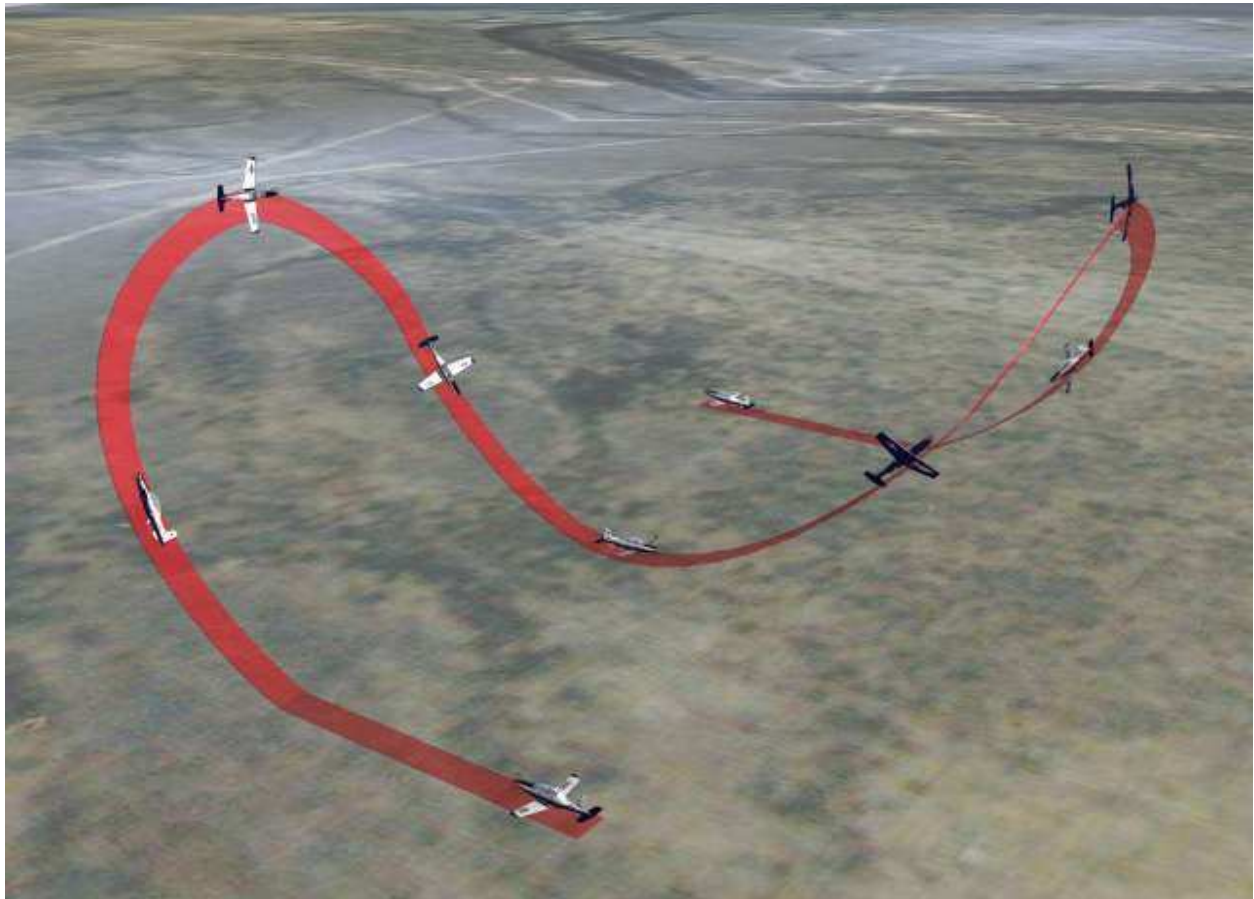
CAI VIDEO



Wingover: It's a 180° reversal in the direction of flight accomplished by combining a smooth climbing turn for 90° with a smooth diving turn for 90°

- 3 C's
- Set Power to approx 70% TQ, 200-220 KIAS
 - Select reference point 90 off the wing
 - Begin gradual climbing turn to 90 reference point
 - Time to arrive 45 position with 45° nose up and 45° AOB
 - The nose should arrive at 90 reference point with 90 AOB and nose on the horizon
 - Passing horizon, let the nose fall, and begin rolling out of bank.
 - The below horizon leaf should be symmetric to first leaf (nose above horizon)
 - 2nd wingover turn same as 1st

CAI VIDEO



Cloverleaf: Four identical maneuvers, each of which changes heading by 90°. The pull up is similar to loop but less G's. At the top is a rolling pull to 90° displace from original heading. The lower part or pull is flown like a Split-S.

- 3C's
- Set Power to MAX, 200-220 KIAS
 - 2-3 G's initial nose up pull
 - When 45° nose high, roll towards 90° reference point.
 - Continue the pull and roll so the nose passes through reference point with wings level inverted (120 KIAS)
 - Keep level and pull through the bottom (Split-S)
 - Approaching horizon, pull through and start next leaf

CAI VIDEO



NOTE

Intentional inverted stalls are prohibited.

ACCELERATED STALLS

An accelerated stall induced by a turning entry and increased G is preceded by pronounced airframe buffet before the stall is reached. Buffet onset occurs well prior to the actual stall at higher G conditions. However, below 2 G's there may be little natural buffet prior to the actual stall. During a turning entry, the stall is characterized by a moderately abrupt lateral roll-off (either into or away from the direction of turn). The actual stall speed may vary by several knots depending on the entry from a left or right turn. An accelerated stall induced by a rapid decrease in airspeed or a pitch up exhibits similar lateral roll-off characteristics. Sustained heavy buffet in accelerated stalls at greater than 3 G's can produce damaging loads in the fuselage and empennage. Accelerated stalls initiated at greater than 3 G's do not sustain heavy buffet beyond the period required to recognize the accelerated stall.

CAUTION

For accelerated stalls initiated at greater than 3 G's, do not sustain heavy buffet beyond the period required to recognize the accelerated stall.

STALL RECOVERY

Stall recovery is accomplished as follows:

1. Reduce angle of attack. This may require a reduction in back stick pressure, or moving stick progressively towards neutral, or moving stick forward of the trim position.
2. Advance PCL as required to maintain flying airspeed. Anticipate engine power effects, applying aileron and rudder as necessary to maintain or achieve wings level.
3. Use aileron and rudder control as necessary to maintain wings-level, coordinated flight throughout the recovery.
4. As flying speed is regained, smoothly increase back pressure on the control stick to stop the altitude loss and return to level flight, taking care to avoid entering a secondary, accelerated stall during recovery.

Altitude lost during recovery from a wings-level stall is usually less than 100 feet, assuming a prompt application of recovery power. Power-on, accelerated and inverted stall recoveries will lose even less altitude to regain flying speed;

however, these stalls will most likely result in an unusual attitude requiring more altitude for recovery.

DEPARTURES FROM CONTROLLED FLIGHT

DEPARTURES/OUT-OF-CONTROL FLIGHT (OCF)

A situation in which the aircraft does not respond immediately and in a normal sense to application of flight controls is considered out-of-control flight (OCF) or a departure.

OCF is the seemingly random motion of the aircraft about one or more axes, usually resulting from a stalled condition in which the inertial forces on the aircraft exceed the authority of the aerodynamic controls (ailerons, elevator, and rudder). For this reason, initial aircraft motions may not be halted by any application of flight controls and motions may be opposite the direction of the applied control. Certain control applications may intensify the OCF motions. OCF typically results from a stall in accelerated or out-of-balance (uncoordinated) flight conditions or a stall where improper or overly aggressive control inputs are applied. In general, OCF can be divided into three categories: poststall gyrations, incipient spins, and steady-state spins.

Poststall Gyrations

Poststall gyrations are the motions of the aircraft about one or more axes immediately following a stall and prior to the incipient spin. A poststall gyration can usually be identified by uncommanded (and often rapid) aircraft motions about any axis, a feeling that the controls are no longer effective nor acting in the normal sense, stalled or near-stalled angle of attack, transient or erratic airspeed indications, and random turn needle deflections.

A poststall gyration can occur at high airspeed (following an accelerated stall) or at low airspeed (following a normal stall). At high airspeed, the poststall gyration will quickly dissipate kinetic energy and may place high stresses on the aircraft structure. At low airspeed, the inertial forces on the aircraft exceed the authority of the aerodynamic controls, rendering the controls mostly ineffective until flying speed is regained. The poststall gyration can be aggravated or extended through continued application of pro-stall controls or by misapplication of stall recovery controls. Poststall gyrations may be violent and disorienting.

The intuitive response of rapidly applying controls in all axes in an attempt to arrest the motions is generally ineffective and may actually increase the motions, as the flight controls may no longer act in the normal sense. Neutralizing controls and reducing the power to IDLE is the best response until motions stop and the controls become effective in the normal sense again.

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Incipient Spins

The spin-like motion that occurs between a poststall gyration and a fully developed spin is called an incipient spin. Any stall can progress to an incipient spin if steps are not taken to recover the aircraft at either the stall or poststall gyration, or if pro-spin controls are maintained. In an incipient spin, the motions appear to be “spin-like” and there is a sustained unsteady yaw rotation, but the aerodynamic and inertial forces are not yet in balance. As a result, an incipient spin is characterized by oscillations in pitch, roll, and yaw attitudes and rates. The nose attitude will fluctuate from the horizon to vertical (nose down), the yaw rate will increase toward the steady-state spin value, and the wings will rock about the steady-state spin value. An incipient spin can be identified by an oscillatory spin-like motion, a fully deflected turn needle, a stalled angle of attack, and airspeed that is accelerating or decelerating toward the steady-state value. Visual indications may be misleading and can lead to the false impression of a steady-state spin. The incipient spin phase of the aircraft lasts approximately 2 turns. This may be prolonged during intentional spin entries by failure to apply proper pro-spin controls, potentially leading to a spiral.

Steady-State Spins

Steady-state spins are still considered OCF because a control input in any given axis does not have an immediate effect in that axis in the normal sense of the control. For example, a right aileron input in a left spin will not arrest the roll rotation. Altitude loss during a typical steady-state spin is approximately 4500 feet for a 6-turn spin.

NOTE

The aircraft has shown an overall resistance to unintentional spins. However, the aircraft may enter a departure or OCF during various control misapplications, particularly at low airspeed and high power.

DEPARTURE RECOVERY

Recovery from inadvertent loss of aircraft control, including poststall gyrations and incipient spins, can be accomplished by promptly reducing power to IDLE, and positively neutralizing flight controls in all axes. Patience and the maintenance of neutral controls (including visual verification of control positions) is vital since the dynamics of any aircraft departure may prevent an immediate response of the aircraft to control inputs.

NOTE

Cycling of control positions or applying anti-spin controls prematurely can aggravate aircraft motion and significantly delay recovery.

Recovery from a confirmed steady-state spin by maintaining neutral controls is possible, but time to recover and altitude loss will be greater than with use of proper anti-spin control. Consequently, after neutralizing the flight controls and verifying that power is at IDLE, if cockpit indications confirm that a steady-state spin has developed, the appropriate anti-spin control inputs should be made to ensure prompt recovery from the spin.

Refer to Inadvertent Departure from Controlled Flight procedure, Section III.

WARNING

A spiral is often mistaken for a spin. Anti-spin controls may not be effective in arresting a spiral and may actually aggravate the situation.

CAUTION

If not in a steady-state spin, as indicated by increasing airspeed, AOA not at a stalled condition (erect or inverted), and oscillatory motions not typical of the spin, check and maintain IDLE power and neutral controls until regaining aircraft control.

SPIRALS

A spiral is a rolling and/or yawing motion of the aircraft that is often mistaken for a spin, but is not steady-state in that airspeed is increasing through 160 KIAS and motions are oscillatory. A spiral can result from misapplication of pro-spin controls (insufficient rudder or aft stick). It is important to identify a spiral quickly, because the airspeed can increase rapidly in a nose-down attitude. Maintaining large control deflections as speed increases can result in rapid motions and structural overstresses. Anti-spin controls may not be effective in arresting the spiral and may actually aggravate the situation. The best response to a spiral is to reduce the power to IDLE and neutralize the controls until motion stops. ■

SPINS

A spin requires stalled angle of attack simultaneously with sustained yaw rate. If either of these two conditions is

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OBOGS, DEFOG, pressurization, and hydraulic equipment. Consider leaving the engine running while monitoring descent rate.

CAUTION

Consideration should be given to leaving the engine operating with PCL at mid range.

- * 6. PROP SYS circuit breaker - Reset, as required

WARNING

With the PROP SYS circuit breaker pulled and the PMU switch OFF, the feather dump solenoid will not be powered. The propeller will feather at a slower rate as oil pressure decreases and the feathering spring takes effect. Glide performance will be considerably reduced and it may not be possible to intercept or fly the emergency landing pattern.

- * 7. PCL - OFF
- * 8. FIREWALL SHUTOFF handle - Pull
- * 9. Execute Forced Landing or Eject

COMPRESSOR STALLS

Compressor stalls may be initially identified by abnormal engine noise, increasing ITT, and decreasing N_1 and torque, possibly followed by fluctuations in these indications. Audible indications, which may include loud bangs, backfires, or engine sputtering, represent a major difference between a stall and an uncommanded power change/loss of power/uncommanded propeller feather, and may aid in diagnosing the malfunction. Flames and/or smoke may also be visible from the exhaust stacks. Compressor stalls may be caused by damaged or degraded compressor/turbine blades, disrupted airflow into the engine, or compressor bleed valve malfunctions and therefore may occur during either engine acceleration or deceleration. Severe compressor stalls may cause engine damage and/or flameout.

- * 1. PCL - Slowly retard below stall threshold
- * 2. DEFOG switch - ON

NOTE

Setting the DEFOG switch to ON automatically selects high bleed air inflow and will alleviate back pressure on the engine compressor.

- * 3. PCL - Slowly advance (as required)

IF POWER IS SUFFICIENT FOR CONTINUED FLIGHT:

- * 4. PEL - Execute

IF POWER IS INSUFFICIENT TO COMPLETE PEL:

- * 5. PCL - OFF

WARNING

When the engine is so underpowered that high rates of descent occur, any delay in shutting down the engine to feather the propeller may result in insufficient altitude to reach a suitable landing site.

- * 6. FIREWALL SHUTOFF handle - Pull
- * 7. Execute Forced Landing or Eject

INADVERTENT DEPARTURE FROM CONTROLLED FLIGHT

It is possible to depart controlled flight as a result of improper or overly aggressive control inputs near stall, mechanical failures, atmospheric conditions, or a combination thereof. Power setting has a strong influence on inducing or recovering from out of control conditions for the aircraft. Reducing power immediately may allow the aircraft to recover with no other pilot intervention or action. If the out of control condition is allowed to progress, departure characteristics can be highly oscillatory and disorienting. It is crucial the pilot neutralize controls. If an inadvertent departure from controlled flight is encountered, accomplish the following steps, allowing time for the power and controls to take effect.

- * 1. PCL - IDLE
- * 2. CONTROLS - NEUTRAL

WARNING

Improperly positioning the control stick/elevator aft of the neutral position may significantly delay or prevent the aircraft from recovering from an OCF/spin which could result in loss of aircraft and/or crew.

NOTE

Cycling of control positions or applying anti-spin controls prematurely can aggravate aircraft motion and significantly delay recovery.

- * 3. ALTITUDE - CHECK

WARNING

Recommended minimum altitude for ejection is 6000 feet AGL.

- * 4. Recover from unusual attitude

whether or not you are executing the maneuver correctly, see your squadron flight surgeon or wing Aeromedical Safety Officer.

2. Inter-cockpit communication between aircrew is imperative. Both individuals must rely on the other not to apply high G forces without first giving prior warning. Historically poor crew communication has been a major causal factor in G-LOC episodes. During high G maneuvers, G-suit inflation can inadvertently key the radio transmit switch on the PCL. Take care to position your leg to prevent this from occurring and blocking communications with your IP.
3. Be prepared physically.
 - a. Avoid flying if ill or extremely fatigued.
 - b. Maintain an adequate fluid intake and do not skip meals.
 - c. Stay in shape. The optimum fitness program for increasing G-tolerance is a combination of moderate weight training and cardiovascular aerobic exercise (running, walking, swimming, etc.) 2-3 times weekly. Avoid excessive long distance running (more than 25 miles per week) or overly intense weight training. These will typically result in lower blood pressure and heart rate which may decrease G-tolerance.
4. G awareness Exercise/G warm-up maneuver: Accomplish a G-awareness exercise on sorties that include maneuvers that require or may result in 3 or more Gs. This may be accomplished by performing the following procedures:
 - a. Complete the Pre-Stalling, Spinning, and Aerobic Checklist. Notify the other crewmember that you are going to commence the G-awareness Exercise.
 - b. Begin wings level at 200-220 KIAS. Advance power to MAX, smoothly roll to 70-80 degrees AOB, allowing the nose to drop slightly below the horizon (no more than 10 degrees), pause momentarily to stop roll and smoothly pull.
 - c. The G-onset rate should be slow and smooth, allowing sufficient time to evaluate the effectiveness of the AGSM and determine G-tolerance. Increase Gs to approximately 4 Gs for approximately 4 to 5 breathing cycles in order to allow full cardiovascular response.
 - d. For advanced aerobatic and formation training, the G-awareness exercise should be flown to G-loads of 4 - 5 Gs.

905. CONTACT UNUSUAL ATTITUDES

1. **Description.** Recovery may be required due to an improperly flown maneuver, disorientation, area boundaries (lateral or vertical), an aircraft malfunction, or traffic conflicts.

2. **General.** The diverse and demanding missions performed by military aircraft often require maneuvers which involve unusual attitudes. An effective military pilot must therefore be trained to quickly recognize and then safely recover from unusual attitudes. This must often be accomplished while relying almost exclusively upon the interpretation of visual cues from outside the cockpit. In this stage of training you will perform the procedures for recovery from various unusual attitudes utilizing what is primarily a scan of visual references located outside the cockpit.

- a. The IP will configure the aircraft commensurate with entering an aerobatic maneuver of choice. Refer to Figure 9-1.
- b. The instructor will then smoothly maneuver the aircraft so as to place it in an unusual attitude.
- c. Once directed by the instructor, assume the controls and recover the aircraft in accordance with the following procedures. Recovery shall be accomplished by 6000 feet AGL.

Nose-High Recovery

A nose-high attitude can be encountered with insufficient airspeed to continue the maneuver. Immediate and proper recovery procedures prevent aggravated stall and spin. Expeditious return to level flight from a nose-high attitude, without departing controlled flight or exceeding aircraft limits.

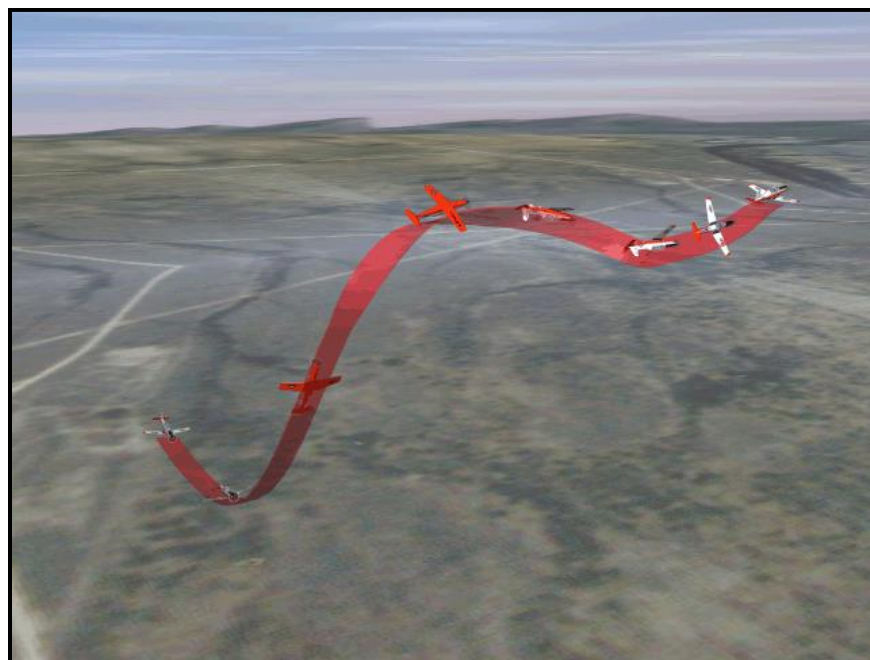


Figure 9-2 Nose-High Recovery

3. **Procedures.**

- a. Set power to MAX (as required in low airspeed situations) and initiate a coordinated roll *past 90° AOB*. Utilize back stick pressure to bring the nose of the aircraft down to the nearest horizon. Depending on initial airspeed and aircraft attitude, a wings-level, inverted attitude may be reached. As the nose approaches the horizon, roll to an upright attitude (Figure 9-2).

NOTE

Do not push the stick forward and induce zero or negative G in an effort to nose the plane back to the horizon.

NOTE

Only rolling to 90° AOB and knife-edging to the horizon should be avoided as it relies primarily on gravity to bring the nose to the horizon. This will not produce as expeditious of a recovery as rolling past 90° AOB and using positive G.

- b. If the airspeed is low, the rollout may be delayed until the nose is definitely below the horizon. In some cases, the nose has to be flown well below the horizon to regain enough airspeed to feel positive pressure on the controls. When airspeed is sufficient, roll wings level, raise the nose, check for normal oil pressure, and use power as required to recover to level flight.
- c. Do not be too aggressive when pulling to the horizon or pulling up from a nose-low attitude. The stick shaker and airframe buffet indicate a potential for stall. Decrease back-stick pressure before the stall.
- d. In all cases, observe system limitations when operating near zero-G.
- e. During some nose-high, low airspeed situations, when the aircraft responds to inputs slowly due to low airspeed or torque effect, a reduction in power may be required (usually below 60% torque) and all available control authority may be required to smoothly return the aircraft to level flight. If the aircraft does not respond normally, or if situational awareness is lost, an OCF recovery shall be accomplished.

4. **Common Errors.**

- a. Failure to set power to MAX (as required in low airspeed situations).
- b. Pushing the nose over (resulting in 0 or (-) G's)."
- c. Failure to roll past 90° AOB, resulting in an inability to use backpressure to bring the nose to the horizon.

Nose-Low Recovery.

Aerobatics require nose-low attitudes. Immediate and proper recovery procedures prevent a high-speed dive or excessive G-forces. Expeditious recovery to level flight from a nose-low attitude with minimum altitude loss and without exceeding aircraft limits.

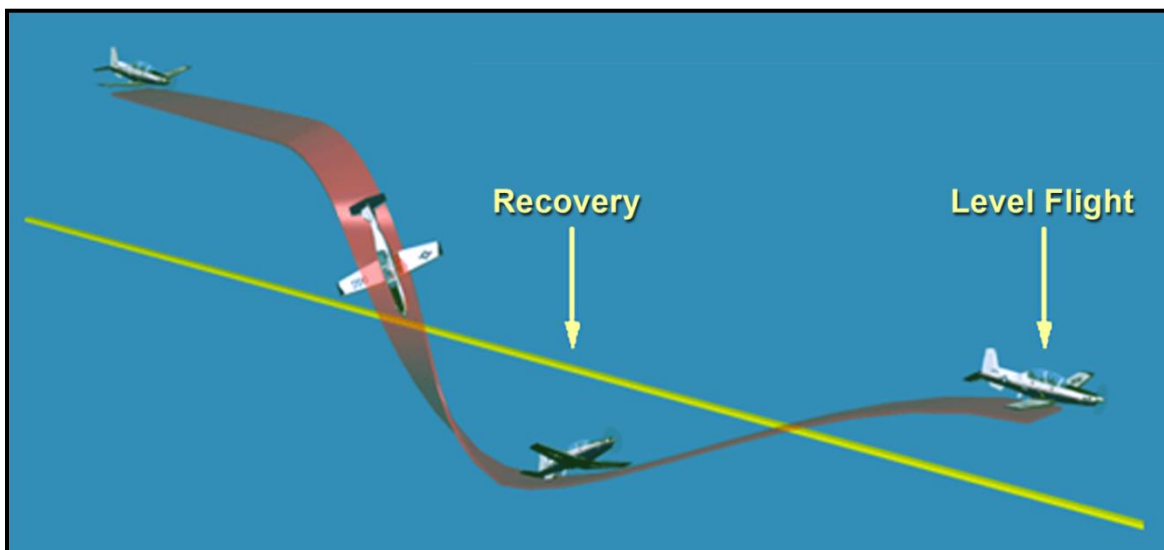


Figure 9-3 Nose-Low Recovery

5. Procedures.

Roll the aircraft to the nearest horizon while simultaneously reducing the PCL to IDLE. Use the speed brake as required. Do not exceed maximum allowable airspeed (316 KIAS). Airspeed may continue to increase as the nose is raised, and maximum airspeed can occur just before level flight is attained. G-loading increases during recovery. Accomplish a proper AGSM. With the nose on or slightly above the horizon, check oil pressure is normal then set power as required (Figure 9-3).

6. Common Errors.

Not reducing power and extending speed brake to prevent excessive airspeed.

Inverted Recovery.

Immediate and proper recovery procedures prevent a high-speed dive or excessive G-forces. Expeditious recovery to level flight from an inverted attitude with minimum altitude loss and without exceeding aircraft limits.

7. Procedures.

- a. When slightly nose-high, nose-low, or near an inverted position, recover by rolling in the shortest direction to set the aircraft in an upright position adding power as required. With the nose on or slightly above the horizon, check oil pressure is normal then power as required.
- b. For purely inverted recoveries, execute a coordinated roll to the nearest horizon.

8. Common Errors.

Not rolling in shortest direction to horizon.

906. LOOP

1. **Description.** The loop is a 360° turn in the vertical plane with constant heading and nose track. Because it is executed in a single plane, the elevator is the principle control surface. Ailerons and rudder are used to maintain directional control and coordinated flight. The maneuver is complete when wings are level at the horizon on the same heading as at entry.

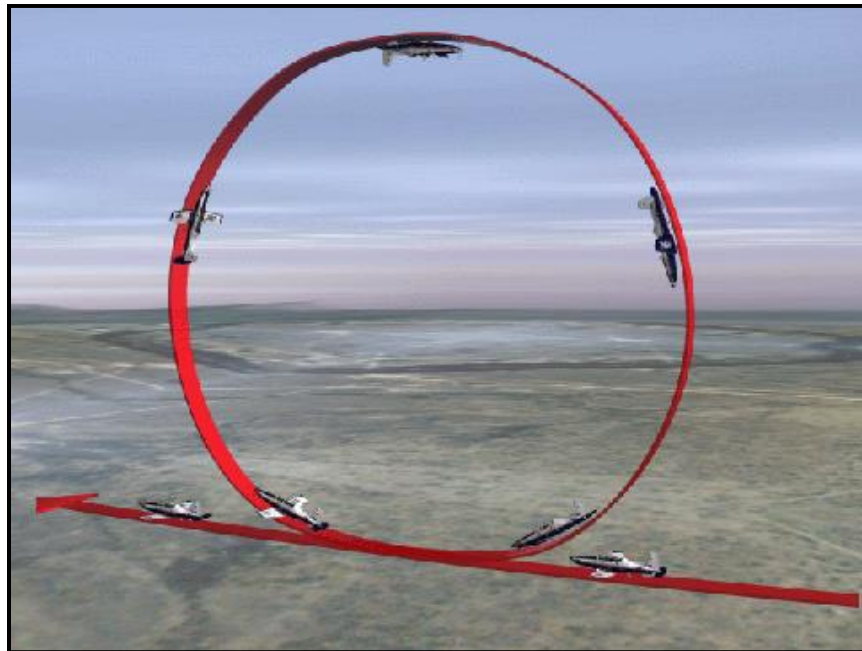


Figure 9-4 Loop

2. **General.** The Loop is one of the most rudimentary aerobatic maneuvers, yet one which requires skill and practice to consistently perform well. The nose pitch rate should be constant, but the aft stick force required to obtain this will vary with airspeed and "G" loading. Directional control is maintained by adjusting rudder input as the airspeed varies, thereby maintaining balanced flight. Aileron is used only in making corrections to maintain the wings parallel with the horizon throughout the entire maneuver.

3. Procedures.

- a. **CONFIGURATION:** Entry airspeed 230-250 KIAS, power at MAX.

CHECKLIST: Complete the Pre-Stalling, Spinning and Aerobatic Checklist.

CLEAR AREA: Clear working area with visual scan, TCAS, and clearing turns as required.

- b. Recheck the wings level and clear the airspace above you. Just prior to entry, check and report the entry altitude over the ICS. Commence the AGSM and immediately start a smooth straight pull up accelerating to 4 Gs within two to three seconds. Do not use the aileron.
- c. Recheck the wings level as the nose passes through the horizon. Adjust stick pressure as necessary to keep the nose moving at a constant rate. Increase right rudder pressure as airspeed decreases.
- d. Shortly after passing the vertical position, tilt your head back and visually locate the opposite horizon. Correct with aileron as necessary to maintain the wings parallel to the horizon. Check the nose in relation to the section line and correct directional deviations as necessary by adjusting the rudder input.
- e. Airspeed will reach its slowest point at the top of the Loop (100-120 KIAS). The greatest amount of right rudder input will therefore be required at this point in order to maintain balanced flight. The amount of aft stick force required to maintain a constant nose pitch rate will have decreased significantly from the initial pull-up. Maintain positive "G" loading and wings parallel to the horizon.
- f. Allow the nose to fall through the opposite horizon, adjusting the amount of aft stick pressure to maintain a constant pitch rate. Fly the aircraft's nose along the section line, relaxing right rudder pressure as airspeed is quickly regained.
- g. Continue to relax right rudder pressure as the airspeed increases in the dive and smoothly increase aft stick pressure as necessary to maintain a constant pitch rate. The recovery will again require approximately 4 Gs, so remember to resume the AGSM.

4. Common Errors.

- a. Failure to check and report the altitude prior to entry. It is hard to recover on the altitude you began the maneuver when you do not know what it is.
- b. Poor directional control caused by failure to maintain balanced flight with the proper amount of right rudder as airspeed is lost and then regained. Poor rudder control is easily detected by checking the alignment of the nose and the section line. Remember that the required rudder input varies as airspeed varies. Almost constant rudder adjustment will be required during the maneuver.

NOTE

Landing gear and flap retraction is not possible once extended using emergency landing gear extension system.

5. Land as soon as practical

CONTROLLABILITY CHECK (STRUCTURAL DAMAGE/FLIGHT CONTROL MALFUNCTION)

If a bird strike, structural damage, or a flight control malfunction occurs or is suspected in flight, a decision to abandon the aircraft or attempt a landing must be made. The following check aids the pilot in determining whether the aircraft may be safely landed, and if so, what configuration is best for safe landing.

If rudder trim push rod failure is suspected, binding may occur on internal components of the rudder trim system. This binding may cause control forces to exceed normal limits. In some cases, with a binding rudder trim push rod, the trim indications will respond to trim inputs, but will have no effect upon rudder pedal forces or trim tab position. Movement of the rudder trim or rudder pedals in both directions may eliminate the binding condition and allow for easier controllability. If unable to eliminate the binding by changing the control position: bank angle, power, and/or airspeed changes may relieve some excessive control forces. In all cases, use whatever means available to maintain aircraft control.

WARNING

Failure to stow the gust lock completely may prevent the flight controls from operating properly. Any attempt to actuate the flight controls with the gust lock not properly stowed may result in damage to the flight control assemblies.

1. Climb to minimum 6000 ft AGL, if practical

On aircraft with a suspected rudder trim push rod failure, perform Steps 2 thru 7; otherwise, proceed to Step 8.

NOTE

If necessary, relax rudder pedal force and allow heading to drift, controlling heading with bank angle. If the aircraft slip indicator is fully deflected, remain below 140 KIAS.

2. TAD switch - OFF
3. Check rudder trim indicator position
4. TRIM DISCONNECT switch - NORM
5. RUD TRIM circuit breaker (left front console) - Check, reset if open

6. Rudder trim - Move left and/or right
7. Rudder pedals - Move left and/or right
8. Check flight characteristics, gradually slowing aircraft to landing configuration and airspeed

WARNING

- Do not stall aircraft or slow to the point that full stick or rudder is required to maintain aircraft control. In no case should the aircraft be slowed below 90 KIAS or to activation of the stick shaker, whichever is higher.
- Do not change configuration once controllability check is complete.

CAUTION

If flap system damage is known or suspected, do not reposition flaps.

NOTE

Ensure all power options (idle to max power) are attempted during the controllability check. With the PCL at IDLE, zero torque will simulate the flare and landing. This condition should demonstrate if the rudder is available for a normal landing.

9. Fly no slower than minimum controllable airspeed plus 20 KIAS until on final approach
10. Fly a power-on, straight-in approach requiring minimum flare and plan to touch down at no less than previously determined minimum controllable airspeed

WARNING

With a suspected rudder trim push rod failure and a crosswind component that exceeds 5 knots, directional control on final approach may be extremely difficult if the binding condition does not allow the application of proper crosswind controls. Fly a no-flap, straight-in approach.

CAUTION

Landings have been accomplished at touchdown speeds up to approximately 110 KIAS with landing flaps and 130 KIAS with flaps up. Anticipate increased directional sensitivity and longer landing distances at touchdown speeds above 100 KIAS. High touchdown airspeeds also increase the potential for a blown tire, brake fade, and/or overheated brakes.

TRAINING RULES

NOTE: Brief items applicable to your mission in sufficient detail to prevent any misunderstandings between crewmembers

Minimum Altitudes

- Aerobatics or confidence maneuvers: 6,000' AGL.
- Stalls or slow flight: 7,000' AGL.
- Spins: > 10K MSL and < 22K MSL, ensure spin developed by 13,500' AGL.
- Progressive spin: 19,000' AGL.
- Ejection:
 - Controlled: 2,000' AGL.
 - Uncontrolled: 6,000' AGL.
- Dual : 1000' AGL (unless on syllabus LL event on scheduled route).
- Night: 2000' AGL.
- Noise sensitive areas (beaches, sporting events, etc.): 3000' AGL (FWOP).
- Formation Low Approach: 100' AGL.

Minimum Weather

- Aerobatics: Clear of clouds (if in MOA) with discernable horizon.
- NSE Pattern: 1000/3 VFR.

“Knock-It-Off” Situations - “Knock-It-Off” will be called when safety of flight is a factor or where doubt or confusion exists (examples are listed below):

- A dangerous situation is developing.
- Situational awareness (SA) is lost.
- Any aircraft exceeds maneuvering limits that compromise Safety of Flight (for example, over-G, minimum airspeed).
- Bingo fuel is inadvertently overflowed.

“Terminate” Situations - When Safety of Flight is not a factor, “terminate” will be used to discontinue maneuvering:

- Bingo fuel is reached.
- Desired learning objectives are met.
- The aircraft is out of position with no expectation of an expeditious return to position.

“Knock-It-Off”/ “Terminate” Actions

- Clear the flight path
- Cease maneuvering and climb or descend to a safe altitude
- Maintain visual if able
- Acknowledge IAW FWOP/FTI

Low Level Flights

- Low Levels shall not be flown solo.
- Enter route no earlier than 30 min after sunrise and exit no later than 30 min before sunset.
- Fly at an altitude of 500'-1500' AGL, maintain min of 500' above highest terrain w/ 2000' of the aircraft.
- Plan to fly a minimum of 500' above highest obstacle w/ 2 NM of the aircraft. After obstacle positively identified, maintain 2000' horizontal clearance.
- Off station Low Levels require Ops Officer approval.
- Radar altimeter shall be used, set no lower than 10% of altitude.
- Bird Hazard: Low/Moderate can be flown; if Severe, do not enter route.
- Aircrew shall not enter route unless w/ + / - 3 minutes of schedule entry time.

G-Awareness Exercise

- Fly the G-awareness exercise in airspace that is free from potential conflict; ensure adequate spacing between formation aircraft.
- **Perform any time > 3Gs anticipated for sortie.**

Lost Sight or "Blind"

- The pilot flying the aircraft that loses sight will call "blind" and the altitude.
- The visual aircraft will assume formation deconfliction and execute the following:
 - If the #1 aircraft is blind, transmit "blind, X,XXX feet" and maintain a predictable flightpath.
 - The wingman will either call "continue" and state his or her position or call "Knock-It-Off".
 - If the wingman is blind, transmit "blind, X,XXX feet" & maneuver away from #1's last known position. #1 will coordinate for a rejoin.

TRAINING TIME OUT POLICY

- Called in any training situation where a student or IP expresses concern for personal safety or requests clarification of procedures or requirements. Also relief from physical discomfort.

FORMATION

- SECTION TAKEOFF / LANDING
 - Circling minimums.
 - Dry runway.
 - Runway: Min 5000' length / 150' wide.
 - 10 kts max crosswind.
 - Formation Touch and Go is prohibited.
- Basic Formation training limited to local area unless approved otherwise by TW5.

STUDENT SOLO (FWOP)

- 10 kts crosswind.
- 25 kts headwind.
- No tailwind.
- 5000' runway.
- WX 5000'/5 (3000'/5 formation solo) home field to depart, clear in area.
- Prohibited from practicing emergencies / ELPs / NF Landings.
- On deck NLT 30 mins. prior to sunset.

FLIGHT TIME (FWOP)

- Daily flight time should not exceed 3 flights / 6.5 hours total.
- Squadron Commanders may approve up to a 14 hour crew duty day.

FWOP RESTRICTIONS

- PPEs may be practiced day and night at uncontrolled airfields, but pilots are reminded general aviation pilots may be unfamiliar with ELP traffic pattern.
- OCF in T-6 requires ground reference and visible horizon and no higher than a 4,000' undercast. **Aerobatics only require visible horizon.**
- Aircrew **should** not depart NSE on CCX or O&I with more than 2 tire cords exposed.
- When NSE/NDZ closed, practice instrument approaches under VFR conditions are authorized however 500' AGL shall be used as lowest MDA or DH.
- Taxi lines in the HUB are not mandatory during daylight hours.
- **Aerobatics/OCF in all Alert Areas shall squawk 4700 (unless on discreet squawk).**
- TW5 aircraft shall not operate at NOLFs without an RDO present.

Ejection Seat Sequencing Mitigation

Procedures

• Dual Flights

- ISS Mode Selector – SOLO in flight (Before Takeoff checks)
- RCP occupant shall initiate ejection ON third “EJECT” call
- FCP occupant shall initiate ejection NET ~0.5 sec AFTER third “EJECT” call

• Solo Flights

- Normal NATOPS Procedures Apply
- Ensure ISS Mode Selector is in SOLO

Contingencies

• FCP Incapacitation

1. ISS Mode Selector – BOTH
2. RCP – Eject

• ICS Failure

- “Face curtain” signal serves as the preparatory command during a controlled ejection. A thumbs up from each occupant is required to initiate ejection sequence.
- FCP shall initiate ejection sequence with three “raps” of the canopy
- RCP occupant shall initiate ejection ON third “rap”
- FCP occupant shall initiate ejection NET ~0.5 seconds AFTER third “rap”

CRM

• RCP Delaying Ejection

- May lead to collision with FCP seat
- RCP shall not hesitate or delay ejecting
- RCP occupant shall initiate ejection ON third “EJECT” call

• FCP Initiating Ejection Too Soon

- May lead to collision with RCP seat
- FCP shall initiate ejection NET ~0.5 sec after third “EJECT” call

Misc

• Unqualified personnel prohibited

- Must be NATOPS qualified, enrolled in a formal aviation syllabus, or an observer qualified Naval Flight Officer, Flight Surgeon, or Aeromedical Safety Officer

• Delaying ejection below 2,000 ft AGL is not recommended

• Any delays may negatively impact the ejection envelope

- FCP occupant initiates ejection NET ~0.5 sec AFTER third “EJECT” call or immediately after confirming the RCP occupant has ejected
- Proper manual ejection sequencing requires the RCP occupant to eject prior to the FCP occupant