UNIVERSITY OF DUBUQUE
FLIGHT TRAINING
STANDARDIZATION MANUAL

September 11, 2013

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PREFLIGHT PREPARATION

FLIGHT INSTRUCTION BASICS

—**The Demonstration & Performance Method** of flight instruction will be used by all University of Dubuque Flight instructors.

—**The Integrated Flight Instruction Method** will also be used. Using this method the flight instructor explains all maneuvers by referring to "outside" visual references and "instrument" references.

—**Checklist Usage** Our training aircraft do not require two crewmembers and therefore our pilots must demonstrate single-pilot proficiency in the training aircraft to pass the FAA Practical Tests and to safely operate in a single pilot environment.

—**Read and Do Lists** Read and Do Lists must be accomplished only by reference to the lists and not by memory. These actions are normally associated with Abnormal Procedures. However, for safety during training, this philosophy will also be used for all our Normal Procedures and adherence to the checklists for all phases of flight will be required.

The entire Read and Do task must be read before any action is taken. **Example:** Pilot flying reads: "Throttle, 1800 RPM", (read eighteen hundred RPM). Pilot flying sets the throttle to 1800 RPM and acknowledges: "EIGHTEEN HUNDRED RPM". All Read and Do actions are written in the present tense but the response should be in the past tense since the item has been completed, i.e, Pilot flying reads "PROP CLEAR", the pilot performs the action and acknowledges: "CLEARED".

At the completion of every checklist phase of flight, the Pilot flying acknowledges :

_____ checklist complete i.e., "LANDING CHECKLIST COMPLETE".

If you are interrupted during any checklist, stop and announce - "HOLD CHECK LIST AT_____". When returning to the checklist, start that particular checklist over from the beginning.

—**Memory Items** Memory actions are performed by memory with the aid of a flow pattern to help ensure each task is performed. These are often referred to as "flows" or "flow checks" in larger aircraft. Each training aircraft will have its own flow patterns. It is important to learn these flow patterns to keep items as simple as possible. Too much memorization interferes with the pilot's ability to learn other tasks crucial to becoming a safe, skilled, proficient pilot. Most of the memory actions deal with emergency situations when it is impractical to read a checklist. In all cases, the pilot should consult the checklist **AFTER** the aircraft is stabilized and verify correct actions have been taken. **Bold items on the emergency checklists should be committed to memory.**

USE APPROPRIATE CHECKLISTS ON EVERY FLIGHT

—**Transfer of Controls** will be discussed and conducted according to FAA procedure at all times.

—**Collision Avoidance/Clearing Procedures** must be verbal and must be taught from the beginning and adhered to at all times. UD aircraft will monitor 121.95 when in the practice areas.

—**Heading Indicator Precession** checks must be taught from the very beginning and adhered to all times.

—**Clearing Turns** The first clearing turn prior to a sequence of maneuvers will be a 360° clearing turn. Subsequent clearing turns will be, as directed, by the instructor. Wings should be raised for a better view prior to clearing for a turn. Check for obstructions during all clearing procedures.

—**Stowage of cargo** All cargo will be stowed and secured appropriately. Cessna 172 cleaning materials and towbar will be stowed in baggage area 2 as noted in the POH. Similar items in the Trinidads and Seminoles will be stored in the baggage area.

DISPATCH

—**IMSAFE** Is the student fit to fly? Is the instructor fit to fly?

—**WEATHER**

—Students will check, write down, and analyze the weather.

—Students will give a weather briefing, to include METARs, TAFs, FDs, NOTAMs, and TFRs, to their instructor before each flight.

—Ceilings and winds will be compared to UD standards.

—Crosswind components will be compared to UD standards.

—**AIRCRAFT DISPATCH**

—**AIRCRAFT BINDERS** will be dispatched from the DISPATCH DESK

—**STUDENTS WILL TAKE** the aircraft assigned to them.

—**ASSIGNMENT PROBLEMS** If students have problems with aircraft assigned to them, they will discuss the problem with their instructor. If the instructor has a problem with the aircraft, the instructor will consult a supervisor, the supervisor will consult dis patch.

—**AIRCRAFT BINDERS**

—**NEXT INSPECTION TIME** will be compared to current airplane time.

—**TRANSPONDER** inspection date will be checked.

—**STATIC SYSTEM** inspection date will be checked.

—**ALTIMETER** inspection date will be checked.

—**MODE C ENCODER** inspection dates will be checked.

—**ELT BATTERY DUE DATE** will be checked.

—**VOR CHECK** will be done and recorded before any IFR flight.

The airplane **WILL NOT BE FLOWN** if any of the above dates have passed

—**SQUAWKS** The squawk sheet will be checked for **ANY OPEN SQUAWKS**.

—AIRCRAFT **WILL NOT BE FLOWN** WITH **OPEN SQUAWKS.**

—Previous squawks will be reviewed and checked prior to flight.

—NPPC (Next Pilot Please Comment) written next to a squawk means the Maintenance Manager would like the instructor to observe and report on the noted squawk.

MANDATORY CALL-OUTS

—Call ALL HOLD SHORT LINES (coming and going) as follows:

"HOLD SHORT LINE: CLEARED to cross!" or

"HOLD SHORT LINE: NOT CLEARED to cross!"

—Call prior to taxiing onto runway for takeoff:

"FINAL APPROACH CLEAR!"

—Call during takeoff roll:

"AIRSPEED ALIVE — POWER STABLE!"

"VR!" (on reaching rotate speed)

—Call during climbout:

"POSITIVE RATE!"

"UNABLE TO LAND — GEAR UP!"

—Call during climbs and descents:

"1000 FEET TO GO!"

"200 FEET TO GO!"

—Call after the completion of all written checklists:

"CHECKLIST COMPLETE!"

—Call GUMPS checklist on BASE and FINAL:

"GAS, UNDERCARRIAGE, MIXTURE, PROPS, SWITCHES!"

—Call after GUMPS completed on final:

"LANDING CHECKLIST COMPLETE!"

PREFLIGHT PROCEDURES

PREFLIGHT INSPECTION

—**PREFLIGHT INSPECTION** will be conducted using an approved checklist.

—**HAVE THE CHECKLIST IN HAND** as you do the preflight.

—**PREFLIGHT INSPECTIONS** will be done in a **thorough and methodical** manner.

—**PREFLIGHT PROBLEMS** will be reported to the flight instructor immediately.

—**CLEAN THE WINDSHIELD** this is a SAFETY MATTER.

—**CHECK FOR PROPER TIRE INFLATION** this is a SAFETY MATTER.

—**LOCK THE BAGGAGE DOOR** with key if possible.

—**TOW BAR** make sure the towbar is removed and stowed in the baggage area.

—**CHOCKS** make sure chocks are removed and stowed in the baggage area.

NOTE: Instructors should observe all pre-solo preflights. After solo, instructors should regularly observe their students preflighting activities.

NOTE: Instructors will do a "WALK-AROUND" and check the aircraft for gas, oil, towbar, flags, chocks, baggage door, and other obvious problems before each flight.

COCKPIT MANAGEMENT

—**STOW AND SECURE ALL CARGO SAFELY**

—All cargo will be stowed and secured appropriately.

—All materials associated with cleaning or handling the aircraft will be stowed in the appropriate baggage area.

—**SEAT PASSENGERS** per weight & balance planning.

—**SECURE PASSENGERS** with seatbelts and harnesses.

—**STOW ALL FLIGHT EQUIPMENT** in a logical and secure manner.

—**ADJUST SEATS** make sure student and instructor can reach all controls easily.

—Remember, good vision over the nose is necessary to make good landings.

—Proper positioning of feet on rudder pedals is very important.

—**BRIEF ALL PASSENGERS** on SAFETY INFORMATION before engine start.

—Use the aircraft BRIEFING CARD if one is available.

ENGINE STARTING

—**AIRCRAFT LOCATION** Do not blow debris on other aircraft, people, equipment, or into open hangars when you start the engine.

—**USE THE CHECKLIST** to perform the engine start

—Call "Checklist Complete !"

—**ROTATING BEACON ON**

—**HAND PROPPING** of UD aircraft **IS NOT ALLOWED**

However, students will be given ground instruction in safe hand-propping procedure.

PRE-TAXI

—**GENERAL**

—**REVIEW EXCHANGE OF CONTROLS**

—**CHECK WINDSOCK**

—**ATIS**

—**SELECT ATIS FREQUENCY**

—**WRITE DOWN THE ATIS INFORMATION**

—**REVIEW ATIS**

—SET ALTIMETER

—CONFIRM VFR VISIBILITY & CLOUD CLEARANCE for the airspace

—CONFIRM VFR CONDITIONS are within UD limits

—CONFIRM WINDS are within UD limits

—**REVIEW EXPECTED TAXI ROUTE** on AIRPORT DIAGRAM

—**SET ALL RADIOS**

—**COMM PANEL**

—**GPS**

—**COMM/NAV 1** check volumes

—**COMM/NAV 2** check volumes

—**ADF**

—**TRANSPONDER**

—**AUTOPILOT**

—**REVIEW THE TAXI CHECKLIST**

—**TAXI CLEARANCE**

—**REQUEST, WRITE DOWN,** and **READBACK** taxi clearance

—**REVIEW ASSIGNED TAXI ROUTE**

—**REQUEST DELAY** if needed to review taxi route

—**REQUEST PROGRESSIVE TAXI** if needed

—**TURN ON TAXI LIGHT**

TAXI

—**CLEAR THE AREA**

—**POSITION CONTROL WHEEL** for the wind

—**BEGIN TAXI ROLL**

—**PERFORM TAXI CHECKLIST**

—**CHECK STEERING**

—**PERFORM PILOT BRAKE TEST** after closing throttle

—**EXCHANGE CONTROLS** and **PERFORM COPILOT BRAKE TEST**

—**EXCHANGE CONTROLS** and **RESUME TAXI**

—Call "TAXI CHECK COMPLETE !"

—**TAXI** at a **SAFE SPEED** consistent with taxiway and traffic conditions

—**STEER WITH RUDDER PEDALS** and not the brakes

—Use brakes **ONLY WHEN NEEDED** for steering and stopping

—**DO NOT RIDE THE BRAKES!**

—**CALL OUT** and **VERIFY** the **RAMP/TAXIWAY HOLD SHORT LINE**

—**PERFORM** the **FIRST TURN GYRO** and **COMPASS CHECKS**

—**STAY ON THE YELLOW TAXIWAY CENTERLINE**

—**CALL OUT ALL** TAXIWAY **SIGNS**, TAXIWAY **MARKINGS**, and **HOLD SHORT LINES**

—DO NOT PERFORM "non-taxi" tasks while taxiing!

—DO NOT COPY CLEARANCES while taxiing

—DO NOT TUNE NAV RADIOS while taxiing

—**REMAIN ALERT FOR TAXI HAZARDS AT ALL TIMES**

—AT THE RUNUP AREA

—**DO NOT PARK** facing obstacles

—**PARK 45° ACROSS THE CENTERLINE** to the wind side when wind is a factor

—**PARK 45° ACROSS THE CENTERLINE** toward final when wind is not a factor

—**SET PARKING BRAKE**

BEFORE TAKEOFF CHECK

—**CLEAR THE AREA**

—**HOLD THE CONTROL WHEEL** at ALL TIMES during the engine check

—**READ and PERFORM the BEFORE TAKEOFF CHECKLIST**

—**FOLLOW THE CHECKLIST EXACTLY**

—Call "BEFORE TAKEOFF CHECK COMPLETE !"

—**PERFORM the TAKEOFF EMERGENCIES BRIEFING**

—**Engine failure on the runway**

—**Engine failure below traffic pattern altitude**

—**PERFORM the TAKEOFF BRIEFING** (short, soft, normal, and departure)

—**TAKEOFF POINT** call out

—**TAKEOFF ABORT POINT** call out

—**TAXI up to the HOLD SHORT LINE**

—At controlled airports

—**POSITION THE AIRPLANE** so you can observe final for traffic

—**REQUEST, WRITE DOWN,** and **READBACK** TAKEOFF CLEARANCE

—**REVIEW** any clearance changes

—**STROBES ON / LANDING LIGHT ON** **"AFTER"** getting your takeoff clearance

—**TAXI TO RUNWAY CENTERLINE** following the lead line, if available, unless doing a short field takeoff.

—At uncontrolled airports

—**360° CLEARING TURN** if possible, to observe the whole pattern for traffic

—**ANNOUNCE TAXIING ONTO ACTIVE RUNWAY** for takeoff on CTAF

—**TAXI TO RUNWAY CENTERLINE**

TAKEOFFS, PATTERNS, LANDINGS

Note: **Airspeeds listed will be in the following order: C-172, C-172SP, TB20, PA-44 as appropriate.**

Beware of Distractions

**Most gear-up landings are the result of distractions.*

**Be mindful of this, particularly in traffic patterns and while practicing emergency/power off landings.*

**Complete landing checklist on all approaches.*

**Verbalize GUMPS - "Landing checklist complete."*

NORMAL TAKEOFF & CLIMB

NOTE: NORMAL TAKEOFF assumes:
(1) NO WIND
(2) WIND RIGHT DOWN THE RUNWAY . . . or
(3) VERY LITTLE CROSSWIND

REMEMBER, even the smallest crosswind can cause problems during takeoff for those pilots who do not appreciate the effect these winds can have.

PROCEDURE

—**LINE UP ON THE CENTERLINE**

—**CHECK HEADING INDICATOR** call out match with assigned runway heading

—**CHECK THE WIND SOCK** and **CALL THE WIND**

—**ROLL AILERONS** FULL INTO THE WIND

—**HOLD ELEVATORS** NEUTRAL

—**CHECK THE RUNWAY** call "RUNWAY CLEAR"

—**FULL THROTTLE SMOOTHLY**

—**STAY ON THE CENTERLINE** with rudders

—**CALL** "AIRSPEED ALIVE" and "POWER STABLE"

—**CALL ROTATION** "55 AND ROTATE" 55—68—75

—**CRAB INTO WIND** immediately after liftoff to maintain runway centerline

—**PITCH FOR and HOLD V_Y** when safely clear of ground 79/74—95—88

—**TRIM FOR CLIMB V_Y**

—**CALL "UNABLE TO LAND, GEAR UP" TOUCH BRAKES** and **RETRACT GEAR** when appropriate (complex aircraft)

—**RETRACT FLAPS at 300' AGL**

—**CALL CHECKING TRAFFIC and ENGINE**

CROSSWIND TAKEOFF & CLIMB

PROCEDURE

—**LINE UP ON THE CENTERLINE**

—**CHECK HEADING INDICATOR** call out match with assigned runway heading

—**CHECK THE WIND SOCK** and **CALL THE WIND**

—**ROLL AILERONS FULL INTO THE WIND**

—**CHECK THE RUNWAY** call "RUNWAY CLEARr"

NOTE: Aileron deflection MUST ALWAYS BE LEFT IN, during takeoff roll, to the extent necessary to counteract the crosswind. Remember that EVEN THE SMALLEST CROSSWIND has a disruptive effect on the takeoff.

—**HOLD ELEVATOR** SLIGHTLY NOSE DOWN if the crosswind requires

—**FULL THROTTLE SMOOTHLY**

—**STAY ON THE CENTERLINE** with rudders

— **CALL** "AIRSPEED ALIVE" and "POWER STABLE"

—**LESSEN AILERON INPUT** as speed increases and as crosswind permits

—**CALL ROTATION** **"55 AND ROTATE"** 55—68—75

NOTE: In strong crosswinds, pilots would be well advised to increase the aircraft rotation speed by 2-5 kts to insure a clean break with the runway at rotation. This helps prevent placing side-loads on the landing gear.

—**CRAB INTO WIND** immediately after liftoff to maintain runway centerline

—**PITCH FOR and HOLD V_Y** when safely clear of the ground 79/74—95—88

—**TRIM FOR V_Y**

— **CALL "UNABLE TO LAND, GEAR UP" TOUCH BRAKES** and **RETRACT GEAR** when appropriate (complex aircraft)

—**RETRACT FLAPS at 300' AGL**

—**CALL CHECKING TRAFFIC and ENGINE**

SHORT-FIELD TAKEOFF & MAXIMUM PERFORMANCE CLIMB

NOTE: Short-Field Procedure, POH Sections 4 and 5, should be reviewed when doing pre-flight planning takeoff calculations. PA-44 obstacle clearance speed no slower than 70 with 25˚ flap.

PROCEDURE

—**LINE UP ON CENTERLINE** as close to the end of the runway as possible

—**STOP** with nosewheel straight

—**VERIFY FLAPS** for short-field per POH

—**CHECK THE WIND SOCK** and **CALL THE WIND**

—**ROLL AILERONS FULL INTO WIND**

—**HOLD ELEVATOR** NEUTRAL or SLIGHTLY NOSE DOWN if the crosswind requires

—**CHECK RUNWAY** and call "RUNWAY CLEAR"

—**HOLD THE BRAKES**

—**THROTTLE SMOOTHLY TO FULL POWER**

—**CHECK ENGINE GAUGES** in the GREEN

—**RELEASE BRAKES** get COMPLETELY OFF THE BRAKES !

—**STAY ON THE CENTERLINE** with rudders

— **CALL** "AIRSPEED ALIVE" and "POWER STABLE"

—**LESSEN AILERON INPUT** as speed increases and as crosswind permits

—**CALL ROTATION** **"55 AND ROTATE"** 51—71—70

—**CRAB INTO WIND** immediately after liftoff to maintain centerline

—**PITCH and HOLD OBSTACLE CLEARANCE SPEED** 57—56—78—82

—**CALL "UNABLE TO LAND, GEAR UP" TOUCH BRAKES** and **RETRACT GEAR** when appropriate (complex aircraft)

—**PITCH and HOLD Vy** when safely clear of obstacles 79/74—95—88

—**TRIM FOR CLIMB Vy**

—**RETRACT FLAPS at 300' AGL**

—**CALL CHECKING TRAFFIC and ENGINE**

SOFT-FIELD TAKEOFF & CLIMB

NOTE: Soft-Field run-up should be done on solid ground before getting to the runway. Flaps should be set for soft-field takeoff during the run-up actions.

PROCEDURE

—**LINE UP ON CENTERLINE** *(DO NOT STOP — KEEP ROLLING)*

—**CHECK RUNWAY** call *"RUNWAY CLEAR"*

—**CHECK THE WIND SOCK** and **CALL THE WIND**

—**ROLL AILERONS FULL INTO WIND**

—**APPLY CONTROL WHEEL BACK PRESSURE**

—**THROTTLE TO FULL POWER** smoothly

—**STAY ON DRYEST GROUND** with rudders

—**LESSEN AILERON INPUT** as crosswind dictates

—**MAINTAIN CONTROL WHEEL BACK PRESSURE** to hold nosewheel just off the ground

— **CALL** "AIRSPEED ALIVE" and "POWER STABLE"

—**LIFT OFF AT MINIMUM AIRSPEED**

—**CRAB INTO WIND** to maintain runway centerline

—**MAINTAIN A SHALLOW CLIMB UNITIL REACHING Vx**

—**PITCH FOR and HOLD Vx TO 50'** 60—62—75—82

—**PITCH and HOLD V_Y AFTER 50'** 79—74—95—88

—**CALL "UNABLE TO LAND, GEAR UP" TOUCH BRAKES** and **RETRACT GEAR** when appropriate (complex aircraft)

—**CLIMB / TRIM FOR V_Y**

—**RETRACT FLAPS at 300' AGL**

—**CALL CHECKING TRAFFIC and ENGINE**

TRAFFIC PATTERN

—**AIM** All patterns will be flown per AIM recommendations

—**SPEEDS and DISTANCES**

—**CROSSWIND** Vy and 1/2 mile from the runway

—**DOWNWIND** 85—100—110 and 1/2 to 1 mile from the runway

—**BASE** 75—90—100 and 1/2 mile from the runway

—**FINAL** 65—80—90

—**COLLISION AVOIDANCE**

—Traffic will be checked **PRIOR TO EACH TURN** in the pattern

—**CONTROLLED AIRPORT PROCEDURES**

—**ATC INSTRUCTIONS** will be followed at towered airports; except when necessary to deviate due to an emergency

—**PATTERN ALTITUDE** will be 800' AGL unless noted otherwise in the A/FD

—**CLARIFICATION** of any unclear ATC instructions will be requested

—**UNCONTROLLED AIRPORT PROCEDURES**

—**VISUAL COLLISION AVOIDANCE** procedures are primary

—**NORDO** Some small aircraft do not have radios

—Some pilots do not use radios at uncontrolled airports

—**OVERFLIGHTS** for checking pattern will be made at 500' above pattern altitude

—**PATTERN DIRECTION** will be standard left unless noted otherwise in the

—A/FD

—Sectional Chart

—Segmented Circle

—**PATTERN ALTITUDE** will be 1000' AGL unless otherwise noted in the A/FD

—**PATTERN ENTRIES** will per the AIM

—**RADIO CALLS** will be made as follows:

—10 miles inbound
—2 miles inbound
—Entering pattern
—On all legs of the pattern
—Backtaxiing
—Clear of runway
—Beginning to taxi
—Taking the runway for departure
—Beginning takeoff roll
—Departing the airport area

NORMAL & CROSSWIND APPROACH & LANDING

—**BASE LEG**

—**POSITION** begins at the 45° point (±) (depends on the wind)

—**DESCENDING**

—**FLAPS** 20°—10°—25°

—**PARTIAL POWER** to allow for positive control

—**SPEED** 75—90—100

—**TRIM** hands off

—**WIND CONTROL** crab

—**GUMPS CHECK** call out

—**CHECK TRAFFIC** call out

—**FINAL APPROACH**

—**FLAPS** 30°—40°—40°

—**POWER** partial to allow for better control and to keep the engine warm

—**SPEED** 65—80—90

—**TRIM** hands off

—**WIND CONTROL** sideslip keeping the longitudinal axis straight with the centerline of the runway

—**GUMPS CHECK** call out

—**CHECK TRAFFIC** call out

—**AIMING POINT** should be the middle of the first third of the runway

—**ROUNDOUT**

—**SPEED** Begin slowing toward stall speed — Vso

—**POWER** can be reduced to idle at any point after the roundout based on situation

—**TRIM** can be increased, nose up, to lighten the elevator pressure

—**WIND CONTROL** correct for any drift

—**TOUCHDOWN**

—**MAIN GEAR** on the ground first / upwind main wheel first

—**WIND CONTROL**

—Ailerons FULL INTO WIND after touchdown

—Pitch FULL BACK for aerodynamic braking

—**CENTERLINE** Track centerline using rudder pedals

SLIPS TO A LANDING

NOTE: Before doing Forward Slips, check the POH/AFM, Section 2, for limitations.

NOTE: This maneuver is primarily associated with aircraft NOT HAVING FLAPS.

NOTE: Slips should NOT be used to fix a bad final approach.

FORWARD SLIP

PURPOSE To increase descent rate without increasing airspeed

—**NOSE POINTS** to the SIDE, of course

Note: Pitch for normal approach speed before initiating slip power is idle.

PROCEDURE

—**LOWER WING** on the upwind side

—**ADD RUDDER** opposite the aileron deflection

—**TRACK CENTERLINE** by varying control pressures

—**HOLD** normal airspeed

—**RECOVER** at an altitude that will allow transition to a normal landing

SIDE SLIP

PURPOSE To keep the airplane over the extended centerline with the nose pointed straight down the runway

PROCEDURE

—**LOWER WING** on the upwind side with ailerons just enough to stop drifting

—**ADD RUDDER** just enough opposite rudder to keep nose pointed straight ahead

—**HOLD CENTERLINE** Using aileron and rudder, cross-controlled, to prevent drift and to keep the longitudinal axis aligned with the centerline

—**ON TOUCHDOWN** roll ailerons full into the wind, and use the rudder to steer down the runway, on the centerline

GO-AROUND

PURPOSE to terminate a landing approach and go around for another try

PROCEDURE

—**DECIDE TO GO AROUND**

—**MAX POWER** allowable applied

—**LEVEL WINGS**

—**PITCH FOR Vx** 60/62—85—82

—**FLAPS** to takeoff setting (or per POH)

NOTE: The airplane may touchdown briefly and then become airborne again.

—**POSITIVE RATE** (when the VSI reverses direction)

—**GEAR UP**

—**SPEED TO Vx** going to Vy

—**FLAPS ALL UP**

—**RADIO CALL "GOING AROUND"**

—**CHECK & CALL TRAFFIC, ENGINE & FUEL GAUGES**

SHORT-FIELD APPROACH & LANDING

—**BASE LEG**

—**FLAPS** 20°—10°—25°

—**POWER** partial for positive control

—**SPEED** 70—90—100

—**TRIM** hands off

—**WIND CONTROL** crab

—**CHECK TRAFFIC** verbal call

—**FINAL APPROACH**

—**FLAPS** 30°—40°—40°

—**POWER** partial then idle after clearing obstacle

—**SPEED** 62—73—85

—**TRIM** hands off

—**WIND CONTROL** sideslip

—**CHECK TRAFFIC** verbal call

—**AIMING POINT** just beyond the obstacle

—**ROUNDOUT**

—**ALTITUDE** 5 -10 feet

—**DESCENT RATE** slows as back pressure applied to control wheel

—**SPEED** slowing toward stall speed — Vso

—**TRIM** can be increased, nose up, to lighten the elevator pressure

—**WIND CONTROL** correct for any drift

—**TOUCHDOWN**

—**MAIN GEAR** touches down first

—**WIND CONTROL**

—Ailerons FULL INTO WIND.

—Pitch FULL BACK for aerodynamic braking

—**CENTERLINE** Track CENTERLINE using rudders pedals

—**FLAPS RETRACT** Simulate flaps up by calling “FLAPS UP”

—**APPLY BRAKES** Simulate brake application by calling “BRAKES NOW”

SOFT-FIELD APPROACH & LANDING

—**BASE LEG**

—**FLAPS** 20°—10°—25°

—**POWER** partial for positive control

—**SPEED** 70—90—100

—**TRIM** hands off

—**WIND CONTROL** crab

—**CHECK TRAFFIC** verbal call

—**FINAL APPROACH**

—**FLAPS** 30°—40°—40°

—**POWER** partial throughout the landing until on solid ground

—**SPEED** 62—73—85

—**TRIM** hands off

—**WIND CONTROL** sideslip

—**CHECK TRAFFIC** verbal call

—**ROUNDOUT**

—**POSITION** Begin at 10-15 feet AGL and ease it down till just off the ground.

—**DESCENT RATE** stop by applying back pressure to the control wheel

—**SLIGHT POWER**

—Use slight power to soften the touchdown

—**SPEED** Slow but NOT stalling

—**WIND CONTROL** sideslip to control drift

—**TOUCHDOWN**

—**MAIN GEAR** Ease the mains on the ground first. Hold the nose off long as possible

—**WIND CONTROL**

— Ailerons FULL INTO WIND. Hold the nose wheel off the ground with elevator

—**POWER**

—Use power to keep the airplane rolling to solid ground

STRAIGHT & LEVEL, TURNS, CLIMBS, DESCENTS

STRAIGHT AND LEVEL

—**STRAIGHT AND LEVEL MEANS:**

—**HOLDING A CONSTANT HEADING**

—**HOLDING A CONSTANT ALTITUDE**

—**HOLDING WINGS LEVEL**

PROCEDURE

—**HOLD WINGS LEVEL** using the ailerons

—(VR) Check the wingtips to see if they are equally above or below the horizon.

—(IR) Check the ATTITUDE INDICATOR for a wings level position.

—**HOLD A CONSTANT HEADING** using the ailerons and rudder

—(VR) Heading the airplane so one or more "on-course" landmarks stay in a consistent spot somewhere on the airplane windshield. If you do this you will track directly to those spots.

—(IR) checking the HEADING INDICATOR to see that it remains constant.

—Maintain a constant heading by:

—Maintaining a zero yaw attitude by using the rudder to keep the ball centered,

—Maintaining a wings level attitude because a bank will change your heading,

—Demonstrate yaw around the vertical axis and yaw stability.

—**HOLD A CONSTANT ALTITUDE** using the elevator

—(VR) Hold the horizon in a constant height in the windshield.

—(IR) Check the altimeter.

—Demonstrate pitch around the lateral axis.

—Demonstrate pitch stability (phugoid movement on the longitudinal line).

—Demonstrate the effect of throttle changes on altitude and airpeed.

—Demonstrate maximum trim while holding level flight.

—Explain the relationship between elevator pitch and trim pitch.

LEVEL TURNS

PROCEDURE

—**CHECK TRAFFIC** and verbally call “clear” BEFORE each turn.

—**USE AILERON AND RUDDER** and ROLL into a coordinated turn.

—**ADD POWER** to hold airspeed when doing medium and steep turns.

—**USE PITCH** to maintain altitude.

RECOVERY

—**ROLLOUT** using visual references by making a coordinated turn in the other direction until wings level.

—Demonstrate that a turn is the maneuver used to **change heading**.

—Demonstrate that the airplane can be turned with RUDDER ALONE.

—Demonstrate that the airplane can be turned with AILERONS ALONE.

—(VR) Demonstrate that a rapid aileron bank results in **adverse yaw** of the nose.

—(IR) Demonstrate how adverse yaw causes the **ball** to react.

—Demonstrate how rudder is used to control yaw created by banking motions, thereby, making for **coordinated turns.**

—Demonstrate that a COORDINATED TURN requires the coordinated use of ailerons, rudder, elevator, and power.

—Demonstrate the three classes of turns: shallow, medium, and steep.

—Demonstrate a **shallow turn** (<20°) and show **positive bank stability.**

—Point out the **underbanking tendency**.

—Demonstrate a **medium turn** (20° to 45°) and show **neutral bank stability.**

—Demonstrate a **steep turn** (>45°) and show **negative bank stability**.

—Point out the **overbanking tendency**.

—Demonstrate the **effect of bank** on altitude and heading (**lift vector**).

STRAIGHT CLIMBS & CLIMBING TURNS

PROCEDURE

—**CHECK TRAFFIC** verbal call

—**PERFORM CLIMB CHECKLIST** as appropriate

—**ADD FULL POWER* and PITCH** at the same time

—**POWER** to full or climb power

—**PITCH** to climb attitude

—**CORRECT** for left turning tendencies using rudder

—**BANK AS REQUIRED** if turning

—**TRIM FOR VY** or cruise climb speed or as specified

—**CHECK AIRSPEED, PITCH, and HEADING**

—Airspeed for correct speed

—(VR) Nose and wingtips for correct attitude and heading

—(IR) Attitude Indicator for correct attitude (pitch and bank)

—(IR) Heading Indicator for correct heading

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

Full power in fixed-pitch airplanes
Climb power in airplanes with constant-speed props (25" and 2500 RPM)

NOTE: During climbs, gentle S-turns or a lowered nose can be used to check for traffic ahead.

LEVEL-OFF

NOTE: Begin level-off on reaching (10% of rate-of-climb) below cruise altitude

PROCEDURE

—**CHECK TRAFFIC** call out

—**BEGIN LEVEL-OFF BY . . .**

—**PITCHING DOWN GRADUALLY**

at 10% of the rate-of-climb lower than the desired altitude

—**SMOOTHLY INTERCEPT DESIRED ALTITUDE**

—**HOLD ALTITUDE** using elevator

—**BEGIN TRIMMING NOSE DOWN** during acceleration to relieve elevator pressure

—**ACCELERATE TO CRUISE AIRSPEED**

—**THROTTLE BACK TO CRUISE RPM**

—**TRIM FOR CRUISE** "hands-off"

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

STRAIGHT DESCENTS & DESCENDING TURNS

At various airspeeds and configurations

PROCEDURE

—**CHECK TRAFFIC** call out

—**PERFORM DESCENT CHECKLIST**

—**THROTTLE BACK** to desired descent power setting.

—**PITCH** to hold altitude until desired airspeed is reached.

—**PITCH DOWN** when desired descent airspeed is reached.

—**BANK AS REQUIRED** if turning.

—**STABILIZE DESCENT PITCH** by holding desired airspeed with pitch.

—**RUDDER AS REQUIRED** for coordinated flight.

—**TRIM** "hands off" to hold descent airspeed.

—**CHECK FOR TRAFFIC FREQUENTLY** call out

RECOVERY

—**RECOVER TO LEVEL FLIGHT** begin recovery (10% of rate) prior to desired altitude.

—**SET CRUISE POWER**

—**TRIM FOR CRUISE**

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

—**PERFORM CRUISE CHECKLIST**

SHALLOW TURNS

PROCEDURE

—**CHECK TRAFFIC** call out

—**BANK THE AIRPLANE** using coordinated ailerons and rudder

—Bank to 15° as estimated by visual reference to the horizon

—**ADD POWER** for airspeed as required

—**USE ELEVATOR** for altitude as required

—**STABILIZE TURN**

—STABILIZE BANK by holding aileron against positive stability

—Check the attitude indicator for bank accuracy

—STABILIZE YAW with rudder by keeping ball centered (Step on the ball)

—Check the ball for yaw accuracy

—STABILIZE ALTITUDE by using small amounts of up or down elevator

—Check the altimeter for altitude accuracy

NOTE: Check and call traffic, altitude, and bank every 90° of turn.

RECOVERY

—**ROLL OUT** on the desired visual reference by making a coordinated turn in the opposite direction until the wings are level

—Begin rollout at 1/2 the bank angle prior to desired heading

—**MAINTAIN ALTITUDE** on rollout with elevator

—**STABILIZE** the airplane

—**TRIM** for straight and level

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

MEDIUM TURNS

PROCEDURE

—**CHECK TRAFFIC** call out

—**BANK THE AIRPLANE** using coordinated ailerons and rudder

—Bank to 30° as estimated by visual reference to the horizon

—**ADD POWER** for airspeed as required

—**USE ELEVATOR** for altitude as required

—**STABILIZE TURN**

—STABILIZE BANK by neutralizing the ailerons

—Check the attitude indicator for bank accuracy

—STABILIZE YAW with rudder by keeping ball centered (Step on the ball)

—Check the ball for yaw accuracy

—STABILIZE ALTITUDE by using small amounts of up or down elevator

—Check the altimeter for altitude accuracy

—**TRIM** as necessary

NOTE: Check and call traffic, altitude, and bank every 90°

RECOVERY

—**ROLL OUT** on the desired heading by making a

coordinated turn in the opposite direction until the wings are level

—Begin rollout at 1/2 the bank angle prior to desired heading

—**MAINTAIN ALTITUDE** on rollout with elevator

—**STABILIZE** the airplane

—**TRIM** for straight and level

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

PERFORMANCE MANEUVERS

STEEP TURNS

MINIMUM RECOVERY ALTITUDE = 1500' AGL

ENTRY SPEED = 95—120—120

ENTRY HEADING = cardinal

—**PICK** = Select a place to do the maneuver.

—**PICK** = Select an EMERGENCY LANDING AREA.

—**CHECK** = Perform the PRE-MANEUVER CHECKLIST. (Leave gear up in retractables)

—**LOOK** = Check for traffic using standard UD procedures.

PROCEDURE

—**BANK THE AIRPLANE** using coordinated ailerons and rudder.

—Bank to Pvt 45°±5°, Comm 50°±5 as estimated by visual reference to the horizon.

—Check the ATTITUDE INDICATOR for bank accuracy.

—Check the TURN COORDINATION BALL for yaw (rudder) accuracy.

—**ADD POWER** for airspeed as required

—**USE ELEVATOR** for altitude as required

—STABILIZE ALTITUDE by using small amounts of up or down elevator.

—Check the ALTIMETER for altitude accuracy.

—**TRIM** if desired.

RECOVERY

—**ROLL OUT** on the desired heading (±10°) by making a coordinated turn in the opposite direction until the wings are level.

—Begin rollout at 1/2 the bank angle prior to desired heading.

—**MAINTAIN ALTITUDE** on rollout with elevator

—**AIRSPEED** power as required to maintain

—**STABILIZE** altitude and heading

—**TRIM** for straight and level flight at starting altitude and airspeed.

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

NOTE: Check and call traffic, altitude, and bank every 90°

CHANDELLES

MINIMUM RECOVERY ALTITUDE = 1500' AGL
ENTRY SPEED = 105—120—120
ENTRY HEADING = cardinal

—**PICK** a place to do the maneuver
—**PICK** an EMERGENCY LANDING AREA
—**CHECK** do the PRE-MANEUVER CHECKLIST (gear stays up)
—**LOOK** check for traffic using UD standard procedures

PROCEDURE

Increase RPM to 2500 in TB20

—ROLL TO 30° BANK *attitude*

THEN SIMULTANEOUSLY

—BEGIN SMOOTH CONTINUOUS PITCH UP *be 15° up at the 90° point*
—APPLY POWER SMOOTHLY full 172 — 25" TB20 — 65% PA44

AT THE 90° POINT

—BANK STARTS DECREASING be at 0° bank by the 180° point
—PITCH HOLDS CONSTANT from 90° POINT to the 180° POINT
—SPEED SLOWING to JUST ABOVE STALL at the 180° POINT

RECOVERY

—AT 180° POINT
—HOLD MAXIMUM ALTITUDE GAINED. . . and then . . .
—SLOWLY RETURN TO ENTRY AIRSPEED
—CHECK & CALL — TRAFFIC, ENGINE, & FUEL GAUGES
—**DO CRUISE CHECKLIST**

LAZY EIGHTS

MINIMUM RECOVERY ALTITUDE = 1500' AGL
ENTRY SPEED = 105—120—120
ENTRY HEADING = cardinal
GROUND REFERENCE = section lines, landmarks
—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST. (Leave gear up in retractables)
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE
—STRAIGHT & LEVEL @ ENTRY SPEED
—POWER DOES NOT CHANGE
—BEGIN SMOOTH CLIMBING TURN

AT 45° INTO THE TURN
—CHECK TRAFFIC / ENGINE / FUEL (call out)
—BE AT MAX PITCH UP and 15° OF BANK
—BEGIN PITCHING DOWN SMOOTHLY . . .
—BUT CONTINUE INCREASING BANK

AT 90° INTO THE TURN
—CHECK TRAFFIC / ENGINE / FUEL (call out)
—BE AT LEVEL PITCH and 30° OF BANK
—CONTINUE PITCHING DOWN SMOOTHLY
—BEGIN DECREASING BANK

AT 135° INTO THE TURN
—CHECK TRAFFIC / ENGINE / FUEL (call out)
—BE AT MAX PITCH DOWN and 15° OF BANK
—BEGIN PITCHING UP SMOOTHLY
—CONTINUE DECREASING BANK

AT 180° INTO THE TURN
—BE AT LEVEL PITCH
—BE AT YOUR STARTING ALTITUDE
—BE AT YOUR STARTING AIRSPEED
—BE AT 0° OF BANK
REPEAT THE PROCEDURE IN THE OTHER DIRECTION

RECOVERY
—RECOVER TO STRAIGHT AND LEVEL ON ENTRY HEADING and ALTITUDE
—CHECK TRAFFIC, ENGINE, & FUEL GAUGES (call out)
—**PERFORM CRUISE CHECKLIST**

STEEP SPIRALS

MINIMUM RECOVERY ALTITUDE = 1000' AGL
ENTRY SPEED = 70—100
ENTRY HEADING = cardinal
GROUND REFERENCE = crossroads

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST. (Leave gear up in retractables)
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**THROTTLE TO IDLE (summer) 1200 RPM or 15" (winter)**

—**BEGIN GLIDING TURN**

—**MAINTAIN ENTRY SPEED** 70—100

NOTE: Clearing the engine is advised on the upwind portion of each turn.

—For winter operations landing gear may be extended to simulate similar descent rate of idle power.

—**MAINTAIN A CONSTANT RADIUS** approximately 1/4 mile

—**CORRECT FOR WIND** maximum bank 60°

—**COMPLETE 3 TURNS** by 1000' AGL

RECOVERY

—**AT OR BEFORE 1000' AGL**

—**ON ENTRY HEADING**

—**ROLL TO LEVEL FLIGHT**

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

°NOTE: If sufficient altitude is not available, due to ceilings, this maneuver may be practiced with reduced turns.

GROUND REFERENCE MANEUVERS

RECTANGULAR PATTERN

MINIMUM ALTITUDE = 1000' AGL (2000' MSL in the Dubuque area.)

ENTRY SPEED = 95—120—120

ENTRY HEADING = 45° to the downwind leg

GROUND REFERENCE = rectangular field

—**PICK** = Select a place to do the maneuver.

—**PICK** = Select an EMERGENCY LANDING AREA.

—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.

—**LOOK** = Check for traffic using standard UD procedures.

PROCEDURE

—**REDUCE SPEED to ENTRY SPEED** 95—120—120.

—**ENTER on 45° DOWNWIND LEG.**

—**MAINTAIN DISTANCE** (1/4 to 1/2 mile) by compensating for wind drift (i.e.; crabbing).

—**MAINTAIN ALTITUDE** by using pitch and checking the altimeter.

—**CHECK TRAFFIC / ENGINE** (call out every 90°)

—**BEGIN ALL TURNS ABEAM** the ends of the rectangle being used.

—Ground speed dictates bank angles required.

RECOVERY

—**DEPART THE MANEUVER** after one complete pattern.

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

TURNS AROUND A POINT

MINIMUM ALTITUDE = 1000' AGL (2000' MSL in the Dubuque area.)

ENTRY SPEED = 95—120—120

HEADING = downwind

GROUND REFERENCE = crossroads

—**PICK** = Select a place to do the maneuver.

—**PICK** = Select an EMERGENCY LANDING AREA.

—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.

—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**ENTER DOWNWIND**

—**MAINTAIN SPEED** at entry speed 95—120—120.

—**MAINTAIN RADIUS** (1/4 to 1/2 mile) by compensating for wind drift by varying bank angle. Maximum bank angle will not exceed 45°.

—**MAINTAIN ALTITUDE** by using elevator and checking the altimeter.

—**CHECK TRAFFIC / ENGINE** (call out every 90°)

RECOVERY

—**DEPART THE MANEUVER** after at least one complete circle.

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

S-TURNS ACROSS A ROAD

ALTITUDE = 1000 AGL (2000' MSL in the Dubuque area.)
ENTRY SPEED = 95—120—120
HEADING = 90° across the ground reference line
GROUND REFERENCE = a straight road, perpendicular to the wind

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**ENTER DOWNWIND**
—**MAINTAIN SPEED** at entry speed 95—120—120
—**MAINTAIN ALTITUDE** by using the elevator and checking the altimeter
—**MAINTAIN RADIUS** (1/2 mile) by compensating for wind drift
—Maximum bank angle will not exceed 45°.
—At no time should the airplane be flown straight and level other than momentarily while crossing the reference line.
—**CHECK TRAFFIC / ENGINE** (call out every 90°)
—**CROSS THE REFERENCE LINE** perpendicular to it and wings level

RECOVERY

—**DEPART THE MANEUVER** after at least one complete set of turns
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

EIGHTS-ON-PYLONS

ENTRY ALTITUDE = pivotal altitude
ENTRY SPEED = 95—120—120
ENTRY HEADING = as required
GROUND REFERENCE = two landmarks (pylons) perpendicular to the wind

—**PICK** = Select a place to do the maneuver.
—**PICK** = Select an EMERGENCY LANDING AREA.
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures.

PROCEDURE

—PICK REFERENCE LINE PERPINDICULAR TO WIND

—PICK TWO PYLONS ALONG REFERENCE LINE

—ENTER DOWNWIND @ MIDPOINT, 45° TO LINE CONNECTING PYLONS

—AT ENTRY SPEED 95—120—120

NOTE: You must climb and descend during the maneuver, due to the changing groundspeed, to hold the reference line on the pylons.

—CROSS THE AXIS LINE . . . and . . .

—SMOOTHLY BANK onto the first pylon

—HOLD REFERENCE LINE ON PYLON while circling

—CHECK TRAFFIC / ENGINE (call out every 90°)

NOTE: Hold the reference line on the pylons by adjusting altitude with elevator/stabilator.

—ROLL WINGS LEVEL on a 45° tangent to the second pylon

—HOLD STRAIGHT & LEVEL from 3 to 5 SECONDS

—SMOOTHLY BANK onto the second pylon

—HOLD THE REFERENCE LINE on the pylon while circling

—CHECK TRAFFIC / ENGINE (call out)

RECOVERY

—ROLL WINGS LEVEL at the entry point or as directed

—DEPART THE MANEUVER AT THIS POINT

—CHECK TRAFFIC, ENGINE, & FUEL GAUGES (call out)

—**PERFORM CRUISE CHECKLIST**

SLOW FIGHT, STALLS, SPIN AWARENESS

SLOW FLIGHT

MINIMUM RECOVERY ALTITUDE = 1500' AGL
AIRSPEED = MINIMUM CONTROLLABLE (Pvt-0+10) (Comm -0+5)
ENTRY HEADING = cardinal

—**PICK** = pick a place to do the maneuver

—**PICK** = pick an EMERGENCY LANDING AREA

—**CHECK** = do the PRE-MANEUVER CHECKLIST

—**LOOK** = check for traffic using standard UD procedures

PROCEDURE

—**AT SLOW CRUISE, STRAIGHT & LEVEL, FLAPS UP**

—**REDUCE POWER** to 1500 RPM or 15"

—**GEAR** down

—**MAINTAIN ALTITUDE** increase pitch to make up for loss of power

—**SLOW TO MINIMUM CONTROLLABLE AIRSPEED** increase power as necessary

—**MAINTAIN ALTITUDE** increase power to make up for loss of altitude

—**MAINTAIN HEADING**

—**STABILIZE AIRSPEED** at minimum controllable

—**TRIM**

—**CHECK TRAFFIC / ENGINE**

—**TURN 90° LEFT** — 20°±10° max bank

—**STABILIZE** on new heading

—**CHECK TRAFFIC** verbal call

—**TURN 90° RIGHT**— 20°±10° max bank

—**STABILIZE** on new heading

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

CLIMBING SLOW FLIGHT

—**ZERO FLAP SETTING**

- —**CHECK TRAFFIC / ENGINE** (call out)
- —**FULL POWER** climb at slow flight speed
- —**90° CLIMBING TURN** 20°±10° max bank
- —**STABILIZE** on **NEW HEADING and ALTITUDE**
- —**LEVEL OFF**
- —**CHECK TRAFFIC / ENGINE** (call out)

LEVEL SLOW FLIGHT WITH FLAPS

—**FIRST FLAP SETTING**

- —**CHECK TRAFFIC / ENGINE** (call out)
- —**FLAPS SET** 10°—10°—10°
- —**TURNS** 90° left and right
- —**STABILIZE** on **NEW HEADING**
- —**CHECK TRAFFIC / ENGINE** (call out)

—**SECOND FLAP SETTING**

- —**CHECK TRAFFIC / ENGINE** (call out)
- —**FLAPS SET** 20°—40°—25°
- —**POWER** as required
- —**90° TURNS** 20°±10° max bank
- —**STABILIZE** on **NEW HEADING**
- —**LEVEL OFF**
- —**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

DESCENDING SLOW FLIGHT

FULL FLAPS STRAIGHT DESCENT

—**CHECK TRAFFIC / ENGINE** (call out)

—**FLAPS SET** 30—40—40

—**POWER** reduce for descent while maintaining slow flight

—**STABILIZED DESCENT ON HEADING or with TURNS**

—**RECOVER TO STRAIGHT & LEVEL SLOW FLIGHT**

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

RECOVERY

—**FULL POWER and CLEAN UP AIRCRAFT/per POH**

—**RECOVER TO STRAIGHT & LEVEL CRUISE**

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

POWER OFF STALLS

Straight and turning—in all flap configuration

MINIMUM ALTITUDE = recover by 1500' AGL SEL 3000'AGL MEL
ENTRY AIRSPEED = final approach speed
ENTRY HEADING = as specified by instructor
SCENARIO = simulate aircraft in the landing or slow flight configuration

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

- —**AT SLOW CRUISE** . .
- —**REDUCE POWER** to begin descent 1200 rpm—15"—15".
- —**FLAPS AS SPECIFIED / GEAR DOWN / PROPS FORWARD**
- —**STABILIZE AIRSPEED** at approach speed 65—80—90
- —**TRIM HANDS OFF** straight descent or 20° banked descent
- —**POWER TO IDLE**
- —**PITCH UP** smoothly to stall attitude
- —**KEEP BALL CENTERED** with rudder
- —**CALL STALL WARNINGS** sloppy controls—stall horn—buffet
- —**CALL THE STALL**

NOTE: INSTRUCTORS SHOULD ALSO DEMONSTRATE THE MUSHING STALL.
Stall recovery should be initiated at the following stages:
Private - after the stall occurs
Commercial - as the stall occurs
Instrument - at the first indication of the stall

RECOVERY

- —**RELEASE ELEVATOR BACK-PRESSURE**
- —**INCREASE POWER** to maximum allowable
- —**LEVEL WINGS** using coordinated controls
- —**RETRACT FLAPS** to 20 in C172
- —**MAINTAIN HEADING**
- —**POSITIVE RATE OF CLIMB**
- —**RETRACT LANDING GEAR.** in TB20
- —**RETRACT FLAPS** incrementally as airspeed increases
- —**RETURN TO ALTITUDE and SPEED** as specified by instructor
- —**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
- —**PERFORM CRUISE CHECKLIST**

POWER ON STALLS

Flight: Straight and turning

MINIMUM ALTITUDE = RECOVER BY 1500' AGL SEL 3000' AGL MEL
AIRSPEED = rotate speeds per POH
HEADING = as specified by instructor
SCENARIO = simulate aircraft stall in takeoff configurations

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**SLOW TO LIFT-OFF SPEED**
—**FLAPS 0° or TAKEOFF**
—**GEAR DOWN & UP**
—**AT V_R APPLY TAKEOFF POWER** full—20"—20" (or as per PTS/AFM)
—**AT ROTATE SPEED** . . .
—**PITCH & TRIM FOR NORMAL CLIMB**
—**PITCH FOR STALL ATTITUDE**
—**KEEP BALL CENTERED WITH RUDDER**
—**CALL STALL WARNINGS** sloppy controls—stall horn—buffet
—**CALL THE STALL - ME RECOVER at HORN**

Note: **Stall recovery should be initiated at the following stages:**
Private - after the stall occurs
Commercial - as the stall occurs
Instrument - at first indication of stall
Multi-Engine - at first indication of stall

RECOVERY

—**RELEASE BACK-ELEVATOR PRESSURE** pitch to the horizon
—**MAXIMUM POWER** if not already at maximum allowable
—**LEVEL WINGS** using coordinated controls
—**PITCH FOR Vx**
—**CLIMB at and TRIM for Vx**
—**MAINTAIN HEADING**
—**POSITIVE RATE OF CLIMB**
—**GEAR UP**
—**FLAPS UP** at an appropriate altitude

—**PITCH FOR Vy**

—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

ACCELERATED STALLS

Flight: Straight and turning

MINIMUM ALTITUDE = recover by 3000' AGL
AIRSPEED = maneuvering speed
HEADING = as specified by instructor
SCENARIO = turning stall

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**AT LOW CRUISE** 85 — 90 — 100
—**FLAPS UP - GEAR UP**
—**ROLL INTO STEEP BANK (45°) LEVEL TURN**
* **Reduce Power - 1500 RPM/15" MAP**
Propeller - full forward if applicable
—**STABILIZE IN TURN** **speed = VS1 + 20: 68 - 90 - 77**
—**CENTER BALL**
—**APPLY BACK-ELEVATOR PRESSURE FIRMLY FOR STALL**
—**CALL THE STALL**

Note: Stall recovery should be initiated as the stall occurs.

RECOVERY

—**RELEASE APPROPRIATE BACK-ELEVATOR PRESSURE**
—**ADD FULL POWER**
—**LEVEL WINGS**
—**PITCH TO MAINTAIN Vx then Vy**
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

CROSS-CONTROLLED STALLS

Flight: Straight and turning — Flaps: No flaps

MINIMUM ALTITUDE = recover by 1500' AGL
AIRSPEED = approach speed
HEADING = as specified by instructor
SCENARIO = simulate aircraft stall during base to final turn or while slipping on final

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**FLAPS UP** & **GEAR DOWN** or as specified
—**THROTTLE TO APPROACH SETTING** 75 — 90 — 100
—**DESCENDING ON BASE AT APPROACH SPEED**
—**OVERSHOOT FINAL**
—**ROLL INTO MEDIUM BANK TURN TO RE-ESTABLISH FINAL**
—**APPLY EXCESS RUDDER INTO THE TURN**
—**APPLY EXCESS AILERON TO THE OUTSIDE OF TURN**
—**PITCH UP**
—**CALL THE STALL**

Note: Stall recovery should be initiated as the stall occurs.

RECOVERY

—**RELEASE ALL CONTROL PRESSURES**
—**FULL POWER**
—**LEVEL WINGS**
—**PITCH FOR Vx**
—**HOLD Vx** and get **POSITIVE RATE OF CLIMB**
—**GEAR UP**
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

ELEVATOR TRIM STALLS

Flight: Straight and turning

MINIMUM ALTITUDE = recover by 1500' AGL
AIRSPEED = final approach speed
HEADING = as specified by instructor
SCENARIO = simulate aircraft stall during go-around

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**THROTTLE TO APPROACH SETTING** 75 — 90 — 100
—**FLAPS TO LANDING**
—**GEAR DOWN**
—**DESCENDING AT FINAL APPROACH SPEED**
—**TRIMMED FOR STABILIZED APPROACH**
—**GO-AROUND DECISION**
—**FULL POWER** or as instructed
—**PITCH FOR NORMAL CLIMB ATTITUDE**
—**TRY TO TRIM FOR NORMAL CLIMB ATTITUDE**
—**CALL THE STALL**

Note: Stall recovery should be initiated as the stall occurs.

RECOVERY

—**APPLY FORWARD PRESSURE** to prevent stall
—**PITCH FOR Vx**
—**LEVEL WINGS**
—**HOLD Vx** and get **POSITIVE RATE OF CLIMB**
—**FLAP, GEAR, FLAP UP**
—**TRIM FOR STABILIZED CLIMB**
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

SECONDARY STALLS

Applies to all stall scenarios

MINIMUM ALTITUDE = RECOVER BY 1500' AGL
AIRSPEED = as appropriate for the stall being used
HEADING = as specified by instructor
SCENARIO = immediately after any stall

RECOVERY

—**RELEASE BACK PRESSURE** to break the stall
—**FULL POWER**
—**APPLY BACK PRESSURE AGGRESIVELY** to recover
—**CALL THE SECONDARY STALL**
—**RELEASE BACK PRESSURE** and accelerate to Vx
—**HOLD Vx and get POSITIVE RATE OF CLIMB**
—**FLAP, GEAR, FLAPS UP**
—**PITCH FOR/AND HOLD Vy**
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

SPIN AWARENESS

NOTE: SPIN TRAINING, IN AIRCRAFT, IS RESERVED FOR CFI STUDENTS

GROUND

—**NAME SITUATIONS WHERE SPINS ARE POSSIBLE**

—**REVIEW THE AFM/POH FOR STALL/SPIN INFORMATION**

—Is the airplane APPROVED for spins?

—Are there special procedures for entry and recovery?

—**MAKE SURE THE AIRPLANE WEIGHT & BALANCE (CG) IS APPROPRIATE**

—**PERFORM A THOROUGH SPIN PREFLIGHT INSPECTION**

—Remove all loose items

—**PICK** = Select a place to do the maneuver

—**PICK** = Select an EMERGENCY LANDING AREA

—**CHECK** = Perform the PRE-MANEUVER CHECKLIST.

—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**ENTRY PHASE**

—**REDUCE POWER** slowly to idle . . . and . . .

—**PITCH SMOOTHLY** to stall attitude

—**AILERONS NEUTRAL** or per POH/AFM

—JUST PRIOR TO STALL . . .

—**APPLY FULL RUDDER** smoothly in the direction you want to spin

—**PITCH UP FULLY and HOLD** until recovery begins

—**INCIPIENT PHASE** begins at the stall and continues to the one-turn point

—**MAINTAIN FULL RUDDER** into the spin

—**MAINTAIN FULL BACK ELEVATOR PRESSURE**

—**MAINTAIN AILERONS NEUTRAL** or per POH/AFM

—**COUNT ONE TURN**

—**RECOVERY PHASE** Recover at one complete turn using POH/AFM PROCEDURE.

No written procedure? Then use the following procedure:

—**POWER TO IDLE**

—**AILERONS NEUTRAL**

—**FULL OPPOSITE RUDDER** then immediately . . .

—**POSITIVE PITCH DOWN** past the neutral position to break the stall

—**NEUTRAL RUDDER** after rotation has stopped . . . then . . .

—**SMOOTH PITCH UP** to recover from the dive and . . .

—**RECOVER TO CRUISE**

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

EMERGENCY DESCENT:

FLIGHT: Required by uncontrollable fire, loss of cabin pressurization, or any situation demanding an immediate and rapid descent.

MINIMUM ALTITUDE = recover high enough to ensure a safe recovery back to level flight or a precautionary landing.

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PRE-MANEUVER CHECKLIST
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

THROTTLE/S IDLE

PROP/S FORWARD/

MIXTURE/S FULL RICH *

FUEL PUMP/S ON *

AIRSPEED 100 - 129 - 140

LANDING GEAR DOWN

ROLL INTO 30-45 DEGREE BANK - maintain positive load factor

AIRSPEED - descend @ 100 - 139 - 140 max

RECOVERY

***RECOVER SO AS TO RETURN TO LEVEL FLIGHT OR PRECAUTIONARY LANDING AS DIRECTED**

***LEVEL WINGS / ADD POWER / CLIMB OUT / CLEAN UP OR CONTINUE WITH FORCED LANDING**

***RETURN TO ALTITUDE, HEADING, and SPEED as specified by instructor**

WARNING: If emergency descent is conducted in turbulent conditions do not exceed Va

*** If emergency descent is a result of an engine fire - Mixtures and Fuel Pumps - OFF**

Appendix I

Multi - Engine Operations

Beware of Distractions

*Most gear-up landings are the result of distractions.
*Be mindful of this, particularly in traffic patterns and while practicing single-engine landings.

SLOW FLIGHT

MINIMUM RECOVERY ALTITUDE = 3000' AGL
AIRSPEED = MINIMUM CONTROLLABLE (Comm -0+5)
ENTRY HEADING = cardinal

— **PICK** = Select a place to do the manuver.
— **PICK** = Select an EMERGENCY LANDING AREA
— **CHECK** = Perform the PREMANUVER CHECKLIST.
— **LOOK** = Check for traffic using standard UD procedures.

PROCEDURE

—**AT MANEUVERING SPEED, STRAIGHT & LEVEL, FLAPS UP**

—**REDUCE POWER** to or 15" MP

—**EXTEND LANDING GEAR**

—**PROPELLERS** full forward below 100 KIAS

—**MAINTAIN ALTITUDE** increase pitch to compensate for loss of power

—**SLOW TO MINIMUM CONTROLLABLE AIRSPEED** increase power as necessary

NOTE: With partial power airspeed may be reduced to the extent required to continually hear the stall warning horn.

—**MAINTAIN ALTITUDE** increase power to compensate for loss of altitude/airspeed

—**MAINTAIN HEADING**

—**STABILIZE AIRSPEED** at minimum controllable

—**TRIM**

—**CHECK TRAFFIC / ENGINE**

—**TURN 90° LEFT** — 20°±5° max bank

—**STABILIZE** on new heading

—**CHECK TRAFFIC** verbal call

—**TURN 90° RIGHT**— 20°±5° max bank

—**STABILIZE** on new heading

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

CLIMBING SLOW FLIGHT

—**ZERO FLAP SETTING**

- —**CHECK TRAFFIC / ENGINE** (call out)
- —**FULL POWER** climb at slow flight speed
- —**90° CLIMBING TURN** 20°±5° max bank
- —**STABILIZE** on **NEW HEADING**
- —**LEVEL OFF** at predetermined altitude
- —**CHECK TRAFFIC / ENGINE** (call out)

LEVEL SLOW FLIGHT

—**FIRST FLAP SETTING**

- —**CHECK TRAFFIC / ENGINE** (call out)
- —**FLAPS SET** 10°
- —**90° TURN** 20°±5° max bank
- —**STABILIZE** on **NEW HEADING**
- —**CHECK TRAFFIC / ENGINE** (call out)

—**SECOND FLAP SETTING**

- —**FLAPS SET** 25°
- —**90° TURN** 20°±5° max bank
- —**STABILIZE** on **NEW HEADING**
- —**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**FULL FLAP SETTING**

- —**FLAPS SET** 40°
- —**90° TURN** 20°±5° max bank
- —**STABILIZE** on **NEW HEADING**
- —**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

DESCENDING SLOW FLIGHT

FULL FLAPS STRAIGHT DESCENT

—**CHECK TRAFFIC / ENGINE** (call out)

—**FLAPS SET** 40

—**POWER** reduce for descent while maintaining slow flight

—**STABILIZED DESCENT ON HEADING**

—**RECOVER TO STRAIGHT & LEVEL SLOW FLIGHT**

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

FULL FLAPS TURNING DESCENT

—**CHECK TRAFFIC / ENGINE** (call out)

—**FLAPS SET** 40

—**POWER** reduce for 500 FPM descent while maintaining slow flight

—**90° TURN, DESCENDING, COORDINATED** 20°±5° max bank

—**STABILIZED IN TURN**

—**CHECK TRAFFIC / ENGINE** (call out)

—**ROLL OUT ON HEADING**

—**LEVEL OFF** at desired altitude

RECOVERY FROM SLOW FLIGHT

—**FULL POWER and CLEAN UP AIRCRAFT (**Flaps, Gear, Flaps, Flaps)

—**RECOVER TO STRAIGHT & LEVEL CRUISE**

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

POWER OFF STALLS

Straight and turning—in all flap configuration

MINIMUM ALTITUDE = recover by 3000' AGL
ENTRY AIRSPEED = final approach speed
ENTRY HEADING = as specified by instructor
SCENARIO = simulate aircraft landing

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**AT MANEUVERING SPEED**
—**REDUCE POWER** to begin descent — 15" MP
—**FLAPS AS SPECIFIED / GEAR DOWN / PROPS FORWARD**
—**STABILIZE AIRSPEED** at approach speed — 90
—**TRIM HANDS OFF** straight descent or 20° banked descent
—**POWER TO IDLE**
—**PITCH UP** smoothly to stall attitude
—**KEEP BALL CENTERED** with rudder
—**CALL STALL WARNINGS** sloppy controls—stall horn
—**CALL THE STALL** recover at the onset of the stall (buffeting condition)

RECOVERY

—**RELEASE ELEVATOR BACK-PRESSURE**
—**FULL POWER**
—**LEVEL WINGS** using coordinated controls
—**RETRACT FLAPS** to 25°
—**MAINTAIN HEADING**
—**POSITIVE RATE OF CLIMB**
—**GEAR UP**
—**ACCELLERATE TO VX** - Flaps 10°
—**ACCELLERATE TO VY** - Flaps Up
—**RETURN TO ALTITUDE and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

POWER ON STALLS

Flight: Straight and turning

MINIMUM ALTITUDE = RECOVER BY 3000' AGL
AIRSPEED = rotate speeds per POH
HEADING = as specified by instructor
SCENARIO = simulate aircraft stall in takeoff configurations

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**AT MANEUVERING SPEED:**
—**REDUCE POWER** to 15"MP – slow to Vr
—**PROPELLERS** full forward below 100 KIAS
—**FLAPS 0° or TAKEOFF**
—**GEAR DOWN & UP**
—**AT ROTATE SPEED** . . .
—**APPLY TAKEOFF POWER** — 20" MP
—**PITCH & TRIM FOR NORMAL CLIMB**
—**PITCH FOR STALL ATTITUDE**
—**KEEP BALL CENTERED** with rudder
—**CALL STALL WARNINGS** sloppy controls—stall horn
—**CALL THE STALL** recover at the onset of the stall (buffeting condition)

RECOVERY

—**RELEASE BACK-ELEVATOR PRESSURE**
—**FULL POWER**
—**LEVEL WINGS** using coordinated controls
—**MAINTAIN HEADING**
—**POSITIVE RATE OF CLIMB**
—**GEAR UP**
—**ACCELLERATE TO VX -** Flaps 10°
—**ACCELLERATE TO VY -** Flaps Up
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

ACCELERATED STALLS

Flight: turning

MINIMUM ALTITUDE = recover by 3000' AGL
AIRSPEED = manuvering speed = 120 KIAS
HEADING = as specified by instructor
SCENARIO = turning stall

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**AT SLOW CRUISE** - 100
—**FLAPS UP** - **GEAR UP**
—**ROLL INTO STEEP BANK (45°) LEVEL TURN**
—**REDUCE POWER** - 15"MP
—**PROPELLERS** full forward below 100 KIAS
—**STABILIZE IN TURN** **speed = VS1 + 20: 77**
—**KEEP BALL CENTERED** with rudder
—**APPLY BACK-ELEVATOR PRESSURE FIRMLY FOR STALL**
—**CALL THE STALL**- recover as the stall occurs (buffet)

RECOVERY

—**RELEASE APPROPRIATE BACK-ELEVATOR PRESSURE**
—**FULL POWER**
—**LEVEL WINGS**
—**MAINTAIN HEADING**
—**PITCH TO MAINTAIN VY**
—**RETURN TO ALTITUDE, HEADING, and SPEED** as specified by instructor
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)
—**PERFORM CRUISE CHECKLIST**

VMC DEMONSTRATION

MINIMUM ALTITUDE = RECOVER BY 3000' AGL
ENTRY AIRSPEED = VYSE - 88 KIAS
HEADING = as specified by instructor
SCENARIO = simulate recovery procedures for an engine failure below VMC in flight

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

ENTRY PROCEDURE

—**REVIEW VMC DEMONSTRATION CHECKLIST**
—**COWL FLAPS OPEN**
—**LANDING GEAR UP**
—**REDUCE POWER TO 15"MP** - slow to VYSE - 88 KIAS
—**PROPELLERS** full forward below 100 KIAS
—**SIMULATE ONE ENGINE INOPERATIVE USING THROTTLE** reduce smoothly to idle
—**APPLY FULL POWER ON THE OTHER ENGINE**
—**MAINTAIN HEADING USING RUDDER PRESSURE & UP TO 5° BANK TOWARD OPERATING ENGINE**

NOTE: Instructors should demonstrate the procedure without banking toward the operating engine to show the effect of the sideslip condition.

—**PITCH FOR CLIMB ATTITUDE TO REDUCE AIRSPEED BY 1 knot per second**
—**RECOVER AT Vmca, STALL BUFFET, STALL HORN, LOSS OF DIRECTIONAL CONTROL** - whichever occurs first

RECOVERY PROCEDURE

—**SIMULTAINOUSLY REDUCE POWER ON OPERATING ENGINE & ANGLE OF ATTACK IN ORDER TO MAINTAIN DIRECTIONAL CONTROL**
—**MAINTAIN HEADING**
—**ACCELLERATE TO VXSE** - 82 KIAS
—**APPLY FULL POWER ON OPERATING ENGINE**
—**RETURN TO ALTITUDE and SPEED as specified by instructor**
—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES (call out)**
—**PERFORM CRUISE CHECKLIST**

SIMULATED ENGINE FAILURE ON TAKEOFF & CLIMB

MINIMUM ALTITUDE = 400' AGL
AIRSPEED = ENTRY AIRSPEED = VYSE - 88 KIAS
HEADING = as specified by instructor
SCENARIO = simulate an engine failure during the takeoff roll and climb-out

SIMULATED ENGINE FAILURE ON TAKEOFF GROUND ROLL

—**ENSURE ADEQUATE RUNWAY DISTANCE IS AVAILABLE**

—**REQUEST DELAY FROM TOWER** or announce Intentions on CTAF

—**DURING TAKEOFF ROLL BELOW 28 KIAS** (50%Vmca)…

—**REDUCE ONE MIXTURE CONTROL SLIGHLY** to simulate loss of power

—**REDUCE BOTH THROTTLES TO IDLE SMOOTHLY**

—**APPLY RUDDER PRESSURE** to maintain directional control

—**APPLY BRAKES** Simulate brake application by calling “BRAKES NOW”

—**RESUME TAKEOFF PROCEDURE**

SIMULATED ENGINE FAILURE ON CLIMB-OUT

—**DURING NORMAL CLIMB-OUT:**

—**REDUCE ONE THROTTLE TO IDLE** to simulate engine failure (above 400' AGL)

—**POWER UP** – on operating engine (mixtures, props, throttles)

—**CLEAN UP - LANDING GEAR AND FLAPS** verify retracted

—**IDENTIFY INOP ENGNIE** “dead foot, dead engine”

—**VERIFY INOP ENGINE** reduce throttle on inop. engine half way then fully to verify

—**FEATHER PROP ON INOP ENGINE** simulate feather using throttle (88KIAS=2180RPM)

—**MIXTURE TO IDLE-CUTOFF** on dead engine (simulated)

—**PITCH FOR VYSE** - 88 KIAS

—**MAINTAIN DIRECTIONAL CONTROL** by using rudder pressure and up to 5° bank toward operating engine

—**ADJUST TRIM AS NECESSARY** to relieve control pressures

—**SECURE INOP ENGINE** (simulated) fuel selector – off, electric fuel pump – off, magnetos – off, alternator – off

—**CLOSE COWL FLAP** on inop. engine

—**RETURN FOR LANDING** - making turns toward operating engine if able

ENGINE SHUTDOWN/FEATHER/RESTART

MINIMUM ALTITUDE = RECOVER BY 3000' AGL
AIRSPEED = cruise airspeed above VSSE - 82 KIAS
HEADING = as specified by instructor
SCENARIO = engine failure during cruise flight

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

SHUTDOWN PROCEDURE

—**DURING CRUISE FLIGHT THE CFI WILL:**

—**PLACE FUEL SELECTOR IN OFF POSITION** to shutdown engine (above 3000' AGL)

OR —**PULL ONE MIXTURE LEVER TO IDLE CUT OFF**

—**STUDENT WILL:**

—**MAINTAIN DIRECTIONAL CONTROL** by using rudder pressure and up to 5° bank toward operating engine

—**POWER UP** – mixtures, props, throttles

—**CLEAN UP - LANDING GEAR AND FLAPS** verify retracted

—**IDENTIFY INOP ENGNIE** "dead foot, dead engine"

—**VERIFY INOP ENGINE** reduce throttle on inop. engine half way then fully to verify

—**SET POWER ON OPERATING ENGINE** - as required

—**PITCH FOR AIRSPEED** - VYSE or greater (hold altitude or minimum sink rate)

—**TROUBLESHOOT DEAD ENGINE** – fuel selectors – on, carb heat – on, electric fuel pumps – on, magnetos – on, fuel quantity – check, engine oil temp/press. – check

SECURING PROCEDURE (USING PRINTED CHECKLIST)

—**IF ENGINE FAILS TO START:**

—**RETARD THROTTLE TO VERIFY INOP ENGINE** - half way - no change - fully back - no change

—**FEATHER PROP** on inop. engine - half way - no change - fully back - no change

—**MIXTURE TO IDLE-CUTOFF** on inop. engine - half way - no change - fully back - no change

—**SECURE INOP ENGINE** - fuel selector - off, cowl flap - closed, carb heat - off, electric fuel pumps - off, magnetos - off, alternator - off

—**SET POWER ON OPERATING ENGINE** – as required

—**COWL FLAP ON OPERATING ENGINE** – as required

—**ADJUST TRIM AS NECESSARY** to relieve control pressures

—**ELECTRICAL LOAD** – reduce as necessary

—**CROSSFEED OPERATING ENGINE** – if required

—**LAND AT NEARBY AIRPORT**

RESTART PROCEDURE

—**FUEL SELECTOR ON** - inop. engine

—**MIXTURE FULL RICH** - inop. engine

—**THROTTLE 1/4" OPEN** - inop. engine

—**ELECTRIC FUEL PUMP ON** - inop. engine

—**MAGNETOS ON** - inop. engine

—**PRIME INOP ENGINE** – as required (normal prime – 4-6 seconds)

—**INCREASE AIRSPEED TO 110** - using pitch control

—**PROPELLER LEVER FULL FORWARD** – inop. Engine (after reaching 110 KIAS)

NOTE: If propeller does not windmill within 5-7 seconds, engage starter.

—**THROTTLE SET** – 15” MP until engine is warm

—**ELECTRIC FUEL PUMP OFF**

—**ALTERNATOR ON**

ENGINE OUT MANEUVERING

MINIMUM ALTITUDE = RECOVER BY 3000' AGL
AIRSPEED = VYSE - 88 KIAS or higher if able to hold altitude
HEADING = as specified by instructor
SCENARIO = maneuvering with one engine inoperative

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

STRAIGHT AND LEVEL:

—**HOLD SHALLOW BANK** using the ailerons – up to 5° bank toward the operating engine

—**HOLD A CONSTANT HEADING** using the ailerons and rudder

—(VR) Heading the airplane so one or more "on-course" landmarks stay in a consistent spot somewhere on the airplane windshield.

(IR) checking the HEADING INDICATOR to see that it remains constant

—**SET RUDDER TRIM** - to relieve control pressure required

—**HOLD A CONSTANT ALTITUDE** using the elevator

—(VR) Hold the horizon in a constant height in the windshield.

—(IR) Check the altimeter.

—**SET PITCH TRIM** - to relieve control pressure required

LEVEL TURNS:

—**CHECK TRAFFIC** and verbally call "clear" BEFORE each turn

—**USE AILERON AND RUDDER** TO roll into a coordinated turn

NOTE: Practice turns towards both the operating and inoperative engines.

—**ADD POWER** as required - to hold airspeed

—**USE PITCH** to maintain altitude

—**ROLLOUT** using visual references by making a coordinated turn in the other direction until wings level.

STRAIGHT CLIMBS & CLIMBING TURNS:

—**CHECK TRAFFIC** and verbally call "clear" BEFORE each turn

—**PERFORM CLIMB CHECKLIST** as appropriate

—**ADD FULL POWER** on operating engine

—**PITCH** to climb attitude

—**MAINTAIN DIRECTIONAL CONTROL** - using aileron and rudder

—**BANK AS REQUIRED** if turning

—**TRIM FOR VYSE**

—**CHECK AIRSPEED, PITCH, and HEADING**

—(VR) Nose and wingtips for correct attitude and heading

—(IR) Attitude Indicator for correct attitude (pitch and bank)

—(IR) Heading Indicator for correct heading

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

—**LEVEL OFF** - Begin level-off on reaching (10% of rate-of-climb) below cruise altitude

—**PITCH DOWN GRADUALLY**

—**SMOOTHLY INTERCEPT DESIRED ALTITUDE**

—**HOLD ALTITUDE** using elevator

—**BEGIN TRIMMING NOSE DOWN** During acceleration to relieve elevator pressure

—**PITCH FOR AIRSPEED** - VYSE or greater (hold altitude or minimum sink rate)

—**THROTTLE REDUCE -** on operating engine as required to hold altitude

—**TRIM FOR CRUISE**

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

STRAIGHT DESCENTS & DESCENDING TURNS:

—**CHECK TRAFFIC** and verbally call “clear” BEFORE each turn

—**PERFORM DESCENT CHECKLIST**

—**THROTTLE BACK** to desired descent power setting.

—**PITCH FOR AIRSPEED** - VYSE or greater (hold altitude or minimum sink rate)

—**BANK AS REQUIRED** if turning

—**STABILIZE DESCENT PITCH** by holding desired airspeed with pitch.

—**RUDDER AS REQUIRED** for zero sideslip

—**TRIM** as required to hold descent airspeed

—**CHECK FOR TRAFFIC FREQUENTLY** call out

—**LEVEL OFF** - Begin level-off on reaching (10% of rate-of-descent) above cruise altitude.

—**SET POWER** – as required to maintain altitude and airspeed (VYSE or greater)

—**TRIM FOR CRUISE**

—**CHECK TRAFFIC / ENGINE / FUEL** (call out)

EMERGENCY DESCENT

MINIMUM ALTITUDE = RECOVER BY 1500' AGL
AIRSPEED = 130KIAS
HEADING = as specified by instructor
SCENARIO = a simulated emergency requiring an emergency descent (i.e. loss of cabin pressure, smoke/fire, ect.)

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**RECOGNIZE SITUATION REQUIRING EMERGENCY DESCENT**

—**CLOSE COWL FLAPS**

—**THROTTLES SMOOTHLY TO IDLE**

—**MIXTURES** - full rich

—**PROPELLER LEVERS** – full forward

—**LANDING GEAR DOWN** - below 140 KIAS

—**ROLLS INTO 30°- 45° BANK** - to keep positive load factor

—**PITCH FOR DESCENT AIRSPEED** - 130 KIAS (airspeed may be increased to VLE for maximum descent rate if required)

—**RECOVER TO STRAIGHT & LEVEL CRUISE**

—**BEGIN LEVEL OFF** - 10% of descent rate prior to desired altitude

—**ROLL WINGS LEVEL** - maintain desired heading

—**INCREASE POWER GRADUALLY** – to low cruise setting, keep airspeed below 109 KIAS

—**RETRACT LANDING GEAR IF APPLICAPBLE** – verify below 109 KIAS before retracting landing gear

—**CHECK TRAFFIC, ENGINE, & FUEL GAUGES** (call out)

—**PERFORM CRUISE CHECKLIST**

SIMULATED SINGLE ENGINE TRAFFIC PATTERN

MINIMUM ALTITUDE = traffic pattern altitude
AIRSPEED = VYSE - 88 KIAS
HEADING = as required for traffic pattern
SCENARIO = simulate engine failure in the traffic pattern

PROCEDURE

—**REDUCE ONE THROTTLE TO IDLE** to simulate engine failure (at pattern altitude)

—**POWER UP** – on operating engine (mixtures, props, throttles)

—**CLEAN UP - LANDING GEAR AND FLAPS** if required

NOTE: If landing gear is already extended, such as on base or final, it may be left extended so as to continue with a normal approach and landing.

—**IDENTIFY INOP ENGNIE** "dead foot, dead engine"

—**VERIFY INOP ENGINE** reduce throttle on inop. engine half way then fully to verify

—**FEATHER PROP ON INOP ENGINE** simulate feather using throttle (88KIAS=2180RPM)

—**MIXTURE TO IDLE-CUTOFF** on dead engine – simulated (if time allows)

—**PITCH FOR AIRSPEED** - VYSE or greater (hold altitude or minimum sink rate)

—**MAINTAIN DIRECTIONAL CONTROL** by using rudder pressure and up to 5° bank toward operating engine

—**ADJUST TRIM AS NECESSARY** to relieve control pressures

—**SECURE INOP ENGINE - IF TIME ALLOWS** (simulated) fuel selector – off, electric fuel pump – off, magnetos – off, alternator – off

—**CLOSE COWL FLAP** on inop. engine (if time allows)

—**EXECUTE NORMAL LANDING** - making turns toward operating engine if able

SIMULATED SINGLE ENGINE LANDING

MINIMUM ALTITUDE = traffic pattern altitude
AIRSPEED = VYSE - 90 KIAS
HEADING = as required for traffic pattern
SCENARIO = simulate landing with one engine inoperative

PROCEDURE

- —**FOLLOWING ENGINE OUT PROCEDURES LISTED ABOVE:**
- —**MAINTAIN AT LEAST VYSE - 88 KIAS IN TRAFFIC PATTERN**
- —**LANDING GEAR DOWN** when landing is assured
- —**PERFORM BEFORE LANDING (GUMPS) CHECKLIST**

—**BASE LEG**

- —**POSITION** begins at the 45° point (±) (depends on the wind)
- —**DESCENDING**
- —**FLAPS** - as required – no more than 10°
- —**PARTIAL POWER** – operating engine – maintain a stable descent rate
- —**TRIM** as required
- —**WIND CONTROL** crab
- —**GUMPS CHECK** call out
- —**CHECK TRAFFIC** call out

—**FINAL APPROACH**

- —**FLAPS** – as required – no more than 25°
- —**POWER** partial to allow for better control and to keep the engine warm
- —**TRIM** as required
- —**WIND CONTROL** sideslip keeping the longitudinal axis straight with runway centerline
- —**GUMPS CHECK** call out
- —**CHECK TRAFFIC** call out
- —**AIMING POINT** should be the middle of the first third of the runway

—**ROUNDOUT**

- —**SPEED** Begin slowing toward stall speed — Vso
- —**POWER** can be reduced to idle on the operating engine as required
- —**TRIM** can be increased, nose up, to lighten the elevator pressure
- —**DIRECTIONAL CONTROL** correct for any wind drift and reduced drag on feathered engine

—**TOUCHDOWN**

- —**MAIN GEAR** on the ground first / upwind main wheel first
- —**WIND CONTROL**
  - —Ailerons FULL INTO WIND after touchdown
  - —Pitch FULL BACK for aerodynamic braking
- —**CENTERLINE** Track centerline using rudder pedals
- —**REDUCE THROTTLE TO IDLE** on sim. feathered engine

SIMULATED SINGLE ENGINE GO AROUND

MINIMUM ALTITUDE = 400' AGL
AIRSPEED = final approach airspeed = 90 KIAS
HEADING = runway heading
SCENARIO = decide to go around while performing a single engine landing

PROCEDURE

—**FOLLOWING ENGINE OUT PROCEDURES LISTED ABOVE:**

—**DECIDE TO GO AROUND**

—**FULL POWER**

NOTE: Keep inoperative engine sim. feathered.

—**LEVEL WINGS**

—**PITCH FOR VXSE** – 82 KIAS

—**FLAPS** – retract to take off setting if extended

—**POSITIVE RATE OF CLIMB**

—**LANDING GEAR UP**

—**PITCH FOR VYSE -** 88 KIAS

—**FLAPS** – retract fully up

—**RADIO CALL** - "GOING AROUND"

—**CHECK & CALL TRAFFIC, ENGINE, FUEL GUAGES**

SYSTEMS AND EQUIPMENT MALFUNCTIONS

MINIMUM ALTITUDE = as required
AIRSPEED = as required
HEADING = as specified by instructor
SCENARIO = simulate malfunctions during various phases of flight

—**PICK** = Select a place to do the maneuver
—**PICK** = Select an EMERGENCY LANDING AREA
—**CHECK** = Perform the PREMANUVER CHECKLIST.
—**LOOK** = Check for traffic using standard UD procedures

PROCEDURE

—**FLIGHT INSTRUCTORS SHALL SIMULATE THE FOLLOWING MALFUNCTIONS:**

a. partial or complete power loss.
b. engine roughness or overheat.
c. carburetor or induction icing.
d. loss of oil pressure.
e. fuel starvation.
f. electrical malfunction.
g. vacuum/pressure, and associated flight instruments malfunction.
h. pitot/static.
i. landing gear or flap malfunction.
j. inoperative trim.
k. inadvertant door or window opening.
l. structural icing.
m. smoke/fire/engine compartment fire.
n. any other emergency appropriate to the airplane.

—**PERFORM THE APPROPRIATE EMERGENCY CHECKLIST** – as outlined in the POH

—**CHECK & CALL TRAFFIC, ENGINE, FUEL GUAGES**

SIMULATED ENGINE OUT INSTRUMENT APPROACH

MINIMUM ALTITUDE = published minimum IFR altitude or as specified
AIRSPEED = slow cruise airspeed
HEADING = as required for the SIAP
SCENARIO = simulate an engine failure during an instrument approach

PROCEDURE

—**DURING VARIOUS PHASES OF SIAP:**

—**REDUCE ONE THROTTLE TO IDLE** to simulate engine failure

—**DISENGAGE AUTOPILOT –** if being used for the approach

—**POWER UP** – on operating engine (mixtures, props, throttles)

—**CLEAN UP - LANDING GEAR AND FLAPS** verify retracted

—**IDENTIFY INOP ENGNIE** "dead foot, dead engine"

—**VERIFY INOP ENGINE** reduce throttle on inop. engine half way then fully to verify

—**FEATHER PROP ON INOP ENGINE** simulate feather using throttle (88KIAS=2180RPM)

NOTE: If the situation allows – a restart may be attempted. Follow procedures outline in emergency checklist.

—**MIXTURE TO IDLE-CUTOFF** on dead engine (simulated)

—**PITCH FOR AIRSPEED** - VYSE or greater (hold altitude or minimum sink rate)

—**MAINTAIN DIRECTIONAL CONTROL** by using rudder pressure and up to 5° bank toward operating engine

—**ADJUST TRIM AS NECESSARY** to relieve control pressures

—**SECURE INOP ENGINE** (simulated) fuel selector – off, electric fuel pump – off, magnetos – off, alternator – off

—**CLOSE COWL FLAP** on inop. engine

—**COMPLETE SIAP** - making turns toward operating engine if able

DRAG DEMONSTRATION (MEI)

MINIMUM ALTITUDE = RECOVER BY 3000' AGL
AIRSPEED = VYSE = 88 KIAS
HEADING = as specified by instructor
SCENARIO = demonstration of the effects of various airspeeds and configurations on engine inoperative performance

ENTRY PROCEDURE

—**LANDING GEAR UP**

—**REDUCE POWER TO 15"MP** - slow to VYSE - 88 KIAS

—**PROPELLERS** full forward below 100 KIAS

—**SIMULATE ONE ENGINE INOPERATIVE USING THROTTLE** set RPM for sim. feather

—**APPLY FULL POWER ON THE OTHER ENGINE**

—**MAINTAIN HEADING USING RUDDER PRESSURE & UP TO 5° BANK TOWARD OPERATING ENGINE**

NOTE: Instructors should demonstrate the procedure without banking toward the operating engine to show the effect of the sideslip condition.

—**REDUCE AIRSPEED 10 KNOTS BELOW VYSE** – note the change in descent rate

—**INCREASE AIRSPEED 10 KNOTS ABOVE VYSE** – note the change in descent rate

—**RETURN TO VYSE**

—**EXTEND LANDING GEAR** – note the change in descent rate

—**EXTEND FLAPS** – note the change in descent rate

—**REDUCE THROTTLE TO IDLE ON INOPERATIVE ENGINE** – note the change in descent rate with windmilling prop

RECOVERY PROCEDURE

—**FULL POWER**

—**LEVEL WINGS**

—**PITCH FOR VYSE** – 88 KIAS

—**FLAPS** – retract to 25°

—**POSITIVE RATE OF CLIMB**

—**LANDING GEAR UP**

—**FLAPS** – retract fully up

—**RETURN TO CRUISE FLIGHT**

—**CHECK & CALL TRAFFIC, ENGINE, FUEL GUAGES**

GENERAL INSTRUMENT PROCEDURES

- **Instrument instruction fundamentals**
  - Instructors will teach basic flight maneuvers (Straight and Level, Climbs, Turns, Descents) using both primary and supporting and control/performance scanning methods.
  - Instructors will give students "simulated" ATC communications/clearances whenever possible when flying under VFR & in all training devices.
  - During maneuvers training, Instructors will advise students: "Leaving ATC environment for maneuvers practice". The same applies when returning to instrument scenarios from maneuvers training: "Returning to ATC environment"
  - Instructors (safety pilot) will ensure collision avoidance procedures are used by the student. See "Callouts" section below.
    - *PPCL will be accomplished prior to any maneuvers, with the assistance of the CFI/Safety pilot.*
  - While conducting simulated instrument flight, the instructor will inform the student when to discontinue simulated instrument flight by announcing: "**TAKE OVER VISUALLY**" unless a predetermined breakout point has been established between the instructor/student.
  - When flying outbound during simulated instrument approaches/procedures at DBQ airport, instructors will assign students an altitude 500' above the highest published inbound altitude for any approach procedures for that specific runway. Descents can be commenced to the published inbound altitude on the procedure turn, or when the instructor has ensured there is no traffic conflict.
- Callouts – In addition to the normal callouts prescribed by the UD standardization manual, the following callouts apply to IFR training operations:
  - When engaging autopilot, to confirm that autopilot is on and in the proper mode: "**AUTOPILOT ON**, **PITCH MODE**(i.e. pit/flc/vs/alt)/**BANK MODE**(i.e. rol/hdg/nav/apr)"
    - *The student also must visually confirm the proper AP modes with the AP status annunciator.*
  - When disconnecting autopilot to manually fly the airplane: "**AUTOPILOT OFF**"
  - Before beginning any turn: Student calls out: "**CLEAR LEFT/RIGHT**", CFI/Safety pilot confirms: "**CLEAR LEFT/RIGHT**".
  - Prior to course interception: "**LOCALIZER ALIVE**"

- *For a VOR/GPS or other approach the term "localizer" may be replaced with "course"*

- Prior to FAF on any approach: "**BEFORE LANDING CHECK COMPLETE**"
- Prior to glide slope interception: "**GLIDE SLOPE ALIVE**" if using a GPS (LPV) approach: "**GLIDE PATH ALIVE**"
- Crossing the OM on a precision approach or crossing FAF on NPA: "**ALTITUDE CONFIRMED**"
- When arriving at the MDA for a non-precision approach: "**MINIMUMS, *LEVELING OFF***"
- After crossing the VDP on a non-precision approach: "**RUNWAY IN SIGHT, LANDING**" OR "**APPROACH LIGHTS IN SIGHT, CONTINUING**" OR "**RUNWAY NOT IN SIGHT PREPARE FOR MISSED**".
- When arriving at the DA for a precision approach: "**MINIMUMS, RUNWAY IN SIGHT, LANDING**" OR "**MINIMUMS, APPROACH LIGHTS IN SIGHT, CONTINUING**" OR "**MINIMUMS, NO CONTACT, GOING MISSED**".
- When initiating a missed approach: "**POWER UP/CLEAN UP**"

- 5T Check (Time, Turn, Twist, Throttle, Talk) Will be conducted *verbally* when crossing IAF, IF, PT, FAF, Turning onto a DME arc, Entering a holding pattern, and each turn in the holding pattern, as applicable.
  - Time – The student will start the stopwatch timer as appropriate.
  - Turn – The student turns the airplane to the new desired heading, either manually or by using the autopilot. If using autopilot, the HDG bug or CRS must be adjusted as appropriate in order to execute the turn.
  - Twist – The student will twist the CRS knob to the desired course or verify the GPS sequencing to the desired course as appropriate.
  - Throttle – The student will adjust the throttle for climbs, descents, changes in airspeed as appropriate.
  - Talk – The student will report to ATC or make the required simulated communications to the CFI as appropriate.
- Approach briefings – must be conducted for every instrument approach. A full approach briefing should be done during periods of low workload such as prior to descent, during cruise. Procedures should be loaded into the FMS and frequencies tuned/identified prior to or during the approach briefing.

- Obtain weather (ATIS/ASOS/AWOS) before briefing approach
- *Abbreviated approach* briefings will be accomplished prior to reaching the FAF on any approach. The **3M** briefing will be used: "**MINIMUMS/MAP/MISSED APPROACH (initial)PROCEDURE/ALT**"

- FMS/Automation procedures
  - Flight Management Systems (FMS)
    - GPS equipped aircraft (G1000/GNS430/KLN 94) – Always use FMS to program flight plan/procedures during instrument flight training.
      - At a minimum this means programming a flight plan with departure/destination airports or direct-to-waypoint.
    - Always keep an up-to-date flight plan in the FMS – as plans change during the course of an instruction flight the FMS flight plan will need to be changed.
    - When programming the flight plan - Pay close attention to the clearance you've received, vs. the flight plan you filed.
    - *Instructors will train students on instrument procedures without the use of FMS/GPS during the course of instrument training.*
    - When programming FMS – **LOAD** procedures if told to "expect" a specific procedure; **ACTIVATE** procedures if "cleared" for a specific procedure, or when given: "This is vectors for the…specific approach".
    - When programming an approach procedure – use the timer/references window to set a bug the MDA/DA for the approach.
  - Flight Director/Autopilot programming
    - University of Dubuque standard operating procedures dictate that Flight Director (FD) should be used during all instrument flight operations and Autopilot (AP) be used whenever possible during instrument flight.
      - *Instructors will require students to practice instrument flight without the use of FD and AP throughout the course of instrument training.*
    - Altitude select will be used whenever possible or as indicated by aircraft checklists
      - Select changes in altitude any time a clearance for altitude change is received – DO NOT select altitude changes for *"expected"* altitudes

- Precision approaches – after beginning descent on the glideslope, set altitude select to highest altitude prescribed by missed approach procedure
- Non-precision approaches – upon crossing FAF, set altitude select to MDA
  - Upon capturing altitude at MDA - select altitude to highest altitude prescribed by missed approach procedure

- Go Around Switch (G1000 aircraft) – the "Go Around" switch will be pressed any time a missed approach is initiated. This switch has the following functions:
  - Sets FD to GA mode (7° climb/wings level) (TO mode on ground)
  - Activates missed approach leg of GPS flight plan (approach-active)
  - Changes CDI source to GPS
  - Disengages AP
- AP use – Autopilot should be used whenever possible during instrument flight at the discretion of the instructor
  - Autopilot must be disengaged for missed approach procedure & landing
  - Minimum altitudes for AP use:
    - Takeoff Climb - 800'AGL
    - Missed approach climb – once positive climb is established
    - Approach – 200' above TDZE
- University of Dubuque standard FD modes (shown: **PITCH/BANK**)
  - Takeoff – **TO**/**HDG** (programmed to runway heading)
    - **ALTS** mode armed
  - Initial Climb – **FLC**-Vy (if installed or **VS** – 500fpm if not installed)/**HDG** or **NAV** (as appropriate with ATC clearance)
    - **ALTS** mode armed
  - Climbs – **FLC** – desired climb speed(if installed or **VS** – 500fpm if not installed)/**HDG** or **NAV** (as appropriate with ATC clearance)
    - **ALTS** mode armed

- Cruise – **ALT**/ **HDG** or **NAV** (as appropriate with ATC clearance)
- Descents – **VS**-500fpm/**HDG** or **NAV** (as appropriate with ATC clearance)
    - **ALTS** mode armed /**VNV** mode may be used – as appropriate
- Approach procedures (prior to receiving approach clearance)
    - **ALT** or **VS**-500fpm (if descending)/**NAV** or **HDG** (if being radar vectored/during course reversals)
    - ***NAV*** *mode should be selected if instructed to join the localizer/inbound course but not yet "cleared for approach"*
- Approach procedures (after receiving approach clearance)
    - **APR** or **VS**-500fpm (for descent after FAF on NPA)/**APR**
- Missed approach
    - Initial climb - **GA**/**GA** (G1000 aircraft)

      VS-500fpm/**HDG** – runway heading (GNS 430/KLN 94 aircraft)
    - Once climb is established – **FLC**-Vy/**HDG** or **NAV** (as appropriate)
        - **ALTS** mode armed

FLIGHT BY REFERENCE TO INSTRUMENTS

- *All flight by reference to instruments will be taught using: primary and supporting method and control/performance method.*
- Basic flight maneuvers
    - *While the basic flight maneuvers will be practiced throughout instrument training, a sufficient amount of time and practice should be allowed for initial instrument maneuvers training.*
    - Straight and Level, Climbs, Turns, Descents – Refer to UD Standardization manual for step-by-step training procedure.
    - Refer to Instrument Flying Handbook chapters 4 & 5 for more information on basic flight maneuvers/instrument scanning techniques.
- Recovery from unusual attitudes
    - Recovery from unusual flight attitudes will be practiced in both full and partial panel situations
    - Nose low attitude recovery:
        - Reduce throttle to idle or as required to maintain safe airspeed
        - Roll the wings level using coordinated aileron and rudder controls
        - Pitch the nose level with the horizon using elevator back pressure
        - Once the aircraft has been returned to a straight and level flight attitude – apply power as desired and perform cruise checklist
    - Nose high attitude recovery:
        - Apply full throttle to prevent excessive loss of airspeed
        - Pitch the nose level using forward elevator pressure
        - Roll the wings level using coordinated aileron and rudder controls
        - Once the aircraft has been returned to a straight and level flight attitude – reduce power as desired and perform cruise checklist

HOLDING PROCEDURES

VOR/DME/Intersection/GPS

- Copy clearance, read it back, follow instructions:
  - Direct to holding fix/Heading to intercept course/Track a course – as instructed
  - Report entering, established, or leaving the hold – as instructed

- Navigation
  - Ensure appropriate frequency, course, and CDI is loaded/active
  - Draw the hold on scrap paper or on the chart
  - Draw aircraft position
  - Determine entry procedure necessary
  - Slow the aircraft to holding speed within 3 minutes of entering holding pattern: 95/110/120 KIAS

- Entering – when crossing holding fix:
  - Perform entry procedure via the 5T check:
    - Time – outbound, upon crossing holding fix
    - Turn
      - Direct – directly to outbound HEADING
      - Teardrop – 30º off the outbound holding course on holding side
      - Parallel – to the outbound HEADING on non-holding side
    - Twist
      - Set CDI/OBS to INBOUND course
      - Set HDG bug on desired entry heading

        The CDI will be set to outbound course if using G1000 – published procedure active in FMS flight plan
    - Throttle - Set as appropriate to maintain holding speed
    - Talk – Report: "Entering" – as appropriate

- Arrival at the outbound end turn:
  - Perform 5T Check:
  - Time – Start timer for turn once established in standard rate (i.e. [airspeed/10+5=degrees of bank for standard rate])
  - Turn - to intercept INBOUND course
    - Roll wings level – upon intercepting inbound course, arriving at desired heading for intercept/wind correction, or after 1 minute (STD rate turn)
  - Twist
    - Set OBS/CRS to INBOUND course
    - Set HDG bug to inbound/desired heading
  - Throttle - set as appropriate

        - Talk – Report: “Established” – as appropriate
    - Upon crossing the holding fix after established
        - Repeat the 5T check at each turn and when departing the hold
        - Start timer outbound abeam the holding fix each outbound leg of the hold.

DME ARCS/NAVIGATION

- Copy clearance, read it back, and follow instructions:
    - Transition to arc: Present course to intercept/Heading to course/Track a different course/direct
    - Approach for which the arc will be used: Published/Non-published arcs
        - Load the procedure in the FMS
        - Choose vectors as the transition if using a non-published arc
            - *This may suspend the flight plan at the FAF depending on location. This may have to by unsuspended upon interception of the final approach course.*
        - Choose proper IAF (reference inbound course) if using a published DME arc
- Navigation
    - Ensure appropriate navaid/frequency/ course, and CDI is loaded/active
        - If using GPS, the OBS button will have to be depressed in order to manually select course
    - Review procedure for turn onto arc – Coming from inside or outside of the arc
    - Ensure DME (GPS distance) is from correct Nav facility
    - Ensure bearing pointer is set to correct navaid - if using the bearing pointer method
- Entering the arc:
    - Time – Not applicable
    - Turn - Approximately 0.5 NM prior to assigned DME – turn 90º toward arc
        - Plus/minus wind correction
    - Twist – Set CDI to the next cross radial 10º in the direction of the arc

      *The bearing pointer method (using RMI) should be taught as the **preferred** method, in addition to the "twist 10/turn 10" method*
    - Throttle – as appropriate
    - Talk – report established – as required
- Established on the arc
    - Upon CDI centering, turn heading 10º and twist OBS 10º
        - Plus/minus wind correction – to maintain proper DME
        - Using bearing pointer – keep pointer at approximately 90º/270º relative bearing for right turn/left turn arcs, respectively
- Determining lead radial/bearing
    - If using bearings – 7º off inbound final approach course
    - If using radials – 7º off outbound final approach course
    - Or as published
- Upon crossing lead radial/bearing…
    - Time – not applicable
    - Turn – ½ standard rate to intercept approach course

A 45º intercept angle to final approach course may be used if ½ std. rate turn does not allow for course interception.

- Twist – Tune or set the final approach course
    - This could entail changing the navigation source
    - At this time it is appropriate to use the navaid designated for the approach
- Throttle – as appropriate
- Talk – as appropriate

INTERCEPTING AND TRACKING

- Copy clearance, read it back, follow instructions:
    - Present position direct – means to utilize the "direct" function of the GPS to navigate from where the airplane is at currently to the waypoint specified
    - On course – means to intercept the course issued in a previous clearance
    - Vectors – fly assigned heading to intercept course specified in vector clearance
    - Instructors should ensure the expectations to how to conduct the flight:
        - "Skyhawk 123, cleared to Monticello airport via direct, maintain 3,000, expect 4,000 10 minutes after departure, departure frequency Chicago Center 133.95, squawk 1200"
        - "Skyhawk 123, cleared to Monticello airport via direct OREVY then direct, maintain 3,000, expect 4,000 10 minutes after departure, departure frequency Chicago Center 133.95, squawk 1200"
        - "Skyhawk 123, cleared for takeoff, proceed on course, maintain 4,000"
- Navigation
    - Verify navigation source is correct/operational/selected on HSI/OBS & Nav radio
    - Course – set desired course in HSI/OBS
        - Course and heading should coincide +/- wind correction
          If not, upon AHRS failure the CDI will be susceptible to reverse sensing
        - Intercepting/tracking courses – Use a 30-45° intercept angle for selected course
        - Once on course – determine wind correction angle and apply to heading
        - Continue to cross check CDI and heading – make heading adjustments to maintain course centerline
          "Established on Course" means the CDI is centered!
    - DME - Set using the bearing information window or GPS (active waypoint)
    - FMS - Load the entire flight plan
        - Airways - In order to load airways, a navaid or intersection must first be put in the flight plan from which the airway is joined
        - Direct route for GPS - Set departure airport followed by destination airport
        - Procedures – Load all procedures in FMS as soon as possible after receiving instructions to expect or clearance for a procedure

INSTRUMENT APPROACH PROCEDURES

- **PRECISION** – Includes: GPS (LPV), ILS, PAR
    - Copy clearance, read it back, and follow instructions:
        - Transition – Direct-to, or intercept publish course to IAF/Vectors to final/DME arc

      All types of transitions should be practiced throughout the course of instrument flight training.
    - Navigation
        - Brief and load procedure as instructed/cleared
        - Select appropriate navigation source for the given leg
            - GPS can be used for procedure turns and as necessary to navigate to certain IF or IAF
        - Prior to intercepting the final approach course, the primary navaid prescribed for the approach must be selected and active
        - The CFI will give a simulated clearance to the student before descent on published approach is initiated
            - The clearance provided to the student should dictate how the approach is conducted.
                - "…maintain 3,000 until established on the final approach course"
                - "…maintain 3,000 until procedure turn outbound/inbound"
                - "…maintain 3,000 until established on the glideslope"
    - Communications with ATC
        - Student should assume responsibility for all ATC communications
        - If the instructor has performed some radio communications in order to relay intentions to the tower - provide the student with a separate, simulated clearance to ensure the student is informed as to reporting points along the approach
            - i.e. FAF, missed, established, entering, or leaving the hold, etc.
    - Aircraft Management (AVIATE)
        - Prior to crossing the FAF (glide slope intercept) the before landing checklist must be complete, 3Ms reviewed, flaps set to 10º and airspeed stabilized at: 90/105/110 KIAS

      Flaps may be left in the up position for circle-to-land approaches, and if weather conditions dictate (high wind gusts).
        - After glide slope intercept – establish a descent rate that will maintain glide slope tracking at the proper airspeed (see above)
        - Upon arriving at DA – Determine if required visual references allow for a continued approach/descent
        - Descent from DA to the runway should begin only:
            - If the flight visibility is greater than or equal to the minimum visibility prescribed by the SIAP
            - If the runway environment is in sight

If the approach lights are in sight – except that the pilot may only descend to 100' above TDZE – If the required visual references are not insight at that point a missed approach must be executed.

- When the aircraft is continuously in a position from which a landing can be made using normal maneuvers

- **NON PRECISION** – Includes: VOR, GPS (LNAV), LOC, LBC, ASR

  - Copy clearance, read it back, and follow instructions:
    - Transition – Direct-to, or intercept publish course to IAF/Vectors to final/DME arc

  All types of transitions should be practices throughout the course of instrument flight training.
- Navigation
  - Brief and load procedure as instructed/cleared
  - Select appropriate navigation source for the given leg
    - GPS can be used for procedure turns and as necessary to navigate to certain IF or IAF
  - Prior to intercepting the final approach course, the primary navaid prescribed for the approach must be selected and active
  - The CFI will give a simulated clearance to the student before descent on published approach is initiated
    - The clearance provided to the student should dictate how the approach is conducted.
      - "…maintain 3,000 until established on the final approach course"
      - "…maintain 3,000 until procedure turn outbound/inbound"
      - "…maintain 3,000 until established on the glideslope"
- Communications with ATC
  - Student should assume responsibility for all ATC communications
  - If the instructor has performed some radio communications in order to relay intentions to the tower - provide the student with a separate, simulated clearance to ensure the student is informed as to reporting points along the approach
    - i.e. FAF, missed, established, entering, or leaving the hold, etc.
- Aircraft Management (AVIATE)
  - Prior to crossing the FAF or commencing descent at FAP the before landing checklist must be complete, 3Ms reviewed, flaps set to 10º and airspeed stabilized at: 90/105/110 KIAS

  Flaps may be left in the up position for circle-to-land approaches, and if weather conditions dictate (high wind gusts).
  - After crossing FAF or when beginning descent at FAP – establish a descent rate that will allow for level off at MDA prior to reaching MAP (approx. 500 fpm)
  - At altitude approx. 10% of descent rate above MDA - Lead level-off by applying power/increasing pitch

    Generally, 2000RPM or 20" MP is required to maintain altitude/airspeed at MDA

- Descent from MDA to the runway should begin only:
    - If the flight visibility is greater than or equal to the minimum visibility prescribed by the SIAP
    - If the runway environment is in sight
      If the approach lights are in sight – except that the pilot may only descend to 100' above TDZE – If the required visual references are not insight at that point a missed approach must be executed.
    - When the aircraft is continuously in a position from which a landing can be made using normal maneuvers
    - After crossing the VDP

- **MISSED APPROACH**

- Upon arrival at the DA/DH or MAP or full deflection of the CDI without visual references required

    - **Power Up** – Mixtures, props, throttle (as appropriate)

    - Go around button (if installed)

        - Disconnects AP, places FD in GA mode, changes the cdi to GPS, and activates missed approach in gps flight plan

    - **Clean up** – flaps, gear (as appropriate)

    - Program fms/gps (as required)

    - Program flight director

    - **Radio call** "going missed"

    - Copy, confirm, comply missed approach clearance

    - Climb checklist

    - Cruise checklist

    - Brief the hold

- **CIRCLING APPROACH**

- Upon acquiring the required visual references and minimum visibility as required by the instrument approach procedure –

- Power up – apply enough power (roughly 2000RPM or 20” MP) to maintain an altitude at or above the minimum altitude prescribed for circling by the SIAP
- Begin circling maneuver – within 1.3NM (Category A) of the runway (1.5NM Category B)
- Maintain airplane with 1.3NM (Category A) or 1.5NM (Category B) of the runways
- Maintain altitude at circling MDA until the airplane is continuously in a position from which a descent to landing can be made using normal maneuvers
- Comply with ATC instructors for circling maneuver

Non-towered airport ops. – circling maneuver is pilot’s discretion. Comply with procedures outline in the instrument flying handbook chapter 10.

- **LANDING FROM A STRAIGHT IN OR CIRCLING APPROACH**
- Upon acquiring the required visual references and minimum visibility as required by the instrument approach procedure –
  - Transition to visual flight at the DA, MDA, or VDP
  - Confirm: “**BEFORE LANDING CHECKLIST COMPLETE**” “**CLEARED TO LAND**”
  - Adjust approach speed, airplane configuration – as appropriate for weather conditions
  - Complete landing as specified in the UD standardization manual

IFR EMERGENCY OPS

- Loss of communications
  - *While this task is primarily a knowledge area, the CFI should work loss of communications into scenarios throughout instrument training.*
  - Recognize loss of communication
  - Continue to destination according to flight plan or deviate from flight plan as prescribed by FAR 91.185
  - Adjust aircraft speed in order to begin approach at destination as close as possible to EFC time or ETA, as specified
- Partial panel
  - Instrument/system failures will be practiced throughout instrument flight training
  - When simulating the malfunction of flight instrument systems, CFIs will simulate failure of all associated instruments for the system being simulated failed
  - The method used to simulate failures varies by aircraft:
    - G1000 equipped aircraft – use foam "cover" or "window cling" to simulate ADC/AHRS failure
    - The PFD or MFD screen may be dimmed to its lowest setting to simulate a screen failure
    - Aircraft with analog flight instruments – use other cover up (i.e. suction cup type, paper type) to simulate failures of flight instruments and systems

      At no time will the CFI pull a circuit breaker to simulate failures.
  - Consult appropriate emergency/abnormal checklist
  - Anytime an instrument malfunction occurs or is simulated the student will advise the instructor/examiner as well as ATC
- Instrument approach with loss of primary flight instrument indicators
  - Determine which flight instruments/systems have failed
  - Advise ATC of malfunction as prescribed by FAR 91.187
  - Complete non-precision approach without the use of appropriate primary flight instruments

CFI must ensure an accurate simulation – for AHRS failure CDI course may need to be changed during Localizer operations to simulate reverse sensing

POSTFLIGHT PROCEDURES

- Checking instruments and equipment
- Verify proper operation of all flight instruments and equipment, and note any discrepancy on the UD aircraft squawk sheet, as appropriate

APPENDICES

INSTRUMENT TRAINING SCENARIOS

Objective: In this scenario, the student will perform basic attitude instrument flying, while practicing automation management and ATC communications. Cockpit organization and VOR/GPS navigation will be emphasized throughout the scenario through practice of holding and approach procedures. Weather decision making will be incorporated into this scenario. This scenario will last approximately 1.5 hr.

Materials: The student will need the low alt. enroute chart and approach charts for Iowa (L-28/NC-3). Also, the student should have all their normal cockpit organizational materials – kneeboard, pencil, ect. This scenario can be accomplished either in the AATD or Airplane.

Pilot Briefing: The CFI will brief the student ahead of time on the purpose of the mission and what tasks will be emphasized through the scenario.

- The Mission: The flight will be planned as a "cross-country" from DBQ-DVN. The purpose of the mission is to pick up a friend who is stuck at the DVN airport due to car trouble. The weather is IFR for the entire route of flight, ovc 005, 1sm vis, -RA.
- The flight will be cleared to DVN via V129
- The student will decide which approach should be conducted at DVN
- Before receiving an approach clearance the student will be instructed to hold over CVA VOR
- ATC will advise the student that other airplanes have not been able to make it into DVN due to deteriorating weather conditions
- The student must decide whether or not to continue the approach into DVN or go to an alternate or return to DBQ
- If the student elects to try the approach at DVN, they will not break out and must execute the missed approach procedure.
- The preferred choice would be to return to DBQ, as the weather at departure was good enough to break out on the approach.
- Upon returning to DBQ (or alternate airport) a GPS approach will be assigned, with a hold at the IF due to traffic in the area.
- The flight will then be cleared for the approach, and complete the approach to a full stop landing.

Suggested UD TCOs/Lessons: Instrument – 7,8,11,16. Commercial – 2,11.

Appendix: Approach Briefings

- Determine which approach and landing runway should be used based on:
    - WX Reports(ATIS/ASOS/AWOS), ATC instructions, CFI instructions
      CFIs should allow students to practice ADM whenever possible.
- Full Briefing - Accomplished during enroute segment (workload permitting)
    - Begin briefing with a general review of pertinent information:
        - ATIS/Weather/Terrain/NOTAMs/Approaches in use/Runway conditions/performance considerations/Expected route to final approach course/Traffic situation
    - Airport/City name & approach title – verify correct chart/procedure is loaded in FMS
    - Date/Revision – verify approach chart is current
    - Navaid frequency (if applicable) – verify loaded and active
    - Approach course – verify loaded and correct NAV source (CDI)
    - Runway information – TDZE/THRE/length - as applicable
    - Approach lighting system/VGSI – is it working?
    - Communication frequencies – review/set as applicable
        - Center/Approach/Tower/CTAF/Ground/ATIS/UNICOM
    - Route/Course Info:
        - Transition – Vectors/IAF/Procedure turn
        - Step-down Fixes – if applicable
        - FAF/FAP
        - MAP
        - VDP – if applicable
    - Altitudes – Review the following altitudes on the approach chart:
        - Published altitudes for each approach segment
        - MSA/Baro altitude at OM crossing/DA/MDA/Missed approach altitudes
    - Visibility Requirements – adjusted for inop. equipment – if applicable
    - Missed approach procedure – Review procedure/route/altitude/hold entry
        - Verify appropriate frequencies tuned/loaded in standby
    - Planned Turn-Off/Taxi Route – emphasis on runway incursion avoidance and hot spots
    - Notes/Equipment requirements – review as applicable
- Abbreviated Briefing – Three “M’s”
    - **M**inimums
    - **M**AP
    - **M**issed approach procedure

Appendix: ATC Clearances for VFR Operations (Instructional Communications)

- **Route Clearances:** On the ground, prior to departure, provide the student with a simulated clearance which will provide the student with the necessary information as to how to setup the FMS.
  - If you want the student to go directly to the airport:
    - "Skyhawk N6318D, cleared to Monticello airport via direct, maintain 3,000, expect 4,000 one zero minutes after departure, departure frequency 133.95, squawk 1200"
  - If you want the student to navigate to an IAF (e.g. OREVY – the IAF for the RNAV 15 into KMXO)
    - "Skyhawk N6318D, cleared to Monticello airport via direct OREVY then direct, maintain 3,000, expect 4,000 one zero minutes after departure, departure frequency 133.95, squawk 1200"

- **Enroute clearances:** Provide the student with clearances enroute to simulate that which would be encountered while on an IFR flight plan which will dictate how the student will fly the approach and navigate the route.
  - Simulate handing off between control frequencies shortly after departure: "Skyhawk N6318D, contact departure"
  - If the student is not given a clearance on the ground which would dictate what approach will be utilized at the destination, provide the student with a clearance to proceed to the approach as desired.
    - Direct to IAF: "Skyhawk N6318D, proceed direct ZAWDI for the RNAV 33 approach at Platteville"
    - Vector to final: "Skyhawk N6318D, turn right heading 090, vectors for the RNAV 33 approach at Platteville"
  - Once the student is on-course to the IAF or beginning vectors for the approach, it is necessary to clear the student for the approach.
    - "Skyhawk N6318D, maintain 3,000 until established on a published segment of the approach, cleared for the RNAV 33 into Platteville"
    - Skyhawk N6318D, turn left heading 360, maintain 3,000 until established on the final approach course, cleared for the RNAV 33"

      Occasionally the CFI may want to delay giving the student an approach clearance to simulate a situation when it would be necessary to query ATC.
  - When practicing approaches in the Dubuque area, the 500 feet above the inbound altitude rule applies. Work this into the clearance.
    - "Skyhawk N6318D, maintain 3,500 until procedure turn outbound/inbound, cleared for the full ILS 36 at Dubuque"

- **Terminal Clearances:** It is necessary to inform the student to switch frequencies from the enroute to the applicable terminal frequency (i.e. CTAF or tower.)

- When transitioning into an uncontrolled airport: “Skyhawk N6318D, radar services terminated, change to advisory approved, report going to missed on this frequency”
- When transitioning into a controlled airport: “Skyhawk N6318D, contact Dubuque tower on 119.5”

- **Holding clearances:** Providing the holding clearance itself is a fundamental part of practicing holds, but providing the transition clearance as to how to navigate to the holding fix is an integral part of the process as well.
  - Holding clearance: “Skyhawk N6318D, hold **west** of the **DBQ** VOR on the **270** degree radial, **E**xpect **F**urther **C**learance at two-zero-one-five zulu, maintain **3000**”
  - Have the student read it back and follow with the transition clearance: “Skyhawk N6318D, read back correct, proceed direct to the VOR, report entering the hold”

    *The **bold** items above are elements of the holding clearance the CFI must become familiar with and standardize.*

- **DME arc clearances:** Non-published arcs can be done in a variety of ways.
  - If desiring to begin the lesson with an arc: “Skyhawk N6318D, cleared for takeoff, proceed outbound on the 090 degree radial, intercept a 10 DME arc to the localizer 31, climb and maintain 3,500”
  - If leaving a hold over the Dubuque VOR: “Skyhawk N6318D, upon crossing the VOR inbound, proceed outbound on the 270 degree radial for a 10 DME arc to the localizer back-course 13, maintain 3,000”
  - If transitioning from the practice area or from another airport to Dubuque (KMXO direct-to KDBQ): “Skyhawk N6318D, from present course, intercept a ten DME arc to the ILS 36, maintain 3,000”

- **Missed approach instructions:** Sometimes ATC provides alternative missed approach instructions. When practicing back-to-back approaches at Dubuque, it may be necessary or helpful to provide the student with alternative missed approach instructions.
  - When shooting the ILS 36 followed by the LOC/BC 13: “Skyhawk N6318D, upon going to missed, turn left and proceed outbound on the localizer for the back-course 13, climb maintain 3,400”