SECTION II – INDOCTRINATION

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INTRODUCTION

This chapter establishes the training syllabus for the minimum instruction requirements for pilot training, qualification and currency in the UC-45J and RC-45J aircraft.

GROUND TRAINING SYLLABUS

The overall ground training syllabus for each activity varies according to local conditions, facilities, authority, and the currency of C-45 pilot personnel involved. However, to establish a standardized subject course, the following outline is presented.

ENGINEERING

GENERAL

General description of aircraft.

ENGINE OPERATING PROCEDURE AND LIMITATIONS

Discuss the powerplant operation and limitations during ground and flight operations.

AIRCRAFT SYSTEMS

1. Landing gear
2. Flaps
3. Brakes
4. Propeller
5. Deicing and anti-icing
6. Oil
7. Fuel
8. Electrical

TRANSITION AND FAMILIARIZATION

GROUND OPERATIONS

1. Preflight
2. Starting procedures
3. Taxiing procedures
4. Engine ground check

FLIGHT OPERATIONS

1. Takeoff
2. Level-off
3. Basic transitions
4. Climbs and glides
5. Steep turns
6. Stall characteristics

7. Slow-flight
8. Landings

EMERGENCY PROCEDURES

Discuss aircraft emergencies and the correct procedures to follow for each.

INSTRUMENTS

AIRCRAFT RADIO AND INSTRUMENT OPERATIONS

Discuss the location, function, and operation of the aircraft radio equipment and flight instruments.

INSTRUMENT PROCEDURES

1. Discuss instrument departures, en route, and terminal procedures.
2. Discuss the characteristics of the aircraft during instrument flight.

FLIGHT TRAINING SYLLABUS

Specific aircraft utilization, local command restrictions, geographic location and other factors influence the actual flight syllabus and its sequence of completion.

AIRCRAFT FAMILIARIZATION

FLIGHT ONE

The instructor pilot will introduce:
1. Preflight
2. Starting procedures
3. Taxiing
4. Engine ground check
5. Takeoff
6. Climbout
7. Climbs and descents
8. Level speed changes
9. Steep turns
10. Slow-flight
11. Stall characteristics
12. Anti-icing and deicing equipment
13. Normal landings

FLIGHT TWO

Practice all maneuvers previously introduced. The Instructor Pilot will introduce:
1. Engine fire during start
2. Cabin fire
3. Electrical fire
4. Fuel starvation
5. Emergency operation of gear and flaps
6. Single-engine emergency procedures
7. No-flap and no-brake landings
8. Basic instruments
   a. Steep turn pattern
   b. Partial panel
   c. Unusual attitudes
   d. Climbs and descents

FLIGHT THREE

Practice all maneuvers previously introduced. The Instructor Pilot will introduce:
1. Engine fire in flight
2. Obstacle takeoff
3. Obstacle landing
4. Single-engine landing
5. Crosswind landing
6. Single-engine failure after takeoff
7. Failure of both engines after takeoff
8. Radio and instrument departure, enroute, and terminal procedure

FLIGHT FOUR

Practice all maneuvers previously introduced.

FLIGHT FIVE

Standardization evaluation flight check.

NOTE

Flight four or five may be standardization, evaluation flight check depending on pilot proficiency.

AIRCRAFT FAMILIARIZATION MANEUVERS

The following maneuvers may be used to demonstrate various flight characteristics.

1. Steep Turns - The steep turn maneuver will be flown with the aircraft trimmed for normal cruise. The maneuver consists of two level 360-degree turns (one in each direction), utilizing 45 degrees of bank. If the airspeed drops below 105 KIAS, power should be added.
2. Stalls - The stall series consists of the following maneuvers:
   a. Prior to starting a maneuver, conduct these checks:
      Mixture levers - RICH
      Propeller levers - 2000 rpm
      Fuel supply (minimum - 0.5 auxiliary or 0.3 main) - CHECKED
      Shoulder harness - LOCKED
   b. Execute one 180-degree or two 90-degree clearing turns.
   c. Throttle back to 13 inches MAP, maintaining a constant altitude when commencing clearing turns. After rollout, maintain directional control with the rudders, allowing the airspeed to diminish until the aircraft shudders (approximately 61 KIAS when clean).
   d. Recover by opening the throttle to 30 inches MAP, simultaneously reducing the angle of attack.
   e. Maintain a constant altitude while accelerating to 105 KIAS.
   f. When an airspeed of 105 KIAS is attained, throttle back until the horn blows and lower the landing gear.
   g. At 100 KIAS, lower full flaps.
   h. Close the throttles, maintaining a constant heading and altitude. When the aircraft shudders (approximately 52 knots), recover as in item d above. Raise

the landing gear immediately following application of power.

i. Begin retracting the flaps in increments of 15 degrees at an airspeed of at least 75 KIAS. Raise the last 15 degrees after a speed of 95 KIAS.

j. Return to normal cruise.

WARNING

The aircraft should not be trimmed below 90 KIAS during an approach to the stall.

3. Slow-flight

a. Prior to establishing a slow-flight condition:
Mixture levers - RICH
Propeller levers - 2000 rpm
Fuel supply (minimum - 0.5 auxiliary or 0.3 main) - CHECKED
Shoulder harness - LOCKED

b. Maintain a constant altitude and heading during the entry and recovery.

c. Reduce power (until horn sounds), slow to 105 KIAS and lower the landing gear.

d. At 100 KIAS, lower full flaps

e. Assume a nose high attitude and apply right rudder as required to maintain heading. Apply power (24 to 26 inches MAP) as required to maintain 65 KIAS.

f. Cowl flaps - OPEN

g. Fly through several coordinated turns, using power to counteract lift loss due to banking attitude.

h. Upon completion of slow-flight, advance throttles to 30 inches MAP and retract the landing gear. Raise the wing flaps at 75 KIAS and transtion to normal cruise flight.

FLIGHT CREW REQUIREMENTS

The minimum flight crew is a pilot qualified in model plus a crewmember assigned lookout duties for the off-pilot side. Under actual or simulated instruments, a copilot is required in addition to a pilot qualified in model. During all simulated instrument flights, since the safety pilot is restricted from maintaining a proper lookout on both sides of the aircraft, a rear seat observer, equipped with a functioning microphone and earphones for communications with the pilots, will be stationed as lookout in a seat on the side opposite the safety pilot. This lookout shall be thoroughly briefed on his responsibility for properly reporting any aircraft.

PILOT IN COMMAND INITIAL QUALIFICATION AND CURRENCY REQUIREMENTS

Unit commanders may waive minimum ground and flight training requirements when pilot proficiency and recent experience in similar models warrants.

INITIAL QUALIFICATIONS

For initial qualifications in either the UC-45J or RC-45J aircraft, a pilot shall meet the following minimum requirements:

1. Complete the ground and flight training syllabus.
2. Satisfactorily complete a NATOPS evaluation.
3. Log 10 hours of first pilot time in either the UC-45J or RC-45J aircraft within the preceeding 90 days.
4. Possess a current instrument rating.

CURRENCY

To maintain currency in either the UC-45J or RC-45J aircraft, a pilot must meet the following minimum currency requirements:

1. Log 5 hours of first pilot time and two take-offs and landings within the preceeding 90 days.
2. Maintain NATOPS qualifications in accordance with OPNAVINST 3510.9 series.
3. Maintain instrument rating in accordance with OPNAVINST 3710.7 series and the NATOPS Instrument Flight Manual.

FERRY PILOTS

Training requirements, checkout procedures, evaluation procedures, and weather minima for ferry squadron pilots are governed by the previous contained in OPNAV Instruction 3710.6 series.

PERSONAL FLYING EQUIPMENT

Refer to OPNAV 3710.7 series for personal flying equipment requirements.

FLIGHT TEST

TEST PILOT QUALIFICATION

Aviators appointed as test pilots should meet the following requirements.

1. Logged at least 50 hours in the C-45 series type aircraft within the preceeding six months. Commanding Officers are authorized to waive this requirement when individual pilot proficiency warrants.
2. Designated as qualified test pilot in writing by Commanding Officer.

FLIGHT TEST SAFETY RULES

Safety shall be the governing factor on all test flights, and the following general rules shall apply:

1. No aircraft shall be test-flown until all safety-of-flight discrepancies have been corrected and signed off by a designated inspector.
2. All test flights shall be conducted in accordance with OPNAV, FAR, and local directives.
3. Radio communication with the control tower shall be maintained at all times.
4. Test flights will be flown in a designated area where an emergency landing can be made on a hard-surfaced runway.

SECTION III – NORMAL PROCEDURES

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BRIEFING/DEBRIEFING OPERATIONS

Mission briefing and debriefing is the responsibility of the pilot in Command and should cover all items pertinent to the specific mission. Particular attention should be paid to any area where difficulty was encountered or where any tactics employed were ineffective or limited. The pilot in command shall be responsible for briefing passengers on all phases of the flight, including all directives related thereto.

MISSION PLANNING

The basic aircraft mission is personnel transportation for the UC-45J and aerial photography for the RC-45J. These missions, although quite dissimilar in purpose, have a common element in that training is their objective. Although these missions may be pre-planned, their actual execution requires the entire aircrew to employ their knowledge, experience, originality and even imagination. Any mission which allows planning, should be planned as thoroughly and completely as possible in order to realize maximum safety and mission accomplishment. Planning for a mission is the responsibility of the pilot in command.

NAVIGATION

The importance of maintaining a current plot or exact knowledge of aircraft position cannot be over emphasized. This enables a pilot to return to an installation and to make prompt and accurate position reports.

The following radio equipment installations will be available in various combinations (due to the difference in aircraft configuration) to assist in navigation.

1. Omni range receiver AN/ARN-30
2. Radio compass AN/ARN-7
3. Marker beacon AN/ARN-8
4. Radio altimeter AN/APN-1

CRUISE CONTROL

Normally, adequate fuel for a planned mission will be aboard. However, a pilot should practice fuel conservation on each flight since an unknown element such as a diversion, extended hold, etc., may present itself. Power settings in accordance with Section XI, Performance Data should be used to obtain the maximum effective control of fuel consumption. If necessary, a fuel management log should be maintained to assist in determining performance and for estimating endurance. Although it is permissible to use up to maximum continuous power when necessary to meet aircraft performance requirements cruise power settings above the maximum cruise limits should be restricted to emergency cruise operations only.

SPECIAL MISSIONS

The capabilities of the C-45J series aircraft are such that a variety of special missions may be assigned. Specifically, the RC-45J aircraft is designed for aerial photography and is used extensively for training photographer's mates and selected officers in aerial photography, obtaining photographic coverage of military establishments, plus many varied photographic missions. Refer to Section VIII, Special Missions for a discussion of RC-45J aircraft and photographic equipment operating techniques.

PREFLIGHT PREPARATION

SCHEDULING

Flight scheduling and the determination of pilot qualification for scheduling purposes is the responsibility of the Commanding Officer. The purpose of the preplanned schedule is the orderly and efficient utilization of aircraft and pilots.

LINE OPERATION

AIRCRAFT ACCEPTANCE

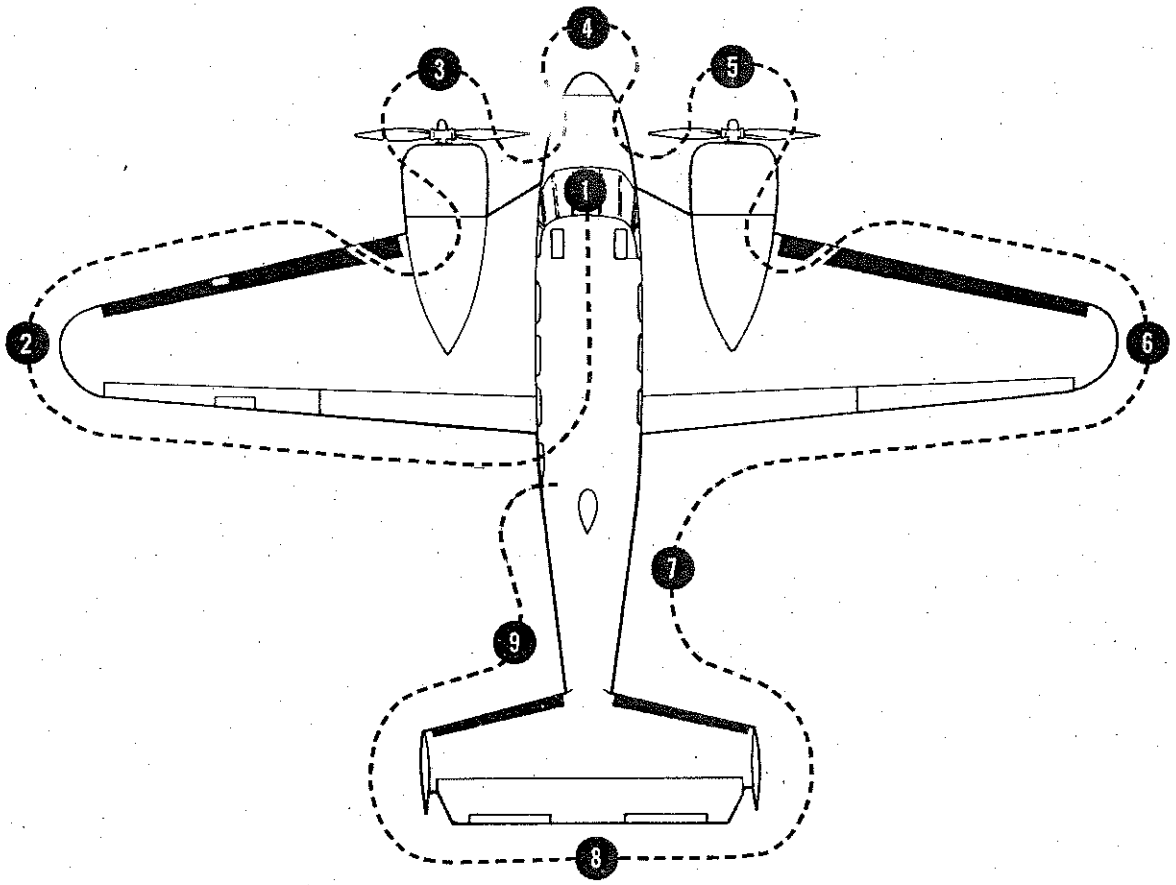
The pilot in command should not accept an aircraft until he is satisfied that it is safe for flight and is capable of completing the intended mission. The two main factors involved in this determination are careful examination of the aircraft's recent discrepancies and a thorough preflight inspection.

YELLOW SHEETS

Review at least the last ten yellow sheets for the discrepancies noted and the corrective action taken. When satisfied with the yellow sheet information on aircraft flight status, fuel loading, gross weight, center-of-gravity, configuration, etc., the pilot in command will sign the sheet and proceed with the preflight inspection.

PREFLIGHT INSPECTION (EXTERIOR)

The exterior inspection is presented in figure 3-1 and is reproduced in the Pilot's Pocket Checklist NAVAIR 01-90CE-1B. Completion of these checks is the responsibility of the pilot in command.



1

PILOT'S COMPARTMENT (INITIAL)

1. BATTERIES OFF.
2. MIXTURES IDLE CUT-OFF.
3. FUEL TANK SELECTOR OFF.
4. MAGS OFF.
5. LANDING GEAR HANDLE DOWN.
6. COWL FLAPS OPEN.
7. TRIM TABS SET.
8. CONTROLS LOCK OFF.

2

LEFT WING

1. SKIN CONDITION.
2. ACCESS COVERS SECURE.
3. FLAP.
4. AILERON.
5. AILERON TAB.
6. NAVIGATION AND PASSING LIGHT.
7. DEICER BOOTS.
8. LANDING LIGHT.

3

LEFT ENGINE, LANDING GEAR, AND WHEEL WELL

1. EXHAUST STACK AND INTENSIFIER TUBE.
2. EXTERNAL POWER RECEPTACLE.
3. COWL FLAPS AND FASTENERS.
4. VISUAL CHECK THROUGH COWL FLAP OPENING —
   (1) ACCESSORY SECTION.
   (2) CARBURETOR ELBOW INTAKE PIPE.
5. WHEEL BRAKE COMPONENTS.
6. LANDING GEAR SHOCK STRUT (2½ INCHES MAX., 1½ INCHES MIN.).
7. WHEEL WELL AREA —
   (1) DEICER DISTRIBUTOR VALVE AND FILTER.
   (2) HEATER HOSES.
   (3) OIL "Y" DRAIN OFF.
   (4) OIL BYPASS VALVE AND CONTROL CABLE.
   (5) LANDING GEAR CHAIN.
   (6) SLIDE TUBE (BELOW LANDING GEAR CHAIN).
   (7) LANDING GEAR UP AND DOWN LOCK SWITCHES.
   (8) PROP FEATHERING PUMP.
   (9) WHEEL DOORS (IF INSTALLED).
   (10) LANDING GEAR STRUT WELD JOINTS.
8. PROP CONDITION.
9. PROP ANTI-ICER LINE.
10. ENGINE NOSE SECTION.
11. IGNITION HARNESS.

4

LEFT INBOARD WING, UNDERSIDE OF AIRCRAFT, NOSE, AND RIGHT INBOARD WING

1. ENGINE OIL SHUTTER FLAPPER.
2. VENTILATION AIR INTAKE.
3. BATTERY VENT.
4. BELLY ANTENNA.
5. ANTI-COLLISON AND FUSELAGE LIGHTS.
6. FUEL SUMP DRAINS.
7. FUSELAGE ACCESS DOOR.
8. PITOT TUBES.
9. NOSE DOOR.
10. NOSE FUEL TANK FILLER COVER.
11. ENGINE FIRE EXTINGUISHER BLOW-OUT DISK.
12. BATTERY VENT.
13. VENTILATING AIR INTAKE.
14. OIL SHUTTER FLAPPER.

Figure 3-1. Preflight Inspection (Sheet 1 of 2)

5

RIGHT ENGINE, LANDING GEAR, AND WHEEL WELL

1. COWL FLAPS AND FASTENERS
2. VISUAL CHECK THROUGH COWL FLAP OPENING —
   (1) ACCESSORY SECTION.
   (2) CARBURETOR ELBOW INTAKE PIPE.
3. WHEEL BRAKE COMPONENTS.
4. LANDING GEAR SHOCK STRUT (2 ½ INCHES MAX., 1 ½ INCHES MIN.).
5. IN WHEEL WELL AREA —
   (1) HEATER HOSES.
   (2) OIL "Y" DRAIN OFF.
   (3) OIL BYPASS VALVE AND CONTROL CABLE.
   (4) LANDING GEAR CHAIN.
   (5) SLIDE TUBE (BELOW LANDING GEAR CHAIN).
   (6) LANDING GEAR UP AND DOWN LOCK SWITCHES.
   (7) PROP FEATHERING PUMP.
   (8) WHEEL DOORS (IF INSTALLED).
   (9) LANDING GEAR STRUT WELD JOINTS.
6. PROP CONDITION.
7. PROP ANTI-ICER LINE.
8. ENGINE NOSE SECTION.
9. IGNITION HARNESS.
10. EXHAUST STACK AND INTENSIFIER TUBE.

6

RIGHT WING

1. LANDING LIGHT.
2. DEICER BOOTS.
3. NAVIGATION LIGHT.
4. AILERON.
5. FLAP.
6. ACCESS COVERS SECURE.
7. SKIN CONDITION.

7

AFT FUSELAGE, RIGHT SIDE

1. SKIN AND WINDOWS.
2. EMERGENCY EXIT HATCH.

8

TAIL OF AIRCRAFT

1. TAIL WHEEL ASSEMBLY —
   (1) SHOCK STRUT EXTENSION (3 TO 6 INCHES).
   (2) SHOCK STRUT WELD JOINTS.
   (3) LOCK AND PIN.
   (4) TIRE.
   (5) TAIL GROUND WIRE.
2. EMPENNAGE —
   (1) RUDDERS.
   (2) DEICER BOOTS.
   (3) ELEVATOR AND RUDDER FABRIC.
   (4) HINGES.
   (5) SURFACE TRAVEL UNOBSTRUCTED.
   (6) DRAIN HOLES.
   (7) TAIL POSITION LIGHT.
   (8) ELEVATOR TABS.
   (9) TAIL CONE.

9

AFT FUSELAGE, LEFT SIDE, AND INSIDE MAIN ENTRANCE DOOR

1. SKIN AND WINDOWS.
2. ANTENNAS.
3. LIGHTS.
4. ENTRANCE DOOR EMERGENCY RELEASE.
5. OXYGEN FILLER VALVE PLUG.
6. FIRE EXTINGUISHER.
7. FIRST AID KITS.
8. RADIO RACKS.

Figure 3-1. Preflight Inspection (Sheet 2 of 2)

PRESTART CHECKLIST

1. Circuit breakers - IN
2. Landing gear clutch teeth - MESHED
3. Landing gear emergency clutch pedal - COVERED
4. Landing gear handle - DOWN
5. Radio equipment - OFF
6. Battery switches (or external power) - ON

CAUTION

If external power is used, battery switches should be OFF until external power is disconnected. Battery switches should then be turned ON below generator cut-in speed.

7. Exterior/Interior Lights - AS REQUIRED

NOTE

If night operations are to be conducted, ensure that all external, and internal lights are operable in all positions.

8. Parking brake - RELEASE AND RESET

CAUTION

To set the parking brakes, depress the brake pedals, and pull the "T" handle straight out to its limit of travel (do not use a twisting movement) and release pressure as the full limit of travel is reached. Damage to the "T" handle linkage, will result if excessive pressure is exerted after full limit of travel is reached.

9. Control quadrant friction locks - UNLOCKED
10. Manifold heat levers - COLD (up)
11. Propeller levers - FULL INCREASE RPM
12. Throttles - CRACKED
13. Mixture levers - RICH
14. Oil shutter levers - AS REQUIRED
15. Heaters/deicers - OFF (check heater, deicer, and anti-icer switches OFF)
16. Fuel crossfeed valve - OFF
17. Oil bypass valve handles - AS REQUIRED (OUT, for full hot if oil temperature is below 10°C. Slowly push IN after temperature reaches 20°C)
18. Anti-icer tank gage - FULL
19. Engine fuel selector valve - BOTH
20. Engine fire extinguisher - AS REQUIRED
21. Pitot heat switches - OFF
22. Fuel quantity gage - CHECK ALL TANKS
23. Wing flaps - UP (then wing flap lever OFF)

24. Fuel tank selector handle - DESIRED TANK
25. Landing gear handle light - CHECK
26. Propeller Anti-icer - OFF
27. Fire Guard - POSTED

NOTE

Determine that the area aft of the aircraft is clear of any object that may be blown around by propeller blast. The fire guard should be in a position to indicate to the pilot that the area is clear. The left engine should not be started with the main entrance door open or unlatched.

28. Propeller - CLEAR TO START

STARTING ENGINES

1. Prime each engine seven (7) full strokes for cold engines and three (3) or four (4) for warm engines.

CAUTION

Do not pump throttles in an effort to prime engines. Doing so can cause a carburetor fire.

2. MAG master switch - ON
3. Starter switch - ENGAGE (either engine)
4. Individual engine MAG switch - BOTH (after propeller has turned six blades)
5. Check oil pressure indicator for proper indication and that limitations are not exceeded (20 psi in 30 seconds or shut-down).

CAUTION

In case of fire keep engine turning with starter and attempt to start engine. If this does not put out fire, pull fire extinguisher handle at the base of the pilot's control pedestal (fire extinguisher selector valve set to engine being started in preceeding procedure). Refer to Engine Fire During Start, Section V, Emergency Procedures.

CAUTION

Overheating of the starter motor will occur with prolonged operation. Thirty seconds should be considered the maximum for continuous operation without a cooling period.

NOTE

Engine back firing may cause the manifold heat lever to move to the HOT (down) position. Return the lever to the COLD (up) position when this occurs. Keep the propeller-manifold heat friction lock knob in the unlocked position to avoid damage to the manifold heat valve and linkage.

6. Warm up engine using 1100 RPM until oil temperature reaches 40°C . Avoid exceeding 100 psi engine oil pressure by reducing RPM as necessary.
7. Repeat engine start procedure for other engine.

PRETAXI CHECKLIST

1. Oil bypass valve handles - IN (minimum oil temperature is 40°C for engine speeds greater than 1000 RPM)
2. Radio equipment - AS DESIRED
3. Flight instruments - UNCAGED/OPERATING
4. Fuel system - Consume fuel from each tank for a minimum of two minutes.

TAXI

Taxi operations should be conducted with the engine cowl flaps open and the propeller in FULL INCREASE RPM (low pitch). Avoid extended periods at idle RPM, since these settings will foul the spark plugs. After initial forward movement apply the brakes to check the system. Continue to taxi slowly, checking ahead and to either side for obstructions and personnel. Use engine power differential to assist in turning and avoid excessive use of brakes. At some point during the taxi operation the copilot should check his brakes, however, they should not be applied simultaneously with the pilot's. The tailwheel lock "T" handle may be placed in either the locked or unlocked position at any time, however, the tailwheel will only lock in the forward or zero-degree position, i.e., with the wheel in the normal trail position. When the tailwheel is locked it is difficult to unlock if side pressure is exerted on the aircraft (due to a strong wing or unequal brake application). In general night taxi procedures are the same as day commensurate with ground safety. The landing lights may be used on a limited basis when there is any doubt about the area ahead. Observe gyro operation while turning.

PRETAKE-OFF CHECKLIST

1. Fuel tank selector handle and quantity indicator - FULLEST MAIN
2. Engine instruments - NORMAL
   a. Cylinder head temperature - 140°C MINIMUM
   b. Oil pressure - 50 psi MINIMUM (70 to 90 psi normal range)
   c. Oil temperature - 40°C MINIMUM (60 to 75°C normal range, 90°C maximum)
   d. Fuel pressure - 2.0 PSI MINIMUM IDLING, 3.5 PSI NORMAL OPERATING, 4.0 PSI MAXIMUM
   e. SUCTION - 3.50 MINIMUM, 3.50 TO 4.50 NORMAL, 4.50 MAXIMUM (a vacuum warning light for the appropriate engine will illuminate in the event a pump becomes inoperative)

CAUTION

Avoid prolonged ground runup. Do not exceed a cylinder head temperature indication of 232°C.

3. Engine - RUNUP (adjust the throttle on both engines to obtain 1500 rpm and complete the following procedures):

NOTE

During runup, the landing gear drag leg shock absorber will compress a small but noticeable distance as power is added. Hold the control column back during runup. Do not rely on the parking brake to hold during the power check.

a. Volt/ammeters - CHECK PARALLEL (same indication on both, ± 5 amps.)
b. Voltage - CHECK approximately 27.5 volts (± 1 volt)
c. Generator - CHECK:
   (1) Generator switches - OFF (one at a time) and check for a definite increase in load meter reading for the opposite or operating generator. Return both generators to ON.
d. Pitot heat switches - ON (one at a time) and check for a slight increase in loadmeter reading; then return switches to OFF
e. Propeller - CHECK:
   (1) Propeller levers - FULL DECREASE RPM (engine speed should stabilize at approximately 1200 ± 50 RPM)
   (2) Manifold heat levers - HOT (down)
   (3) Carburetor air temperature gage - CHECK (should increase approximately 30 degrees from original indication)
   (4) Propeller levers - FULL INCREASE (retard and advance the propeller levers several times to circulate warm oil through the propeller dome).
   (5) Manifold heat levers - COLD (up)
f. Individual propeller feathering - CHECK:
   (1) Propeller feathering switch - ON
   (2) Propeller feathering button - DEPRESS until approximately 200 RPM drop is noted.
   (3) Propeller feathering switch - OFF
   (4) Propeller feathering switch - ON (repeat procedure for opposite engine)

NOTE

When the engine is operating at approximately 1500RPM before feathering, it will continue to run fully feathered at about 450RPM. Under these conditions, once the propeller is feathered, it will tend to slowly and steadily come out of the feathered position. This should not be considered abnormal since it is caused by the engine oil remaining under pressure.

g. Engine power - CHECK. Retard the throttle to approximately 1100 RPM on engine not to be checked, and advance the remaining throttle until the manifold pressure reading is equal to existing field barometric pressure as read on manifold pressure gage before starting engines (approximately 30 inches MAP at sea level) and check for 1950 ± 50 RPM.

NOTE

If engine RPM is too low for the given manifold pressure, engine is not developing sufficient power and should be checked before flight.

h. Ignition system MAGS - CHECK (each engine simultaneously with engine power check)
   (1) Individual engine MAG switch - BOTH to R to BOTH to L to BOTH (momentarily stop on the R and L position to note the RPM drop)

CAUTION

Normal drop-off in either R or L position, is 50 to 75 RPM, and should not exceed 100 RPM. Difference in drop between R and L should not exceed 40 RPM. Avoid running on one magneto for more than 5 seconds.

NOTE

Throughout the engine check, with the mixture RICH, acceleration or deceleration should be both smooth and rapid with no tendency to miss or backfire.

   (2) Throttle - CLOSED (idle RPM)
   (3) Individual engine MAG switch - BOTH to OFF to BOTH (momentarily pause on OFF to insure no "hot" MAGS)

i. Repeat preceeding steps "g" and "h" for other engine.

j. Engine idle speed - CHECK. Retard throttles (individually) to full CLOSED position; engine should idle at approximately 500 RPM

k. Idle mixture - CHECK (each engine individually)
   (1) Throttle (on engine being checked) - 600 RPM
   (2) Mixture lever (on engine being checked) - RETARD slowly and smoothly into IDLE CUT-OFF position and observe tachometer for any change in RPM. Return the mixture lever to full RICH before engine cuts out. Do not add power to revive the engine unless the engine fails to respond to the full RICH mixture.

NOTE

A rise of more than 10 RPM indicates too rich an idle-mixture, and no change or a drop of RPM indicates that the mixture is too lean. A rise from 5 to 10 RPM is recommended to permit lower idling speeds without the danger of fouling plugs and at the same time to afford good acceleration characteristics.

1. Throttle - 1100 RPM (generator cut-in speed)

ENGINE RUNUP COMPLETE

4. Propeller feathering switch - ON
5. Propeller levers - FULL INCREASE RPM
6. Manifold heat levers - AS REQUIRED

WARNING

Manifold heat should be used for take-off under carburetor icing conditions. Manifold heat may be used for take-off in ambient air temperatures of 0°C or lower and is strongly recommended at temperatures of -20°C or lower. Adjust manifold heat levers as necessary throughout flight.

7. Mixture levers - RICH
8. Oil shutter levers - AS REQUIRED
9. Control quadrant friction locks - SET
10. Trim tabs - SET
11. Magneto switches - BOTH
12. Wing flaps - AS REQUIRED
13. Radio equipment - CHECKED/SET
14. Gyro instruments - SET
15. Cowl flaps - TRAIL
16. Pitot heat - AS REQUIRED
17. Propeller Anti-icer - AS REQUIRED
18. Flight Controls - NORMAL/FULL TRAVEL
19. Interior/exterior lighting - AS REQUIRED
20. Shoulder harness and safety belts - SECURE
21. Crew and passengers - READY
22. Tailwheel - LOCKED

TAKE-OFF

After completion of the Pretake-off Checklist (except for locking the tailwheel) taxi into take-off position, align the aircraft with the runway and allow it to roll straight ahead for a few feet then lock the tailwheel. Check for locking by alternating pressure on the brakes. After all checks are complete and final clearance is received, the take-off shall be made as follows:

WARNING

Do not take-off or land with the lavatory compartment occupied, since, this will exceed aircraft weight and balance limitations.

1. Release the brakes and advance the throttles smoothly to take-off power. Maximum allowable manifold pressure is 37 inches MAP.

NOTE

Take-off power is provided to be used and there should be no hesitation in taking advantage of the full rating. Engine life depends mainly on the number of revolutions the engine makes. Get the airplane off the ground and gain safe single-engine airspeed in a minimum of time, then reduce manifold pressure and engine speed for climb.

2. Maintain directional control during the first part of the take-off run by the use of differential power, rudder control, and if necessary braking action. The rudder is effective for directional control above approximately 35 knots. As the controls become effective, raise the tail to take-off atitude and maintain directional control with the rudders.

NOTE

Do not attempt to raise tail too early. Directional stability from control surfaces is not effective below approximately 30 knots. If weight is removed from tailwheel below this speed, aircraft may tend to swerve.

3. Maintain a take-off attitude and allow the aircraft to fly off at 70 to 80 KIAS. Continue to accelerate to Best Rate of Climb speed.

4. Retract the landing gear only when there is insufficient runway remaining to abort the take-off and reland. In no event will the landing gear be retracted until the aircraft is completely airborne and safely climbing.

WARNING

Do not retract the landing gear prematurely, since, the retraction mechanism will probably be damaged if the wheels re-contact the runway after retraction has started. However, keep in mind that aircraft single-engine performance is greatly improved with the landing gear (and wing flaps) UP.

NOTE

As landing gear retracts the center of gravity moves aft. Weight should be distributed so that CG limits will not be exceeded under these conditions.

5. After the landing gear is retracted and sing engine climb speed is attained, (wing flaps r tracted above 95 knots if used) reduce power climb power setting, which is 30 inches MAP a 2,000 RPM. Maintain a climb airspeed of 1 KIAS.

6. Adjust manifold heat and oil radiator shutters conditions warrant.

NOTE

Cylinder-head temperature will increase 25° to 30°C during take-off run. Before take-off is started cylinder temperatures must be sufficiently below the maximum to prevent this rise from exceeding the maximum allowable temperature of 260°C. This higher temperature is allowable for 5 minutes only.

CROSSWIND TAKE-OFF

When take-off is made in a severe crosswind, directional control can be maintained with differential power, rudder, and aileron. The tailwheel should be held on the runway slightly longer in a crosswind than is customary for a normal into-the-wind takeoff. This procedure will minimize the effect of the crosswind on the vertical tail surfaces and reduce the aircraft's tendency to weather vane. As the aircraft accelerates, gradually reduce aileron displacement, holding enough aileron to keep the wing slightly down. Lift the aircraft off as soon as flying airspeed is attained. When safely airborne, counteract drift by a coordinated turn into the wind. Avoid the use of brakes on take-off, except at the very beginning of the roll or as a last resort. See figure 11-3 for recommended liftoff airspeed under various crosswind conditions.

MINIMUM RUN TAKE-OFF

A minimum run take-off is a maximum performance maneuver requiring excellent feel of the aircraft at airspeeds just above stalling airspeeds. When conditions necessitate a minimum run take-off, align the aircraft on the extreme end of the runway lock the tail wheel and lower approximately 15 degrees flaps. Hold the brakes on with toe pressure and advance throttles to maximum power. Hold back pressure on the control column and release brakes. As the aircraft accelerates, gradually release back pressure on the control column. When the aircraft has reached an airspeed of approximately 60 to 65 KIAS, apply elevator pressure to pull the aircraft off the ground. After definitely airborne, level off to accelerate and retract the landing gear and wing flaps.

WARNING

Do not retract the wing flaps below 95 KIAS.

OBSTACLE CLEARANCE TAKE-OFF

When a maximum performance take-off and climbout over obstructions is required, use the procedure for Minimum Run Take-Off up to the point where the aircraft is airborne. From that point it varies as follows: As soon as aircraft is airborne, retract the landing gear and maintain a climbing attitude; accelerating to 85 to 90 KIAS as rapidly as possible. Maintain this airspeed in climb attitude until all obstructions are cleared. Level off to accelerate, retracting wing flaps when maximum flap airspeed is reached. Re-establish a climbing attitude after attaining Best Rate-of-Climb speed.

NIGHT TAKE-OFF

Normal take-off technique can be employed for night take-off with the exception that all instrument and pilot's compartment lights should be dimmed to minimize glare. This will provide maximum outside visibility. Turn the landing lights on, if desired, and maintain heading by visual cross-reference to the directional indicator. Acceleration after take-off should be accomplished in a climbing attitude. Maintain attitude by reference to the attitude indicator.

AFTER TAKE-OFF -- CLIMB

When comfortably airborne, and the aircraft is "cleaned-up", check power setting and climb speed. Normal power settings for climb are 30 inches MAP and 2000 RPM. Do not exceed 35 inches MAP and 2000 rpm at any time for continuous operation. Best climbing speed at sea level is from 95 to 105 KIAS. During climb proceed as follows:

1. Adjust cowl flaps as necessary. Never close cowl flaps beyond TRAIL position during climb.
2. Check cylinder head temperatures frequently. If over allowable limit of 232°C for continuous operation, increase airspeed by decreasing rate of climb.
3. At approximately 50 feet below the desired cruising altitude, smoothly lower the nose to the level-flight attitude.
4. On the desired cruising altitude, accelerate to the desired airspeed at climb power, then reduce to cruise power, retrim, and adjust the engine controls as necessary.
5. Check all indicated operating temperatures; oil, carburetor mixture, cylinder head, and outside air temperature.
6. Select desired fuel tank and corresponding liquidometer selector switch setting.

DURING FLIGHT

Trim tabs should be used at all times during flight to reduce control pressures. Stability and control of the aircraft is good under all normal loading conditions. Refer to Section IV for flight and handling characteristics.

For all flight conditions, when practical, it is desirable to maintain carburetor mixture temperature at 3°C for most satisfactory engine operation. When operating under conditions of rapidly changing power and altitude, care should be exercised that carburetor mixture temperature does not exceed 15°C.

NOTE

The maximum allowable cylinder-head temperature for continuous operation is 232°C. Minimum cylinder head temperature for smooth engine operation is 120°C. Oil temperature is the best indication of over-all engine conditions.

Refer to Section XI, Performance Data for cruise control computation. Do not draw more than 400 horsepower for maximum continuous operation.

MANUAL MIXTURE LEANING

For fuel consumption economy, lean the engine fuel mixture as follows:

1. Adjust both throttles to desired cruise settings, synchronize the propellers, and note the cylinder head temperature.
2. Lean one engine at a time by retarding the mixture lever in small increments until a slight engine roughness is noted; immediately move the mixture control forward (RICH) until the engine is again operating smoothly and synchronization is regained.
3. Monitor cylinder head temperatures and do not exceed the maximum continuous temperature of 232°C.
4. Repeat procedure for other engine.
5. The mixtures must be placed in full RICH and the engines re-leaned whenever any of the following changes occur:

   a. Upon commencing a climb or descent (mixture RICH until desired altitude is reached).
   b. A change in throttle or RPM setting.
   c. A change in manifold heat setting.

FUEL MANAGEMENT

Recommended fuel tank usage sequence and restrictions are as follows:

1. Start engines on the nose tanks, if fully serviced (UC-45J Only), otherwise use the right main.
2. Rotate the fuel tank selector handle counterclockwise, and consume fuel from each tank for at least two minutes.
3. All takeoffs and landings should be made on a main tank. Fuel should be drawn from the tanks in inverse numerical order.
4. Do not use the tanks below one-tenth indicated. The fuel tanks should not be run dry, due to the possibility of airlock or damage to the liquidometer.

DESCENT

Aircraft range can be increased by a good descent technique i.e., by executing the descent to locate the aircraft at the desired altitude at the desired point. The rate of descent is determined by altitude, distance from landing point, terrain, and aircraft gross weight (below maximum landing weight of 8600 pounds). For normal descent from cruise altitude, reduce power as required to maintain desired rate of descent and airspeed. Maintain cylinder head and carburetor air temperatures within normal limits. Obtain landing instructions and accomplish the Prelanding Checklist prior to entering the traffic pattern.

PRELANDING CHECKLIST

1. Crew and/or passengers - BRIEFED ADVISED
2. Fuel quantity gage - CHECK FUEL QUANTITY
3. Fuel tank selector handle - FULLEST MAIN
4. Mixture levers - RICH (full forward)
5. Manifold heat levers - AS REQUIRED

CAUTION

Monitor carburetor air temperatures, since fuel/air ratios during descent are those most conductive to the formation of ice in the induction system.

6. Autopilot - OFF (RC-45J Only)
7. Surface deicer button - OFF (full down)
8. Altimeter - SET

CAUTION

Do not allow cylinder head temperature to go below 125°C or use less than 14 inches MAP during prolonged descents.

All transitions from descent to level flight at the same airspeed are commenced 50 feet prior to reaching altitude, and transitions from descent to level flight at a greater airspeed are commenced 175 feet prior to reaching altitude. Six inches less manifold pressure than that required for level flight will result in approximately 500 feet-per-minute rate of descent for any given airspeed.

9. Gyros - SET
10. Landing gear emergency extension clutch - COVERED
11. Tail wheel - LOCKED
12. Pilot's compartment heater controls - OFF (full out)
13. Shoulder harness and safety belts - LOCKED (advise crew and passengers)

CAUTION

The lavatory compartment must not be occupied during landing operations.

NOTE

Prior to extending the landing gear, one throttle should be retarded momentarily to check operation of the landing gear warning horn.

ENTERING DOWNWIND

14. Slow aircraft - 105 KIAS (approximately)
15. Throttles - RETARD (until landing gear warning horn sounds at approximately 12 inches MAP)

LANDING CHECKLIST

1. Landing gear handle - DOWN (landing gear handle light OUT. Visually check in mirror for gear in DOWN and LOCKED position)

2. Throttles - ADVANCE (to maintain level flight when horn stops)
3. Elevator trim - ADJUST (to compensate for nose-heavy condition which exists when landing gear, or wing flaps, are DOWN)
4. Wheel brakes - DEPRESS PEDALS (check for solid feel)
5. Wing flaps - DOWN 15 DEGREES (then wing flap lever OFF)

BASE LEG

6. Slow aircraft - 90 KIAS (approximately)
7. Wing flaps - DOWN (additional flaps as required, then wing flap lever OFF)
8. Elevator trim - ADJUST

FINAL

9. Propeller levers - FULL INCREASE RPM
10. Slow aircraft - 85 KIAS (approximately)
11. Elevator trim - ADJUST
12. Landing light switches - ON (if required)
13. Airspeed - 80 KIAS (approximately) across field boundary. Intercept the runway centerline with a straightaway of 800 to 1000 feet at an altitude of 50 to 150 feet

NOTE

In the event a no flap landing is to be conducted, use an approach speed of 90 KIAS slowing to 85 KIAS on final.

LANDING

NORMAL LANDING TECHNIQUE

Throughout the approach, trim the aircraft to relieve elevator pressure as more control is applied to reduce airspeed. Maintain the desired rate-of-descent with power variation rather than causing airspeed fluctuation by using elevators. Contact with the runway should be on the main wheels first in a slight tail-low attitude. Check throttles closed, retract the wing flaps, and reduce back pressure on the control column. As the aircraft decelerates, lower the tail wheel to the runway, in one smooth continuous motion. Maintain directional control by use of rudder, differential power, and brakes, as necessary. Maintain back pressure on the control column until the landing roll is completed. Utilize the full landing area, permitting the aircraft to roll to a stop, rather than using the brakes unnecessarily. When speed has decreased sufficiently (normal taxi speed), open the cowl flaps and unlock the tail wheel. When clear of the runway, turn off all unnecessary electrical and radio equipment.

CROSSWIND LANDING TECHNIQUE

When making a cross wind landing in a crosswind of moderate component, fly the approach with not more than 15 degrees of flap. Use a combination of crab into the wind and lowering the upwind wing to compensate for wind drift. If wind velocity is constant, maintain normal approach airspeed. In gusty conditions, increase approach airspeed approximately 10 knots above normal. Remove any crab effect just prior to touchdown. During the ground roll, when airspeed has decreased, the tail should be lowered and full back pressure applied in one smooth continuous motion. Use rudders and throttles to maintain directional control on the runway. See figure 11-3 for recommended touchdown airspeed under various crosswind conditions.

MINIMUM ROLL LANDING TECHNIQUE

If conditions require a minimum roll landing, use a power-on, full flap approach. Cross the approach end of the runway in a slightly nose high attitude at approximately 70 KIAS. In this attitude, the rate of descent is very rapid unless considerable power is used to retard it. Variations in airspeed/power/altitude combinations will be required for the individual circumstances and must be determined by the pilot in command. As contact is made with the runway, retard the throttles and retract the wing flaps. The control column should be held full back. Apply brake pressure as required to stop the landing ground roll.

NIGHT LANDING TECHNIQUE

Power-on approaches are used for night landings. Procedures are the same as used during a normal landing except for the use of power which decreases the rate-of-descent on the approach. This decreased rate-of-descent gives more time for accurate appraisal of distance from the ground during the flare-out and touch-down portions of the landing. Landing lights may be used at the pilots discretion.

TOUCH-AND-GO LANDING TECHNIQUE

The approach and touchdown for touch-and-go landings is the same as used for a normal landing. Following touchdown, however, since a take-off is to be initiated immediately, the normal post landing procedures require the attention of both pilot and copilot, i.e., the pilot requests the copilot to retract the wing flaps while he adjusts the elevator trim and applies take-off power. After take-off, initiate a climb straight ahead to an altitude of 300 feet (actual). Before starting a turn to the downwind leg of the pattern, level off on the downwind leg at pattern altitude and 105 KIAS and accomplish the usual pre-landing procedures.

NO BRAKE LANDING TECHNIQUE

In event of landing wheel brake failure during flight, touchdown airspeed should be as slow as possible commensurate with safety and positive control. Maintain directional control with rudders and differential throttle control.

WAVE-OFF

A wave-off signal, regardless of how received, requires immediate and positive action in aborting

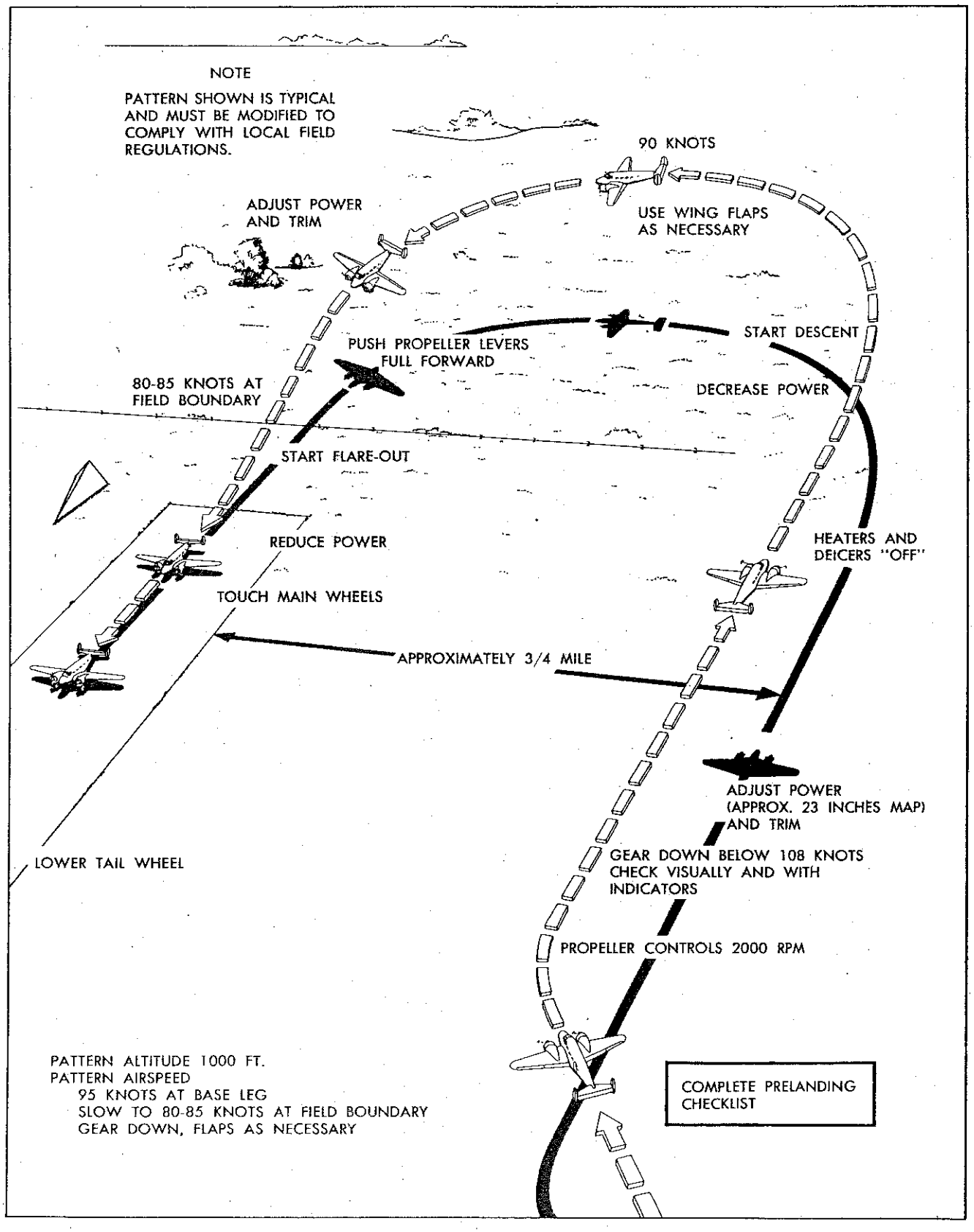


Figure 3-2. Normal Landing Pattern (Typical)

either the approach or landing. A wave-off is executed by simultaneously leveling the wings, adding full power (not to exceed 37 inches MAP and 2300 RPM), and establishing a slight climb attitude. Retract the landing gear, clear the runway and accelerate to Best Rate of Climb speed unless a steeper climb is required to clear an obstruction. Retract the wing flaps in increments as airspeed permits, open the cowl flaps, and retrim the aircraft.

POSTLANDING CHECKLIST

(After Clearing Runway)

1. Wing Flaps - UP
2. Landing Lights - UP (retracted and OFF)
3. Cowl Flaps - FULL OPEN
4. Unnecessary electrical equipment - OFF

GROUND SECURE CHECKLIST

After the aircraft is in the parking spot, set the throttles for 600 to 800 RPM and complete the following checks:

1. Tailwheel - LOCKED
2. Parking brakes - SET
3. Individual engine MAG switches - BOTH to OFF to BOTH (momentarily pause on OFF to insure no "hot" MAGS)
4. Wing Flaps - UP (Down, when auxiliary tanks are to be fueled, unless gusty wind conditions exist)
5. Mixture levers - IDLE CUT-OFF
   a. Throttles - OPEN slowly as engine shut down occurs
6. Master ignition and individual MAG switches - OFF
7. All electrical equipment - OFF
8. Battery switches - OFF
9. Fuel tank selector handle - OFF
10. Parking brakes - RELEASED (after wheel chocks are placed)
11. Cowl flaps - OPEN (until engines have cooled to ambient temperatures)
12. Flight Controls lock - INSTALLED

POST-FLIGHT INSPECTION

Visually inspect the aircraft for signs of fuel, oil, or hydraulic fluid leaks after each flight before signing off the aircraft yellow sheet.

AUXILIARY CHECKS (RC-45J Only)

The following P-1 automatic pilot and photographic equipment systems checks are not usually performed for each flight, however, they do apply if desired.

P-1 AUTOMATIC PILOT SYSTEM GROUND CHECK

1. Aircraft power - ON
2. Autopilot clutch push button switch-DISENGAGED
3. Autopilot amplifier switch - ON

NOTE

Gyros and amplifier must be on for two minutes, for proper operation.

4. Flight controls - CHECK (manually manipulate through full range of travel to ensure freedom from aircraft control system drag)
5. P-1 autopilot controller adjustments - CENTERED
6. Autopilot clutch push button switch - ENGAGED (depressed)
7. P-1 autopilot controller adjustments - OPERATE (check carefully for proper control surface deflection)
8. Autopilot disengage button (on pilot's control wheel) - DEPRESSED
9. Autopilot clutch push button switch-DISENGAGED (out)
10. Autopilot amplifier switch - OFF

P-1 AUTOMATIC PILOT SYSTEM FLIGHT CHECK

1. Altitude - CHECK SAFE
2. P-1 Autopilot controller adjustments - CENTERED
3. Aircraft trim - HANDSOFF AND SLIGHT CLIMB
4. Autopilot amplifier switch - ON (allow two minutes for system warmup)
5. Autopilot clutch push button - DEPRESSED
6. Turn and slip indicator - CHECK BALL IN CENTER
7. Control wheel steering - CHECK ROLL/PITCH
8. Aircraft - Bank left or right 20 degrees with controller adjustments and check trim indicator.
9. Autopilot disengage button (on pilot's control wheel) - DEPRESSED
10. Autopilot amplifier switch - OFF

PHOTOGRAPHIC EQUIPMENT

PREFLIGHT AND PRESTART INSPECTION (INTERIOR)

1. General camera installation - SECURITY
2. All camera installation switches and controls OFF or as required.
3. Set B-9 intervalometer as required for particular type camera operation.
4. CK-1 control box for S-7 type continuous strip camera switches and controls - AS REQUIRED

PREFLIGHT INSPECTION (EXTERIOR)

1. Camera hatch exterior doors - SECURED
2. Forward vision view finder lens - CLEAN

AFTER START

1. Instrument vacuum supply - IN LIMITS

DEBRIEFING

Debriefing will be the responsibility of the pilot in command and will cover matters pertinent to the flight.

The operational capabilities of the UC-45J and RC-45J aircraft are limited to normal shore-based operations. No carrier based procedures are applicable.

SECTION IV

FLIGHT PROCEDURES AND CHARACTERISTICS

TABLE OF CONTENTS

PART 1 FLIGHT PROCEDURES

GENERAL

Transistion to the C-45J series aircraft poses no problem to the conventional landing gear oriented pilot. However, to pilots making the transition to either or both multi-engine and/or conventional type landing gear, ground handling and take-off and landing acceleration and deceleration, crosswind technique, throttle handling, etc., will require greater attention than nose wheel type aircraft. Otherwise, transition and familiarization of different pilot categories should be normal, depending on the experience level in each category.

ENGINE POWER CHANGE

Cylinder pressures in any engine are the prime limiting factors on engine operation. For this reason proper coordination of propeller and throttle controls is an absolute must. Use the following technique when changing engine power settings.

To increase power:

1. MIXTURES - RICH
2. PROPS - ADJUST to desired RPM
3. THROTTLES - ADJUST to desired MAP
4. MIXTURES - ADJUST for new power setting

To reduce power:

1. MIXTURES - RICH
2. THROTTLES - ADJUST to desired MAP
3. PROPS - ADJUST to desired RPM
4. THROTTLES - READJUST as necessary
5. MIXTURES - ADJUST for new power setting

INFLIGHT PROPELLER FEATHERING CHECK

Proper propeller feathering action may be checked in flight by depressing the feathering button for the propeller to be checked (at or below cruise power settings). Observe the tachometer for rpm drop as the propeller begins to feather. After a drop of approximately 200 rpm, trip the propeller feathering circuit breaker. The propeller feathering button will "pop out" and the propeller will return to its original pitch setting. Re-set the feathering circuit breaker after the feathering check is completed.

ENGINE COWL FLAPS

Normal operation cylinder head temperatures are regulated by engine cowl flaps. These flaps adequately control temperature for ground and air operations, other than during icing conditions. During flight operations, full open cowl flaps create an unneces-

sarily high drag and will usually result in less than normal (cold) cylinder temperatures. Under most flight conditions optimum performance will be obtained with the cowl flaps in the "trail" or "full closed" position. In any event the cowl flaps must be set to maintain in-flight cylinder head temperatures within limits.

OIL TEMPERATURE

Engine oil temperature (and pressure which is relative to temperature) is probably the most important single factor in engine life and performance. Reaching the normal operational temperatures as quickly after engine start as possible, and maintaining this temperature is accomplished by oil radiator shutters and oil radiator by-pass valves. For quick oil system warm-up, close the oil by pass valves which allows oil to by-pass the respective oil radiator and flow from the engine directly to the supply tank for a quicker warm up. Once operational temperatures are reached in this manner, the oil by-pass may be opened and the oil radiator shutters closed until the oil radiator is warmed. The shutters may then be opened as required to maintain operational oil system temperature.

BRAKE OPERATION

In general, operating personnel use the wheel brakes excessively to decelerate or stop the aircraft as quickly as possible regardless of runway length, and are often times guilty of dragging the brakes while taxiing. To minimize tire and wheel brake wear, be extremely judicious in the use of brakes immediately after touchdown, during landing deceleration, and taxiing.

PART 2 FLIGHT CHARACTERISTICS

FLIGHT HANDLING CHARACTERISTICS

The aircraft has satisfactory stability and control characteristics under all conditions of speed, power, load factor (G) and altitude when operated within the respective limitations of airspeed, power, weight, and center-of-gravity loading.

STABILITY AND CONTROL

Stability and control characteristics relative to the indicated center-of-gravity location is as follows: All conditions are with the landing gear retracted; center-of-gravity references are relative to mean aerodynamic chord or MAC. Refer to the manual of weight and balance data, T.O. 01-1B-40 and AN 01-1B-40.

1. Approximately 28.5% MAC - Longitudinal stability, as evidenced by the variation in amount and direction of control force relative to airspeed, is slightly positive except in high power climbs, during which no change in control force is noted by a change in trim speed.
2. Aft of approximately 28.5% MAC and forward of 30.5% MAC - Control column force and movement required to stall the aircraft without power are in the desired direction but barely perceptible.
3. Approximately 30.5% MAC - Longitudinal stability is negative in all power-on conditions and a push force and forward control position is required to maintain a speed less than trim speed, while a pull force and rearward control position is required to maintain a speed above trim speed. Under these conditions, control "feel" in approaching the stall is opposite to that experienced in a stable aircraft. Adequate control, however, is available to recover from power-on stalls. The dynamic stability, evidenced by the degree with which pitching oscillations are damped out, is negative in all power-on conditions. Full nose down elevator trim is inadequate in high power climb at low speeds.
4. Aircraft stability will progressively decrease with center-of-gravity movement aft of 30.5% MAC.

CONTROL PRESSURES

Control pressure "feel" throughout the range of control surface travel may be considered as very light and effective. Extreme trim settings may be applied individually with one hand.

STALL CHARACTERISTICS

Adequate stall warning is given in the form of tail buffeting and a decrease in control effectiveness in either power-on or power-off stalls. During the approach to a stall, recovery is possible with no loss of altitude. With the aircraft completely stalled, no extreme changes of attitude are required for recovery. If the aircraft is stalled in a near level attitude, the tendency will be for it to "mush" without the nose dropping any great amount. If stalled in a nose high attitude, the aircraft will "mush" for a period, then the nose will drop. In either case, although the left wing may drop first, there is no great tendency for the stall to develop into a spin. Recovery can be effected by a relaxing of back pressure and an addition of power. Diving the aircraft is not necessary. See figure 4-1 for indicated stall speeds at various gross weights, and configurations.

CONFIGURATION	ANGLE OF BANK DEGREES	APPROXIMATE IAS — KNOTS GROSS WEIGHT — POUNDS 9200	9000	8800	8600	8400	8200	8000	7800	7600	7400
		MAXIMUM POWER									
FLAPS UP, GEAR UP	0	66	66	65	64	64	63	62	61	61	60
	15	67	67	66	65	65	64	63	62	61	61
	30	70	70	69	68	67	66	66	65	64	63
	45	79	78	77	76	75	74	74	73	72	71
		POWER OFF									
FLAPS UP, GEAR UP	0	74	73	72	72	71	70	69	68	67	67
	15	75	74	74	73	72	71	70	69	68	67
	30	79	78	77	76	75	74	74	73	72	71
	45	87	86	85	84	83	82	81	80	79	78
		APPROACH POWER (2000 RPM, 20 INCHES MAP)									
FLAPS FULL DOWN, GEAR DOWN	0	58	57	56	56	55	54	54	53	53	52
	15	59	58	57	57	56	55	55	54	53	53
	30	62	61	60	60	59	58	57	57	56	55
	45	67	67	66	65	65	64	63	62	61	61
		POWER OFF									
FLAPS FULL DOWN, GEAR DOWN (GEAR DOORS INSTALLED)	0	68	67	67	66	65	64	64	63	62	61
	15	69	68	68	67	66	65	65	64	63	62
	30	75	74	74	73	72	71	70	69	68	67
	45	82	81	80	79	78	77	76	75	74	73
		SINGLE ENGINE, MAXIMUM POWER									
FLAPS UP, GEAR UP, PROPELLER FEATHERED	0	74	73	72	72	71	70	69	68	67	67
	15	75	74	74	73	72	71	70	69	68	67
	30	79	78	77	76	75	74	74	73	72	71
	45	87	86	85	84	83	82	81	80	79	78

Figure 4-1. Stall Speeds

SPINS

Intentional spins are prohibited. However, if a spin is inadvertently entered, use the following recovery procedure:

1. Throttles - CLOSED
2. Apply opposite rudder to stop rotation
3. Apply enough forward pressure to relieve the stall.
4. Recover from the resulting dive as rapidly as possible without imposing excessive wing loads.

NOTE

Power should not be used for spin recovery. Power will be of no advantage in your recovery and it will increase diving speeds.

ACROBATICS

Any deliberate maneuver or flight attitude normally considered to be acrobatic is prohibited. Acrobatic flight is considered to exist when:

1. A bank angle in excess of 60 degrees relative to the horizon exists; and/or
2. A nose up or nose down angle in excess of 30 degrees relative to the horizon exists.

DIVING

The airplane becomes slightly tail-heavy as speed increases during a dive, but has no tendency to yaw.

INSTRUMENT FLIGHT

STANDARD RATE TURNS

The approximate angles of bank for standard rate turns (3 degrees per second) are:

105 knots - - 16 DEGREES
125 knots - - 19 DEGREES
140 knots - - 22 DEGREES

HOLDING

Holding airspeed is 105 knots.

APPROACH

When begining an approach, the following procedures are performed:

1. Check time over the station
2. Turn, if necessary, to intercept the desired course
3. MIXTURES - RICH
4. Descend, if necessary
5. Make the appropriate voice report
6. Perform the Landing Checklist
7. The landing gear is extended and the wing flaps lowered at the discretion of the pilot.

MISSED APPROACH

If a visual landing cannot be effected upon reaching facility instrument minimums:

1. THROTTLES - ADVANCE to 30 inches MAP
2. GEAR - UP
3. Establish climb
4. FLAPS - UP
5. Comply with published procedures.

GROUND CONTROLLED APPROACH (GCA)

The downwind leg of the GCA pattern is flown at an airspeed of 105 knots. The recommended final approach airspeed is 90 KIAS, with 30 degrees of flap, 20 - 22 inches MAP gives approximately 500 feet-per-minute rate of descent.

NIGHT FLIGHT

Night flying may be considered very closely related to instrument operations. It is therefore of utmost importance to insure that all aircraft instrumentation, radio navigation, and lighting equipment is functioning properly prior to take-off. Otherwise, night flying is the same as day, with the exception that departure and approach patterns are usually somewhat larger except that power is carried to decrease the rate of descent on the approaches.

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