ROBINSON HELICOPTER COMPANY
FLIGHT TRAINING GUIDE

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PUBLICATIONS

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CHAPTER LIST

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FLIGHT TRAINING GUIDE
CHAPTER 1

GENERAL

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CHAPTER 1

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CONTENTS

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INTRODUCTION

The Robinson Flight Training Guide is a comprehensive document which contains detailed training syllabi for multiple levels of training in R22, R44, and R66 helicopters. Syllabi are provided for initial training, transition/qualification training, and flight reviews.

Hours shown in each syllabus are based on average rates of learning and reflect minimum flight times in accordance U.S. regulatory minimums including Special Aviation Regulation (SFAR) 73 where appropriate. However, final determination of proficiency lies in the hands of individual instructors. Additional training time may be required.

The Flight Training Guide contains the following material:

- Private Pilot Ground Training Syllabus
- Private Pilot Flight Training Syllabus
  - o These two syllabi taken together comprise a training program from zero experience through a U.S. private pilot certificate. Completion of Stage 1 from the flight training syllabus meets initial (pre-solo) experience requirements of SFAR 73.
- R22/R44 Qualification Courses
  - o Training for an already rated helicopter pilot to transition to an R22 or R44. It meets the transition/qualification requirements of SFAR 73.
- R66 Qualification Course
  - o Training for an already rated helicopter pilot to transition to an R66. Flight and ground hours reflect Robinson factory recommendations.
- Flight Review Guide
  - o Material to be covered during flight reviews in accordance with 14 CFR 61.56 and SFAR 73.
- R22, R44, and R66 Maneuvers Guides
  - o Techniques and completion standards for the flight maneuvers in the above syllabi. Completion standards are based on FAA practical test standards.

Checklists, written examinations, and recommended endorsements are provided where appropriate.

The Flight Training Guide will be updated periodically with the latest factory information, and the most up-to-date revision will always be available on the Robinson website at www.robinsonheli.com.

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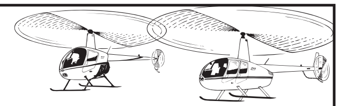
ENDORSEMENT TEMPLATES

The following templates may be used by instructors to provide endorsements following successful completion of various levels of training or evaluation. The templates meet U.S. regulatory requirements. Other requirements may apply outside the US. Instructors are not required to use the exact template wording as long as the endorsement is clear. See also FAA Advisory Circular AC 61-65, *Certification: Pilots and Flight and Ground Instructors*, Appendix A.

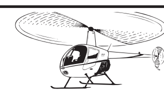
Awareness Training



I certify that ____________________________,
pilot certificate no. (if applicable)_______________ has received the awareness training required by SFAR 73 section 2(a)(3)(i-v).

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ________________________________

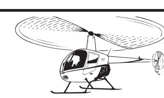
R22 Solo Endorsement



I certify that ____________________________,
pilot certificate no. ___________ meets the experience requirements of SFAR 73, section 2(b)(3) and has been given training specified by SFAR 73 section 2(b)(3)(i-iv). He/She has been found proficient to solo in the R22 helicopter.

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ________________________________

R22 Pilot-In-Command Endorsement



I certify that ____________________________,
pilot certificate no. ______________________ meets the experience requirements of SFAR 73, section 2(b)(1)(ii)(A-D) for Robinson R22 helicopters and is proficient to act as pilot in command. An annual flight review must be completed by (date)_________ unless the requirements of SFAR 73 section 2(b)(1)(i) are met.

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ________________________________

ENDORSEMENT TEMPLATES (Cont'd)

R22 Flight Instructor Endorsement

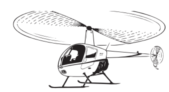
I certify that ______________________________,
flight instructor certificate no. _____________ meets the experience requirements and has completed the training specified by SFAR 73, section 2(b)(5)(i-ii) and (iii)(A-D) and has demonstrated the ability to provide instruction on the general subject areas of SFAR 73, section 2(a)(3) and the flight training identified in SFAR 73, section 2(b)(5)(iii) in a Robinson R22 helicopter.

Date: _____________ Print Name: ______________________________

Sign: ____

DPE # & exp date: _________________________ or FAA ASI (circle)

R22 Flight Review



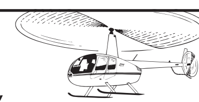
I certify that _______________________________,
pilot certificate no. ____
has satisfactorily completed the flight review in an R22 required by §61.56 and SFAR 73, section 2(c)(1) and (3) on (date) __________.

Date: _____________ Print Name: ________________________

Sign: ____

CFI # & exp date: ______________________________

R44 Solo Endorsement



I certify that _____________________________,
pilot certificate no. ___________ meets the experience requirements of SFAR 73, section 2(b)(4) and has been given training specified by SFAR 73 section 2(b)(4)(i-iv). He/She has been found proficient to solo in the R44 helicopter.

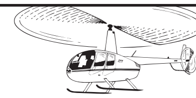
Date: _____________ Print Name: ________________________

Sign: ____

CFI # & exp date: ______________________________

ENDORSEMENT TEMPLATES (Cont'd)

R44 Pilot-In-Command Endorsement



I certify that ____________________________,
pilot certificate no. ____________________ meets the experience requirements of SFAR 73, section 2(b)(2)(ii)(A-D) for Robinson R44 helicopters and is proficient to act as pilot in command. An annual flight review must be completed by (date)_________ unless the requirements of SFAR 73 section 2(b)(2)(i) are met.

Date: _____________ Print Name: _________________________

Sign: ____

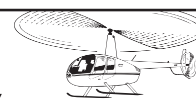
CFI # & exp date: ______________________________

R44 Flight Instructor Endorsement

I certify that ____________________________,
flight instructor certificate no. _____________ meets the experience requirements and has completed the training specified by SFAR 73, section 2(b)(5)(i-ii) and (iii)(A-D) and has demonstrated the ability to provide instruction on the general subject areas of SFAR 73, section 2(a)(3) and the flight training identified in SFAR 73, section 2(b)(5)(iii) in a Robinson R44 helicopter.

Date: ____________ Print Name: _____________________________
Sign: ______________________________________
DPE # & exp date: ________________________ or FAA ASI (circle)

R44 Flight Review

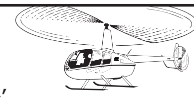


I certify that _____________________________,
pilot certificate no. __________________________ has satisfactorily completed the flight review in an R44 required by §61.56 and SFAR 73, section 2(c)(2) and (3) on (date) ______________.

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ______________________________

ENDORSEMENT TEMPLATES (Cont'd)

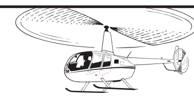
R66 Pilot-In-Command Endorsement



I certify that ____________________________,
pilot certificate no. _______________ has completed a qualification in accordance with the Robinson Flight Training Guide and is proficient to act as pilot in command of an R66 helicopter.

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ______________________________

Completion of a flight review IAW 14 CFR §61.56(a)



I certify that ________________________________,
private/commercial/ATP (circle one) pilot certificate no. ________ has satisfactorily completed a flight review in accordance with 14 CFR §61.56(a), on (date) __________.

Date: _____________ Print Name: _________________________
Sign: ____
CFI # & exp date: ______________________________

TECHNICAL PUBLICATIONS

RECOMMENDED CHANGE REPORT

Please direct recommended changes to RHC Technical Publications via the email address listed below, by phone, or by submitting a duplicate of this completed form by fax or mail. Please include or have available the information detailed by this form.

Recommended changes may include but are not limited to: general comments, corrections, omitted information, or clarification of instructions.

Please send recommendations to:

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Torrance, CA 90505-6115
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Date: ______________________

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Helicopter Model: ______________________

Serial Number: ______________________

Phone: ______________________

Email: ______________________

Publication: ______________________

Chapter: ______________________

Section: ______________________

Page: ______________________

Revision: ______________________

COMMENTS:

GENERAL INFORMATION

CHANGE BARS

Change bars are located on the outside edge of the page, and indicate new or revised data. Change bars between lines indicate data was removed. Change bars on graphics indicate changes to the graphic somewhere across the page in the area of the change bar. Change bars that are the full length of the page indicate all new data.

SAFETY NOTICES

Safety Notices are referenced periodically throughout the training guide and have been issued by Robinson Helicopter Company as a result of various accidents and incidents. Studying the mistakes made by other pilots will help you avoid making the same errors.

Safety Notices are published in section 10 of the POH, and are available on the RHC website www.robinsonheli.com, under the Publications tab.

FLIGHT TRAINING GUIDE
CHAPTER 2

PRIVATE PILOT GROUND TRAINING SYLLABUS

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CHAPTER 2

PRIVATE PILOT GROUND TRAINING SYLLABUS

CONTENTS

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GROUND TRAINING SYLLABUS

PRIVATE PILOT RATING: ROTORCRAFT – HELICOPTER

GROUND TRAINING COURSE OBJECTIVES

The student will obtain the necessary aeronautical knowledge to meet the requirements for a U.S. private pilot certificate with a rotorcraft category and a helicopter class rating in a Robinson R22, R44, or R66.

GROUND TRAINING COURSE COMPLETION STANDARDS

The student will demonstrate through oral and written tests and records that they have obtained the necessary aeronautical knowledge to pass a U.S. private pilot knowledge test.

SYLLABUS ARRANGEMENT

The 35 hours of ground training will be accomplished in three stages. Each of these instructional units is described in the succeeding pages.

STUDENTS ADDING AN ADDITIONAL CATEGORY/CLASS RATING

Stage 1, consisting of 13 hours of ground training, is the only required stage for students adding an additional category/class rating.

COURSE COMPLETION TIME – 35 HOURS

STAGE CHECKS: GROUND TRAINING SYLLABUS

Stage 1 Written Exam	Grade	Date	Chief Ground Instructor
Stage 2 Written Exam	Grade	Date	Chief Ground Instructor
Stage 3 Written Exam	Grade	Date	Chief Ground Instructor

FINAL KNOWLEDGE TEST

U.S. Private Pilot	Grade	Date

GROUND TRAINING SYLLABUS (cont'd)

13 Hours Ground Training

Lessons 1–7 include study of helicopter components, systems, instruments, and basic aerodynamics. Additionally, the method and importance of accurately determining helicopter weight and balance performance will be introduced.

13 Hours Ground Training

Lessons 8–14 includes study of aviation weather, the flight computer, and the Aeronautical Information Manual (AIM).

9 Hours Ground Training

Lessons 15–19 includes study of VFR charts, the navigation plotter, radio navigation, cross-country planning, physiological and psychological considerations, and federal aviation regulations (FAR).

STAGE 1

GROUND TRAINING: 13.0 hours

STAGE 1 OBJECTIVES

During Stage 1 the student will study helicopter components, systems, instruments, and basic aerodynamics. Additionally, the method and importance of accurately determining helicopter weight and balance performance will be introduced.

STAGE 1 COMPLETION STANDARDS

Stage 1 will be complete when the student has passed the Stage 1 written examination with a minimum score of 70%. The instructor will review each incorrect response to assure complete understanding before advancing the student to Stage 2.

LESSON 1: 2.0 Hours Ground Training

OBJECTIVES

This lesson will introduce the student to the helicopter's components, systems and instruments.

LESSON CONTENT

1. Helicopter Components
   a. Main rotor
   b. Tail rotor
   c. Transmission
   d. Powerplant
   e. Swashplate assembly
   f. Gearboxes
   g. Drive train and tailcone
   h. Clutch
   i. Governor (piston engine or power turbine)

2. Flight Controls
   a. Cyclic
   b. Collective
   c. Throttle and governor
   d. Pedals

3. Electrical System
   a. Battery
   b. Alternator or generator
   c. Circuit breakers
   d. Magnetos (R22/R44 only)
   e. Aircraft lights
      i) Navigation/position lights
      ii) Anti-collision light
      iii) Landing light

4. Fuel and Fuel System
   a. Proper fuel
   b. Fuel system operation
   c. Fuel contamination
      i) Preventative measures
      ii) Elimination measures

5. Oil and Oil System
   a. Type and quantity
   b. Oil system operation

6. Instruments—Function, Markings and Limitations
   a. Engine
      i) Dual tachometer
      ii) Manifold pressure (R22/R44) Torque, MGT and N_1 (R66)
   b. Flight—function, markings and limitations
      i) Pitot-static system
         1) Pitot-static source
         2) Alternate pitot-static source
         3) Airspeed indicator
         4) Pressure altimeter
         5) Vertical speed indicator
      ii) Magnetic compass

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 2: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will study basic aerodynamics to gain an understanding of the principles of helicopter flight.

LESSON CONTENT

1. The Four Forces
   a. Lift
   b. Weight
   c. Thrust
   d. Drag
2. Airfoils
   a. Symmetrical vs. unsymmetrical
   b. Leading edge
   c. Trailing edge
   d. Chord line
   e. Relative wind
   f. Angle of attack
   g. Bernoulli's principle
   h. Newton’s third law of motion
   I. Tip path plane
3. Factors Affecting Lift and Drag
   a. Surface area
   b. Angle of attack
   c. Velocity of airflow
   d. Air density
   e. Blade stall
   f. Low rotor RPM
4. The Three Axes
   a. Longitudinal—roll
   b. Lateral—pitch
   c. Vertical—yaw
5. Torque
   a. Newton's third law of motion
   b. Tail rotor thrust
   c. Controlling torque
6. Rotor Systems
   a. Fully articulated
   b. Semi-rigid
   c. Rigid
7. Vibrations
   a. Resonance
      i) Sympathetic
      ii) Ground
   b. Low frequency
   c. Medium frequency
   d. High frequency

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 3: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will continue to gain an understanding of the principles of helicopter flight.

LESSON CONTENT

1. Hovering Flight
   a. Lift and thrust resultant
   b. Weight and drag
   c. Axis of rotation
   d. Coning
      1) Lift
      2) Centrifugal force
   e. Blade flapping
   f. Coriolis effect
   g. Translating tendency or drift
   h. Direction of airflow
   i. Ground effect
   j. Forward, sideward and rearward hovering
      1) Lift and thrust resultant
      2) Weight and Drag
   k. Gyroscopic precession
   l. Pendular action
2. Forward Flight
   a. Lift and thrust resultant
   b. Weight and drag
   c. Translational lift
   d. Dissymmetry of lift
   e. Transverse flow effect
   f. Retreating blade stall
      i) Causes
      ii) Corrections
   g. Loss of tail rotor effectiveness

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 4: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will be introduced to the aerodynamics of turns, loads and autorotative descents.

LESSON CONTENT

1. The Turn
   a. Lift components in a turn
      i) Vertical component
      ii) Horizontal component
      iii) Total lift resultant
   b. Weight and centrifugal force in a turn
   c. Angle of bank vs. angle of attack
   d. Angle of bank vs. rate of turn
2. Loads and Load Factor
   a. How conditions of flight affect loads
      i) Straight and level flight
      ii) Turns
      iii) Flares
   b. Load factor
      i) Definition
      ii) Effect of angle of bank on load factor
      iii) Effect of turbulence and high gross weight on load factor
      iv) Effect of density altitude and pilot technique on load factor
      v) Low-G mast bumping
3. Autorotative Descents
   a. Definition
   b. Free wheeling unit
   c. Direction of airflow
   d. Rotor RPM
      i) In turns
      ii) Effect of flares
      iii) Effect of updrafts and downdrafts
   e. Airspeed
      i) Manufacturer's recommended autorotational airspeed
      ii) Minimum rate of descent airspeed
      iii) Maximum glide distance airspeeds
   f. Hovering autorotation
      i) Torque effect
      ii) Translating tendency or drift
   g. Energy management

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 5: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will continue to gain an understanding of the principles of helicopter flight.

LESSON CONTENT

1. The Pilot's Operating Handbook
   a. Operating limitations
      i) Airspeed
      ii) Rotor
      iii) Powerplant
      iv) Type of operation
      v) Fuel limitations
      vi) Instrument markings
   b. Operating procedures
      i) Emergency procedures
      ii) Takeoff and landing procedures
      ii) Checklists
         1) Preflight
         2) Engine starting and warm-up
         3) Engine shutdown
   c. Performance information
      i) Performance charts
         1) Types of charts
         2) Interpretation of charts
      ii) Placard information
   d. Angle of bank vs. rate of turn
2. Helicopter Performance
   a. Density altitude
      i) Definition
      ii) Air density
      iii) Pressure altitude
      iv) Temperature
      v) Moisture
      vi) Computing density altitude on chart
      vii) Effect on hovering, takeoff and rate of climb
   b. Effect of gross weight
      i) On hovering ceiling
      ii) On takeoff and rate of climb
   c. Effect of wind
      i) Wind velocity
      ii) Gusty wind
      iii) Wind direction
   d. Carburetor icing (R22 and R44)
      i) Causes and indications
      ii) Elimination
      iii) Safety Notice #25

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 6: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will be introduced to weight and balance theory and computations.

LESSON CONTENT

1. Weight and Balance Definitions
   a. Empty weight
   b. Gross weight
   c. Maximum gross weight
   d. Useful load
   e. Datum
   f. Arm
   g. Moment
   h. Center of gravity
2. Weight and Balance Determinations
   a. Computation method—longitudinal/ lateral
   b. Graph method
   c. Table method
3. Weight and Balance Management
   a. Weight adjustment
   b. Center of gravity adjustment
   c. Fuel burn-off
   d. Effect of out-of-balance loading

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 7: 1.0 Hour Ground Training

OBJECTIVES

This lesson will be a review of material presented in Lessons 1 through 6, in preparation for the Stage 1 Written Examination.

LESSON CONTENT

Review as necessary.

COMPLETION STANDARDS

This lesson and Stage 1 will be complete when the student has passed the Stage 1 Written Examination, with a minimum score of 70%.

Note: *An appropriate stage one examination is to be developed by the instructor. It should consist of material covered in lessons 1-6 as appropriate for the R22, R44 or R66.*

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

STAGE 2

GROUND TRAINING: 13.0 hours

STAGE 2 OBJECTIVES

During Stage 2 the student will be introduced to aviation weather, the flight computer, and the Aeronautical Information Manual (AIM).

STAGE 2 COMPLETION STANDARDS

Stage 2 will be complete when the student has passed the Stage 2 Written Examination with a minimum score of 70%. The instructor will review each incorrect response to assure complete understanding before advancing the student to Stage 3.

LESSON 8: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will obtain a basic understanding of weather elements and their importance to the pilot.

LESSON CONTENT

1. The Earth's Atmosphere
   a. Composition
   b. Vertical structure
   c. International standard atmosphere—ISA
2. Temperature
   a. Temperature measurement
   b. Temperature lapse rate
3. Atmospheric Pressure and Altimetry
   a. Atmospheric pressure measurements
   b. Sea level pressure
   c. Station pressure
   d. Pressure variations
   e. Pressure systems
4. Winds
   a. Basic theory of general circulation
   b. Coriolis force
   c. Pressure gradient force
   d. Friction effect
   e. Local wind systems
5. Moisture
   a. Physical states
   b. Measurements
      i) Relative Humidity
      ii) Dew Point
   c. Condensation and sublimation products
      i) Clouds and fog
      ii) Precipitation
      iii) Dew and frost
6. Stability
   a. Causes
   b. Effects
7. Clouds
   a. Composition
   b. Formation and structure
   c. Types
   d. Recognition

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 9: 2.0 Hours Ground Training

OBJECTIVES

This lesson will complete the introduction of basic weather elements.

LESSON CONTENT

1. Air Masses
   a. Source regions
   b. Classification and characteristics of air masses
   c. Air mass modification
2. Fronts
   a. Definition
   b. Types
   c. Associated weather and characteristics
3. Turbulence
   a. Convective currents
   b. Obstructions to wind flow
   c. Wind shear
   d. Clear air turbulence
   e. Categories of turbulence intensity
4. Structural Icing
   a. Types
   b. Causes
   c. Effects
   d. Intensity
   e. Prevention and elimination
5. Thunderstorms
   a. Conditions necessary for formation
   b. Formation and life cycle
   c. Hazards
   d. Avoidance procedures

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 10: 2.0 Hours Ground Training

OBJECTIVES

During this lesson the student will learn to interpret and apply aviation weather reports and forecasts prepared by the national weather service.

LESSON CONTENT

1. Methods of Collecting Weather Data
   a. Surface observations
   b. Upper air observations
   c. Radar observations
   d. Satellite observations
   e. Pilot reports—PIREPs
2. Prior/Current Weather Conditions
   a. Surface analysis chart
   b. METAR
   c. Weather depiction chart
   d. Radar summary chart
   e. Winds aloft chart
   f. AWOS, ASOS, and ATIS Reports
3. Forecast
   a. Graphical Forecasts for Aviation—GFA
   b. Terminal Aerodrome Forecast—TAF
   c. Winds aloft forecast—FD
4. METAR and TAF Codes

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 11: 2.0 Hours Ground Training

OBJECTIVES

This lesson will introduce the flight computer and its use in navigational computations.

LESSON CONTENT

1. Calculator Side
    a. Explanation of markings
    b. Mileage and speed conversions
    c. Time, speed and distance computations
    d. Fuel consumption
    e. Airspeed computations
    f. True/density altitude computations
2. Wind Face Side
    a. Explanation of markings
    b. The wind triangle
    c. Ground speed
    d. Wind correction angle
    e. True headings

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 12: 2.0 Hours Ground Training

OBJECTIVES

This lesson will introduce the use of the Aeronautical Information Manual (AIM) and other information available to the pilot.

LESSON CONTENT

1. The Aeronautical Information Manual
    a. Basic flight information and ATC procedures
        i) Navigation aids
        ii) Airport and heliport markings and lighting
        iii) Airspace
            1) Class A, B, C, D, E, and G
            2) Prohibited, restricted, and warning areas
            3) MOA, alert areas
            4) Other airspace
            5) Temporary Flight Restrictions—TFR
        iv) Services available to pilots
        v) Airport and Heliport operations
        vi) Emergency procedures
        vii) Good operating practices

2. Chart Supplement
    a. Content
    b. Use—Legend
    c. Applications

3. The Advisory Circular System

4. The Notam System
    a. Notam L
    b. Notam D
    c Notam FDC

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 13: 2.0 Hours Ground Training

OBJECTIVES

This lesson will increase the student's understanding of airport and heliport operations and facilities, and services available to pilots.

LESSON CONTENT

1. Airports and Heliports
   a. Runway numbering
   b. Active runways
   c. Runway and heliport markings
   d. Taxiways
   e. Parking areas
   f. Field elevation
   g. Wind direction indicators
   h. Airport and heliport lighting
   i. Airport traffic patterns
      i) Airplanes
      ii) Helicopters

2. Radio Communications
   a. Frequency assignment plan
   b. Contact procedure
   c. Microphone technique
   d. Aircraft call signs
   e. Radio phraseology
   f. Light signals

3. Airport and Heliport Communications
   a. Controlled airports and heliports
      i) Automatic terminal information service—ATIS
      ii) Tower control
      iii) Ground control
   b. Uncontrolled airports and heliports
      i) Common traffic advisory frequency (CTAF)
      ii) Unicom
      iii) Multicom
      iv) AWOS, ASOS

4. Other ATC Facilities and Services
   a. Air route traffic control center
   b. Approach control
   c. Departure control

5. FSS Services Available
   a. Briefing services
   b. Frequencies and In-flight services

6. Emergency Procedures
   a. Emergency locator transmitter
   b. Emergency VHF frequency—121.5
   c. Transponder codes

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 14: 1.0 Hours Ground Training

OBJECTIVES

This lesson will be a review of material presented in Lessons 8 through 13 in preparation for the Stage 2 Written Examination.

LESSON CONTENT

Review as necessary.

COMPLETION STANDARDS

This lesson and Stage 2 will be complete when the student has passed the Stage 2 Written Examination, covering the material presented in Lessons 8 through 13, with a minimum score of 70%.

Note: *An appropriate stage two examination is to be composed by the instructor.*

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

STAGE 3

GROUND TRAINING: 9.0 hours

STAGE 3 OBJECTIVES

During Stage 3 the student will be introduced to VFR charts, the navigation plotter, radio navigation, cross-country planning, federal aviation regulations, and physiological and psychological considerations.

STAGE 3 COMPLETION STANDARDS

Stage 3 will be complete when the student has passed the Stage 3 Written Examination with a minimum score of 70%. The instructor will review each incorrect response to assure complete understanding.

LESSON 15: 2.0 Hours Ground Training

OBJECTIVES

This lesson will introduce VFR charts and the navigation plotter, and their use in planning and conducting cross-country flights.

LESSON CONTENT

1. VFR charts
   a. General considerations
      i) Types of VFR charts
   b. Symbols and markings
      i) Latitude and longitude
      ii) Magnetic variation
      iii) Topography
      iv) National Airspace System
      v) Navigation aids
      vi) Aerodromes, heliports and flight service stations
      vii) Legend—other markings
2. The Navigation Plotter
   a. Mileage scales
   b. Azimuth scale
   c. Plotting and measuring courses
3. Application of Navigation Methods
   a. Pilotage
   b. Dead reckoning
   c. Radio/GPS navigation

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 16: 2.0 Hours Ground Training

OBJECTIVES

This lesson will introduce radio navigation and its application in cross-country flight.

LESSON CONTENT

1. VHF-Omni Directional Radio Range System—VOR
   a. Receiver components
      i) Omni-bearing selector—OBS
      ii) Course deviation indicator—CDI
      iii) To-From indicator
   b. VOR radials
   c. VOR navigation
   d. VOR navigation procedures
   e. VOR indications
   f. VOR orientation
   g. Position fixing
   h. Intercepting a radial
   i. VOR test signals—VOT
2. Distance Measuring Equipment—DME
3. Area Navigation—RNAV
4. Automatic Direction Finder—ADF
5. Global Positioning System—GPS
   a. System description
   b. VFR use of GPS
   c. Database currency
   d. RAIM
6. Air Traffic Control
   a. Radar
      i) Radar vectors
      ii) Traffic advisories
      iii) Sequencing
      iv) Transponder
         1) Phraseology
         2) Modes and codes
   b. ADS-B in/out

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 17: 2.0 Hours Ground Training

OBJECTIVES

This lesson incorporates the subjects of previous lessons into the planning of a cross-country flight.

LESSON CONTENT

1. Chart Selection
2. Weather Briefing and Course Selection
3. Navigation Log
    a. True course
    b. Altitude selection
    c. Winds aloft and temperature
    d. Wind correction angle
    e. True airspeed, ground speed
    f. True heading
    g. Magnetic variation
    h. Magnetic heading
    i. Deviation
    j. Compass heading
    k. Time estimates—ETE and ETA
    l. Fuel requirements
4. Airport Information for Destination
    a. VFR Charts
    b. Chart Supplement
5. VFR Flight Plan
    a. Filing
    b. Opening
    c. Extending if necessary
    d. Closing/Cancelling

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 18: 2.0 Hours Ground Training

OBJECTIVES

This lesson reviews the Federal Aviation Regulations discussed as an integral part of previous lessons and introduces other regulations applicable to the private pilot's certification. In addition, the student will be introduced to physiological and psychological factors which can affect the comfort and safety of the pilot and his passengers.

LESSON CONTENT

1. Federal Aviation Regulations
   a. 14 CFR § 1
   b. 14 CFR § 61
   c. 14 CFR § 91
   d. NTSB, Part 830
2. Physiological Considerations
   a. Fatigue
   b. Hypoxia
   c. Alcohol
   d. Drugs
   e. Vertigo
   f. Carbon monoxide
   g. Vision
   h. Middle ear

3 Psychological Considerations
   a. Anxiety
   b. Stress

4. Aeronautical Decision Making
   a. "I'M SAFE" checklist
   b. "PAVE" checklist
   c. Single pilot Resource Management—SRM
   d. Situational Awareness

COMPLETION STANDARDS

This lesson will be complete when, by oral examination, the student displays an understanding of the material presented and has completed the study assignment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 19: 1.0 Hour Ground Training

OBJECTIVES

This lesson will be a review of material presented in Lessons 1 through 18 in preparation for the Stage 3 and Final Written Examination.

LESSON CONTENT

Review as necessary.

COMPLETION STANDARDS

This lesson and Stage 3 will be complete when the student has passed the Stage 3 and Final Written Examination, covering the material presented in Lessons 1 through 18, with a minimum score of 70%. The student should now be ready to take the FAA Private Pilot Helicopter Knowledge test.

Note: *An appropriate stage three examination is to be composed by the instructor.*

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES

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NOTES

NOTES

FLIGHT TRAINING GUIDE
CHAPTER 3

PRIVATE PILOT FLIGHT TRAINING SYLLABUS

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CHAPTER 3

PRIVATE PILOT FLIGHT TRAINING SYLLABUS

CONTENTS

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FLIGHT TRAINING SYLLABUS

PRIVATE PILOT RATING: ROTORCRAFT-HELICOPTER

FLIGHT TRAINING COURSE OBJECTIVES

The student will obtain the aeronautical skill and experience necessary to meet the requirements of a U.S. private pilot certificate with a rotorcraft category rating and a helicopter class rating in an R22, R44 or R66 as appropriate.

FLIGHT TRAINING COURSE COMPLETION STANDARDS

Completion standards will be equivalent to the FAA Private Pilot Practical Test Standards (PTS).

SYLLABUS ARRANGEMENT

The flight training will be accomplished in three stages. Hours shown in each lesson and stage of training are based on the average rate of student learning and are offered as a guide to the instructor. Times used on individual lessons and stages may be adjusted to meet individual student needs. Above average students may require less time to meet lesson, stage, or course completion standards, but must meet at least the minimum times specified below.

COURSE COMPLETION TIMES

AVERAGE COURSE TIME

Type	Total	Night	Cross-Country
Dual	40.0 hours	3.0 hours	7.0 hours
Solo	10.0 hours	0.0 hours	5.0 hours
Total:	50.0 hours	3.0 hours	12.0 hours

MINIMUM COURSE TIME – 14 CFR § PART 61

Type	Total	Night	Cross-Country
Dual	20.0 hours	3.0 hours	3.0 hours
Solo	10.0 hours	0.0 hours	3.0 hours
Total:	40.0 hours	3.0 hours	6.0 hours

FLIGHT TRAINING SYLLABUS (cont'd)

20 Hours Dual
0.5 Hour Solo

Lessons 1—18 include all pre-solo requirements and some practice in advanced maneuvers, e.g. Maximum Performance Takeoffs, Steep Approaches, Quick Stops.

NOTE: Completion of Stage 1 of the Syllabus meets the initial (pre-solo) experience requirements in accordance with SFAR 73.

9 Hours Dual (1.5 Hours Night)
4.5 Hours Solo

Lessons 19—29 include solo operations, off-airport operations, night traffic pattern operations, hazardous flight conditions and emergency operations.

11 Hours Dual (7 Hours X-C, 1.5 Hours Night)
5 Hours Solo (5 Hours X-C)

Lessons 30—39 include cross-country training including emergencies, solo cross-country, solo practice and preparation for the FAA flight check.

STAGE 1

DUAL: 20.0 hours
SOLO: 0.5 hour

STAGE 1 OBJECTIVES

During this stage the student will obtain the foundation for all future helicopter training. They will become familiar with the Robinson helicopter and will gain proficiency in all procedures and maneuvers necessary for their first supervised solo flight.

STAGE 1 COMPLETION STANDARDS

At the completion of this stage the student will satisfactorily pass the Stage 1 Flight Check and the pre solo written test, thereby demonstrating the knowledge and ability to safely conduct solo flights in the local area.

LESSON 1: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will be introduced to the Robinson helicopter and the importance of a proper preflight inspection. They will gain an understanding of safety precautions to be followed preparing for flight and will be introduced to basic flight maneuvers.

LESSON CONTENT

Introduction

1. Preflight Preparation Procedures
    a. Required documents
    b. Aircraft logbooks
    c. Use of checklists
    d. Preflight inspection
    e. Helicopter servicing
    f. Fuel system and fuel type
    g. Equipment checks
    h. Ground safety procedures
    i. Cockpit management
    j. Emergency equipment and survival gear
2. SFAR 73 Awareness Training
    a. Energy management
    b. Low RPM Decay and Rotor Stall
    c. Low G Hazards and Mast Bumping
3. Flight Demonstration
    a. Engine starting and rotor engagement
    b. Engine and systems check
    c. Before takeoff check
    d. Hovering
    e. Normal takeoff from a hover
    f. Normal approach to a hover
    g. Engine shutdown
    h. After landing and securing
4. Student Practice
    a. Straight and level flight
    b. Shallow (10 degree) and medium (20 degree) bank, turns in both directions
    c. Climbs and descents
    d. Flight at various airspeeds

COMPLETION STANDARDS

At the completion of this lesson the student, with instructor assistance, will be able to conduct a preflight inspection, use checklists, and start the engine. They will gain an understanding of the use of the flight controls and display an understanding of ground safety. Required SFAR 73 Awareness Training will be completed.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 2:

1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will review the procedures/maneuvers in Lesson 1 to gain proficiency in the use of the flight controls and be introduced to additional material.

LESSON CONTENT

Review

1. Preflight inspection / cockpit management
2. Engine Starting
3. Engine and systems checks
4. Before takeoff check
5. Straight and level flight – student practice
6. Shallow and medium bank turns in both directions – student practice
7. Climbs and descents – student practice
8. Flight at various airspeeds
9. Engine shutdown
10. Ground safety procedures
11. Emergency equipment and survival gear

Introduction

1. Climbing turns
2. Descending turns
3. Radio communications
4. Hovering
5. Collision avoidance procedures
6. Wind drift correction
7. Wake turbulence and wind shear avoidance
8. Low-G recognition and avoidance—***Discussion Only***
9. Airport/heliport markings
10. Airport/heliport operations

COMPLETION STANDARDS

The student will be able to conduct the preflight inspection accurately with instructor assistance and will display increased understanding and proficiency in the use of the flight controls to control aircraft attitude.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 3: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will continue to gain proficiency in basic flight maneuvers and will be further introduced to the airport environment.

LESSON CONTENT

Review

1. Preflight inspection
2. Engine starting
3. Engine and systems preflight check
4. Straight and level flight
5. Shallow and medium bank turns – both directions
6. Climbs and descents with and without turns
7. Radio communications
8. Hovering
9. Collision avoidance procedures
10. Wake turbulence and wind shear avoidance
11. Low-G Recognition and Avoidance—***Discussion Only***
12. Airport/heliport markings
13. Airport/heliport operations
14. Engine shutdown

Introduction

1. Normal/crosswind takeoff from a hover
2. Normal/crosswind approach to a hover
3. Airport traffic patterns, including entry and departure procedures

COMPLETION STANDARDS

The student will have a basic understanding of the airport environment with regard to helicopter operations, and will be able to perform the preflight inspection, engine starting, engine and systems preflight checks, and engine shutdown, unassisted. They will display increased proficiency in coordinated helicopter control, and will maintain altitude within 300 feet during turns and airspeed changes.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 4: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will review flight maneuvers previously introduced and emphasize how crosswinds affect these maneuvers.

LESSON CONTENT

Review

1. Hovering
2. Normal/crosswind takeoff from a hover
3. Normal/crosswind approach to a hover
4. Traffic pattern procedures

Introduction

1. Vertical takeoff to a hover
2. Landing from a hover
3. Ground reference maneuvers
4. Sideward, forward, and rearward hovering
5. Hovering turns
6. Hover taxi

COMPLETION STANDARDS

The student will increase proficiency in attitude control during takeoffs and approaches and will understand how crosswind components affect these maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 5: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will practice basic maneuvers, concentrating on hovering.

LESSON CONTENT

Review

1. Vertical takeoff to a hover
2. Hovering—sideward, forward, rearward and turns
3. Normal/crosswind takeoff from a hover
4. Normal/crosswind approach to a hover
5. Landing from a hover
6. Ground reference maneuvers
7. Hover taxi

COMPLETION STANDARDS

The student will show increased proficiency during takeoffs, traffic pattern operations, approaches and hovering.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 6: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will continue to practice basic maneuvers.

LESSON CONTENT

Review

1. Vertical takeoff to a hover
2. Hovering—sideward, forward, rearward and turns
3. Normal/crosswind takeoff from a hover
4. Normal/crosswind approach to a hover
5. Hover taxi

COMPLETION STANDARDS

The student will show increased proficiency during takeoffs, traffic pattern operations, approaches and hovering.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 7:

1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will continue to practice pre-solo maneuvers and will be introduced to maximum performance takeoffs and steep approaches.

LESSON CONTENT

Review

1. Vertical takeoff to a hover
2. Hovering
3. Normal takeoff from a hover
4. Normal approach to a hover
5. Landing from a hover

Introduction

1. Maximum performance takeoff and climb
2. Steep approach
3. Steep Turns—30 degree bank angle
4. Air Taxi

COMPLETION STANDARDS

The student will demonstrate proper radio communications and traffic pattern procedures. Takeoffs will be performed unassisted, but approaches will be performed with instructor assistance. During straight and level flight and turns, altitude will be maintained within 250 feet, airspeed within 20 kts, and heading within 25 degrees. During climbs and descents the level off will be accomplished within 250 feet of the assigned altitude, airspeed will be maintained within 20 kts, and heading within 25 degrees.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 8: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will concentrate on takeoffs, approaches, and hovering maneuvers to build proficiency. The student will be introduced to the circumstances and procedures for a go-around.

LESSON CONTENT

Review

1. Normal takeoffs and approaches
2. Maximum performance takeoffs and climbs
3. Steep approaches
4. Hovering—sideward, rearward, forward and turns
5. Steep turns—30 degree bank angle
6. Air Taxi

Introduction

1. Go Arounds

COMPLETION STANDARDS

The student will demonstrate an increased proficiency while hovering; and will also gain an increased understanding of maximum performance takeoffs and steep approaches.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 9: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will concentrate on areas of weakness.

LESSON CONTENT

Review

1. Areas of student weakness

COMPLETION STANDARDS

The student will demonstrate an increased proficiency in areas of weakness.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 10: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

The student will practice weak areas and will be introduced to autorotations and rapid decelerations.

LESSON CONTENT

Review

1. Areas of student weakness

Introduction

1. Straight in autorotations with power recovery
2. Rapid decelerations—quick stops

COMPLETION STANDARDS

The student will demonstrate an increased proficiency in areas of weakness. They will gain an understanding of autorotations, the power recovery and further develop control coordination with the introduction of quick stops.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 11: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review pre-solo maneuvers and will be introduced to systems and equipment malfunctions, RPM control without the use of the governor and Vortex Ring State.

LESSON CONTENT

Review

1. Pre-solo maneuvers as necessary
2. Straight in autorotations with power recovery
3. Rapid decelerations—quick stops

Introduction

1. Emergency procedures and equipment malfunctions
   a. Pilot's Operating Handbook
   b. Alternator or generator failure
   c. Electrical fire or smoke in the cockpit
   d. Tachometer failure
   e. Caution lights
   f. Warning lights
   g. RHC safety notices
2. Vortex Ring State—Vuichard/ Traditional Recovery
3. RPM control without the use of the governor (R22/R44)

COMPLETION STANDARDS

At the completion of this lesson the student will show increased proficiency in all pre-solo maneuvers. During straight and level flight and turns, altitude will be maintained within 200 feet, airspeed within 15 kts, and heading within 20 degrees. During climbs and descents the level off will be accomplished within 200 feet of the assigned altitude, airspeed will be maintained within 15 kts, and heading within 20 degrees. They will gain an understanding of the conditions that result in Vortex Ring State and systems and equipment malfunctions. During governor off operations, RPM will be maintained within 4%.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 12:

1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will continue to practice autorotations and be introduced to hovering autorotations. R22 and R44 students will be introduced to the recognition and recovery from low rotor RPM.

LESSON CONTENT

Review

1. Straight in autorotation
2. Takeoffs and approaches
3. Rapid decelerations—quick stops
4. RPM control without the use of the governor (R22/R44)

Introduction

1. Recognition and recovery from low rotor RPM (R22/R44)
   a. During cruise flight
   b. On takeoff
   c. At a hover
2. Hovering autorotation

COMPLETION STANDARDS

During straight in autorotation, the student will demonstrate proper entry techniques, maintain airspeed between 55 and 75 kts and rotor rpm in the green. R22/R44 students will gain an understanding of the effects of low rotor RPM, its recognition and proper recovery techniques.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 13: 1.5 Hours Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will be a review of important pre-solo maneuvers.

LESSON CONTENT

Review

1. Takeoffs and approaches
2. Hovering—sideward, rearward, forward and turns
3. Straight in autorotation
4. Hovering autorotation
5. Rapid decelerations—quick stops
6. Recognition and recovery from low rotor RPM
7. Vortex Ring State—Vuichard/Traditional Recovery
8. RPM control without the use of the governor (R22/R44)

COMPLETION STANDARDS

The student will demonstrate increased proficiency in all pre-solo maneuvers. During governor off operations, RPM will be maintained within 3%.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 14:

1.5 Hours Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will be introduced to 180° autorotation and the effects of turns during autorotative descents. For the pre-solo stage this will serve as "enhanced autorotation training" in accordance with SFAR 73.

LESSON CONTENT

Review

1. Pre-solo maneuvers as necessary

Introduction

1. 180° autorotation with power recovery
2. Simulated engine failure—Forced landing

COMPLETION STANDARDS

The student will gain an understanding of the importance of attitude and RPM control during 180° autorotation. During forced landings the student will understand the need to immediately lower the collective to prevent a low rotor RPM situation and techniques for controlling RPM during autorotative descents.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 15: 1.5 Hours Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will continue practicing pre-solo maneuvers, concentrating on takeoffs, approaches and autorotations.

LESSON CONTENT

Review

1. Normal takeoffs and approaches
2. Maximum performance takeoffs and climbs
3. Steep approaches
4. 180° autorotation with power recovery
5. Simulated engine failure—Forced landing

COMPLETION STANDARDS

1. During takeoffs, student will be able to maintain proper attitude control and heading.
2. During approaches, proper approach angles will be maintained with only minor corrections and rate of closure will not be excessive.
3. Entry into autorotation will be smooth, exercising proper attitude, trim, and RPM control. The flare and power recovery will be performed at prescribed altitudes.
4. During forced landings the student will lower the collective so as to prevent the RPM from decaying below 90%.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 16: 1.5 Hours Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson is a review of all pre-solo maneuvers in preparation for the student's first supervised solo. The student will also experience flight with hydraulics off in the R44 or R66 (no approaches or landing).

LESSON CONTENT

Oral Discussion

1. ATC/Traffic pattern procedures
2. Emergency procedures and equipment malfunctions

Review

1. Preflight inspection
2. Engine starting
3. Engine and systems preflight check
4. Vertical takeoff to a hover
5. Hovering—sideward, rearward, forward and turns
6. Radio communications
7. Normal takeoff from a hover
8. Traffic pattern procedures/collision avoidance precautions
9. Autorotative descents with power recovery
10. Hovering autorotation
11. Simulated engine failure—Forced landing
12. Normal approach to a hover
13. Recognition and recovery from low RPM (R22/R44)
14. RPM control without the use of the governor (R22/R44)
15. Landing from a hover

Introduction—R44 or R66

1. Hydraulic off flight
   a. Straight and level
   b. Turns
   c. No approaches or landings

COMPLETION STANDARDS

The student will demonstrate the knowledge and proficiency to safely solo the helicopter. R44 or R66 students will experience hydraulic off flight.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 17: STAGE 1 FLIGHT CHECK

1.0 Hour Dual
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this stage check the Chief Flight Instructor or a designated instructor will evaluate the student's proficiency on the listed Stage 1 maneuvers and procedures to determine if the student is ready to solo the helicopter and be advanced to Stage 2.

LESSON CONTENT

Review

1. Preflight inspection
2. Engine starting
3. Engine and systems preflight check
4. Vertical takeoff to a hover
5. Hovering—sideward, rearward, forward and turns
6. Radio communications
7. Normal takeoffs from a hover
8. Traffic pattern procedures/collision avoidance precautions
9. Autorotative descents with power recovery
10. Hovering autorotation
11. Simulated engine failure—Forced landing
12. Recognition and recovery from low RPM (R22/R44)
13. Rapid decelerations—quick stops
14. Normal approach to a hover
15. RPM control without the use of the governor (R22/R44)
16. Engine shutdown

Oral Examination

1. Pilot's Operating Handbook
   a. Airworthiness requirements
   b. Limitations
   c. Normal procedures
   d. Emergency procedures
2. RHC Safety Notices
3. Airspace rules and airport procedures
4. Low-G Recognition, Avoidance, and Recovery

COMPLETION STANDARDS

This lesson and Stage 1 will be complete when the student displays skill and understanding while performing the maneuvers necessary to safely conduct solo flights in the local training area. They will maintain altitude within 150 feet, airspeed within 15 kts, and heading within 15°. During governor off operations, RPM will be maintained within 2%. The student will also demonstrate sufficient knowledge of emergency operations, the Pilot's Operating Handbook, RHC Safety Notices and must satisfactorily pass the pre-solo written test with a minimum score of 70%.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 18:

1.0 Hour Dual
0.5 Hour Solo
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the instructor will review all Stage 1 and pre-solo requirements to check the student's readiness for solo flight. During the second portion of this lesson, the student will conduct their first supervised solo flight.

LESSON CONTENT

Pre-Solo Written Test

1. FAR Parts 61 and 91 as appropriate
2. R22, R44, or R66 limitations and flight characteristics
3. Airspace rules and airport procedures
4. Low-G Recognition, Avoidance, and Recovery
5. Low RPM Recognition and Recovery (R22/R44)

Review

1. Normal/crosswind takeoffs and approaches
2. Hovering maneuvers
3. Radio communications
4. Straight in autorotations
5. Emergency procedures and equipment malfunctions

First Supervised Solo Flight

1. Vertical takeoffs to a hover
2. Hovering
3. Landings from a hover
4. Three normal takeoffs, traffic patterns, and normal approaches

COMPLETION STANDARDS

The dual portion of this lesson will be complete when the instructor has reviewed the student logbook to ensure all flight time and maneuver requirements have been met and has made the appropriate FAR Part 61 endorsements; and has reviewed with the student all incorrect answers to the pre-solo written test. The student will demonstrate the ability to safely solo the helicopter while adhering to established traffic pattern procedures.

The solo portion of the lesson will be complete when the student has completed the first supervised solo flight.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES

STAGE 2

DUAL: 9.0 hours/1.5 Night

SOLO: 4.5 hours

STAGE 2 OBJECTIVES

The student will continue to be instructed in advanced maneuvers in preparation for the introduction of off-airport operations. They will also increase their confidence and refine their piloting skills during solo practice.

STAGE 2 COMPLETION STANDARDS

This stage will be complete when the student satisfactorily passes the Stage 2 flight check, thereby demonstrating the knowledge and proficiency to safely perform advanced maneuvers and off-airport operations.

Note – At no time during the student's solo lessons should they be allowed to practice any of the following maneuvers:

1. Autorotative descents of any kind
2. Hovering autorotation
3. Simulated engine failure—Forced landing
4. Vortex Ring State Recovery
5. Recovery from low RPM (R22/R44)
6. Governor failure (R22/R44)
7. Running landings
8. Slope landings/takeoffs
9. Hydraulic off flight—(R44/R66)
10. Maneuvers added by the instructor on a case by case basis

LESSON 19:

0.5 Hour Dual
0.5 Hour Solo
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During the dual portion of this lesson, the instructor will review takeoff, traffic pattern, and approach procedures to check the student's readiness for the second supervised solo flight and introduce slope operations. During the solo portion of the lesson the student will conduct their second supervised solo flight.

LESSON CONTENT

Review

1. Normal takeoff from a hover
2. Traffic pattern procedures
3. Hovering
4. Normal approach to a hover

Introduction

1. Slope landings
2. Slope takeoffs

Second Supervised Solo Flight

1. Vertical takeoffs to a hover
2. Hovering
3. Landings from a hover
4. Three normal takeoffs, traffic patterns, and normal approaches

COMPLETION STANDARDS

The student will gain confidence in their ability to safely solo the helicopter. The student will gain an understanding of proper techniques to slope landings/takeoffs.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 20:

0.5 Hours Dual
0.5 Hour Solo
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review pre-solo maneuvers in preparation for their third supervised solo flight.

LESSON CONTENT

Review

1. Maximum performance takeoffs
2. Steep approaches
3. Hovering autorotation
4. Autorotative descents with power recovery
5. Recognition and recovery from low rotor RPM
6. Slope takeoffs and landings

Third Supervised Solo Flight

1. Vertical takeoffs to a hover
2. Hovering
3. Landings from a hover
4. Normal takeoffs, traffic patterns, and normal approaches

COMPLETION STANDARDS

The student will increase their proficiency in advanced maneuvers and gain additional confidence in their ability to safely solo the helicopter.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 21: 1.0 Hour Solo
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will practice the listed maneuvers to increase their proficiency and confidence in solo flight.

LESSON CONTENT

Practice

1. Maximum performance takeoff and climb
2. Steep approach
3. Normal takeoff from a hover
4. Normal approach to a hover
5. Hovering—sideward, rearward, forward and turns

COMPLETION STANDARDS

This lesson will be complete when the student has practiced the assigned maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 22: 1.5 Hours Dual
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will introduce the student to off-airport operations in confined areas, and will stress the importance of performance planning and off-airport operating procedures. The student will gain an understanding of hazards associated with off-airport operations and review those previously covered.

LESSON CONTENT

Oral Discussion

1. Weight and balance calculations and considerations
2. Performance planning
   a. Limit manifold pressure or torque/MGT—maximum power available
   b. Hover performance—IGE, OGE
   c. Never exceed speed

Review

1. Vortex Ring State—Vuichard/Traditional Recovery
2. Power failure at altitude—Forced landing

Introduction

1. Confined area and pinnacle operations
   a. High reconnaissance
   b. Low reconnaissance
   c. Confined area & pinnacle approach and departure
2. Hazardous conditions
   a. Obstructions—natural and man-made
   b. Landing surface conditions
   c. Dynamic rollover—slope operations

COMPLETION STANDARDS

This lesson will be complete when the student demonstrates the ability to plan and execute a high and low reconnaissance. They will be able to select suitable landing areas and demonstrate good judgment in their traffic pattern procedures.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 23: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will be introduced to shallow approaches, to a running landing, and situations that may require a running landing.

LESSON CONTENT

Review

1. Normal takeoff from a hover
2. Normal approach to a hover
3. Traffic pattern procedures
4. Autorotative descents with power recovery
5. Hovering autorotation
6. Recognition and recovery from low rotor RPM (R22/R44)

Introduction

1. Partial power failure
2. Shallow approach and running landing

COMPLETION STANDARDS

The student will gain an understanding of what conditions necessitate more advanced takeoffs and approaches. During autorotative descents the student will maintain airspeed between 60 and 75 KTS and rotor RPM within the green range. Directional control during simulated power failure at a hover will be within 10° and proper drift control will be exercised. The student will be able to recognize and recover from a low RPM situation prior to the RPM decaying below 90%. The student will gain an understanding of the conditions requiring a shallow approach and running landing.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 24: 1.0 Hours Solo
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will practice the maneuvers assigned by the instructor to increase proficiency and solo experience.

LESSON CONTENT

Practice

1. Maneuvers assigned by the flight instructor

COMPLETION STANDARDS

This lesson will be complete when the student has practiced the listed maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 25: 1.5 Hours Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review off-airport operations in confined areas and running landings.

LESSON CONTENT

Review

1. Maximum performance takeoff and climb
2. Steep approach
3. Confined area and pinnacle operations
4. Slope operations
5. Shallow approach and running landing

COMPLETION STANDARDS

The student will demonstrate proper attitude and power control during maximum performance takeoffs. Heading will be maintained within 15° during maximum performance takeoffs and a smooth transition to normal climb will be demonstrated. The student will maintain translational lift until ground contact during a shallow approach and running landing and demonstrate proper use of the cyclic during slope operations. During straight and level flight and turns, altitude will be maintained within 100 feet, airspeed within 10 KTS, and heading within 10°. The student will properly conduct the high/low reconnaissance when conducting confined area operations and select an approach angle that will ensure obstacle clearance.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 26: 1.5 Hours Dual Night
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will familiarize the student with the special considerations and characteristics of helicopter flight at night.

LESSON CONTENT

Introduction

1. Preflight planning
   a. Night flight planning considerations
   b. Preflight inspection for night flight
   c. Night vision techniques
   d. Personal lighting devices
   e. Locating and identifying switches and circuit breakers
2. Night Flight
   a. Hovering
   b. Use of landing light and instrument light
   c. Normal takeoff from a hover
   d. Local area night orientation
   e. Traffic pattern operations
   f. Normal approach to a hover
   g. Airport lighting
   h. Straight in autorotation
   i. Hovering autorotation

COMPLETION STANDARDS

The student will become familiar with helicopter flight in the night environment, including airport/heliport lighting; aircraft lighting, locating and identifying switches, circuit breakers, etc.; and the types and uses of various personal lighting devices.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 27: 1.5 Hours Solo
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will practice the maneuvers assigned by the instructor to increase proficiency and solo experience.

LESSON CONTENT

Practice

1. Maneuvers assigned by the flight instructor

COMPLETION STANDARDS

This lesson will be complete when the student has practiced the listed maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 28: 1.0 Hour Dual
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review Stage 2 maneuvers in preparation for the Stage 2 flight check.

LESSON CONTENT

Review

1. Confined area and pinnacle operations
2. Maximum performance takeoff and climb
3. Steep approach
4. Anti-torque failure—oral discussion
5. Shallow approach and running landings
6. Autorotative descents
7. Slope operations
8. Rapid deceleration—quick stops
9. Recovery from low rotor RPM
10. Partial power failure
11. Hovering autorotation
12. Systems and equipment malfunctions—oral discussion
13. Simulated engine failure—forced landing
14. Maneuvers selected by the instructor

COMPLETION STANDARDS

At the completion of this lesson, the student will have demonstrated increased proficiency in all advanced maneuvers. They will demonstrate early recognition and immediate recovery from all hazardous flight conditions and a good understanding of off-airport operations, emergencies, and systems and equipment malfunctions.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 29: STAGE 2 FLIGHT CHECK

1.5 Hours Dual
1.5 Hours Pre/Post Flight Discussion

OBJECTIVES

During this lesson, the Chief Flight Instructor or a designated instructor will determine that the student meets the knowledge, proficiency, and performance standards required in performing advanced maneuvers and off-airport operations.

LESSON CONTENT

Oral Examination

1. Weight and balance computation
2. Performance planning
3. Hazardous conditions
   a. Adverse winds and turbulence
   b. Vortex Ring State
   c. Dynamic rollover

Review

1. Confined area and pinnacle operations
2. Shallow approach/running landing
3. Slope operations
4. Autorotative descents
5. Rapid deceleration—quick stops
6. Recovery from low RPM (R22/R44)
7. Hovering autorotation
8. Simulated engine failure—forced landing
9. Maneuvers selected by the instructor

COMPLETION STANDARDS

1. During takeoffs and climbs, the student will demonstrate proper attitude and heading control.
2. During approaches, proper sight picture, rate of closure, and ground track will be demonstrated.
3. While conducting slope operations the student will demonstrate proper use of the cyclic and collective.
4. During autorotative descents rotor RPM will be maintained in the green arc. Airspeed will be maintained between 60 to 70 KTS, and the power recovery will be executed smoothly and properly.
5. While executing a hovering autorotation, the student will maintain heading with 10° and proper drift control will be exercised.
6. The student will demonstrate knowledge and understanding of systems and equipment malfunctions.
7. The student will be able to recognize and recover from low RPM prior to 90%.
8. The student will exercise proper planning and good judgment with conducting off-airport operations.

LESSON 29: STAGE 2 FLIGHT CHECK (cont'd)

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES

STAGE 3

DUAL: 11.0 Hours/7.0 Cross-country/1.5 Night Cross-country

SOLO: 5.0 Hours Cross-country

STAGE 3 OBJECTIVES

The student will be instructed in maneuvers and procedures necessary for a cross-country flight. They will learn operations within the ATC environment and develop the skills necessary for solo flights to unfamiliar airports. Additionally, the student will receive instruction and increase their proficiency in all private pilot operations in preparation for the Stage 3 Flight Check.

STAGE 3 COMPLETION STANDARDS

This Stage will be complete when the student satisfactorily passes the Stage 3 Flight Check, demonstrating the knowledge and proficiency outlined in the current FAA Rotorcraft-Helicopter Practical Test/Airman Certification Standards for Private Pilot.

LESSON 30:

1.5 Hours Dual X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will be introduced to helicopter cross-country planning and procedures. The flight will consist of at least two legs and will be conducted using pilotage and dead reckoning.

LESSON CONTENT

Introduction

1. Preflight planning
   a. Aeronautical Information Manual
   b. Sectional and Terminal area charts
   c. Course selection
   d. Procurement/analysis of weather reports and forecasts
   e. Aircraft performance—best range airspeed, fuel endurance, ground speed
   f. Cross-country flight log
   g. Fuel requirements
2. Cross-Country Flight
   a. Navigation
      i) Pilotage
      ii) Dead reckoning—with magnetic compass
   b. Estimating visibility in flight
   c. Recognition and avoidance of hazardous terrain
3. Airport Operations
   a. Navigation
   b. Opening and closing flight plan
   c. Airport traffic control procedures
      i) ATIS
      ii) Control tower/CTAF
4. Emergency Procedures
   a. Complete or partial power loss—forced landing
   b. System and equipment malfunctions—precautionary landing
   c. Collision avoidance and wake turbulence precautions, wind shear avoidance

COMPLETION STANDARDS

At the completion of this lesson, the student will be able to plan a VFR cross-country flight. They will be prepared for VFR navigation and have the knowledge to deal with some cross-country emergencies.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 31: 2.0 Hours Dual X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will expand the student's understanding of cross-country operations and emergency procedures in preparation for their first solo cross-country flight. The flight will consist of three legs using pilotage, dead reckoning and radio navigation.

LESSON CONTENT

Review

1. Preflight planning
   a. Weather briefing
   b. Course selection
   c. Cross-country flight log
   d. VFR flight plan
2. Cross-Country flight operations
   a. Opening and closing flight plan
   b. Pilotage and Dead Reckoning
3. Air traffic control procedures
4. Emergency Procedures
   a. Complete or partial power loss
   b. System and equipment malfunction

Introduction

1. Radio Navigation (VOR/GPS) and Radar Services
2. Adverse weather—estimating critical weather in flight
3. Diversion to alternate
   a. As a preventative measure
   b. Airport selection
   c. Estimating time en route
4. Lost procedures
   a. Heading selection
      i) Proceeding to last known position
      ii) Proceeding to nearest prominent land mark
   b. Altitude selection
      i) Climb VFR as appropriate
      ii) Best altitude for communications
      iii) Best altitude for chart interpretation
   c. Obtaining assistance
      i) ATC facility—frequencies and services
      ii) FSS facility—frequencies and services
      iii) Transponder operation
      iv) Navaids—communications and navigation
   d. Emergency landing
      i) Deteriorating weather
      ii) Low fuel
      iii) Area selection
5. Lost Communications
   a. Transponder operation
   b. Airport operations—ATC light signals

LESSON 31: (cont'd)

COMPLETION STANDARDS

This lesson will be complete when the student demonstrates the ability to perform a cross-country flight using pilotage, dead reckoning and radio navigation. Upon completion the student should be ready for their first solo cross-country flight and will understand and be capable of executing the procedures used to divert to an alternate airport as appropriate to their first solo cross-country. The student will also select the best course of action when given a lost situation.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 32: 1.5 Hours Dual Night X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will familiarize the student with night cross-country procedures. The flight will be over 50 NM total distance and will emphasize pilotage in the night environment.

LESSON CONTENT

Review

1. Preflight planning
   a. Weather briefing
   b. Course selection
   c. Altitude selection
2. Cross-Country flight
   a. Pilotage
   b. Radio navigation (VOR/GPS)

Introduction

1. Night flying considerations
   a. Chart interpretation
   b. Minimum altitude
   c. Cockpit lighting
   d. Airport lighting
2. Night emergency procedures

COMPLETION STANDARDS

Upon completion of this lesson, the student will show an increased understanding of preflight planning, especially with regard to night cross-country operations. The student should act promptly to simulated emergencies, exhibiting good judgment.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 33:

1.0 Hour Solo X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will be the student's first solo cross-country flight. The instructor will select a relatively easy course and review all preflight planning and make appropriate endorsements.

LESSON CONTENT

1. Preflight planning—Checked by instructor
   a. Sectional charts
   b. Altitude selection
   c. Course selection
   d. Checkpoint selection
   e. Distance measurements
   f. Computation of flight time, headings, and fuel requirements
   g. Weather briefing
   h. Aircraft performance
   i. Navigation log
   j. VFR flight plan
   k. Weight and balance
2. Cross-Country flight
   a. Departure
   b. Establishing desired course
   c. Opening flight plan and closing flight plan
   d. Pilotage and dead reckoning
   e. Proper radio communications
3. Airport operations
4. Instructor limitations

COMPLETION STANDARDS

The student will conduct the assigned cross-country flight. The instructor will determine how well the flight was conducted by oral examination and will check to be sure all required flight log entries have been made.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 34: 1.5 Hour Solo X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will gain additional confidence and understanding of cross-country flight operations. This flight will consist of a longer course than the initial solo cross-country flight.

LESSON CONTENT

1. Preflight planning—Checked by instructor
   a. Sectional charts
   b. Altitude selection
   c. Course selection
   d. Checkpoint selection
   e. Distance measurements
   f. Computation of flight time, headings, and fuel requirements
   g. Weather briefing
   h. Aircraft performance
   i. Navigation log
   j. VFR flight plan
   k. Weight and balance
2. Cross-country flight
   a. Departure
   b. Establishing desired course
   c. Opening flight plan and closing flight plan
   d. Pilotage and dead reckoning
   e. VOR/GPS navigation
   f. Computing ground speed and ETA
   g. Proper radio communications
3. Airport operations

COMPLETION STANDARDS

The student will conduct the assigned cross-country flight. The instructor will determine how well the flight was conducted by oral examination and will check to be sure all required flight log entries have been made.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 35: 2.0 Hour Dual X-C
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

This lesson will be a longer cross-country flight with landings at three different airports. The student will be able to demonstrate a complete understanding of cross-country procedures.

LESSON CONTENT

Review

1. Preflight planning
   a. Weather
   b. Course
   c. Altitude
   d. Weight and balance
   e. VFR flight plan
2. Cross-country flight
   a. Pilotage, dead reckoning, radio navigation (VOR/GPS)
   b. Diversion to an alternate
   c. Lost procedures
   d. Emergency procedures

Introduction

1. Ground speed check—estimating time of arrival

COMPLETION STANDARDS

Upon completion of this lesson, the student will:

1. Demonstrate a thorough understanding of cross-country procedures;
2. Be able to verify the position of the helicopter within 3 NM at all times;
3. Arrive at checkpoints at ± 5 minutes of his estimate;
4. Maintain selected altitude ± 100 feet;
5. Maintain the desired airspeed ± 10 knots;
6. Maintain the desired heading ± 10°; and,
7. During radio navigation, locate their position relative to the radio facility and track along a given radial or bearing.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 36: 2.5 Hour Solo X-C
1.5 Hour Pre/Post Flight Discussion

OBJECTIVES

This solo cross-country flight will consist of at least 100 NM total distance with landings at a minimum of three airports, one unfamiliar to the student. One segment of the flight will be at least 25 NM straight line distance from takeoff to landing. If the student has not made any solo takeoffs, traffic patterns and landings at an airport with an operating control tower, such an airport should be selected for this flight and these three operations should be accomplished.

LESSON CONTENT

1. Preflight planning—Checked by instructor
   a. Sectional charts
   b. Altitude selection
   c. Course selection
   d. Checkpoint selection
   e. Distance measurements
   f. Computation of flight time, headings, and fuel requirements
   g. Weather briefing
   h. Aircraft performance
   i. Navigation log
   j. VFR flight plan
   k. Weight and balance
2. Cross-country flight
   a. Departure
   b. Establishing desired course
   c. Opening flight plan/closing flight plan
   d. Pilotage and dead reckoning
   e. VOR/GPS navigation
   f. Computing ground speed and ETA
   g. Proper radio communications
3. Airport operations

COMPLETION STANDARDS

The student will conduct the assigned cross-country flight. The instructor will determine how well the flight was conducted by oral examination and will check to be sure all required flight log entries have been made.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 37: 1.0 Hour Dual
0.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review traffic pattern operations, advanced takeoff and landings, and emergency procedures in order to maintain proficiency. The student will gain an understanding of Hydraulic OFF approach and landing in the R44 or R66.

LESSON CONTENT

Review

1. Maximum performance takeoff and climb
2. Steep approach
3. Normal approach/takeoff
4. Shallow approach, running landing
5. Rapid deceleration—quick stops
6. Slope operations
7. Autorotative descents
8. Hovering autorotation
9. Partial power failure
10. Recovery from low rotor RPM (R22/R44)
11. Systems and equipment malfunction

Introduction

1. Hydraulic OFF approach and landing (R44/R66)
2. Governor Failure (R22/R44)

COMPLETION STANDARDS

At the completion of this lesson the student will have demonstrated increased proficiency in all advanced maneuvers. The student will have performed a Hydraulic OFF approach and landing (R44/R66).

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 38: 1.5 Hours Dual
1.0 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the student will review basic flight maneuvers and emergency operations in preparation for the Stage 3 and final flight check.

LESSON CONTENT

Review

1. Normal takeoff from a hover
2. Normal approach to a hover
3. Maximum performance takeoff and climb
4. Steep approach
5. Governor failure (R22/R44)
6. Shallow approach/running landing
7. Rapid deceleration—quick stop
8. Slope operations
9. Autorotative descents with power recovery
10. Hovering autorotation
11. Vortex Ring State
12. Systems and equipment malfunctions
13. Partial power failure
14. Recovery from low rotor RPM (R22/R44)
15. Simulated engine failure—Forced landings
16. Hydraulic Off approach and landing (R44/R66)

COMPLETION STANDARDS

1. During takeoff and climbs the student will demonstrate proper altitude and heading control, correcting for crosswind as appropriate.
2. During approaches, proper angle, rate of closure, and ground track will be demonstrated, correcting for crosswind as appropriate and terminating within 3 feet of designated point.
3. During running landings the student will make a smooth transition from descent to surface contact at or slightly above effective translational lift, using less than hovering power, and beyond but within 50 feet of designated point.
4. During simulated hazardous flight conditions the student will demonstrate immediate recognition and recovery. Hydraulic OFF landings will touchdown skids level maintaining proper heading control—(R44/R66).
5. During simulated engine failure, the student will maintain rotor RPM within allowable limits immediately lowering the collective. They will establish an appropriate attitude maintaining airspeed as necessary. They will select a suitable landing area and maneuver so as to arrive at the selected area in trim, with acceptable RPM, airspeed and descent rate, and in position to make a safe autorotative landing.

LESSON 38: (cont'd)

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

LESSON 39: 1.5 Hours Dual
1.5 Hour Pre/Post Flight Discussion

OBJECTIVES

During this lesson the Stage 3 and Final Flight Check will be conducted by the Chief Flight Instructor or a designated instructor. The instructor will evaluate the student's readiness for the *Private Pilot—Helicopter* flight test.

LESSON CONTENT

Review

1. Oral examination
   a. Pilot's Operating Handbook
   b. Weight and balance computation
   c. Aircraft performance
   d. Cross-country flight planning
   e. Weather briefing
   f. Pertinent Aviation Regulations (14 CFR § 1, 61 and 91)
   g. Areas selected by the Chief Flight Instructor
2. Flight check
   a. Cross-country flight operations
   b. Normal and emergency maneuvers chosen by the Chief Flight Instructor

COMPLETION STANDARDS

The student will demonstrate the knowledge and proficiency that meets or exceeds the minimum standards as outlined in the current FAA Rotorcraft-Helicopter Practical Test/ Airman Certification Standards for Private Pilot.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES

NOTES

NOTES

APPENDIX A
SCHOOL SAFETY PROCEDURES

1. Weather Minimums
   A. Dual Flights—At the discretion of the instructor.
   B. Solo Flights:
      i) Traffic Pattern—Ceiling 1,000 ft. AGL, visibility 3 mile
      ii) Cross-country—Ceiling 3,000 ft. AGL, visibility 5 miles
   C. Wind limitations—Each student will observe the following surface wind limitations as directed by his or her instructor:

NOT TO EXCEED	STUDENT INITIALS	INSTRUCTOR INITIALS
5 KTS	____________	____________
8 KTS	____________	____________
10 KTS	____________	____________
12 KTS	____________	____________
15 KTS	____________	____________

UNDER NO CIRCUMSTANCES ARE STUDENTS ALLOWED TO FLY SOLO IN WINDS IN EXCESS OF 15 KTS.

GUST SPREAD NOT TO EXCEED	STUDENT INITIALS	INSTRUCTOR INITIALS
5 KTS	____________	____________
8 KTS	____________	____________
10 KTS	____________	____________
12 KTS	____________	____________

2. All pilots shall avoid air taxiing over any surface which has any debris or litter which may be ingested into the main or tail rotors.
3. Smoking during preflight and refuelling is prohibited.
4. In the event of a precautionary landing notify ___________________ as soon as practical. The pilot in command is responsible for the aircraft until released by someone from ____________________________________.

5. Each pilot shall check squawk sheet prior to each flight. All discrepancies shall be recorded in the appropriate manner on the squawk sheet.
6. A fuel reserve of 30 minutes is required on all cross-country and solo flights.
7. Pilots will not fly at an altitude less than 500 ft above the highest obstacle unless necessary for takeoff and landings.
8. The following maneuvers will not be practiced without a flight instructor on board unless the instructor has completed #10 below:
   A. Autorotative descents of any kind
   B. Hovering autorotation
   C. Simulated engine failure – Forced landing
   D. Vortex Ring State Recovery
   E. Recovery from low RPM (R22/R44)
   F. Governor failure (R22/R44)
   G. Running landings
   H. Hydraulic off flight – (R44/R66)
   I. Slope Landings/takeoffs
9. A VFR flight plan must be filed for all solo cross-country flights. All day cross-country flights must terminate ½ hour prior to sunset.
10. The Following maneuvers must have instructors initials before pilot solo practice:

	STUDENT INITIALS	INSTRUCTOR INITIALS
A. Quick Stops	________	__________
B. Running Landings	________	__________
C. Confined Area Operations	________	__________
D. Pinnacle Operations	________	__________
E. Slope Landings/Takeoff	________	__________
F. Off Airport Landings	________	__________
1. ______________________	________	__________
2. ______________________	________	__________
3. ______________________	________	__________

All students must read and understand these requirements.
They are for your safety.

Signature:________________________________ Date:________________

FLIGHT TRAINING GUIDE
CHAPTER 4

R22/R44
PILOT QUALIFICATION SYLLABUS

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CHAPTER 4

R22/R44 PILOT QUALIFICATION SYLLABUS

CONTENTS

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ROBINSON HELICOPTER COMPANY

R22/R44 PILOT QUALIFICATION SYLLABUS

COURSE OBJECTIVES

The objective of this course is to qualify a helicopter pilot to act as pilot in command in the Robinson R22 or R44 helicopter. This course meets the experience and training requirements of FAA Special Federal Aviation Regulation (SFAR) 73.

COURSE COMPLETION STANDARDS

This course is successfully completed when the pilot passes the end of course written examination with a score of at least 80% and has satisfactorily completed the end of course flight evaluation. Standards found in the appropriate FAA Private/Commercial Practical Test Standards or foreign agency equivalent shall be used to determine satisfactory flight proficiency.

Pilots who have completed all ground and flight lessons in accordance with the completion standards are eligible for an instructor's endorsement to act as pilot in command. It is the instructor’s responsibility to ensure satisfactory knowledge and proficiency prior to issuing the endorsement. A recommended endorsement is provided at the end of chapter 1 of this guide.

COURSE PREREQUISITES

This course is intended for pilots who hold a rotorcraft—helicopter category/class rating on their pilot certificate.

COURSE CONTENT

This course consists of six hours of ground training and ten hours of flight training. In accordance with SFAR 73, R44 pilots may credit five hours R22 experience towards the 10-hour R44 requirement. This credit may come from previous experience or as a part of this course if conducted in an R22 (the remaining five hours would then have to be conducted in an R44). Ground training lesson times may be adjusted by the instructor based on individual student needs, however, flight training hours are the minimum and students may require additional time to meet proficiency requirements. The flight and ground training can be conducted concurrently but, for pilots holding a U.S. pilot certificate who have not received the Awareness Training required by SFAR 73, ground lesson 1A must be accomplished prior to manipulating the controls. For pilots who do not hold a U.S. pilot certificate ground and flight hours may be adjusted to meet foreign agency requirements.

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STUDENT PROGRESS REPORT

Name ____

Ground Training

Lesson	Date Completed	Instructor Initials
1A.	__________	_____
1B.	__________	_____
2.	__________	_____
3.	__________	_____
4.	__________	_____
5.	__________	_____

Flight Training

Lesson	Date Completed	Instructor Initials
1.	__________	_____
2.	__________	_____
3.	__________	_____
4.	__________	_____
5.	__________	_____

Written examination results __________ **Course completion date** ______________

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GROUND TRAINING

LESSON 1A 0.5 Hours

OBJECTIVES

During this lesson the Awareness Training required by SFAR 73 paragraph 2(a)(3)(i-v) for pilots holding a U.S. pilot certificate who have not previously received the training will be completed.

LESSON CONTENT

1. SFAR 73 familiarization
2. Awareness Training
   a. Energy Management
   b. Mast Bumping
   c. Low rotor RPM (rotor stall)
   d. Low-G hazards
   e. Rotor RPM decay

COMPLETION STANDARDS

The student will receive an instructor's logbook endorsement indicating completion of the required training.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 1B

1.5 Hours

OBJECTIVES

During this lesson the student will be introduced to the R22/R44 systems and components.

LESSON CONTENT

1. Main rotor system
   a. Type
   b. Blade construction
   c. Tri-hinge design
2. Tail rotor system
   a. Type
   b. Construction
   c. Airfoil
3. Powerplant
   a. Engine type
   b. Horsepower—normal/MCP/5 min
   c. How/why horsepower derating
   d. Governor system
4. Fuel system
   a. Quantity/type/color
   b. Fuel pumps (R44 II)
   c. Low fuel warning
5. Electrical system
   a. Battery
   b. Alternator
   c. Lighting systems
6. Hydraulic system (R44 series)
   a. Pump
   b. Servos
   c. Reservoir
7. Carburetor heat assist (R22, R44 I, and R44 cadet)
8. T-bar Cyclic
9. Optional equipment as appropriate

COMPLETION STANDARDS

This lesson will be complete when the student has gained an understanding of the R22/R44’s systems.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 2 — 2.0 Hours

OBJECTIVES

During this lesson the student will be introduced to the R22/R44 Pilot Operating Handbook and become familiar with its contents.

LESSON CONTENT

1. General
2. Limitations
3. Emergency procedures
4. Normal procedures
5. Performance
6. Weight & balance
7. Systems description
8. Handling and maintenance
9. Supplements (as appropriate)
10. Safety Information

COMPLETION STANDARDS

This lesson will be complete when the student has gained an understanding of the content and location of material in the appropriate Pilot's Operating Handbook. The student will be able to accurately calculate the aircraft weight & balance, determine proper performance parameters and become very familiar with the R22/R44's limitations/emergency procedures.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 3 — 1.5 Hours

OBJECTIVES

During this lesson the student will review general subject areas that historical data have shown to be major contributors to helicopter accidents. These subject areas should be covered as appropriate to the student's experience level and planned operations.

LESSON CONTENT

1. Proper preflight planning
   (Ref SNs 15, 26, & 43)
   a. Thorough preflight inspection
   b. Fuel/weather
   c. Performance planning (hot/high/ loading)
2. Carburetor ice
   (SN 25, & 31)
   a. Conditions conducive to ice
   b. Use of carb heat assist
   c. Calculating MP limits
3. Distractions
   (Ref SNs 16, 34, 36, 41 & 44)
   a. Continual scanning
   b. High workload missions (photo flights)
   c. Passengers
   d. Avionics
   e. Mobile phones
4. Low RPM
   (Ref SNs 10, 24 & 29)
   a. Causes
   b. Recognition
   c. Recovery
5. Low G and mast bumping
   (Ref SNs 11, 20, 29 & 32)
   a. Avoidance
   b. Recognition
   c. Recovery
6. Loss of outside visual reference
   (Ref SNs 18, 19 & 26)
   a. Seriousness of condition
   b. Night flight (marginal weather, poorly lit terrain, over water)
   c. Personal weather minimums
7. Vortex ring state
   (Ref SNs 22 & 34)
   a. Causes
   b. Recognition
   c. Vuichard/Traditional Recovery
8. Dynamic Rollover
   (Ref SN 9)

COMPLETION STANDARDS

This lesson will be complete when the student understands the importance of these areas in preventing helicopter accidents.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 4

0.5 Hour

OBJECTIVES

During this lesson the student will learn the proper R22/R44 preflight procedure.

LESSON CONTENT

1. Use of checklist
2. Preflight procedures
3. Cautions

COMPLETION STANDARDS

This lesson will be complete when the student can properly preflight an R22/R44.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 5 0.5 Hour

OBJECTIVES

During this lesson the student will complete the R22/R44 Qualification written examination.

LESSON CONTENT

1. Written examination
2. Test correction
3. Explanations

COMPLETION STANDARDS

The ground training will be complete when the student scores 80% on the written examination.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES:

NOTES:

FLIGHT TRAINING

LESSON 1 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to the normal flight maneuvers in the R22/R44. Touchdown autorotations will be at the discretion of the instructor considering the appropriate regulatory requirements.

LESSON CONTENT

1. Before engine starting
2. Engine starting
3. Engine run-up
4. Air work
   a. Straight & level
   b. Turns
   c. Climbs/descents
5. Hovering maneuvers
   a. Forward, rearward, sideward
   b. Hovering turns
6. Takeoffs
   a. To a hover
   b. Normal takeoff
   c. Maximum performance takeoff
7. Approaches
   a. Normal approach
   b. Steep approach
   c. Shallow approach
8. Landings
   a. From a hover
   b. Slope landings
   c. Running landings
9. Traffic patterns
10. Autorotations
    a. Straight in autorotations
       i) Power recovery
       ii) Touchdown (optional)
    b. Hovering autorotations
11. Low RPM recognition/recovery
12. RPM control without the use of the governor
13. Engine shutdown

COMPLETION STANDARDS

This lesson will be complete when the student understands and has piloted the helicopter through all of the normal flight maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 2 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to advanced autorotations, reacting to engine failures, vortex ring state recognition/recovery and, for R44 students, hydraulic OFF landings.

LESSON CONTENT

1. Review normal maneuvers from lesson one
2. 180° autorotations
3. Maneuvering in autorotation (enhanced autorotation procedures)
   a. Turns
   b. Varying airspeed
   c. Using pedals
4. Simulated engine failure
5. Vortex ring state
   a. Causes
   b. Recognition
   c. Vuichard/traditional recovery
6. Hydraulics OFF approach and landing (R44)

COMPLETION STANDARDS

This lesson will be complete when the student is proficient at each of the flight tasks listed.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 3 — 1.0 Hour

OBJECTIVES

This lesson will consist of operations without the use of the engine governor and a review of all maneuvers from lessons 1 and 2.

LESSON CONTENT

1. Governor OFF operations
   a. Air work
   b. Approach and landing
   c. Governor failure
2. Review all maneuvers as necessary and provide additional instruction in areas where proficiency is lacking.

COMPLETION STANDARDS

This lesson will be complete when the student is proficient at all maneuvers in the R22/R44.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 4 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to off airport operations in the R22/R44 and the importance of proper preflight planning.

LESSON CONTENT

1. Off airport operations
2. Proper preflight planning
   (Ref SNs 15, 26 & 43)

COMPLETION STANDARDS

At the completion of this lesson the student will be proficient at off airport operations in the R22/R44 and understand the importance of proper preflight planning.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING
LESSON 5 — 1.0 Hour

OBJECTIVES

The object of this lesson is for the instructor to determine the student's ability to safely act as pilot in command in an R22/R44. Use of the R22/R44 Pilot Qualification Flight Checklist may be helpful to the instructor.

LESSON CONTENT

1. All normal maneuvers (items 1 through 9 from lesson 1B)
2. Low RPM recognition and recovery
3. Autorotations
4. Vortex ring state—Vuichard/Traditional recovery
5. Governor OFF approach and landing
6. Hydraulics OFF approach and landing (R44)
7. Simulated engine failure

COMPLETION STANDARDS

At the completion of this lesson the student will demonstrate the ability to safely act as pilot in command in an R22 or R44. Standards found in the appropriate FAA Private/Commercial Practical Test/Airman Certification Standards or foreign agency equivalent shall be used to determine satisfactory flight proficiency.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES:

R22/R44 PILOT QUALIFICATION FLIGHT CHECKLIST

Pilot Name ______________ Instructor ____________ Date ______________

- ☐ Awareness training if applicable
- ☐ Engine starting/run-up
- ☐ Air work
- ☐ Hovering Maneuvers
- ☐ Takeoffs:
  - ☐ To a hover
  - ☐ Normal Takeoff
  - ☐ Maximum performance takeoff
- ☐ Approaches:
  - ☐ Normal approach
  - ☐ Steep approach
  - ☐ Shallow approach
  - ☐ Governor OFF/Failure
- ☐ Landings:
  - ☐ From a hover
  - ☐ Slope landing
  - ☐ Running Landing
  - ☐ Hydraulics OFF landing (R44)
- ☐ Autorotations—power recovery and/or touchdown:
  - ☐ Hovering autorotation
  - ☐ Straight-in
  - ☐ 180° Autorotation
  - ☐ Simulated engine failure
- ☐ Low RPM recognition/recovery
- ☐ Vortex ring state recovery:
  - ☐ Traditional
  - ☐ Vuichard
- ☐ Engine shut down

A recommended endorsement following completion of written examination and flight checklist is found at the end of Chapter 1 of this guide. It is the instructor's responsibility to insure satisfactory knowledge and proficiency prior to issuing the endorsement.

NOTES:

APPENDIX 1

R44 ASTRO/RAVEN I QUALIFICATION WRITTEN EXAMINATION

In an effort to maximize the student's familiarity with the use of the Pilot's Operating Handbook in locating information, the POH may be used during the test. As changes to the POH occur, test questions may not be updated in a timely manner; consequently, a current POH will take precedence.

1. The R44 Astro/Raven I engine is derated to:
   a. 210 BHP for maximum continuous power
   b. 225 BHP five minute takeoff power
   c. 250 BHP five minute takeoff power
   d. 195 BHP for maximum continuous power

2. The maximum gross weight is:
   a. 2000 lbs
   b. 2200 lbs
   c. 2600 lbs
   d. 2400 lbs

3. The Vne above 2200 lbs is:
   a. 130 KIAS
   b. 100 KIAS
   c. 120 KIAS
   d. 115 KIAS

4. The Vne in autorotation is:
   a. 100 KIAS
   b. 120 KIAS
   c. 130 KIAS
   d. 115 KIAS

5. When operating at power above maximum continuous power the Vne is:
   a. 120 KIAS
   b. 130 KIAS
   c. 110 KIAS
   d. 100 KIAS

6. The maximum weight per seat is:
   a. 240 lbs
   b. 300 lbs
   c. 260 lbs
   d. There is no limit

7. The power off rotor limits are:
   a. 90% – 108%
   b. 99% – 102%
   c. 97% – 108%
   d. 97% – 102%

8. Low-G cyclic pushovers are:
   a. Permitted at low airspeeds
   b. Prohibited
   c. Prohibited at weights above 2200 lbs
   d. Permitted at all airspeeds

9. It is acceptable to solo from the right and left seats.
   a. True
   b. False

10. Which of the following must be operative for flight:
    a. Heater
    b. Vertical speed indicator
    c. Alternator
    d. Cigarette lighter

11. The R44 fuel usable capacity is (assume bladder-style fuel tanks; fuel tanks without bladders should no longer be in service):
    a. 46.5 US gallons (176 liters)
    b. 50.1 US gallons (190 liters)
    c. 47.7 US gallons (180 liters)
    d. 43.9 US gallons (166 liters)

12. Maximum glide distance configuration is:
    a. 55 KIAS/97% rotor RPM
    b. 55 KIAS/90% rotor RPM
    c. 90 KIAS/97% rotor RPM
    d. 90 KIAS/90% rotor RPM

13. If a total loss of tail rotor thrust occurs, the pilot should:
    a. Reduce power and perform a running landing
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue normal flight

14. The low fuel warning light comes on when there is approximately ________ remaining:
    a. One gallon/5 minutes
    b. Two gallons/5 minutes
    c. Three gallons/10 minutes
    d. Four gallons/10 minutes

15. If the MR CHIP light comes on during flight and is accompanied by a grinding noise and increased vibration, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Continue flight
    d. Pull MR circuit breaker and continue flight

16. If the yellow clutch light comes on during flight and stays on for 10 seconds and the smell of hot rubber exists, the pilot should:
    a. Pull the clutch circuit breaker and land immediately
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue flight

17. If full carb heat is applied, the engine produces less horsepower at a given manifold pressure, therefore the pilot:
    a. Should recalculate manifold pressure limits using the CAT
    b. Should calculate manifold pressure limits using the OAT
    c. May add 1.5 inches to the manifold pressure limit
    d. May disregard the manifold pressure gauge since it's not accurate

18. The low RPM warning light and horn comes on at:
    a. 90%
    b. 95%
    c. 97%
    d. 100%

Questions 19 and 20 require the use of the Limit Manifold Pressure and Never Exceed Speed charts.

At a pressure altitude of 4000 ft, +10°C, & less than 2200 lbs gross weight

19. Find the 5 minute takeoff power:
    a. 23.8 inches
    b. 23.4 inches
    c. 24.7 inches
    d. 23.1 inches

20. Find the never exceed speed:
    a. 130 KIAS
    b. 120 KIAS
    c. 117 KIAS
    d. 126 KIAS

Questions 21 and 22 require the use of the IGE/OGE Hover Ceiling vs. Gross Weight charts; at a pressure altitude of 5000 ft and +10ºC

21. Find the maximum weight to hover IGE:
    a. 2200 lbs
    b. 2250 lbs
    c. 2300 lbs
    d. 2400 lbs

22. Find the maximum weight to hover OGE:
    a. 2180 lbs
    b. 2300 lbs
    c. 2400 lbs
    d. 2250 lbs

23. The R44 RPM governor is only active above:
    a. 80% rotor RPM
    b. 80% engine RPM
    c. 90% rotor RPM
    d. 90% engine RPM

24. The landing lights operate only when clutch is in the engage position.
    a. True
    b. False

25. The main rotor blades are made of
    a. Composite material
    b. Composite and metal.
    c. Metal
    d. Tight grained wood

R44 ASTRO/RAVEN I WRITTEN EXAMINATION

Answer Key

1. b
2. d
3. c
4. a
5. d
6. b
7. a
8. b
9. b
10. c
11. a
12. d
13. b
14. c
15. b
16. a
17. c
18. c
19. c
20. d
21. d
22. a
23. b
24. a
25. c

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APPENDIX 2

R44 RAVEN II QUALIFICATION WRITTEN EXAMINATION

In an effort to maximize the student's familiarity with the use of the Pilot's Operating Handbook in locating information, the POH may be used during the test. As changes to the POH occur, test questions may not be updated in a timely matter; consequently, a current POH will take precedence.

1. The R44 Raven II engine is derated to:
   a. 210 BHP for maximum continuous power
   b. 245 BHP five minute takeoff power
   c. 250 BHP five minute takeoff power
   d. 195 BHP for maximum continuous power

2. The maximum gross weight is:
   a. 2000 lbs
   b. 2200 lbs
   c. 2600 lbs
   d. 2500 lbs

3. The Vne above 2200 lbs is:
   a. 130 KIAS
   b. 100 KIAS
   c. 120 KIAS
   d. 115 KIAS

4. The Vne in autorotation is:
   a. 100 KIAS
   b. 120 KIAS
   c. 130 KIAS
   d. 115 KIAS

5. When operating at power above maximum continuous power the Vne is:
   a. 120 KIAS
   b. 130 KIAS
   c. 110 KIAS
   d. 100 KIAS

6. The maximum weight per seat is:
   a. 240 lbs
   b. 300 lbs
   c. 260 lbs
   d. There is no limit

7. The power off rotor limits are:
   a. 90% – 108%
   b. 99% – 102%
   c. 97% – 108%
   d. 97% – 102%

8. Low-G cyclic pushovers are:
   a. Permitted at low airspeeds
   b. Prohibited
   c. Prohibited at weights above 2200 lbs
   d. Permitted at all airspeeds

9. It is acceptable to solo from the right and left seats.
   a. True
   b. False

10. The following must be operative for flight:
    a. Heater
    b. Vertical speed indicator
    c. Alternator
    d. Cigarette lighter

11. The R44 II fuel usable capacity is (assume bladder-style fuel tanks; fuel tanks without bladders should no longer be in service):
    a. 46.5 US gallons (176 liters)
    b. 50.1 US gallons (190 liters)
    c. 47.7 US gallons (180 liters)
    d. 43.9 US gallons (166 liters)

12. Maximum glide distance configuration is:
    a. 55 KIAS/97% rotor RPM
    b. 55 KIAS/90% rotor RPM
    c. 90 KIAS/97% rotor RPM
    d. 90 KIAS/90% rotor RPM

13. If a total loss of tail rotor thrust occurs, the pilot should:
    a. Reduce power and perform a running landing
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue normal flight

14. The low fuel warning light comes on when there is approximately ________ remaining:
    a. One gallon/5 minutes
    b. Two gallons/5 minutes
    c. Three gallons/10 minutes
    d. Four gallons/10 minutes

15. If the MR CHIP light comes on during flight and is accompanied by a grinding noise and increased vibration, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Continue flight
    d. Pull MR circuit breaker and continue flight

16. If the yellow clutch light comes on during flight and stays on for 10 seconds and the smell of hot rubber exists, the pilot should:
    a. Pull the clutch circuit breaker and land immediately
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue flight

17. Using the height-velocity chart, 350 ft and 25 kts is:
    a. Inside the shaded area at sea level
    b. Outside the shaded area at sea level
    c. Recommended for takeoff
    d. Recommended for approach

18. The low RPM warning light and horn comes on at:
    a. 90%
    b. 95%
    c. 97%
    d. 100%

Questions 19 and 20 require the use of the Limit Manifold Pressure and Never Exceed Speed charts; at a pressure altitude of 6000 ft, +10ºC, & less than 2200 lbs gross weight

19. Find the 5 minute takeoff power:
    a. 21.0 inches
    b. 23.4 inches
    c. 23.8 inches
    d. 23.1 inches

20. Find the never exceed speed:
    a. 130 KIAS
    b. 120 KIAS
    c. 126 KIAS
    d. 117 KIAS

Questions 21 and 22 require the use of the IGE/OGE Hover Ceiling vs. Gross Weight charts; at a pressure altitude of 8000 ft and +30ºC

21. Find the maximum weight to hover IGE:
    a. 2200 lbs
    b. 2250 lbs
    c. 2300 lbs
    d. 2400 lbs

22. Find the maximum weight to hover OGE:
    a. 2100 lbs
    b. 2300 lbs
    c. 2400 lbs
    d. 2250 lbs

23. The R44 RPM governor is only active above:
    a. 80% rotor RPM
    b. 80% engine RPM
    c. 90% rotor RPM
    d. 90% engine RPM

24. The landing lights operate only when clutch is in the engage position.
    a. true
    b. false

25. The main rotor blades are made of:
    a. composite material
    b. composite and metal
    c. metal
    d. tight grained wood

R44 RAVEN II WRITTEN EXAMINATION

Answer Key

1. b
2. d
3. c
4. a
5. d
6. b
7. a
8. b
9. b
10. c
11. a
12. d
13. b
14. c
15. b
16. a
17. b
18. c
19. c
20. d
21. d
22. a
23. b
24. a
25. c

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APPENDIX 3

R44 CADET QUALIFICATION WRITTEN EXAMINATION

In an effort to maximize the student's familiarity with the use of the Pilot's Operating Handbook in locating information, the POH may be used during the test. As changes to the POH occur, test questions may not be updated in a timely matter; consequently, a current POH will take precedence.

1. The R44 Cadet engine is derated to:
   a. 205 BHP for maximum continuous power
   b. 210 BHP five minute takeoff power
   c. 200 BHP five minute takeoff power
   d. 195 BHP for maximum continuous power

2. The maximum gross weight is:
   a. 2000 lbs
   b. 2400 lbs
   c. 2600 lbs
   d. 2200 lbs

3. The Vne is:
   a. 130 KIAS
   b. 100 KIAS
   c. 120 KIAS
   d. 115 KIAS

4. The Vne in autorotation is:
   a. 100 KIAS
   b. 120 KIAS
   c. 130 KIAS
   d. 115 KIAS

5. When operating at power above maximum continuous power the Vne is:
   a. 120 KIAS
   b. 130 KIAS
   c. 110 KIAS
   d. 100 KIAS

6. The maximum weight per seat is:
   a. 240 lbs
   b. 300 lbs
   c. 260 lbs
   d. There is no limit

7. The power off rotor limits are:
   a. 90% – 108%
   b. 99% – 102%
   c. 97% – 108%
   d. 97% – 102%

8. Low-G cyclic pushovers are:
   a. Permitted at low airspeeds
   b. Prohibited
   c. Prohibited at weights above 2200 lbs
   d. Permitted at all airspeeds

9. It is acceptable to solo from the right and left seats.
   a. True
   b. False

10. Which of the following must be operative for flight:
    a. Heater
    b. Vertical speed indicator
    c. Alternator
    d. Cigarette lighter

11. The R44 Cadet usable fuel capacity is:
    a. 46.5 US gallons (176 liters)
    b. 50.1 US gallons (190 liters)
    c. 45.6 US gallons (166 liters)
    d. 43.9 US gallons (166 liters)

12. Maximum glide distance configuration is:
    a. 55 KIAS/97% rotor RPM
    b. 55 KIAS/90% rotor RPM
    c. 90 KIAS/97% rotor RPM
    d. 90 KIAS/90% rotor RPM

13. If a total loss of tail rotor thrust occurs, the pilot should:
    a. Reduce power and perform a running landing
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue normal flight

14. The low fuel warning light comes on when there is approximately ________ remaining:
    a. One gallon/5 minutes
    b. Two gallons/5 minutes
    c. Three gallons/10 minutes
    d. Four gallons/10 minutes

15. If the MR CHIP light comes on during flight and is accompanied by a grinding noise and increased vibration, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Continue flight
    d. Pull MR circuit breaker and continue flight

16. If the yellow clutch light comes on during flight and stays on for 10 seconds and the smell of hot rubber exists, the pilot should:
    a. Pull the clutch circuit breaker and land immediately
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue flight

17. If full carb heat is applied, the engine produces less horsepower at a given manifold pressure, therefore the pilot:
    a. Should recalculate manifold pressure limits using the CAT
    b. Should calculate manifold pressure limits using the OAT
    c. May add 1.5 inches to the manifold pressure limit
    d. May disregard the manifold pressure gage since it’s not accurate

18. The low RPM warning light and horn comes on at:
    a. 90%
    b. 95%
    c. 97%
    d. 100%

Questions 19 and 20 require the use of the Limit Manifold Pressure and Never Exceed Speed charts; at a pressure altitude of 4000 ft, +10°C

19. Find the 5 minute takeoff power:
    a. 21.3 inches
    b. 23.4 inches
    c. 23.3 inches
    d. 22.1 inches

20. Find the never exceed speed:
    a. 120 KIAS
    b. 112 KIAS
    c. 107 KIAS
    d. 116 KIAS

Questions 21 and 22 require the use of the IGE/OGE Hover Ceiling vs. Gross Weight charts; at a pressure altitude of 7000 ft and +20ºC

21. Find the maximum weight to hover IGE:
    a. 2100 lbs
    b. 2050 lbs
    c. 2150 lbs
    d. 2200 lbs

22. Find the maximum weight to hover OGE:
    a. 1970 lbs
    b. 2200 lbs
    c. 1900 lbs
    d. 1890 lbs

23. The R44 RPM governor is only active above:
    a. 80% rotor RPM
    b. 80% engine RPM
    c. 90% rotor RPM
    d. 90% engine RPM

24. The landing lights operate only when clutch is in the engage position.
    a. True
    b. False

25. The main rotor blades are made of:
    a. Composite material
    b. Composite and metal
    c. Metal
    d. Tight grained wood

R44 CADET WRITTEN EXAMINATION

Answer Key

1. b
2. d
3. c
4. a
5. d
6. b
7. a
8. b
9. b
10. c
11. a
12. d
13. b
14. c
15. b
16. a
17. c
18. c
19. c
20. d
21. d
22. a
23. b
24. a
25. c

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APPENDIX 4

R22 QUALIFICATION WRITTEN EXAMINATION

(Assume R22 Beta II)

In an effort to maximize the student's familiarity with the use of the Pilot's Operating Handbook in locating information, the POH may be used during the test. As changes to the POH occur, test questions may not be updated in a timely matter; consequently, a current POH will take precedence.

1. The R22 Beta II engine is derated to:
   a. 140 BHP for maximum continuous power
   b. 131 BHP five minute takeoff power
   c. 124 BHP five minute takeoff power
   d. 180 BHP for maximum continuous power

2. The maximum gross weight is:
   a. 1300 lbs
   b. 1350 lbs
   c. 1325 lbs
   d. 1370 lbs

3. The Vne is:
   a. 105 KIAS
   b. 100 KIAS
   c. 102 KIAS
   d. 90 KIAS

4. VFR operations at night are permitted without an operable landing light.
   a. False
   b. True
   c. True only when visibility exceeds 5 miles
   d. False if the pilot has a hand held flashlight

5. The maximum weight in each baggage compartment is:
   a. 25 lbs/11 kg
   b. 60 lbs/27 kg
   c. 30 lbs/14 kg
   d. 50 lbs/23 kg

6. The maximum weight per seat is:
   a. 250 lbs/114 kg
   b. 240 lbs/109 kg
   c. 260 lbs/118 kg
   d. There is no limit

7. The power off rotor limits are:
   a. 90% – 110%
   b. 99% – 102%
   c. 97% – 110%
   d. 97% – 102%

8. Low-G cyclic pushovers are:
   a. Permitted at low airspeeds
   b. Prohibited
   c. Prohibited at weights above 2200 lbs
   d. Permitted at all airspeeds

9. It is acceptable to solo from the right and left seats.
   a. True
   b. False

10. Which of the following must be operative for flight:
    a. Heater
    b. Vertical speed indicator
    c. Alternator
    d. Cigarette lighter

11. The R22 with bladder-style fuel tanks has a usable fuel capacity of:
    a. 26.3 US gallons (100 liters)
    b. 50.1 US gallons (190 liters)
    c. 29.7 US gallons (112 liters)
    d. 43.9 US gallons (165 liters)

12. Maximum glide distance configuration is:
    a. 75 KIAS/97% rotor RPM
    b. 55 KIAS/90% rotor RPM
    c. 53 KIAS/97% rotor RPM
    d. 75 KIAS/90% rotor RPM

13. If a total loss of tail rotor thrust occurs, the pilot should:
    a. Reduce power and perform a running landing
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue normal flight

14. The low fuel warning light (assume bladder-style tanks) comes on when there is approximately ________ remaining:
    a. Three gallon/7 minutes
    b. Two gallons/5 minutes
    c. One point five gallons/10 minutes
    d. Four gallons/10 minutes

15. If the MR CHIP light comes on during flight and is accompanied by a grinding noise and increased vibration, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Continue flight
    d. Pull MR circuit breaker and continue flight

16. If the yellow clutch light comes on during flight and stays on for 10 seconds and the smell of hot rubber exists, the pilot should:
    a. Pull the clutch circuit breaker and land immediately
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue flight

17. If full carb heat is applied, the engine produces less horsepower at a given manifold pressure, therefore the pilot:
    a. Should recalculate manifold pressure limits using the CAT
    b. Should calculate manifold pressure limits using the OAT
    c. May add 1.5 inches to the manifold pressure limit
    d. May disregard the manifold pressure gage since it's not accurate

18. The low RPM warning light and horn comes on at:
    a. 90%
    b. 95%
    c. 97%
    d. 100%

Questions 19 and 20 require the use of the Limit Manifold Pressure and Never Exceed Speed charts; at a pressure altitude of 4000 ft, +10ºC

19. Find the 5 minute takeoff power:
    a. 21.5 inches
    b. 23.4 inches
    c. 22.4 inches
    d. 22.1 inches

20. Find the never exceed speed:
    a. 102 KIAS
    b. 94 KIAS
    c. 90 KIAS
    d. 98 KIAS

Questions 21 and 22 require the use of the IGE/OGE Hover Ceiling vs. Gross Weight charts; at a pressure altitude of 7000 ft and +20ºC

21. Find the maximum weight to hover IGE:
    a. 1300 lbs
    b. 1450 lbs
    c. 1250 lbs
    d. 1370 lbs

22. Find the maximum weight to hover OGE:
    a. 1300 lbs
    b. 1275 lbs
    c. 1250 lbs
    d. 1370 lbs

23. The R22 RPM governor is only active above:
    a. 80% rotor RPM
    b. 80% engine RPM
    c. 90% rotor RPM
    d. 90% engine RPM

24. The landing lights operate only when clutch is in the engage position.
    a. True
    b. False

25. The main rotor blades are made of:
    a. Composite material
    b. Composite and metal
    c. Metal
    d. Tight grained wood

R22 WRITTEN EXAMINATION

Answer Key

1. b
2. d
3. c
4. a
5. d
6. b
7. a
8. b
9. b
10. c
11. a
12. d
13. b
14. c
15. b
16. a
17. c
18. c
19. c
20. d
21. d
22. a
23. b
24. a
25. c

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FLIGHT TRAINING GUIDE

CHAPTER 5

R66

PILOT QUALIFICATION SYLLABUS

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CHAPTER 5

R66 PILOT QUALIFICATION SYLLABUS

CONTENTS

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ROBINSON HELICOPTER COMPANY

R66 PILOT QUALIFICATION SYLLABUS

COURSE OBJECTIVES

The objective of this course is to qualify a helicopter pilot to act as pilot in command in the Robinson R66 helicopter.

COURSE COMPLETION STANDARDS

This course will be complete when the pilot passes the end of course written examination with a score of at least 80% and has satisfactorily completed the end of course flight evaluation. Standards found in the appropriate FAA Private/Commercial Practical Test Standards or foreign agency equivalent shall be used to determine satisfactory flight proficiency.

COURSE PREREQUISITES

This course is intended for pilots who hold a rotorcraft—helicopter category/class rating on their pilot certificate.

COURSE CONTENT

There are no US regulatory requirements for R66 qualification. However, Robinson recommends at least five hours dual instruction or at least three hours if the student has at least 150 hours turbine helicopter experience and 150 hours Robinson helicopter experience. This course consists of six hours of ground training and five hours of flight training. Ground and flight lesson times may be adjusted by the instructor based on individual student needs. The flight and ground training can be accomplished concurrently. Specific maneuver techniques are located in the R66 Maneuver Guide.

INSTRUCTOR RECOMMENDATIONS

There are no US regulatory requirements for flight instructors to be able to teach this R66 Qualification Course. However, Robinson recommends instructors have at least 200 hours in helicopters, 50 of which must be in a Robinson helicopter and 25 of which must be in an R66 or at least 400 hours dual instruction given in helicopters with at least 5 hours R66 experience.

TURBINE ENGINE SPECIAL EMPHASIS AREAS

In cases where the student transitioning into the R66 has little or no turbine engine helicopter experience, the training should emphasize the following areas where there is a marked difference in the procedures and techniques between turbine and piston powerplants.

Engine Starting:
Engine starting is much more critical in a turbine engine. Extensive damage can result if excessive measured gas temperatures (MGT) are allowed to occur during the start process (hot start). Pilots need to be very familiar and focused on the proper starting procedure. Factors such as battery voltage, fuel introduction, MGT limitations, and time between start attempts must be fully understood.

Practice Autorotation Entry:
The throttle reduction during the entry into a practice autorotation in the R66 is different than the R22 and R44. In the R22/R44, the collective is lowered full down, then the throttle is rolled off. In an R66, this technique could cause a rotor overspeed. The proper technique in the R66 is to first roll the throttle off, then lower the collective.

Power Recovery Procedure:
Pilots transitioning into the turbine-powered helicopter need to understand the lag in the engine response when conducting the power recovery portion of the practice autorotation. Due to this inherent lag, the power recovery maneuver must be started at a significantly higher altitude than with the piston engine. Additionally, the R66 throttle must be rolled full on before the collective is raised.

STUDENT PROGRESS REPORT

Name ____

Ground Training

Lesson	Date Completed	Instructor Initials
1.	___________	_____
2.	___________	_____
3.	___________	_____
4.	___________	_____
5.	___________	_____

Flight Training

Lesson	Date Completed	Instructor Initials
1.	___________	_____
2.	___________	_____
3.	___________	_____
4.	___________	_____
5.	___________	_____

Written examination results ___________ **Course completion date** _______________

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GROUND TRAINING

LESSON 1 — 1.5 Hour

OBJECTIVES

During this lesson the student will be introduced to the R66 systems and components.

LESSON CONTENT

1. Main rotor system
   a. type
   b. blade construction
   c. tri-hinge design
2. Tail rotor system
   a. type
   b. blade construction
   c. airfoil
3. Powerplant
   a. engine type
   b. turbine engine operation
   c. horsepower ratings
      i) normal rating
      ii) max continuous
      iii) 5 minute rating
   d. engine instruments
      i) measured gas temp (MGT)
      ii) torque
      iii) N1
      iv) N2
   e. engine anti-ice/cabin heat
   f. engine monitoring unit (EMU)
4. Fuel system
   a. quantity, type, color
   b. fuel pump/filter
   c. low fuel warning
   d. bladder-type fuel tank
5. Electrical system
   a. battery
   b. starter generator
   c. generator control unit
6. Hydraulic system
   a. pump
   b. servos
   c. reservoir
7. Annunciator panel
8. Optional equipment as appropriate

COMPLETION STANDARDS

This lesson will be complete when the student has gained an understanding of the R66's systems.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 2 — 2.0 Hours

OBJECTIVES

During this lesson the student will be introduced to the R66 Pilot Operating Handbook and become familiar with its contents.

LESSON CONTENT

1. General section
2. Limitations
3. Emergency procedures
4. Normal procedures
5. Performance
6. Weight & balance
7. Systems description
8. Handling and maintenance
9. Supplements (as appropriate)
10. Safety Information

COMPLETION STANDARDS

This lesson will be complete when the student has gained an understanding of the content and location of material in the R66 Pilot Operating Handbook. The student will be able to accurately calculate the aircraft weight & balance, determine proper performance parameters and become very familiar with the R66's limitations/emergency procedures

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 3 — 1.5 Hours

OBJECTIVES

During this lesson the student will review general subject areas that historical data have shown to be major contributors to helicopter accidents. These subject areas should be covered as appropriate to the student's experience level and planned operations.

LESSON CONTENT

1. Proper preflight planning
   (Ref SNs 15, 26, and 43)
   a. Thorough preflight inspection
   b. Fuel/weather
   c. Performance planning (hot/high/loading)
2. Avoiding hot starts
   (Ref Section 4, R66 POH)
   a. Causes
   b. Recognition
   c. Corrective action
3. Distractions
   (Ref SNs 16, 34, 36, 41 & 44)
   a. Continual scanning
   b. High workload missions (photo flights)
   c. Passengers
   d. Avionics
   e. Mobile phones
4. Low G and mast bumping
   (Ref SNs 11, 20, 29 & 32)
   a. Avoidance
   b. Recognition
   c. Recovery
5. Loss of outside visual reference
   (Ref SNs 18, 19 & 26)
   a. Seriousness of condition
   b. Night flight (marginal weather, poorly lit terrain, over water)
   c. Personal weather minimums
6. Vortex ring state
   (Ref SNs 22 & 34)
   a. Causes
   b. Recognition
   c. Vuichard/Traditional Recovery
7. Dynamic Rollover
   (Ref SN 9)

COMPLETION STANDARDS

This lesson will be complete when the student understands the importance of these areas in preventing helicopter accidents.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 4 — 0.5 Hour

OBJECTIVES

During this lesson the student will learn the proper R66 preflight procedure.

LESSON CONTENT

1. Use of checklist
2. Preflight procedures
3. Cautions

COMPLETION STANDARDS

This lesson will be complete when the student can properly preflight an R66.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

GROUND TRAINING

LESSON 5 0.5 Hour

OBJECTIVES

During this lesson the student will complete the R66 Qualification written examination.

LESSON CONTENT

1. Written examination
2. Test correction
3. Explanations

COMPLETION STANDARDS

This lesson and the ground training will be complete when the student scores 80% on the written examination.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES:

FLIGHT TRAINING

LESSON 1 — 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to the normal flight maneuvers in the R66. Touchdown autorotations will be at the discretion of the instructor considering the appropriate regulatory requirements.

LESSON CONTENT

1. Before engine starting
2. Engine starting
3. Engine run-up
4. Air work
   a. Straight & level
   b. Turns
   c. Climbs/descents
5. Hovering maneuvers
   a. Forward, rearward, sideward
   b. Hovering turns
6. Takeoffs
   a. To a hover
   b. Normal takeoff
   c. Maximum performance takeoff
7. Approaches
   a. Normal approach
   b. Steep approach
   c. Shallow approach
8. Landings
   a. From a hover
   b. Slope landings
   c. Running landings
9. Traffic patterns
10. Practice Autorotations
    a. Straight in autorotations
       i) Power recovery
       ii) Touchdown
    b. Hovering autorotations
11. Engine shutdown

COMPLETION STANDARDS

This lesson will be complete when the student has been introduced to the normal R66 flight maneuvers.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 2 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to advanced autorotations, reacting to engine failures, vortex ring state recognition/recovery, and hydraulic off landings.

LESSON CONTENT

1. Review normal maneuvers from lesson 1
2. 180° autorotations
3. Maneuvering in autorotation (enhanced autorotation procedures)
   a. Turns
   b. Varying airspeed
   c. Using pedals
4. Simulated engine failure (forced landing)
5. Vortex ring state
   a. Causes
   b. Recognition
   c. Vuichard/traditional recovery
6. Hydraulic OFF approach and landing

COMPLETION STANDARDS

This lesson will be complete when the student is proficient at each of the flight tasks listed.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 3 1.0 Hour

OBJECTIVES

This lesson will be a review of all maneuvers.

LESSON CONTENT

1. Review all maneuvers as necessary and provide additional instruction in areas where proficiency is lacking.

COMPLETION STANDARDS

This lesson will be complete when the student is proficient at all maneuvers in the R66.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 4 1.0 Hour

OBJECTIVES

During this lesson the student will be introduced to off airport operations in the R66 and the importance of proper preflight planning.

LESSON CONTENT

1. Off airport operations
2. Proper preflight planning
   (Ref SNs 15, 26 & 43)

COMPLETION STANDARDS

At the completion of this lesson the student will be proficient at off airport operations in the R66 and the importance of proper preflight planning.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

FLIGHT TRAINING

LESSON 5 — 1.0 Hour

OBJECTIVES

The object of this lesson is for the instructor to determine the student's ability to safely act as pilot in command in an R66. Use of the R66 Pilot Qualification Flight Checklist may be helpful to the instructor.

LESSON CONTENT

1. Normal maneuvers
2. Autorotations
3. Vortex ring state—Vuichard/Traditional Recovery
4. Hydraulics OFF landings

COMPLETION STANDARDS

At the completion of this lesson the student will demonstrate the ability to safely act as pilot in command in an R66. Standards found in the appropriate FAA Private/Commercial Practical Test Standards or foreign agency equivalent will be used to determine satisfactory flight proficiency.

INSTRUCTOR'S COMMENTS AND RECOMMENDATIONS:

NOTES:

R66 PILOT QUALIFICATION FLIGHT CHECKLIST

Pilot Name ______________ Instructor ____________ Date ______________

- ☐ Awareness training if applicable
- ☐ Engine starting/run-up
- ☐ Air work
- ☐ Hovering Maneuvers
- ☐ Takeoffs:
  - ☐ To a hover
  - ☐ Normal Takeoff
  - ☐ Maximum performance takeoff
- ☐ Approaches:
  - ☐ Normal approach
  - ☐ Steep approach
  - ☐ Shallow approach
- ☐ Landings:
  - ☐ From a hover
  - ☐ Slope landing
  - ☐ Running Landing
  - ☐ Hydraulics OFF landing
- ☐ Autorotations—power recovery and/or touchdown:
  - ☐ Hovering autorotation
  - ☐ Straight-in
  - ☐ 180° Autorotation
  - ☐ Simulated engine failure
- ☐ Vortex ring state recovery:
  - ☐ Traditional
  - ☐ Vuichard
- ☐ Engine shut down

A recommended endorsement following completion of written examination and flight checklist is found at the end of Chapter 1 of this guide. It is the instructor's responsibility to insure satisfactory knowledge and proficiency prior to issuing the endorsement.

NOTES:

APPENDIX 1

R66 PILOT QUALIFICATION WRITTEN EXAMINATION

In an effort to maximize the student's familiarity with the use of the Pilot's Operating Handbook in locating information, the POH may be used during the test. As changes to the POH occur, test questions may not be updated in a timely matter; consequently, a current POH will take precedence.

1. The R66's RR300 engine has a normal rating of 300 BHP but is derated to:
   a. 210 BHP for maximum continuous power
   b. 270 BHP five minute takeoff power
   c. 250 BHP five minute takeoff power
   d. 195 BHP for maximum continuous power

2. The maximum gross weight is:
   a. 2000 lbs
   b. 2200 lbs
   c. 2600 lbs
   d. 2700 lbs

3. The Vne above 2200 lbs is:
   a. 140 KIAS
   b. 100 KIAS
   c. 130 KIAS
   d. 115 KIAS

4. The Vne in autorotation is:
   a. 100 KIAS
   b. 120 KIAS
   c. 130 KIAS
   d. 115 KIAS

5. When operating at power above maximum continuous power (83% torque) the Vne is:
   a. 120 KIAS
   b. 130 KIAS
   c. 110 KIAS
   d. 65 KIAS

6. The maximum weight per seat is:
   a. 240 lbs
   b. 300 lbs
   c. 260 lbs
   d. There is no limit

7. The maximum MGT for starting is:
   a. 927° C
   b. 810° C
   c. 782° C
   d. 706° C

8. Low-G cyclic pushovers are:
   a. Permitted at low airspeeds
   b. Prohibited
   c. Prohibited at weights above 2200 lbs
   d. Permitted at all airspeeds

9. In a standard R66 configuration it is acceptable to solo from the right and left seats.
   a. True
   b. False

10. The torque limits are:
    a. 83% continuous/100% 5 minute limit
    b. 100% continuous/105% 5 minute limit
    c. 90% continuous/110% 5 minute limit
    d. 90% continuous/100% 5 minute limit

11. The R66 fuel usable capacity without the aux fuel tank installed is:
    a. 73.6 US gallons (279 liters)
    b. 50.1 US gallons (190 liters)
    c. 45.6 US gallons (176 liters)
    d. 65.2 US gallons (247 liters)

12. Maximum glide distance configuration is:
    a. 55 KIAS/97% rotor RPM
    b. 55 KIAS/90% rotor RPM
    c. 90 KIAS/97% rotor RPM
    d. 90 KIAS/90% rotor RPM

13. If a total loss of tail rotor thrust occurs, the pilot should:
    a. Reduce power and perform a running landing
    b. Immediately enter autorotation
    c. Land as soon as practical
    d. Continue normal flight

14. The low fuel warning light comes on when there is approximately _________ remaining:
    a. One gallon/6 minutes
    b. Two gallons/7 minutes
    c. Five gallons/10 minutes
    d. Four gallons/8 minutes

15. If the MR CHIP light comes on during flight and is accompanied by a grinding noise and an increase in vibration, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Continue flight
    d. Pull MR circuit breaker and continue flight

16. If the fuel filter light illuminates accompanied by erratic engine operation, the pilot should:
    a. Land as soon as practical
    b. Land immediately
    c. Land at the nearest airport
    d. Pull fuel filter circuit breaker

17. During starting the fuel cutoff knob should be pushed in at ___ N1:
    a. 5-10%
    b. Above 15%
    c. 20-25%
    d. 25%

18. The low RPM warning light and horn comes on at:
    a. 90%
    b. 95%
    c. 97%
    d. 100%

19. The Power Assurance Chart shows the:
    a. Max torque available
    b. Max MGT available
    c. Max MGT for a minimum specification engine to produce specified torque
    d. Minimum MGT for a minimum specification engine to produce specified torque

20. Find the never exceed speed at 8000 feet pressure altitude/+20° C below 2200 lbs:
    a. 140 KIAS
    b. 120 KIAS
    c. 117 KIAS
    d. 112 KIAS

Questions 21 and 22 require the use of the IGE/OGE Hover Ceiling vs. Gross Weight charts.

21. At a pressure altitude of 9000 ft, +10º C, anti-ice and cabin heat off, find the maximum weight to hover IGE:
    a. 2550 lbs/1159 kg
    b. 2600 lbs/1182 kg
    c. 2650 lbs/1205 kg
    d. 2700 lbs/1225 kg

22. At a pressure altitude of 10,000 ft, +0°C with engine anti-ice ON and cabin heat ON, find the maximum weight to hover OGE:
    a. 2250 lbs/1021 kg
    b. 2650 lbs/1202 kg
    c. 2450 lbs/1111 kg
    d. 2700 lbs/1225 kg

23. Using the Climb Performance Chart, find the climb rate at 5000' PA, max continuous MGT (706° C), +10° C, 2700 lbs, anti-ice and cabin heat off:
    a. 1050 ft/min
    b. 900 ft/min
    c. 1200 ft/min
    d. 1300 ft/min

24. The maximum baggage compartment weight is:
    a. 100 lbs/46 kg
    b. 300 lbs/136 kg
    c. 200 lbs/92 kg
    d. 400 lbs/182 kg

25. If the Engine Monitoring Unit (EMU) detects an exceedance, when the EMU test button is depressed the EMU segment light will:
    a. Flash 4 times per second
    b. Flash 1 time every 2 seconds
    c. Flash 1 time every 4 seconds
    d. Stay on until reset

R66 PILOT QUALIFICATION WRITTEN EXAMINATION

Answer Key

1. b
2. d
3. c
4. a
5. d
6. b
7. a
8. b
9. b
10. a
11. a
12. d
13. b
14. c
15. b
16. b
17. b
18. b
19. c
20. d
21. d
22. a
23. a
24. b
25. a

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FLIGHT TRAINING GUIDE
CHAPTER 6

FLIGHT REVIEW GUIDE

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CHAPTER 6

FLIGHT REVIEW GUIDE

CONTENTS

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ROBINSON HELICOPTER COMPANY'S

FLIGHT REVIEW GUIDE

For the Robinson R22, R44, and R66

PURPOSE

This guide is intended to be used by flight instructors to assist in conducting an effective flight review in accordance with U.S. regulatory requirements (reference 14 CFR § 61.56 and SFAR 73 as appropriate), Pilots' Operating Handbook requirements, and factory recommendations. Flight reviews conducted outside the US should be adjusted, as appropriate, to meet foreign agency review requirements. Both the flight instructor and pilot should understand that the flight review is not a test or checkride but rather recurrent training in which knowledge and proficiency are being evaluated and weak areas can be brought up to appropriate standards. This guide also provides tools that can be used by the flight instructor and pilot to develop a plan for a personal weather minimum, currency and proficiency program.

STRUCTURE

14 CFR § 61.56 states the flight review must consist of a minimum of one hour of ground instruction, which must include a review of the general operating rules of 14 CFR part 91, and one hour of flight instruction. It also states the flight maneuvers are determined by the flight instructor administering the review. In many instances, especially for pilots that do not fly on a regular basis, these times will not be adequate to properly evaluate a pilot's knowledge and proficiency and bring weak areas up to appropriate standards. Pilots and flight instructors should focus on conducting a beneficial and worthwhile review rather than on completing in the minimum time.

The guide is divided into three parts:

PART 1
A pre-review checklist for the instructor conducting the flight review.

PART 2
A guide for the conduct of both the flight and ground portion.

PART 3
A plan to develop a personal weather minimum, currency and proficiency program.

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PART 1
FLIGHT INSTRUCTOR'S PRE-REVIEW CHECKLIST

This checklist can be used by the instructor to gather preliminary pilot information to be used to construct his/her plan for the flight review. It should be completed by a discussion between the instructor and the pilot.

Name ______________________________

Contact info. Phone ______________ Email ______________________

Pilot certificates held ______________________________

Ratings held ______________________________

Total experience:

Total flight hours __________ Total helicopter hours ____________

Helicopter hours last six months _________

Average helicopter hours/month _________

Time since last flight review: _________ months/_________ flight hours

R22, R44 or R66 experience as appropriate:

Total time _________

Last six months _________

Average hours/month _________

Type of flying (circle as appropriate):

Pleasure

Business

Local

Cross Country

Night

Personal skills assessment by pilot:

Strengths as a pilot ______________________________

Areas for improvement ______________________________

Aviation goals ______________________________

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PART 2
FLIGHT REVIEW GUIDE

The Flight Review Guide is intended to act as a plan for the instructor to use to conduct a thorough flight review. Instructors should tailor the guide based on individual pilot experience, flight activities and location of the review.

GROUND REVIEW:

Regulatory Review—14 CFR part 91:

Subpart A—General
- ☐ 91.3 Pilot in command
- ☐ 91.13 careless/reckless operation
- ☐ 91.15 Dropping Objects
- ☐ 91.17 Alcohol or drugs

Subpart B—Flight Rules, General
- ☐ 91.103 Preflight action
- ☐ 91.107 Use of safety belts
- ☐ 91.111 Operator near other aircraft
- ☐ 91.113 Right of way rules
- ☐ 91.119 Minimum safe altitudes
- ☐ 91.123 Compliance with ATC
- ☐ 91.127—91.131 Airspace requirements
- ☐ 91.133 Restricted/prohibited areas
- ☐ 91.137 TFR disaster/hazard areas
- ☐ 91.141 TFR presidential
- ☐ 91.145 Operations around sporting events

Subpart B—Flight Rules, VFR
- ☐ 91.151 Fuel requirements
- ☐ 91.155/157 VFR/SVFR wx mins
- ☐ 91.159 VFR cruising altitude

Subpart C—Equipment
- ☐ 91.203 Aircraft certification req
- ☐ 91.205 Instrument/equipment req
- ☐ 91.209 Aircraft lights
- ☐ 91.213 Inoperative equipment
- ☐ 91.225 ADS-B equipment

Subpart E—Maintenance
- ☐ 91.405 Maintenance requirements
- ☐ 91.407 Operation after maintenance
- ☐ 91.409 Inspections
- ☐ 91.413 Transponder inspection
- ☐ 91.417 Maintenance records

Pilot's Operating Handbook:

- ☐ Limitations
- ☐ Emergency Procedures
- ☐ Normal Procedures
- ☐ Performance

PART 2
FLIGHT REVIEW GUIDE (cont'd)

GROUND REVIEW (cont'd)

Proper Preflight Planning:

☐ Weight & balance
☐ Route selection
☐ Weather collection
☐ Performance planning (hot/high/loading)
☐ Risk assessment
☐ Elements of a good passenger briefing (SN 44)

Special Emphasis Areas/Safety Tips & Safety Notices:

☐ Use of carburetor heat (R22/R44 I, SN 25)

☐ Avoiding hot starts (R66)
- Causes of hot starts
- Recognition
- Corrective actions

☐ Distractions in flight (SNs 16, 34, 36, 41, & 44)

☐ Low RPM rotor stall (SNs 10 & 24)

☐ Low G/Mast Bumping (SNs 11, 20, 29 & 31)
- Cause and avoidance
- Recognition and recovery
- Turbulence (SN 32)

☐ Loss of visual reference (SNs 18, 19, & 26)

☐ Vortex ring state (SNs 22 & 34)
- Causes and recognition
- Vuichard/traditional recovery

☐ Dynamic Rollover (Ref SN 9)

PART 2
FLIGHT REVIEW GUIDE (cont'd)

The appropriate Practical Test Standard/Airman Certification Standard (PTS/ACS) or foreign agency equivalent will be used to determine satisfactory flight proficiency. Specific maneuver techniques are located in the R22, R44 or R66 Maneuver Guide.

FLIGHT REVIEW:

☐ Engine starting/run-up
☐ Hovering maneuvers

Takeoffs:
☐ To a hover
☐ Normal takeoff
☐ Maximum performance takeoff

Landings:
☐ From a hover
☐ Slope landing
☐ Running landing
☐ Hydraulic off landing (R44/R66, optional)

Low RPM recovery (R22/R44):
☐ Recognition
☐ Recovery

Approaches:
☐ Normal approach
☐ Steep approach
☐ Shallow approach
☐ GOV off (R22/R44)

Autorotations:
☐ Straight-in
☐ 180° Autorotation
☐ Hovering Autorotation
☐ Simulated engine failure (forced landing)

☐ Vortex ring state recovery – Vuichard/traditional
☐ Engine shutdown

Endorsement templates are found at the end of Chapter 1 of this guide. It is the instructor's responsibility to insure satisfactory knowledge and proficiency prior to issuing the endorsement.

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PART 3
PERSONAL WEATHER MINIMUMS & PILOT CURRENCY/PROFICIENCY PLAN

Personal Weather Minimums:

One of the most useful things a pilot can do in aviation risk management is to develop, write down, and adhere to a set of personal weather minimums.

These minimums should be determined by the pilot, with the aid of an instructor, taking into account the pilot's experience, local weather patterns and terrain.

A study by the US Helicopter Safety Team found that 65% of helicopter fatal accidents due to flight into inadvertent IMC occurred at night. A pilot's need for night flight and the importance of night proficiency should be thoroughly discussed and, if a need to fly at night is determined, increased weather minimums should be selected.

Day:

Local Flights

Ceiling ______ feet
Visibility ______ miles
Wind ______ kts
Gust spread ______ kts

X-C flights

Ceiling ______ feet
Visibility ______ miles

Night:

Local Flights

Currency ____night hours every___days
Ceiling ______ feet
Visibility ______ miles
Wind ______ kts
Gust spread ______ kts

X-C flights

Ceiling ______ feet
Visibility ______ miles

Pilot Currency/Proficiency Plan:

Pilot proficiency is a "use it" or "lose it" skill. Pilots, especially new or lower time pilots, should develop personal aeronautical goals to maintain their knowledge and proficiency. A realistic plan, developed with the assistance of an instructor, should take into account the pilot's typical flight activities, experience level and goals.

1. A dual flight every ______ months (recommended at least every 4-6 months)
2. Number of flights per month ______ or number or hours per month ______
3. Number of night flights per month ______ or number of night hours per month ____
4. Number of hours per year ______
5. Number of X-C flights (more than 50 nm) per year ______
6. Attend ______ safety seminars per year
7. Review Pilot's Operating Handbook (POH) every ______ weeks (~ every 4-6 weeks)

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FLIGHT TRAINING GUIDE

CHAPTER 7

R22 MANEUVER GUIDE

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CHAPTER 7

R22 MANEUVER GUIDE

INTRODUCTION

The intention of this guide is to aid both the student and instructors while conducting training in the R22. It should be understood that because of the many variables in geographic location, altitudes, loading and individual instructor techniques, minor modifications to certain maneuvers might be necessary. For the purposes of training, the following parameters should be adhered to:

Normal Climb	60 kts @ 104% RPM
Normal Cruise	75 kts @ 102%–104% RPM
Hovering	5 feet @ 104% RPM
Takeoffs	104% RPM
Autorotative Descents	60–70 kts
Maximum Hover Speed—Forward	10 kts groundspeed
Maximum Hover Speed—Lateral/Rearward	5 kts groundspeed

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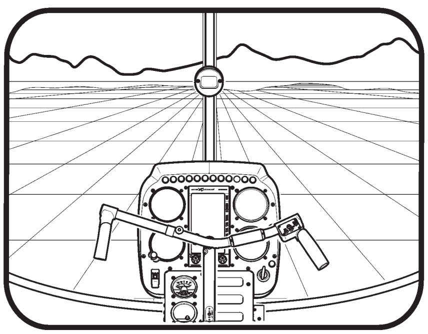
STRAIGHT AND LEVEL FLIGHT

PURPOSE:

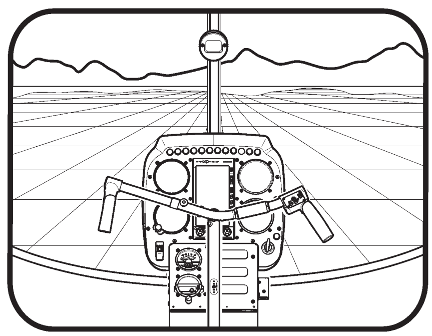
To fly the helicopter at a constant airspeed, altitude, and heading.

DESCRIPTION:

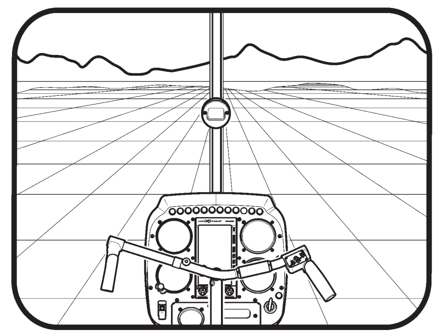
Attitude or pitch control with the cyclic is the most important aspect of straight and level flight. A level flight attitude is best determined by referencing the horizon with a fixed point in the cockpit, such as the magnetic compass or the tip path plane. The pilot will be able to detect changes in attitude by noting changes between the fixed point and the horizon. Airspeed is determined by attitude and controlled by the cyclic. As in all helicopters, the R22 cyclic control is very sensitive and requires very slight pressure to effect a change. Normal cruise airspeed for training is 75 KTS.



Level Flight Attitude
Constant Airspeed



Nose High Attitude
Airspeed Decreases



Nose Low Attitude
Airspeed Increases

Altitude is controlled primarily by the collective. Each collective movement will require a corresponding pedal adjustment to maintain the aircraft in trim. An increase of collective will require left pedal. A collective decrease will require right pedal. Additionally, when the collective is increased, the nose will tend to rise, requiring slight forward cyclic to maintain a level or cruise flight attitude. The opposite is true with a decrease in collective—the nose will move down—requiring a slight aft cyclic.

The governor will control RPM. However, should the governor fail, the RPM is correlated and few throttle adjustments will be required. High manifold pressure settings or high-density altitude conditions will require the pilot to maintain RPM with throttle, in the event of a governor failure. An increase in collective will require an increase in throttle to prevent low RPM. A decrease in collective will require a decrease in throttle to prevent high RPM.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

NORMAL CLIMBS AND DESCENTS

PURPOSE:

To change altitude at a controlled rate in a controlled attitude.

DESCRIPTION:

Climbs

For training purposes, climb airspeed is 60 KTS at 500 feet per minute rate of climb. From straight and level flight at 75 KTS, clear above the aircraft. Initiate the climb by increasing collective to climb power (manifold pressure setting which will provide a 500 ft/min climb at 60 KTS). The governor will maintain the RPM. Maintain aircraft trim with a slight amount of left pedal and apply aft cyclic to adjust the attitude to a “60 KT climb attitude". 50 feet prior to reaching the level-off altitude, begin the level off by lowering the nose to a 75 KT attitude with forward cyclic, decreasing the collective slowly to cruise power (manifold pressure setting for level flight at 75 KTS). Maintain aircraft trim with right pedal. Throughout the climb and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

Descents

For training purposes, descent airspeed is 60 KTS at 500 feet per minute rate of descent. From straight and level flight at 75 KTS, clear below the aircraft. Initiate the descent by decreasing collective to a manifold pressure setting that will provide a 500 feet per minute descent at 60 KTS. Maintain aircraft trim with a slight amount of right pedal, the governor will maintain the RPM. Apply aft cyclic to adjust the attitude to a "60 KT attitude". 50 feet prior to reaching the level-off altitude, begin the level off by increasing the collective slowly to cruise power. Maintain aircraft trim with left pedal. Apply forward cyclic to adjust the attitude to a level flight attitude. Throughout the descent and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Level-off Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TURNS

PURPOSE:

To turn the aircraft using a constant angle of bank at a constant airspeed and altitude.

DESCRIPTION:

From straight and level flight at 75 KTS, clear the aircraft in the direction of turn. Smoothly apply cyclic towards the direction of turn until the desired angle of bank is reached. Unlike an airplane, the pedals should not be used to assist the turn. Use the horizon as a reference to maintain a "75 KT attitude" and desired angle of bank with cyclic. As the angle of bank increases, additional collective may be required to maintain altitude. Keep the aircraft in trim with the pedals. Begin the recovery from the turn just prior to reaching the desired rollout heading. Apply cyclic opposite the direction of turn, and if any collective has been added during the turn, reduce it back to cruise power, while maintaining aircraft trim.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Roll out Heading	± 10°	± 5°

ACCELERATION / DECELERATION

PURPOSE:

To increase pilot control co-ordination. Maintaining a constant altitude, accelerate to 85 KTS, decelerate to 60 KTS, and then accelerate back to 75 KTS.

DESCRIPTION:

From straight and level flight at 75 KTS, slowly increase the collective approximately 2″ above cruise power, adding left pedal and forward cyclic. As the aircraft begins to accelerate, adjust cyclic, collective and pedals, (the governor will control the RPM) as necessary to stabilize at 85 KTS and level flight. Begin the deceleration by slowly reducing the collective co-coordinated with right pedal and aft cyclic. Again, use all controls slowly and smoothly as necessary to decelerate to 60 KTS and level flight. Accelerate back to 75 KTS by increasing collective to cruise power, left pedal and forward cyclic to attain level flight at 75 KTS.

Throughout the maneuver, a constant crosscheck of airspeed, altitude, attitude, RPM and trim must be maintained.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TAKEOFF TO A HOVER

PURPOSE:

To transition from the ground to a stabilized 5-foot hover.

DESCRIPTION:

After completing a pre-takeoff check, clear the helicopter left and right. With the collective full down and the cyclic and pedals neutralized, slowly increase the throttle. As the RPM passes 80%, the governor will activate and increase the RPM to 104%. Increase the collective and a small amount of left pedal will be required to compensate for the increased torque. As the helicopter becomes light on the skids, select a reference point 50 to 75 feet in front of the helicopter and neutralize all aircraft movement with the cyclic and pedals. Continue to increase the collective smoothly and slowly, maintaining heading with slight pedal corrections. Since the R22 normally hovers in a nose low attitude with two occupants, the heels of the skids will break ground first. Compensate with aft cyclic. As the helicopter becomes light on the skids, extreme caution must be used to avoid any rearward or lateral movement since this can cause an immediate rollover. Should any lateral or rearward movement occur, immediately lower the collective and begin again. The helicopter should rise vertically, maintaining heading with pedals, position over the ground with cyclic, and altitude with the collective. After attaining a stabilized 5-foot hover, perform hover check:

1. RPM—104%
2. Engine instruments—Green Range
3. Hover power—(Manifold Pressure)
4. Carb. Heat—As Necessary

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10º	± 5º
Position	10' Circle	5' Circle

LANDING FROM A HOVER

PURPOSE:

To land the helicopter from a 5-foot hover.

DESCRIPTION:

From a stabilized 5-foot hover, headed into the wind, slightly lower the collective to establish a slow rate of sink. A small amount of right pedal will be needed to maintain heading. The cyclic will be used to maintain position over the ground. Vision should be directed 50–75 feet in front of the helicopter. Do not look immediately in front of the helicopter, as this will lead to over controlling.

As the helicopter descends to about 6 inches, additional downward pressure on the collective may be necessary to overcome the increase in ground effect. As the skids make ground contact, neutralize all aircraft movement with cyclic and pedals, continuing to smoothly lower the collective until it is full down. Due to the nose low attitude of the R22 with two people aboard, the toes of the skids will normally touch first on level terrain. A slight amount of forward cyclic will be necessary as ground contact is made. During solo flight, the attitude of the R22 is level and will not require forward cyclic when ground contact is made.

CAUTION

Do not allow the helicopter to land with any rearward or sideward movement.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10º	± 5º
Drift	4 feet	2 feet

HOVERING FLIGHT

PURPOSE:

To maneuver the helicopter forward, sideward, rearward and turn the aircraft while hovering.

DESCRIPTION:

Forward, sideward and rearward flight

From a stabilized 5-foot hover, headed into the wind, move the cyclic smoothly towards the desired direction of flight. Maintain heading with small pedal corrections and altitude with collective. As movement begins, adjust the cyclic to keep the groundspeed at a constant rate equivalent to a normal walk. Reference points along the direction of flight can be used to maintain correct ground track. To stop the movement, apply cyclic opposite to the direction of movement until the helicopter stops. During all phases of hovering, cyclic changes should be small and smooth to minimize the effects of over controlling or pendular action.

Crosswind hovering is accomplished in much the same manner. The cyclic must be inclined into the wind enough to cancel out any tendency for the helicopter to drift.

Hovering Turns

Hovering turns are accomplished by use of the pedals. With the helicopter headed into the wind, apply pedal in the desired direction of turn. As the helicopter turns, counter pressures on the opposite pedal should be used to maintain a slow, constant rate of turn. (A rate of 360° in 15 seconds is recommended.)

Cyclic is used to control attitude and position over the ground and should be continually adjusted into the wind to avoid drifting and excessive attitude changes during the turn. Maintain a constant altitude with the collective. Normally, a slight altitude and RPM loss will occur in a left turn due to the increased pitch of the tail rotor blades. This can be corrected with a slight increase in collective and the governor will increase throttle if necessary. Right turns produce just the opposite effect. A decrease in the tail rotor pitch will cause a slight increase in RPM and altitude. If necessary, compensate by slightly lowering the collective and the governor will reduce throttle. As the desired heading is reached, stop the turn by applying slight pressure on the opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10°	± 5°
Ground Track	± 5 feet	± 3 feet

TRAFFIC PATTERN OPERATIONS

PURPOSE:

For training purposes, traffic pattern operations are used for the practice of continual takeoffs and landings.

DESCRIPTION:

Upwind Leg

After takeoff, assume a normal climb at 60 KTS. Upon reaching a predetermined point on the ground, begin a 90º turn to crosswind.

Crosswind Leg

Maintain ground track by crabbing the helicopter into the wind. 50 feet prior to reaching 500 feet AGL, begin a level-off by accelerating slowly to 75 KTS and reducing the power to cruise power. Upon reaching a predetermined point on the ground, begin a 90º turn to downwind.

Downwind Leg

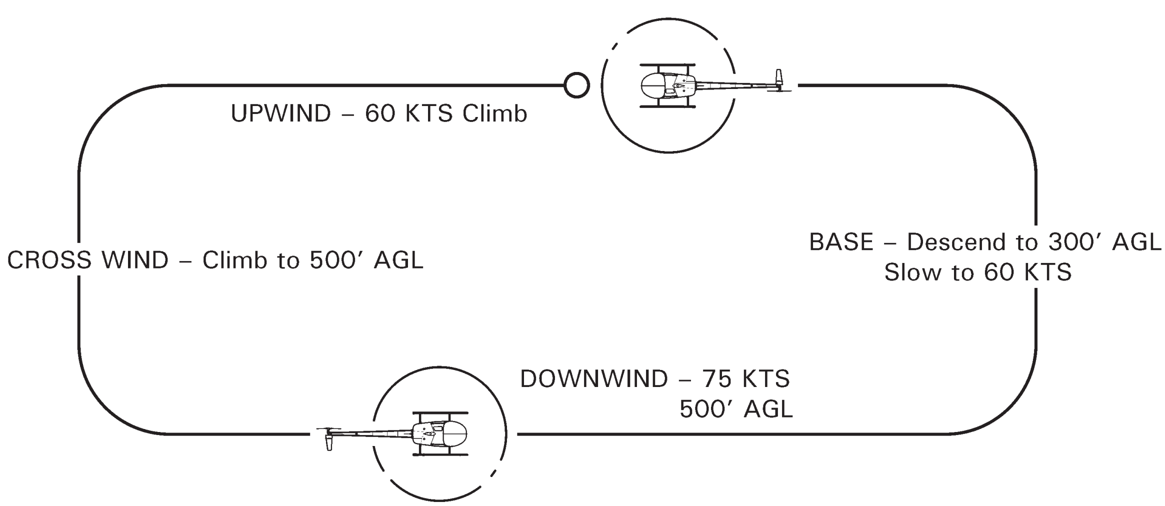
Groundspeed will increase due to the downwind condition. Fly the downwind leg at 75 KTS and 500 feet AGL using ground reference points to maintain ground track. Upon reaching a predetermined point on the ground, decrease the collective to establish a descent. Once the descent is established, begin a 90º turn and start decelerating to 60 KTS. This turn will require a steeper angle of bank due to the downwind condition.

Base Leg

On base, descend to 300 feet AGL and slow to 60 KTS. Plan the turn from base to final so as to roll out aligned with the point of intended touchdown.

Final

Fly the final approach leg at 60 KTS and 300 feet AGL until the appropriate approach angle is reached.



TRAFFIC PATTERN OPERATIONS (cont'd)

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet

NORMAL TAKEOFF FROM A HOVER

PURPOSE:

To transition from a hover to a normal climb.

DESCRIPTION:

From a stabilized 5-foot hover, select an object(s) along the takeoff path for use as a reference point to maintain ground track.

Clear the aircraft left and right with a clearing turn, then complete a before takeoff check (RPM 104%, warning lights, instruments and carb heat).

Begin the takeoff with a small amount of forward cyclic to get the helicopter moving forward. If the helicopter begins to settle, increase the collective as necessary to hold altitude and maintain heading with pedals.

As the airspeed increases to approximately 10–12 KTS, effective translational lift (ETL) will occur, and can be felt as a lateral vibration.

At ETL, lift will increase noticeably causing the nose to pitch up. Apply sufficient forward cyclic to continue the acceleration and prevent the nose from rising.

As airspeed increases, the streamlining of the fuselage and the increased efficiency of the tail rotor will cause a left yaw, requiring a right pedal correction. Continue to smoothly accelerate, maintaining ground track.

At an altitude of 300 feet and airspeed of 55 KTS, adjust manifold pressure to climb power and slight aft cyclic to establish a 60 KT climb attitude.

CROSSWIND CONSIDERATIONS:

During crosswind takeoffs, the helicopter is flown in a slip to an altitude of 50 feet. Place the cyclic into the wind as necessary to maintain the proper ground track. Apply opposite pedal to align the fuselage with the ground track. Above 50 feet, crab the helicopter into the wind by putting the aircraft in trim and maintaining ground track with cyclic.

NOTE

During the takeoff, the acceleration to climb speed and the commensurate altitude gain should be accomplished without entering the shaded areas of the R22's height-velocity diagram.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift below 10 feet	± 25 feet	± 10 feet
Drift above 10 feet	± 50 feet	± 25 feet

NORMAL APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a stabilized 5-foot hover.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a normal approach angle of 10° is intercepted, begin the approach by lowering the collective sufficiently to get the helicopter descending down the approach angle. With the decrease in collective, the nose will tend to pitch down, requiring the aft cyclic to maintain a 60 knot attitude and right pedal to maintain heading. The pilot can determine the proper approach angle by relating the point of intended touchdown to a point on the helicopter windshield. The collective controls the angle of approach. If the touchdown point seems to be moving up on the windshield, the angle is becoming shallower, necessitating a slight increase in collective. If the touchdown point moves down on the windshield, the approach angle is becoming steeper, requiring a slight decrease in collective. The cyclic is used to control the rate of closure or how fast you are moving toward the touchdown point.

Maintain entry airspeed until the apparent groundspeed and rate of closure appear to be increasing. At this point, slowly begin decelerating with slight aft cyclic, maintaining the approach angle by smoothly reducing the collective. Use the cyclic to maintain a rate of closure equivalent to a brisk walk. At approximately 25–40 feet, depending on wind, the helicopter will begin to lose effective translational lift. This loss will be felt as a lateral vibration and the aircraft will begin to settle. The pilot must anticipate the loss of ETL, and compensate with increased collective to maintain the approach angle, (the governor will maintain the RPM). The increase of collective will tend to make the nose rise requiring forward cyclic to maintain proper rate of closure. As the helicopter approaches an altitude of 5 feet, the collective should be increased sufficiently to hold a 5-foot hover, maintaining heading with pedals. A small aft cyclic input may be necessary to stop any forward movement.

CROSSWIND CONSIDERATIONS:

During the approach, maintain a crab into the wind and the aircraft in trim. At 50 feet of altitude, a slip should be used to align the fuselage with the ground track. Apply cyclic into the wind and opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift above 10 feet	± 50 feet	± 25 feet
Drift below 10 feet	± 25 feet	± 10 feet

MAXIMUM PERFORMANCE TAKEOFF AND CLIMB

PURPOSE:

To transition from the surface to a maximum performance climb, simulating obstruction clearance.

DESCRIPTION:

While on the ground at a reduced RPM, check the manifold pressure limit chart to determine the maximum takeoff power. Clear the aircraft left, right and overhead, then complete a before takeoff check (RPM 104%, Warning Lights, Instruments, and Carb Heat). Select a reference point(s) along the takeoff path to maintain ground track.

Begin the takeoff by getting the helicopter light on the skids. Pause and neutralize all aircraft movement. Slowly increase the collective and position the cyclic so as to break ground and maintain a 40 KT attitude (approximately the same attitude as when the helicopter is light on the skids). Continue to slowly increase the collective until the maximum takeoff power is reached. This large collective movement will require a substantial increase in left pedal to maintain heading. The governor will maintain the RPM.

At 50 feet of altitude, slowly lower the nose to a normal 60 KT climb attitude. As the airspeed passes 55 KTS, reduce the collective to normal climb power.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Power	-1"	-0.5"

STEEP APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a hover using a steeper than normal approach angle.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a steep approach angle of 15° is intercepted, begin the approach by lowering the collective to get the helicopter descending down the approach angle and coordinate right pedal for trim. Since this angle is steeper than a normal approach angle, the collective must be reduced more than for a normal approach. As in the normal approach, reference the touchdown point on the windshield to determine changes in the approach angle. Aft cyclic will be required to decelerate sooner than in a normal approach due to the steeper angle and the rate of closure will become apparent at a slightly higher altitude. Maintain a crab above 50 feet, and a slip below 50 feet.

Maintain the approach angle and rate of descent with collective, rate of closure with cyclic, and trim with pedals. Loss of ETL will occur higher during a steep approach requiring an increase in collective to prevent settling, forward cyclic for proper rate of closure, and left pedal for trim. Terminate at a stabilized 5-foot hover.

CAUTION

Avoid high rates of descent at airspeeds below 30 KTS.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Termination	± 10 feet	± 5 feet

STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter with a complete power loss.

DESCRIPTION:

The Entry

From level flight at 70–75 KTS, 500–700 feet AGL, and headed into the wind, smoothly, but firmly, lower the collective full down without reducing the throttle. Coordinate the collective movement with right pedal for trim and aft cyclic to maintain a 70 KT attitude. The RPM needles will usually split establishing an autorotative descent. If the needles do not split, reduce the throttle slightly. Crosscheck attitude, trim, rotor RPM and airspeed. With two occupants on-board anticipate an increase in RPM requiring an increase of collective.

The Glide

After descent has been established, slowly reduce the airspeed to 60–70 KTS and maintain this attitude throughout the glide. During straight-in autorotative glides, aft cyclic movements will cause an increase in rotor RPM which is controlled by a small increase in collective. If the collective is increased to control the rotor RPM, hold or retard the throttle slightly to prevent the governor from joining the needles. Avoid a large collective increase, which will result in a rapid decay of rotor RPM and lead to “chasing the RPM". Maintain RPM in the green (between 97% and 104% in the Beta II) and the aircraft in trim during the glide. Below 100 feet AGL, maintain the aircraft alignment with ground track with a slip. A constant 60–70 KT attitude should be held with the cyclic. Avoid looking straight down in front of the aircraft. Continually crosscheck attitude, trim, rotor RPM, and airspeed.

NOTE

Prior to the helicopter descending through 100 feet AGL, the instructor should make an immediate power recovery if the following three conditions do not exist:

1. **Rotor RPM stabilized between 97%–104% RPM.**
2. **Airspeed stabilized 60–70 KTS.**
3. **A normal rate of decent, usually less than 1500 FPM.**

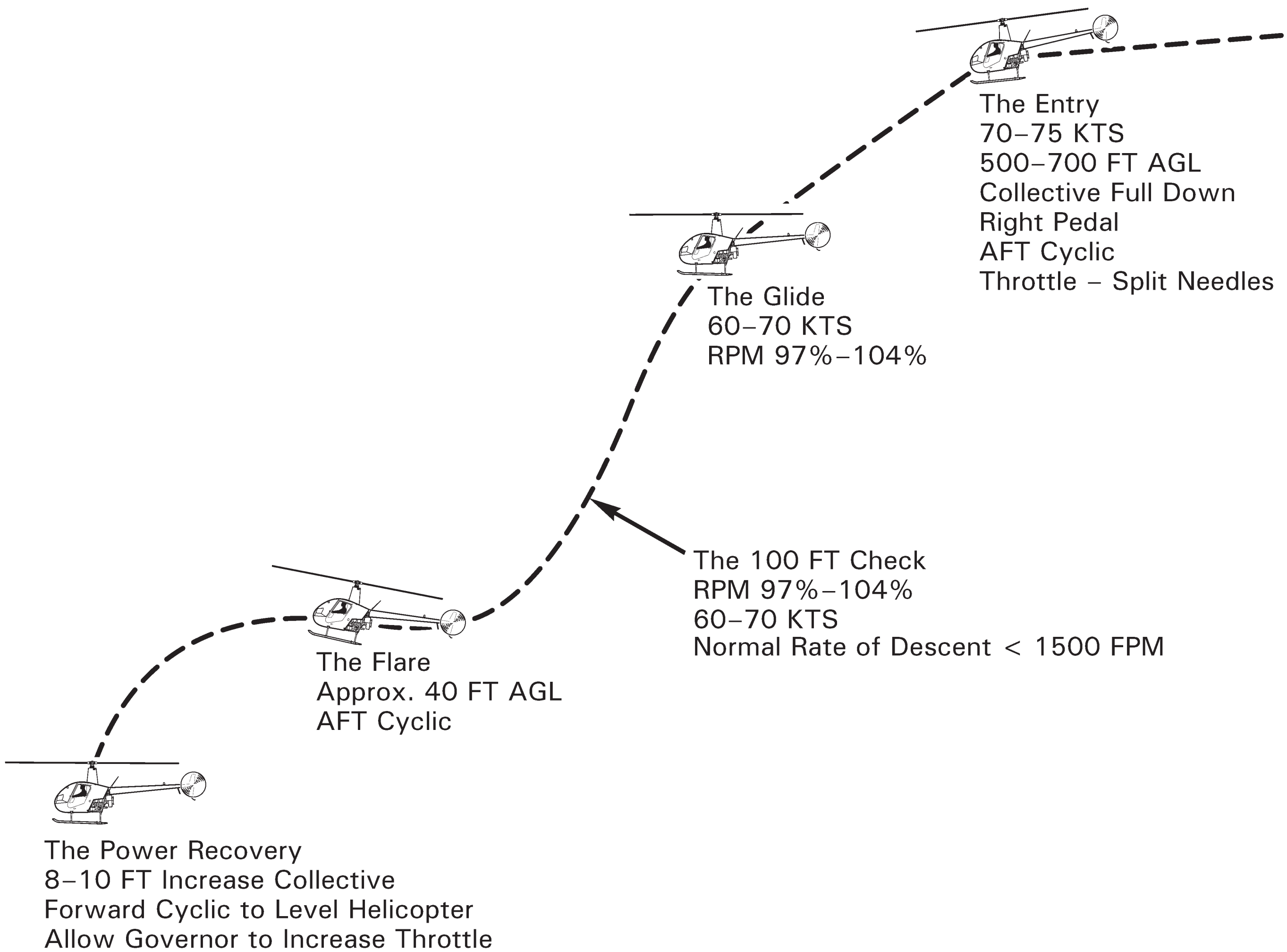
The Flare

At approximately 40 feet AGL, begin the flare with aft cyclic to reduce forward airspeed and decrease the rate of descent. The amount of flare will depend on wind conditions and gross weight, and should gradually be increased so that groundspeed and rate of descent are significantly decreased. Too much flare will cause the helicopter to balloon up causing a high vertical descent, as airspeed is lost.

STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY (cont'd)

The Power Recovery

At approximately 8 to 10 foot skid height, begin to level the helicopter with forward cyclic. Extreme caution should be used to avoid an excessive nose high/tail low attitude below 10 feet. Just prior to achieving a level attitude, with the nose still slightly up, increase the collective maintaining heading with left pedal. If the engine RPM is below 80% increase the throttle and allow the governor to increase the RPM to 104%. Do not allow the helicopter to descend below 5 feet during the power recovery.



PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	97%–104%	97%–104%
Airspeed	+ 10 KTS	± 5 KTS

180º AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter by turning 180º with a complete power loss.

DESCRIPTION:

The Entry

Establish the aircraft on downwind at 75 KTS and 700 feet AGL. When abeam the intended touchdown point, enter the autorotation by smoothly, but firmly, lowering the collective full down without reducing the throttle. Usually the needles will split establishing an autorotation. If the needles do not split, reduce the throttle slightly. Apply right pedal and aft cyclic to maintain the attitude. Crosscheck attitude, trim, rotor RPM, and airspeed.

The Glide / Turn

After the descent is established, apply aft cyclic to achieve a 60 to 70 KT attitude, then roll into a 180º turn. The proper angle of bank will be determined by wind velocity, but use caution to avoid an excessively steep turn, as this will increase the descent rate. Throughout the turn, it is important to maintain the proper attitude (airspeed) and keep the aircraft in trim. Changes in the aircraft's attitude and the angle of bank will cause corresponding increases and decreases in rotor RPM. Adjust the collective as necessary in the turn to maintain rotor RPM between 97%–104%. Continually crosscheck rotor RPM when maneuvering the R22 in autorotative turns as the low inertia rotor system can allow rapid increases in rotor RPM. The turn should be completed and the helicopter aligned with the intended touchdown area prior to passing through 100 feet AGL. If the collective has been increased to load the rotor during the turn, it may have to be lowered on roll out to prevent decay in RPM.

NOTE

Prior to the helicopter descending through 100 feet AGL, make an immediate power recovery if the following conditions do not exist:

1. **Aircraft aligned with the touchdown point (turn completed)**
2. **Rotor RPM stabilized between 97%–104%**
3. **Airspeed stabilized between 60–70 KTS**
4. **A normal rate of descent, usually less than 1500 FPM**

The Flare

Same as straight-in autorotation.

Power Recovery

Same as straight-in autorotation.

180º AUTOROTATION WITH POWER RECOVERY (cont'd)

PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	97%–104%	97%–104%
Airspeed	+ 10 KTS – 5 KTS	± 5 KTS

POWER FAILURE AT A HOVER—HOVERING AUTOROTATION

PURPOSE:

To simulate landing the helicopter from a hover with a complete power loss.

DESCRIPTION:

Begin from a stabilized 2–3 foot hover at 104% RPM, over level terrain and headed into the wind. If necessary, reposition the left hand so that the throttle can easily be rolled off into the override, leaving the governor on. Firmly roll the throttle into the spring-loaded override while simultaneously adding right pedal to maintain heading. The loss of tail rotor thrust will cause a left drift requiring a slight right cyclic correction. Use caution not to raise or lower the collective when rolling off the throttle. When the aircraft has settled to approximately 1 foot, fully increase the collective, holding the throttle firmly in the spring-loaded override, to cushion the landing. As the skids touch down, apply slight forward cyclic. Once firmly on the ground, lower the collective full down. Use caution to avoid any sideward or rearward movement on touchdown to prevent the possibility of a rollover.

If simulating a tail rotor failure at a hover, allow the helicopter to yaw a maximum of 90° to the right, then perform the hovering autorotation.

NOTE

Other than for a T/R failure at a hover, it is recommended that the instructor rolls the throttle off, then the student maintains heading with right pedal once the engine failure is detected.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown	Level	Level

POWER FAILURE AT ALTITUDE—FORCED LANDING

PURPOSE:

To teach the student how to recognize an engine failure, properly enter an autorotation, select a landing area and maneuver to it.

DESCRIPTION:

During cruise flight with the student at the controls; the instructor will initiate the forced landing by leaving the governor on and rolling the throttle smoothly to the idle position splitting the needles. The student will immediately lower the collective full down co-coordinated with the right pedal for trim, and aft cyclic to maintain attitude. This should be accomplished quickly enough to prevent the rotor RPM from decaying below 90%. As the rotor RPM builds back into the green, increase collective as necessary to maintain rotor RPM between 97%–104%. The instructor will control the throttle to prevent the governor from joining the needles. Once established in an autorotative descent, select an intended landing area. Maneuver the helicopter as necessary to align the aircraft with the intended landing area, generally headed into the wind. Use increases in the collective and/or forward cyclic to prevent the rotor from over speeding while maneuvering. Airspeed should be adjusted to 60–70 KTS.

Prior to passing through 100 feet, the aircraft should be aligned with the touchdown area, at 60–70 KTS, rotor RPM between 97%–104%, and in trim. Execute a power recovery and transition to normal climb.

NOTE

The instructor should apply the recommendations contained in Safety Notice #27.

PERFORMANCE STANDARDS:

	Private	Commercial
RPM on Entry	Above 90%	Above 90%
Airspeed	+10 KTS – 5 KTS	+5 KTS
Area Selection	Suitable	Suitable

RAPID DECELERATION (QUICK STOP)

PURPOSE:

To simulate a condition when a rapid decrease in forward airspeed is required as in an aborted takeoff.

DESCRIPTION:

Perform a normal takeoff into the wind. Once a minimum altitude of 25 feet is attained, apply additional forward cyclic to accelerate to 40–50 KTS while maintaining altitude. Begin the quick stop by smoothly lowering the collective, adding right pedal, and simultaneously applying aft cyclic to decelerate. Apply aft cyclic as needed to maintain entry altitude throughout the deceleration. As airspeed is lost, the helicopter will begin to settle. Slowly increase the collective to control the rate of descent adding forward cyclic to level the helicopter. Maintain heading with pedals. Terminate at a stabilized 5-foot hover. Use caution to avoid terminating at a high hover or in an extreme tail low attitude.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Altitude	± 15 feet	± 10 feet
Termination Point	± 50 feet	± 25 feet

SHALLOW APPROACH AND RUNNING LANDING

PURPOSE:

To simulate an approach and landing when sufficient power for hovering is not available.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind at 60 KTS and 300 feet AGL. When a shallow approach angle of 5° is intercepted, begin the approach by lowering the collective to maintain the approach angle. Maintain entry airspeed until apparent rate of closure and groundspeed appear to be increasing. Begin a slow deceleration with aft cyclic, maintaining approach angle by reducing collective and the aircraft in trim. Plan to arrive at the point of intended touchdown at or slightly above effective translational lift. Prior to ground contact, insure that the helicopter is in a level attitude. After ground contact, maintain heading with pedals and slowly lower the collective for braking action allow the governor to maintain RPM (do not squeeze the throttle inhibiting the governor) until the helicopter comes to a complete stop.

Crosswind Considerations:

As in normal and steep approach, crab the helicopter above 50 feet AGL, and use a slip below 50 feet AGL to align the aircraft with the ground track.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown Point	± 50 feet	± 25 feet
Manifold Pressure	Less than hover power	

SLOPE OPERATIONS

PURPOSE:

To land from a hover and takeoff to a hover from a sloping surface.

DESCRIPTION:

Prior to conducting slope operations, the pilot must be thoroughly familiar with dynamic rollover characteristics and mast bumping. For training, use a maximum slope angle of 5°.

Slope Landings:

Position the helicopter cross slope at a stabilized 5-foot hover headed into the wind. Lower the collective slightly to establish a slow rate of sink. When upslope skid contacts the ground, begin applying lateral cyclic in the direction of the slope (upslope) to hold the skid against the slope. Maintain heading with pedals. Continue to apply cyclic into slope as the collective is lowered until the down slope skid is firmly on the ground. Once the collective is full down, center the cyclic to allow safe “head clearance” on the upslope side.

Slope Takeoffs:

The procedure for a slope takeoff is almost the exact reverse of that for a slope landing. Apply cyclic into the slope (upslope) and slowly begin to increase the collective. As the helicopter becomes light on the skids, pause and neutralize any aircraft movement. Continue to increase the collective maintaining heading with pedals. When the down slope skid breaks ground, slowly begin to center the cyclic. As a level attitude is reached, the cyclic should be approximately neutral. Continue to increase collective, maintaining position over the ground with cyclic and heading with pedals until a stabilized 5-foot hover is attained.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°

RECOGNITION AND RECOVERY FROM LOW ROTOR RPM

PURPOSE:

To become thoroughly familiar with the recognition of low rotor RPM and the techniques of recovery. Prior to performing this maneuver, the pilot should be familiar with RHC Safety Notices #10 and #24.

DESCRIPTION:

Cruise flight, takeoff & approach

A) Entry and Recognition

During cruise flight, takeoffs and approaches, at 104% RPM, the instructor will, turn the governor off, then slowly decrease the throttle to 95% RPM. The low RPM condition will be recognized by:

1. A noticeable decrease in engine noise.
2. Aircraft vibrations and cyclic stick shake especially at higher airspeeds.
3. The low rotor RPM warning horn and light at approximately 97% RPM.

The instructor should demonstrate the further increase in vibration and decrease in engine noise by decreasing the RPM to 92% RPM.

B) Recovery Technique

Upon recognizing the low RPM condition, simultaneously add throttle and lower the collective half inch to one inch to regain operating RPM. Larger collective movements will require additional throttle due to the correlator. A gentle aft cyclic movement will prevent the nose from going down and inhibiting the recovery, but the primary recovery controls are the collective and throttle. Avoid any forward cyclic input, which will inhibit RPM recovery. Once RPM is regained, slowly raise the collective to reduce the sink rate, while closely monitoring the RPM.

At a Hover

During hovering flight at 104% RPM, the instructor will turn the governor off and slowly decrease the throttle to 95% RPM. Note the obvious decrease in engine noise and the tendency for the aircraft to settle back toward the ground. As the aircraft settles, the tendency for some pilots will be to increase the collective to stop the descent. This may only increase the RPM decay and increase the descent. Recovery is the same as in forward flight. Lower the collective simultaneously adding throttle. If RPM cannot be regained prior to ground contact, insure that the helicopter touches down in a level attitude.

PERFORMANCE STANDARDS:

The pilot should be able to recognize and recover from low rotor RPM prior to reaching 90% RPM.

VORTEX RING STATE

PURPOSE:

To demonstrate the dangerous results of operating at low airspeeds, moderate to high power settings, and high rates of sink.

DESCRIPTION:

Settling with power is most dangerous when it happens at relatively low altitudes. The most common condition is during a steep approach with a tailwind. It should be demonstrated at an altitude of at least 1000 feet AGL.

To enter a maneuver, adjust the power to approximately 5″ below hover power. Hold altitude with aft cyclic until the airspeed approaches 20 kts. Allow the sink rate to increase to 300 FPM or more as the attitude is adjusted to obtain airspeed of less than 10 KTS. The aircraft will begin to shudder. Application of additional up collective will increase the vibration and sink rate. Once the condition is well developed, rate of sink in excess of 2000 FPM can result. Recovery should be initiated at the first sign. The maneuver can also be entered from an OGE hover.

To recover, apply forward cyclic to increase airspeed and simultaneously reduce the collective. When the airspeed indication indicates 20–30 KTS and the trim strings have become effective, increase the collective to the 5 minute takeoff limit and adjust the cyclic to a maximum performance climb attitude. The recovery is completed when the VSI reads 0.

Another recovery technique is called the Vuichard Recovery after an FOCA inspector in Switzerland. Initiate the recovery by increasing the collective to takeoff power, simultaneously applying left pedal to maintain heading and right cyclic (10°–15° bank) to get lateral movement. Once the right side of the rotor disc reaches the upwind part of the vortex the recovery is completed. Average loss of altitude during the recovery is 20–50 feet depending on the duration of the recovery procedure.

PERFORMANCE STANDARDS:

The pilot must thoroughly understand and recognize the settling with power conditions and be able to safely recover.

ENHANCED AUTOROTATION PROCEDURES (Required by SFAR 73)

PURPOSE:

To understand the different elements that can be used to maneuver the helicopter in autorotation. This training is only recommended for students who hold at least a private pilot certificate.

DESCRIPTION:

Each element will be discussed. Once the student has an understanding of the elements, one or more can be combined in one autorotative glide.

Use of turns

Left, right or "S" turns can be used to decrease the glide distance in autorotation. It is important to maintain proper attitude and trim when turning to prevent increased descent rates. Adjust the collective as necessary in the turn to maintain rotor RPM between 97%–104%. A large turn (270°–360°) is not recommended since for much of the turn the pilot will lose sight of the landing area and will be unable to determine the effect of wind on the glide.

Use of airspeed

Airspeeds from zero to max glide airspeed (75 kts in an R22) can be used to adjust the autorotative glide distance as necessary. Maximum glide distance configuration is covered later in this maneuver so this discussion concerns reducing airspeed. It is recommended an entry altitude of 1500–2000 feet AGL be used so the student can get an extended time flying at the lower speeds in autorotation. Enter the autorotation so that a normal glide will take the helicopter well past the point of intended landing thus requiring a shortened glide distance. Once the glide is established apply aft cyclic to a 10°–15° nose high attitude. Adjust the collective as necessary to control increases in rotor RPM. At approximately 25–30 kts the nose of the aircraft will come down to a level attitude due to the upward flow of air acting on the tail cone and horizontal stabilizer. Maintain this configuration and observe the landing area moving up on the windshield. When a normal autorotative angle is achieved or approaching 500 feet AGL, lower the nose to 10°–15° nose down to increase airspeed back to the normal autorotative speed of 60–70 kts.

Use of pedals

Set the maneuver up at 1500–2000 feet AGL with the point of intended landing and the wind 90° from the helicopter's ground track (out the left or right door). Since the left pedal is the strong pedal in autorotation, it is recommended the landing area be positioned out the left door requiring left pedal to turn. However, the student should experience use of both pedals. Enter the autorotation and slow the airspeed as in the "Use of airspeed" maneuver. Once the nose comes down to the level attitude, apply pedal to align the aircraft with the desired track towards the landing area. Use of left pedal will decrease the rotor RPM requiring the pilot to lower the collective as necessary to maintain the rotor RPM. (cont'd)

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Use of pedals (cont'd)

The remainder of the maneuver is the same as the "Use of airspeed" discussion.

Use of sideward flight

The purpose of using sideward flight in an autorotative glide is when the point of intended landing is almost directly below the helicopter. Set up the condition with the wind 90° (left or right) from the aircraft's ground track at 1500–2000 feet. Enter the autorotation directly over or just prior to the intended landing area. Decrease the airspeed as in the "Use of airspeed" maneuver. When the nose comes down to the level attitude apply lateral cyclic in the direction of the desired sideward flight and opposite pedal to prevent the aircraft from weathervaning towards the direction of flight. The resulting slip and wind direction will move the helicopter downwind from the landing area. Once the helicopter is far enough away from the landing area stop the sideward flight with opposite cyclic. Opposite pedal is then applied (as in the "use of pedal" maneuver) to align the aircraft into the wind tracking towards the landing area and lower the nose to regain airspeed. Again, left pedal is the strong pedal in autorotation, so sideward flight to the right, requiring the use of left pedal is the easier of the two sideward flight directions.

NOTE

When using the above techniques to maneuver in autorotation the nose must be lowered to regain airspeed no lower than 500 ft AGL. Below 500 ft AGL use only turns to maneuver.

Maximum Glide Distance Configuration

In FAR Part 27 approved helicopters the maximum glide distance configuration is found in the Pilot's Operating Handbook (POH). It is 75 kts/90% rotor RPM in the R22. The purpose in practicing this maneuver is not only to glide the furthest distance in autorotation, but also, to get the pilot accustomed to the low RPM warning system being on for extended periods and developing the pilot's ability to determine if a glide will be "to long" or "to short". Enter the autorotation at 1500–2000 feet to give the student an extended time to fly at the max glide configuration. Adjust the airspeed to 75 kts and increase the collective to set the rotor RPM at 90% (the low RPM horn/ light will be on the entire time the RPM is below 95%). It's very important to keep the aircraft in trim during the entire glide. While at the max glide configuration reference any movement of the point of intended landing up or down on the windshield. If the landing area moves up, the glide will not reach the area and a new area should be selected. If the landing area begins to move down, then the glide will take the aircraft past the area so exit the max glide configuration. Allow the rotor RPM to build back into the normal range below 500 ft.

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Minimum Rate of Descent Configuration

The minimum rate of descent configuration is 53 kts/90% rotor RPM in the R22. The purpose of practicing this maneuver is not only to autorotate at the slowest descent rate, but also, to practice performing another procedure such as an air restart or mayday call while still flying the helicopter in autorotation. Enter the autorotation at 1500–2000 feet. After establishing an autorotative glide simultaneously apply aft cyclic to slow the helicopter to the appropriate airspeed and increase the collective to bring the rotor RPM down to 90%. Realize that these two control inputs compete with each other, in that the aft cyclic tends to increase the RPM while the pilot is trying to reduce the RPM with the collective. First, build proficiency establishing and maintaining the minimum rate of descent configuration then add performing a simulated air restart or mayday call into the autorotation. Return to the normal airspeed and rotor RPM prior to descending below 500 ft AGL.

HOVER OUT-OF-GROUND EFFECT (OGE)

PURPOSE:

To hover the helicopter out-of-ground effect (OGE), perform 90° hovering turns and properly descend to an in-ground-effect hover (IGE) over a predetermined spot. Recommended minimum OGE hover altitude for training is 50 feet.

DESCRIPTION:

NOTE
It is recommended this maneuver only be performed with an instructor at one set of controls.

The OGE hover can be initiated from the ground or at the termination of an approach. In both cases, proper performance planning needs to be accomplished to insure OGE capability by using the OGE Hover Ceiling vs Gross Weight chart in the Pilot's Operating Handbook and the IGE hover check referenced below.

From the Ground:

Headed into the wind, select at least two outside visual reference points (trees, poles etc.) that will aid in controlling aircraft drift during the maneuver; one point at the 12 o'clock position and one approximately 90° in the direction of the intended turn. These points should be a minimum distance from the helicopter of at least twice the intended hover altitude. Any additional reference points that are available can be used to fine tune position over the ground. Perform a takeoff to a 2 foot IGE hover and complete a hover check to confirm available power. The maneuver should not be attempted unless the IGE hover manifold pressure is 2 inches below the maximum takeoff power (5 minute) limit or 2 inches below full throttle at higher altitudes.

Begin the ascent to an OGE hover by increasing the collective, maintain heading with the pedals and crosscheck both reference points. The lateral reference is especially important to control the common tendency of forward drift during the ascent and descent. Once established at an OGE hover, check power and effects of any difference in wind speed or direction. Use the outside reference points to control drift over the ground and altitude.

It is recommended to begin with a left pedal turn to evaluate the amount of tail rotor thrust available. Since it takes more thrust to stop a right pedal turn, do not attempt a right pedal turn if thrust during the left turn appears marginal. Prior to beginning the turn, clear the area in both directions and anticipate the effect of the wind during the turn. Begin the turn with the appropriate pedal and maintain a slow, steady turning rate. Avoid high turn rates especially with right pedal turns. Stop the turn at the 90° point, stabilize the hover using the reference points then slowly begin a turn in the opposite direction terminating at the original position (heading).

Begin the descent by lowering the collective, maintaining position over the ground with the cyclic. Again, avoid the tendency to drift forward during the descent. Using outside references, maintain a slow, steady descent rate. (cont'd)

HOVER OUT-OF-GROUND EFFECT (OGE) (cont'd)

Terminate the descent at an IGE hover over a predetermined spot or continue to the ground.

From an approach:

On final insure the aircraft is headed into the wind then establish a 5° shallow approach angle to a predetermined spot on the ground. During the last 200 feet begin to slow the closure rate to lose ETL while avoiding a descent rate greater than 300 ft/min. Prior to establishing an OGE hover over the predetermined spot, select the forward and lateral reference points. It is recommended that initially the student be familiar with the predetermined spot on the ground and the reference points and then move to unfamiliar areas.

Once established in an OGE hover over the predetermined spot, proceed as explained in "From the Ground".

CAUTION
Throughout the maneuver avoid gripping the throttle tightly which can override the governor and cause a low RPM condition.

Once proficiency in the above conditions is achieved, demonstration/student practice at altitudes above 500 feet AGL will reinforce the importance of proper reference and aircraft control.

RISK MANAGEMENT:

- Understand the risk of operating in the shaded area of the height/velocity diagram.
- Avoid excessive descent rates to prevent entry into the vortex ring state.
- Focus on the need for left pedal to anticipate the loss of tail rotor effectiveness (LTE)
- Be aware of operations near full throttle to avoid a low RPM condition.
- Monitor engine temperature, pressure and power limits to avoid an exceedance.
- Avoid unnecessary distractions during the maneuver.

PERFORMANCE STANDARDS:

	Private	Commercial
Position over ground	No FAA Private Pilot standards established. RHC recommends training to Commercial standards.	± 10 ft
OGE hover altitude		± 5 feet
Heading		± 5°
Descent Rate		Safe

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FLIGHT TRAINING GUIDE

CHAPTER 8

R44 MANEUVER GUIDE

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CHAPTER 8

R44 MANEUVER GUIDE

INTRODUCTION

The intention of this guide is to aid both the student and instructors while conducting training in the R44. It should be understood that because of the many variables in geographic location, altitudes, loading and individual instructor techniques, minor modifications to certain maneuvers might be necessary. For the purposes of training, the following parameters should be adhered to:

Normal Climb	60 kts @ 102% RPM
Normal Cruise	90–110 kts @ 102% RPM
Hovering	5 feet @ 102% RPM
Takeoffs	102% RPM
Autorotative Descents	60–70 kts
Maximum Hover Speed—Forward	10 kts groundspeed
Maximum Hover Speed—Lateral/Rearward	5 kts groundspeed

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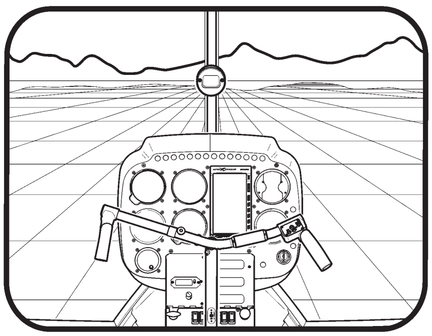
STRAIGHT AND LEVEL FLIGHT

PURPOSE:

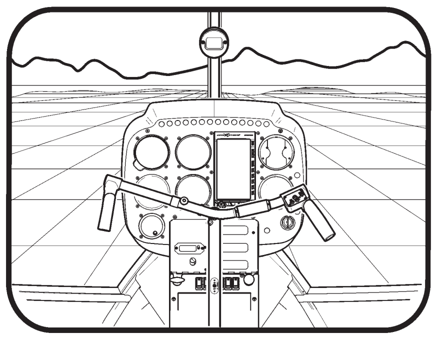
To fly the helicopter at a constant airspeed, altitude, and heading.

DESCRIPTION:

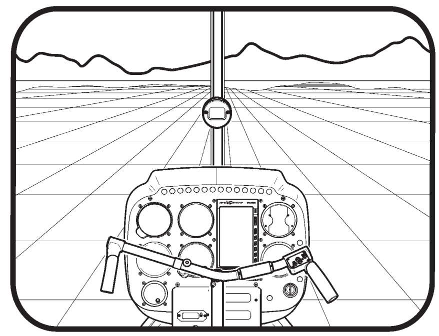
Attitude or pitch control with the cyclic is the most important aspect of straight and level flight. A level flight attitude is best determined by referencing the horizon with a fixed point in the cockpit, such as the magnetic compass or the tip path plane. The pilot will be able to detect changes in attitude by noting changes between the fixed point and the horizon. Airspeed is determined by attitude and controlled by the cyclic. As in all helicopters, the R44 cyclic control is very sensitive and requires very slight pressure to



Level Flight Attitude
Constant Airspeed



Nose High Attitude
Airspeed Decreases



Nose Low Attitude
Airspeed Increases

effect a change. Normal cruise airspeed for training is 90 KTS.
Altitude is controlled primarily by the collective. Each collective movement will require a corresponding pedal adjustment to maintain the aircraft in trim. An increase of collective will require left pedal. A collective decrease will require right pedal. Additionally, when the collective is increased, the nose will tend to rise, requiring slight forward cyclic to maintain a level or cruise flight attitude. The opposite is true with a decrease in collective—the nose will move down, requiring a slight aft cyclic.

The governor will control RPM. However, should the governor fail, the RPM is correlated and few throttle adjustments will be required. High manifold pressure settings or high-density altitude conditions will require the pilot to maintain RPM with throttle, in the event of a governor failure. An increase in collective will require an increase in throttle to prevent low RPM. A decrease in collective will require a decrease in throttle to prevent high RPM.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

NORMAL CLIMBS AND DESCENTS

PURPOSE:

To change altitude at a controlled rate in a controlled attitude.

DESCRIPTION:

Climbs

For training purposes, climb airspeed is 60 KTS at 500 feet per minute rate of climb. From straight and level flight at 90 KTS, clear above the aircraft. Initiate the climb by increasing collective to climb power (manifold pressure setting which will provide a 500 ft/min climb at 60 KTS). The governor will maintain the RPM. Maintain aircraft trim with a slight amount of left pedal and apply aft cyclic to adjust the attitude to a "60 KT climb attitude". 50 feet prior to reaching the level-off altitude, begin the level off by lowering the nose to a 90 KT attitude with forward cyclic, decreasing the collective slowly to cruise power (manifold pressure setting for level flight at 90 KTS). Maintain aircraft trim with right pedal. Throughout the climb and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

Descents

For training purposes, descent airspeed is 60 KTS at 500 feet per minute rate of descent. From straight and level flight at 90 KTS, clear below the aircraft. Initiate the descent by decreasing collective to a manifold pressure setting that will provide a 500 feet per minute descent at 60 KTS. Maintain aircraft trim with a slight amount of right pedal, the governor will maintain the RPM. Apply aft cyclic to adjust the attitude to a "60 KT attitude". 50 feet prior to reaching the level-off altitude, begin the level off by increasing the collective slowly to cruise power. Maintain aircraft trim with left pedal. Apply forward cyclic to adjust the attitude to a level flight attitude. Throughout the descent and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Level-off Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TURNS

PURPOSE:

To turn the aircraft using a constant angle of bank at a constant airspeed and altitude.

DESCRIPTION:

From straight and level flight at 90 KTS, clear the aircraft in the direction of turn. Smoothly apply cyclic towards the direction of turn until the desired angle of bank is reached. Unlike an airplane, the pedals should not be used to assist the turn. Use the horizon as a reference to maintain a "90 KT attitude" and desired angle of bank with cyclic. As the angle of bank increases, additional collective may be required to maintain altitude. Keep the aircraft in trim with the pedals. Begin the recovery from the turn just prior to reaching the desired rollout heading. Apply cyclic opposite the direction of turn, and if any collective has been added during the turn, reduce it back to cruise power, while maintaining aircraft trim.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Roll out Heading	± 10º	± 5º

ACCELERATION / DECELERATION

PURPOSE:

To increase pilot control co-ordination. Maintaining a constant altitude, accelerate to 110 KTS, decelerate to 60 KTS, and then accelerate back to 90 KTS.

DESCRIPTION:

From straight and level flight at 90 KTS, slowly increase the collective approximately 2″ above cruise power, adding left pedal and forward cyclic. As the aircraft begins to accelerate, adjust cyclic, collective and pedals, (the governor will control the RPM) as necessary to stabilize at 110 KTS and level flight. Begin the deceleration by slowly reducing the collective co-coordinated with right pedal and aft cyclic. Again, use all controls slowly and smoothly as necessary to decelerate to 60 KTS and level flight. Accelerate back to 90 KTS by increasing collective to cruise power, left pedal and forward cyclic to attain level flight at 90 KTS.

Throughout the maneuver, a constant crosscheck of airspeed, altitude, attitude, RPM and trim must be maintained.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TAKEOFF TO A HOVER

PURPOSE:

To transition from the ground to a stabilized 5-foot hover.

DESCRIPTION:

After completing a pre-takeoff check, clear the helicopter left and right. With the collective full down and the cyclic and pedals neutralized, slowly increase the throttle. As the RPM passes 80%, the governor will activate and increase the RPM to 102%. Increase the collective and a small amount of left pedal will be required to compensate for the increased torque. As the helicopter becomes light on the skids, select a reference point 50 to 75 feet in front of the helicopter and neutralize all aircraft movement with the cyclic and pedals. Continue to increase the collective smoothly and slowly, maintaining heading with slight pedal corrections. Since the R44 normally hovers in a nose high attitude with two occupants, the toes of the skids will break ground first. Compensate with forward cyclic. As the helicopter becomes light on the skids, extreme caution must be used to avoid any rearward or lateral movement since this can cause an immediate rollover. Should any lateral or rearward movement occur, immediately lower the collective and begin again. The helicopter should rise vertically, maintaining heading with pedals, position over the ground with cyclic, and altitude with the collective. After attaining a stabilized 5-foot hover, perform hover check:

1. RPM—102%
2. Engine instruments—Green Range
3. Hover power (Manifold Pressure)
4. Carb Heat (if installed)—As Necessary

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10º	± 5º
Position	10′ Circle	5′ Circle

LANDING FROM A HOVER

PURPOSE:

To land the helicopter from a 5-foot hover.

DESCRIPTION:

From a stabilized 5-foot hover, headed into the wind, slightly lower the collective to establish a slow rate of sink. A small amount of right pedal will be needed to maintain heading. The cyclic will be used to maintain position over the ground. Vision should be directed 50–75 feet in front of the helicopter. Do not look immediately in front of the helicopter, as this will lead to over controlling.

As the helicopter descends to about 6 inches, additional downward pressure on the collective may be necessary to overcome the increase in ground effect. As the skids make ground contact, neutralize all aircraft movement with cyclic and pedals, continuing to smoothly lower the collective until it is full down. Due to the nose high attitude of the R44 with two people aboard, the heels of the skids will normally touch first on level terrain. A slight amount of aft cyclic will be necessary as ground contact is made.

CAUTION

Do not allow the helicopter to land with any rearward or sideward movement.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10º	± 5º
Drift	4 feet	2 feet

HOVERING FLIGHT

PURPOSE:

To maneuver the helicopter forward, sideward, rearward and turn the aircraft while hovering.

DESCRIPTION:

Forward, sideward and rearward flight

From a stabilized 5-foot hover, headed in to the wind, move the cyclic smoothly towards the desired direction of flight. Maintain heading with small pedal corrections and altitude with collective. As movement begins, adjust the cyclic to keep the groundspeed at a constant rate equivalent to a normal walk. Reference points along the direction of flight can be used to maintain correct ground track. To stop the movement, apply cyclic opposite to the direction of movement until the helicopter stops. During all phases of hovering, cyclic changes should be small and smooth to minimize the effects of over controlling or pendular action.

Crosswind hovering is accomplished in much the same manner. The cyclic must be inclined into the wind enough to cancel out any tendency for the helicopter to drift.

Hovering Turns

Hovering turns are accomplished by use of the pedals. With the helicopter headed into the wind, apply pedal in the desired direction of turn. As the helicopter turns, counter pressures on the opposite pedal should be used to maintain a slow, constant rate of turn. (A rate of 360° in 15 seconds is recommended.)

Cyclic is used to control attitude and position over the ground and should be continually adjusted into the wind to avoid drifting and excessive attitude changes during the turn. Maintain a constant altitude with the collective. Normally, a slight altitude and RPM loss will occur in a left turn due to the increased pitch of the tail rotor blades. This can be corrected with a slight increase in collective and the governor will increase throttle if necessary. Right turns produce just the opposite effect. A decrease in the tail rotor pitch will cause a slight increase in RPM and altitude. If necessary, compensate by slightly lowering the collective and the governor will reduce throttle. As the desired heading is reached, stop the turn by applying slight pressure on the opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10°	± 5°
Ground Track	± 5 feet	± 3 feet

TRAFFIC PATTERN OPERATIONS

PURPOSE:

For training purposes, traffic pattern operations are used for the practice of continual takeoffs and landings.

DESCRIPTION:

Upwind Leg

After takeoff, assume a normal climb at 60 KTS. Upon reaching a predetermined point on the ground, begin a 90º turn to crosswind.

Crosswind Leg

Maintain ground track by crabbing the helicopter into the wind. 50 feet prior to reaching 500 feet AGL, begin a level off by accelerating slowly to 75 KTS and reducing the power to cruise power. Upon reaching a predetermined point on the ground, begin a 90º turn to downwind.

Downwind Leg

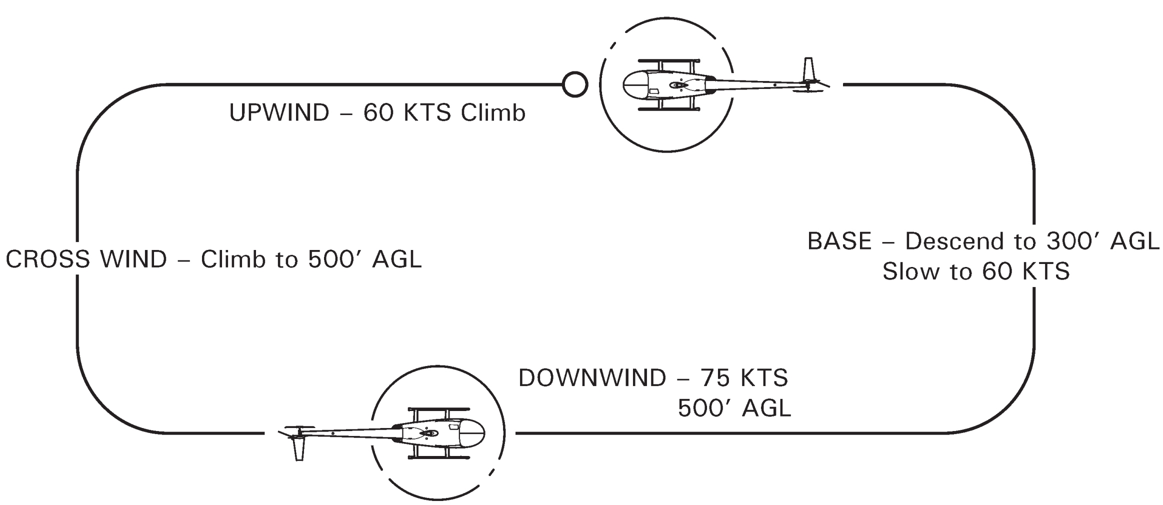
Groundspeed will increase due to the downwind condition. Fly the downwind leg at 75–90 KTS (depending on the size of the pattern) and 500 feet AGL using ground reference points to maintain ground track. Upon reaching a predetermined point on the ground, decrease the collective to establish a descent. Once the descent is established, begin a 90º turn and start decelerating to 60 KTS. This turn will require a steeper angle of bank due to the downwind condition.

Base Leg

On base, descend to 300 feet AGL and slow to 60 KTS. Plan the turn from base to final so as to roll out aligned with the point of intended touchdown.

Final

Fly the final approach leg at 60 KTS and 300 feet AGL until the appropriate approach angle is reached.



TRAFFIC PATTERN OPERATIONS (cont'd)

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet

NORMAL TAKEOFF FROM A HOVER

PURPOSE:

To transition from a hover to a normal climb.

DESCRIPTION:

From a stabilized 5-foot hover, select an object(s) along the takeoff path for use as a reference point to maintain ground track.

Clear the aircraft left and right with a clearing turn, then complete a before takeoff check (RPM 102%, warning lights, instruments and carb heat, if installed).

Begin the takeoff with a small amount of forward cyclic to get the helicopter moving forward. If the helicopter begins to settle, increase the collective as necessary to hold altitude and maintain heading with pedals.

As the airspeed increases to approximately 10–12 KTS, effective translational lift (ETL) will occur, and can be felt as a lateral vibration.

At ETL, lift will increase noticeably causing the nose to pitch up. Apply sufficient forward cyclic to continue the acceleration and prevent the nose from rising.

As airspeed increases, the streamlining of the fuselage and the increased efficiency of the tail rotor will cause a left yaw, requiring a right pedal correction. Continue to smoothly accelerate, maintaining ground track.

At an altitude of 300 feet and airspeed of 55 KTS, adjust manifold pressure to climb power and slight aft cyclic to establish a 60 KT climb attitude.

CROSSWIND CONSIDERATIONS:

During crosswind takeoffs, the helicopter is flown in a slip to an altitude of 50 feet. Place the cyclic into the wind as necessary to maintain the proper ground track. Apply opposite pedal to align the fuselage with the ground track. Above 50 feet, crab the helicopter into the wind by putting the aircraft in trim and maintaining ground track with cyclic.

NOTE

During the takeoff, the acceleration to climb speed and the commensurate altitude gain should be accomplished without entering the shaded areas of the R44's height-velocity diagram.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift below 10 feet	± 25 feet	± 10 feet
Drift above 10 feet	± 50 feet	± 25 feet

NORMAL APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a stabilized 5-foot hover.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a normal approach angle of 10° is intercepted, begin the approach by lowering the collective sufficiently to get the helicopter descending down the approach angle. With the decrease in collective, the nose will tend to pitch down, requiring aft cyclic to maintain a 60 knot attitude and right pedal to maintain heading. The pilot can determine the proper approach angle by relating the point of intended touchdown to a point on the helicopter windshield. The collective controls the angle of approach. If the touchdown point seems to be moving up on the windshield, the angle is becoming shallower, necessitating a slight increase in collective. If the touchdown point moves down on the windshield, the approach angle is becoming steeper, requiring a slight decrease in collective. The cyclic is used to control the rate of closure or how fast you are moving toward the touchdown point.

Maintain entry airspeed until the apparent groundspeed and rate of closure appear to be increasing. At this point, slowly begin decelerating with slight aft cyclic, maintaining the approach angle by smoothly reducing the collective. Use the cyclic to maintain a rate of closure equivalent to a brisk walk. At approximately 25–40 feet, depending on wind, the helicopter will begin to lose effective translational lift. This loss will be felt as a lateral vibration and the aircraft will begin to settle. The pilot must anticipate the loss of ETL, and compensate with increased collective to maintain the approach angle, (the governor will maintain the RPM). The increase of collective will tend to make the nose rise requiring forward cyclic to maintain proper rate of closure. As the helicopter approaches an altitude of 5 feet, the collective should be increased sufficiently to hold a 5-foot hover, maintaining heading with pedals. A small aft cyclic input may be necessary to stop any forward movement.

CROSSWIND CONSIDERATIONS:

During the approach, maintain a crab into the wind and the aircraft in trim. At 50 feet of altitude, a slip should be used to align the fuselage with the ground track. Apply cyclic into the wind and opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift above 10 feet	± 50 feet	± 25 feet
Drift below 10 feet	± 25 feet	± 10 feet

MAXIMUM PERFORMANCE TAKEOFF AND CLIMB

PURPOSE:

To transition from the surface to a maximum performance climb, simulating obstruction clearance.

DESCRIPTION:

While on the ground at a reduced RPM, check the manifold pressure limit chart to determine the maximum takeoff power. Clear the aircraft left, right and overhead, then complete a before takeoff check (RPM 102%, Warning Lights, Instruments, and Carb Heat). Select a reference point(s) along the takeoff path to maintain ground track.

Begin the takeoff by getting the helicopter light on the skids. Pause and neutralize all aircraft movement. Slowly increase the collective and position the cyclic so as to break ground and maintain a 40 KT attitude (approximately the same attitude as when the helicopter is light on the skids). Continue to slowly increase the collective until the maximum takeoff power is reached. This large collective movement will require a substantial increase in left pedal to maintain heading. The governor will maintain the RPM.

At 50 feet of altitude, slowly lower the nose to a normal 60 KT climb attitude. As the airspeed passes 55 KTS, reduce the collective to normal climb power.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Power	-1"	-0.5"

STEEP APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a hover using a steeper than normal approach angle.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a steep approach angle of 15° is intercepted, begin the approach by lowering the collective to get the helicopter descending down the approach angle and coordinate right pedal for trim. Since this angle is steeper than a normal approach angle, the collective must be reduced more than for a normal approach. As in the normal approach, reference the touchdown point on the windshield to determine changes in the approach angle. Aft cyclic will be required to decelerate sooner than in a normal approach due to the steeper angle and the rate of closure will become apparent at a slightly higher altitude. Maintain a crab above 50 feet, and a slip below 50 feet.

Maintain the approach angle and rate of descent with collective, rate of closure with cyclic, and trim with pedals. Loss of ETL will occur higher during a steep approach requiring an increase in collective to prevent settling, forward cyclic for proper rate of closure, and left pedal for trim. Terminate at a stabilized 5-foot hover.

CAUTION

Avoid high rates of descent at airspeeds below 30 KTS.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Termination	± 10 feet	± 5 feet

STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter with a complete power loss.

DESCRIPTION:

The Entry

From level flight at 70–75 KTS, 500–700 feet AGL, and headed into the wind, smoothly, but firmly, lower the collective full down without reducing the throttle. Coordinate the collective movement with right pedal for trim and aft cyclic to maintain a 70 KT attitude. The RPM needles will usually split establishing an autorotative descent. If the needles do not split, reduce the throttle slightly. Crosscheck attitude, trim, rotor RPM and airspeed. With two occupants on board anticipate a slight increase in RPM requiring a small increase of collective.

The Glide

After descent has been established, slowly reduce the airspeed to 60–70 KTS and maintain this attitude throughout the glide. During straight-in autorotative glides, aft cyclic movements will cause an increase in rotor RPM which is controlled by a small increase in collective. If the collective is increased to control the rotor RPM, hold or retard the throttle slightly to prevent the governor from joining the needles. Avoid a large collective increase, which will result in a rapid decay of rotor RPM and lead to “chasing the RPM”. Maintain RPM in the green (between 97% and 102%) and the aircraft in trim during the glide. Below 100 feet AGL, maintain the aircraft alignment with ground track with a slip. A constant 60–70 KT attitude should be held with the cyclic. Avoid looking straight down in front of the aircraft. Continually crosscheck attitude, trim, rotor RPM, and airspeed.

NOTE

Prior to the helicopter descending through 100 feet AGL, the instructor should make an immediate power recovery if the following three conditions do not exist:

1. **Rotor RPM stabilized between 97%–102% RPM.**
2. **Airspeed stabilized 60–70 KTS.**
3. **A normal rate of decent, usually less than 1500 FPM.**

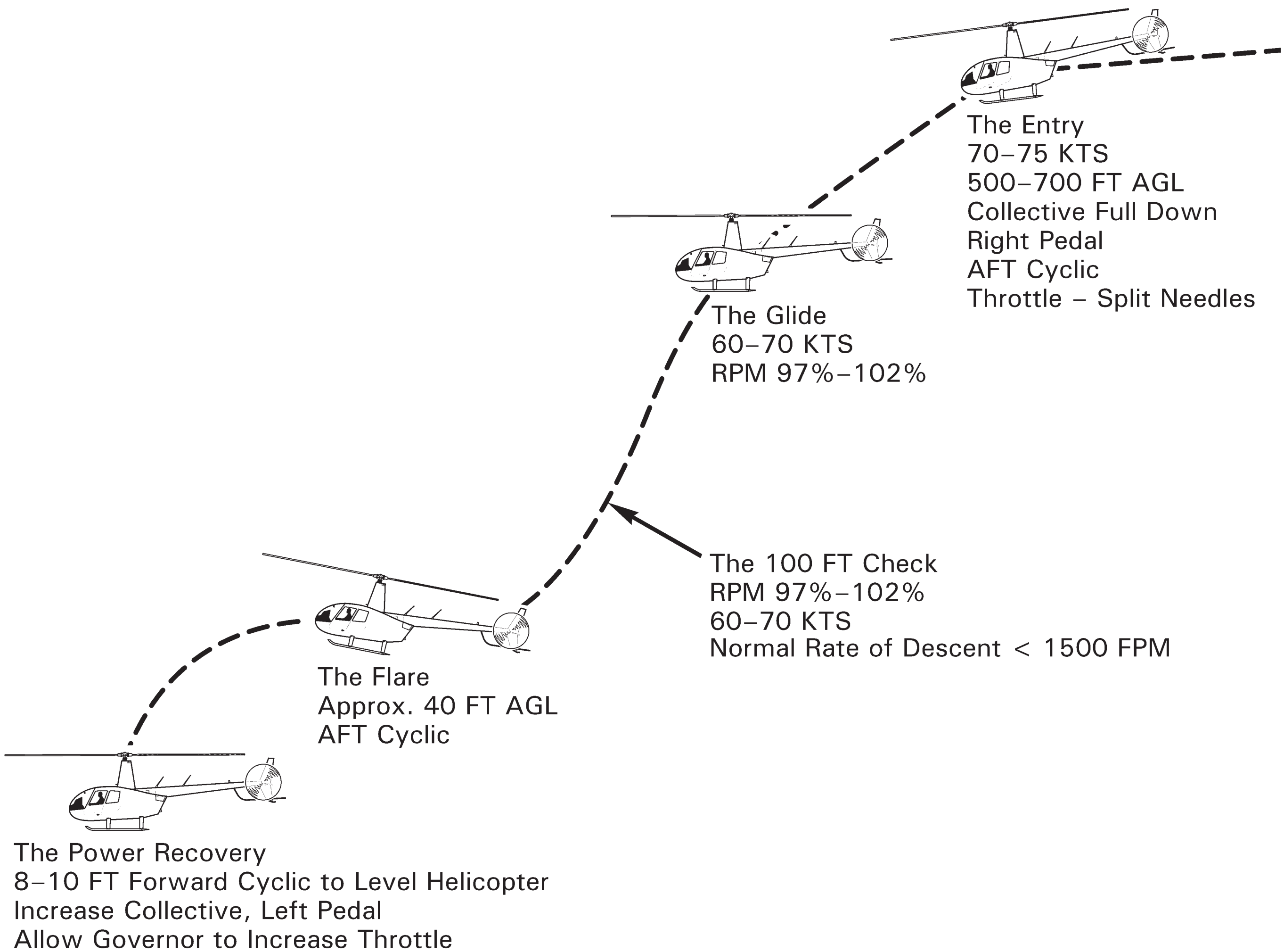
The Flare

At approximately 40 feet AGL, begin the flare with aft cyclic to reduce forward airspeed and decrease the rate of descent. The amount of flare will depend on wind conditions and gross weight, and should gradually be increased so that groundspeed and rate of descent are significantly decreased. Too much flare will cause the helicopter to balloon up causing a high vertical descent, as airspeed is lost.

STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY (cont'd)

The Power Recovery

At approximately 8–10 foot skid height, begin to level the helicopter with forward cyclic. Extreme caution should be used to avoid an excessive nose high/tail low attitude below 10 feet. Just prior to achieving a level attitude, with the nose still slightly up, increase the collective maintaining heading with left pedal. If the engine RPM is below 80% increase the throttle and allow the governor to increase the RPM to 104%. Do not allow the helicopter to descend below 5 feet during the power recovery.



PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	97%–102%	97%–102%
Airspeed	+10 KTS	± 5 KTS

180º AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter by turning 180º with a complete power loss.

DESCRIPTION:

The Entry

Establish the aircraft on downwind at 75 KTS and 700 feet AGL. When abeam the intended touchdown point, enter the autorotation by smoothly, but firmly, lowering the collective full down without reducing the throttle. Usually the needles will split establishing an autorotation. If the needles do not split, reduce the throttle slightly. Apply right pedal and aft cyclic to maintain the attitude. Crosscheck attitude, trim, rotor RPM, and airspeed.

The Glide / Turn

After the descent is established, apply aft cyclic to achieve a 60–70 KT attitude, then roll into a 180º turn. The proper angle of bank will be determined by wind velocity, but use caution to avoid an excessively steep turn, as this will increase the descent rate. Throughout the turn, it is important to maintain the proper attitude (airspeed) and keep the aircraft in trim. Changes in the aircraft's attitude and the angle of bank will cause corresponding increases and decreases in rotor RPM. Adjust the collective as necessary in the turn to maintain rotor RPM between 97%–102%. Continually crosscheck rotor RPM, attitude and trim in the turn. The turn should be completed and the helicopter aligned with the intended touchdown area prior to passing through 100 feet AGL. If the collective has been increased to load the rotor during the turn, it may have to be lowered on roll-out to prevent decay in RPM.

NOTE

Prior to the helicopter descending through 100 feet AGL, make an immediate power recovery if the following conditions do not exist:

1. **Aircraft aligned with the touchdown point (turn completed)**
2. **Rotor RPM stabilized between 97%–102 %**
3. **Airspeed stabilized between 60–70 KTS**
4. **A normal rate of descent, usually less than 1500 FPM**

The Flare

Same as straight-in autorotation.

Power Recovery

Same as straight-in autorotation.

180º AUTOROTATION WITH POWER RECOVERY (cont'd)

PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	97%–102%	97%–102%
Airspeed	+10 KTS – 5 KTS	± 5 KTS

POWER FAILURE AT A HOVER—HOVERING AUTOROTATION

PURPOSE:

To simulate landing the helicopter from a hover with a complete power loss.

DESCRIPTION:

Begin from a stabilized 3–5 foot hover at 102% RPM, over level terrain and headed into the wind. If necessary, reposition the left hand so that the throttle can easily be rolled off into the override, leaving the governor on. Firmly roll the throttle into the spring-loaded override while simultaneously adding right pedal to maintain heading. The loss of tail rotor thrust will cause a left drift requiring a slight right cyclic correction. Use caution not to raise or lower the collective when rolling off the throttle. When the aircraft has settled to approximately 1 foot, fully increase the collective, holding the throttle firmly in the spring-loaded override, to cushion the landing. As the skids touch down, apply slight forward cyclic. Once firmly on the ground, lower the collective full down. Use caution to avoid any sideward or rearward movement on touchdown to prevent the possibility of a rollover.

If simulating a tail rotor failure at a hover, allow the helicopter to yaw a maximum of 90° to the right, then perform the hovering autorotation.

NOTE

Other than for a T/R failure at a hover, it is recommended that the instructor rolls the throttle off, then the student maintains heading with right pedal once the engine failure is detected.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown	Level	Level

POWER FAILURE AT ALTITUDE—FORCED LANDING

PURPOSE:

To teach the student how to recognize an engine failure, properly enter an autorotation, select a landing area and maneuver to it.

DESCRIPTION:

During cruise flight with the student at the controls; the instructor will initiate the forced landing by leaving the governor on and rolling the throttle smoothly to the idle position splitting the needles. The student will immediately lower the collective full down co-coordinated with the right pedal for trim, and aft cyclic to maintain attitude. This should be accomplished quickly enough to prevent the rotor RPM from decaying below 90%. As the rotor RPM builds back into the green, increase collective as necessary to maintain rotor RPM between 97%–104%. The instructor will control the throttle to prevent the governor from joining the needles. Once established in an autorotative descent, select an intended landing area. Maneuver the helicopter as necessary to align the aircraft with the intended landing area, generally headed into the wind. Use increases in the collective and/or forward cyclic to prevent the rotor from over-speeding while maneuvering. Airspeed should be adjusted to 60–70 KTS.

Prior to passing through 100 feet, the aircraft should be aligned with the touchdown area, at 60–70 KTS, rotor RPM between 97%–102%, and in trim. Execute a power recovery and transition to normal climb.

NOTE

The instructor should apply the recommendations contained in Safety Notice #27.

PERFORMANCE STANDARDS:

	Private	Commercial
RPM on Entry	Above 90%	Above 90%
Airspeed	+10 KTS – 5 KTS	+5 KTS
Area Selection	Suitable	Suitable

RAPID DECELERATION (QUICK STOP)

PURPOSE:

To simulate a condition when a rapid decrease in forward airspeed is required as in an aborted takeoff.

DESCRIPTION:

Perform a normal takeoff into the wind. Once a minimum altitude of 25 feet is attained, apply additional forward cyclic to accelerate to 40–50 KTS while maintaining altitude. Begin the quick stop by smoothly lowering the collective, adding right pedal, and simultaneously applying aft cyclic to decelerate. Apply aft cyclic as needed to maintain entry altitude throughout the deceleration. As airspeed is lost, the helicopter will begin to settle. Slowly increase the collective to control the rate of descent adding forward cyclic to level the helicopter. Maintain heading with pedals. Terminate at a stabilized 5-foot hover. Use caution to avoid terminating at a high hover or in an extreme tail low attitude.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Altitude	± 15 feet	± 10 feet
Termination Point	± 50 feet	± 25 feet

SHALLOW APPROACH AND RUNNING LANDING

PURPOSE:

To simulate an approach and landing when sufficient power for hovering is not available.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind at 60 KTS and 300 feet AGL. When a shallow approach angle of 5° is intercepted, begin the approach by lowering the collective to maintain the approach angle. Maintain entry airspeed until apparent rate of closure and groundspeed appear to be increasing. Begin a slow deceleration with aft cyclic, maintaining approach angle by reducing collective and the aircraft in trim. Plan to arrive at the point of intended touchdown at or slightly above effective translational lift. Prior to ground contact, insure that the helicopter is in a level attitude. After ground contact, maintain heading with pedals and slowly lower the collective for braking action allow the governor to maintain RPM (do not squeeze the throttle inhibiting the governor) until the helicopter comes to a complete stop.

Crosswind Considerations:

As in normal and steep approach, crab the helicopter above 50 feet AGL, and use a slip below 50 feet AGL to align the aircraft with the ground track.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown Point	± 50 feet	± 25 feet
Touchdown Speed	Above ETL	
Manifold Pressure	Less than hover power	

SLOPE OPERATIONS

PURPOSE:

To land from a hover and takeoff to a hover from a sloping surface.

DESCRIPTION:

Prior to conducting slope operations, the pilot must be thoroughly familiar with dynamic rollover characteristics and mast bumping. For training, use a maximum slope angle of 5°.

Slope Landings:

Position the helicopter cross slope at a stabilized 5-foot hover headed into the wind. Lower the collective slightly to establish a slow rate of sink. When upslope skid contacts the ground, begin applying lateral cyclic in the direction of the slope (upslope) to hold the skid against the slope. Maintain heading with pedals. Continue to apply cyclic into slope as the collective is lowered until the down slope skid is firmly on the ground. Once the collective is full down, center the cyclic to allow safe “head clearance” on the upslope side.

Slope Takeoffs:

The procedure for a slope takeoff is almost the exact reverse of that for a slope landing. Apply cyclic into the slope (upslope) and slowly begin to increase the collective. As the helicopter becomes light on the skids, pause and neutralize any aircraft movement. Continue to increase the collective maintaining heading with pedals. When the down slope skid breaks ground, slowly begin to center the cyclic. As a level attitude is reached, the cyclic should be approximately neutral. Continue to increase collective, maintaining position over the ground with cyclic and heading with pedals until a stabilized 5-foot hover is attained.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°

RECOGNITION AND RECOVERY FROM LOW ROTOR RPM

PURPOSE:

To become thoroughly familiar with the recognition of low rotor RPM and the techniques of recovery. Prior to performing this maneuver, the pilot should be familiar with RHC Safety Notices #10 and #24.

DESCRIPTION:

Cruise flight, takeoff & approach

A) Entry and Recognition

During cruise flight, takeoffs and approaches, at 102% RPM, the instructor will, turn the governor off, then slowly decrease the throttle to 95% RPM. The low RPM condition will be recognized by:

1. A noticeable decrease in engine noise.
2. Aircraft vibrations and cyclic stick shake especially at higher airspeeds.
3. The low rotor RPM warning horn and light at approximately 97% RPM.

The instructor should demonstrate the further increase in vibration and decrease in engine noise by decreasing the RPM to 92% RPM.

B) Recovery Technique

Upon recognizing the low RPM condition, simultaneously add throttle and lower the collective half-an-inch to one-inch to regain operating RPM. Larger collective movements will require additional throttle due to the correlator. A gentle aft cyclic movement will prevent the nose from going down and inhibiting the recovery, but the primary recovery controls are the collective and throttle. Avoid any forward cyclic input, which will inhibit RPM recovery. Once RPM is regained, slowly raise the collective to reduce the sink rate, while closely monitoring the RPM.

At a Hover

During hovering flight at 102% RPM, the instructor will turn the governor off and slowly decrease the throttle to 95% RPM. Note the obvious decrease in engine noise and the tendency for the aircraft to settle back toward the ground. As the aircraft settles, the tendency for some pilots will be to increase the collective to stop the descent. This may only increase the RPM decay and increase the descent. Recovery is the same as in forward flight. Lower the collective simultaneously adding throttle. If RPM cannot be regained prior to ground contact, insure that the helicopter touches down in a level attitude.

PERFORMANCE STANDARDS:

The pilot should be able to recognize and recover from low rotor RPM prior to reaching 90% RPM.

VORTEX RING STATE

PURPOSE:

To demonstrate the dangerous results of operating at low airspeeds, moderate to high power settings, and high rates of sink (Vortex Ring State).

DESCRIPTION:

The vortex ring state is most dangerous when it happens at relatively low altitudes. The most common condition is during a steep approach with a tailwind. It should be demonstrated at an altitude of at least 1000 feet AGL.

To enter a maneuver, adjust the power to approximately 13–15 inches manifold pressure. Hold altitude with aft cyclic until the airspeed approaches 20 KTS. Allow the sink rate to increase to 300 FPM or more as the attitude is adjusted to obtain airspeed of less than 10 KTS. The aircraft will begin to shudder. Application of additional up collective will increase the vibration and sink rate while the cyclic and pedal effectiveness is reduced. Once the condition is well developed, rate of sink in excess of 2000 FPM can result. Recovery should be initiated at the first sign. The maneuver can also be entered from an OGE hover.

There are two recovery techniques:

1. The traditional technique is to apply forward cyclic to increase airspeed and simultaneously reduce the collective. When the airspeed indicates 20–30 KTS and the trim strings have become effective raise the collective to takeoff power and adjust the cyclic to a maximum performance climb attitude. The recovery is completed when the VSI reads 0.
2. A more efficient recovery technique is called the Vuichard Recovery. Initiate the recovery by raising the collective to takeoff power (MCP at lower gross weights), simultaneously applying left pedal to maintain heading and right cyclic (10°–20° bank) to get lateral movement. Once the right side of the rotor disc reaches the upwind part of the vortex the recovery is completed. Average loss of altitude during the recovery is 20–50 feet.

PERFORMANCE STANDARDS:

The pilot must thoroughly understand and recognize the vortex ring state and be able to safely recover.

ENHANCED AUTOROTATION PROCEDURES (Required by SFAR 73)

PURPOSE:

To understand the different elements that can be used to maneuver the helicopter in autorotation. This training is only recommended for students who hold at least a private pilot certificate.

DESCRIPTION:

Each element will be discussed. Once the student has an understanding of the elements, one or more can be combined in one autorotative glide.

Use of turns

Left, right or "S" turns can be used to decrease the glide distance in autorotation. It is important to maintain proper attitude and trim when turning, to prevent increased descent rates. Adjust the collective as necessary in the turn to maintain rotor RPM between 97%–102%. A large turn (270°–360°) is not recommended since for much of the turn the pilot will lose sight of the landing area and will be unable to determine the effect of wind on the glide.

Use of airspeed

Airspeeds from zero to max glide airspeed (90 kts in an R44) can be used to adjust the autorotative glide distance as necessary. Maximum glide distance configuration is covered later in this maneuver so this discussion concerns reducing airspeed. It is recommended an entry altitude of 1500–2000 feet AGL be used so the student can get an extended time flying at the lower speeds in autorotation. Enter the autorotation so that a normal glide will take the helicopter well past the point of intended landing thus requiring a shortened glide distance. Once the glide is established apply aft cyclic to a 10°–15° nose high attitude. Adjust the collective as necessary to control increases in rotor RPM. At approximately 25–30 kts the nose of the aircraft will come down to a level attitude due to the upward flow of air acting on the tail cone and horizontal stabilizer. Maintain this configuration and observe the landing area moving up on the windshield. When a normal Autorotative angle is achieved or approaching 500 feet AGL, lower the nose to 10°–15° nose down to increase airspeed back to the normal autorotative speed of 60–70 kts.

Use of pedals

Set the maneuver up at 1500–2000 feet AGL with the point of intended landing and the wind 90° from the helicopter's ground track (out the left or right door). Since the left pedal is the strong pedal in autorotation, it is recommended the landing area be positioned out the left door requiring left pedal to turn. However, the student should experience use of both pedals. Enter the autorotation and slow the airspeed as in the "Use of airspeed" maneuver. Once the nose comes down to the level attitude, apply pedal to align the aircraft with the desired track towards the landing area. Use of left pedal will decrease the rotor RPM requiring the pilot to lower the collective as necessary to maintain the rotor RPM. (cont'd)

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Use of pedals (cont'd)

The remainder of the maneuver is the same as the "Use of airspeed" discussion.

Use of sideward flight

The purpose of using sideward flight in an autorotative glide is when the point of intended landing is almost directly below the helicopter. Set up the condition with the wind 90° (left or right) from the aircraft's ground track at 1500–2000 feet. Enter the autorotation directly over or just prior to the intended landing area. Decrease the airspeed as in the "Use of airspeed" maneuver. When the nose comes down to the level attitude apply lateral cyclic in the direction of the desired sideward flight and opposite pedal to prevent the aircraft from weather vaneing towards the direction of flight. The resulting slip and wind direction will move the helicopter downwind from the landing area. Once the helicopter is far enough away from the landing area stop the sideward flight with opposite cyclic. Opposite pedal is then applied (as in the "use of pedal" maneuver) to align the aircraft into the wind tracking towards the landing area and lower the nose to regain airspeed. Again, left pedal is the strong pedal in autorotation, so sideward flight to the right, requiring the use of left pedal is the easier of the two sideward flight directions.

CAUTION
When using the above techniques to maneuver in autorotation the nose must be lowered to regain airspeed no lower than 500 ft AGL. Below 500 ft AGL use only turns to maneuver.

Maximum Glide Distance Configuration

In FAR Part 27 approved helicopters the maximum glide distance configuration is found in the Pilot's Operating Handbook (POH). It is 90 kts/90% rotor RPM in the R44. The purpose in practicing this maneuver is not only to glide the furthest distance in autorotation, but also, to get the pilot accustomed to the low RPM warning system being on for extended periods and developing the pilot's ability to determine if a glide will be "to long" or "to short". Enter the autorotation at 1500–2000 feet to give the student an extended time to fly at the max glide configuration. Adjust the airspeed to 90 kts and increase the collective to set the rotor RPM at 90% (the low RPM horn/light will be on the entire time the RPM is below 95%). It's very important to keep the aircraft in trim during the entire glide. While at the max glide configuration reference any movement of the point of intended landing up or down on the windshield. If the landing area moves up the glide will not reach the area and a new area should be selected. If the landing area begins to move down then the glide will take the aircraft past the area so exit the max glide configuration. Allow the rotor RPM to build back into the normal range below 500 ft.

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Minimum Rate of Descent Configuration

The minimum rate of descent configuration is 55 kts/90% rotor RPM in the R44. The purpose of practicing this maneuver is not only to autorotate at the slowest descent rate, but also, to practice performing another procedure such as an air restart or mayday call while still flying the helicopter in autorotation. Enter the autorotation at 1500–2000 feet. After establishing an autorotative glide simultaneously apply aft cyclic to slow the helicopter to the appropriate airspeed and increase the collective to bring the rotor RPM down to 90%. Realize that these two control inputs compete with each other, in that the aft cyclic tends to increase the RPM while the pilot is trying to reduce the RPM with the collective. First, build proficiency establishing and maintaining the minimum rate of descent configuration then add performing a simulated air restart or mayday call into the autorotation. Return to the normal airspeed and rotor RPM prior to descending below 500 feet AGL.

HYDRAULIC OFF APPROACH AND LANDING

PURPOSE:

To simulate an approach and landing with a hydraulic system failure.

DESCRIPTION:

NOTE
It is recommended this maneuver only be performed with an instructor at one set of controls.

During cruise flight or on downwind in the traffic pattern, the instructor will identify the hydraulic control switch, instruct the student to relax on the controls, then turn the hydraulic control switch off. Once the increase in control forces is noticed, vigorously exercise the cyclic and collective to develop a feel for the control forces that will be needed. Note a much greater force is needed to raise the collective than to lower it and fore & aft cyclic is much more difficult than lateral cyclic. Execute a shallow approach (see page 21). It is recommended the first few landings be accomplished with a running landing (see page 21). However, as proficiency increases an approach directly to the ground or to a hover may be practiced. Pilots should develop a comfort level for the type of landing they prefer, develop proficiency at that type of landing, then use that landing in the event of an actual hydraulic failure. Once the aircraft has come to a complete stop on the ground the instructor should, again, identify the hydraulic control switch, instruct the student to relax on the controls, then turn the hydraulic control switch on.

CAUTION
Once the helicopter has decelerated below ETL on the approach, the hydraulic control switch should not be turned on until the aircraft is at a full stop on the ground. If a go-around is initiated do not turn the hydraulics back on until the aircraft is above 100 ft AGL and the airspeed is above 40 knots.

PERFORMANCE STANDARDS:

Touchdown should be in a level attitude with the skids parallel to the ground track.

HOVER OUT-OF-GROUND EFFECT (OGE)

PURPOSE:

To hover the helicopter out-of-ground effect (OGE), perform 90° hovering turns and properly descend to an in-ground-effect hover (IGE) over a predetermined spot. Recommended minimum OGE hover altitude for training is 50 feet.

DESCRIPTION:

NOTE
It is recommended this maneuver only be performed with an instructor at one set of controls.

The OGE hover can be initiated from the ground or at the termination of an approach. In both cases, proper performance planning needs to be accomplished to insure OGE capability by using the OGE Hover Ceiling vs Gross Weight chart in the Pilot's Operating Handbook and the IGE hover check referenced below.

<u>From the Ground:</u>

Headed into the wind, select at least two outside visual reference points (trees, poles etc.) that will aid in controlling aircraft drift during the maneuver; one point at the 12 o'clock position and one approximately 90° in the direction of the intended turn. These points should be a minimum distance from the helicopter of at least twice the intended hover altitude. Any additional reference points that are available can be used to fine tune position over the ground. Perform a takeoff to a 2 foot IGE hover and complete a hover check to confirm available power. The maneuver should not be attempted unless the IGE hover manifold pressure is 2 inches below the maximum takeoff power (5 minute) limit or 2 inches below full throttle at higher altitudes.

Begin the ascent to an OGE hover by increasing the collective, maintain heading with the pedals and crosscheck both reference points. The lateral reference is especially important to control the common tendency of forward drift during the ascent and descent. Once established at an OGE hover, check power and effects of any difference in wind speed or direction. Use the outside reference points to control drift over the ground and altitude.

It is recommended to begin with a left pedal turn to evaluate the amount of tail rotor thrust available. Since it takes more thrust to stop a right pedal turn, do not attempt a right pedal turn if thrust during the left turn appears marginal. Prior to beginning the turn, clear the area in both directions and anticipate the effect of the wind during the turn. Begin the turn with the appropriate pedal and maintain a slow, steady turning rate. Avoid high turn rates especially with right pedal turns. Stop the turn at the 90° point, stabilize the hover using the reference points then slowly begin a turn in the opposite direction terminating at the original position (heading).

Begin the descent by lowering the collective, maintaining position over the ground with the cyclic. Again, avoid the tendency to drift forward during the descent. Using outside references, maintain a slow, steady descent rate. (cont'd)

HOVER OUT-OF-GROUND EFFECT (OGE) (cont'd)

Terminate the descent at an IGE hover over a predetermined spot or continue to the ground.

From an approach:

On final insure the aircraft is headed into the wind then establish a 5° shallow approach angle to a predetermined spot on the ground. During the last 200 feet begin to slow the closure rate to lose ETL while avoiding a descent rate greater than 300 ft/min. Prior to establishing an OGE hover over the predetermined spot, select the forward and lateral reference points. It is recommended that initially the student be familiar with the predetermined spot on the ground and the reference points and then move to unfamiliar areas.

Once established in an OGE hover over the predetermined spot, proceed as explained in "From the Ground".

CAUTION
Throughout the maneuver avoid gripping the throttle tightly which can override the governor and cause a low RPM condition.

Once proficiency in the above conditions is achieved, demonstration/student practice at altitudes above 500 feet AGL will reinforce the importance of proper reference and aircraft control.

RISK MANAGEMENT:

- Understand the risk of operating in the shaded area of the height/velocity diagram.
- Avoid excessive descent rates to prevent entry into the vortex ring state.
- Focus on the need for left pedal to anticipate the loss of tail rotor effectiveness (LTE)
- Be aware of operations near full throttle to avoid a low RPM condition.
- Monitor engine temperature, pressure and power limits to avoid an exceedance.
- Avoid unnecessary distractions during the maneuver.

PERFORMANCE STANDARDS:

	Private	Commercial
Position over ground	No FAA Private Pilot standards established. RHC recommends training to Commercial standards.	± 10 ft
OGE hover altitude		± 5 feet
Heading		± 5°
Descent Rate		Safe

FLIGHT TRAINING GUIDE
CHAPTER 9

R66 MANEUVER GUIDE

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CHAPTER 9

R66 MANEUVER GUIDE

INTRODUCTION

The intention of this guide is to aid both the student and instructors while conducting training in the R66. It should be understood that because of the many variables in geographic location, altitudes, loading and individual instructor techniques, minor modifications to certain maneuvers might be necessary. For the purposes of training, the following parameters should be adhered to.

Normal Climb	60 kts
Normal Cruise	90–110 kts
Hovering	5 feet
Takeoffs	Hover power
Autorotative Descents	60–70 kts
Maximum Hover Speed—Forward	10 kts groundspeed
Maximum Hover Speed—Lateral/Rearward	5 kts groundspeed

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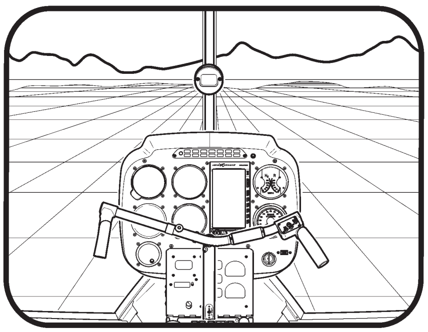
STRAIGHT AND LEVEL FLIGHT

PURPOSE:

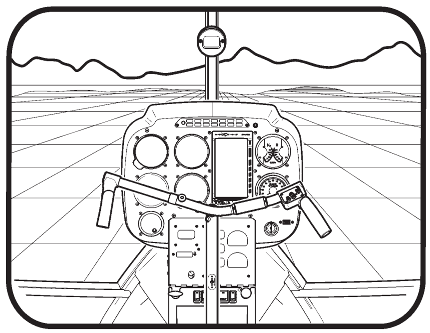
To fly the helicopter at a constant airspeed, altitude, and heading.

DESCRIPTION:

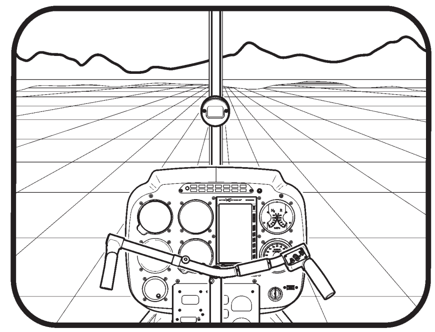
Attitude or pitch control with the cyclic is the most important aspect of straight and level flight. A level flight attitude is best determined by referencing the horizon with a fixed point in the cockpit, such as the magnetic compass or the tip path plane. The pilot will be able to detect changes in attitude by noting changes between the fixed point and the horizon. Airspeed is determined by attitude and controlled by the cyclic. As in all helicopters, the R66 cyclic control is very sensitive and requires very slight pressure to



Level Flight Attitude
Constant Airspeed



Nose High Attitude
Airspeed Decreases



Nose Low Attitude
Airspeed Increases

effect a change. Normal cruise airspeed for training is 90 KTS.

Altitude is controlled primarily by the collective. Each collective movement will require a corresponding pedal adjustment to maintain the aircraft in trim. An increase of collective will require left pedal. A collective decrease will require right pedal. Additionally, when the collective is increased, the nose will tend to rise, requiring slight forward cyclic to maintain a level or cruise flight attitude. The opposite is true with a decrease in collective—the nose will move down, requiring a slight aft cyclic.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

NORMAL CLIMBS AND DESCENTS

PURPOSE:

To change altitude at a controlled rate in a controlled attitude.

DESCRIPTION:

Climbs

For training purposes, climb airspeed is 60 KTS at 500 feet per minute rate of climb. From straight and level flight at 90 KTS, clear above the aircraft. Initiate the climb by raising the collective to climb power (a torque setting which will provide a 500 ft/min climb at 60 KTS). Maintain aircraft trim with a slight amount of left pedal and apply aft cyclic to adjust the attitude to a "60 KT climb attitude". 50 feet prior to reaching the level-off altitude, begin the level off by lowering the nose to a 90 KT attitude with forward cyclic, lowering the collective slowly to cruise power (a torque setting for level flight at 90 KTS). Maintain aircraft trim with right pedal. Throughout the climb and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

Descents

For training purposes, descent airspeed is 60 KTS at 500 feet per minute rate of descent. From straight and level flight at 90 KTS, clear below the aircraft. Initiate the descent by lowering the collective to a torque setting that will provide a 500 feet per minute descent at 60 KTS. Maintain aircraft trim with a slight amount of right pedal. Apply aft cyclic to adjust the attitude to a "60 KT attitude". 50 feet prior to reaching the level-off altitude, begin the level-off by raising the collective slowly to cruise power (torque). Maintain aircraft trim with left pedal. Apply forward cyclic to adjust the attitude to a level flight attitude. Throughout the descent and level-off, continually crosscheck outside references—(attitude and heading) with inside references—(flight instruments).

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Level-off Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TURNS

PURPOSE:

To turn the aircraft using a constant angle of bank at a constant airspeed and altitude.

DESCRIPTION:

From straight and level flight at 90 KTS, clear the aircraft in the direction of turn. Smoothly apply cyclic towards the direction of turn until the desired angle of bank is reached. Unlike an airplane, the pedals should not be used to assist the turn. Use the horizon as a reference to maintain a "90 KT attitude" and desired angle of bank with cyclic. As the angle of bank increases, additional collective may be required to maintain altitude. Keep the aircraft in trim with the pedals. Begin the recovery from the turn just prior to reaching the desired rollout heading. Apply cyclic opposite the direction of turn, and if any collective has been added during the turn, reduce it back to cruise power, while maintaining aircraft trim.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Roll out Heading	± 10º	± 5º

ACCELERATION / DECELERATION

PURPOSE:

To increase pilot control co-ordination. Maintaining a constant altitude, accelerate to 110 KTS, decelerate to 60 KTS, and then accelerate back to 90 KTS.

DESCRIPTION:

From straight and level flight at 90 KTS, slowly raise the collective approximately 10% torque above cruise power, adding left pedal and forward cyclic. As the aircraft begins to accelerate, adjust cyclic, collective and pedals as necessary to stabilize at 110 KTS and level flight. Begin the deceleration by slowly lowering the collective co-coordinated with right pedal and aft cyclic. Again, use all controls slowly and smoothly as necessary to decelerate to 60 KTS and level flight. Accelerate back to 90 KTS by raising the collective to cruise power, left pedal and forward cyclic to attain level flight at 90 KTS.

Throughout the maneuver, a constant crosscheck of airspeed, altitude, attitude and trim must be maintained.

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet
Heading	± 10º	± 5º

TAKEOFF TO A HOVER

PURPOSE:

To transition from the ground to a stabilized 5-foot hover.

DESCRIPTION:

After completing a pre-takeoff check (Annunciator panel lights off, RPM 100%, instruments in the green, fuel, and transponder), clear the helicopter left and right. With the collective full down and the cyclic and pedals neutralized, slowly raise the collective adding a small amount of left pedal to compensate for the increased torque. As the helicopter becomes light on the skids, select a reference point 50 to 75 feet in front of the helicopter and neutralize all aircraft movement with the cyclic and pedals. Continue to raise the collective smoothly and slowly, maintaining heading with slight pedal corrections. Since the R66 normally hovers in a nose high, left rear skid low attitude with two occupants, the toes of the skids will break ground first and the left rear skid last. Compensate with forward and right cyclic. As the helicopter becomes light on the skids, extreme caution must be used to avoid any rearward or lateral movement since this can cause a dynamic rollover. Should any lateral or rearward movement occur, immediately lower the collective and begin again. The helicopter should rise vertically, maintaining heading with pedals (note the pedals are slightly more sensitive than the R44), position over the ground with cyclic, and altitude with the collective. After attaining a stabilized 5-foot hover, perform hover check:

1. RPM—100% (beep if necessary)
2. Engine instruments—green range
3. Hover power—note torque
4. Center of gravity—note cyclic position

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10º	± 5º
Position	10′ Circle	5′ Circle

LANDING FROM A HOVER

PURPOSE:

To land the helicopter from a 5-foot hover.

DESCRIPTION:

From a stabilized 5-foot hover, headed into the wind, slightly lower the collective to establish a slow rate of sink. A small amount of right pedal will be needed to maintain heading. The cyclic will be used to maintain position over the ground. Vision should be directed 50–75 feet in front of the helicopter. Do not look immediately in front of the helicopter, as this will lead to over controlling.

As the helicopter descends to about 6 inches, additional downward pressure on the collective may be necessary to overcome the increase in ground effect. As the skids make ground contact, neutralize all aircraft movement with cyclic and pedals, continuing to smoothly lower the collective until it is full down. Due to the nose high attitude of the R66 with two people aboard, the left rear skid will normally touch first on level terrain. A slight amount of forward and right cyclic will be necessary as ground contact is made.

CAUTION

Do not allow the helicopter to land with any rearward or sideward movement.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10º	± 5º
Drift	4 feet	2 feet

HOVERING FLIGHT

PURPOSE:

To maneuver the helicopter forward, sideward, rearward and turn the aircraft while hovering.

DESCRIPTION:

Forward, sideward and rearward flight

From a stabilized 5-foot hover, headed in to the wind, move the cyclic smoothly towards the desired direction of flight. Maintain heading with small pedal corrections and altitude with collective. As movement begins, adjust the cyclic to keep the groundspeed at a constant rate equivalent to a normal walk. Reference points along the direction of flight can be used to maintain correct ground track. To stop the movement, apply cyclic opposite to the direction of movement until the helicopter stops. During all phases of hovering, cyclic changes should be small and smooth to minimize the effects of over controlling or pendular action.

Crosswind hovering is accomplished in much the same manner. The cyclic must be inclined into the wind enough to cancel out any tendency for the helicopter to drift.

Hovering Turns

Hovering turns are accomplished by use of the pedals. With the helicopter headed into the wind, apply pedal in the desired direction of turn. As the helicopter turns, counter pressures on the opposite pedal should be used to maintain a slow, constant rate of turn. (A rate of 360° in 15 seconds is recommended.)

Cyclic is used to control attitude and position over the ground and should be continually adjusted into the wind to avoid drifting and excessive attitude changes during the turn. Maintain a constant altitude with the collective. Normally, a slight altitude loss will occur in a left turn due to the increased pitch of the tail rotor blades. This can be corrected with a slight increase in collective. Right turns produce just the opposite effect. A decrease in the tail rotor pitch will cause a slight increase in altitude. If necessary, compensate by slightly lowering the collective. As the desired heading is reached, stop the turn by applying slight pressure on the opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Altitude	± 2 feet	± 1 foot
Heading	± 10°	± 5°
Ground Track	± 5 feet	± 3 feet

TRAFFIC PATTERN OPERATIONS

PURPOSE:

For training purposes, traffic pattern operations are used for the practice of continual takeoffs and landings.

DESCRIPTION:

Upwind Leg

After takeoff, assume a normal climb at 60 KTS. Upon reaching a predetermined point on the ground, begin a 90º turn to crosswind.

Crosswind Leg

Maintain ground track by crabbing the helicopter into the wind. 50 feet prior to reaching 500 feet AGL, begin a level-off by accelerating slowly to 75 KTS and reducing the power to cruise power. Upon reaching a predetermined point on the ground, begin a 90º turn to downwind.

Downwind Leg

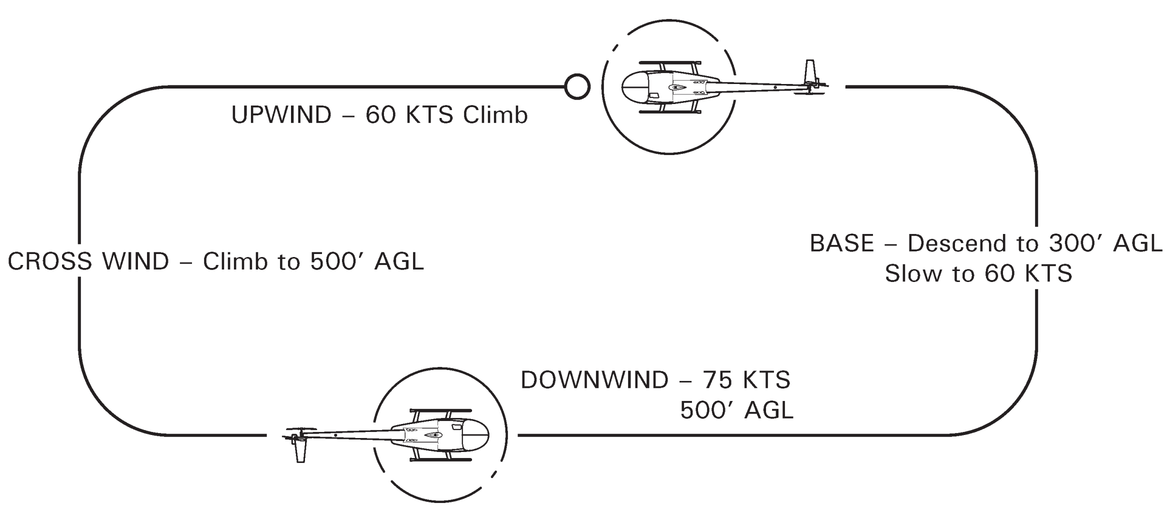
Complete a pre-landing check (Annunciator panel lights off, RPM 100%, instruments in the green and fuel). Groundspeed will increase due to the downwind condition. Fly the downwind leg at 75–90 KTS (depending on the size of the pattern) and 500 feet AGL using ground reference points to maintain ground track. Upon reaching a predetermined point on the ground, lower the collective to establish a descent. Once the descent is established, begin a 90º turn and start decelerating to 60 KTS. This turn will require a steeper angle of bank due to the downwind condition.

Base Leg

On base, descend to 300 feet AGL and slow to 60 KTS. Plan the turn from base to final so as to roll out aligned with the point of intended touchdown.

Final

Fly the final approach leg at 60 KTS and 300 feet AGL until the appropriate approach angle is reached.



TRAFFIC PATTERN OPERATIONS (cont'd)

PERFORMANCE STANDARDS:

	Private	Commercial
Airspeed	± 10 KTS	± 5 KTS
Altitude	± 100 feet	± 50 feet

NORMAL TAKEOFF FROM A HOVER

PURPOSE:

To transition from a hover to a normal climb.

DESCRIPTION:

From a stabilized 5-foot hover, select an object(s) along the takeoff path for use as a reference point to maintain ground track.

Clear the aircraft left and right with a clearing turn, then complete a pre-takeoff check (Annunciator panel lights off, RPM 100%, instruments in the green, fuel and transponder).

Begin the takeoff with a small amount of forward cyclic to get the helicopter moving forward. If the helicopter begins to settle, raise the collective as necessary to hold altitude and maintain heading with pedals.

As the airspeed increases to approximately 10–12 KTS, effective translational lift (ETL) will occur, and can be felt as a lateral vibration.

At ETL, lift will increase noticeably causing the nose to pitch up. Apply sufficient forward cyclic to continue the acceleration and prevent the nose from rising.

As airspeed increases, the streamlining of the fuselage and the increased efficiency of the tail rotor will cause a left yaw, requiring a right pedal correction. Continue to smoothly accelerate, maintaining ground track.

At an altitude of 300 feet and airspeed of 55 KTS, adjust torque to climb power and slight aft cyclic to establish a 60 KT climb attitude.

CROSSWIND CONSIDERATIONS:

During crosswind takeoffs, the helicopter is flown in a slip to an altitude of 50 feet. Place the cyclic into the wind as necessary to maintain the proper ground track. Apply opposite pedal to align the fuselage with the ground track. Above 50 feet, crab the helicopter into the wind by putting the aircraft in trim and maintaining ground track with cyclic.

NOTE

During the takeoff, the acceleration to climb speed and the commensurate altitude gain should be accomplished without entering the shaded areas of the R66's height-velocity diagram.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift below 10 feet	± 25 feet	± 10 feet
Drift above 10 feet	± 50 feet	± 25 feet

NORMAL APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a stabilized 5-foot hover.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a normal approach angle of 10° is intercepted, begin the approach by lowering the collective sufficiently to get the helicopter descending down the approach angle. With the decrease in collective, the nose will tend to pitch down, requiring aft cyclic to maintain a 60 KT attitude and right pedal to maintain heading. The pilot can determine the proper approach angle by relating the point of intended touchdown to a point on the helicopter windshield. The collective controls the angle of approach. If the touchdown point seems to be moving up on the windshield, the angle is becoming shallower, necessitating a slight increase in collective. If the touchdown point moves down on the windshield, the approach angle is becoming steeper, requiring a slight decrease in collective. The cyclic is used to control the rate of closure or how fast you are moving toward the touchdown point.

Maintain entry airspeed until the apparent groundspeed and rate of closure appear to be increasing. At this point, slowly begin decelerating with slight aft cyclic, maintaining the approach angle by smoothly reducing the collective. Use the cyclic to maintain a rate of closure equivalent to a brisk walk. At approximately 25–40 feet, depending on wind, the helicopter will begin to lose effective translational lift. This loss will be felt as a lateral vibration and the aircraft will begin to settle. The pilot must anticipate the loss of ETL, and compensate with increased collective to maintain the approach angle. The increase of collective will tend to make the nose rise and yaw to the right requiring forward cyclic and left pedal to maintain proper rate of closure and heading. As the helicopter approaches an altitude of 5 feet, the collective should be raised sufficiently to hold a 5-foot hover, maintaining heading with pedals. A small aft cyclic input may be necessary to stop any forward movement.

CROSSWIND CONSIDERATIONS:

During the approach, maintain a crab into the wind and the aircraft in trim. At 50 feet of altitude, a slip should be used to align the fuselage with the ground track. Apply cyclic into the wind and opposite pedal.

PERFORMANCE STANDARDS:

	Private	Commercial
Drift above 10 feet	± 50 feet	± 25 feet
Drift below 10 feet	± 25 feet	± 10 feet

MAXIMUM PERFORMANCE TAKEOFF AND CLIMB

PURPOSE:

To transition from the surface to a maximum performance climb, simulating obstruction clearance.

DESCRIPTION:

In the R66 simulate maximum power by using hover power plus 10% torque. Clear the aircraft left, right and overhead, then complete a pre-takeoff check (annunciator panel lights off, RPM 100%, instruments in the green, fuel, and transponder). Select a reference point(s) along the takeoff path to maintain ground track.

Begin the takeoff by getting the helicopter light on the skids. Pause and neutralize all aircraft movement. Slowly raise the collective and position the cyclic so as to break ground and maintain a 40 KT attitude (approximately the same attitude as when the helicopter is light on the skids). Continue to slowly raise the collective until hover power plus 10% torque is reached. This large collective movement will require a substantial increase in left pedal to maintain heading.

At 50 feet of altitude, slowly lower the nose to a normal 60 KT climb attitude. As the airspeed passes 55 KTS, reduce the collective to normal climb power.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Power	± 2%	± 2%

STEEP APPROACH TO A HOVER

PURPOSE:

To transition from flight at altitude to a hover using a steeper than normal approach angle.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind, aligned with the point of intended touchdown, at 60 KTS and 300 feet AGL. When a steep approach angle of 15° is intercepted, begin the approach by lowering the collective to get the helicopter descending down the approach angle and coordinate right pedal for trim. Since this angle is steeper than a normal approach angle, the collective must be reduced more than for a normal approach. As in the normal approach, reference the touchdown point on the windshield to determine changes in the approach angle. Aft cyclic will be required to decelerate sooner than in a normal approach due to the steeper angle and the rate of closure will become apparent at a slightly higher altitude. Maintain a crab above 50 feet, and a slip below 50 feet.

Maintain the approach angle and rate of descent with collective, rate of closure with cyclic, and trim with pedals. Loss of ETL will occur higher during a steep approach requiring an increase in collective to prevent settling, forward cyclic for proper rate of closure, and left pedal for trim. Terminate at a stabilized 5-foot hover.

CAUTION
Avoid high rates of descent at airspeeds below 30 KTS.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Termination	± 10 feet	± 5 feet

STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter with a complete power loss.

DESCRIPTION:

NOTE

1. **Prior to conducting a practice autorotation, insure an N1 Deceleration Check has been performed in accordance with the R66 Pilot's Operating Handbook.**
2. **Insure the cabin heat is off.**

<u>The Entry</u>

From level flight at 70–75 KTS, 500–700 feet AGL, and headed into the wind, smoothly, but firmly, decrease the throttle to idle applying right pedal to correct for the change in torque. When the throttle is at idle immediately lower the collective full down simultaneously applying aft cyclic to maintain a level attitude. **It is important not to lower the collective until the throttle is at the idle position to prevent an N2 overspeed. Crosscheck attitude, trim, rotor RPM, and airspeed.**

<u>The Glide</u>

After the autorotative decent has been established, slowly reduce the airspeed to 60–70 KTS and maintain this attitude throughout the glide. During autorotative glides, attitude control should be accomplished by reference to the horizon not the airspeed indicator. Maintain rotor RPM between 95% and 100% and the aircraft in trim. Below 100 feet AGL, maintain the aircraft ground track with a slip. A constant 60–70 KT attitude should be held with the cyclic. Avoid looking straight down in front of the aircraft. Continually crosscheck attitude, trim, rotor RPM, and airspeed.

100 FT DECISION CHECK

Prior to the helicopter descending through 100 feet AGL, the instructor should make an immediate power recovery if the following three conditions do not exist:

1. **Rotor RPM stabilized between 95%–100% RPM.**
2. **Airspeed stabilized 60–70 KTS.**
3. **A normal rate of decent, usually less than 1500 FPM.**

(At density altitudes above 4000 feet the Decision Check should be completed prior to descending thru 200 feet.)

<u>The Flare</u>

At approximately 40 feet AGL, begin the flare with aft cyclic to reduce forward airspeed and decrease the rate of descent. The amount of flare will depend on wind conditions and gross weight, and should gradually be increased so that groundspeed and rate of descent are significantly decreased. Too much flare will cause the helicopter to balloon

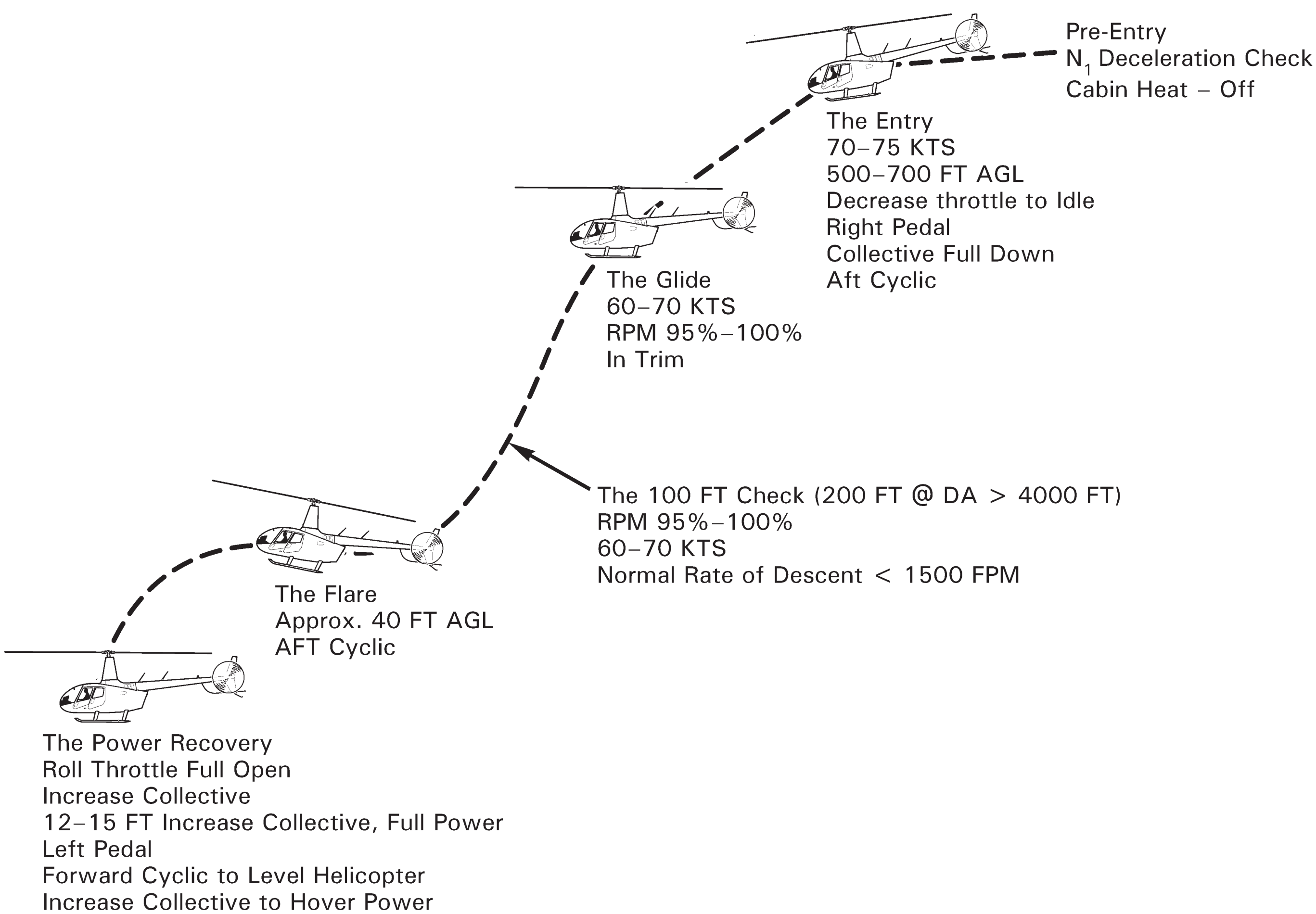
STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY (cont'd)

The Flare (cont'd)

up causing a high vertical descent rate as airspeed is lost and too little flare will not adequately reduce the groundspeed.

The Power Recovery

Due to the inherent lag or delay in the response time of turbine engines, power must be increased much sooner than in a piston helicopter such as the R22 or R44. Just prior to beginning the flare or immediately after initiating the flare, roll the throttle full open then slightly increase the collective to put a load on the engine as it spools up. At approximately 12–15 foot skid height, as the forward speed decreases slowly raise the collective allowing the engine to spool up to full power, maintaining heading with left pedal. Begin to level the helicopter with forward cyclic. Extreme caution should be used to avoid an excessive nose high/tail low attitude below 10 feet. Just prior to achieving a level attitude, with the nose still slightly up, continue to increase the collective to reduce groundspeed and sustain a hover. Slight forward movement as the helicopter comes to a hover is acceptable. Do not allow the helicopter to descend below 5 feet during the power recovery.



STRAIGHT-IN AUTOROTATION WITH POWER RECOVERY (cont'd)

The Touchdown

At the completion of the flare, approximately 5–8 foot skid height, begin to raise the collective to slow the descent rate and decrease the forward speed. At the discretion of the pilot, one of two techniques can be used for increasing the collective. Use either a small, quick “initial pitch pull” immediately followed by a slow “cushioning” increase in collective or one smooth, steady increase of the collective. Unlike the power recovery autorotation, the nose will yaw to the left when the collective is raised due to the friction through the main rotor gearbox and drive train, requiring the need for right pedal to keep the aircraft aligned with the ground track. The most important aspect of the touchdown is to land in a level flight attitude with the skids parallel to the ground track. Landing with the aircraft drifting left or right, skids offset from the ground track or excessively on the “heels” or “toes” of the skid gear can all result in aircraft accidents. Once the aircraft is on the ground the collective can be slowly lowered to act as a brake (assuming the landing is on a hard surface). Aft cyclic should not be used to slow the aircraft on the ground as excessive blade flapping could lead to tail boom contact.

PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	95%–100%	95%–100%
Airspeed	+10 KTS	± 5 KTS

180º AUTOROTATION WITH POWER RECOVERY

PURPOSE:

To simulate safely landing the helicopter by turning 180º with a complete power loss.

DESCRIPTION:

NOTE

1. **Prior to conducting a practice autorotation, insure an N1 Deceleration Check has been performed in accordance with the R66 Pilot's Operating Handbook.**
2. **Insure the cabin heat is off.**

The Entry

Establish the aircraft on downwind at 75 KTS and a minimum of 700 feet AGL (higher entry altitudes are recommended for initial training). When abeam the intended touchdown point smoothly but firmly, decrease the throttle to idle, applying right pedal to correct for the change in torque. When the throttle is at idle immediately lower the collective full down simultaneously applying aft cyclic to maintain a level attitude. It is important not to lower the collective until the throttle is at the idle position to prevent an N2 overspeed. Crosscheck attitude, trim, rotor RPM and airspeed.

The Glide / Turn

After the descent is established, apply aft cyclic to achieve a 60–70 KT attitude, then roll into a 180º turn. The proper angle of bank will be determined by wind velocity, but use caution to avoid an excessively steep turn, as this will increase the descent rate. Throughout the turn, it is important to maintain the proper attitude (airspeed) and keep the aircraft in trim. Changes in the aircraft's attitude and the angle of bank will cause corresponding increases and decreases in rotor RPM. Adjust the collective as necessary in the turn to maintain rotor RPM between 95%–100%. Continually crosscheck rotor RPM, attitude and trim in the turn. The turn should be completed and the helicopter aligned with the intended touchdown area prior to passing through 100 feet AGL. If the collective has been increased to load the rotor during the turn, it may have to be lowered on roll out to prevent decay in RPM.

100 ft Decision Check

Prior to the helicopter descending thru 100 feet AGL, the instructor should make an immediate power recovery if the following four conditions do not exist:

1. Aircraft aligned with the touchdown point (turn completed).
2. Rotor RPM stabilized between 95%–100%.
3. Airspeed stabilized 60–70 KTS.
4. A normal rate of decent, usually less than 1500 FPM.

(At density altitudes above 4000 feet the Decision Check should be completed prior to descending thru 200 feet.)

180º AUTOROTATION WITH POWER RECOVERY (cont'd)

The Flare

Same as straight-in autorotation.

Power Recovery

Same as straight-in autorotation.

Touchdown

Same as straight-in autorotation.

PERFORMANCE STANDARDS:

	Private	Commercial
Predetermined Spot	± 200 feet	± 100 feet
RPM	95%–100%	95%–100%
Airspeed	+10 KTS	± 5 KTS

POWER FAILURE AT A HOVER—HOVERING AUTOROTATION

PURPOSE:

To simulate landing the helicopter from a hover with a complete power loss.

DESCRIPTION:

Begin from a stabilized 3–5 foot hover over level terrain and headed into the wind. If necessary, reposition the left hand so that the throttle can easily be rolled off. Firmly roll the throttle off to the idle position while simultaneously adding right pedal to maintain heading. The loss of tail rotor thrust will cause a left drift requiring a slight right cyclic correction. Use caution not to raise or lower the collective when rolling off the throttle. As the aircraft settles maintain a level attitude by looking 50–75 feet in front of the aircraft. Due to the N1 deceleration schedule in the turbine engine, the left yaw and descent rate will be less than in a piston engine or in an actual engine failure. At approximately 1–2 feet, fully raise the collective to slow the rate of descent and cushion the landing. As the skids touch down, apply slight forward cyclic. Once firmly on the ground, slowly lower the collective full down. Use caution to avoid any sideward or rearward movement on touchdown to prevent the possibility of a rollover.

If simulating a tail rotor failure at a hover, allow the helicopter to yaw a maximum of 90° to the right, then perform the hovering autorotation.

NOTE

Other than for a T/R failure at a hover, it is recommended that the instructor rolls the throttle off, then the student maintains heading with right pedal once the engine failure is detected.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown	Level	Level

POWER FAILURE AT ALTITUDE—FORCED LANDING

PURPOSE:

To teach the student how to recognize an engine failure, properly enter an autorotation, select a landing area and maneuver to it.

DESCRIPTION:

During cruise flight with the student at the controls; the instructor will initiate the forced landing by rolling the throttle smoothly to the idle position splitting the needles. The student will immediately lower the collective full down co-coordinated with the right pedal for trim, and aft cyclic to maintain attitude. This should be accomplished quickly enough to prevent the rotor RPM from decaying below 88%. As the rotor RPM builds back into the green, increase collective as necessary to maintain rotor RPM between 95%–100%. Once established in an autorotative descent, select an intended landing area. Maneuver the helicopter as necessary to align the aircraft with the intended landing area, generally headed into the wind. Use increases in the collective and/or forward cyclic to prevent the rotor from over speeding while maneuvering. Airspeed should be adjusted to 60–70 KTS.

Prior to passing through 300 feet, the aircraft should be aligned with the touchdown area, at 60–70 KTS, rotor RPM between 95%–100%, and in trim. Execute a power recovery and transition to normal climb.

NOTE

Insure an N1 deceleration check has been performed and the cabin heat is off prior to conducting this maneuver.

The instructor should apply the recommendations contained in Safety Notice #27.

PERFORMANCE STANDARDS:

	Private	Commercial
RPM on Entry	Above 88%	Above 88%
Airspeed	+10 KTS – 5 KTS	+5 KTS
Area Selection	Suitable	Suitable

RAPID DECELERATION (QUICK STOP)

PURPOSE:

To simulate a condition when a rapid decrease in forward airspeed is required as in an aborted takeoff.

DESCRIPTION:

Perform a normal takeoff into the wind. Once a minimum altitude of 25 feet is attained, apply additional forward cyclic to accelerate to 40–50 KTS while maintaining altitude. Begin the quick stop by smoothly lowering the collective, adding right pedal, and simultaneously applying aft cyclic to decelerate. Apply aft cyclic as needed to maintain entry altitude throughout the deceleration. As airspeed is lost, the helicopter will begin to settle. Slowly raise the collective to control the rate of descent adding forward cyclic to level the helicopter. Maintain heading with pedals. Terminate at a stabilized 5-foot hover. Use caution to avoid terminating at a high hover or in an extreme tail low attitude.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Altitude	± 15 feet	± 10 feet
Termination Point	± 50 feet	± 25 feet

SHALLOW APPROACH AND RUNNING LANDING

PURPOSE:

To simulate an approach and landing when sufficient power for hovering is not available.

DESCRIPTION:

On final approach, the helicopter should be headed into the wind at 60 KTS and 300 feet AGL. When a shallow approach angle of 5° is intercepted, begin the approach by lowering the collective to maintain the approach angle. Maintain entry airspeed until apparent rate of closure and groundspeed appear to be increasing. Begin a slow deceleration with aft cyclic, maintaining approach angle by reducing collective and keeping the aircraft in trim. Plan to arrive at the point of intended touchdown at or slightly above effective translational lift. Prior to ground contact, insure that the helicopter is in a level attitude. After ground contact, maintain heading with pedals and slowly lower the collective for braking action until the helicopter comes to a complete stop.

Crosswind Considerations:

As in normal and steep approach, crab the helicopter above 50 feet AGL, and use a slip below 50 feet AGL to align the aircraft with the ground track.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°
Touchdown Point	± 50 feet	± 25 feet
Touchdown Speed	Above ETL	
Torque	Less than hover power	

SLOPE OPERATIONS

PURPOSE:

To land from a hover and takeoff to a hover from a sloping surface.

DESCRIPTION:

Prior to conducting slope operations, the pilot must be thoroughly familiar with dynamic rollover characteristics. For training, use a maximum slope angle of 5°.

Slope Landings:

Position the helicopter cross slope at a stabilized 5-foot hover headed into the wind. Lower the collective slightly to establish a slow rate of sink. When upslope skid contacts the ground, begin applying lateral cyclic in the direction of the slope (upslope) to hold the skid against the slope. Maintain heading with pedals. Continue to apply cyclic into slope as the collective is lowered until the down slope skid is firmly on the ground. Once the collective is full down, center the cyclic to allow safe “head clearance” on the upslope side.

Slope Takeoffs:

The procedure for a slope takeoff is almost the exact reverse of that for a slope landing. Apply cyclic into the slope (upslope) and slowly begin to raise the collective. As the helicopter becomes light on the skids, pause and neutralize any aircraft movement. Continue to raise the collective maintaining heading with pedals. When the down slope skid breaks ground, slowly begin to center the cyclic. As a level attitude is reached, the cyclic should be approximately neutral. Continue to raise collective, maintaining position over the ground with cyclic and heading with pedals until a stabilized 5-foot hover is attained.

PERFORMANCE STANDARDS:

	Private	Commercial
Heading	± 10°	± 5°

VORTEX RING STATE

PURPOSE:

To demonstrate the dangerous results of operating at low airspeeds, moderate to high power settings, and high rates of sink (Vortex Ring State).

DESCRIPTION:

The vortex ring state is most dangerous when it happens at relatively low altitudes. The most common condition is during a steep approach with a tailwind. It should be demonstrated at an altitude of at least 1000 feet AGL.

To enter a maneuver, adjust the power to approximately 30% torque. Hold altitude with aft cyclic until the airspeed approaches 20 KTS. Allow the sink rate to increase to 300 FPM or more as the attitude is adjusted to obtain airspeed of less than 10 KTS. The aircraft will begin to shudder. Application of additional up collective will increase the vibration and sink rate while the cyclic and pedal effectiveness is reduced. Once the condition is well developed, rate of sink in excess of 2000 FPM can result. Recovery should be initiated at the first sign. The maneuver can also be entered from an OGE hover.

There are two recovery techniques:

1. The traditional technique is to apply forward cyclic to increase airspeed and simultaneously reduce the collective. When the airspeed indicates 20–30 KTS and the trim strings have become effective raise the collective to takeoff power and adjust the cyclic to a maximum performance climb attitude. The recovery is completed when the VSI reads 0.

2. A more efficient recovery technique is called the Vuichard Recovery. Initiate the recovery by raising the collective to takeoff power (70% torque for training), simultaneously applying left pedal to maintain heading and right cyclic (10°–20° bank) to get lateral movement. Once the right side of the rotor disc reaches the upwind part of the vortex the recovery is completed. Average loss of altitude during the recovery is 20–50 feet.

PERFORMANCE STANDARDS:

The pilot must thoroughly understand and recognize the vortex ring state and be able to safely recover using either of the above recovery techniques.

ENHANCED AUTOROTATION PROCEDURES

PURPOSE:

To understand the different elements that can be used to maneuver the helicopter in autorotation. This training is only recommended for students who hold at least a private pilot certificate.

DESCRIPTION:

Each element will be discussed. Once the student has an understanding of the elements one or more can be combined in one autorotative glide.

Use of turns

Left, right, or "S" turns can be used to decrease the glide distance in autorotation. It is important to maintain proper attitude and trim when turning to prevent increased descent rates. Adjust the collective as necessary in the turn to maintain rotor RPM between 95%–100%. A large turn (270°–360°) is not recommended since for much of the turn the pilot will lose sight of the landing area and will be unable to determine the effect of wind on the glide.

Use of airspeed

Airspeeds from zero to max glide airspeed (90 kts in an R66) can be used to adjust the autorotative glide distance as necessary. Maximum glide distance configuration is covered later in this maneuver so this discussion concerns reducing airspeed. It is recommended an entry altitude of 1500–2000 feet AGL be used so the student can get an extended time flying at the lower speeds in autorotation. Enter the autorotation so that a normal glide will take the helicopter well past the point of intended landing thus requiring a shortened glide distance. Once the glide is established apply aft cyclic to a 10°–15° nose high attitude. Adjust the collective as necessary to control increases in rotor RPM. At approximately 25–30 kts the nose of the aircraft will come down to a level attitude due to the upward flow of air acting on the tail cone and horizontal stabilizer. Maintain this configuration and observe the landing area moving up on the windshield. When a normal autorotative angle is achieved or approaching 500 feet AGL, lower the nose to 10°–15° nose down to increase airspeed back to the normal autorotative speed of 60–70 kts.

Use of pedals

Set the maneuver up at 1500–2000 feet AGL with the point of intended landing and the wind 90° from the helicopter's ground track (out the left or right door). Since the left pedal is the strong pedal in autorotation, it is recommended the landing area be positioned out the left door requiring left pedal to turn. However, the student should experience use of both pedals. Enter the autorotation and slow the airspeed as in the "use of airspeed" maneuver. Once the nose comes down to the level attitude, apply pedal to align the aircraft with the desired track towards the landing area. Use of left pedal will decrease the rotor RPM requiring the pilot to lower the collective as necessary to maintain the rotor RPM. (cont'd)

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Use of pedals (cont'd)

The remainder of the maneuver is the same as the “Use of airspeed” discussion.

Use of sideward flight

The purpose of using sideward flight in an autorotative glide is when the point of intended landing is almost directly below the helicopter. Set up the condition with the wind 90° (left or right) from the aircraft’s ground track at 1500–2000 feet AGL. Enter the autorotation directly over or just prior to the intended landing area. Decrease the airspeed as in the “Use of airspeed” maneuver. When the nose comes down to the level attitude apply lateral cyclic in the direction of the desired sideward flight and opposite pedal to prevent the aircraft from weather vaneing towards the direction of flight. The resulting slip and wind direction will move the helicopter downwind from the landing area. Once the helicopter is far enough away from the landing area stop the sideward flight with opposite cyclic. Opposite pedal is then applied (as in the “use of pedal” maneuver) to align the aircraft into the wind tracking towards the landing area and lower the nose to regain airspeed. Again, left pedal is the strong pedal in autorotation, so sideward flight to the right, requiring the use of left pedal is the easier of the two sideward flight directions.

CAUTION
When using the above techniques to maneuver in autorotation the nose must be lowered to regain airspeed no lower than 500 ft AGL. Below 500 ft AGL use only turns to maneuver.

Maximum Glide Distance Configuration

In FAR Part 27 approved helicopters the maximum glide distance configuration is found in the Pilot’s Operating Handbook (POH). It is 90 kts/90% rotor RPM in the R66. The purpose in practicing this maneuver is not only to glide the furthest distance in autorotation, but also, to get the pilot accustomed to the low RPM warning system being on for extended periods and developing the pilot’s ability to determine if a glide will be “to long” or “to short”. Enter the autorotation at 1500–2000 feet AGL to give the student an extended time to fly at the max glide configuration. Adjust the airspeed to 90 kts and increase the collective to set the rotor RPM at 90% (the low RPM horn/light will be on the entire time the RPM is below 95%). It’s very important to keep the aircraft in trim during the entire glide. While at the max glide configuration reference any movement of the point of intended landing up or down on the windshield. If the landing area moves up the glide will not reach the area and a new area should be selected. If the landing area begins to move down then the glide will take the aircraft past the area so exit the max glide configuration. Allow the rotor RPM to build back into the normal range below 500 ft AGL.

ENHANCED AUTOROTATION PROCEDURES (cont'd)

Minimum Rate of Descent Configuration

The minimum rate of descent configuration is also found in the POH. It is 60 kts/90% rotor RPM in the R66. The purpose of practicing this maneuver is not only to autorotate at the slowest descent rate, but also, to practice preforming another procedure such as an air restart, mayday call or a reconnaissance of the landing area while still flying the helicopter in autorotation. Enter the autorotation at 1500–2000 feet AGL. After establishing an autorotative glide simultaneously apply aft cyclic to slow the helicopter to 60 kts and raise the collective to reduce the rotor RPM down to 90% (the low RPM horn/light will be on the entire time the RPM is below 95%). Realize that these two control inputs compete with each other, in that the aft cyclic tends to increase the RPM while the pilot is trying to reduce the RPM with the collective. First, build proficiency establishing and maintaining the minimum rate of descent configuration then add the performance of a task such as, a simulated air restart, mayday call, or reconnaissance into the autorotation. Return to the normal airspeed and rotor RPM prior to descending below 500 feet AGL.

PERFORMANCE STANDARDS:

The student will have an understanding of the techniques that can be used to maneuver the helicopter in autorotation and be able to use these techniques to maneuver within 100 feet of a predetermined spot.

HYDRAULIC OFF APPROACH AND LANDING

PURPOSE:

To simulate an approach and landing with a hydraulic system failure.

DESCRIPTION:

NOTE
It is recommended this maneuver only be performed with an instructor at one set of controls.

During cruise flight or on downwind in the traffic pattern, the instructor will identify the hydraulic control switch, instruct the student to relax on the controls, then turn the hydraulic control switch off. Once the increase in control forces is noticed, the pilot should simulate executing the hydraulic failure procedure by noting the switch position, simulate turning the switch off and adjusting airspeed for comfortable control. It is suggested the pilot then vigorously exercise the cyclic and collective to develop a feel for the control forces that will be needed. Note a much greater force is needed to raise the collective than to lower it and fore & aft cyclic is much more difficult than lateral cyclic. The R66 Pilot's Operating Handbook (POH) recommends a running landing in the event of a hydraulic control failure. Execute a shallow approach and running landing (page 22). Once the aircraft has come to a complete stop on the ground the instructor should, again, identify the hydraulic control switch, instruct the student to relax on the controls, then turn the hydraulic control switch on.

CAUTION
Below 100 ft AGL on the approach, the hydraulic control switch should not be turned on until the aircraft is at a full stop on the ground. If control of the helicopter becomes questionable, initiate a go-around and do not turn the hydraulics back on until the aircraft is above 100 ft AGL and the airspeed is above 40 knots.

PERFORMANCE STANDARDS:

Touchdown should be above ETL in a level attitude with the skids parallel to the ground track.

HOVER OUT-OF-GROUND EFFECT (OGE)

PURPOSE:

To hover the helicopter out-of-ground effect (OGE), perform 90° hovering turns and properly descend to an in-ground-effect hover (IGE) over a predetermined spot. Recommended minimum OGE hover altitude for training is 50 feet.

DESCRIPTION:

NOTE
It is recommended this maneuver only be performed with an instructor at one set of controls.

The OGE hover can be initiated from the ground or at the termination of an approach. In both cases, proper performance planning needs to be accomplished to insure OGE capability by using the OGE Hover Ceiling vs Gross Weight chart in the Pilot's Operating Handbook and the IGE hover check referenced below.

From the Ground:

Headed into the wind, select at least two outside visual reference points (trees, poles etc.) that will aid in controlling aircraft drift during the maneuver; one point at the 12 o'clock position and one approximately 90° in the direction of the intended turn. These points should be a minimum distance from the helicopter of at least twice the intended hover altitude. Any additional reference points that are available can be used to fine tune position over the ground. Perform a takeoff to a 2 foot IGE hover and complete a hover check to confirm available power. The maneuver should not be attempted unless the IGE hover power is 15% torque or 50°C MGT below the 5 minute limit.

Begin the ascent to an OGE hover by increasing the collective, maintain heading with the pedals and crosscheck both reference points. The lateral reference is especially important to control the common tendency of forward drift during the ascent and descent. Once established at an OGE hover, check power and effects of any difference in wind speed or direction. Use the outside reference points to control drift over the ground and altitude.

It is recommended to begin with a left pedal turn to evaluate the amount of tail rotor thrust available. Since it takes more thrust to stop a right pedal turn, do not attempt a right pedal turn if thrust during the left turn appears marginal. Prior to beginning the turn, clear the area in both directions and anticipate the effect of the wind during the turn. Begin the turn with the appropriate pedal and maintain a slow, steady turning rate. Avoid high turn rates especially with right pedal turns. Stop the turn at the 90° point, stabilize the hover using the reference points then slowly begin a turn in the opposite direction terminating at the original position (heading).

Begin the descent by lowering the collective, maintaining position over the ground with the cyclic. Again, avoid the tendency to drift forward during the descent. Using outside references, maintain a slow, steady descent rate. (cont'd)

HOVER OUT-OF-GROUND EFFECT (OGE) (cont'd)

Terminate the descent at an IGE hover over a predetermined spot or continue to the ground.

From an approach:

On final insure the aircraft is headed into the wind then establish a 5° shallow approach angle to a predetermined spot on the ground. During the last 200 feet begin to slow the closure rate to lose ETL while avoiding a descent rate greater than 300 ft/min. Prior to establishing an OGE hover over the predetermined spot, select the forward and lateral reference points. It is recommended that initially the student be familiar with the predetermined spot on the ground and the reference points and then move to unfamiliar areas.

Once established in an OGE hover over the predetermined spot, proceed as explained in "From the Ground".

Once proficiency in the above conditions is achieved, demonstration/student practice at altitudes above 500 feet AGL will reinforce the importance of proper reference and aircraft control.

RISK MANAGEMENT:

- Understand the risk of operating in the shaded area of the height/velocity diagram.
- Avoid excessive descent rates to prevent entry into the vortex ring state.
- Focus on the need for left pedal to anticipate the loss of tail rotor effectiveness (LTE)
- Monitor engine temperature, pressure and power limits to avoid an exceedance.
- Avoid unnecessary distractions during the maneuver.

PERFORMANCE STANDARDS:

	Private	Commercial
Position over ground	No FAA Private Pilot standards established. RHC recommends training to Commercial standards.	± 10 ft
OGE hover altitude		± 5 feet
Heading		± 5°
Descent Rate		Safe

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REVISION LOG

OCT 2020

The Flight Training Guide list of effective pages and effective dates are given below. If a previously issued page is not listed below, it is no longer an effective page and must be discarded. The issue or revision date is in bold at the top of each revision log page.

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