CHISHOLM, R CIV 023

02+06
02+20

C85-5
F-T-2

OV-1 (MOHAWK)

MANEUVER GUIDE

ABOVE THE BEST

NOVEMBER 1966

UNITED STATES ARMY AVIATION SCHOOL

FORT RUCKER, ALABAMA

PREFACE

The information listed in this publication is to be used as a guide. The procedure explained in performance of maneuver is standard, but is not meant to limit individual technique. Technique differences are separated by a fine line from standardization and technique although some variation in technique will be encountered with different instructors, major differences will be resolved by direct reference to the instructor's guide.

The procedures outlined are not the only acceptable procedures. They are, however, the standard procedures taught in the transition course to provide thorough familiarization with the maneuvers and adequate training for pilot proficiency.

The only emergency procedures covered in this guide are single-engine procedures. All other emergency procedures are adequately covered in the OV-1 Checklist and TM 55-1510-204-10.

NOTES

OV-1 (MOHAWK) STUDENT GUIDE

PURPOSE: To establish a training guide for students in the OV-1 Transition Course at the United States Army Aviation School.

SCOPE: This publication covers the major aspects of maneuvers taught in the OV-1 Transition Course.

OV-1 (MOHAWK) STUDENT GUIDE

PURPOSE: To establish a training guide for students in the OV-1 Transition Course at the United States Army Aviation School.

SCOPE: This publication covers the major aspects of maneuvers taught in the OV-1 Transition Course.

OV-1 (MOHAWK) MANEUVER GUIDE

Section I. CONTACT MANEUVERS AND PROCEDURES

1. TAXIING

a. Definition. To move the aircraft on the ground under its own power not coincident with the takeoff or landing roll.

b. Performance of maneuver.

(1) Power levers will normally be at ground idle while taxiing except when using assymetrical power or reverse power.

(2) During fast taxi and high-wind conditions, the flight controls should be positioned to aid in directional control and keeping the wings level. A firm grip should be maintained on the stick to prevent flapping of the controls.

(3) When reverse thrust is used, it should be taken out at a low-power setting (N_1) to prevent the aircraft from surging forward when coming out of reverse. Reverse with full power should not be used while stopped as it may cause the tail section to strike the ground.

(4) With nose wheel power steering available, it should be used for ease of control while taxiing. Thrust can be reduced by feathering one propeller.

(5) During all taxi operations, use brakes and reverse thrust judiciously.

2. NORMAL TAKEOFF

a. Definition. The procedure by which an airplane attains flying speed and becomes airborne, consistent with positive control and good climb performance.

b. Performance of maneuver.

(1) Head the aircraft straight down the runway with the nose wheel aligned straight ahead, and stop aircraft.

(2) Advance the power levers to obtain 26-36 pounds of torque on each engine; allow engine instruments to stabilize.

(3) Release the brakes, then advance the power levers smoothly to maximum allowable power. Differential power may be used if necessary for directional control.

(4) Apply pressure to the stick as control speed is obtained to maintain level attitude during ground roll. Apply additional back pressure as flying speed is approached (approximately 80 knots) and rotate aircraft to shallow climb attitude.

(5) After breaking ground, maintain a shallow climb until reaching climb airspeed (140 knots).

(6) Complete after-takeoff check.

CAUTION

The power levers must be in the takeoff position to activate the autofeather system in the event of engine failure. Safe single-engine airspeed should be obtained as soon as possible after takeoff.

Note. On crosswind takeoffs, normal crosswind technique is used; in addition, differential power may be applied during initial acceleration.

3. CLIMBS

a. Definition. To fly an aircraft from a lower to a higher altitude.

b. Performance of maneuver.

(1) Normal climbs are performed at 80 pounds of torque and 1600 rpm at 140 knots.

(2) To level off at the desired altitude, gradually lower the nose to obtain normal cruise airspeed. After normal cruise airspeed is obtained, reduce the power and rpm to desired cruise settings.

Note. Although normal rates of climb are performed at 80 pounds of torque, 1600 rpm, and 140 knots, it should be remembered that sustained climbs to altitudes (above 10, 000 feet) are performed at the airspeed (CAS), rpm, and torque pressure as recommended by TM 55-1510-204-10 for best climb rates.

During all climbs, engine instruments should be cross-checked to avoid engine overheating conditions.

4. STRAIGHT AND LEVEL

a. Definition. To fly with the wings level without changing heading or altitude.

b. Performance of maneuver.

(1) When cruising airspeed has been obtained, adjust the power and rpm settings to normal cruise. Normal cruise is performed at 54 pounds of torque and 1450 rpm. At altitudes (above 10, 000), cruise power settings as indicated in TM 55-1510-204-10 should be utilized.

(2) The trim tabs are set to maintain the desired heading and altitude.

(3) In addition to outside reference, some use of attitude instruments may be desired.

Note. Propellers may be synchronized manually or by synchrophasing.

5. SLOW FLIGHT

a. Definition. Slow flight is flight at an airspeed less than cruising airspeed to give the student a better understanding of the capabilities and limitations of the airplane, and practice in maneuvering at slow speed.

b. Performance of maneuver.

(1) Clean configuration. 30

(a) 1600 rpm.

(b) Power as desired.

(c) Use speed brakes as desired.

(d) Adjust power and pitch to maintain altitude and 110 knots.

(2) Landing configurations. 54

(a) 1600 rpm.

(b) Power as desired.

(c) Extend speed brakes.

(d) Lower landing gear and flaps after airspeed dissipates to below 153 knots.

(e) Adjust power and pitch to maintain altitude and 80 knots.

(3) Maximum climb.

(a) Full increase in rpm.

(b) Power maximum allowable.

(c) Speed brakes retracted.

(d) Gear retracted.

(e) Flaps 15°.

(f) Establish attitude to maintain 80 knots IAS.

6. STALLS

a. Definition. Attempting to fly the aircraft at an angle of attack greater than the angle of maximum lift. This maneuver is designed to acquaint the pilot with stall characteristics of the aircraft in all configurations and how to effect a recovery.

b. Performance of maneuver.

(1) Clean configuration - power on and power off.

(a) Clear the area and reduce to slow flight airspeed.

(b) Autofeather switch off, rpm to 1600, and power reduced to flight idle for power-off stalls or 26 pounds of torque for power-on stalls.

(c) Smoothly add back pressure to increase the pitch attitude slowly and constantly until stall occurs.

(d) As the stall occurs, simultaneously lower the nose to build up airspeed and add maximum allowable power at a rate compatible with engine acceleration.

(e) Recover with a minimum loss of altitude.

(2) Landing configuration - power on and power off.

(a) Clear the area and reduce to slow flight landing configuration.

(b) Speed brakes out, gear down, and flaps 45° (below 153 knots).

(c) Reduce power to flight idle for power-off stalls or 26 pounds of torque for power-on stalls.

(d) Increase back pressure until stall occurs.

(e) As the stall occurs, simultaneously lower the nose to build up airspeed and add maximum allowable power at a rate compatible with engine acceleration; speed boards in, stop descent.

(f) Raise the gear and flaps to 15°. As the airspeed reaches 100 knots, raise flaps all the way up and complete recovery with minimum loss of altitude.

7. FLIGHT IDLE GLIDES

a. Definition. To fly the aircraft from a higher to lower altitude.

b. Performance of maneuver.

(1) Clean configuration.

(a) 1450 rpm and power to flight idle.

(b) Establish a 110- to 120-knot glide.

(c) Practice turns with various degrees of bank.

(2) Landing configurations.

(a) 1600 rpm and power to flight idle.

(b) Speed brakes out.

(c) Landing gear extended.

(d) Flaps 15° and 45° to demonstrate different attitudes.

(e) Establish 110- to 120-knot glide.

(f) Use clearing turns during prolonged descent.

(3) Recovery to level flight.

(a) Start the recovery above desired altitude by applying power.

(b) Speed brakes in.

(c) Stop descent.

(d) Retract landing gear.

(e) Retract flaps.

8. TRAFFIC PATTERNS

a. Definition. An expeditious method for control of air traffic around a landing area.

b. Performance of maneuver.

(1) Normal traffic pattern.

(a) Performed 1000 feet above the field elevation and rectangular in shape.

(b) Lateral distance from the runway will be the minimum practicable.

(c) Required landing checks will be accomplished at the appropriate places in the traffic pattern.

1. Downwind check should be completed prior to abeam touch-down point.

2. Final check should be made on final prior to touchdown.

(d) Traffic pattern airspeeds prior to base will be 120 knots, gear and flaps extended, and 140 knots in clean configuration.

(e) Base and final legs will be determined by pilot judgment in such a manner to preclude dragging or diving the aircraft on final.

(f) During closed pattern practice of takeoff and landings, the gear may be left in the extended position.

(2) Tactical traffic pattern. A landing approach utilizing a 360° decending turn.

(a) Initial approach will be performed 1500 feet above field elevation and at a distance as desired or as directed.

Note. Tactical patterns may be practiced or demonstrated at higher altitudes (3000, 4000, and 5000 feet).

(b) Initial approach will be performed at cruising airspeed.

(c) On initial approach, autofeather switch off, and increase rpm to 1600.

(d) Just prior to flying over intended touchdown point -

1. Break in the apprcpriate direction with a level steep turn of 45°-60° bank.

2. Reduce power to 26 psi torque.

3. Extend speed brakes.

4. Maintain altitude until 180° of turn and airspeed dissipates to below 153 knots, then complete landing check.

5. Adjust power and bank as necessary to avoid an extended pattern and to maintain correct approach angle.

9. NORMAL APPROACH AND LANDING

a. Definition. The procedure utilized for approach and landing in unrestricted areas.

b. Performance of maneuver.

(1) Reduce power to initiate descent either on downwind or base as required by pattern size. Maintain 100 knots (IAS) on base leg.

(2) Apply full flaps and speed brakes at pilot's discretion and establish 90 knots (IAS) on final approach.

(3) Recheck landing gear down, hydraulic pressure, and maximum rpm.

(4) Minor power and pitch adjustments may be necessary to maintain the desired approach angle to touchdown.

(5) Do not reduce power below flight idle prior to landing rotation.

(6) Touchdown should be made with main gear first.

(7) Use normal crosswind technique, when applicable.

(8) On touchdown, the nose wheel should be held off the ground to effect aerodynamic braking action.

(9) After the aircraft is on the ground, brakes may be used lightly and smoothly at first, gradually increasing brake pressure as the aircraft slows down.

(10) Reverse thrust may be applied if desired.

10. GO-AROUND

a. Definition. Aborted approach procedure.

b. Performance of maneuver.

(1) The decision to go around should be made before a dangerous situation occurs, not after. The go-around capabilities of the aircraft must be well understood in all flight configurations.

(2) The exact procedure will vary according to circumstances; pilot judgment must be used to determine each situation in detail.

(3) Procedures listed in the pilot's checklist will be standard for the situations they are designed to cover.

Note. Procedures for stall recoveries, go-arounds, and missed approaches on instruments will all follow the same technique.

11. LOW-LEVEL NAVIGATION

a. Definition. A low-level, cross-country flight conducted clear of the terrain and below a maximum established altitude to avoid detection.

Note. Current doctrine and directives will be used to establish minimum safe altitude when performing training missions.

b. Performance of maneuvers.

(1) The route to be flown will be determined by the flight instructor.

(2) The student will then, using available charts, plan the flight as follows:

(a) Determine if the flight can be accomplished with available fuel at a predetermined IAS. (Missions normally will be conducted from 180 to 230 knots and the airspeed to be used will be determined by the flight instructor.)

(b) Check en route weather.

(c) Develop a flight log containing -

1. Check points.

2. Distance between check points.

3. Determine headings to be flown.

4. Estimated times between check points.

5. ETE.

(d) The student will be allowed adequate time to plan and study the proposed flight to minimize unnecessary reference to his maps and flight log during the flight.

CAUTION

When flying over populated areas, towns, or airfields, appropriate FAR's will be complied with.

12. CONTOUR FLYING

a. Definition. Low-level flight in which the flight path is conducted to conform, in general, with the contour of the terrain.

Note. Training contour flights will be conducted at minimum terrain clearance as prescribed by current directives.

b. Performance of maneuver.

(1) Contour flying will be conducted in the prescribed contour flying area only.

(2) Cruise airspeed or above should be used.

(3) Power settings should be established prior to starting contour flight.

(4) Any appropriate maneuver may be used to enter contour flight.

(5) During contour flight, the attention of the aviator should be devoted to outside references for control of the aircraft.

(6) The flight path should be planned to avoid steep banked turns.

(7) Plan ahead; avoid abrupt pitch changes to clear obstructions.

CAUTION

When flying over populated areas, towns, or airfields, appropriate FAR's should be complied with.

13. CONTOUR APPROACHES

a. Definition. A landing approach made at minimum altitude, taking advantage of terrain features to conceal the landing area.

b. Performance of maneuver.

(1) Orientation and navigation. The approach route must be planned prior to starting the approach. For training purposes, this will be accomplished by selection of terrain features for check points during a high reconnaissance. Other aids such as suitable maps and radio facilities may be substituted, if available.

(2) Hazards. The risk, when flying at low altitude and slow speed is increased. Aircraft malfunction leaves little time for decisions or action and outside attention prevents frequent scanning of instruments. Wires are one of the greatest terrain hazards because they are difficult to see. Do not rely on the presence of poles to indicate their location. Always assume that wires exist in unknown areas over rivers, highways, between trees, or any place that poles may be concealed. Avoid steep banked turns by planning ahead and pull up and let down gradually over obstacles. Use coordinated controls. Turning radius and wind drift appear exaggerated at low altitude. In the event of aircraft malfunction, utilize excess speed to gain altitude if the situation permits.

(3) Entry. A thorough check of engine instruments should be made and power setting established prior to contour flight. Autofeather switch off and propeller 1600 rpm is recommended, with power levers positioned as necessary to maintain the desired speed. Propeller rpm may be reduced if minimum noise is desirable. Any suitable maneuver may be used to reduce altitude when starting the approach; a simulated approach to some other point and a diving turn are examples.

(4) Approach. Fly at the highest possible altitude that will accomplish the purpose under existing terrain conditions. Do not gain extra altitude to establish a normal approach on short final. Aircraft configuration during the approach is a matter of pilot judgment; at reduced speeds, 15° of flaps, and speed brakes are recommended. At a predetermined point, speed should be reduced and prelanding check initiated. Short final should be flown at a speed to permit landing. A go-around at this point can defeat the purpose of the approach. Speed brakes and 45° of flaps may be reserved until final deceleration for touchdown. In the event initial location of the field is accomplished at contour altitude or if go-around has been executed, low visibility approach pattern may be flown.

(5) Landing. Use normal or shortfield techniques as desired.

Note. Pilots will conform to local regulations pertaining to minimum altitudes and contour areas.

14. NIGHT FLYING

Performance of maneuver.

a. Preflight inspection. Instructor will point out the location and operation of all lighting equipment.

b. Taxi. The taxi light on nose wheel should be used for all ground operations. The wing and tail lights are to be ON at all times. The anticollision lights are to be used as in normal day operations. Adjust cockpit lights as desired.

c. Takeoff. Landing lights and taxi light may be used as desired.

d. During flight. Landing lights and taxi light OFF.

e. Approach and landing. Use landing lights as desired.

15. FORMATION FLYING

a. Definition. To fly two or more aircraft in close proximity with one leader.

b. Performance of maneuver.

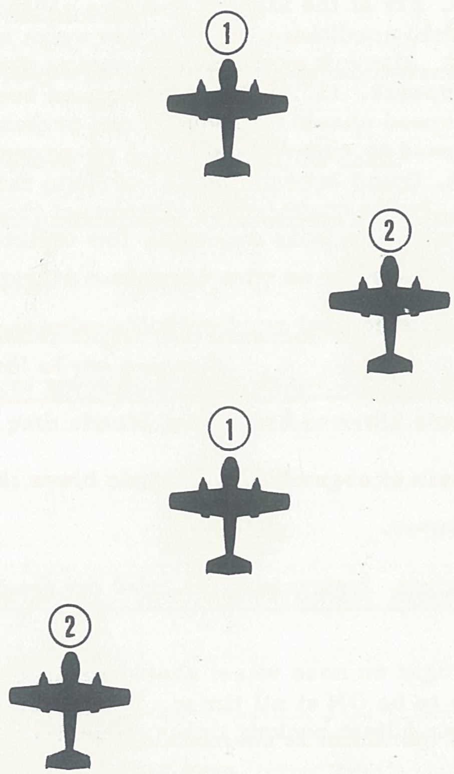
(1) During straight and level flight, the flight leader will maintain a constant power setting. Wing aircraft will maintain constant relative position.

(2) Wing aircraft will be flown with nose to tail and wingtip-to-wingtip clearance to other aircraft.

(3) Because of poor visibility, wing aircraft will be flown in a step-down position so that the lead aircraft will be in sight at all times.

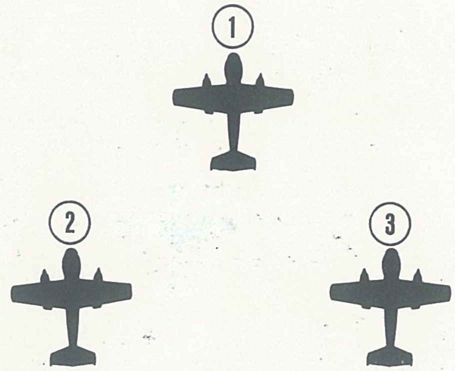
(4) During turns, descents, and climbs, the leader will execute a smooth coordinated maneuver. Wing aircraft will maintain the same relative position to the lead aircraft as in straight and level flight.

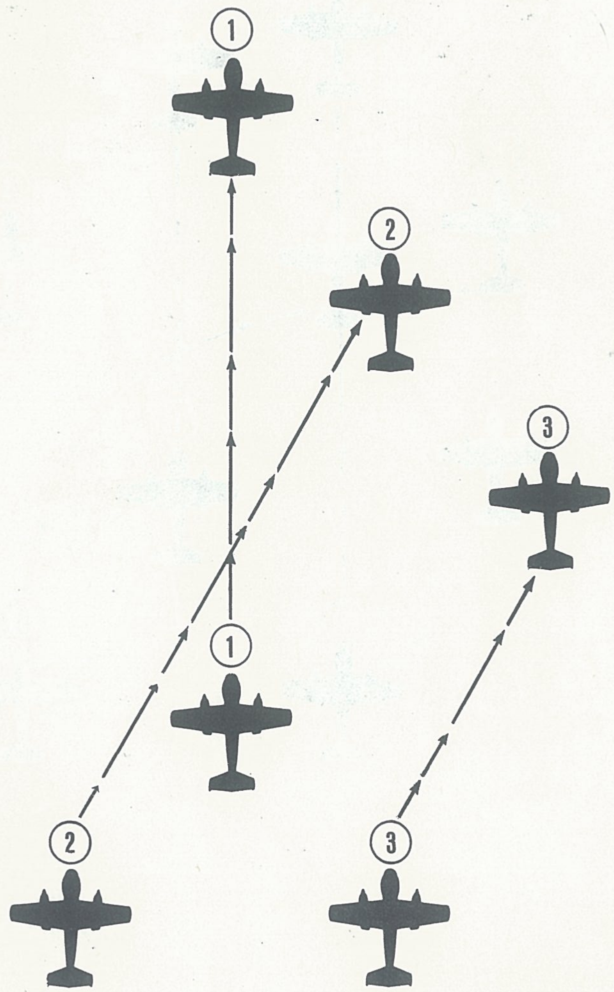
Two-Plane Section.



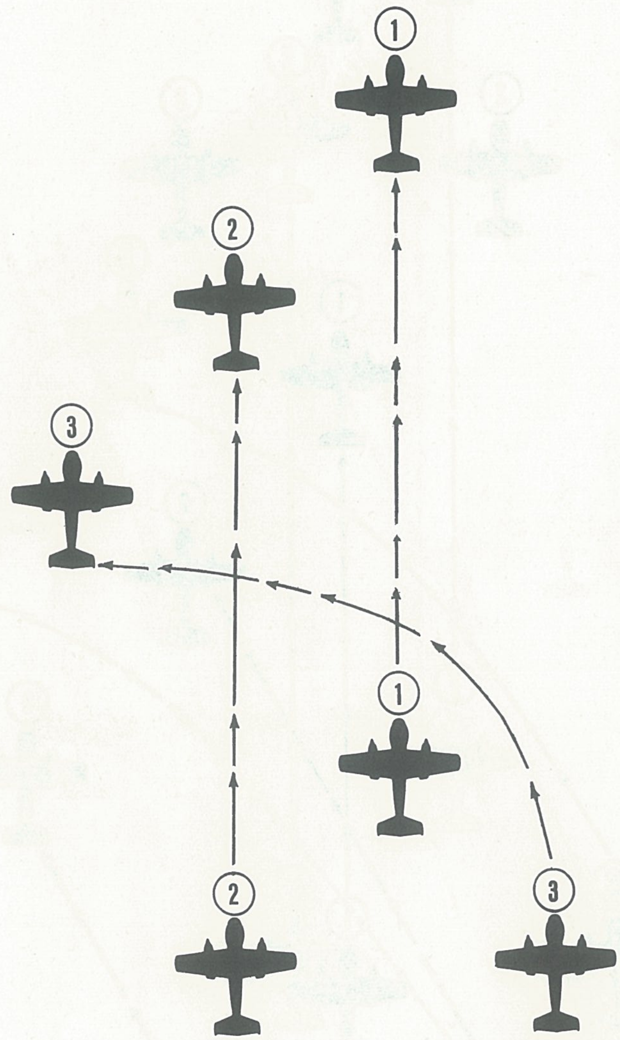
The wingman may fly on the right or left side of the section leader, dependent upon instructions.

Three-Plane Section, V-Formation.



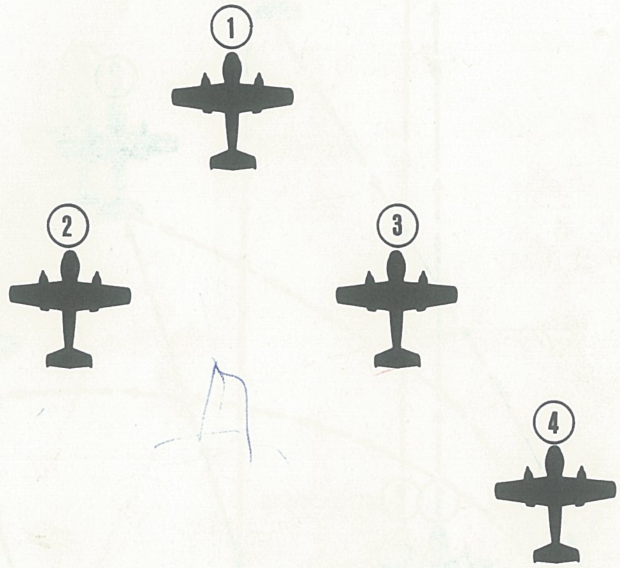


Three-plane section, right echelon formation formed from a three-plane, V-formation.

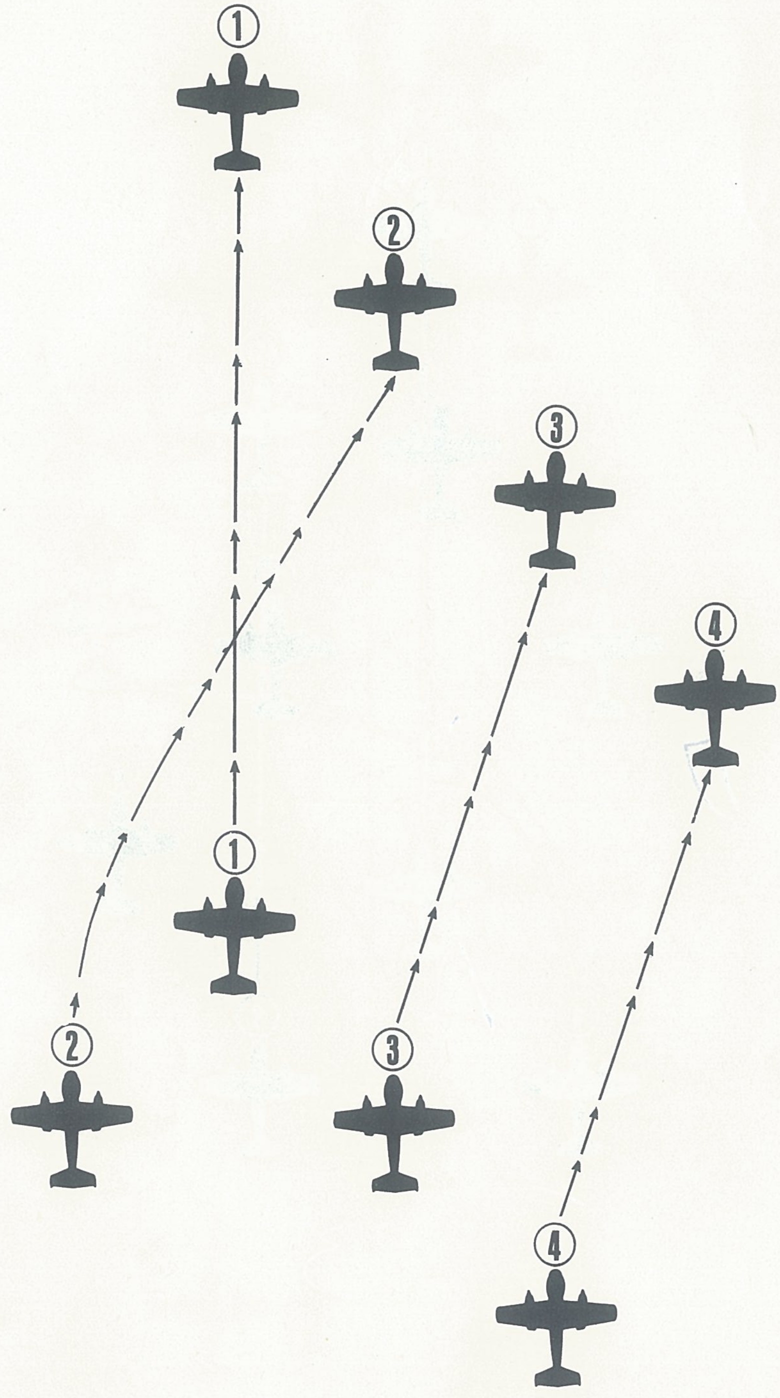


Three-plane section, left echelon formation formed from a three-plane, V-formation.

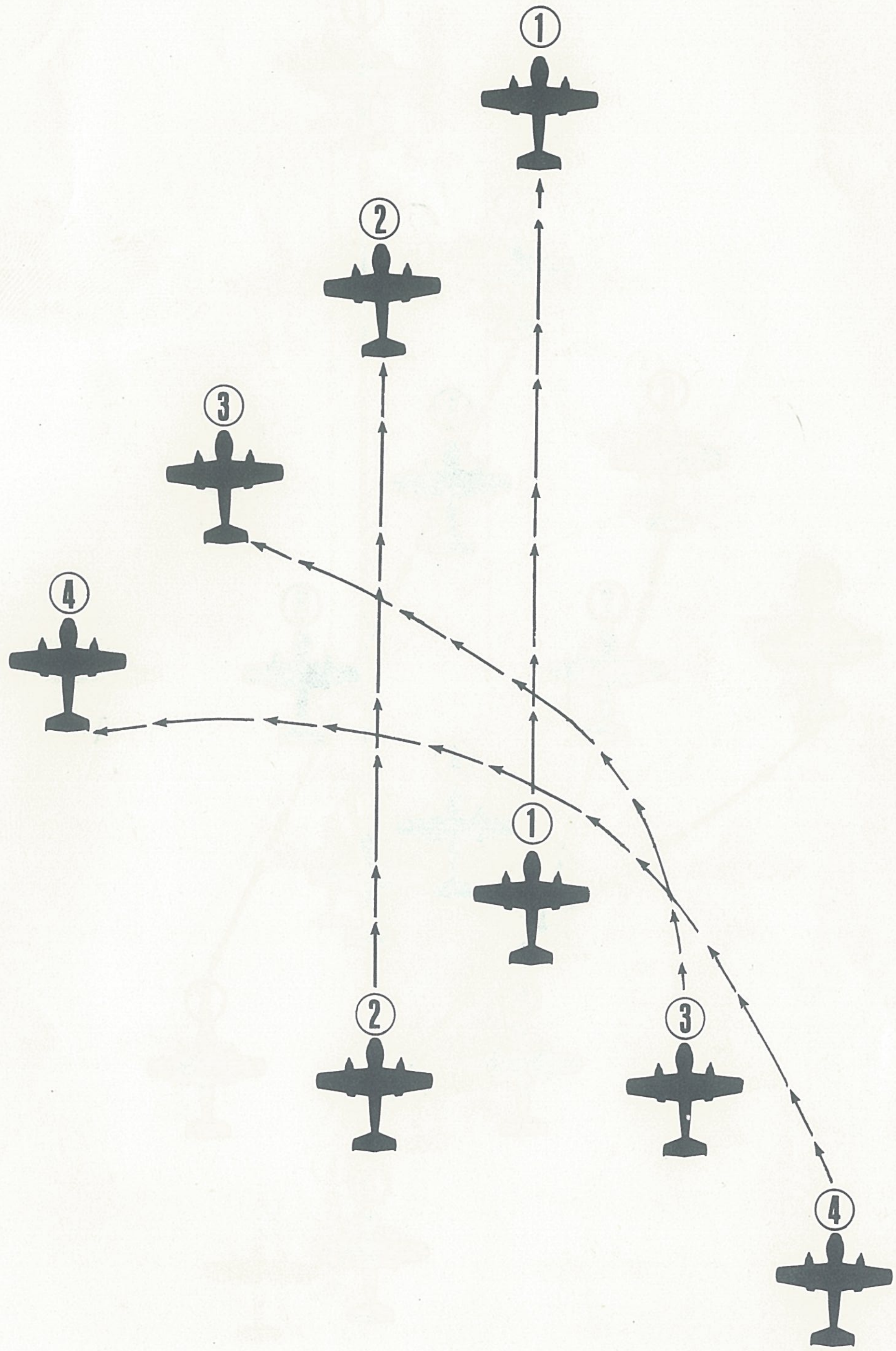
Two-Element Formation.



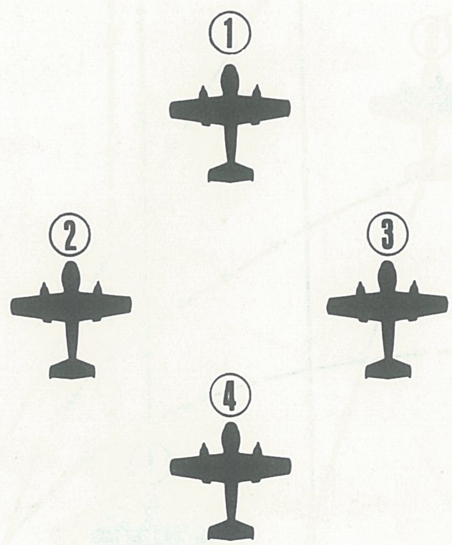
Right Echelon.

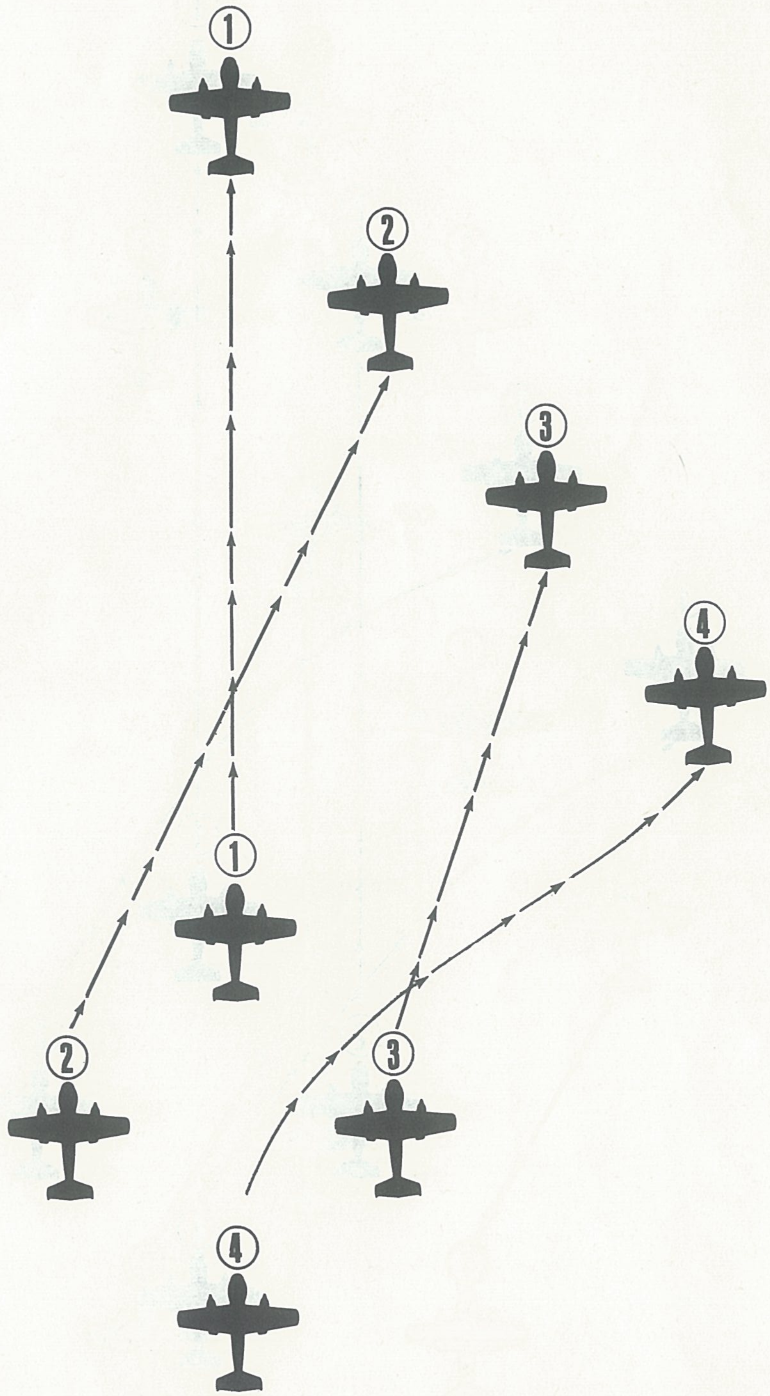


Left Echelon.

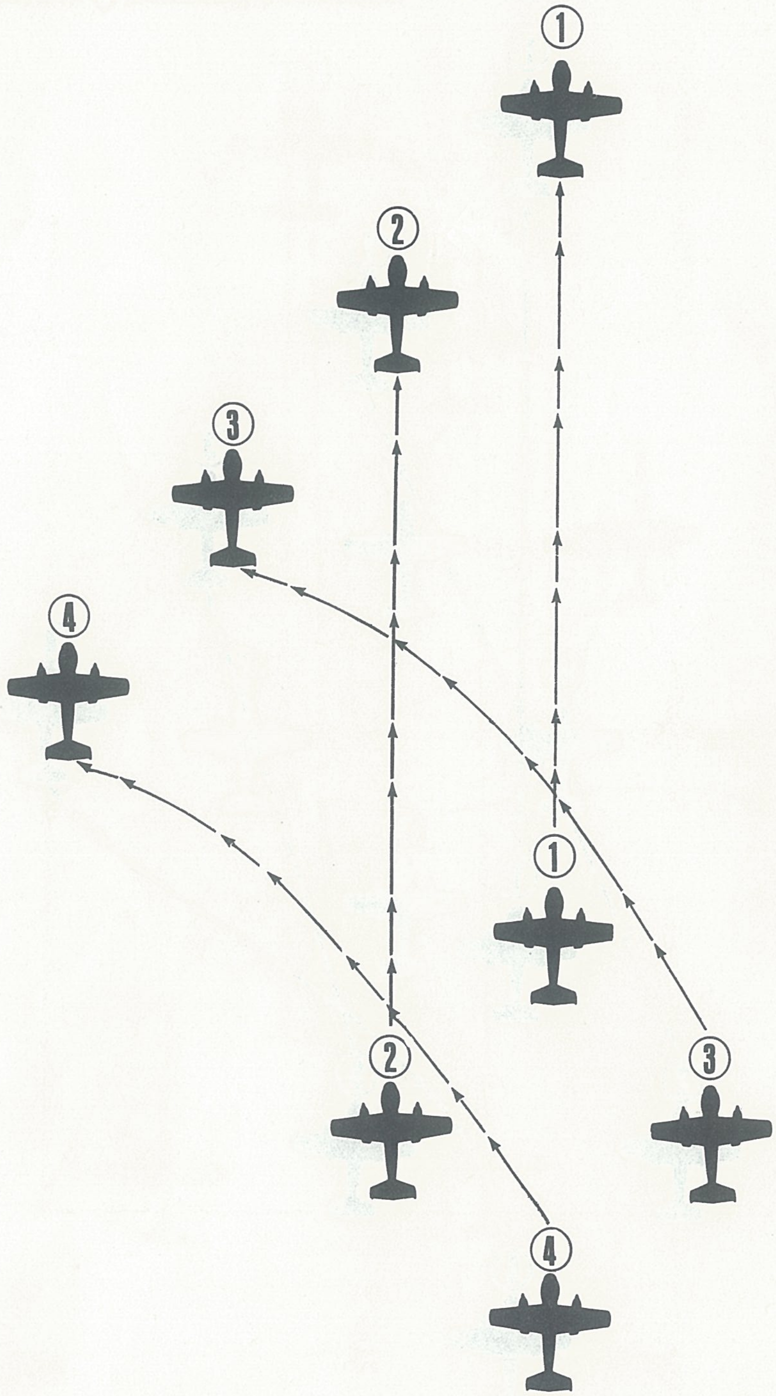


Four-Plane Section ◇ (Diamond) Formation.



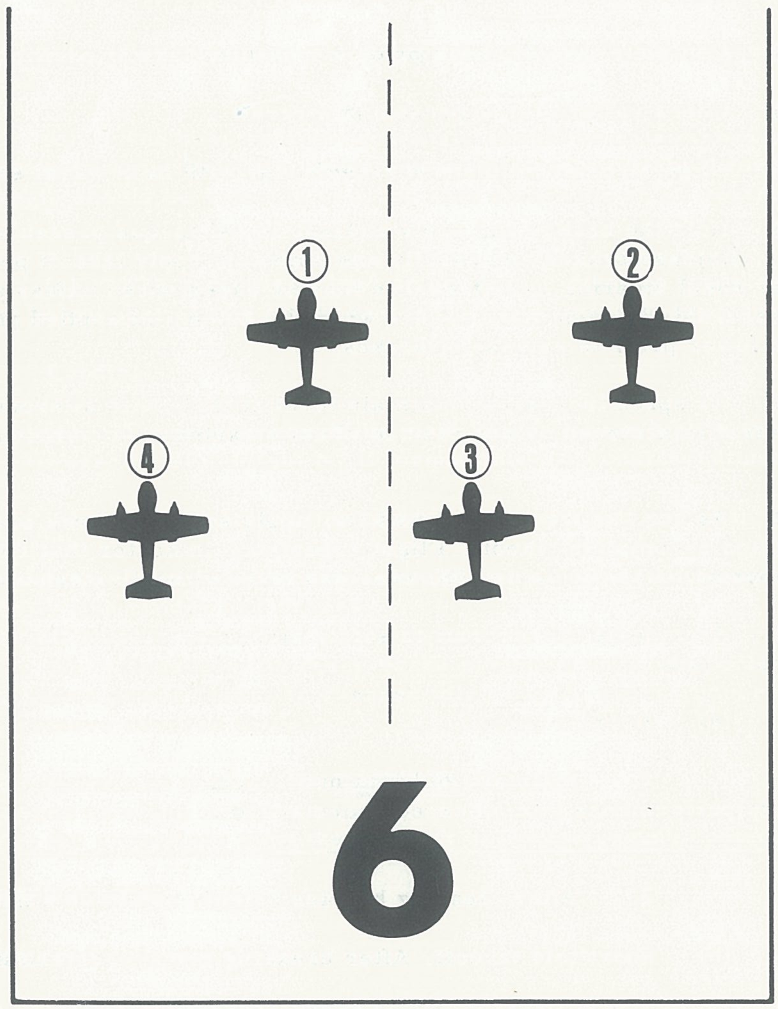


Four-plane section right echelon formation formed from a four-plane ◊ formation.



Four-plane section left echelon formation formed from a four-plane ◊ formation.

Four-Plane Formation Takeoff (Two Elements).



Section II. SHORTFIELD OPERATIONS

16. SHORTFIELD AND BARRIER TAKEOFFS

a. Definition. A takeoff which utilizes minimum ground roll.

b. Performance of maneuver.

(1) Complete takeoff check prior to reaching takeoff position.

(2) Check pattern for approaching aircraft.

(3) Align aircraft in intended takeoff lane with nose wheel straight.

(4) Hold the brakes and apply at least 54 psi torque pressure, if surface is firm and dry. Release brakes and rapidly and smoothly apply takeoff power. In the absence of nose wheel steering, a left swerve may be experienced unless appropriate control action is used; this is even more severe when the amount of applied power causes the left wing to lower prior to release of brakes.

(5) As speed increases, maintain level attitude with ailerons and elevator. Directional control is achieved by use of nose wheel steering or a combination of rudder and ailerons.

(6) As soon as the aircraft will fly, apply sufficient back pressure to raise the nose wheel and accomplish takeoff. Flight experience indicates that rotation should be started at approximately 80 knots IAS, near sea level without external stores.

(7) As soon as the aircraft is safely airborne, retract the landing gear and establish normal climb.

(a) Barrier takeoff.

1. Maintain 90 knots until barrier is cleared. Except for practice of maximum performance climb, exceed normal climb angle as necessary to clear obstructions.

2. After clearing barrier height, establish a normal climb.

(b) Shortfield takeoff. After breaking ground, establish a normal climbout.

Note. 90 knots IAS is recommended for practice of maximum performance climbs in aircraft without external stores under average conditions. For aircraft with stores or operation at high altitude, consult TM for recommended speed.

17. SHORTFIELD APPROACH AND LANDING

a. Definition. An approach made at minimum safe airspeed and landing terminated with shortest ground roll practicable.

b. Performance of maneuver.

(1) Shortfield approach.

(a) Basic technique used is to maintain a constant line of descent with the desired airspeed.

(b) Typical approach speed will be 80 knots after established on final.

(c) Power setting will be approximately 26 psi torque pressure with full increase rpm.

(d) The desired approach angle should be established on base or immediately following completion of final turn and maintained constant throughout final. The approach angle should be selected to allow safe clearance of all obstructions in the approach area.

(e) The decision to land or go around must be made early, usually prior to descent below obstruction height and in all cases prior to touchdown.

(2) Landing.

(a) Touchdown should be made slightly nose high with approximately 26 psi torque pressure, or 80 percent N_1 if torquemeter is considered unreliable.

(b) Immediately after touchdown, apply full power in reverse.

(c) Directional control should be maintained with nose wheel steering or if not available, use rudder and brakes.

(d) Gradually increase brake pressure until stopped. As the aircraft slows to a stop, place power levers in reverse idle. As N_1 speed reduces to idle and the aircraft stops, remove reverse thrust.

CAUTION

Do not reverse the propellers until the aircraft has made ground contact.

18. STRIP OPERATIONS

a. High reconnaissance.

(1) The high reconnaissance is an observation of a preselected possible landing area by the aviator at altitude.

(2) Performance of maneuver.

(a) Locate landing area.

(b) Select altitude that will insure good observation; normally, 1000 feet above terrain.

(c) Look for -

1. Length of strip.

2. Direction best for landing.

3. Surface and slope.

4. Barriers.

5. Surrounding terrain.

6. Touchdown area; and

7. Plan low reconnaissance.

(3) Teaching points. When the strip has been located and positively identified, the aviator begins his high reconnaissance. There is no set pattern or procedure to follow in performing the high reconnaissance. It may be done downwind, upwind, or crosswind. The student should strive to achieve expediency in performing the high reconnaissance with sacrificing thorough consideration of all factors involved. The high reconnaissance should be performed with enough lateral distance from the strip to allow the pilot to make his observations from a comfortable angle and near enough to insure that all features are clearly seen.

(a) Length of strip. Considering the capabilities of the aircraft and the aviator, insure the length is sufficient to provide both a safe landing and takeoff.

(b) Surrounding terrain. Consider the terrain features around the strip and their relation to the strip.

(c) Type and dimensions. Determine the type of surface on the strip and estimate its length. Consider the width of strip.

(d) Slope. Determine the slope of the strip, if any, and gage its extent and steepness.

(e) The approaches. Consider the approaches to the strip and estimate the height and proximity of any barriers present. Examine the barriers to determine the best location for placing the approach.

(f) Direction of landing. Considering the wind, the approaches, the slope of the strip, and terrain, determine the best direction for landing.

(g) The touchdown area. The usable area in which a landing can be accomplished that allows a safe roll-out.

b. Low reconnaissance.

(1) A low reconnaissance is the observation of a proposed landing area from low altitude to inspect the surface of the landing area and determine if a safe landing can be accomplished.

(2) Performance of maneuver.

(a) The low reconnaissance is performed at an altitude which will clear the highest obstacle in the flight path by a minimum safe altitude. This will provide a good view of the strip and allow an adequate safety factor.

(b) At the completion of the high reconnaissance, complete normal downwind check with exception of gear and descend to the position for beginning the low reconnaissance. The approach to this position should be executed in a manner that will insure maximum safety.

(c) All other factors being equal, it is generally better to have the base leg made into the wind where a crosswind exists. This gives the advantage of a slower groundspeed with more time to judge the approach so that the aircraft arrives at the correct position for beginning the low reconnaissance.

(d) Under normal conditions, the low reconnaissance is accomplished at an airspeed of 110 knots.

(e) The aviator plans and executes the approach so that he will be at the proper altitude and speed to perform the low reconnaissance at the approach end of the strip.

(f) Plan the low reconnaissance approach to fly directly over the intended landing path, at a height to clear all obstructions in level flight.

(g) When reaching low reconnaissance altitude, apply sufficient power to maintain altitude and an airspeed of 110 knots or more, depending on turbulence.

(h) When the entire strip has been viewed, the low reconnaissance is completed. Apply climb power and establish a normal climb toward the best terrain or into the wind, according to existing conditions.

(i) If a hazard was discovered during the low reconnaissance, it may be necessary to replan the approach to avoid the hazard. This will be accomplished after climbing back to a safe altitude.

(j) When the approach has been replanned, or if the surface of the strip was satisfactory, the aviator is ready to begin his approach for landing.

(k) More than one low reconnaissance can be made if the aviator deems it necessary; however, each should be made in the safest manner for low observation and not for the purpose of determining the best landing direction by trail approach.

c. Ground reconnaissance.

(1) The ground reconnaissance is the observation from the ground of certain conditions existing on and around a landing area.

(2) Performance of maneuver.

(a) Stop aircraft as soon as safely practicable.

(b) Taxi in known areas only; when in doubt, a ground observer will recon area.

(c) Park aircraft. Taxi aircraft to a safe parking area; it is normally parked with the nose of the aircraft into the wind. Check to insure that the controls are locked and all switches are off with seat on safety prior to leaving the aircraft. When this has been accomplished, the aviator is ready to begin the ground reconnaissance.

(d) The ground reconnaissance is performed to determine the condition of the strip. During the ground reconnaissance, the aviator will -

1. Visually examine the surface of the strip and adjacent taxi and parking areas, noting the positions of any hazards to ground operation of the aircraft.

2. Estimate the height of barriers off the ends of the strip.

3. Check the wind direction and estimate its velocity.

4. Determine takeoff directions. Terrain features of the strip and wind conditions will determine the best direction for takeoff. For this reason, the aviator should always consider all factors in planning the takeoff prior to deciding on the direction.

19. STRIPS

a. Definition. Strips can be defined as areas suitable for and utilized by aircraft for landings and takeoffs.

b. Performance of maneuver.

(1) Location. Efficiently and accurately locating the strip is essential. The shortest route to the coordinates is desirable. Use of prominent landmarks or terrain features should be emphasized.

(2) High reconnaissance. The high reconnaissance should begin when the strip comes into view and is positively identified.

(3) Low reconnaissance. A low reconnaissance will be performed before the initial landing into any strip.

(4) Approaches. An approach with power will be made into all strips. This applies to strips with or without barriers and roadstrips.

(5) Ground operation. Immediately after landing, the aircraft should be stopped as soon as practicable. Taxi operations on the strips should be minimized until proper ground reconnaissance is made.

(6) Ground reconnaissance. A thorough ground reconnaissance will be performed on initial visit to strips. On subsequent visits, only that portion as deemed necessary by the instructor will be required.

(7) Takeoffs. Takeoffs from strips, normally, will be maximum performance. If there is a barrier to be cleared, only the maximum performance climb necessary

to clear the barrier will be used. If the barrier can be cleared in normal climb, do not use maximum pull-up.

(8) Roadstrips. There are factors to consider that are not ordinarily a problem on the average strip. The reconnaissance of roads should include these factors -

(a) Wires.

(b) The width of roads.

(c) Culverts and ditches.

(d) Poles and fences near the road.

(e) Vehicle traffic.

(9) Because of the greater length of the usable landing area in roadstrips, a faster airspeed than normal shortfield approach may be used. However, for a short road, shortfield approach technique will be used.

(10) Because of the comparatively narrow width of roads, directional control is of prime importance.

(11) Aircraft will operate in pairs or maintain radio communication with other aircraft or tower during strip operations.

20. SINGLE-ENGINE PROCEDURES

a. Definition. Action taken by the aviator when one engine fails during flight.

b. Performance.

(1) Engine failure during or immediately after takeoff.

(a) If sufficient runway remains for a normal stop, the takeoff should be aborted and the aircraft stopped by normal braking action.

(b) If the aircraft is airborne and at/or above single-engine climb speed, maintain directional control, jettison external stores if required, and proceed as follows:

1. If propeller autofeathers, follow autofeather procedure outlined in OV-1 Checklist.

2. If propeller does not autofeather, follow manual feather procedure outlined in the OV-1 Checklist.

(c) In the event of engine failure after takeoff at heavy weight, all external stores should be jettisoned immediately and landing gear retracted in order to maintain single-engine climb performance.

(d) Under some atmospheric conditions, maximum allowable torque pressure may be reached before the power levers are full forward. If an engine failure occurs under this condition, advance power levers momentarily to takeoff position to accomplish autofeathering.

(2) Engine failure during cruise flight.

(a) Partial power loss. Accomplish a normal shutdown as outlined in the OV-1 Checklist, if necessary.

(b) Complete power loss. Determine the engine that failed (do not rush) then complete the single-engine failure check as outlined in the OV-1 Checklist.

(c) If the decision is made to attempt an airstart, follow airstart procedure in the OV-1 Checklist.

(d) During cruise flight, the aviator will be required to identify a malfunctioning engine, secure the engine, and continue single-engine flight. A malfunctioning engine may be identified by, but not limited to, -

1. Sudden decrease in EGT (flameout).

2. Sudden increase in EGT (malfunctioning fuel system)

3. Oil pressure out of limits.

4. Oil temperature out of limits.

5. Excessive propeller fluctuation.

6. Fluctuating torque pressure.

7. Sudden decrease in N_1 speed.

(e) Above 10, 000 feet, single-engine operation may require descent to a lower altitude or jettison of external stores.

(3) Engine failure in the traffic pattern.

(a) Manual or autofeather may be used; autofeather is recommended to prevent inadvertent feathering of the operating engine propeller. Use manual feathering if the autofeather system fails to function.

(b) Maintain at least 120 knots IAS with flaps retracted. After extending flaps, maintain at least 110 knots IAS throughout the approach.

(c) Normally, if engine failure occurs prior to base leg, retract the landing gear, if extended. In all cases, it is a matter of pilot judgment when to retract the landing gear, based on airspeed, altitude, and pattern position. The aviator should be well aware of the aircraft's inability to maintain altitude, with one engine inoperative, in landing configuration. As much as 54 psi torque pressure on the operating engine may be necessary to maintain an acceptable rate and angle of descent during landing approach.

(d) An engine failure on short final should require only power and flight control adjustment as necessary to complete the approach and landing as originally planned. The need for propeller feathering, in this situation, can be determined only by judgment and will not normally be accomplished unless aircraft control requires it.

(4) Single-engine approach and landing.

(a) Maintain at least 120 knots IAS in the pattern prior to application of 15° flaps, just before turning base.

(b) Maintain at least 110 knots IAS on base.

(c) When assured that field is made, extend the landing gear; maintain 110 knots IAS.

(d) Increase flaps to 45° prior to the touchdown, if possible.

(e) Once the aircraft is rotated for touchdown, do not attempt a go-around.

(f) Touch down with the nose gear high; utilize aerodynamic drag and smooth braking action to stop the aircraft.

(g) Do not use reverse thrust.

(5) Single-engine climb.

(a) Maintain 120 knots minimum IAS.

(b) Use shallow bank for turns.

(6) Single-engine descents. No special technique is required; maintain the desired airspeed and restrict banks to shallow degrees at low airspeeds.

(7) Single-engine stalls.

(a) Executed the same as normal stalls, except it will be necessary to lower the nose further during initial recovery.

(b) The maximum usable power will be determined by aircraft control (no roll) as well as torque limit. As aircraft control increases, by building airspeed, power should be increased proportionally to maximum allowable limit.

(8) Engine failure during instrument flight.

(a) En route. Use single-engine cruise procedure.

(b) Slow cruise. Use cruise procedure.

(c) Approach.

1. Complete cruise procedure check.

2. Complete landing check except for extending landing gear.

3. Extend gear at aviator's discretion after intercepting final inbound to the airfield.

(9) Single-engine missed approach.

(a) Make decision as soon as possible.

(b) Follow single-engine go-around procedure in OV-1 Checklist.

c. Simulated single-engine procedures.

(1) Autofeather.

(a) The instructor pilot will position the autofeather switch off, then simulate an engine failure by positioning the desired power lever at flight idle.

(b) When the student advances the power lever of the operating engine to takeoff position, the instructor will simulate autofeathering by placing the inoperative engine propeller lever in minimum rpm position.

(c) Student will complete the procedure as listed in the OV-1 Checklist.

(2) Manual feather.

(a) The instructor pilot simulates engine failure by placing the desired power lever in flight idle position.

(b) Student should complete the manual single-engine procedure per OV-1 Checklist.

(3) During cleanup, student should only simulate turning off switches listed in the OV-1 Checklist.

Note. This section covers single-engine procedures only. All other emergency procedures are adequately covered in the OV-1 Checklist and TM 55-1510-204-10.

Section III. AEROBATICS

21. SPINS

The OV-1 is restricted from intentional spins at the present time, detailed techniques will be provided in the event this restriction is lifted.

Normal recovery technique is effective in case an unintentional spin occurs; no known abnormal characteristics exist. If an unintentional spin should occur, use the following procedure for recovery:

a. Power levers - flight idle.

24. HIGH-SPEED DIVE

a. Definition. A high-speed dive is a maneuver in which the maximum allowable airspeed (300 knots) is obtained in a dive, using cruise power (54 psi).

b. Performance of maneuver.

(1) Clear the area.

(2) Establish dive to desired angle (approximately 45°).

(3) Avoid zero or negative G conditions during entry.

(4) Contain airspeed at approximately 300 knots IAS with speed brakes.

(5) Maintain rpm and torque within maximum allowable limit.

(6) Trim as necessary to maintain dive angle.

(7) Initiate recovery at specified altitude.

25. RECOVERY FROM INVERTED FLIGHT

a. Definition. This is a maneuver in which the aircraft is returned to normal straight and level flight from an inverted position.

b. Performance of maneuver. With the aircraft in an inverted position, apply aileron and rudder pressure in desired direction and execute a half-roll to straight and level flight.

26. RECOVERY FROM NEAR VERTICAL FLIGHT

a. Definition. A recovery maneuver which brings the aircraft from near vertical flight to straight and level flight. Prolonged vertical flight is not recommended.

b. Performance of maneuver.

(1) Apply coordinated aileron and rudder pressure left or right to put aircraft in at least a 90° bank.

(2) With the control stick, apply enough back pressure to avoid negative G's.

(3) After the nose of the aircraft passes through the horizon, smoothly apply aileron and rudder to roll the wings level.

(4) Raise the nose back to the horizon with elevator pressure.

Note. If a stall occurs during recovery, the same recovery technique should be used, except immediately reduce power to flight idle.

27. AILERON ROLL

a. Definition. The aileron roll is a maneuver in which the airplane is rolled about its longitudinal axis through 360° primarily by means of aileron.

b. Performance of maneuver.

(1) Clear the area.

(2) Select a point on the horizon or a cardinal heading.

(3) Increase rpm to 1600.

(4) With cruise airspeed (approximately 190 knots), apply back pressure to raise the nose above the horizon (approximately 20°).

(5) Neutralize elevators.

(6) Apply aileron pressure (left or right) in the direction of desired roll.

(7) Maintain sufficient aileron pressure to obtain desired rate of roll.

(8) As aircraft approaches level flight, neutralize ailerons.

Section IV. INSTRUMENT MANEUVERS AND PROCEDURES

28. GENERAL

a. A current instrument card is a prerequisite for this course; therefore, no attempt will be made to duplicate a basic instrument course. This portion of the OV-1 transition training will be conducted as an advanced instrument course and presented in a manner to -

(1) Review all instrument procedures.

(2) Familiarize the student with instrument flight in the OV-1 aircraft.

(3) To develop a proficient advanced OV-1 instrument pilot in the scheduled time.

b. Only those procedures and systems peculiar to the OV-1 aircraft will be included in this publication. Detailed information on instrument flying procedures will be covered in other Army and FAA publications.

29. NORMAL OPERATION

a. Instrument preflight procedures. Current procedures are published in the OV-1 Checklist and will be performed prior to instrument flight.

b. Instrument takeoff.

(1) Align the aircraft on the runway with the nose wheel aligned straight ahead and apply brakes.

(2) Center the steering pointer with the heading knob, approximately runway heading, and recheck gyros for synchronization with the magnetic compass.

(3) Set the pitch bar as desired.

(4) Initially, on takeoff roll, use normal takeoff procedures. To maintain heading control, keep the steering pointer centered and maintain takeoff altitude by reference to the approach horizon.

(5) Apply back pressure to lift the nose wheel off the runway at the recommended takeoff airspeed for the gross weight involved.

(6) When the rate of climb and altimeter indicate a positive climb, perform after-takeoff check.

c. Instrument climbs.

(1) For climbs in the low-altitude airway structure, use normal climbing speeds and altitudes that have been found to be satisfactory under VFR conditions.

(2) For climbs to higher altitude within high-altitude airway structure, use the power setting as recommended in the OV-1 Checklist under miscellaneous from the appropriate climb charts.

d. Cruise flight. Prior to flight, maximum planning should be accomplished for the intended flight utilizing the appropriate charts listed in the OV-1 Checklist under miscellaneous to arrive at proper power settings for flight altitude. Maximum use of these charts should be accomplished to arrive at a realistic fuel consumption for a given flight to insure an adequate fuel reserve.

e. Descents.

(1) The same techniques that are outlined for descents under VFR conditions apply to descents under instrument conditions. However, when making descents from high altitudes, power setting as listed in the appropriate charts in the OV-1 Checklist may be used.

(2) When rapid rates of descents are employed (such as in penetrations), the heating and ventilating system should be turned on for maximum defogging of the windshield.

f. Holding.

(1) When holding, leave the landing gear, flaps, and speed brakes retracted and maintain the necessary power to establish 140 knots IAS at 1450 rpm.

(2) Speed brakes may be utilized as desired to dissipate airspeed when entering or prior to the holding pattern.

g. Instrument approach procedures.

(1) IAS, while operating within an approach control area, may be at 140 knots IAS or above, as desired.

(2) When penetrations are employed in conjunction with an approach, use 180 knots IAS when starting and during the penetration. Penetrations require no special explanation here and are adequately covered in appropriate approach plates. Since high rates of descents are involved, penetrations are planned at a descent of approximately 4000 fpm at flight idle with the speed brakes extended at 180 knots IAS. Normal rates of descents are established after completing the penetration and on the approach. The defogging system will be used during penetrations.

h. FD-105 Integrated Flight System. Procedures to be used will be those as set forth in the FD-105 Integrated Flight System Booklet published by the Collins Radio Company. This booklet will be presented to the student in sufficient time prior to entering the instrument training portion of the OV-1 transition course to allow absorption of the material contained therein.

i. Instrument approach systems.

(1) ADF and RMI.

(a) The operation of the ADF system, except for the presentation in the OV-1, is the same as those the student has already been exposed to; therefore, no detailed information on its operation except for presentation will be given.

(b) The RMI consists of a rotating compass card, a lubber line, and No. 1 and No. 2 needles. The compass card shows the magnetic heading of the aircraft under the lubber line.

1. With the No. 1 or No. 2 needle displaying ADF information from selected stations, the RMI will always give the magnetic bearing to or from the stations.

2. Tracking procedures as previously taught the student will be applied. However, instead of figuring tracks with the stationary ADF card, direct readings of tracks will continuously be given on the RMI, simplifying interceptions and tracking.

(2) VOR.

(a) Basically, the VOR system in the OV-1 is the same type the student has been exposed to, except -

1. The set is digital tuned by setting in the desired VOR frequency.

2. There is no VAR LOC switch.

3. There is a squelch control on the control panel to eliminate background noise.

(b) Although the set is digital tuned, check the aural signal received to insure reception of the desired VOR station.

(c) VOR approaches may be made utilizing the FD-105 display or from the RMI. If the RMI is used for an approach, with VOR information fed to either the No. 1 or No. 2 needle, the approach is performed in the same manner as when ADF information is fed to either the No. 1 or No. 2 needle on the RMI. The student can consider he is now flying radials (as indicated under the selected needle) instead of bearings. The radial is indicated by the No. 1 or No. 2 needle on the compass card of the RMI.

(3) ILS.

(a) Procedures for making an ILS approach are covered in the FD-105 booklet.

(b) Other than the presentation, the ILS system in the OV-1 is basically the same type the student has been exposed to and operation of the set for localizer information is the same, except -

1. The set is digital tuned by setting the desired ILS frequency.

2. There is no VAR LOC switch.

3. There is a squelch control on the control panel to eliminate background noise.

(c) A glide slope receiver is in the OV-1 aircraft. To operate the GS system -

1. Turn the knob on top of the set on.

2. Tune in the desired frequency with the tuning knob. The set is digital tuned and the frequency should be the same as used for the localizer. The actual frequency, however, is higher than the localizer frequency.

3. No aural signal will be heard from the GS system.

4. Information from the GS receiver is displayed only on the FD-105 presentation.

5. 1962 model aircraft are equipped with a compatible tuned glide slope receiver that is coupled to the No. 1 VOR receiver. When an ILS localizer frequency is tuned on the No. 1 VOR glide slope,information will be displayed on the FD-105 presentation.

(4) GCA and ASR. No special equipment other than a receiver and transmitter is present in the OV-1 aircraft. Procedures used for the approaches are covered under "Instrument Approach Procedures."