CHAPTER 4

FORMATION TACTICS

Note. Aviators should practice the tactics described herein until they are proficient in all formation positions. Either radio and/or prearranged light signal codes may be used during the practice of formation tactics.

Section I. TWO-HELICOPTER (ELEMENT) TACTICS

13. RIGHT AND LEFT ECHELON FORMATION

The element leader directs the wingman to move from right to left echelon position by appropriate radio command. (The preparatory command is "Go Left Echelon Formation" and the command of execution is "Execute.") On the command of execution, the No. 2 wingman executes a crossover to his position in left echelon formation. The move from left to right echelon is performed in a similar manner.

14. TURNS, CLIMBS, AND DESCENTS

In practicing various climbs, descents, and turns, the element leader should fly as smoothly as possible to keep the wingman's required power changes to a minimum.

15. TRAIL FORMATION

In a trail formation (fig. 12), the wingman directly behind the element leader is separated by 2 to 4 helicopter lengths and stepped up 3 to 5 feet. To signal a trail formation, the element leader issues the order over the radio or by prearranged light signal. The wingman remains at the same altitude and heading but reduces airspeed slightly to increase the distance between helicopters. When this distance is from 2 to 4 helicopter lengths, the wingman moves to a trail position directly behind the element leader. When the element leader desires his wingman to join up, he issues the order over the radio. The wingman then returns to his previous echelon position.

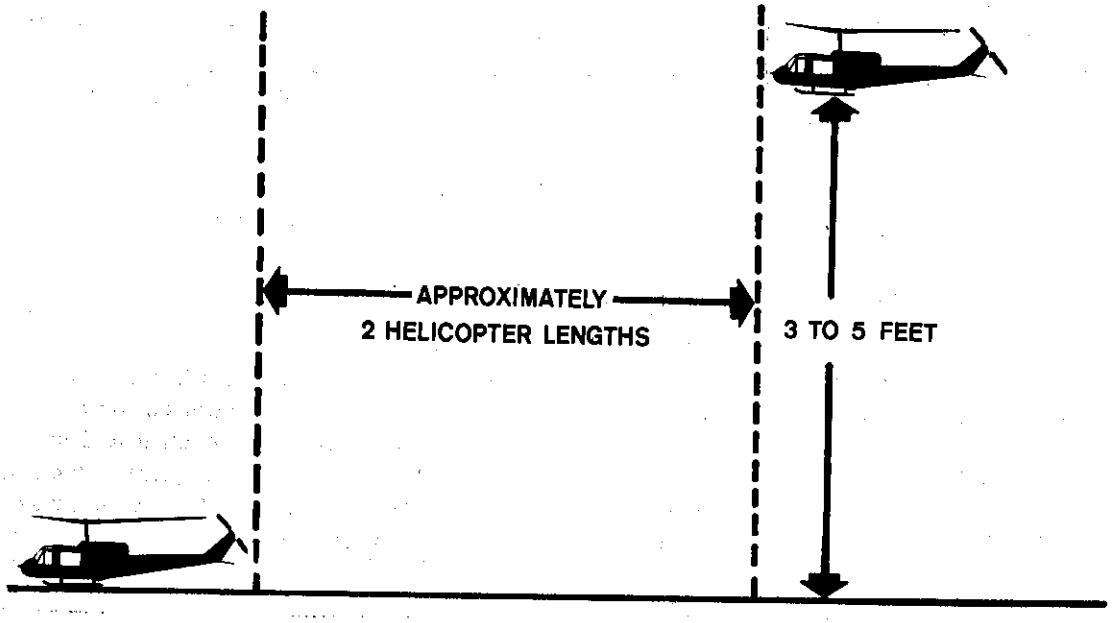


Figure 12. Two-helicopter element trail formation.

16. FORMATION BREAKUP

a. When the element leader desires to execute a formation breakup, he places his wingman in echelon formation on the side opposite to that from which he will break. After announcing his intentions over the radio, he executes a 90° to 180° turn away from the wingman. When flying a light helicopter, the wingman waits 5 to 10 seconds, then turns to follow the element leader. The time interval of 5 to 10 seconds separates the helicopters by 300 to 500 feet and provides proper spacing for landings or for practice of the rendezvous and joinup (para 17 below).

b. For large helicopters, a 10- to 15-second interval is required between each helicopter at breakup.

c. Helicopters should not be banked in excess of 60° when executing a formation breakup. This amount of bank is sufficient and, if exceeded, might overstress the helicopter. At night and when loaded, the amount of bank should not exceed 45°. All turns should be level.

17. RENDEZVOUS AND JOINUP OF HELICOPTERS (180° REVERSAL)

It is desirable to position the helicopters in the formation on the ground and execute a formation takeoff. This procedure saves time and eliminates the requirement for rendezvous and joinup maneuvers; however, in many situations there is neither adequate space nor time to establish the formation prior to takeoff. Rendezvous and joinup procedures are therefore necessary.

a. When the element leader desires to rendezvous and join up his element (fig. 13), he announces his intentions over the radio. He then starts a 180° standard rate turn in the desired direction (left or right). Thus, to execute a left rendezvous and joinup, the element leader turns to the left. The wingman continues on his original course until the element leader, in his turn, is passing through a 45° outbound bearing to the left. The wingman then starts a left turn (greater than standard rate) toward the element leader, and continues the turn until the nose of his helicopter is approximately 45° ahead of the element leader. This now places the element leader to the right. The wingman maintains this relative bearing until the result of the relative motion of his helicopter places him within 200 feet laterally to the left of his intended position in the formation. The wingman then stops his rate of closure for a moment and moves into his position in the formation. To execute a right turn rendezvous and joinup, the above procedures are reversed.

b. Normally, longitudinal separation between the element leader and the wingman after they have executed a formation breakup is not more than 5 to 15 seconds. The procedure for rendezvous and joinup of helicopters described in a above uses a 10-second longitudinal separation between helicopters (fig. 13). The same procedure can be used when the longitudinal separation between helicopters is 1 minute or more (fig. 14). The wingman, upon receiving instructions to execute a left rendezvous and joinup, continues on his original course until the element leader, in the process of his standard rate left turn, is 45° to the left. (With a helicopter separation of 1 minute or more, the element leader will nearly complete, or will complete, a 180° left turn before reaching a position 45° from the wingman.) At this position, the wingman executes the procedure to rendezvous and join up.

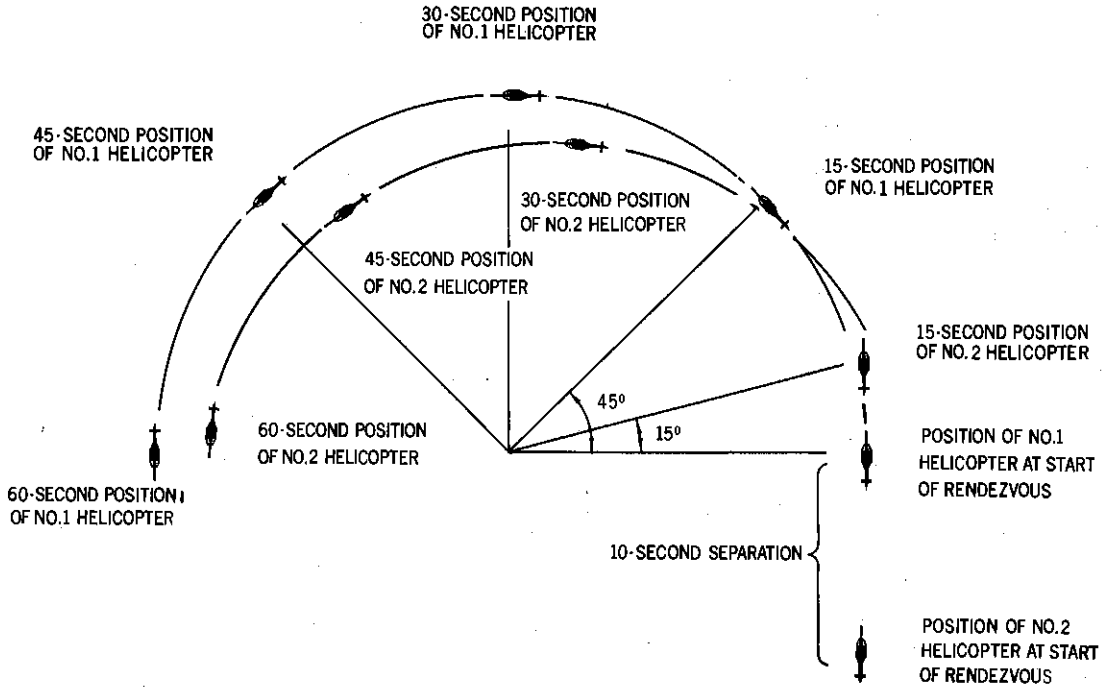


Figure 13. Two-helicopter element rendezvous and joinup procedure with separation of 10 seconds between helicopters.

18. CHANGE OF LEADER

When the element leader desires to pass his leadership responsibilities to the wingman, he places the wingman in either left or right echelon formation, and informs the wingman via radio that he is passing the lead to him. The element leader then moves laterally several helicopter lengths away from his wingman. At this point, keeping his eyes on the wingman, he reduces speed slightly, moves to the echelon position, and becomes the wingman.

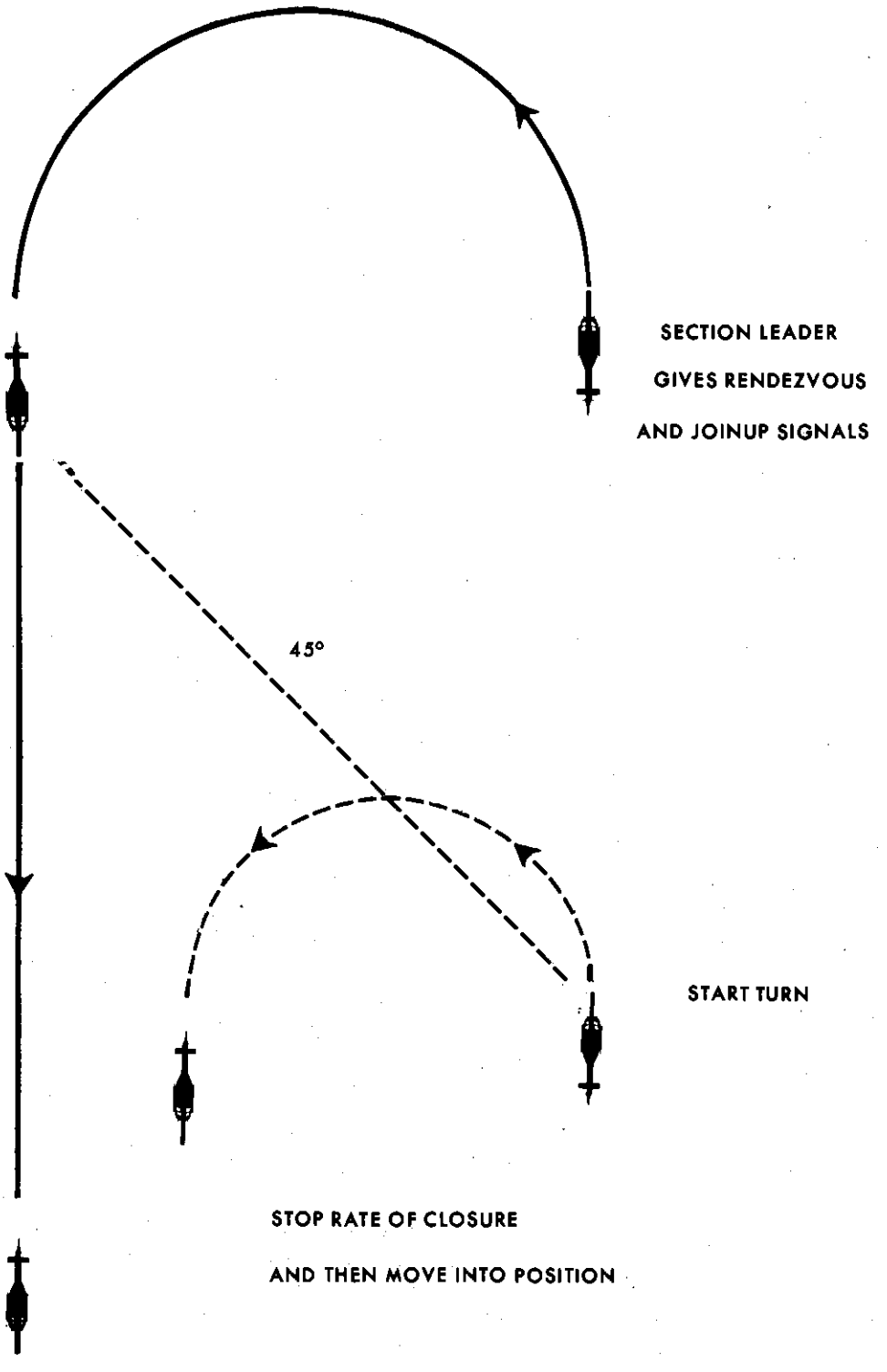


Figure 14. Two-helicopter element rendezvous and joinup procedure with separation of 1 minute or more between helicopters.

Section II. THREE-HELICOPTER (ELEMENT) TACTICS

19. FLEXIBLE 3-HELICOPTER ELEMENT TACTICAL FORMATION

In a flexible 3-helicopter tactical formation, the third helicopter is positioned and flown in the same manner as the second element leader in a 4-helicopter flight. The tactics are the same as those for the 4-helicopter flight (sec. III).

20. FIXED POSITION 3-HELICOPTER ELEMENT V-FORMATION TACTICS

Fixed position 3-helicopter element V-formation tactics should be practiced until the element leader and both wingmen are proficient in the following maneuvers:

a. Turns, Climbs, and Descents. Various turns, climbs, and descents should be practiced until both wingmen are proficient at maintaining their positions throughout the range of maneuvers. The element leader and both wingmen should alternate positions - lead, right wingman, left wingman - until all are proficient in each position. The leader should fly as smoothly as possible to hold the wingmen's power and airspeed changes to a minimum.

b. Right and Left Echelon. To form a right echelon formation from a fixed position 3-helicopter element V-formation, the element leader issues the appropriate command. On the command of execution, the No. 2 wingman reduces speed until the element leader has moved ahead sufficiently to permit the No. 2 wingman to execute a crossover by passing laterally above and to the immediate rear of the lead helicopter. Simultaneously, the No. 3 wingman reduces speed and increases the distance from the leader along the 45° bearing until there is sufficient room for the No. 2 wingman to crossover into his position in right echelon formation, which would be between the leader and the No. 3 wingman (fig. 15). To return to a V-formation, the process is reversed. To form a left echelon formation, the No. 3 wingman reduces speed until the element leader and the No. 2 wingman have moved ahead by one helicopter length; then the No. 3 wingman crosses over to his position in element left echelon formation.

c. Trail Formation. To signal a trail formation from a V-formation, the flight leader issues the order over the radio or by prearranged light signal. When the signal is received, the No. 2 and No. 3 wingmen reduce speed slightly until the element leader has moved ahead of the No. 2 wingman by 100 feet and ahead of the No. 3 wingman by 200 feet. The No. 2 wingman then moves laterally to a position 3 to 5 feet above and 2 to 4 helicopter lengths behind the element

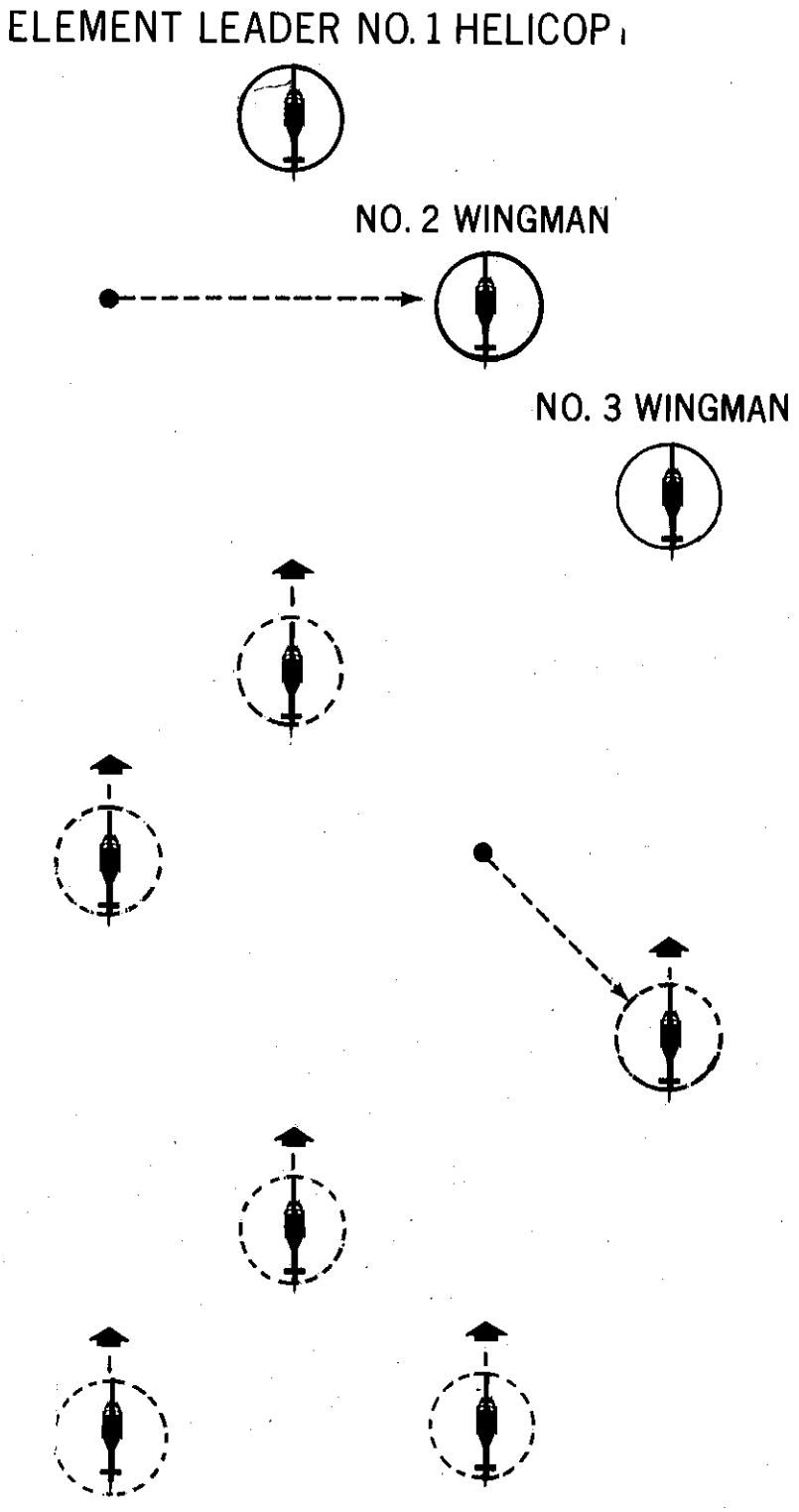


Figure 15. Three-helicopter element right echelon formation formed from a fixed position 3-helicopter element V-formation.

leader. The No. 3 wingman then moves laterally to a position 3 to 5 feet above and 2 to 4 helicopter lengths behind the No. 2 wingman, which completes the trail formation. To return the trail formation to the V-formation, the procedure is reversed.

d. Formation Breakup. The element is placed in echelon to break up the formation. The element leader then breaks up the formation as discussed in paragraph 16.

e. Rendezvous and Joinup of Helicopters (180° Reversal). This maneuver is executed in the same manner as described in paragraph 17 and in figure 13. The only difference is that three helicopters execute the maneuver instead of two.

f. Change of Leader. The change of leader is accomplished from a right or left echelon formation. The element leader informs the wingman by radio that he is passing the lead to him and then moves away from the formation for a distance of several helicopter lengths. At this point he reduces speed slightly until the formation moves ahead of him and he is opposite his new position in the formation. He then moves into position and becomes either the No. 2 or No. 3 wingman, as the case may be.

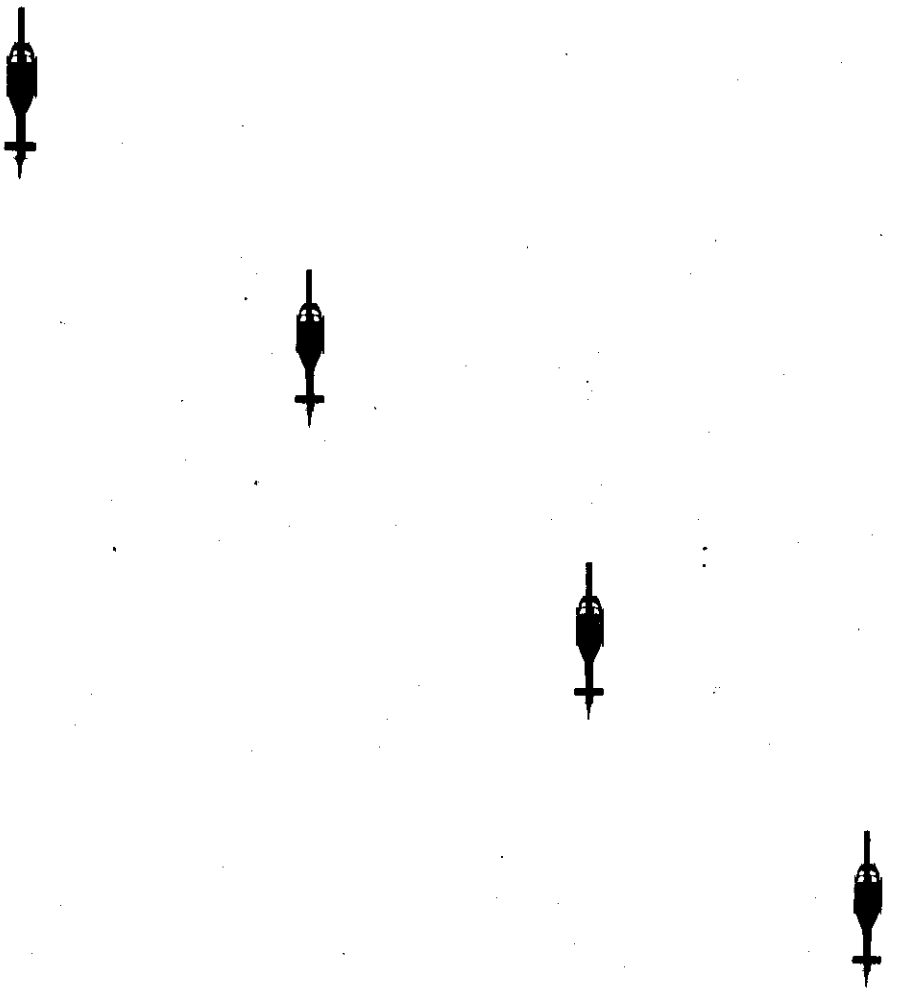
Section III. FOUR-HELICOPTER (FLIGHT) TACTICS

Note. To gain experience and competence in leading a flight, aviators should frequently exchange positions within the formation during practice flights.

21. RIGHT AND LEFT ECHELON FORMATION

a. Tactical Heavy Left Formation to Right Echelon. To place the flight into right echelon formation from tactical heavy left formation, the flight leader issues the appropriate command to the second element leader via the radio. On the command of execution, the leader of the second element then moves his element laterally into flight right echelon formation (fig. 16).

b. Tactical Heavy Right Formation to Left Echelon. To execute this formation, the procedure in a above is reversed.



EACH HELICOPTER IN THE RIGHT ECHELON FORMATION IS ON AN ANGLE APPROXIMATELY 45° FROM THE LEADER. THE DISTANCE BETWEEN EACH HELICOPTER IS 1½ ROTOR DIAMETERS.

Figure 16. Four-helicopter flight in right echelon formation.

c. Tactical Heavy Right Formation to Right Echelon. To place the flight into right echelon formation, the flight leader moves his wingman laterally to the right echelon position. The second element then moves into position and completes the formation.

d. Tactical Heavy Left Formation to Left Echelon. To execute this formation, the procedure in c above is reversed.

22. TURNS, CLIMBS, AND DESCENTS

The flight leader should execute all turns, climbs, and descents as smoothly as possible. During turns of 90° or more, the second element is not restricted to flying a fixed position of heavy right or heavy left position on the flight leader. If the second element is in a heavy right position at the start of a 90° or more right turn, the relative speed of this element to the flight leader will be initially the same. However, as the turn progresses, the relative speed of the second element will increase because it is on the inside of the turn. Therefore, as the increase in relative speed becomes apparent, the second element will move from the heavy right position to a position with adequate spacing (fig. 17) behind the flight leader. In this position, the relative speed of the second element leader will be the same as that of the flight leader. Conversely, if the second element is in the heavy left position at the start of a 90° or more right turn, it moves to a position behind the flight leader. At the completion of the turn, the second element can return to its original position. In steep turns, the second element leader may, in consideration for his wingman, move from heavy right to heavy left position.

23. CHANGE OF LEADER

The change of leader of either element within a flight may be accomplished as described in paragraph 18. The leader of the first element is always the flight leader.

24. TRAIL FORMATION

To signal for a trail formation, the flight leader issues the appropriate commands (preparatory command, "Go Trail"; command of execution, "Execute"). The No. 2, No. 3, and No. 4 helicopters reduce speed and move into their respective positions in trail formation.

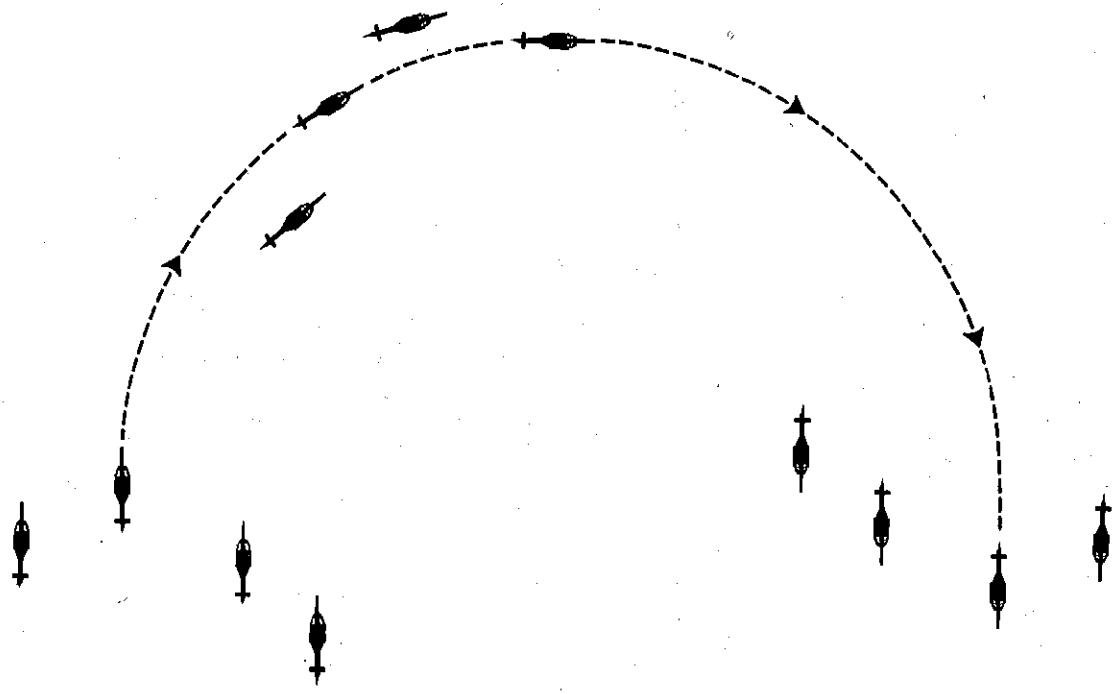


Figure 17. Four-helicopter flight formation turns of 90° to 180°.

25. FORMATION BREAKUP

The breakup for a flight formation can be executed from the right or left echelon formation and is performed in the same manner as an element breakup (para 16). The only difference is that there are four helicopters instead of two.

26. RENDEZVOUS AND JOINUP (180° REVERSAL)

a. When the flight leader desires to rendezvous and join up his flight (fig. 18), he issues the appropriate commands over the radio. On the command of execution, the flight leader starts a 180° standard rate turn in the desired direction (left or right). Thus, to execute a left rendezvous and joinup, the flight leader will turn to the left. The No. 2 helicopter continues on its original course until the flight leader (No. 1 helicopter), in his turn, is passing through a 45°

outbound bearing to the left. The lead element wingman then starts a left turn (greater than standard rate) toward the flight leader and continues the turn until the nose of his aircraft is approximately 45° ahead of the flight leader. This places the flight leader to the right. This relative bearing is maintained until the result of the relative motion of his helicopter places him within 200 feet laterally to the left of his intended position in the formation. He then stops his rate of closure for a moment and crosses over to his position in the formation (No. 2 position or right echelon to the flight leader).

b. When the second element leader (No. 3 helicopter) receives instructions from the flight leader to execute a left rendezvous and joinup, he continues on his original course until the flight leader has reached a position 45° to the left of him. (If properly executing the rendezvous and joinup procedure, the lead element wingman will be approximately on a 45° bearing from the second element leader.) The second element leader then starts a turn toward the flight leader and continues the turn until the nose of his helicopter is approximately 45° ahead of the flight leader. This places the flight leader to the right. The second element leader maintains the relative bearing until the relative motion of his helicopter places him 200 feet laterally to the left of his intended position in the formation. The second element leader then stops his rate of closure for a moment and moves into his position in the formation.

c. When the second element wingman (No. 4 helicopter) receives instructions that the flight will execute a rendezvous and joinup, he continues on his original course until the flight leader has reached a position that bears 45° to the left. (When properly executing the rendezvous and joinup procedure, the No. 2 and No. 3 helicopters will also be in close vicinity to the flight leader and thus can be considered to bear 45° from the No. 4 helicopter.) The No. 4 wingman then starts a turn toward the flight leader and continues the turn until the nose of his helicopter is approximately 45° ahead of the flight leader. This places the flight leader to the right. The second element wingman maintains this position until the relative motion of his helicopter places him 200 feet laterally to the left of his intended position in the formation. He then stops his rate of closure for a moment and moves into position. To execute a right turn rendezvous and joinup, the procedures for the left turn are reversed.

d. Normally, after a formation breakup the longitudinal separation between helicopters is not more than 5 to 15 seconds. The procedure for rendezvous and joinup described in a through c above uses a 10-second longitudinal separation between helicopters (fig. 18).

The same procedures can be used when the longitudinal separations between helicopters are 1 minute or more. The only difference is that the flight leader, in a 1-minute separation, will complete a 180° turn before he consecutively bears 45° from the other helicopters (fig. 19).

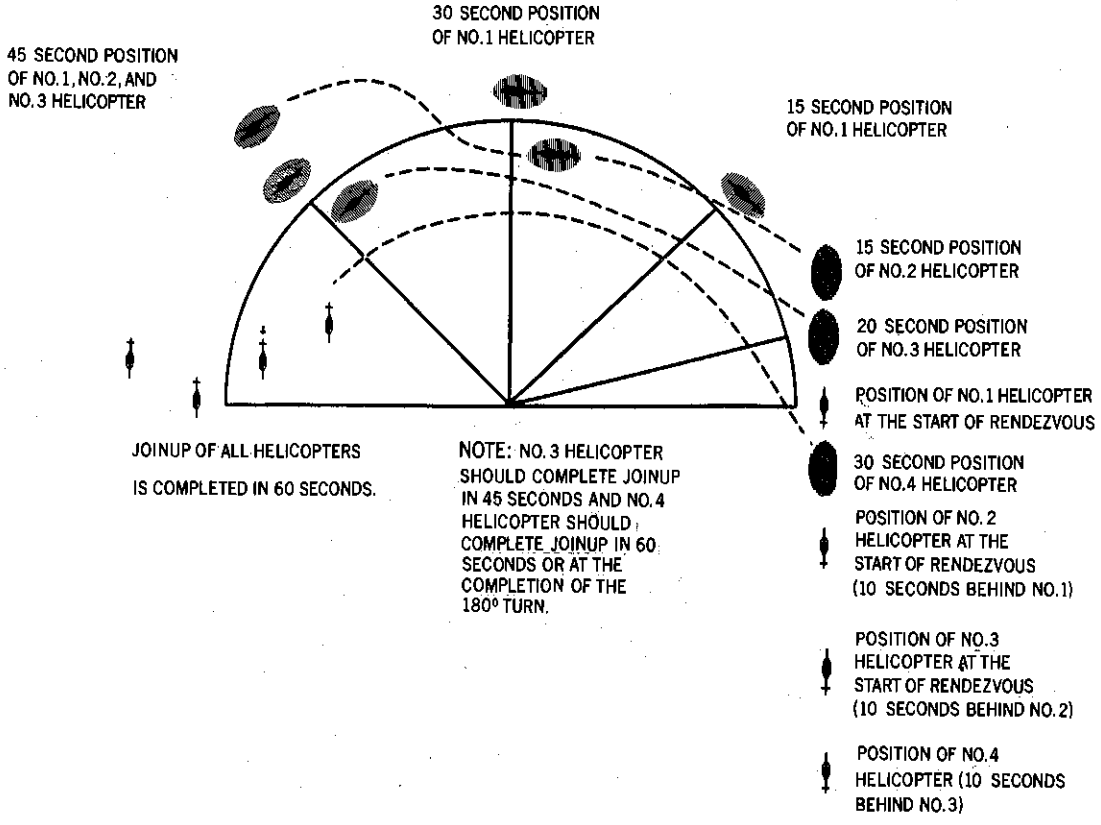


Figure 18. Four-helicopter flight formation rendezvous and joinup (180° reversal) procedure with separation of 10 seconds between helicopters.

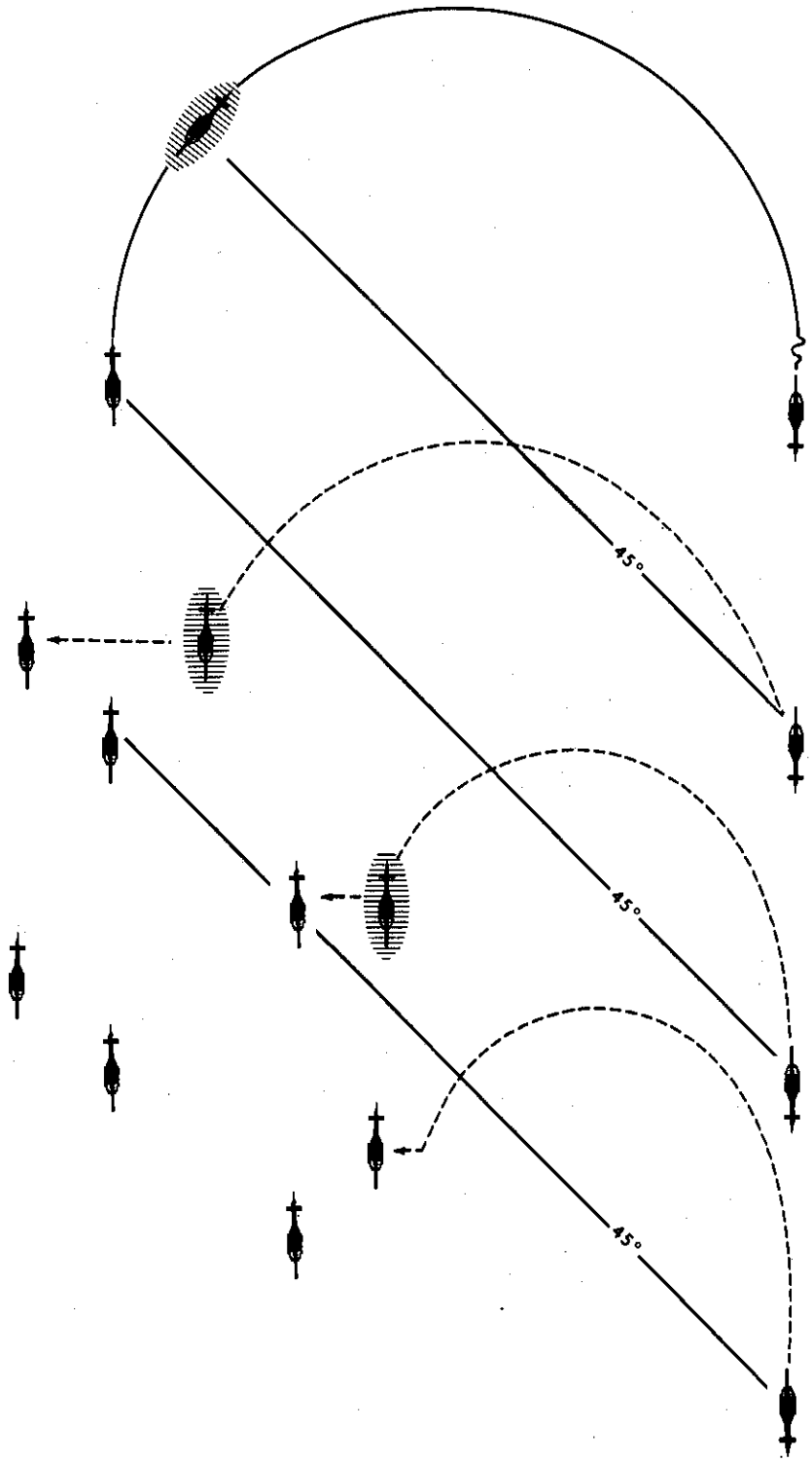


Figure 19. Four-helicopter flight formation rendezvous and joinup (180° reversal) procedure with separation of 1 minute or more between helicopters.

27. INADVERTENT INSTRUMENT FLIGHT WHILE IN FORMATION

Note. Positive radio communications should be established and maintained with all helicopters in the formation if either marginal VFR or IFR weather is forecast. All turns and climbs should be accomplished at a predetermined standard rate.

a. When instrument flight conditions permit the helicopters in formation to remain in visual contact with each other, one of the following procedures may be used:

(1) The formation leader may decide to continue and complete the mission, provided each memeber of the formation is instrument qualified.

(2) The formation leader may elect to perform a 180° formation turn out of the IFR condition.

b. When instrument flight conditions are entered which instantly destroys all visual contact between the helicopters in the formation, each aviator (as simultaneously as possible) must immediately initiate the maneuver designed for his respective position (fig. 20).

c. The duties of the formation leader do not require him to observe the other helicopters with as much constancy as they must observe one another. Therefore, the formation leader depends on a member of the flight (usually the No. 3 helicopter) to announce over the radio: "Visual contact impossible . . . executing IFR breakup procedures." Upon receipt of this statement the following procedural actions are taken:

(1) The flight leader continues straight ahead and reports his magnetic heading altitude.

(2) The lead element wingman executes a 30° turn away from the flight leader, and climbs 100 feet.

(3) The second element leader (the No. 3 helicopter) executes a 30° climbing turn away from the leader, and climbs 200 feet.

(4) The wingman of the second element (the No. 4 helicopter) executes a 60° climbing turn away from his leader, and climbs 300 feet.

Note. As an added safety precaution, the wingman of the second element should reduce airspeed slightly (approximately 10 knots) following the moment of losing visual contact.

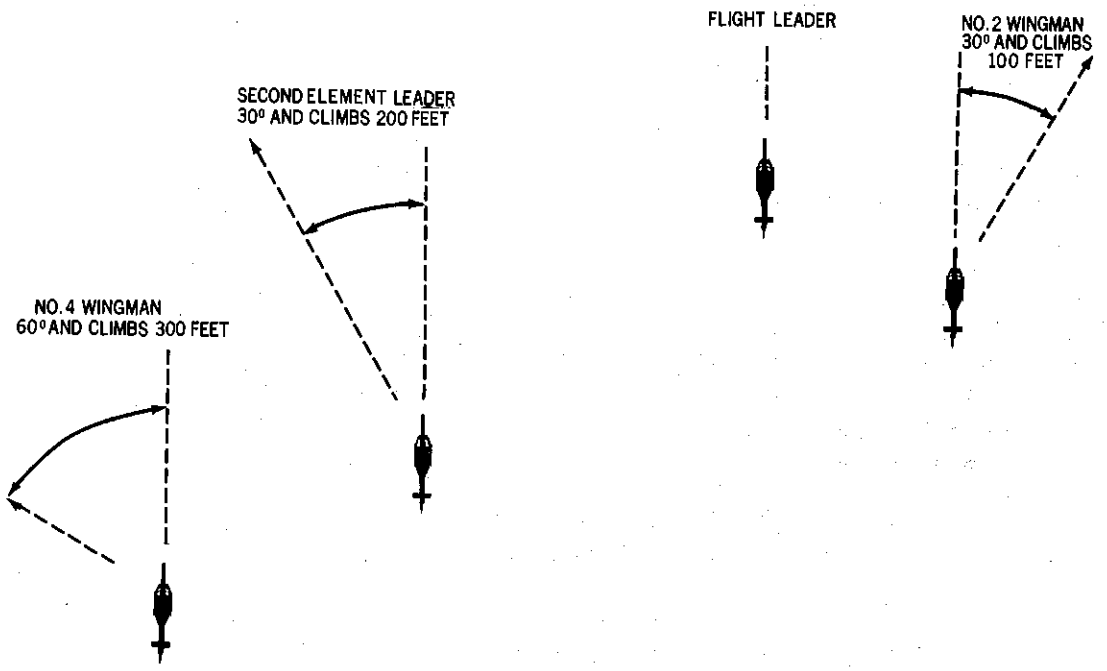


Figure 20. Procedure when visual contact cannot be maintained upon entering IFR conditions.

(5) After all helicopters have completed the initial breakaway turn and climbed to their assigned altitude, they fly a straight course for 30 seconds. The flight leader then commands over the radio "No. 2 and No. 4 helicopters, complete 180° turn." The No. 2 and No. 4 helicopters

acknowledge the communication and continue their turn until they have completed a 180° turn from the original heading of the formation.

(6) After ordering the No. 2 and No. 4 helicopters to complete the 180° turn, the flight leader waits 10 seconds and instructs the No. 3 helicopter to complete his 180° turn. Simultaneously, the flight leader starts his own right 180° turn.

(7) When the pilot of the helicopter at the lowest altitude reports that he has reached VFR conditions, the helicopter at the next higher altitude can start a descent to VFR conditions. This sequence is continued until all helicopters report to the leader that they are VFR, giving their location if known. The flight leader can then proceed to rendezvous and join up the formation.

d. This procedure for formation breakup upon encountering instrument weather will provide both altitude and lateral separation of all aircraft. However, if all aviators cannot, for example, maintain altitude within plus or minus 100 feet, the lateral separation as provided is still sufficient to prevent midair collisions.

e. Since all helicopters may not lose visual contact at the same time, the aviator that first loses visual contact should identify himself to the flight leader and announce that he is executing IFR breakup procedure (for his position in the formation, as set forth above).

Section IV. FIVE- AND SIX-HELICOPTER (FLIGHT) TACTICS

28. TACTICAL FREE CRUISE FORMATIONS

Tactics for the 5- and 6-helicopter tactical flight formations (capable of free cruise) (para 11b) are the same as discussed in section III for 4-helicopter (flight) tactics.

29. SIX-HELICOPTER FLIGHT (FIXED POSITION) FORMATION

Six-helicopter flight (fixed position) formation tactics should be practiced until the flight leader, the second element leader, and all wingmen are proficient in the following maneuvers:

a. Rendezvous and Joinup (180° Reversal). To rendezvous and join up the flight from a trail formation (fig. 21), the flight leader informs the members of the flight of his intentions. The flight leader then begins a 180° standard rate turn to the left or right. To execute a left rendezvous and joinup, the flight leader will turn to the left; for a right rendezvous and joinup, he will turn to the right. The other helicopters continue on the original course until the flight leader, in consecutive order, is 45° from each individual helicopter. As the flight leader reaches this position relative to each helicopter, that helicopter starts a turn toward the flight leader and continues the turn until the nose of the helicopter is approximately 45° ahead of the flight leader. This heading is then maintained until the helicopter is within approximately 200 feet laterally of its intended position in the formation. At this point the rate of closure is stopped for a moment, and the aviator moves his helicopter laterally into position within the formation.

b. Turns, Climbs, and Descents. During normal turns, climbs, and descents, the second element leader and all wingmen must maintain their positions and spacing by adjusting power and airspeed as necessary. The flight leader should fly as smoothly as possible so that the wingmen's power and airspeed adjustments are kept to a minimum. The maneuverability of the column of Vees formation will increase greatly as the individual pilots become proficient in formation flying.

c. Trail Formation. To place the flight into trail formation from a column of Vees, the flight leader issues the appropriate commands. The No. 2 and No. 3 wingmen and the second element reduce speed slightly. The No. 2 wingman allows the flight leader to move ahead of him 2 to 4 helicopter lengths, then moves laterally to a position 3 to 5 feet above and 2 to 4 helicopter lengths behind the flight leader. The No. 3 wingman allows the No. 2 wingman to move ahead of him the same distance; then the No. 3 wingman moves into position behind the No. 2 wingman. The second element leader allows the No. 3 wingman to move ahead 2 to 4 helicopter lengths and into trail position. The second element leader then places himself 2 to 4 helicopter lengths behind and 3 to 5 feet above the No. 3 wingman. The No. 5 and No. 6 wingmen then move into trail formation behind the second element leader in the manner described above for the wingmen of the lead element. The entire flight will be in sequential order - 1, 2, 3, 4, 5, 6.

d. Right and Left Echelon Formation. To place this flight into right echelon formation from the column of Vees formation, the flight leader issues the command for flight right echelon formation (fig. 22). On the command of execution, the first element moves into the right

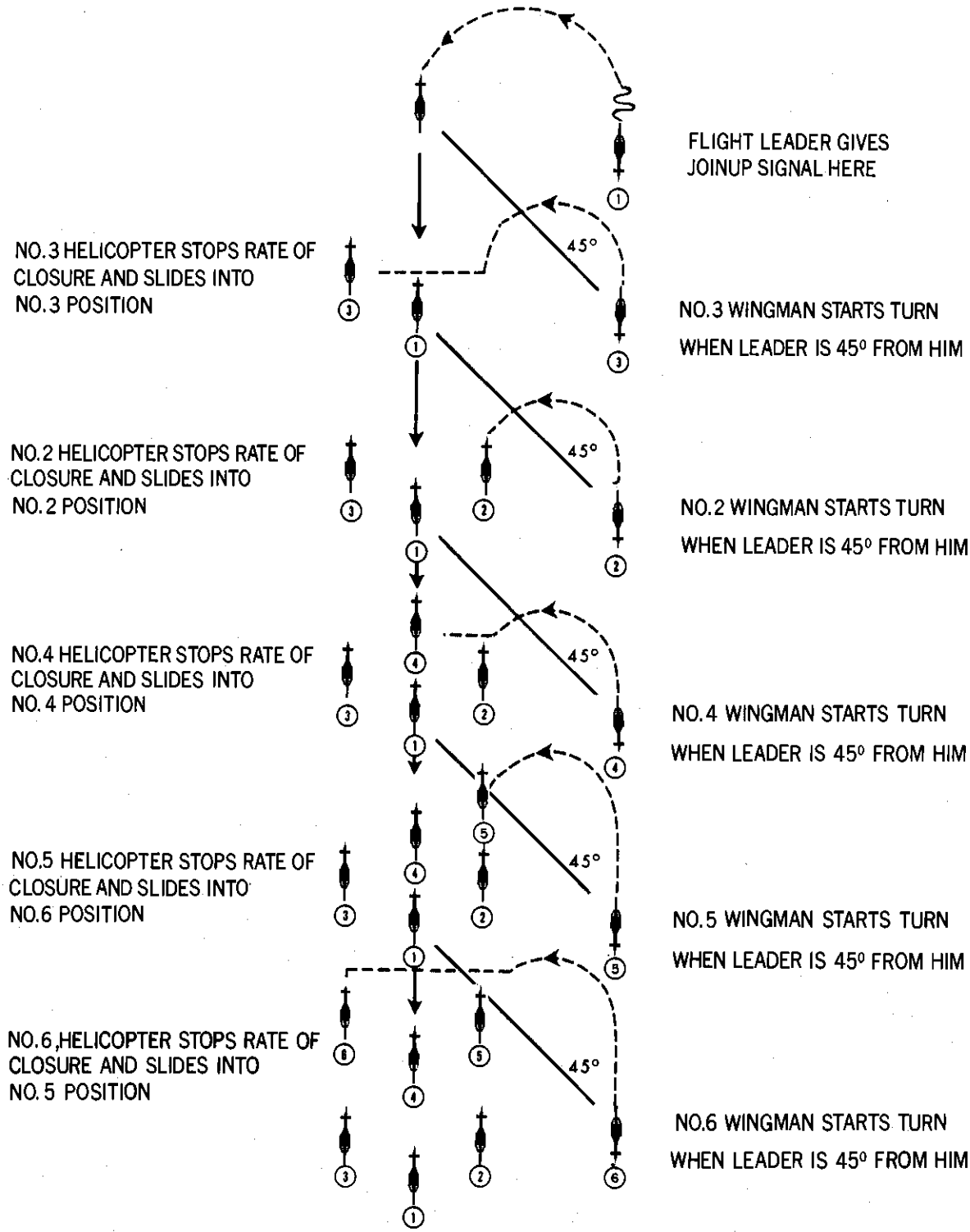


Figure 21. Six-helicopter flight rendezvous and joinup (180° reversal) into column of Vees.

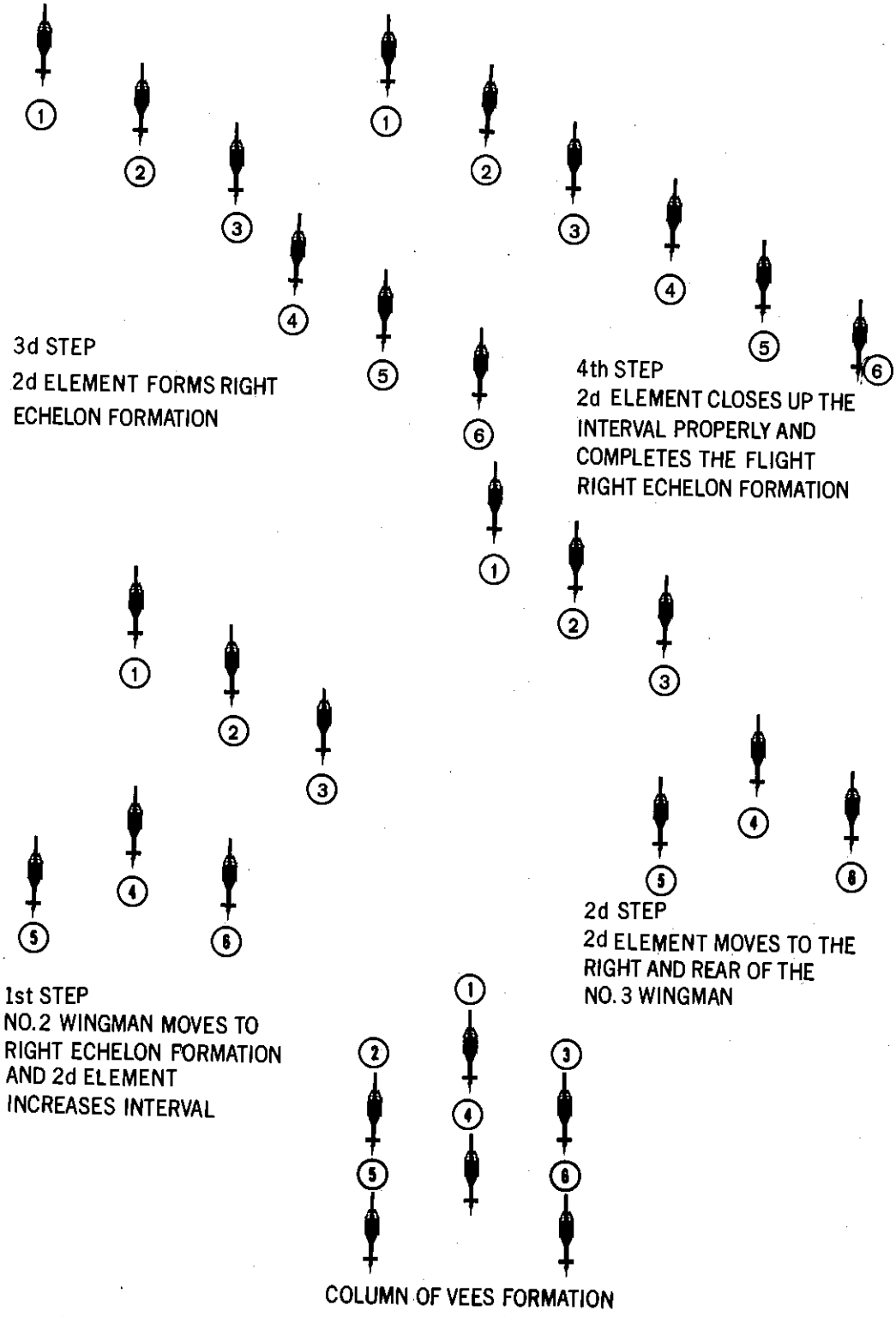


Figure 22. Forming a 6-helicopter flight into right echelon formation from column of Vees.

echelon formation in the same manner as described in paragraph 20b. As a safety precaution, the second element leader increases the interval between elements by 1 or 2 helicopter lengths upon receipt of the flight leader's command of execution. As the No. 2 and No. 3 wingmen move into element right echelon formation, the number 2 element moves to a position 45° to the right rear of the No. 3 wingman of the first section. The second element then executes an element right echelon formation as described in paragraph 20b and thus completes the right echelon formations for the flight. A similar sequence of events is used to form the flight into a left echelon formation.

e. Formation Breakup. To execute a formation breakup, the flight leader places the flight in echelon formation on the side opposite that from which he will break. He then informs the flight of his intent to break away from the formation and executes a 90° to 180° turn away from the flight. Each wingman in succession waits 5 to 10 seconds, then turns and follows the helicopter ahead. The time interval of 5 to 10 seconds separates the helicopters by 300 to 500 feet and provides proper spacing for landings or practice of the rendezvous and joinup.

f. Radio and Hand Signal Communication. Radio and/or prearranged light signal codes may be used during practice of 6-helicopter flight tactics.

Section V. FORMATION LANDING AND TAKEOFF

30. FORMATION LANDING (TACTICAL)

a. Separation between aircraft within the formation should not be greater than three rotor diameters.

b. The lead helicopter should give instructions by radio or light signal code.

c. The approach into the LZ should be smooth and with a constant rate of descent.

d. All helicopters should pick tentative landing area on short final.

e. All approaches should be made directly to ground whenever possible.

f. The last helicopter to land signals when all helicopters are unloaded.

g. The entire landing and takeoff should resemble a wavelike motion.

31. FORMATION TAKEOFF (TACTICAL)

a. Separation between aircraft will depend upon the terrain and upon the location of the helicopters thereon. Generally, separation should not exceed three rotor diameters between aircraft.

b. The lead helicopter signals commencement of the formation takeoff.

c. All helicopters take off simultaneously, maintaining flight integrity.

d. The last helicopter to take off signals that the LZ is clear of aircraft and that the flight has regained formation.

e. If practicable, the lead helicopter should maintain slower airspeed until the flight is joined up. See paragraph 10 for principles of rendezvous and joinup.

CHAPTER 5

NIGHT FORMATION FLYING

32. GENERAL

a. Night formation flying requires a higher degree of proficiency and alertness than day formation flying. Aviators should be trained in the basics of formation flying during daylight hours prior to conducting night training. To reduce the hazards of night formation flying and effect smooth teamwork, careful planning and a thorough briefing of participating aviators should be accomplished before takeoff.

b. The silhouette of a helicopter cannot be seen except at a dangerously close distance; the only points of reference are the navigation lights. Aviators should not stare at one light but should cross-reference two or more lights and scan the entire helicopter to avoid vertigo or autohypnosis while engaged in night formation flying.

c. Night formations must be controlled by radio or prearranged light signal codes. The rotating beacon should be turned off and the running light on dim.

d. Night formation procedures for a 4-helicopter flight are described below. These procedures generally can be applied to any size formation.

33. RENDEZVOUS AND JOINUP OF AIRCRAFT (180° REVERSAL).

a. To rendezvous and join up his flight (fig. 23), the flight leader signals his intention by radio or prearragned light signal code. He then starts a 180° standard-rate turn in the desired direction of rendezvous and joinup. Thus, to execute a left rendezvous and joinup, the flight leader turns to the left. The No. 2 wingman continues on his original course until the flight leader, in his turn, is passing through a 20° to 30° point to the left. The No. 2 wingman then starts a left turn toward the flight leader and continues the turn until the nose of his helicopter is approximately 20° to 30° ahead of the flight leader. This places the flight leader to the right. The No. 2 wingman maintains this heading until he is approximately 60° and 2 to 4 helicopter lengths to the left rear of the flight leader. He then stops his rate of closure for a moment and crosses over to his position of right echelon on the flight leader.

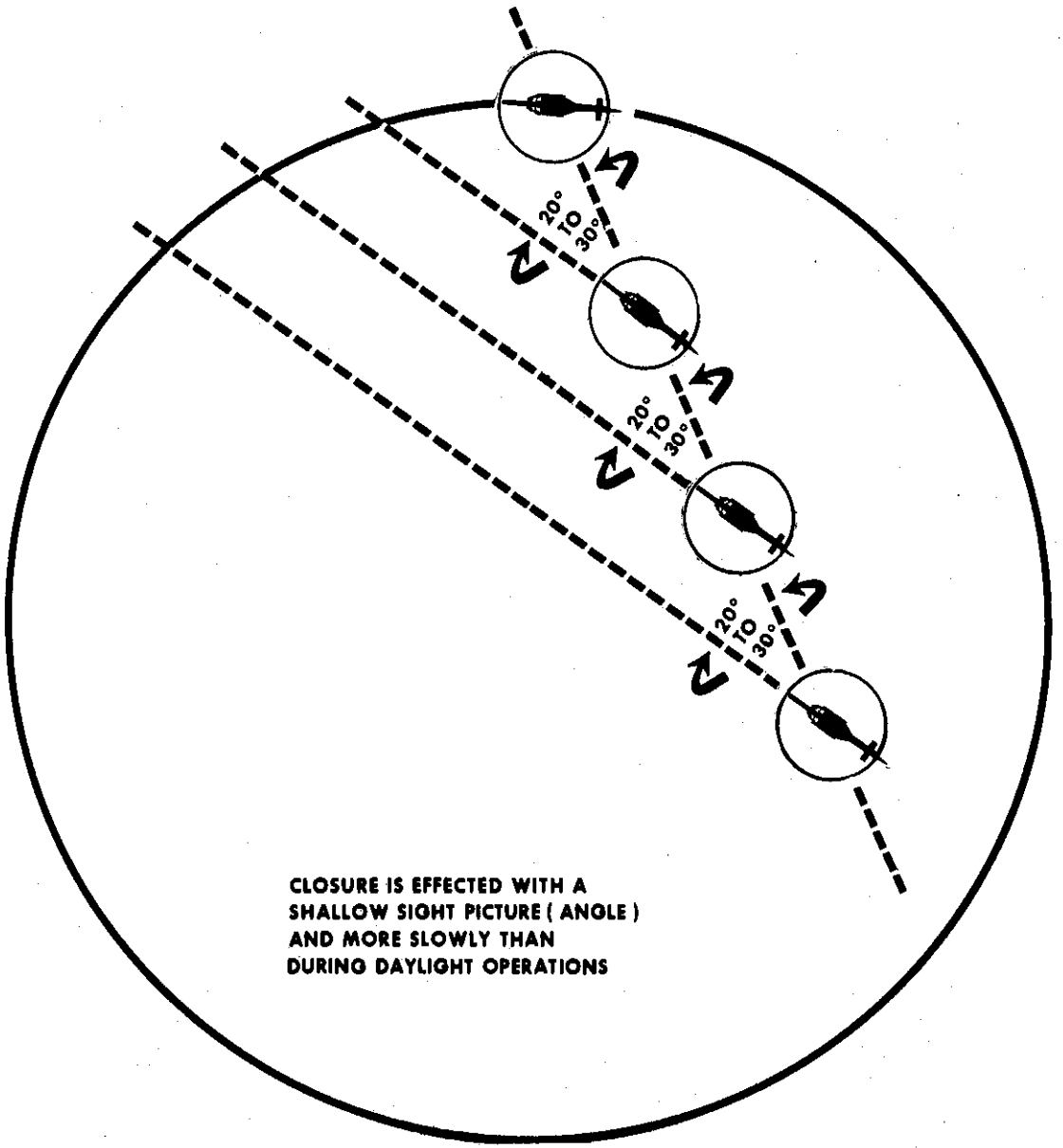


Figure 23. Night rendezvous and joinup of helicopters.

b. When the second element leader (No. 3 helicopter) receives instructions from the flight leader to execute a left rendezvous and joinup, he continues on his original course until the No. 2 wingman, in his turn, reaches a position 20° to 30° from him to the left. The second element leader then starts a turn toward the No. 2 wingman, and continues the turn until the nose of his helicopter is approximately 20° to 30° ahead of the No. 2 wingman. This now places the No. 2 helicopter to the right. The second element leader maintains this heading until the is within 100 feet of his intended position in the formation. He then slows his rate of closure and moves into position. The second element leader's wingman (No. 4 helicopter) executes a rendezvous and joinup in a similar manner.

c. To execute a right rendezvous and joinup, the procedures in a and b above are reversed.

d. The differences between night and day rendezvous and joinup are -

(1) At night, a 20° to 30° interception angle is used instead of the 45° angle used during the day. Therefore, more time is required to effect a rendezvous and joinup. The 20° to 30° angle permits, as a safety precaution, the joining helicopters to approach the formation at a slight angle somewhat from the rear.

(2) At night, each helicopter waits until the one immediately ahead turns 20° to 30° before initiating its own procedures to rendezvous and join up. The aviator in each successive helicopter always keeps the one immediately ahead in view.

(3) Aviators executing a rendezvous and joinup on a dark, moonless night must take care that their rate of closure is slow enough to be stopped instantly, and that they do not overrun the helicopter immediately ahead.

(4) A rendezvous will take longer to effect at night. The flight leader must make all his turns standard rate or less, and should never make any abrupt movements. Unless all aviators in the flight are exceptionally well trained, all heading changes of 30° or more should be announced by the leader prior to effecting the turn.

e. Separation and bearing of aircraft in night formation flying is the same as for day operations.

34. FORMATION BREAKUP

When approaching the field for a night formation breakup preparatory to landing, the flight leader places the flight in a trail formation. This is the easiest and safest formation for executing a breakup at night. A breakup executed from an echelon formation involving more than two helicopters should not be attempted unless all flight members are exceptionally well trained. Prior to executing a formation breakup, the flight leader should indicate his intentions either by radio communication or by a prearranged signal code. Sufficient interval between helicopters must be maintained in order to land the flight expeditiously and prevent the possibility of a go-around. Night formation landings require special training and should be attempted only by aviators proficient in night landings.

CHAPTER 6

MULTIPLE FLIGHT FORMATIONS

35. GENERAL

a. Multiple flight formations (company and battalion) use the same basic formation principles and maneuvers as those discussed for the 4-helicopter flight. Flights within a company formation and companies within a battalion formation are positioned and maneuvered relative to each other in the same manner as individual helicopters are positioned and maneuvered within a flight.

b. The free-cruise principle demonstrates its value best in large formations because multiple flight formations cannot operate in a tactical sense without it.

c. The vertical separation of 3 to 5 feet listed herein is for safety consideration and for the convenience of avoiding turbulence. All aircraft formations may be flown flat (e.g., no vertical separation) if tactically required.

d. Aviators should receive training in 2-helicopter elements and 4-helicopter flight formations before attempting multiple flight formations. They should fully understand the free-cruise principle (para 9), which is essential to the efficient maneuvering of large, complex formations.

36. COMPANY FORMATIONS

a. Company Tactical Formations. A company tactical formation is composed of three or four 4-helicopter flights, depending upon the number of helicopters assigned, attached, or required for a particular mission. For the explanation below, a company formation of four 4-helicopter flights is used.

(1) Company heavy right and heavy left formations.

(a) In a company heavy right formation, each flight is heavy right as shown in B, figure 3. The second flight is positioned 45° to the left rear of the lead flight, at a distance of approximately 1 1/2 times the diameter of a flight and 3 to 5 feet above the lead flight. The third flight is positioned 45° to the right rear of the lead flight at

a distance of twice the diameter of a flight and 3 to 5 feet above the lead flight. The fourth flight is positioned 45° to the right rear of the third flight at a distance of 1 1/2 times the diameter of the flight and 3 to 5 feet above the third flight (fig. 24).

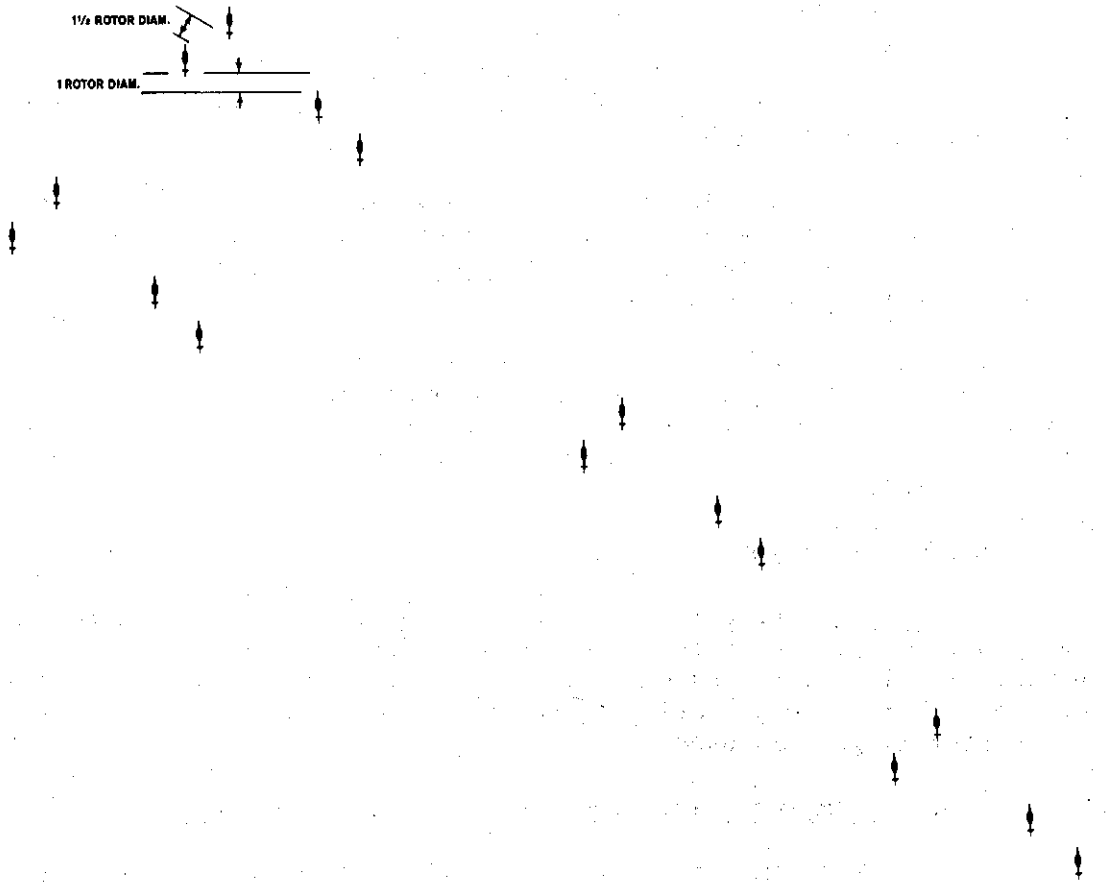


Figure 24. Company heavy right formation (flights heavy right).

(b) In a company heavy left formation, the individual flights are heavy left as shown in A, figure 3. The company is formed in the same manner as the heavy right formation except that the second flight is to the right rear and the third and fourth flights are to the left rear of the lead flight (fig. 25). The spacing and step-up is the same as for a heavy right formation.

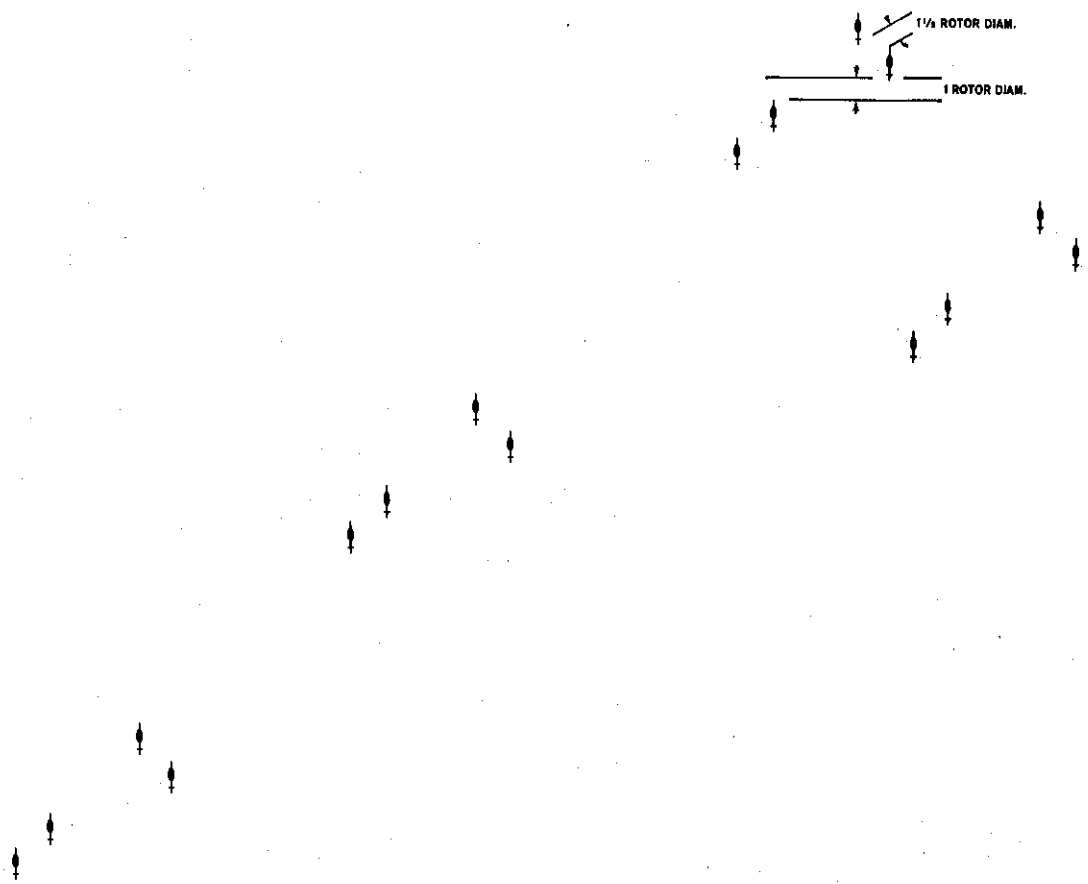


Figure 25. Company heavy left formation (flights heavy left).

(2) Echelon formation.

(a) Right echelon. The company right echelon formation (flights heavy right) is formed by placing the second flight 45° to the right rear and 3 to 5 feet above the lead flight. The third flight is placed in the same position relative to the second flight, and the fourth flight relative to the third flight. Spacing between flights should be 2 to 4 helicopter lengths (fig. 26).

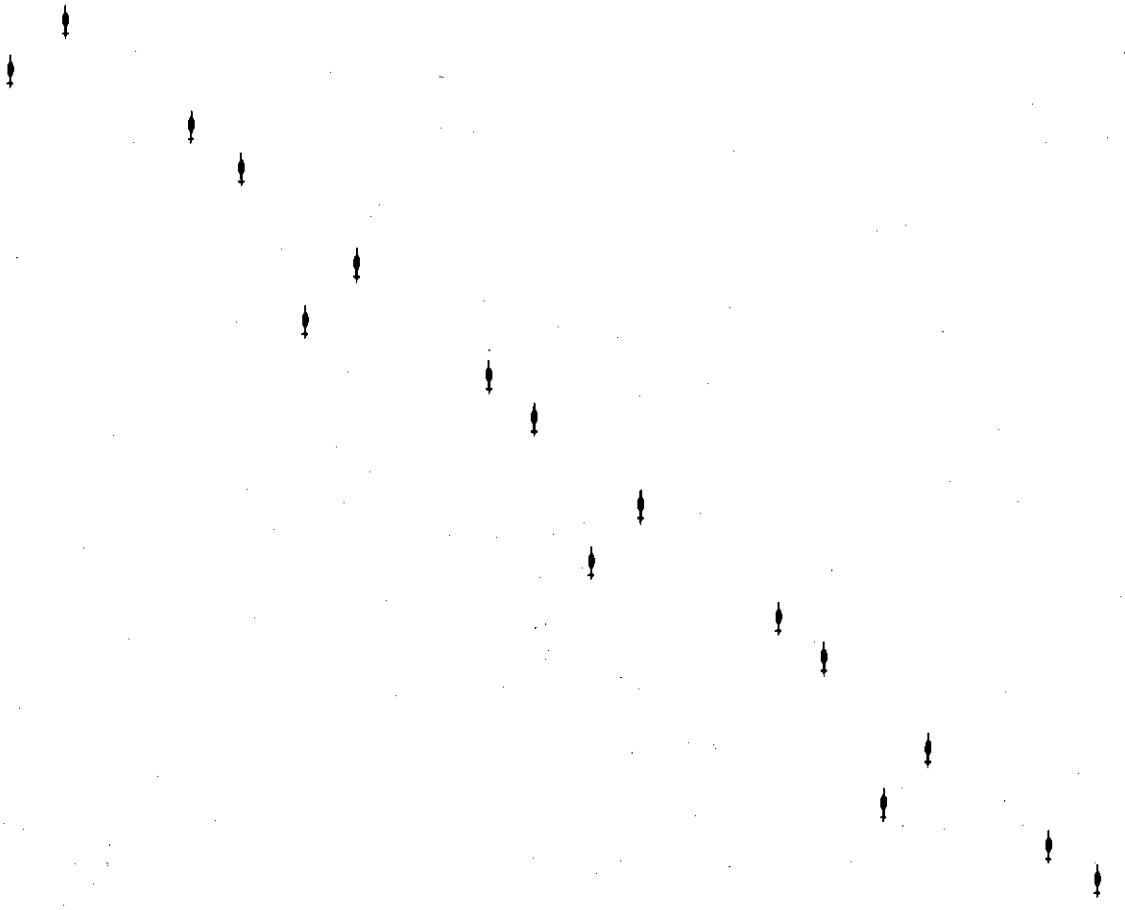


Figure 26. Company right echelon formation (flights heavy right).

(b) Left echelon. The company left echelon (flights heavy left) is the same as for right echelon except that the second, third, and fourth flights are positioned to the left rear of the lead flight (fig. 27). Spacing and step-up distances are the same as for right echelon.

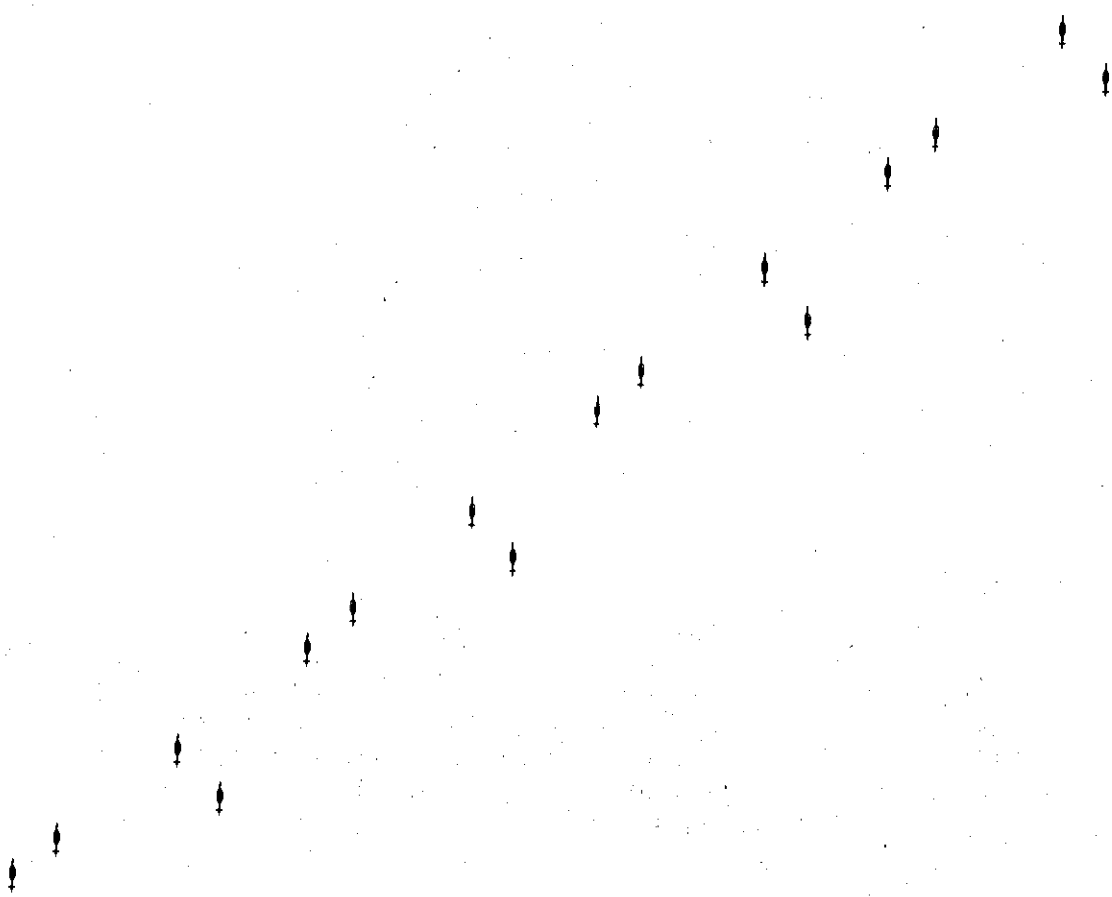


Figure 27. Company left echelon formation (flights heavy left).

(3) Column formation. The company column formation is formed by placing the flights in line directly behind each other. Each flight is stepped up 3 to 5 feet above the one ahead of it, and the spacing between flights should be sufficient to allow the individual flights to change their formation; i.e., to shift from heavy right to echelon, etc. (figs. 28 and 29). Company column means that the flights are in line one behind the other; the specific formation for the helicopters within the flights must be decided.

(4) Trail formation. Company trail formation places all helicopters in single file, one behind the other. Spacing between individual helicopters and flights is normally 2 to 4 helicopter lengths with a vertical stepped-up separation of 3 to 5 feet. However, spacing may be increased as necessary for any particular mission.

(5) Rendezvous and joinup (180° reversal). The rendezvous and joinup of a company is accomplished in the same manner as four individual helicopters joining up into a flight (para 26 and fig. 18). The flights maneuver exactly as discussed for the individual helicopters.

b. Company Column of Vees Formation. The company column of Vees is formed by arranging the helicopters into Vees of three and placing the Vees one directly behind the other. The spacing between Vees should, as a minimum, be sufficient to allow the helicopters within each Vee to change formation to either echelon, generally a distance of 2 to 4 helicopter lengths with a vertical stepped-up separation of 3 to 5 feet.

37. BATTALION FORMATIONS

All formations and the associated principles employed by the company are applicable to the battalion. In battalion formations, the companies are positioned and maneuvered as described in paragraph 36 for the flights within a company formation. Figures 30 through 32 show typical battalion formations. The individual company formations within the battalion formation must be specified.

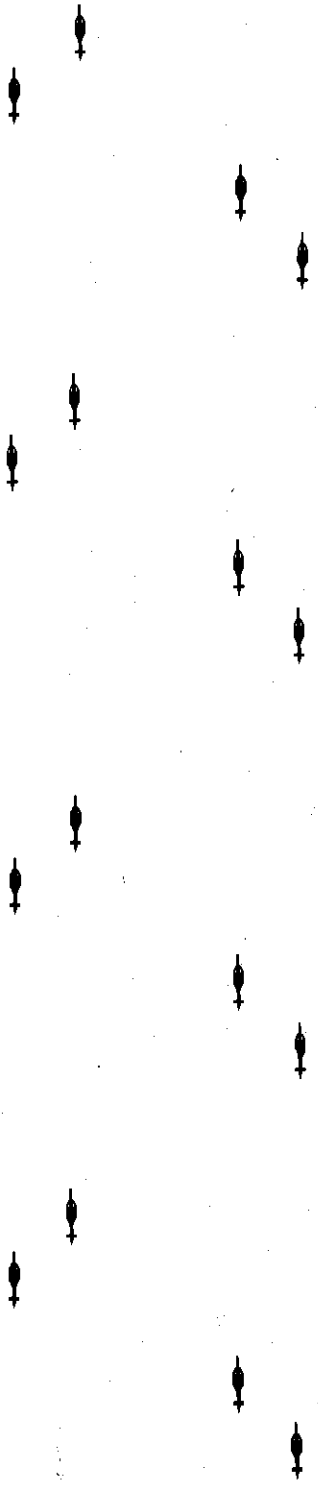


Figure 28. Company column formation (flights heavy right).

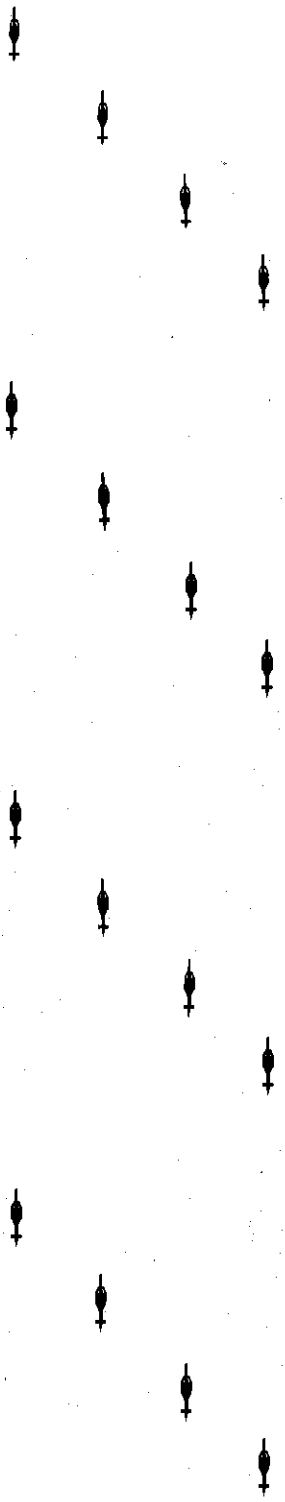


Figure 29. Company column formation (flights right echelon).

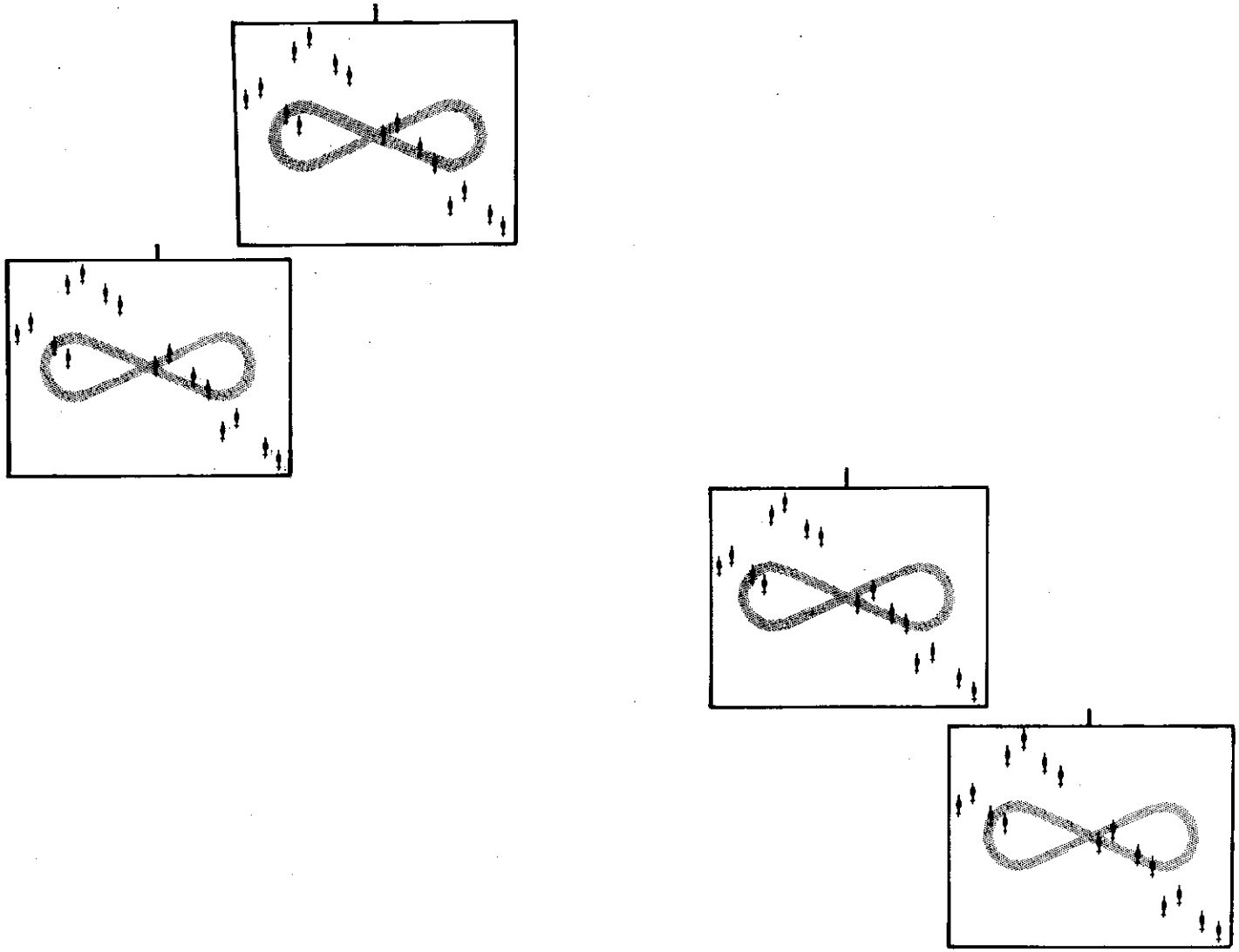


Figure 30. Battalion heavy right formation.

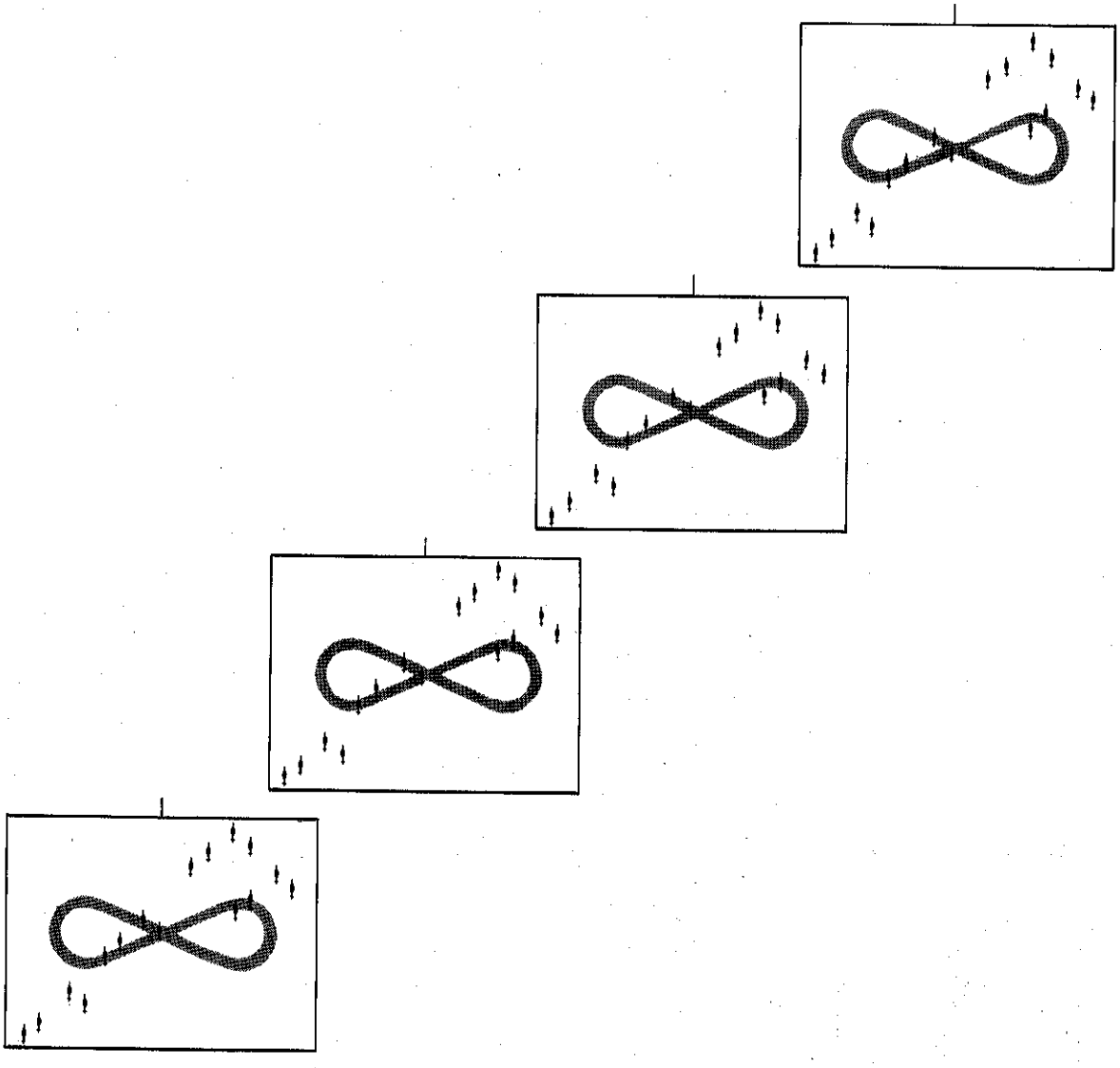


Figure 31. Battalion left echelon formation.

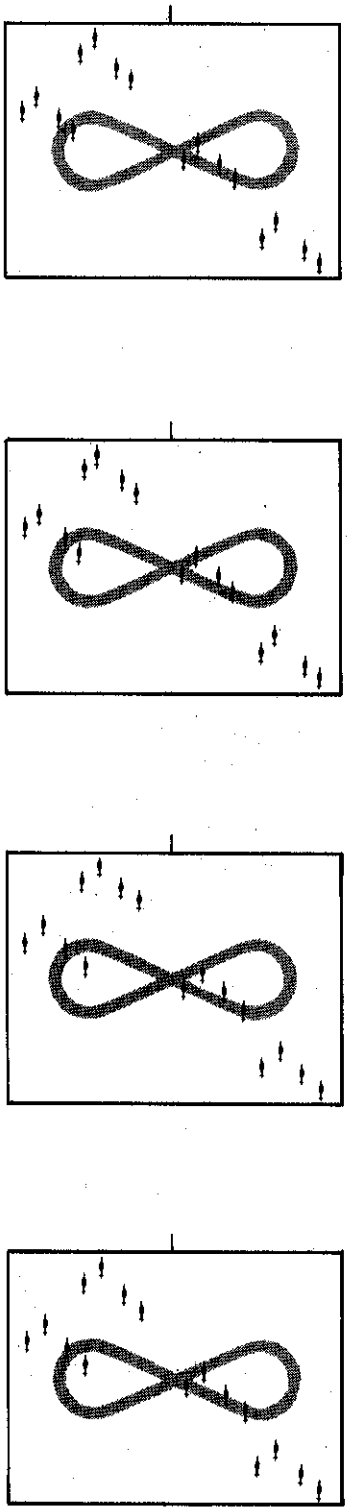


Figure 32. Battalion column formation (companies in heavy right formation).

CHAPTER 7

FORMATION DISPERSION MANEUVERS

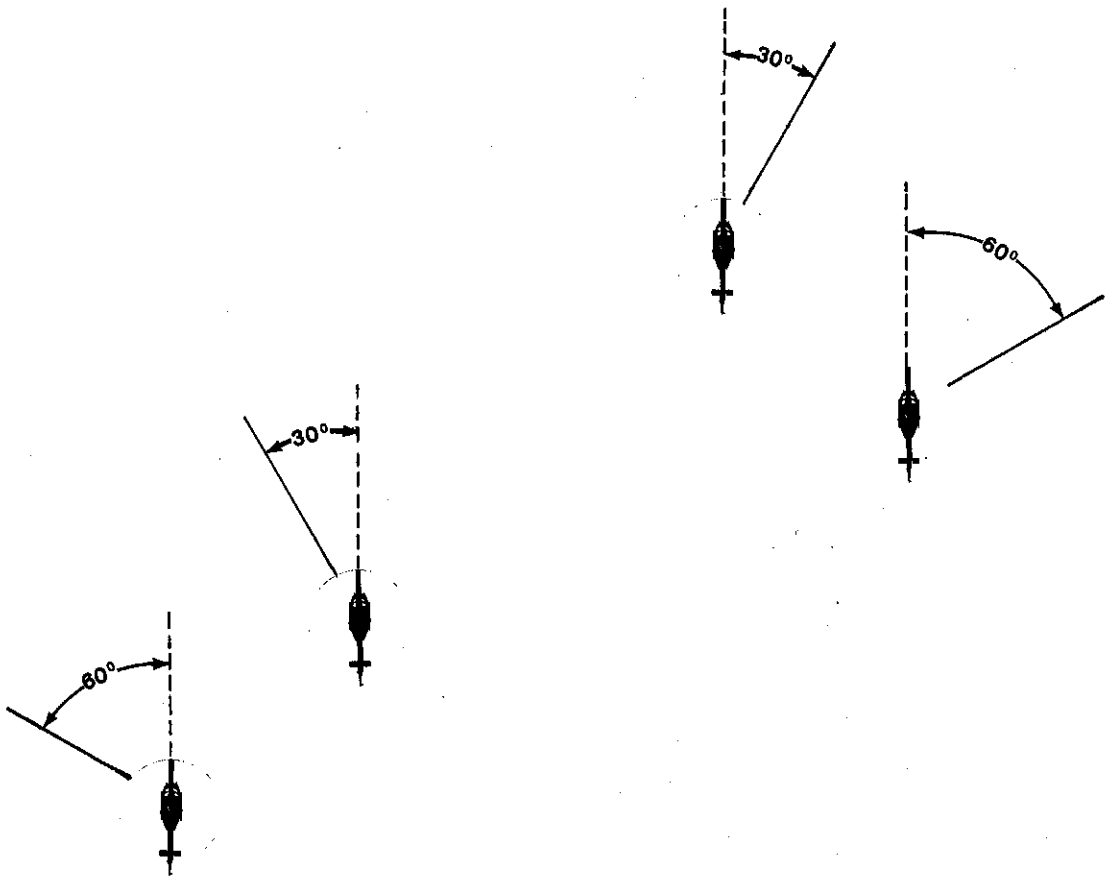
38. GENERAL

Dispersion maneuvers are employed to break up the formation as quickly as possible without resorting to an intermediate procedure such as the echelon formation. The need for rapid dispersion may arise at any time in a tactical situation, particularly if the formation comes under attack by intense hostile ground or aerial fire.

39. BANDIT BREAK

a. The order of execution for formation dispersion maneuvers is "BANDIT BREAK." This command will be given by the formation commander or his designated subordinate. Figures 33 through 37 depict procedures for dispersing typical formations. The commander will reassemble the formation at a designated location and altitude or at predetermined rally points.

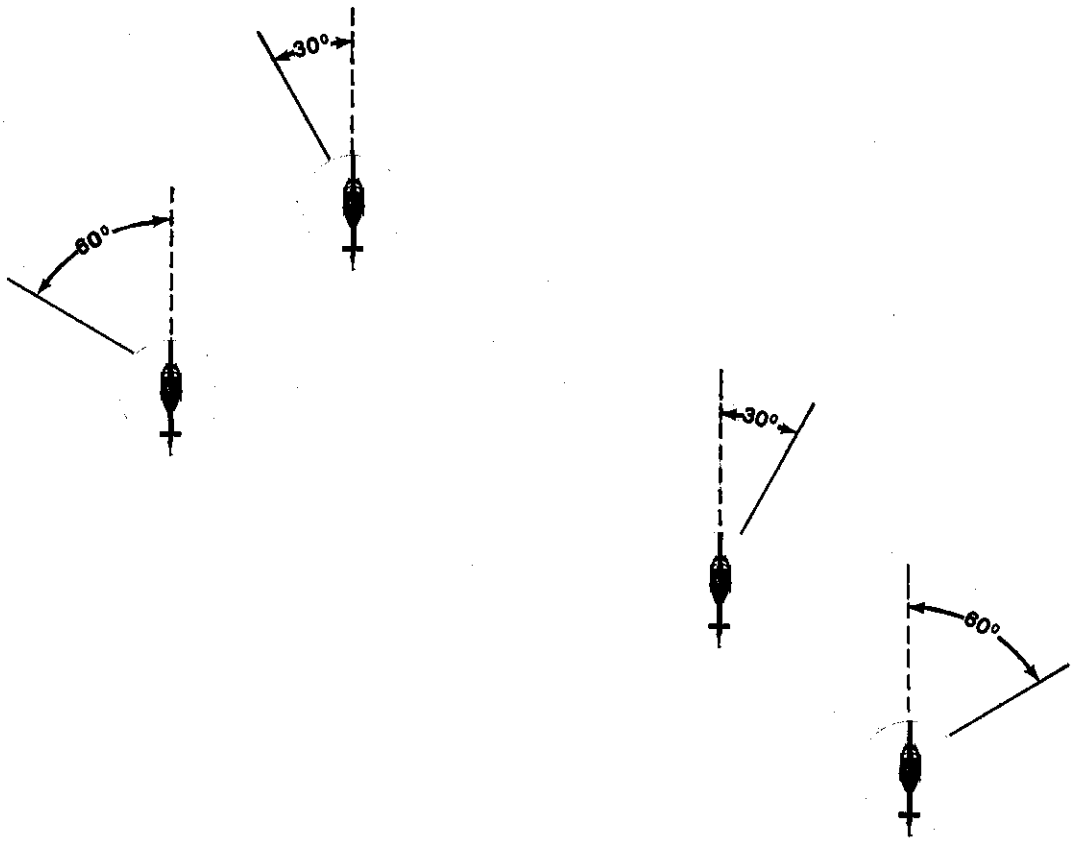
b. Formation dispersion maneuvers should be practiced until the aviators in the formation can quickly and safely disperse and reassemble.



NOTES:

1. FLIGHT LEADER TURNS 30° TO THE RIGHT.
2. SECOND HELICOPTER TURNS 60° TO THE RIGHT.
3. THIRD HELICOPTER TURNS 30° TO THE LEFT.
4. FOURTH HELICOPTER TURNS 60° TO THE LEFT.
5. ALL HELICOPTERS DESCEND TO CONTOUR ALTITUDE.

Figure 33. Flight heavy left formation "bandit break."



NOTE:

1. FLIGHT LEADER TURNS 30° TO THE LEFT.
2. SECOND HELICOPTER TURNS 60° TO THE LEFT.
3. THIRD HELICOPTER TURNS 30° TO THE RIGHT.
4. FOURTH HELICOPTER TURNS 60° TO THE RIGHT.
5. ALL HELICOPTERS DESCEND TO CONTOUR ALTITUDE.

Figure 34. Flight heavy right formation "bandit break."

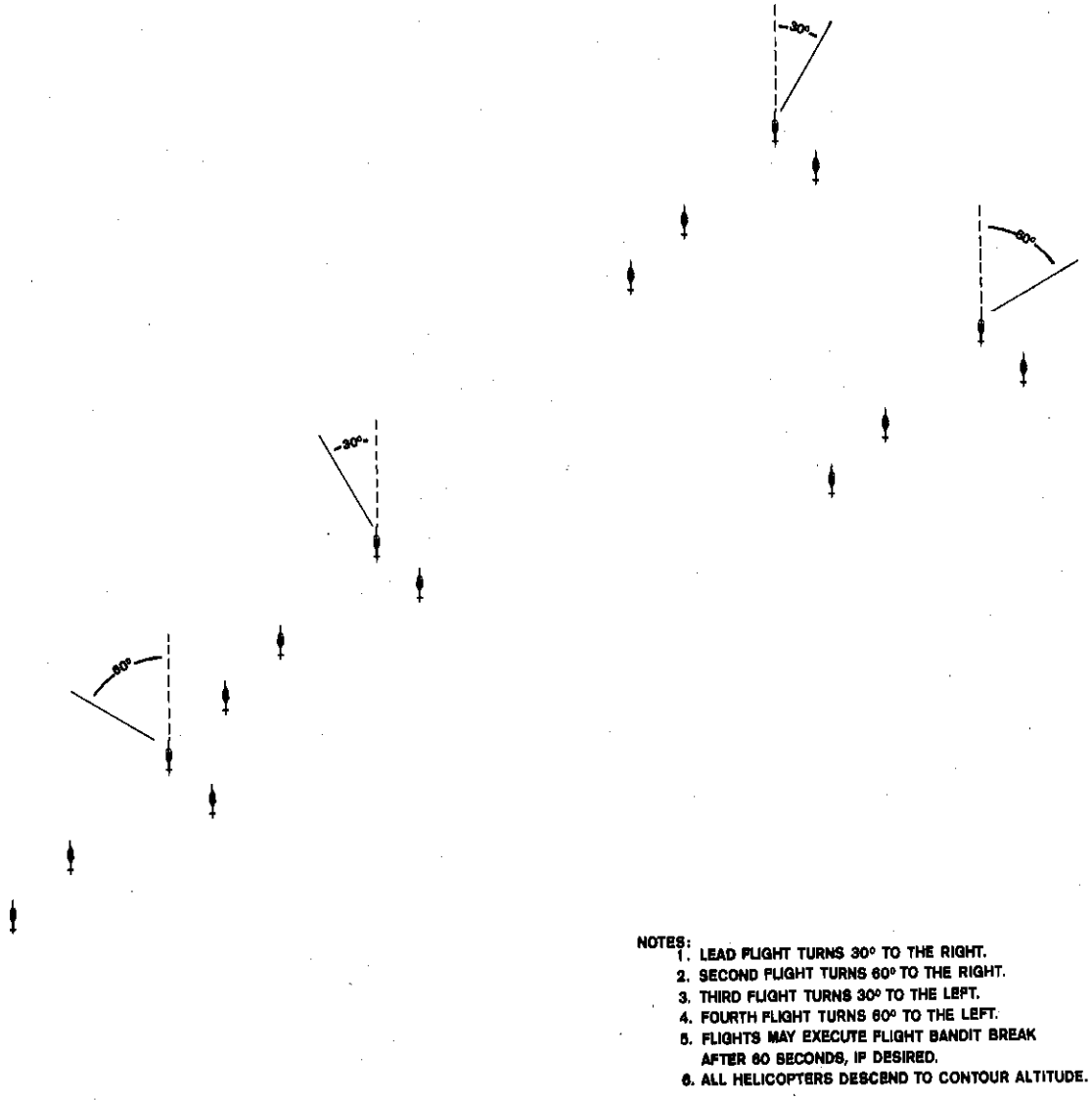


Figure 35. Company heavy left (flights heavy left) "bandit break."

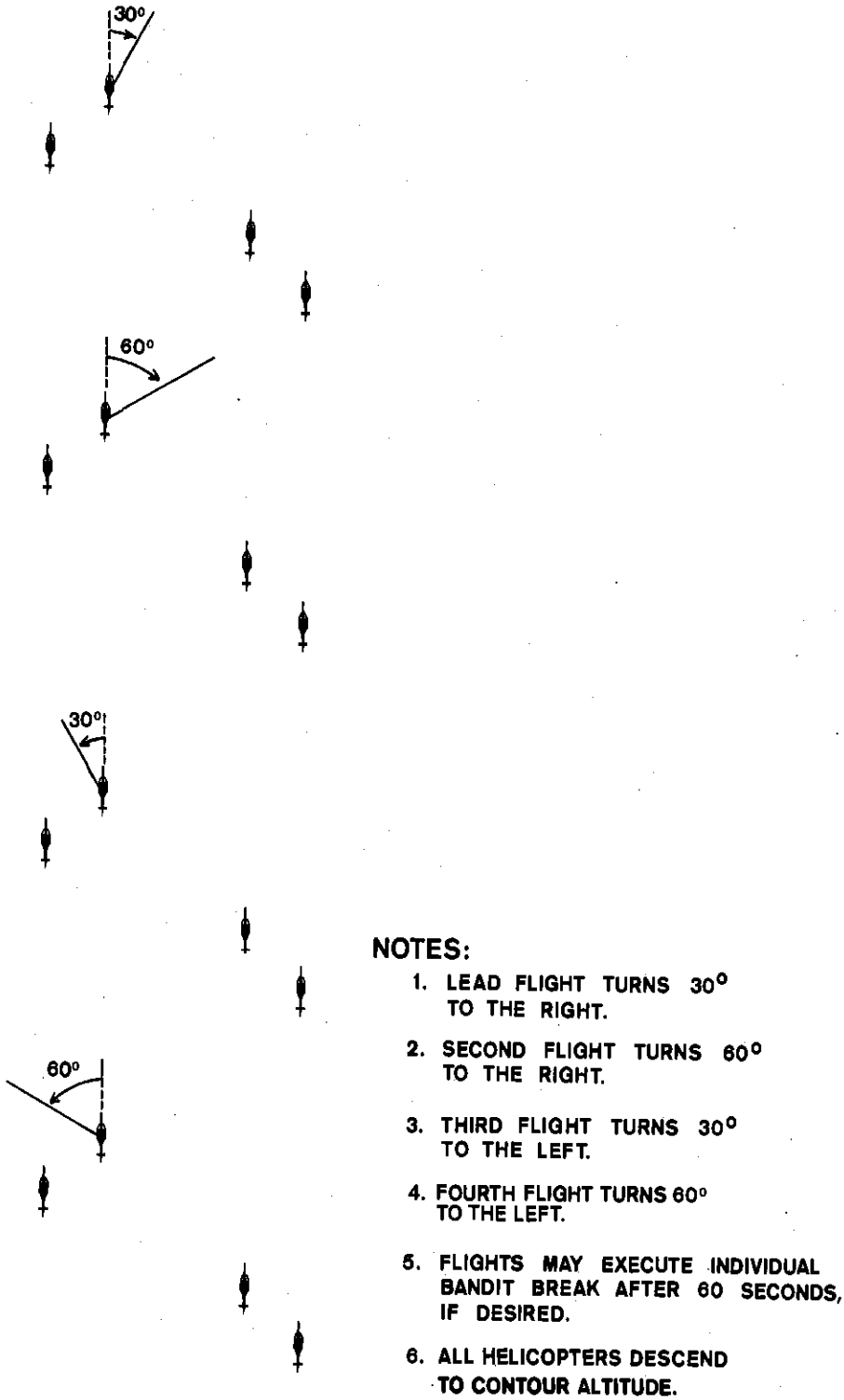


Figure 36. Company column (flights heavy right) "bandit break."

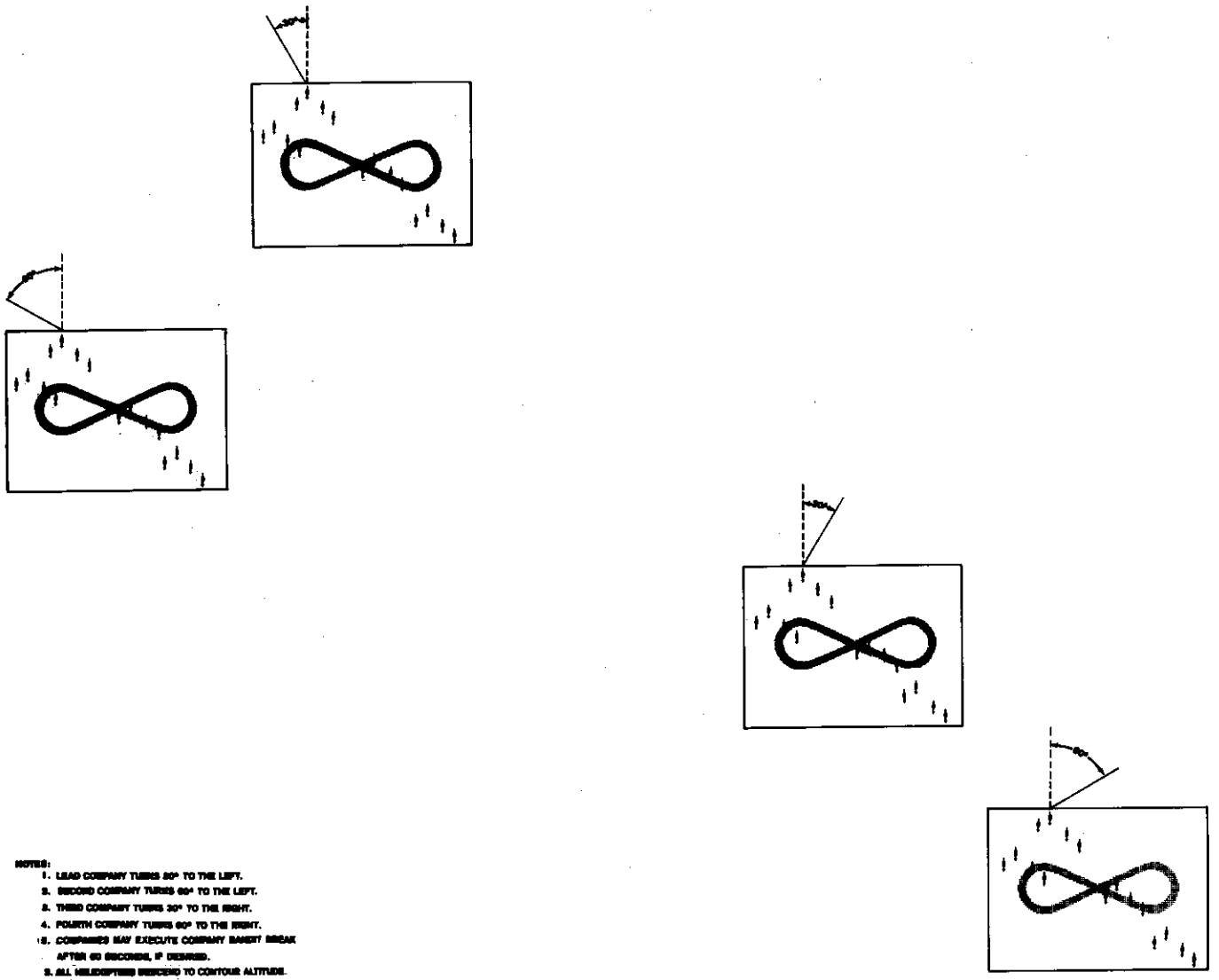


Figure 37. Battalion heavy right formation "bandit break."