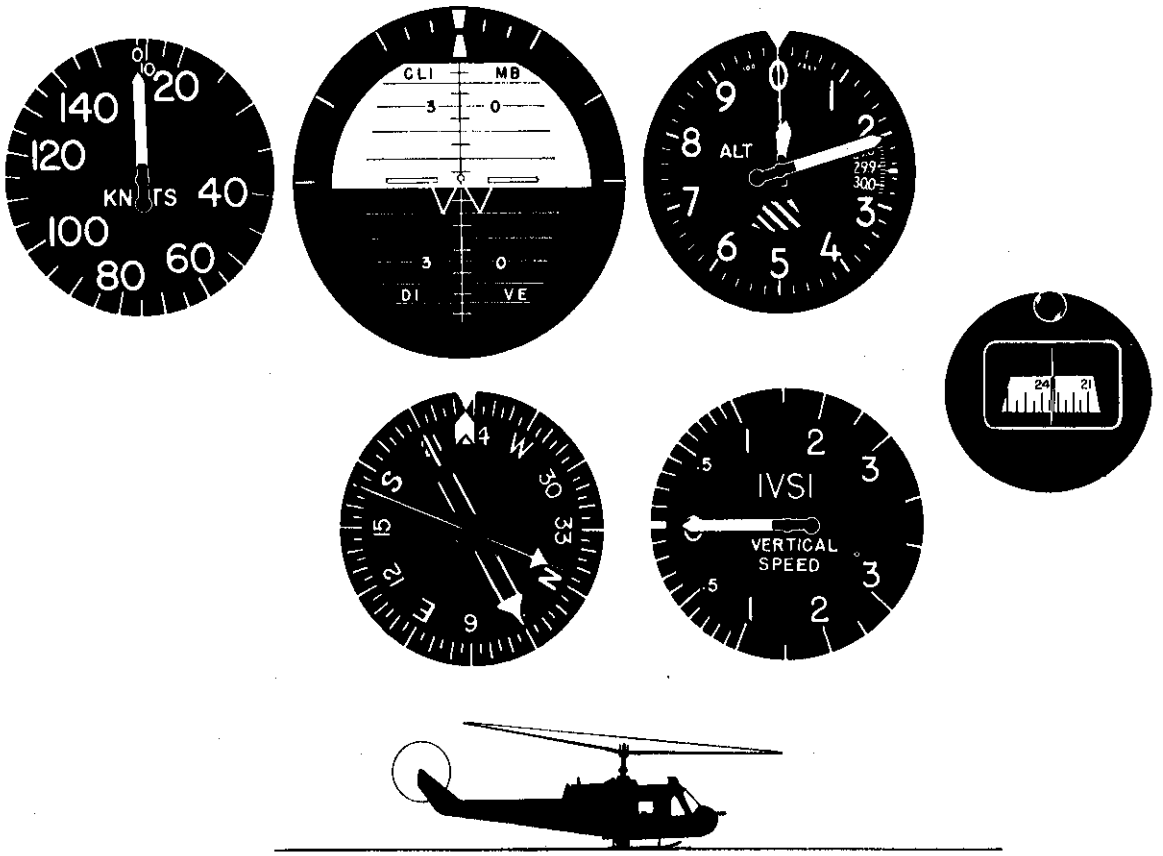
BASIC MANEUVERS

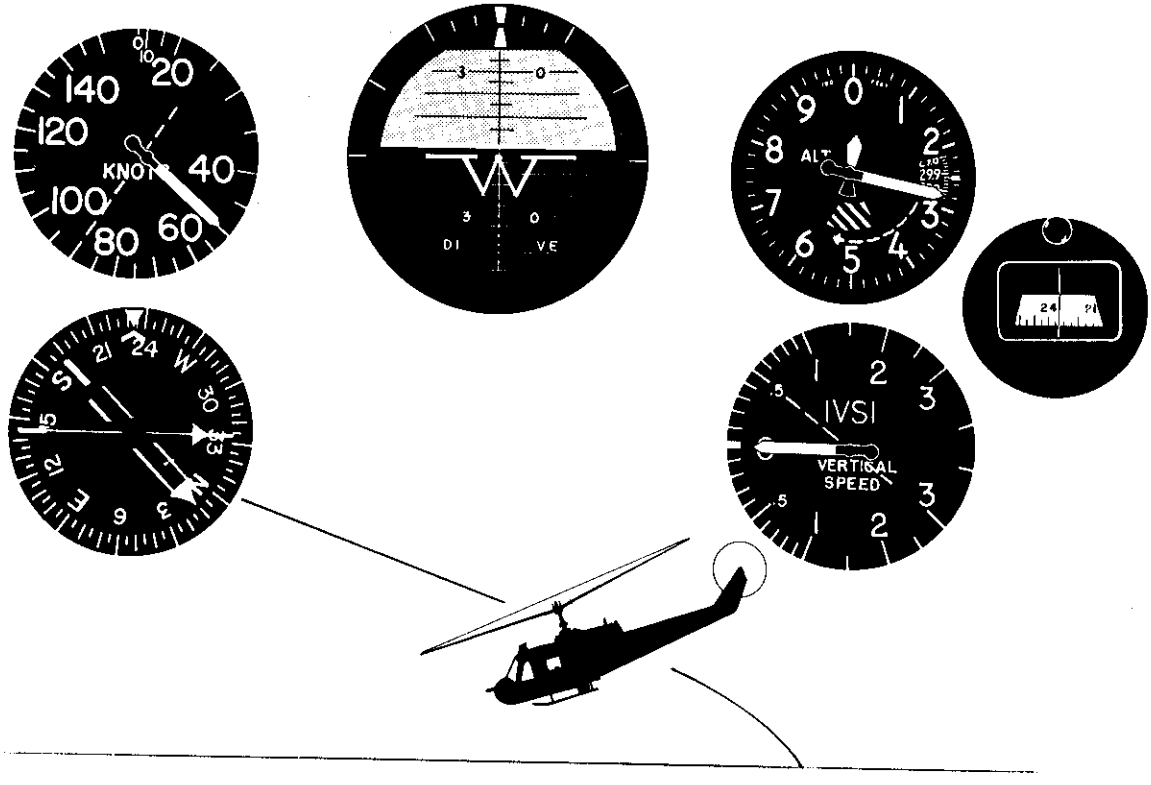
The maneuvers described in this section are designed to develop proficiency in the attitude control of rotary wing aircraft. Basic instrument maneuvers are those taught to obtain proficiency in crosschecking, instrument interpretation, and control techniques.

Turn to page 39.



INSTRUMENT SETTINGS BEFORE TAKEOFF

Turn to page 40.



FLIGHT INSTRUMENTS DURING TAKEOFF

YOUR ANSWER: CYCLIC.

Not so. If the cyclic is used to correct for heading, during initial climb-out prior to reaching sufficient airspeed for coordinated flight, overcontrolling may result.

Turn to page 42.

YOUR ANSWER: PEDALS.

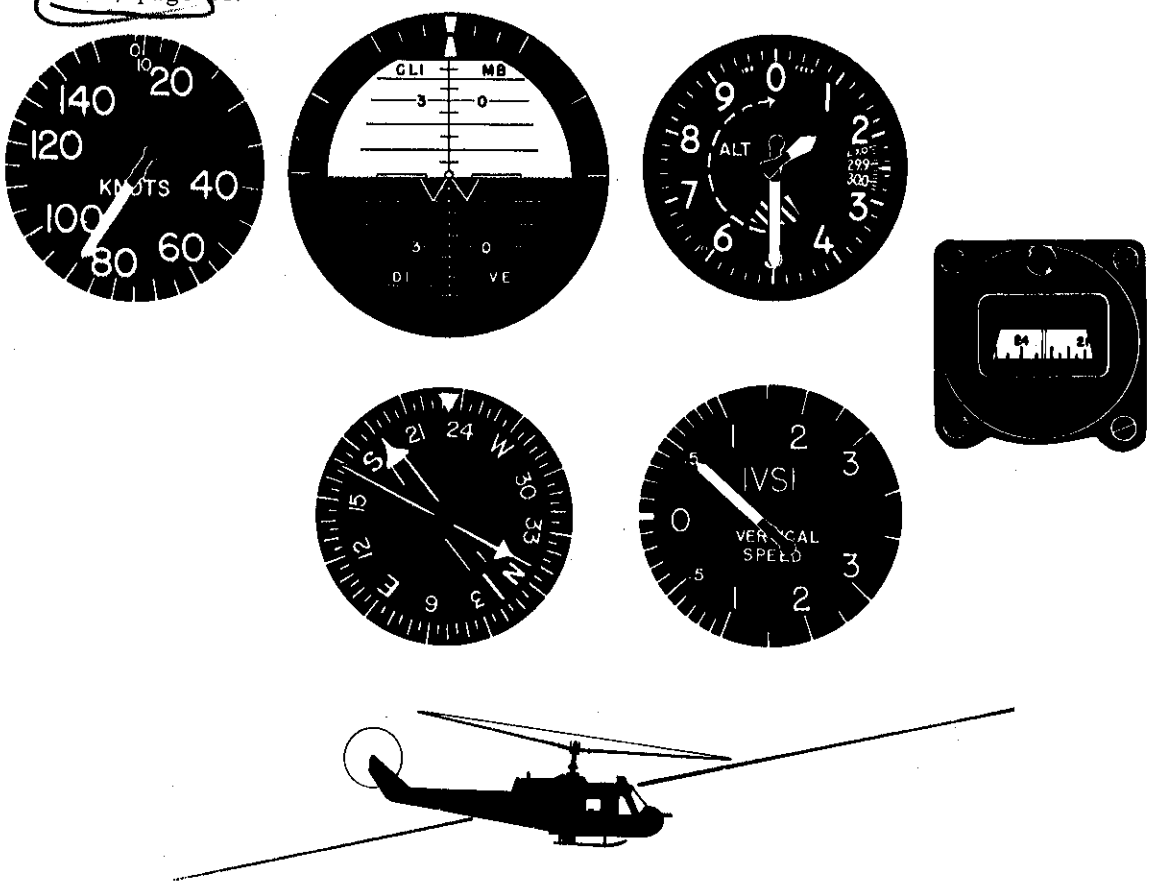
True. Pedals are used for minor correction until sufficient airspeed is attained to transition to coordinated flight.

A straight climb. Heading remains constant while altitude is changed. During the climb, the heading, attitude, airspeed, and rate of climb are maintained with cyclic control; trim is maintained with pedals. Since a 5-knot change in airspeed will change the rate of climb, power is used to adjust the rate of climb only if the desired airspeed is exceeded by ±5 knots.

During the climb, power (collective) is always used to adjust the rate of climb.

True, page 43.

False, page 44.



STRAIGHT CLIMB

YOUR ANSWER: TRUE.

Have you been reading the frames? We just told you that since a 5-knot change in airspeed will change the rate of climb, power is used to adjust the rate of climb only if the desired airspeed is exceeded by ±5 knots. "Airspeed changes in this case are made with ---clic."

Shall we try again? Go to page 44.

YOUR ANSWER: FALSE.

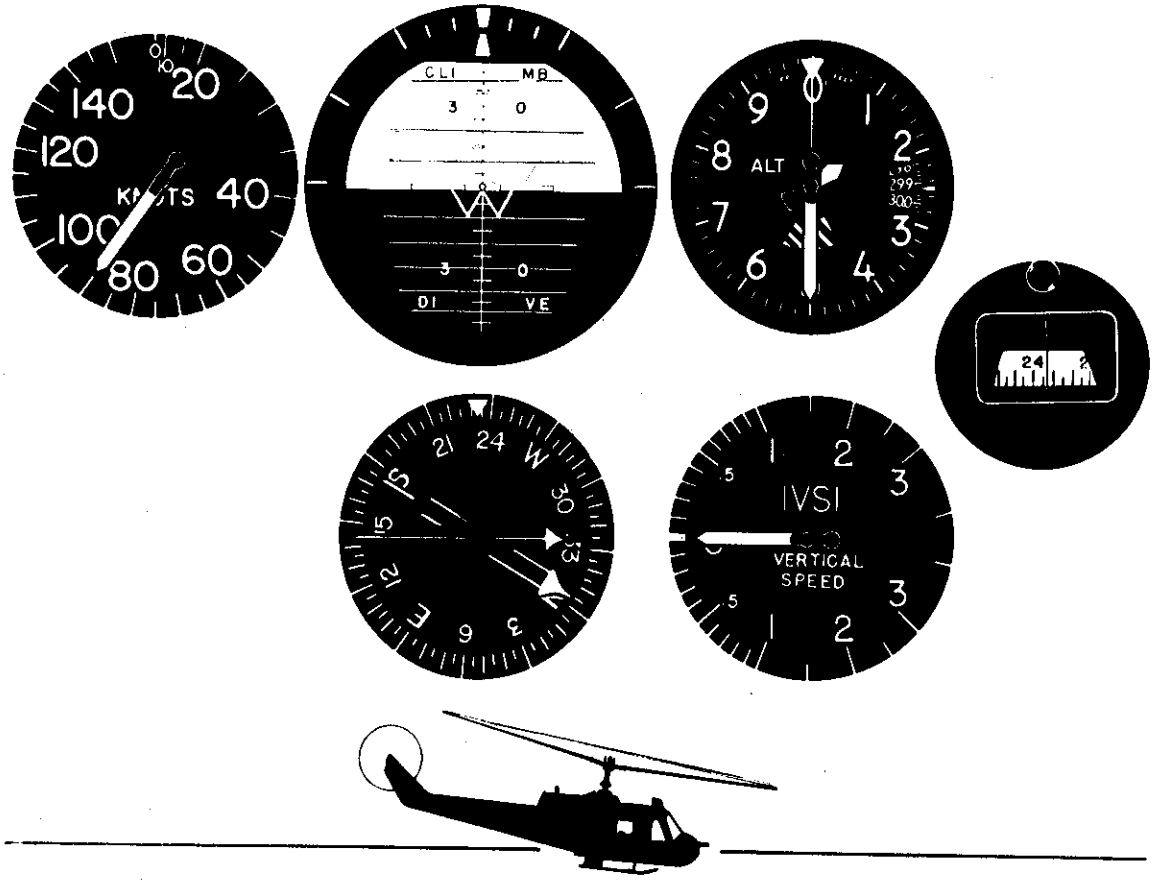
That certainly is a false statement. Cyclic is used to adjust rate of climb by varying airspeed ±5 knots. If it requires more than ±5-knot pitch attitude variation, then power is adjusted.

Straight and level: heading, altitude, and airspeed constant. During straight-and-level flight, heading and altitude are maintained with cyclic control, airspeed with power, and trim with pedals.

Cyclic control is used for minor variations of altitude.

~~Yes, page 46~~.

No, page 45.



STRAIGHT-AND-LEVEL FLIGHT

YOUR ANSWER: NO.

You missed. Remember, in straight climbs we use cyclic to make small changes in pitch attitude to change rate of climb. Why wouldn't this work in straight-and-level flight to help maintain altitude?

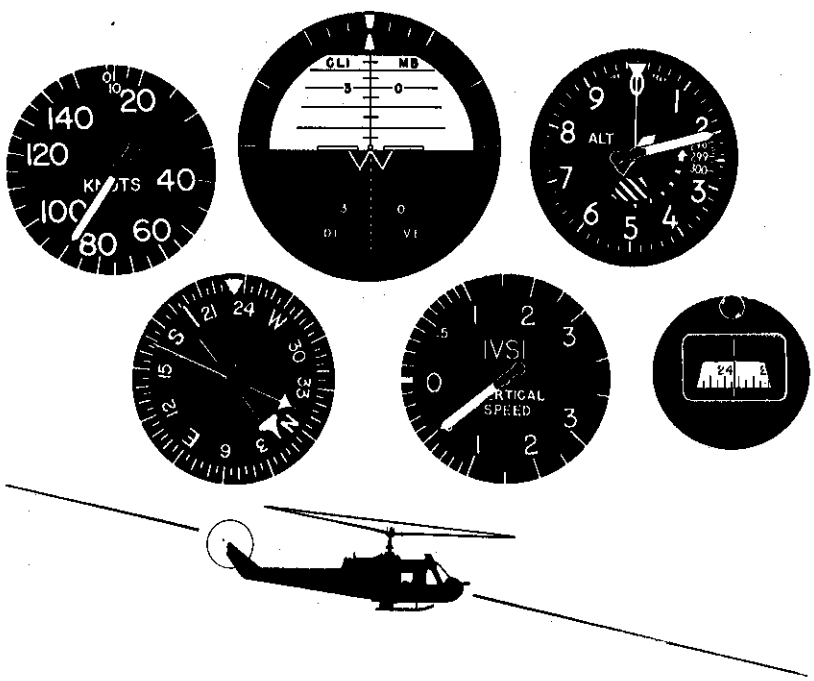
Go back and read page 44 and then select another answer.

YOUR ANSWER: YES.

Of course it is. Power is used to adjust minor variations of altitude only if the desired altitude cannot be maintained by varying pitch attitude, without exceeding ±10 knots speed.

Straight descent: heading remains constant while altitude is changed. The attitude of the helicopter in the descent will be the same as in the climb. During the descent, the heading, attitude, airspeed, and rate of descent are maintained with cyclic control; trim is maintained with pedals. Power is used to adjust rate of descent only if the desired airspeed is exceeded by ±5 knots. Select the statements below of common errors in a straight descent.

1. Failure to maintain heading, page 47.
2. Failure to establish desired rate of descent, page 48.
3. Failure to maintain proper trim, page 50.
4. All of the above, page 49.



STRAIGHT DESCENT

YOUR ANSWER: FAILURE TO MAINTAIN HEADING.

OK, we'll buy that; however, it is only partly correct. Put yourself in the helicopter in a descent, eyeball the gauges, and then think of some errors you might make.

Go back to page 46 and select a better answer.

YOUR ANSWER: FAILURE TO ESTABLISH DESIRED RATE OF DESCENT.

True, but is this the best answer? Failure to establish the desired rate of descent will certainly cause problems throughout the maneuver.

Go back to page 46 and try for a better answer.

YOUR ANSWER: ALL OF THE ABOVE.

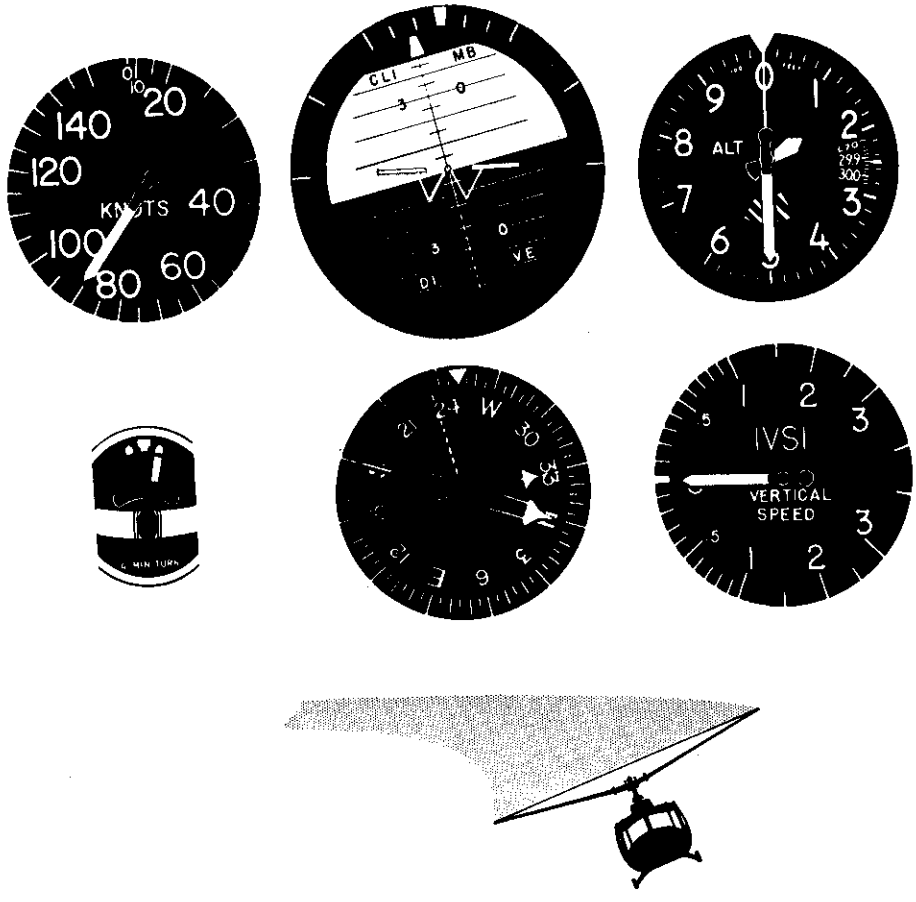
You've hit the nail on the head. These errors and others can cause problems in many of the basic maneuvers. Of course, these common errors can be overcome with practice.

Level turns. Altitude and airspeed remain constant; heading is varied. In the performance of the maneuver, rate of turn and altitude are maintained with cyclic control, airspeed with power, and trim with pedals. Look at the instruments below. Which one gives you an immediate indication of a turn?

Attitude indicator, page 52.

Turn-and-slip indicator, page 51.

Heading indicator, page 53.



LEVEL TURN

YOUR ANSWER: FAILURE TO MAINTAIN PROPER TRIM.

This could definitely be a problem. Good trim indicates quality of control coordination in any maneuver (no yaw or slip). We'll accept this answer; but, go back to page 46 and see if there isn't a better answer.

YOUR ANSWER: TURN-AND-SLIP INDICATOR.

In our discussion earlier, we decided that the turn-and-slip indicator was a roll, rate, and trim instrument. The needle indicates rate of turn and the ball indicates trimmed or coordinated flight. The clue to the question is immediate. For the time being, take our word for it and decide your answer is wrong. Go back to page 49 and try again.

YOUR ANSWER: ATTITUDE INDICATOR.

Are you sure? The attitude indicator gives you a direct reading of attitude; however, it does not give you an immediate indication of a turn. You can do better, so try again.

Go back to page 49 and pick the right answer.

YOUR ANSWER: HEADING INDICATOR.

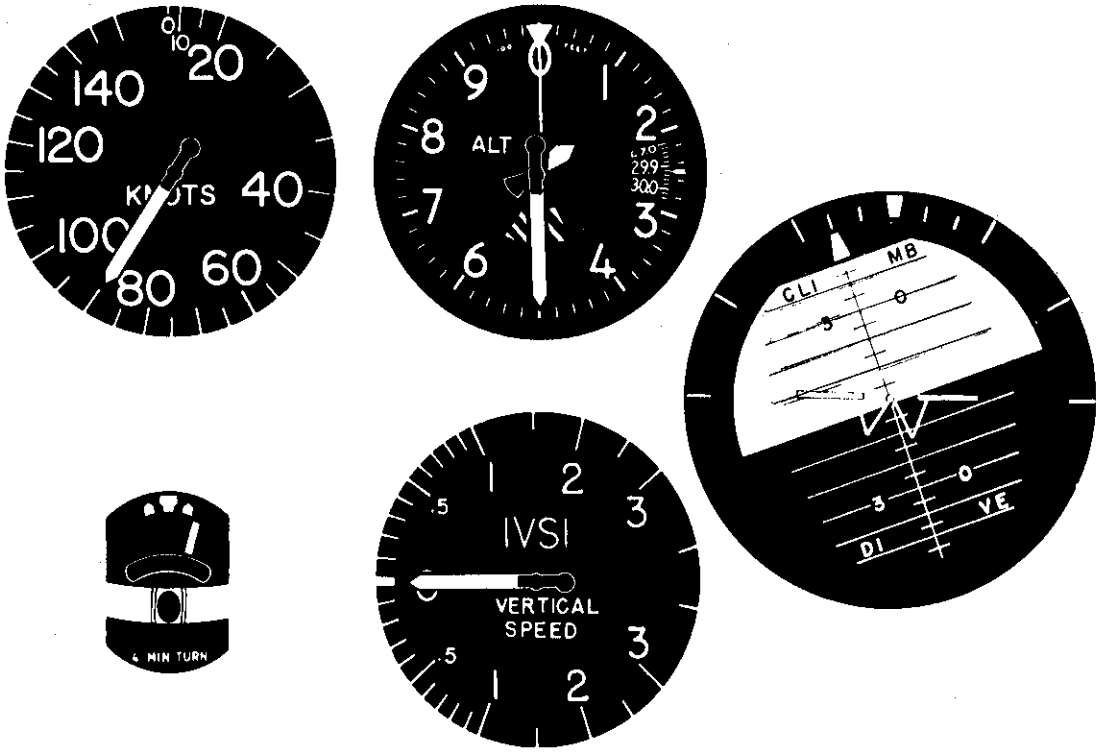
Let's see now. If the heading indicator is moving, we are turning, so our definition then is, that the heading indicator does give an immediate indication of turning. Since you're right, let's move on to steep turns.

A steep turn is any turn greater than standard rate; for practice however, a 4-minute turn needle should indicate a 3-needle width turn deflection on the turn-and-slip indicator.

The techniques of entry and recovery for steep turns are the same as for any turn maneuver.

1. True, page 55.

2. False, page 54.

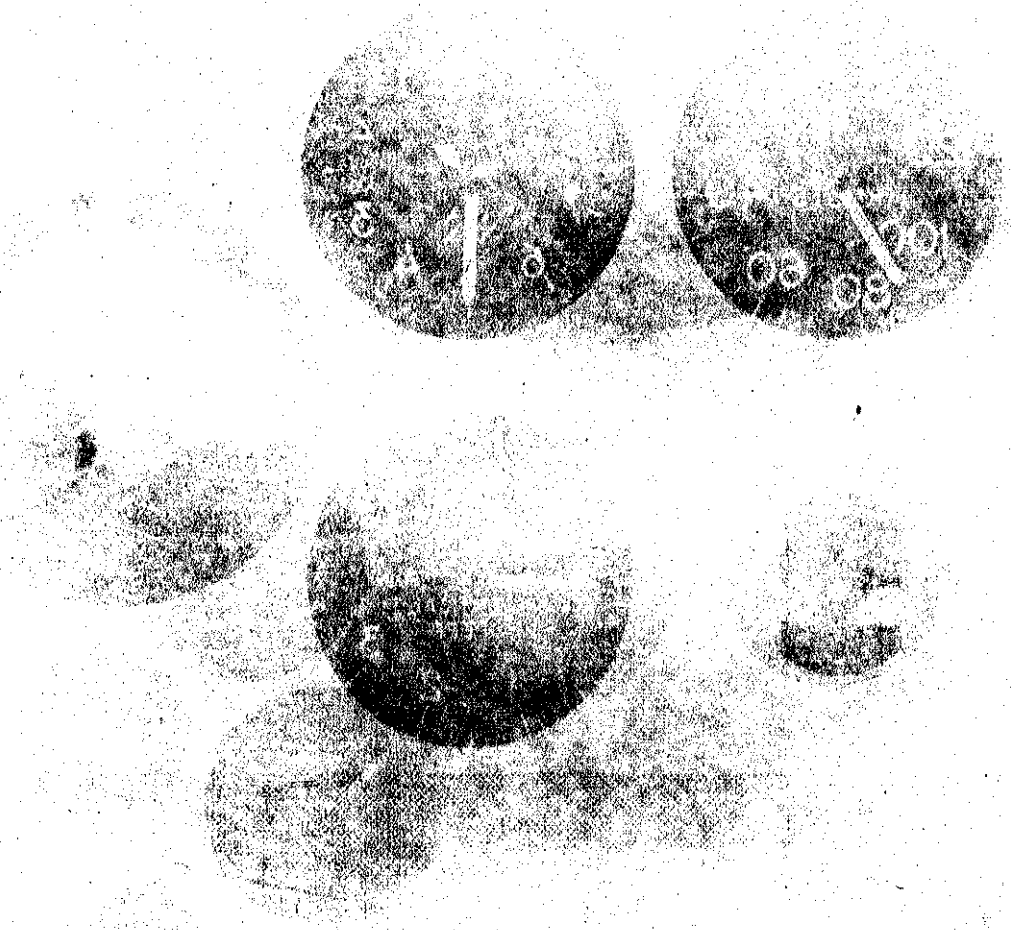


STEEP TURN

YOUR ANSWER: FALSE.

Now wait a minute! What could be different about it? The instruments and controls are the same, so the techniques are the same. The angle of bank and rate of turn is greater, but that doesn't change how we use the controls or instruments. Take our word for it that the techniques of entry and recovery are the same as for any turn maneuver.

Now, turn to page 55.

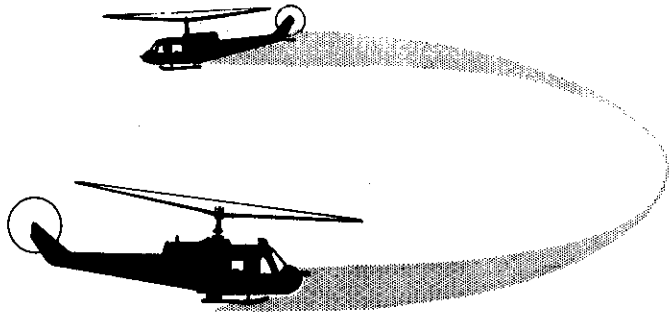


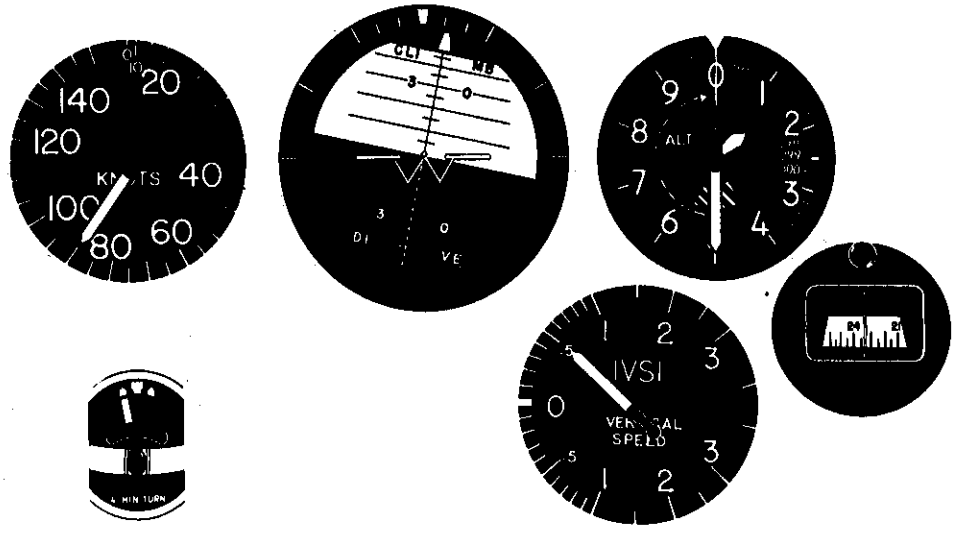
YOUR ANSWER: TRUE.

Correct. The techniques of entry and recovery are the same for any turn maneuver. Rate of turn and altitude are maintained with cyclic control, airspeed is maintained by power, and trim with pedals. A climbing turn is a combination of a climb and a turn and consists of a climb of 500 feet during a turn of 180° in 60 seconds. During a climbing turn, the rate of turn and rate of climb are controlled by _____. Select correct answer.

1. Rate of turn) - Cyclic, page 57.
   Rate of climb)

2. Rate of turn - Cyclic, page 56.
   Rate of climb - Power, page 56.



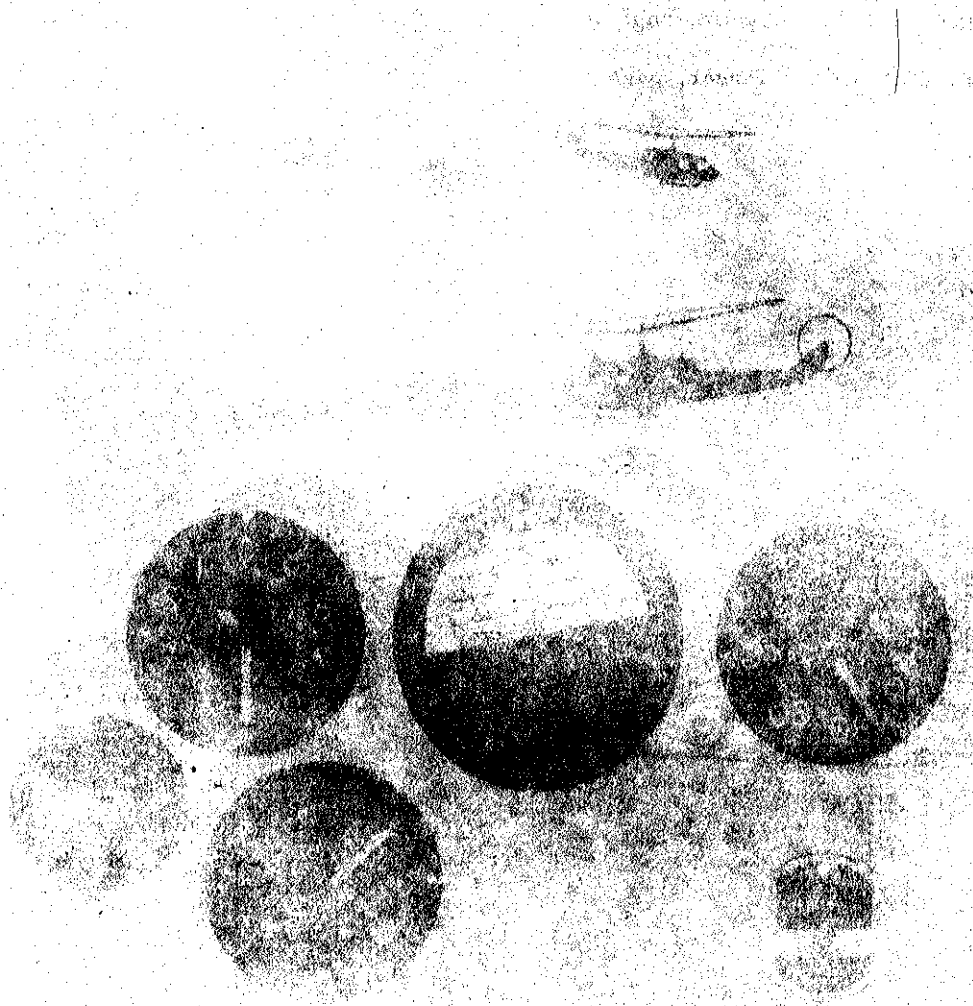


CLIMBING TURN

YOUR ANSWER: RATE OF TURN - CYCLIC.
RATE OF CLIMB - POWER.

Well you are partly right. Rate of turn is controlled by cyclic. Rate of climb, however, during the climbing turn is controlled by the cyclic by varying pitch attitude. Power is used to adjust the rate of climb only if the pitch attitude variation requires more than a ±5-knot airspeed variation.

Go on to page 57.

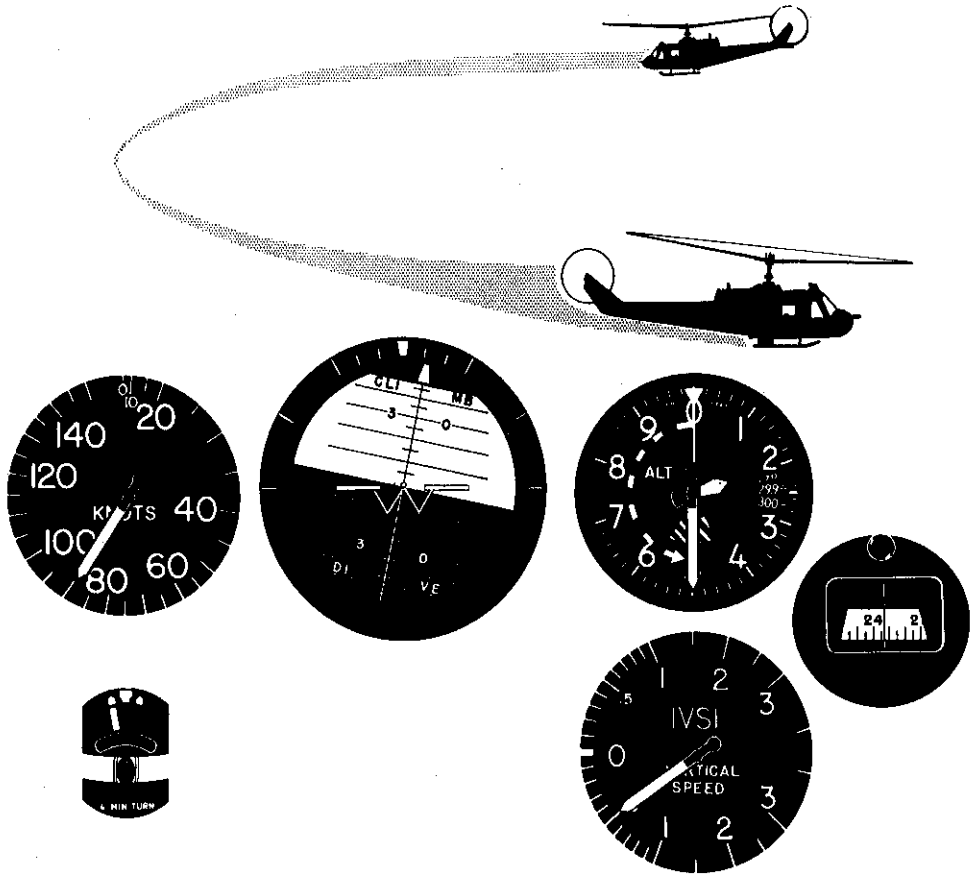


YOUR ANSWER: RATE OF TURN) - CYCLIC.
RATE OF CLIMB)

True. During the climbing turn, the rate of turn, rate of climb, and airspeed are maintained with cyclic control, and trim with pedals. Power is used to adjust the rate of climb only if the desired airspeed is exceeded by ±5 knots. (The ±5 knots is used for minor pitch correction during climbs and descents.) A descending turn is a combination of a descent and a turn, and consists of a descent of 500 feet while turning 180° in 60 seconds. Control techniques during a descending turn are the same as those for climbing turns.

True, page 59.

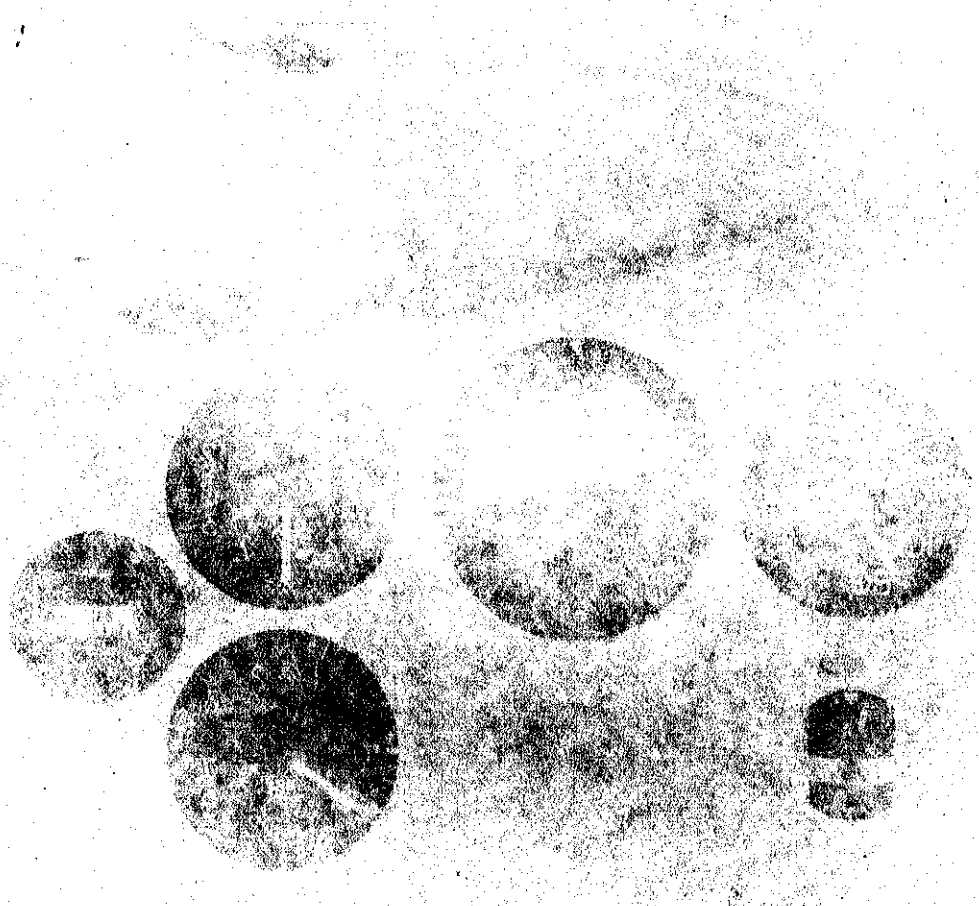
False, page 58.



YOUR ANSWER: FALSE.

You missed this one. During the descending turn, the rate of turn, rate of descent, and airspeed are maintained with cyclic control, and trim with pedals. Power is used to adjust the rate of descent only if the airspeed is exceeded by ±5 knots.

Go on to page 59.



YOUR ANSWER: TRUE.

Certainly, the clue, of course, is the word "during." Earlier we discussed descents and level turns. The control techniques for these maneuvers are merely combined to make a descending turn. The same is true for climbing turns (climbs and level turns). Once the descending turn is started, the same control techniques are then used as those for a climbing turn.

Turn to page 60.

Let's briefly review what has been covered.

1. Instrument interpretation - evaluating or interpreting flight instruments to determine attitude.
2. Pitch attitude, roll attitude, and yaw.
3. Crosscheck - observing or interpreting two or more instruments to determine aircraft attitude.
4. Comparison of intuition versus crosscheck.
5. Instrument indications of attitude.
6. Basic maneuvers - definitions and instrument illustrations.

Turn to page 61.

SELF-TEST

1. Define instrument interpretation. to interpret or evaluate the flight instruments to determine the attitude of the aircraft.

2. Define pitch attitude. the angular relationship of the longitudinal axis of the aircraft and the actual horizon

3. Define roll attitude. the ∠ relationship of the latitudinal axis of the aircraft and the actual horizon.

4. Define yaw.

the ∠ rel. of the vertical axis of the aircraft and the act. hor.

5. Define crosscheck. the interrelation of the instruments to determine the attitude of the aircraft ~~in flight~~.

6. Intuition can give you a false indication of aircraft attitude. (~~True~~ - False)

7. List four pitch attitude instruments.

   a. altimeter
   b. airspeed ind.
   c. vertical speed indicator
   d. attitude indicator

8. List three roll attitude instruments.

   a. turn and bank ind.
   b. directional gyro.
   c. attitude ind.

9. The turn-and-slip indicator is a roll, rate, and turn instrument.

10. During straight-and-level flight, the nose of the helicopter rises. What indication is reflected on the following instruments?

a. Attitude indicator - miniature aircraft is above the horizon bar.

(1) Above.

(2) Below.

b. Vertical speed indicator - needle is showing rate of _____.

(1) Climb.

(2) Descent.

c. Airspeed indicator - airspeed is _____.

(1) High.

(2) Low.

11. During straight-and-level trimmed flight, the aircraft rolls or banks to the right. What instrument gives a direct indication of bank?

a. Attitude indicator.

b. Heading indicator.

c. Turn-and-slip indicator.

12. Write two reasons for a poorly executed maneuver.

a. an out of trim aircraft

b. concentrating on one instrument

13. Match terms in left column with correct control in right column.

a.	Pitch attitude control 3	(1)	Collective d
b.	Roll attitude control 3	(2)	Pedals c
c.	Yaw control 2	(3)	Cyclic a b
d.	Power control 1		

14. Study the diagrams on pages 64, 65, 66, and 67; indicate on the answer sheet, the maneuver that the diagrams are depicting.

a. level or straight climb, normal rate

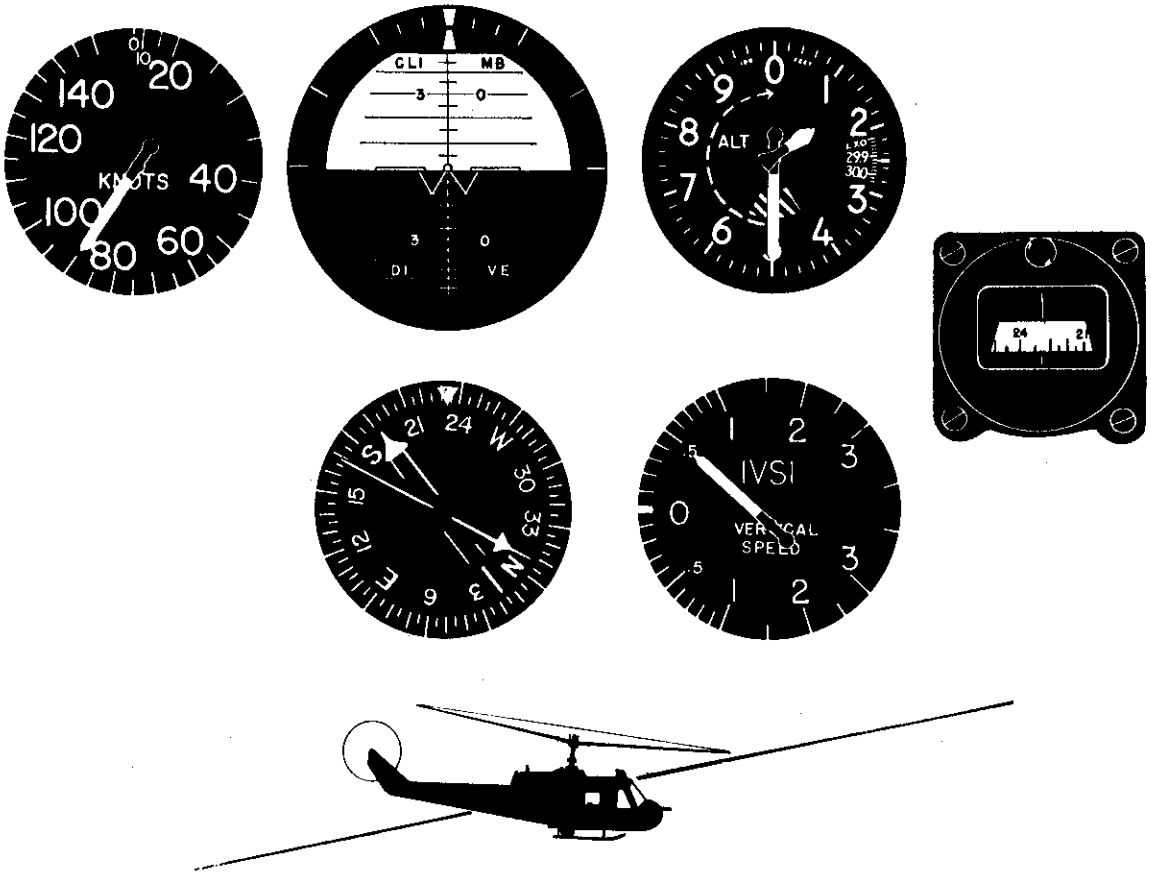
b. level right turn, standard rate of turn

c. descending turn to left

d. climbing turn to left

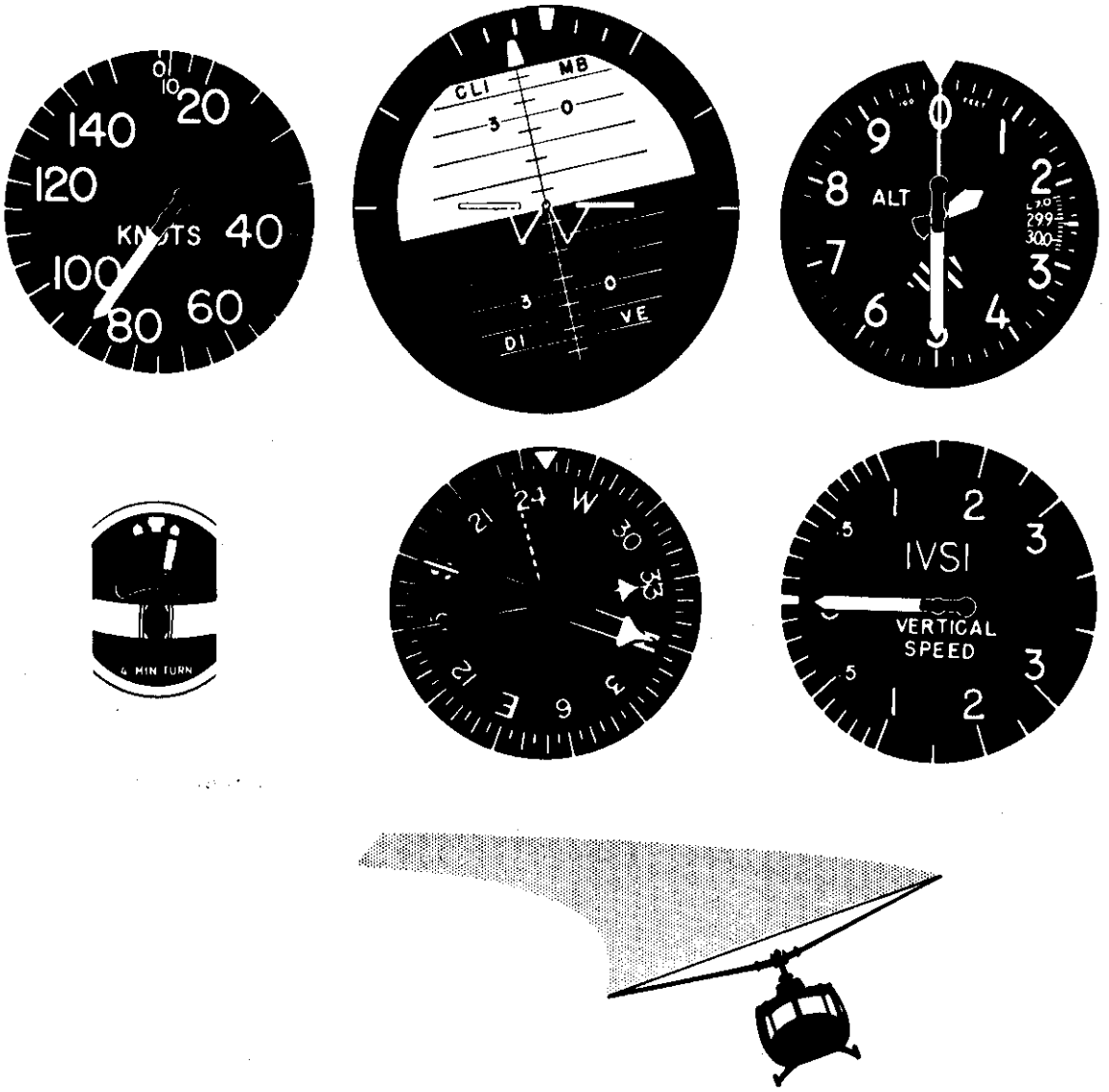
QUESTIONS NO.	ANSWERS ON PAGE
1	14
2	20
3	27
4	28
X 5	11
6	13
7	23
8	32
9	26
10	25
?. X 11	29
12	33
13	35
14a	12
14b	15
14c	17
14d	22

a.



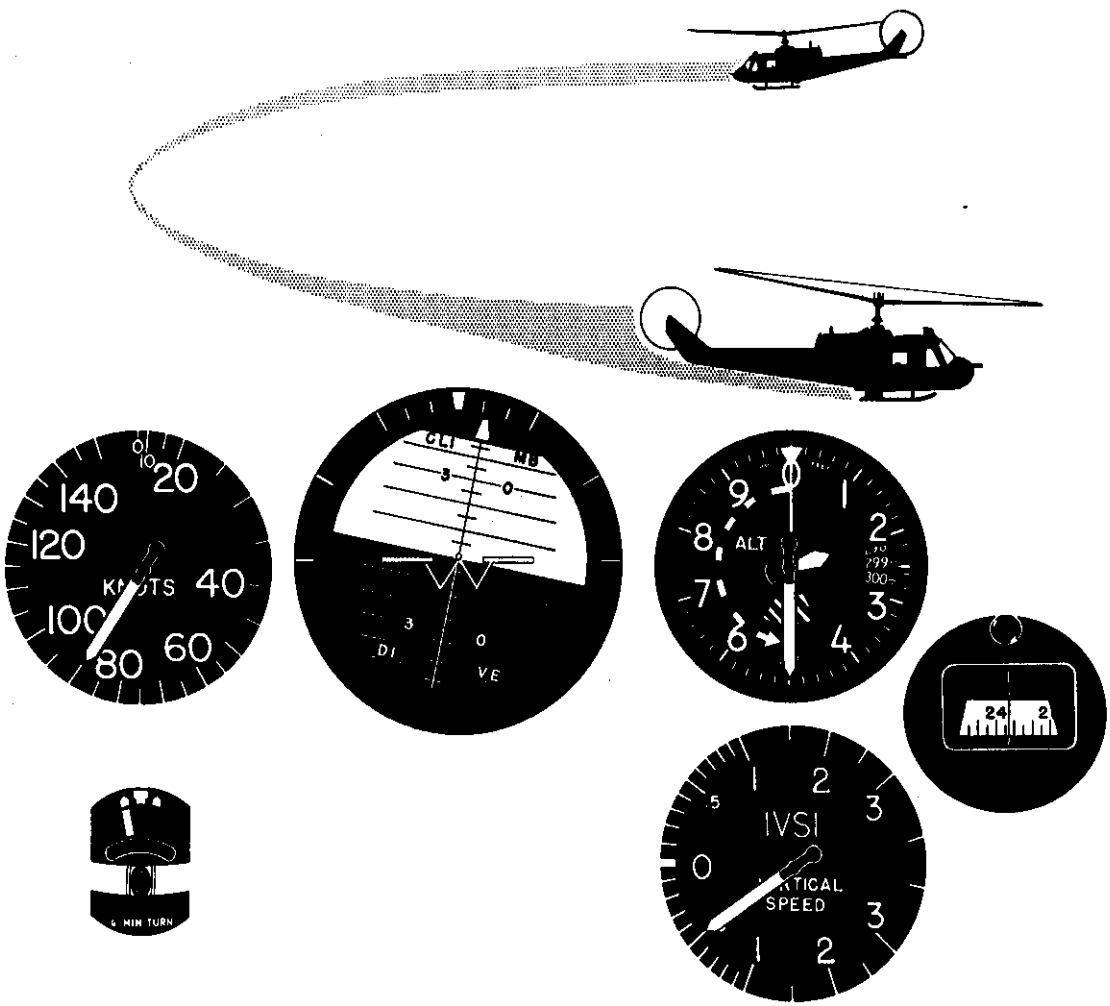
Turn to page 65.

b.



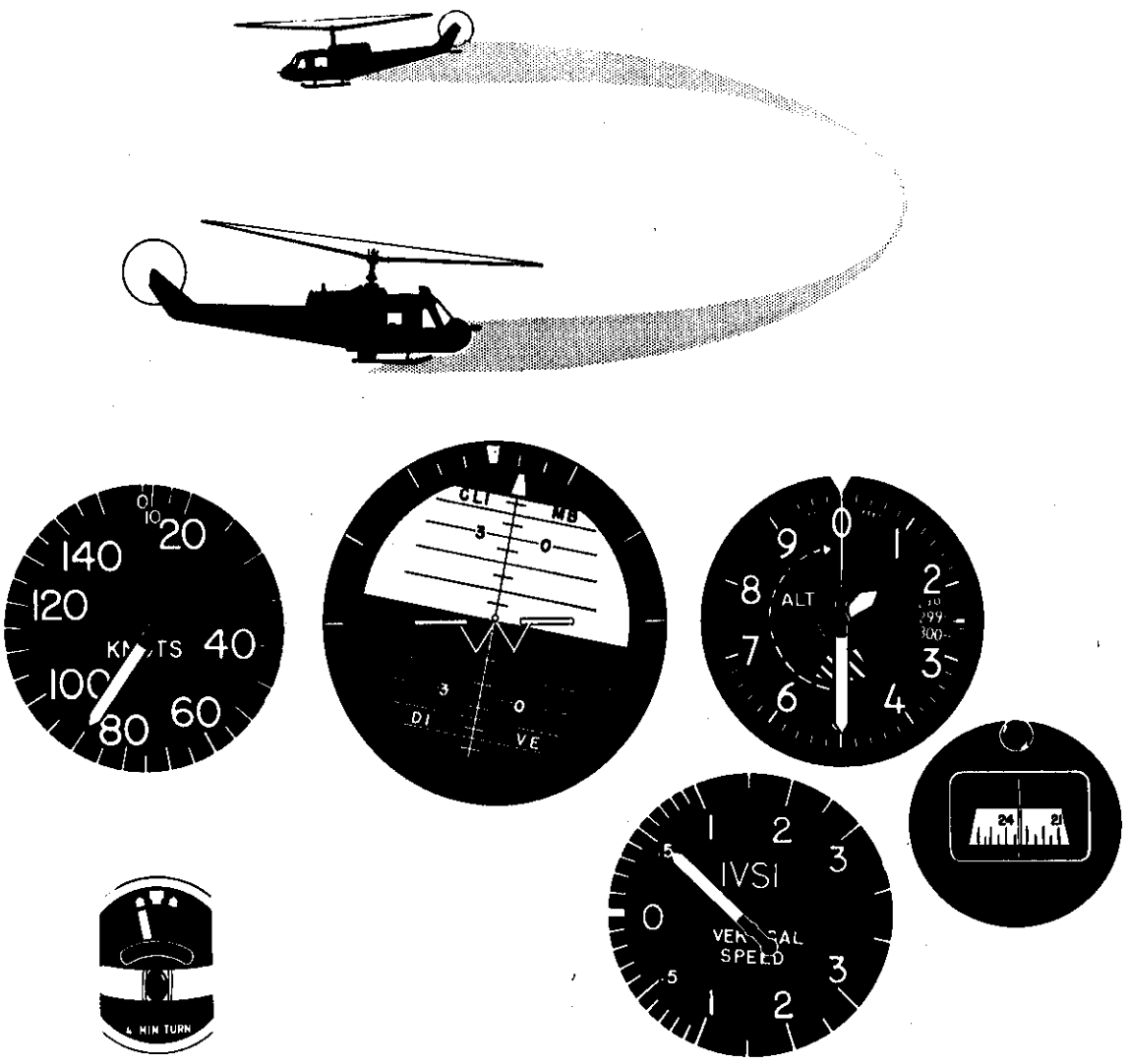
Turn to page 66.

c.



Turn to page 67.

d.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