PRACTICAL EXERCISE NO. 1

RADIO NAVIGATION

1. Explain in your own words the idea of "transition" used with approach procedures.

2. What are the three phases of an IFR approach?

3. What is meant by the "final approach fix"?

4. Describe or sketch a standard holding pattern.

5. What is the last information you get with any "holding instructions?"

6. What is the primary purpose of the transponder in air-traffic control?

7. How can you identify a "Back Course" on an approach plate?

8. On graphic No. 2, label with numbers the following controls:

   a. Master control.

   b. Mode 2 switch.

   c. Function control.

   d. Pilot light - test button - lens shutter.

   e. Mode A code control.

   f. Mode A control on-off switch.

   g. Mode 1 control.

   h. Emergency barrier.

9. In which FLIP component would you find the frequency of the VOT of a certain airport? IFR Supplement

10. In which FLIP component would you find all the necessary data to perform an air-check or a ground-check of your VOR receiver? section IV

11. What are the tolerances for a VOR air-check? ±6°

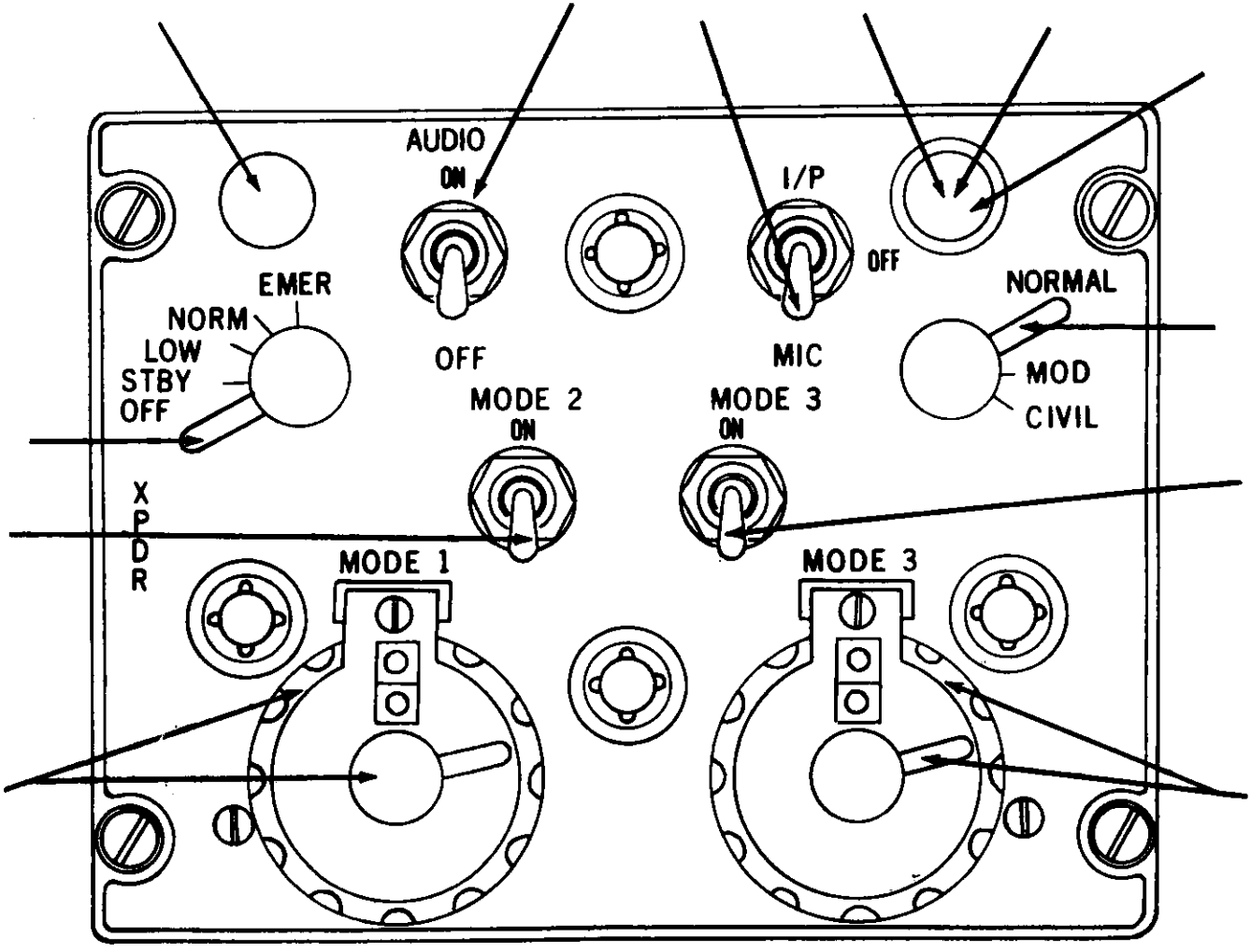
    What are the tolerances for a VOR ground-check? ± 4°

12. In performing a tolerance check on your VOR receiver with the help of a VOT, what would be your—

    a. Course selector setting? 360° degrees, TO-FROM? or 180° degrees, TO-FROM?

    b. Required position of your aircraft? anywhere on airport

    c. Allowable DI position. ± 4° L. or R.


AUDIO
ON
OFF
I/P
OFF
MIC
EMER
NORM
LOW
STBY
OFF
NORMAL
MOD
CIVIL
MODE 2
ON
MODE 3
ON
X
P
D
R
MODE 1
MODE 3

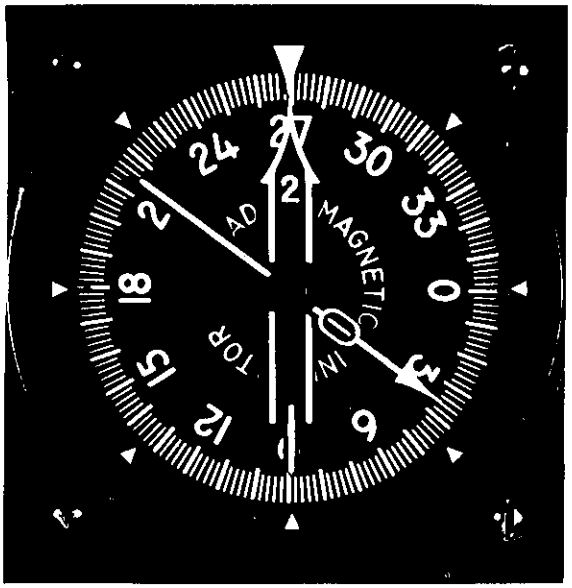
Graphic No. 2

13. The RMI will present a map-like display of any situation if you think of the compass card as a compass rose around a station and let the needle hub become the station. The blunt end of the needle is your position.

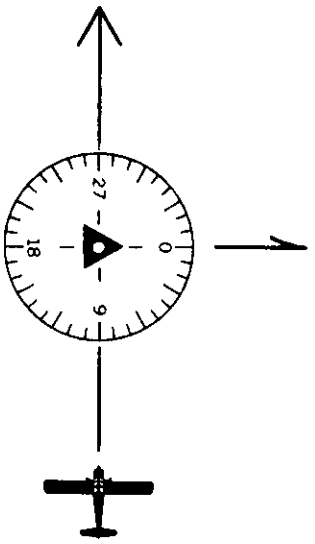
The RMI needle hub represents the station.

The blunt end of the needle is your position.

Therefore, in the example below, you would be E (north, east, south, west) of the VOR.

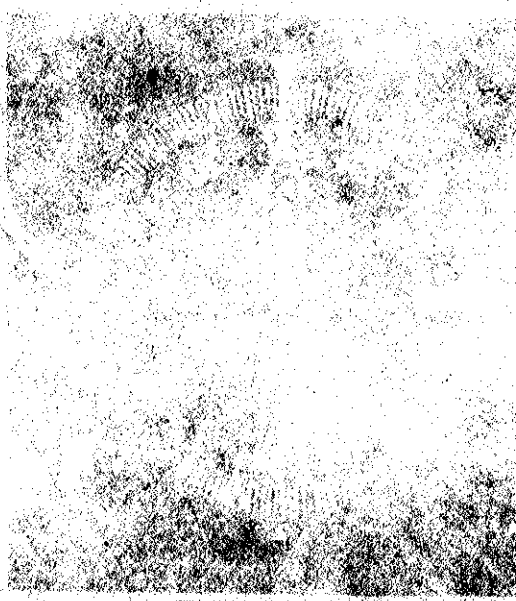


Pilot sees this.



Pilot visualizes this.

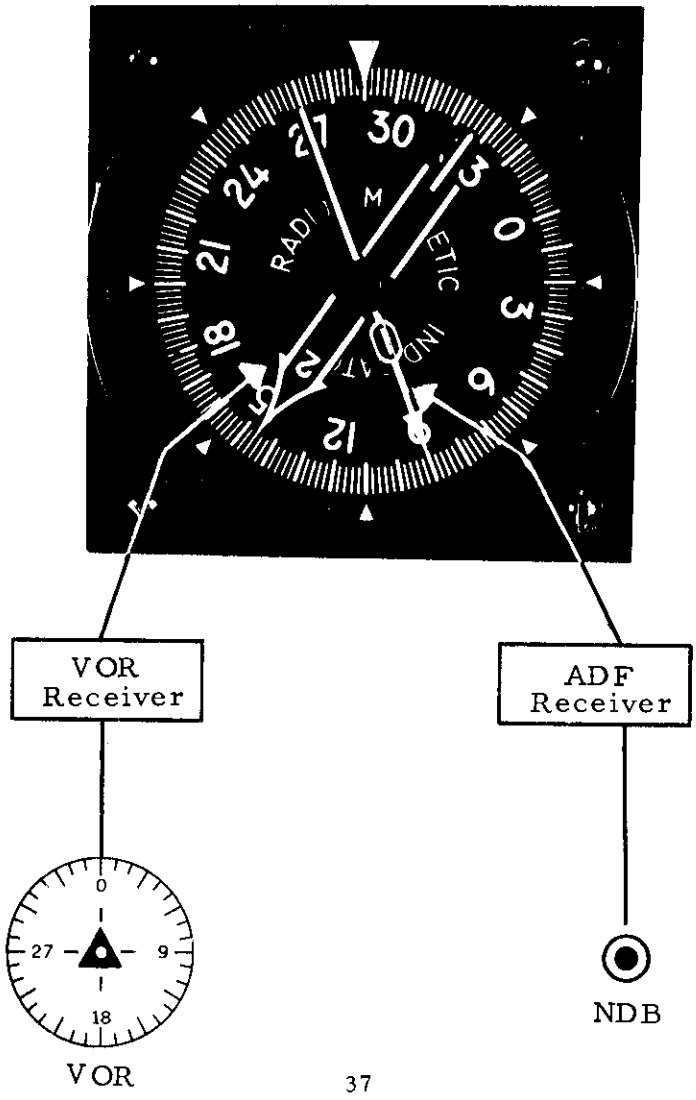
NOTES



PRACTICAL EXERCISE NO. 2

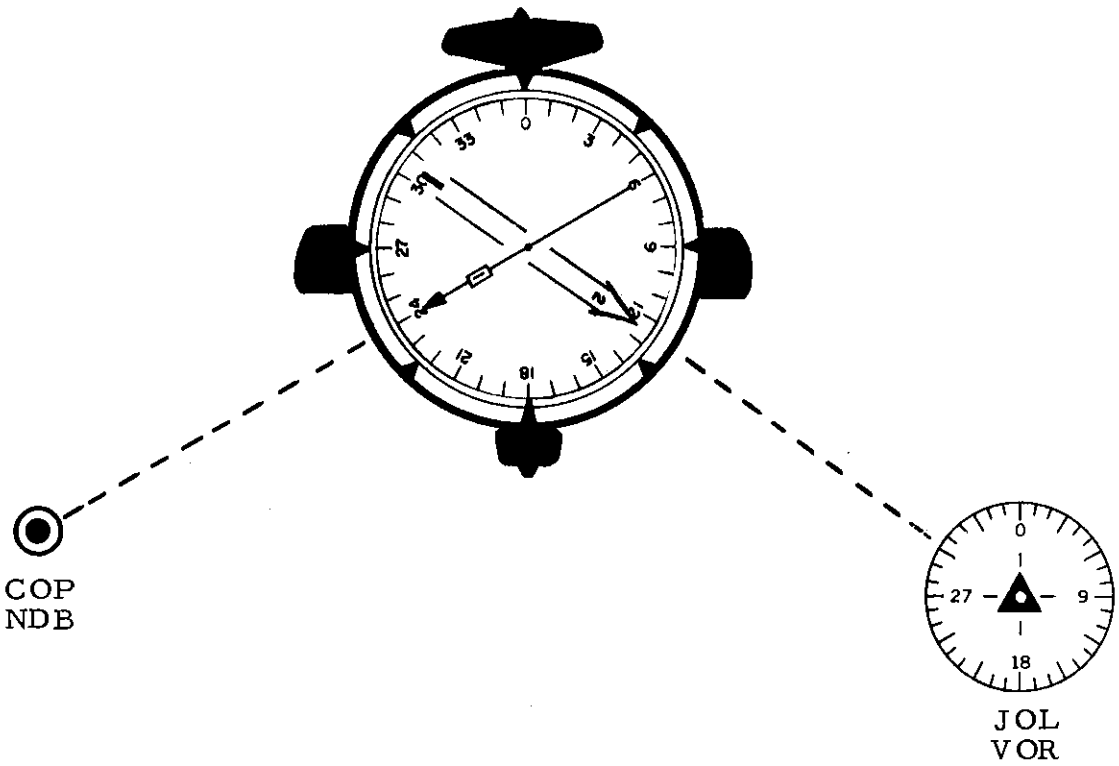
RADIO NAVIGATION (RMI)

Throughout this book use needle No. 1 for NDB or LOM navigation and needle No. 2 for VOR navigation as shown in the diagram below. This is normally true in aircraft with only one ADF receiver and one VOR receiver. In aircraft having dual ADF and/or dual VOR receivers, switches are provided for receiver selection.



Always read magnetic direction to a VOR or ADF station under pointed end of the needles.

In the illustration below, needle No. 1 is tuned to COP NDB and needle No. 2 is tuned to JOL VOR.



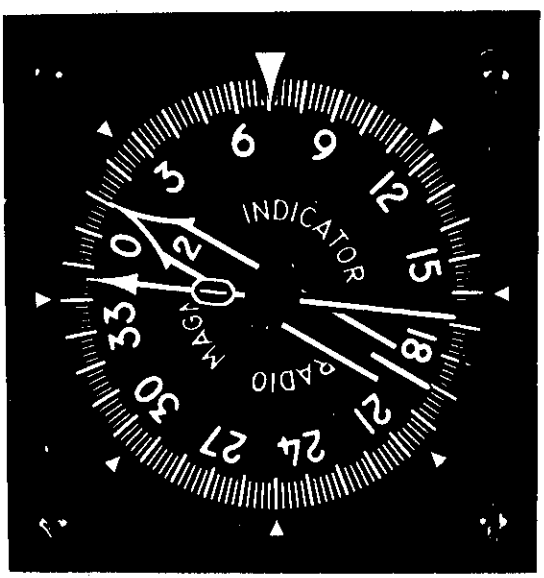
Magnetic direction to COP NDB is 240 °.

Magnetic direction to JOL VOR is 125 °.

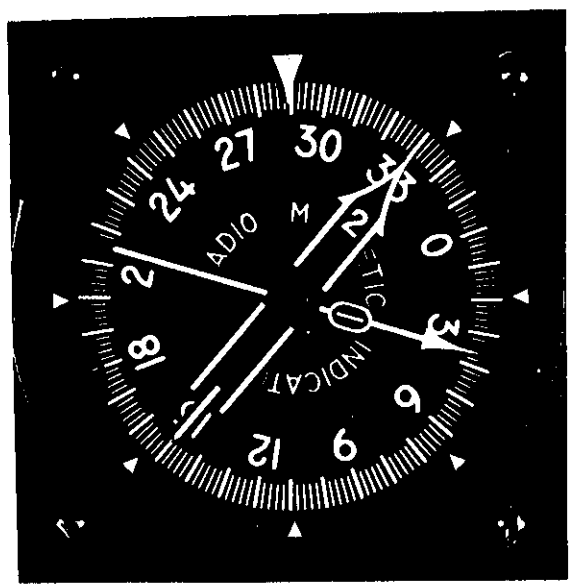
The indicator below shows a heading of 070 °.

Direction to the NDB is 346 °.

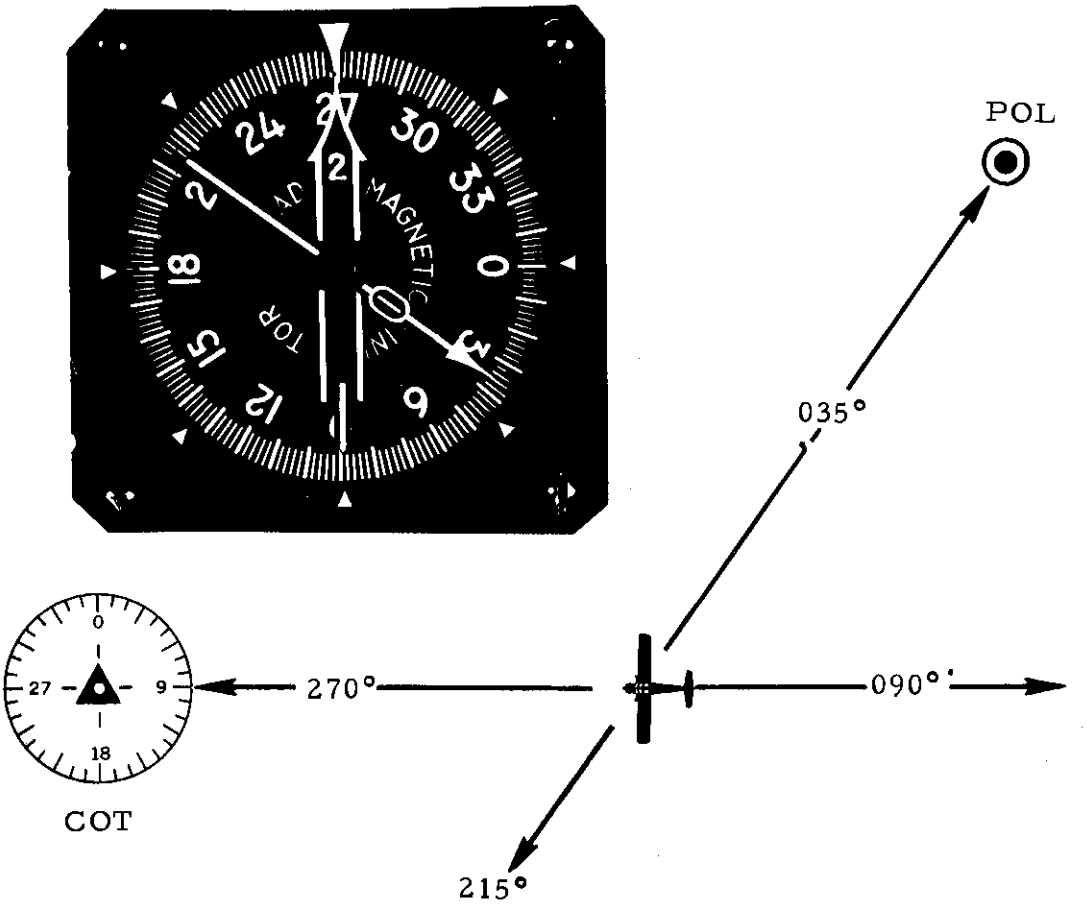
Direction to the VOR is 011 °.



To turn inbound to the VOR, with the indications below, you would turn 45° (right, left) to a heading of 330°.



The blunt end of any needle is opposite to, or the reciprocal of, the pointed end; therefore, you can see that with the pointed end of an RMI needle pointing to a station, the blunt end will be the reciprocal or outbound direction from that station.



The indicator above shows an outbound direction from POL NDB of 215°.

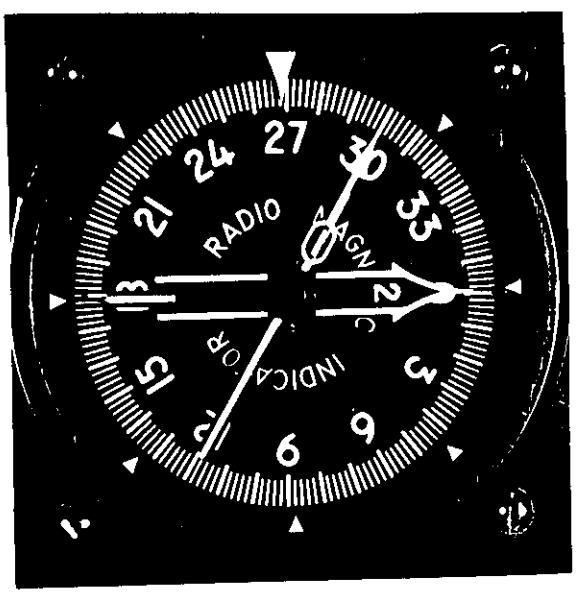
The direction from COT VOR is 090°.

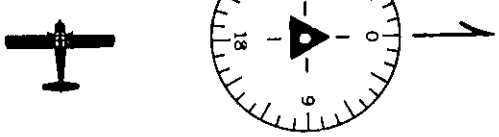
A map-like display on an RMI is a forward view as if the compass card were painted on the ground around the station. You see the compass card over the nose of the aircraft or in the direction of flight.

With the indications below, north is to your right (right, left).

The VOR is to your right (right, left).

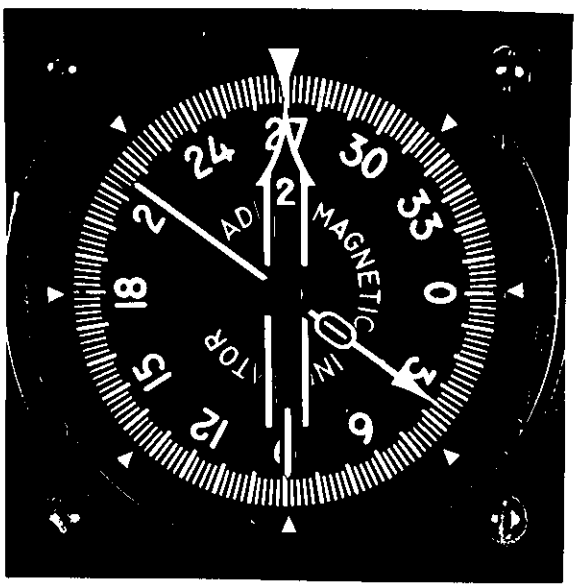
The VOR is north (north, east, south, west) of the aircraft.

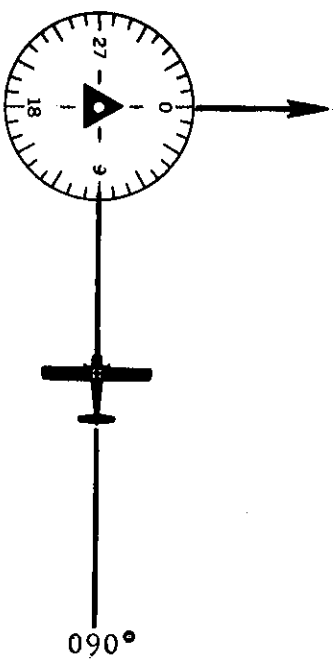




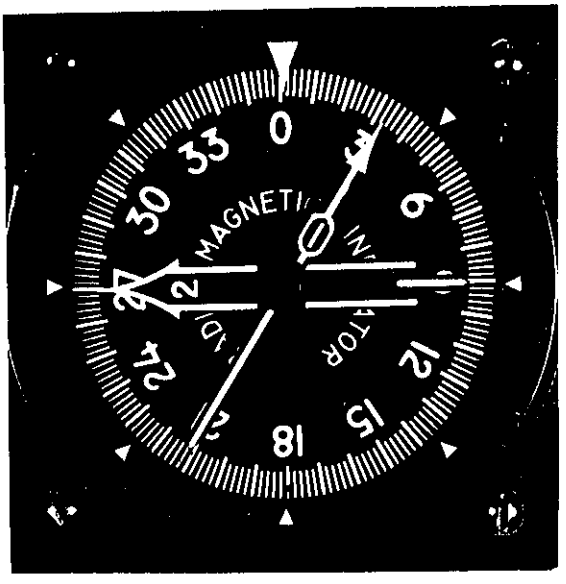
The term "radial" represents position around a VOR station measured as a direction from the station. Therefore, the radial is under the blunt end of the RMI No. 2 needle which is coupled to the VOR receiver in this text.

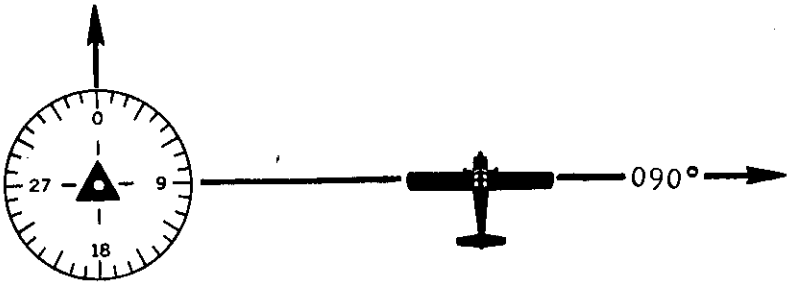
With the indications below, you are located east (north, east, south, west) of the VOR inbound on the 090° radial.





With the indications below, the aircraft is east (north, east, south, west) of the VOR crossing the 090° radial heading north.





Use the blunt end of No. 2 needle to visualize your position on the compass card and complete the following statements:

In figure 1 you are located on the 060° radial of the VOR.

In figure 2 you are on the 225 radial of the VOR. Therefore, in figure 2 the aircraft is SW (NE, SE, SW, NW) of the VOR.

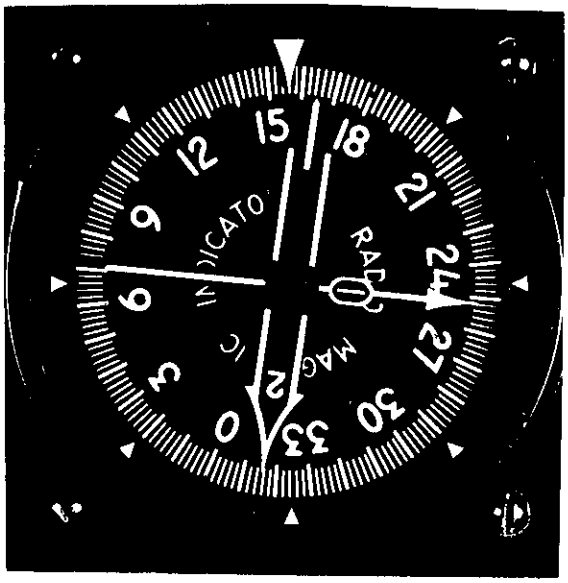


Figure 1

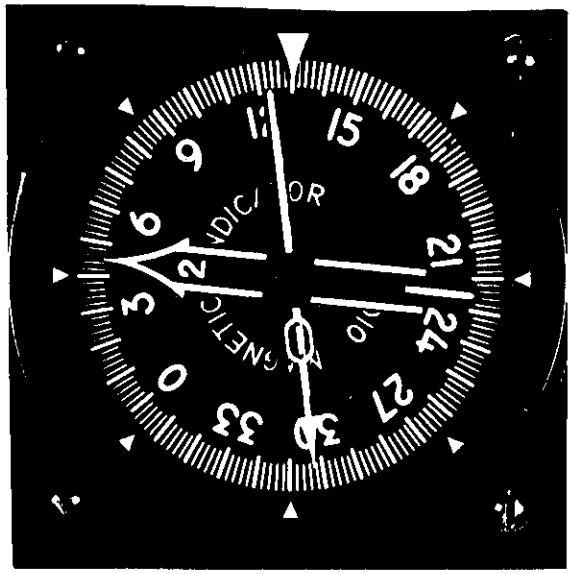
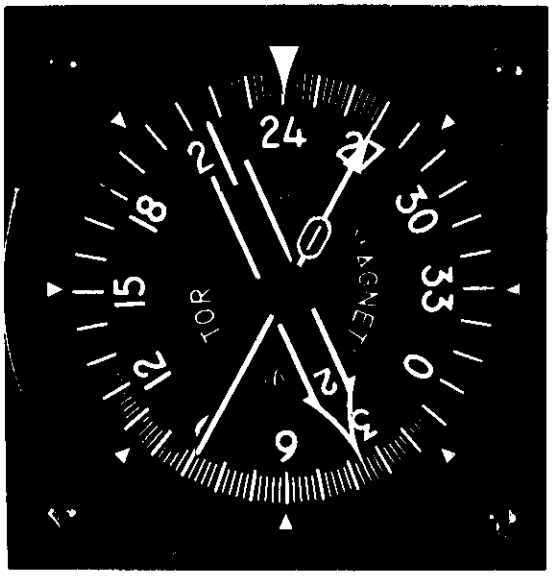


Figure 2

The blunt end of needle No. 1 (ADF) also shows aircraft position relative to the NDB to which it is tuned.

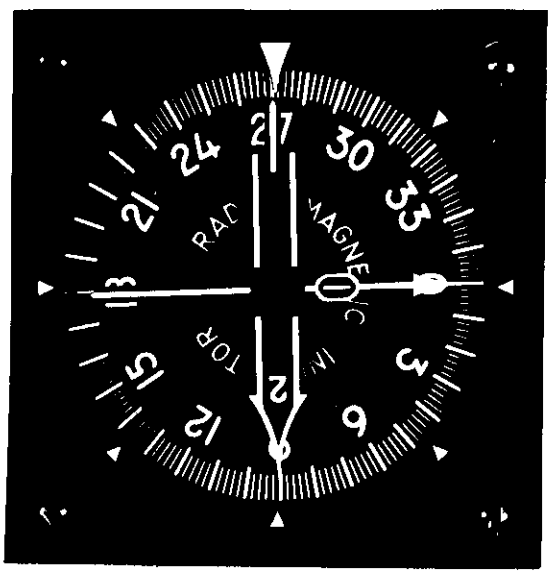
The indicator below shows that the aircraft is east (north, east, south, west) of the NDB flying a heading of 240 °.



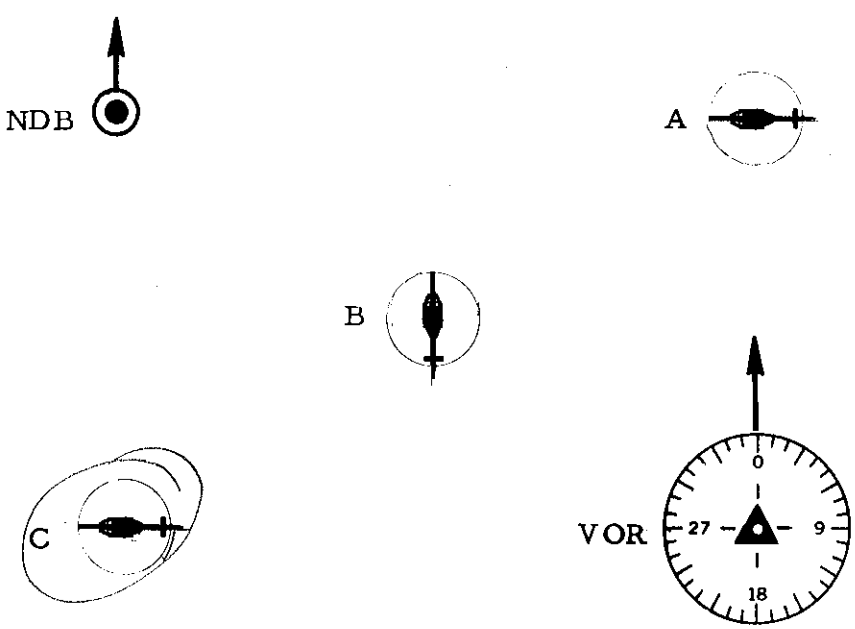
Use the RMI indicator below and complete the following statements:

The aircraft is S (N, E, (S), W) of the NDB.

The aircraft is W (N, E, S, W) of the VOR.

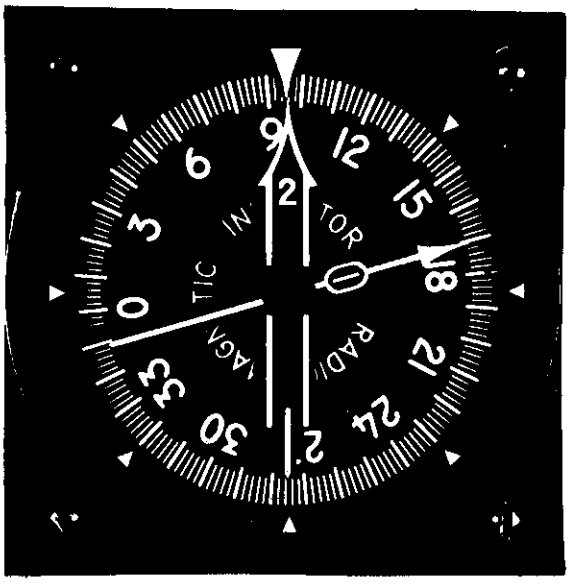


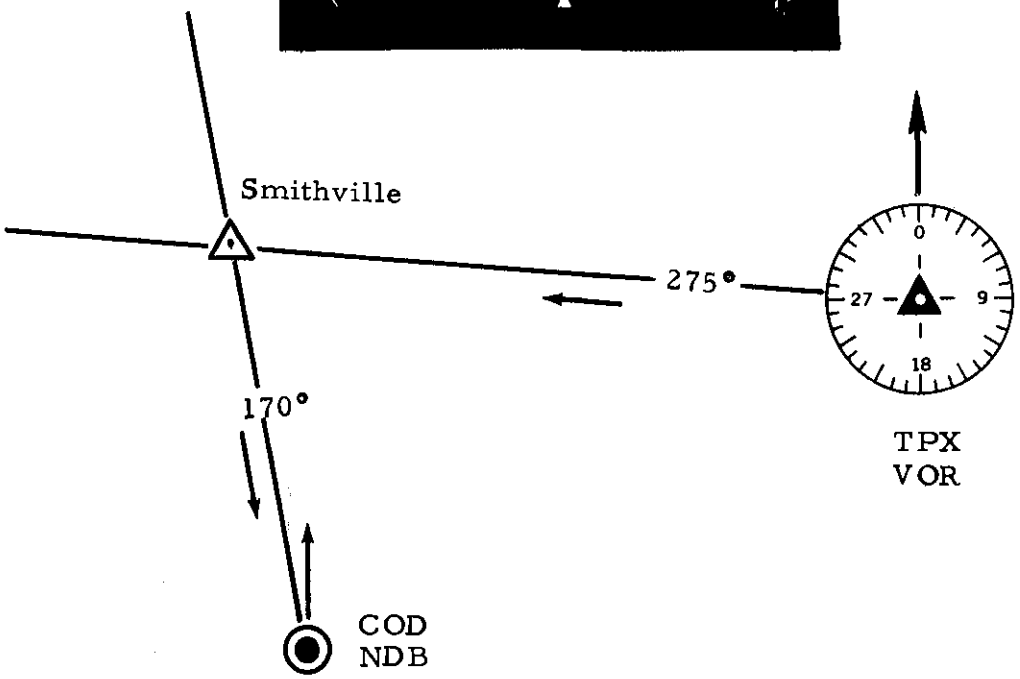
Therefore, in the diagram below, aircraft position is C (A, B, (C).



With the indications below, you are _____ (inbound, outbound) on the 275 radial of TPX VOR.

Needle No. 1 indicates you are (east of, over, west of) Smithville intersection.

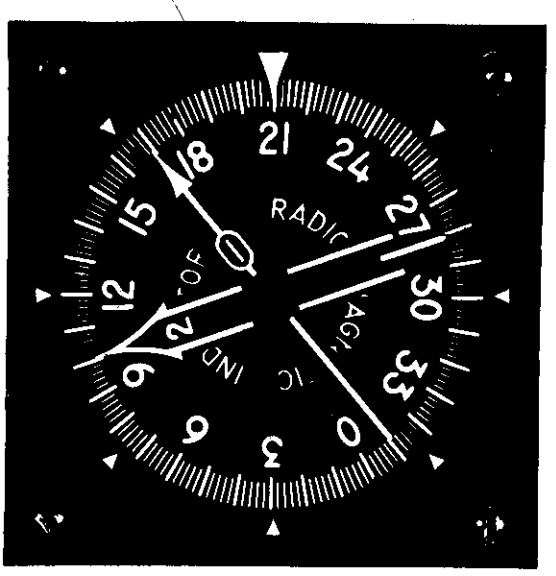


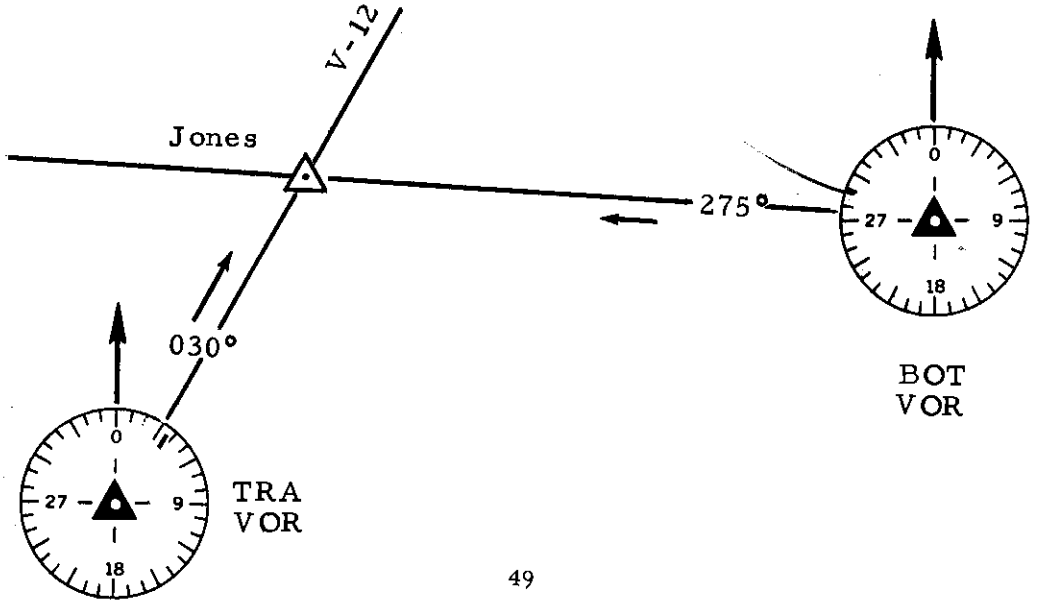


You are flying southwest on V-12 and tune the VOR receiver to BOT VOR to fix Jones intersection.

After checking the indicator below, you know that you are crossing the 280° radial.

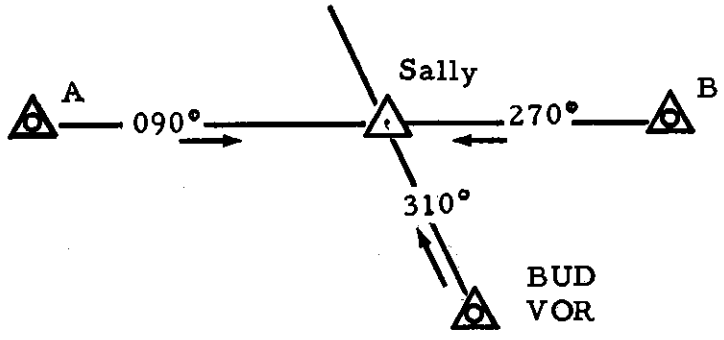
Your position with respect to Jones intersection is NE (NE, over, SW).

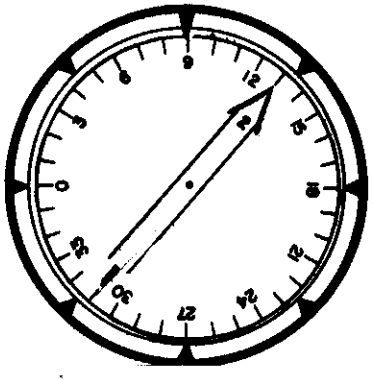




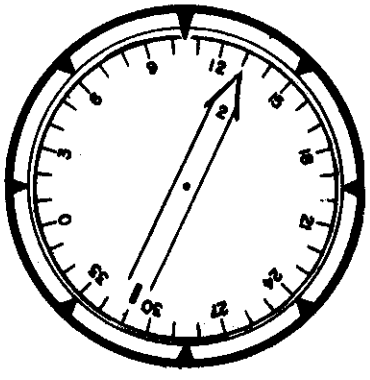
You are maintaining the 90° track from A to B. You tune the VOR receiver to BUD VOR to fix Sally intersection.

Indicate your position with respect to Sally intersection for each RMI indication below.



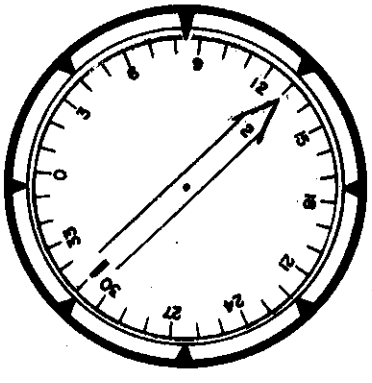


1. _____ (east, over, west)



NOTE: Wind correction.

2. _____ (east, over, west)



NOTE: Wind correction.

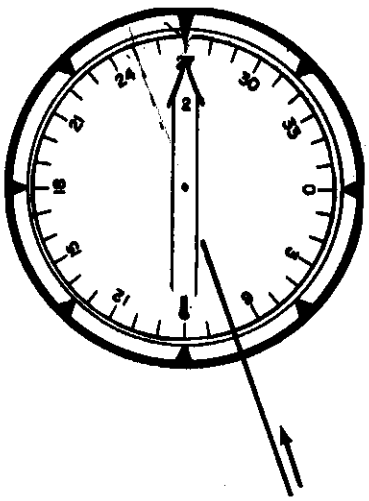
3. _____ (east, over, west)

When making interceptions, visualize your position in relation to the desired course and any possibility of error is minimized.

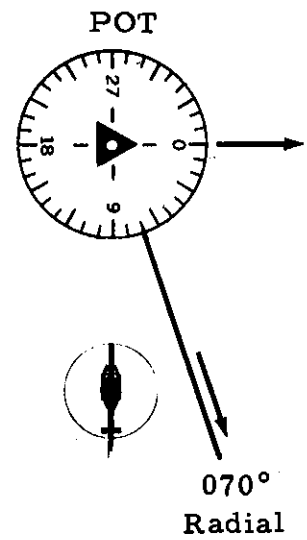
In the example below, you have been cleared to POT VOR via the 070 radial.

You are E (N, (E), S, W) of the VOR flying inbound.

You are 20 ° left (left, right) of the desired course.



250°
Course to
VOR
(See note)

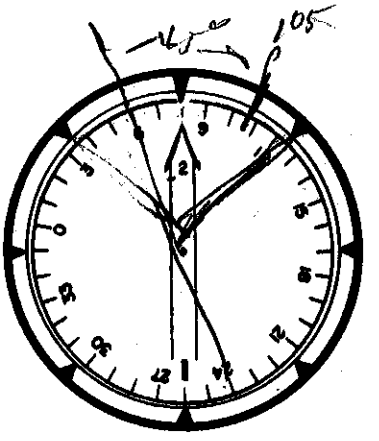


070°
Radial

NOTE: The desired course is shown on the instrument as you would visualize it.

You plan to intercept the 240 radial at a 45-degree angle and track inbound; therefore, the desired course is 060°.

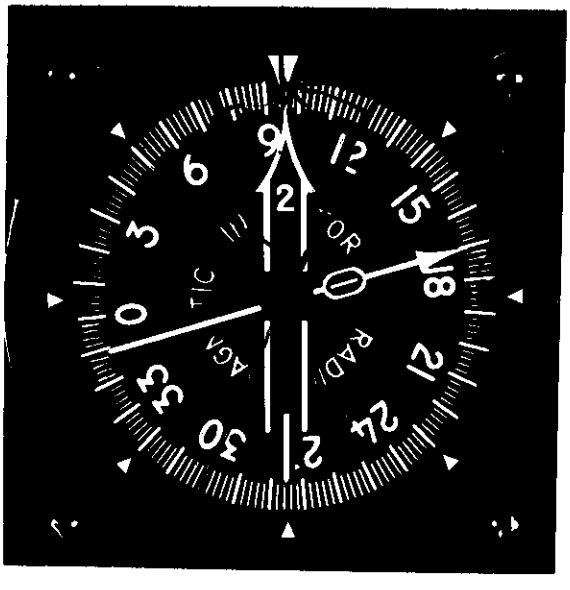
Your position as shown on the indicator below will require an intercept heading that is 45° right of the desired course. The intercept heading is 105°.



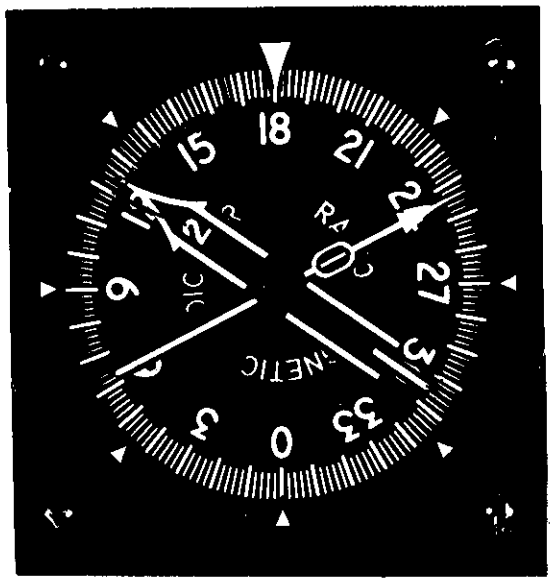
You desire to track inbound on the 300 radial.

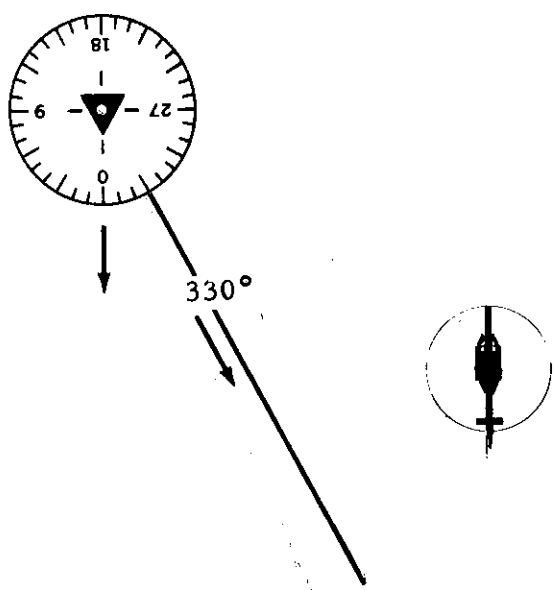
With the indications below, you are 25° right (left, right) of the desired course.

In order to intercept at an angle of 45°, you would turn left to a heading of 075°.



In order to intercept the 330 radial at an angle of 45° and track inbound, you would turn _____ (~~right~~, left) to a heading of 165° %.



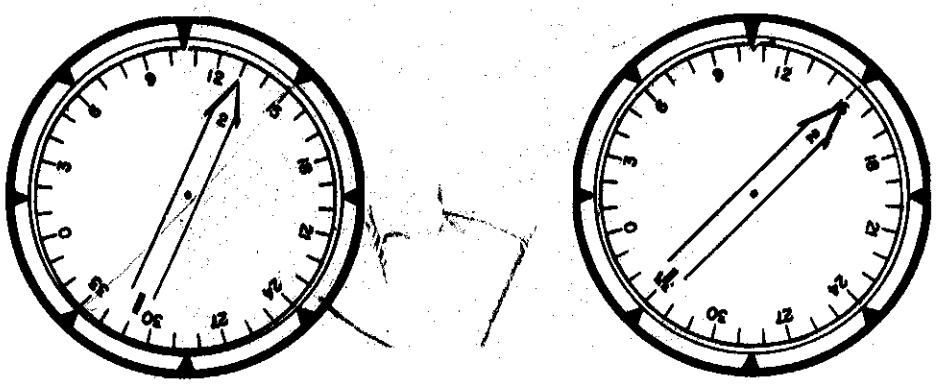


In the figures below, you are intercepting the 330 radial to track inbound.

The angle of interception is 45° °.

In figure 1, you are 20 ° off the desired course.

In figure 2, you are _____ (short of, over, past) the desired course.



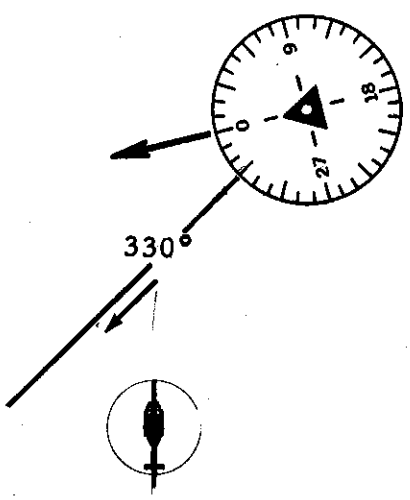


Figure 1

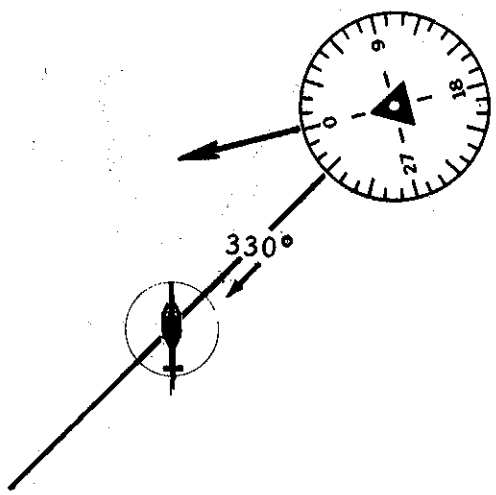
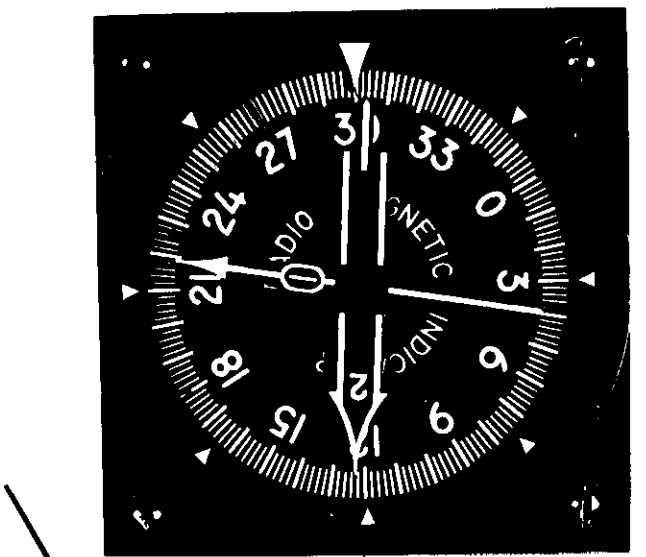
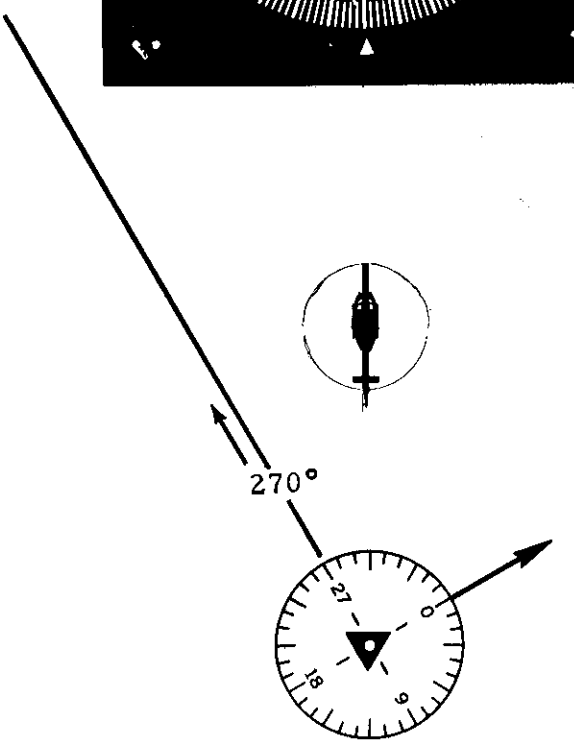


Figure 2

You plan to intercept and track <u>outbound</u> on the 270 radial, using a 45-degree angle for interception.

You would turn _____ (right, left) to an intercept heading of 235° °.



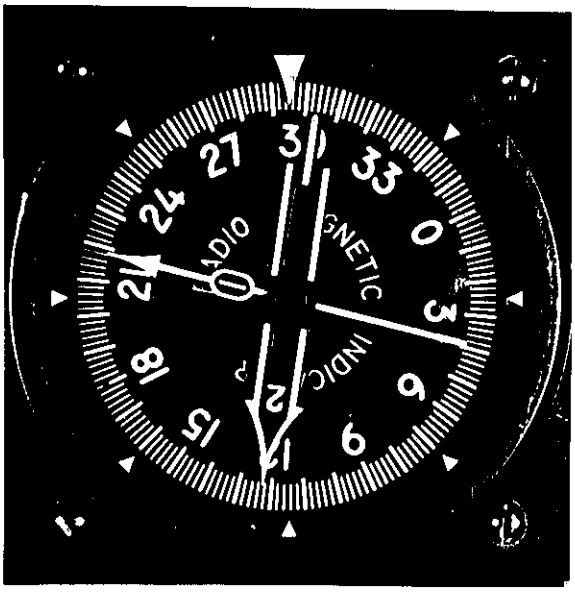


You are cleared outbound from the VOR via the 330 radial.

With the indications below, you are 25 ° off course.

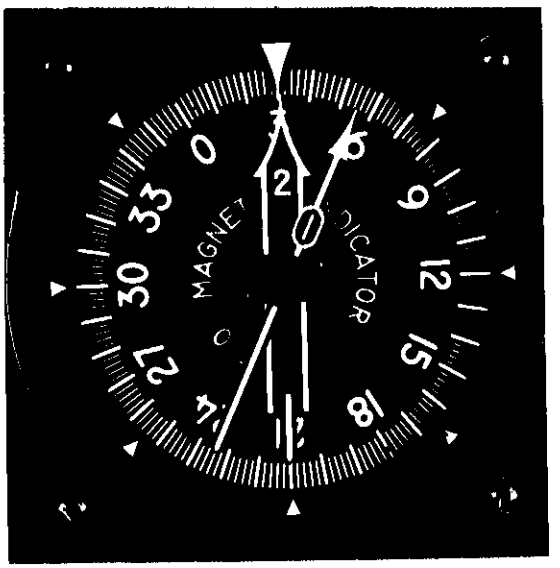
To intercept at a 45-degree angle, you would turn _____ ° (right, left) to an intercept heading of 015 °.

You would be on course when the blunt end of the No. 2 needle reads 330 °.



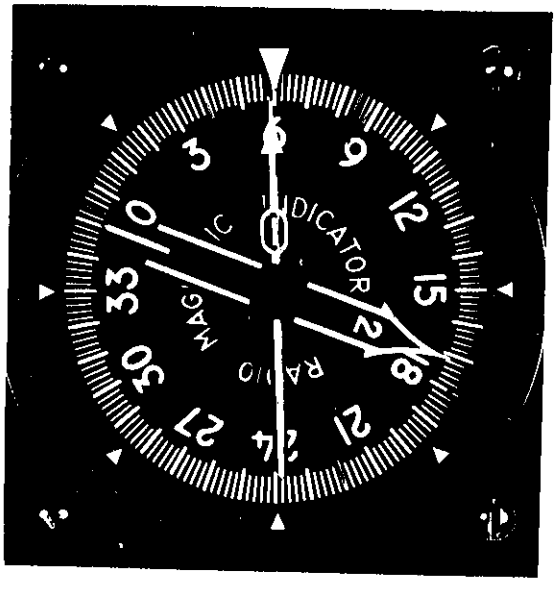
Most interceptions are made using a 45-degree angle. Use a 90-degree angle when told to expedite. It is also advisable to use a 90-degree angle for inbound interceptions where the aircraft is more than 30° off the desired course.

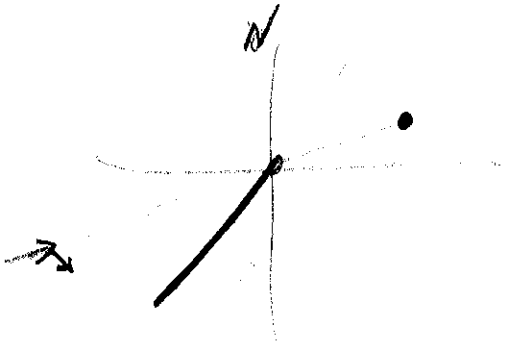
To intercept the 165 radial and track to the VOR with the indications below, you would use a 90-degree angle.



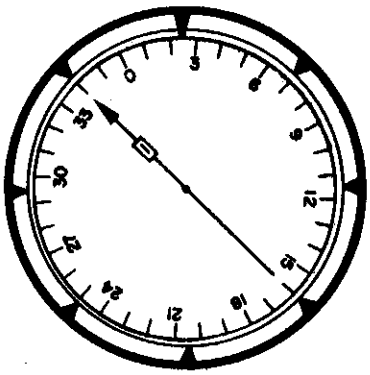
Procedures used for interceptions are the same when using either the VOR or ADF needle. However, different phraseology is used in the clearances. Make sure you visualize the course correctly on the compass card.

After receiving clearance to ETP NDB via the 040 magnetic course, you note the indications below and determine that the intercept heading is 085 °.

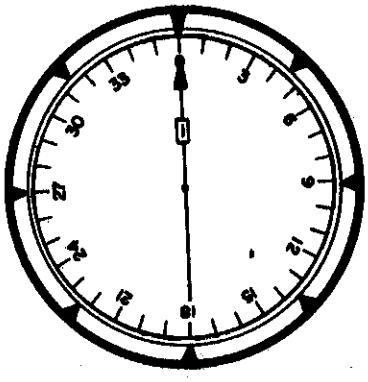




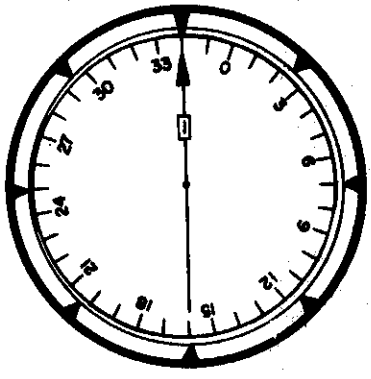
In the illustration below, you are intercepting the 340 course to the NDB. Indicate your position (A, B, C, D) in the diagram under each indication below.



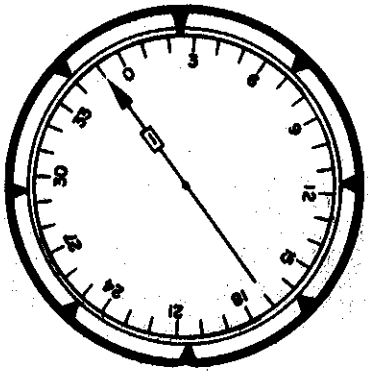
1. C .



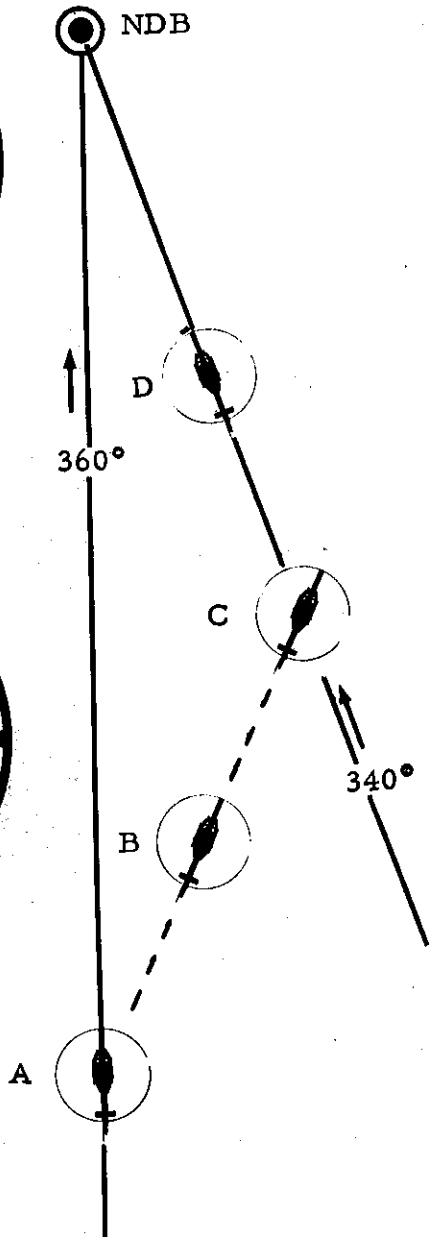
2. a .



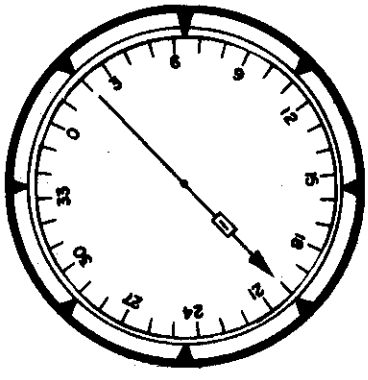
3. d .



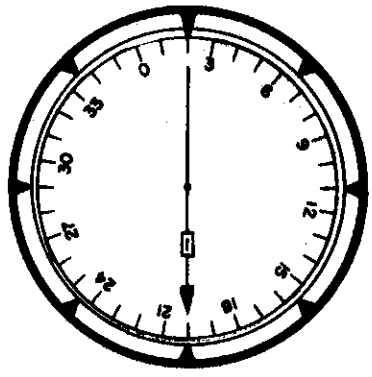
4. B .



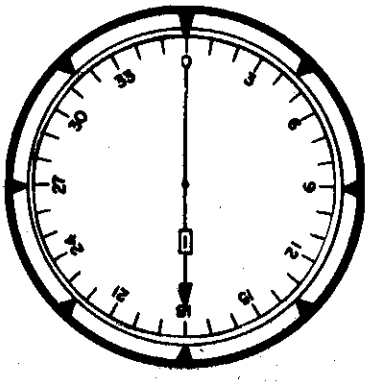
You are intercepting the 020-degree bearing from the NDB. Indicate your position in the diagram under each indication below.



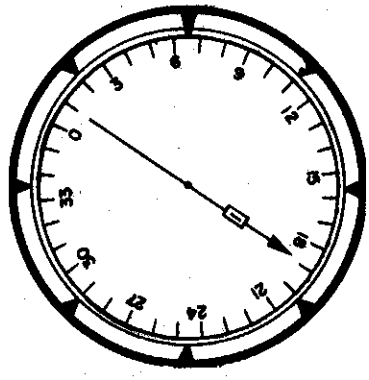
1. C.



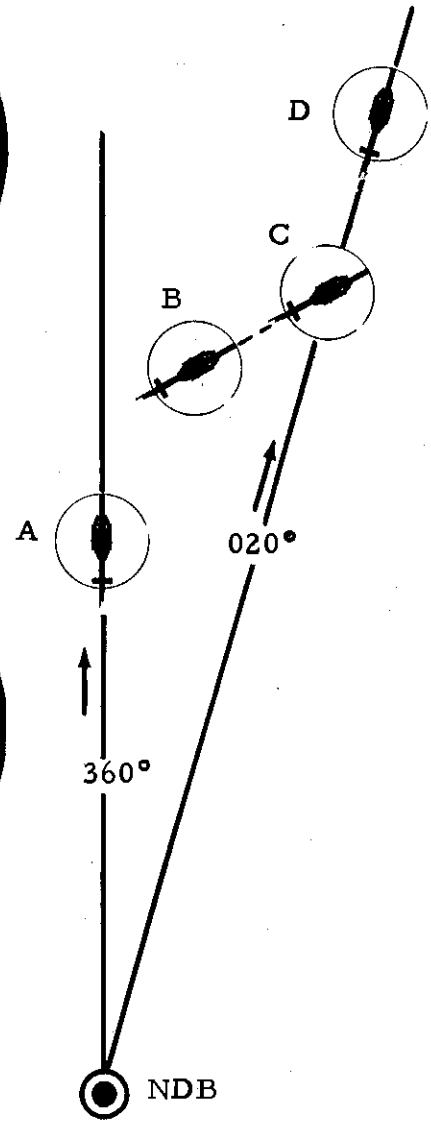
2. d.



3. a.

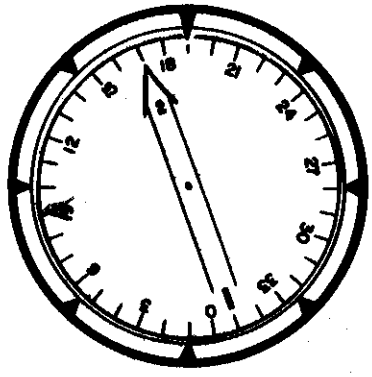


4. B.



The RMI compass card may fail to operate in either slaved or free operation. In this case, the compass card may be in any position; therefore, you lose the map-like display and must use the standby compass for heading information. VOR and ADF needles must be interpreted differently.

The VOR needle will continue to indicate relative to the compass card after the card has failed. Tune a VOR station and No. 2 needle will indicate direction to under the pointed end and direction from under the blunt end.

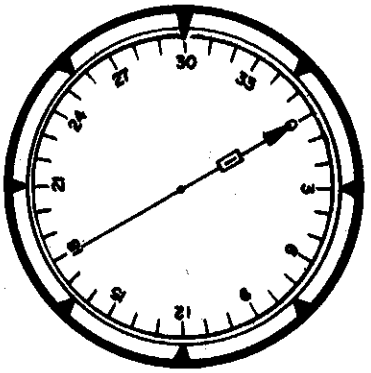


The compass card has failed in the indicator above. The magnetic compass shows your heading is 090°.

You are on the 350 radial.

Direction to the VOR is 170° °.

The RMI compass card has failed. Tune an NDB and No. 1 needle needle will point to the NDB relative to the aircraft nose. Therefore, you must disregard the compass card and read relative bearing from the heading index clockwise to the pointed end of the ADF needle and compute for inbound or outbound direction.



The compass card has failed in the indicator above. Magnetic heading of the aircraft is 090°.

Direction to the NDB is 150°.

The compass card has failed. You check the magnetic compass and it reads 060°. With the indications below, magnetic direction to the NDB is 030° °. Magnetic direction to the VOR is 360° °.