Turning Circles

The circle is the path of the ship's pivot point as it executes a 360° turn. In shallow water, the rate of turn is likely to be decreased, so the vessel will have a larger turning circle.

Advance

This is the distance the ship travelled in the direction of the original heading, measured from the point at the moment when helm was first applied to the turn.

Transfer

This is the distance of the centre of gravity of the ship from the original track line. Thus, the transfer for a turn of 90° is the distance of the centre of gravity of the ship from the original track line when the heading of the ship is 90° relatively from the original heading, and it is about two ship's lengths.

Tactical Diameter

This is the transfer for a turn of 180°, which is almost equal to the max transfer and about the maximum advance. The diameter will vary, based on the speed, the amount of rudder used and the trim.

- When the vessel is trimmed by the stern, the tactical diameter of turn is increased

- When the vessel is trimmed by the head, the tactical diameter of turn is decreased

- The vessel with a list will take longer to execute the turn, and, when turned into the list, will develop a larger circle

- The vessel with a right-hand turn propeller, if making a turn to port, will end up with a smaller diameter than starboard due to the effect of transverse thrust.

The ship should have a **Turn Table**, which gives the turning characteristics of the ship at various speeds and rudder angles.

Procedure for using Transfer and Advance during Piloting

1. Calculate transfer and advance;

2. Draw a line parallel to the current track (before the turn), with a distance equal to the transfer away from current track and on the side from which the turn will be executed. The intersection (F) of the line and the track after the turn will be the point at which the turn should be completed;

3. On the same line, measure a distance equal to the advance from point F back toward the original position, and mark it A;

4. From point A, draw a line perpendicular to the current track. The intersection is marked S, and is the point at which execution of the turn should be started.

Example   Turn table

Speed: 12 kts   Rudder angle: standard

Angle of Turn	Transfer (m)	Advance (m)
15°	20	200
30°	30	250
45°	55	260
60°	100	290

Angle of turn = New course – Current course

Find the transfer and advance for the turn 50°

$$\text{Transfer} = 55 + 5\left(\frac{100-55}{60-45}\right) = 70\,\text{m}$$

$$\text{Advance} = 260 + 5\left(\frac{290-260}{60-45}\right) = 270\,\text{m}$$