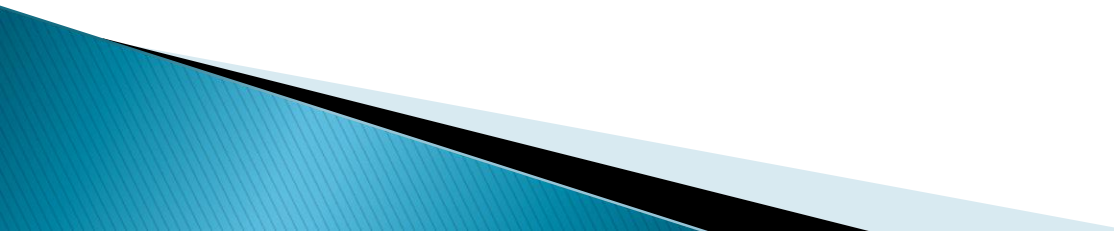


INTRODUCTION TO RADAR SYSTEMS

UNIT-III
Lecture-1

Tracking Radar: Tracking with Radar

A tracking-radar system measures the coordinates of a target and provides data which may be used to determine the target path and to predict its future position.



Classifications:

- ▶ Monopulse Tracking
 - ▶ Conical Scan
 - ▶ Sequential Lobing
- ▶ The various methods for generating the error signal may be classified as sequential lobing, conical scan, and simultaneous lobing or monopulse.

Contd.

The tracking radar must first find its target before it can track. Some radars, such as the SCR-584, operate in a search mode in order to find the target before switching to a tracking mode.

Many radar tracking systems employ a separate search radar to provide the information necessary to position the tracker on the target. A search radar, when used for this purpose, is called an acquisition radar.

Contd.

The scanning fan-beam search radar can also provide tracking information to determine the path of the target and predict its future position.

The chief use of the continuous tracking radar has been for the control of military weapons such as an anti-aircraft artillery and missile guidance.

Tracking radars are used also for guidance in the launchings of satellites and space vehicles.

Sequential Lobing:

The antenna pattern commonly employed with tracking radars is the symmetrical pencil beam in which the elevation and azimuth beam-widths are essentially equal. The difference between the target position and the reference direction is the angular error.

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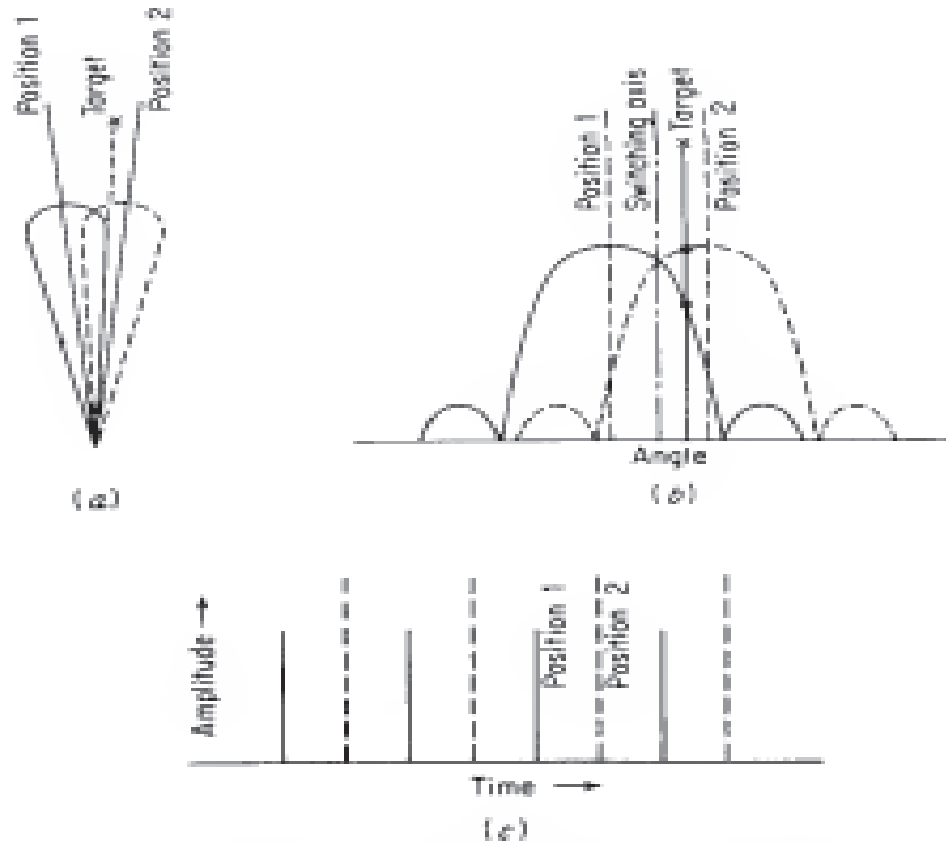
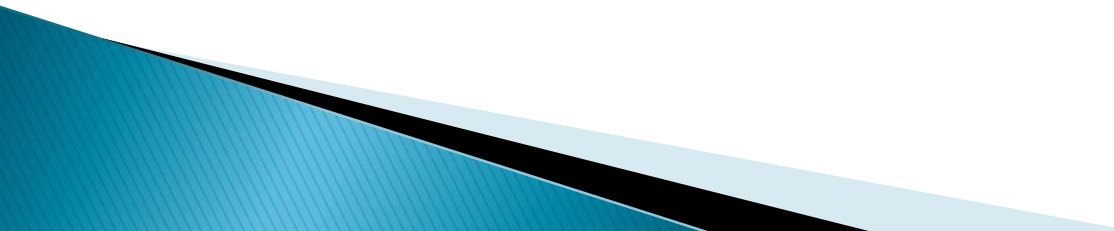
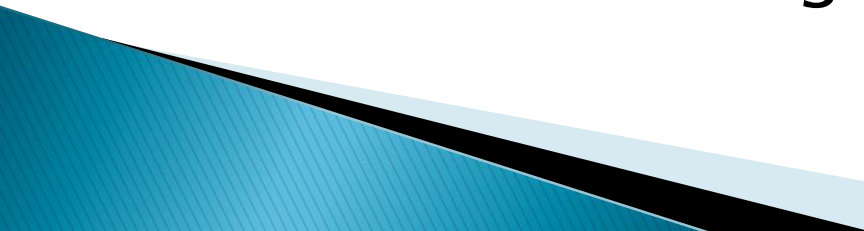


FIG. 5.1. Lobe-switching antenna patterns and error signal (one dimension). (a) Polar representation of switched antenna patterns; (b) rectangular representation; (c) error signal.

Contd.

- ▶ Method of obtaining the direction and the magnitude of the angular error in one coordinate is by alternately switching the antenna beam between two positions.
 - ▶ Two additional switching positions are needed to obtain the angular error in the orthogonal coordinate.
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Contd.

- ▶ Thus a two-dimensional sequentially lobing radar might consist of a cluster of four feed horns illuminating a single antenna, arranged so that the right-left, up-down sectors are covered by successive antenna positions.
 - ▶ A cluster of five feeds might also be employed, with the central feed used for transmission while the outer four feeds are used for receiving.
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Contd.

- ▶ Sequential lobing, or lobe switching, was one of the first tracking–radar techniques to be employed.
- ▶ Early applications were in airborne–interception radar, where it provided directional information for homing on a target, and in ground–based anti-aircraft fire–control radars such as the SCR–268.
- ▶ It is not used as often in modern tracking–radar applications as some of the other techniques to be described.