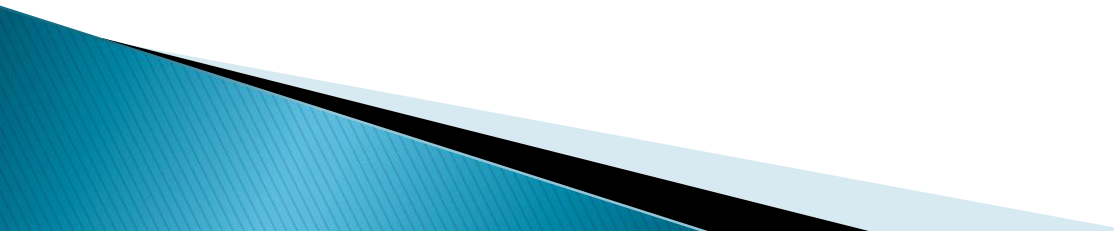


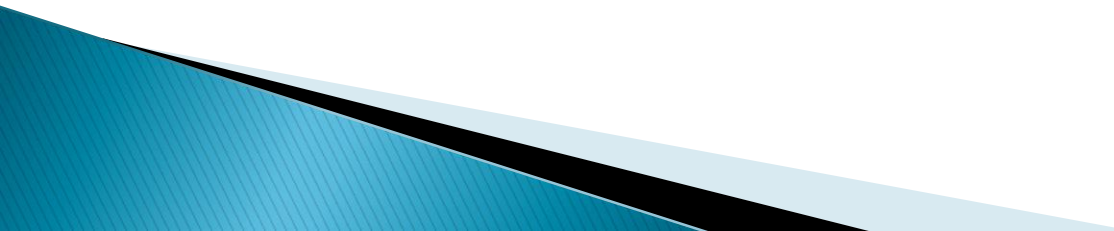
INTRODUCTION TO RADAR SYSTEMS

UNIT-III
Lecture-4

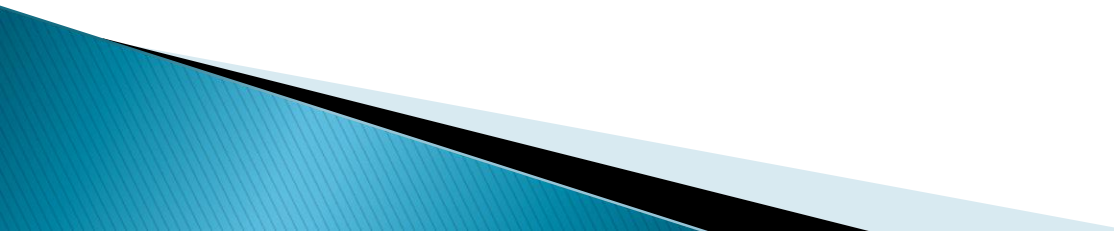
Tracking in Range

- ▶ In most tracking-radar applications the target is continuously tracked in range as well as in angle.
 - ▶ Range tracking might be accomplished by a human operator who watches an A-scope or J-scope presentation and manually positions a hand wheel in order to maintain a marker over the desired target pip.
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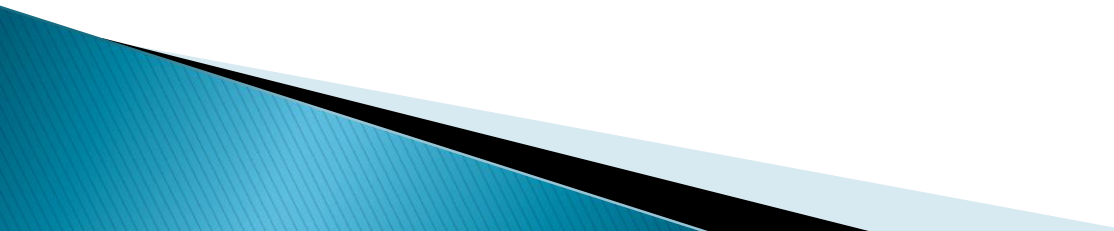
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- ▶ In pure displacement tracking, the turns of the handwheel are made proportional to the displacement of the target.
 - ▶ If the target's range changes at a constant rate, operator must turn his handwheel at a constant rate.
 - ▶ If he is lagging behind the target, he will turn faster until error is corrected, if he is leading the target, he will turn more slowly.
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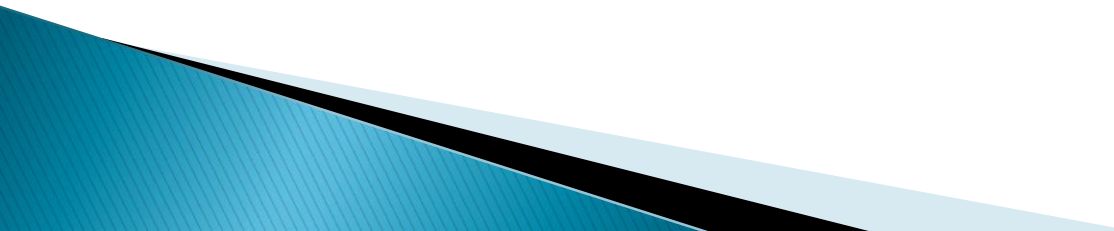
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- ▶ Displacement and rate tracking may be combined so that the handwheel position automatically corrects for speed at the same time that the displacement error is corrected.
 - ▶ This is called aided tracking. Aided tracking may also be used for manual tracking in angle as well as range.
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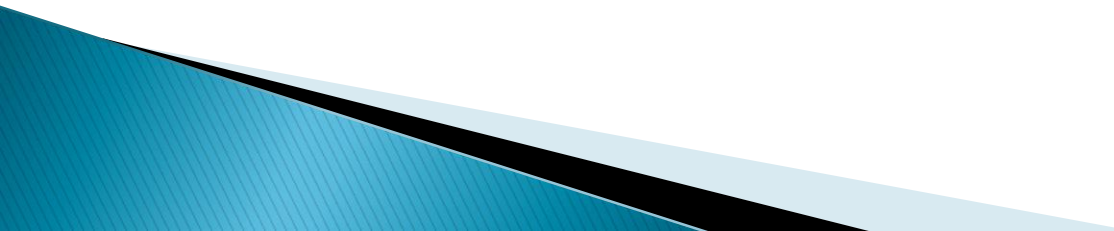
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- ▶ The technique for automatically tracking in range is based on the split range gate.
 - ▶ Two range gates are generated. One is the early gate, and the other is the late gate. The relative position of the gates at a particular instant and the error signal.
 - ▶ The portion of the signal energy contained in the early gate is less than that in the late gate.
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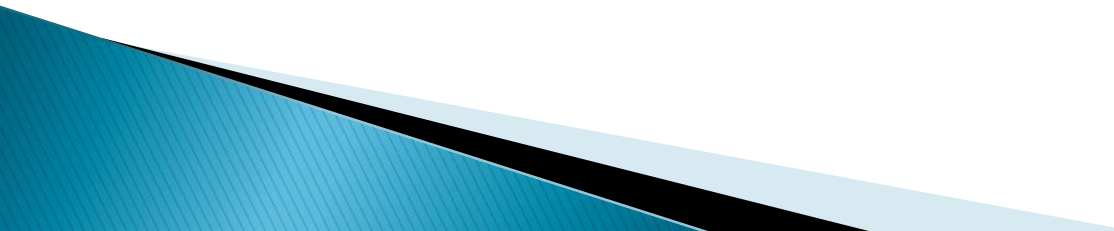
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- ▶ When tracking a target moving with constant velocity the handwheel need not be turned once the proper adjustment has been made.
 - ▶ As target speeds increase, it is increasingly difficult for an operator to perform at the necessary levels of efficiency over a sustained period of time, and automatic tracking becomes a necessity.
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- ▶ The range gating necessary to perform automatic tracking offers several advantages as by-products.
 - ▶ It isolates one target, excluding targets at other ranges. This permits the boxcar generator to be employed. Also, range gating improves the signal-to-noise ratio since it eliminates the noise from the other range intervals.
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- ▶ A target of finite length can cause noise in range-tracking circuits in an analogous manner to angle-fluctuation noise (glint) in the angle-tracking circuits. Range tracking noise depends on the length of the target and its shape.
 - ▶ It has been reported that the rms value of the range noise is approximately 0.8 of the target length when tracking is accomplished with a video split-range-gate error detector.
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- ▶ If the outputs of the two gates are subtracted, an error signal will result which may be used to reposition the center of the gates.
 - ▶ The setting of the hand wheel is a measure of the target range and may be converted to a voltage that is supplied to a data processor.
 - ▶ Hence the width of the gate should be sufficiently narrow to minimize extraneous noise.
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