

# INTRODUCTION TO RADAR SYSTEMS

UNIT-III  
Lecture-6


# Conical Scan: Boxcar Generator

- ▶ The purpose of the third detector and filter is to pass the modulation at the conical-scan frequency and to reject the pulse repetition frequency and its harmonics. In the early S-band version of the SCR-584, this was accomplished with a more or less conventional amplitude detector and filter. In the Z-band version and in most modern radars the filtering function is performed with a device called the boxcar generator.

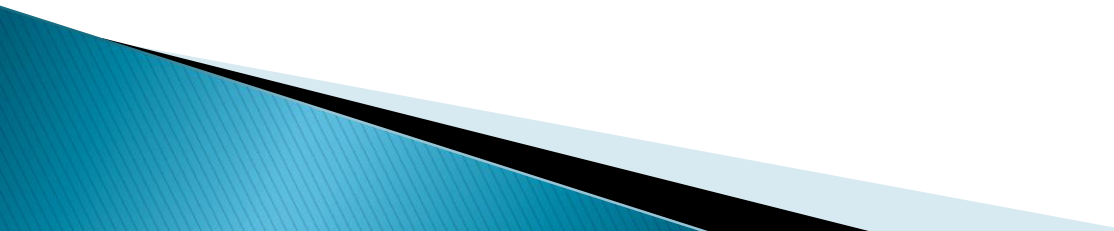
# Contd.

- ▶ In essence, it clamps or stretches the video pulses of figure in time so as to cover the entire pulse–repetition period.
- ▶ This is possible only in a range–gated receiver. (Tracking radars are normally operated with range gates.) The boxcar generator consists of an electric circuit that clamps the potential of a storage element, such as a capacitor, to the video–pulse amplitude each time the pulse is received.

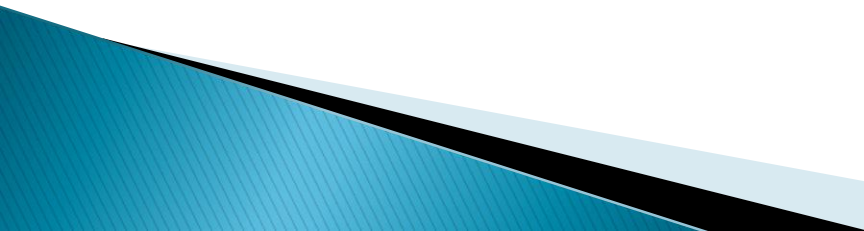
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- ▶ The capacitor maintains the potential of the pulse during the entire repetition period and is altered only when a new video pulse appears whose amplitude differs from the previous one.
  - ▶ The boxcar generator eliminates the pulse repetition frequency and reduces its harmonics. It also has the practical advantage that the magnitude of the conical-scan modulation is amplified because pulse stretching puts more of the available energy at the modulation frequency.
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# Contd.

- ▶ The pulse repetition frequency must be sufficiently large compared with the conical-scan frequency for proper boxcar filtering. If not, it may be necessary to provide additional filtering to attenuate undesired cross-modulation frequency components.
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# Automatic Gain Control:

- ▶ The echo-signal amplitude at the tracking-radar receiver will not be constant but will vary with time.
  - ▶ The three major causes of variation in amplitude are (1) the inverse-fourth-power relationship between the echosignal and range, (2) the conical-scan modulation (angle-error signal), and (3) amplitude fluctuations in the target cross section.
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# Contd.

- ▶ The function of the automatic gain control (AGC) is to maintain the d-c level of the receiver output constant and to smooth or eliminate as much of the noise like amplitude fluctuations as possible without disturbing the extraction of the desired error signal at the conical-scan frequency.

# Contd.

- ▶ One of the purposes of AGC in any receiver is to prevent saturation by large signals.
  - ▶ The scanning modulation and the error signal would be lost if the receiver were to saturate.
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