Key Topic 17 – Timer - Trigger - Synchronizer Circuits

8-17B1 What RADAR circuit determines the pulse repetition rate (PRR)?

A. Discriminator.

B. Timer (synchronizer circuit).

C. Artificial transmission line.

D. Pulse-rate-indicator circuit.

8-17B2 The triggering section is also known as the:

A. PFN.

B. Timer circuit.

C. Blocking oscillator.

D. Synchronizer.

8-17B3 Operation of any RADAR system begins in the:

A. Triggering section.

B. Magnetron.

C. AFC.

D. PFN.

8-17B4 The timer circuit:

A. Determines the pulse repetition rate (PRR).

B. Determines range markers.

C. Provides blanking and unblanking signals for the CRT.

D. All of the above

8-17B5 Pulse RADARs require precise timing for their operation. Which type circuit below might best be used to provide these accurate timing pulses?

A. Single-swing blocking oscillator.

B. AFC controlled sinewave oscillator.

C. Non-symmetrical astable multivibrator.

D. Triggered flip-flop type multivibrator.

8-17B6 Unblanking pulses are produced by the timer circuit. Where are they sent?

A. IF amplifiers.

B. Mixer.

C. CRT.

D. Discriminator.

Answer Key: 8-17B1: B 8-17B2: D 8-17B3: A 8-17B4: D 8-17B5: A 8-17B6: C

Key Topic 18 – Power Supplies

8-18B1 An advantage of resonant charging is that it:

A. Eliminates the need for a reverse current diode.

B. Guarantees perfectly square output pulses.

C. Reduces the high-voltage power supply requirements.

D. Maintains a constant magnetron output frequency.

8-18B2 The characteristics of a field-effect transistor (FET) used in a modern RADAR switching power supply can be compared as follows:

A. "On" state compares to a bipolar transistor. "Off" state compares to a 1-Megohm resistor.

B. "On" state compares to a pure resistor. "Off" state compares to a mechanical relay.

C. "On" state compares to an low resistance inductor. "Off" state compares to a 10-Megohm resistor.

D. "On" state compares to a resistor. "Off" state compares to a capacitor.

8-18B3 A pulse-width modulator in a switching power supply is used to:

A. Provide the reference voltage for the regulator.

B. Vary the frequency of the switching regulator to control the output voltage.

C. Vary the duty cycle of the regulator switch to control the output voltage.

D. Compare the reference voltage with the output voltage sample and produce an error voltage.

8-18B4 In a fixed-frequency switching power supply, the pulse width of the switching circuit will increase when:

A. The load impedance decreases.

B. The load current decreases.

C. The output voltage increases.

D. The input voltage increases.

8-18B5 A major consideration for the use of a switching regulator power supply over a linear regulator is:

A. The switching regulator has better regulation.

B. The linear regulator does not require a transformer to step down AC line voltages to a usable level.

C. The switching regulator can be used in nearly all applications requiring regulated voltage.

D. The overall efficiency of a switching regulator is much higher than a linear power supply.

8-18B6 Which of the following characteristics are true of a power MOSFET used in a RADAR switching supply?

A. Low input impedance; failure mode can be gate punch-through.

B. High input impedance; failure mode can be gate punch-through.

C. High input impedance; failure mode can be thermal runaway.

D. Low input impedance; failure mode can be gate breakdown.

Answer Key: 8-18B1: C 8-18B2: B 8-18B3: C 8-18B4: A 8-18B5: D 8-18B6: B

Key Topic 19 – Receiving Systems

8-19C1 Which of the following statements is true?
A. The front end of the receiver does not provide any amplification to the RADAR signal.
B. The mixer provides a gain of at least 6 db.
C. The I.F. amplifier is always a high gain, narrow bandwidth amplifier.
D. None of the above.

8-19C2 Logarithmic receivers:
A. Can't be damaged.
B. Can't be saturated.
C. Should not be used in RADAR systems.
D. Have low sensitivity.

8-19C3 RADAR receivers are similar to:
A. FM receivers.
B. HF receivers.
C. T.V. receivers.
D. Microwave receivers.

8-19C4 What section of the receiving system sends signals to the display system?
A. Video amplifier.
B. Audio amplifier.
C. I.F. Amplifier.
D. Resolver.

8-19C5 What is the main difference between an analog and a digital receiver?
A. Special amplification circuitry.
B. The presence of decision circuitry to distinguish between "on" and "off" signal levels.
C. An AGC stage is not required in a digital receiver.
D. Digital receivers produce no distortion.

8-19C6 In a RADAR receiver, the RF power amplifier:
A. Is high gain.
B. Is low gain.
C. Does not exist.
D. Requires wide bandwidth.

Answer Key: 8-19C1: A 8-19C2: B 8-19C3: D 8-19C4: A 8-19C5: B 8-19C6: C

Key Topic 20 – Mixers

8-20C1 The diagram in Fig. 8C9 shows a simplified RADAR mixer circuit using a crystal diode as the first detector. *What is the output of the circuit when no echoes are being received?*

A. 60 MHz CW.
B. 4095 MHz CW.
C. 4155 MHz CW.
D. No output is developed.

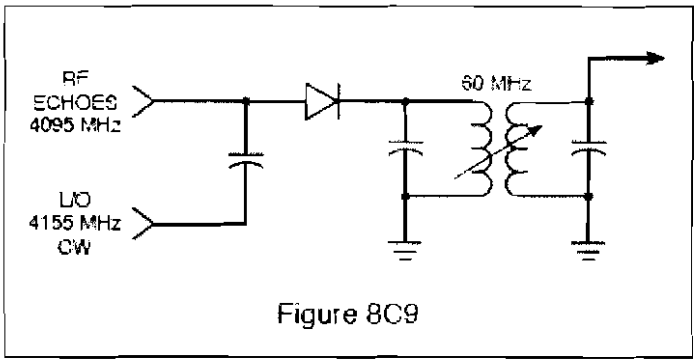

Figure 8C9

8-20C2 In the receive mode, frequency conversion is generally accomplished by a:

A. Tunable wave-guide section.
B. Pentagrid converter.
C. Crystal diode.
D. Ferrite device.

8-20C3 An RF mixer has what purpose in a RADAR system?

A. Mixes the CW transmitter output to form pulsed waves.
B. Converts a low-level signal to a different frequency.
C. Prevents microwave oscillations from reaching the antenna.
D. Combines audio tones with RF to produce the RADAR signal.

8-20C4 In a RADAR unit, the mixer uses a:

A. Pentagrid converter tube.
B. Field-effect transistor.
C. Silicon crystal or PIN diode.
D. Microwave transistor.

8-20C5 What component of a RADAR receiver is represented by block 49 in Fig. 8A1?

A. Discriminator.
B. IF amplifier.
C. Klystron.
D. Crystal detector (the mixer).

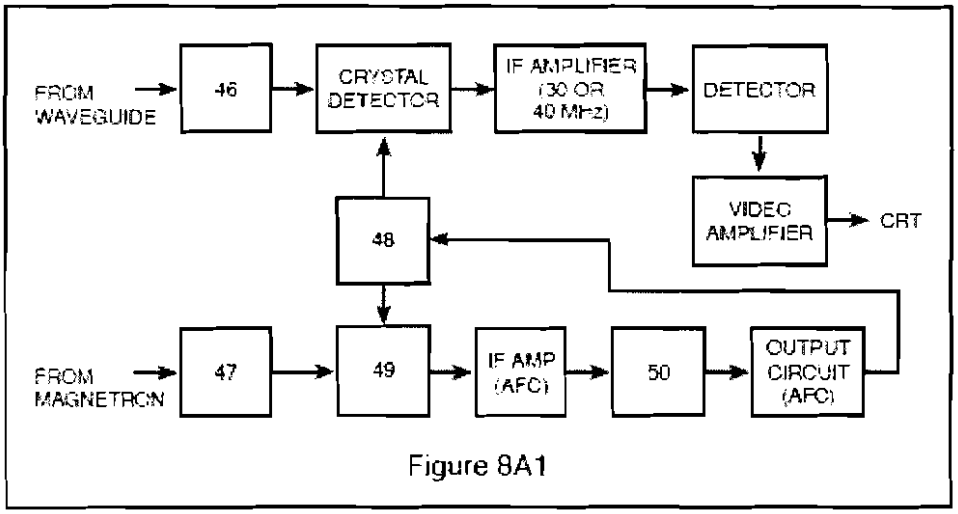

Figure 8A1

8-20C6 In a RADAR unit, the mixer uses:

A. PIN diodes and silicon crystals.
B. PIN diodes.
C. Boettcher crystals.
D. Silicon crystals.

Answer Key: 8-20C1: D 8-20C2: C 8-20C3: B 8-20C4: C 8-20C5: D 8-20C6: A

Key Topic 21 – Local Oscillators

8-21C1 The error voltage from the discriminator is applied to the:
- A. Repeller (reflector) of the klystron.
- B. Grids of the IF amplifier.
- C. Grids of the RF amplifiers.
- D. Magnetron.

8-21C2 In a RADAR unit, the local oscillator is a:
- A. Hydrogen Thyratron.
- B. Klystron.
- C. Pentagrid converter tube.
- D. Reactance tube modulator.

8-21C3 What component of a RADAR receiver is represented by block 48 in Fig. 8A1?
- A. Klystron (local oscillator).
- B. Discriminator.
- C. IF amplifier.
- D. Crystal detector.

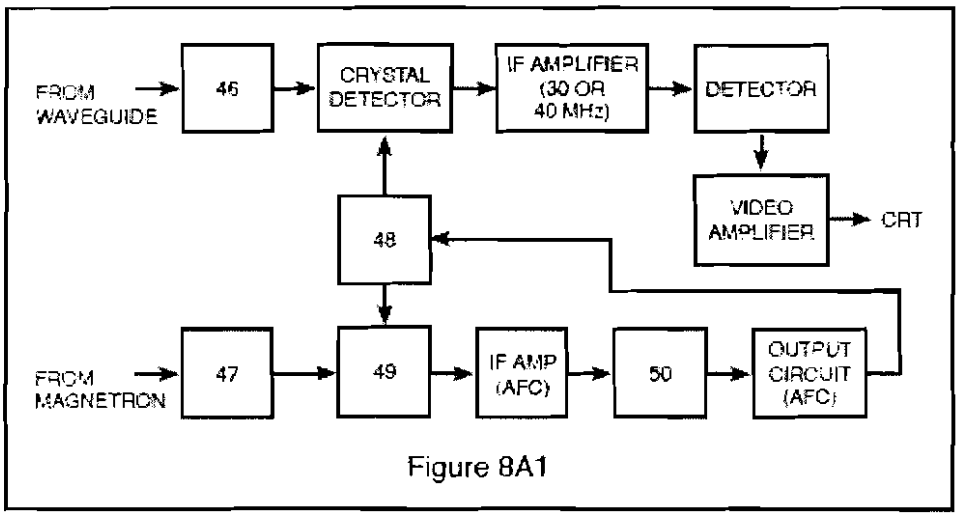

Figure 8A1

8-21C4 What device(s) could be used as the local oscillator in a RADAR receiver?
- A. Thyratron
- B. Klystron
- C. Klystron and a Gunn Diode
- D. Gunn diode

8-21C5 The klystron local oscillator is constantly kept on frequency by:
- A. Constant manual adjustments.
- B. The Automatic Frequency Control circuit.
- C. A feedback loop from the crystal detector.
- D. A feedback loop from the TR box.

8-21C6 How may the frequency of the klystron be varied?

A. Small changes can be made by adjusting the anode voltage.

B. Large changes can be made by adjusting the frequency.

C. By changing the phasing of the buncher grids

D. Small changes can be made by adjusting the repeller voltage and large changes can be made by adjusting the size of the resonant cavity.

Answer Key: 8-21C1: A 8-21C2: B 8-21C3: A 8-21C4: C 8-21C5: B 8-21C6: D

Key Topic 22 – Amplifiers

8-22C1 Overcoupling in a RADAR receiver will cause?
A. Improved target returns.
B. Increase the range of the IAGC.
C. Decrease noise.
D. Oscillations.

8-22C2 The usual intermediate frequency of a shipboard RADAR unit is:
A. 455 kHz.
B. 10.7 MHz.
C. 30 or 60 MHz.
D. 120 MHz.

8-22C3 The I.F. Amplifier bandwidth is:
A. Wide for short ranges and narrow for long ranges.
B. Wide for long ranges and narrow for short ranges.
C. Constant for all ranges.
D. Adjustable from the control panel.

8-22C4 A logarithmic IF amplifier is preferable to a linear IF amplifier in a RADAR receiver because it:
A. Has higher gain.
B. Is more easily aligned.
C. Has a lower noise figure.
D. Has a greater dynamic range.

8-22C5 The high-gain IF amplifiers in a RADAR receiver may amplify a 2 microvolt input signal to an output level of 2 volts. This amount of amplification represents a gain of:
A. 60 db.
B. 100 db.
C. 120 db.
D. 1,000 db.

8-22C6 In a RADAR receiver AGC and IAGC can vary between:
A. 10 and 15 db.
B. 20 and 40 db.
C. 30 and 60 db.
D. 5 and 30 db.

Answer Key: 8-22C1: D 8-22C2: C 8-22C3: A 8-22C4: D 8-22C5: C 8-22C6: B

Key Topic 23 – Detectors - Video Amplifiers

8-23C1 Which of the following statements is correct?
- A. The video amplifier is located between the mixer and the I.F. amplifier.
- B. The video amplifier operates between 60 MHz and 120 Mhz.
- C. The video amplifier is located between the I.F. amplifier and the display system.
- D. The video amplifier is located between the local oscillator and the mixer.

8-23C2 Video amplifiers in pulse RADAR receivers must have a broad bandwidth because:
- A. Weak pulses must be amplified.
- B. High frequency sine waves must be amplified.
- C. The RADARs operate at PRFs above 100.
- D. The pulses produced are normally too wide for video amplification.

8-23C3 In video amplifiers, compensation for the input and output stage capacitances must be accomplished to prevent distorting the video pulses. This compensation is normally accomplished by connecting:
- A. Inductors in parallel with both the input and output capacitances.
- B. Resistances in parallel with both the input and output capacitances.
- C. An inductor in parallel with the input capacitance and an inductor in series with the output capacitance.
- D. An inductor in series with the input capacitance and an inductor in parallel with the output capacitance.

8-23C4 Which of the following signals is not usually an input to the video amplifier?
- A. Resolver.
- B. Range.
- C. Brilliance.
- D. Contrast.

8-23C5 Which of the following signals are usually an input to the video amplifier?
- A. Range.
- B. Brilliance.
- C. Contrast.
- D. All of the above.

8-23C6 The video (second) detector in a pulse modulated RADAR system would most likely use a/an:
- A. Discriminator detector.
- B. Diode detector.
- C. Ratio detector.
- D. Infinite impedance detector.

Answer Key: 8-23C1: C 8-23C2: A 8-23C3: D 8-23C4: A 8-23C5: D 8-23C6: B

Key Topic 24 – Automatic Frequency Control - AFC/ATC

8-24C1 The AFC system is used to:

A. Control the frequency of the magnetron.
B. Control the frequency of the klystron.
C. Control the receiver gain.
D. Control the frequency of the incoming pulses.

8-24C2 A circuit used to develop AFC voltage in a RADAR receiver is called the:

A. Peak detector.
B. Crystal mixer.
C. Second detector.
D. Discriminator.

8-24C3 In the AFC system, the discriminator compares the frequencies of the:

A. Magnetron and klystron.
B. PRR generator and magnetron.
C. Magnetron and crystal detector.
D. Magnetron and video amplifier.

8-24C4 An AFC system keeps the receiver tuned to the transmitted signal by varying the frequency of the:

A. Magnetron.
B. IF amplifier stage.
C. Local oscillator.
D. Cavity duplexer.

8-24C5 A RADAR transmitter is operating on 3.0 GHz and the reflex klystron local oscillator, operating at 3.060 GHz, develops a 60 MHz IF. If the magnetron drifts higher in frequency, the AFC system must cause the klystron repeller plate to become:

A. More positive.
B. More negative.
C. Less positive.
D. Less negative.

8-24C6 What component is block 50 in Fig. 8A1?

A. IF amplifier.
B. AFC amplifier.
C. Discriminator.
D. Crystal detector.

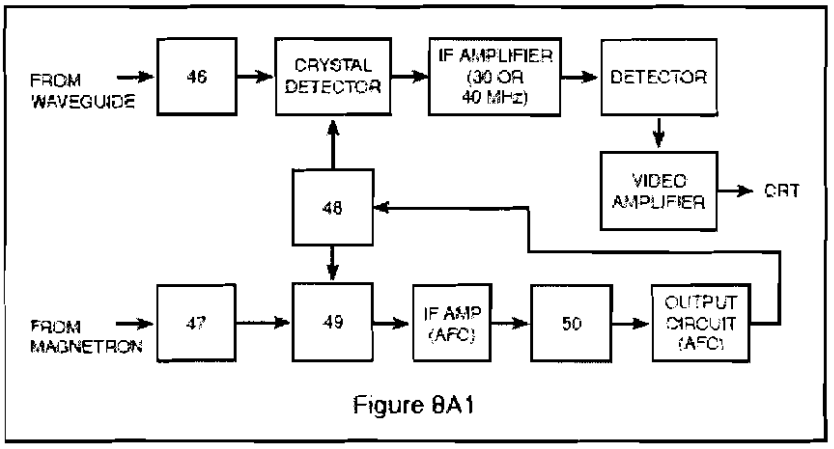

Figure 8A1

Answer Key: 8-24C1: B 8-24C2: D 8-24C3: A 8-24C4: C 8-24C5: B 8-24C6: C

Key Topic 25 – Sea Clutter - STC - FTC

8-25C1 The STC circuit is used to:
- A. Increase receiver stability.
- B. Increase receiver sensitivity.
- C. Increase receiver selectivity.
- D. Decrease sea return on a RADAR receiver.

8-25C2 The STC circuit:
- A. Increases the sensitivity of the receiver for close targets.
- B. Decreases sea return on the PPI scope.
- C. Helps to increase the bearing resolution of targets.
- D. Increases sea return on the PPI scope.

8-25C3 Sea return is:
- A. Sea water that gets into the antenna system.
- B. The return echo from a target at sea.
- C. The reflection of RADAR signals from nearby waves.
- D. None of the above.

8-25C4 Sea clutter on the RADAR scope cannot be effectively reduced using front panel controls. What circuit would you suspect is faulty?
- A. Sensitivity Time Control (STC) circuit.
- B. False Target Eliminator (FTE) circuit.
- C. Fast Time Constant (FTC) circuit.
- D. Intermediate Frequency (IF) circuit.

8-25C5 What circuit controls the suppression of sea clutter?
- A. EBL circuit.
- B. STC circuit.
- C. Local oscillator.
- D. Audio amplifier.

8-25C6 The sensitivity time control (STC) circuit:
- A. Decreases the sensitivity of the receiver for close objects.
- B. Increases the sensitivity of the receiver for close objects.
- C. Increases the sensitivity of the receiver for distant objects.
- D. Decreases the sensitivity of the transmitter for close objects.

Answer Key: 8-25C1: D 8-25C2: B 8-25C3: C 8-25C4: A 8-25C5: B 8-25C6: A

Key Topic 26 – Power Supplies

8-26C1 Prior to making "power-on" measurements on a switching power supply, you should be familiar with the supply because of the following:

A. You need to know where the filter capacitors are so they can be discharged.
B. If it does not use a line isolation transformer you may destroy the supply with grounded test equipment.
C. It is not possible to cause a component failure by using ungrounded test equipment.
D. So that measurements can be made without referring to the schematic.

8-26C2 A constant frequency switching power supply regulator with an input voltage of 165 volts DC, and a switching frequency of 20 kHz, has an "ON" time of 27 microseconds when supplying 1 ampere to its load. What is the output voltage across the load?

A. It cannot be determined with the information given.
B. 305.55 volts DC.
C. 89.1 volts DC.
D. 165 volts DC.

8-26C3 The circuit shown in Fig. 8C10 is the output of a switching power supply. Measuring from the junction of CR6, CR7 and L1 to ground with an oscilloscope, what waveform would you expect to see?

A. Filtered DC.
B. Pulsating DC at line frequency.
C. AC at line frequency.
D. Pulsating DC much higher than line frequency.

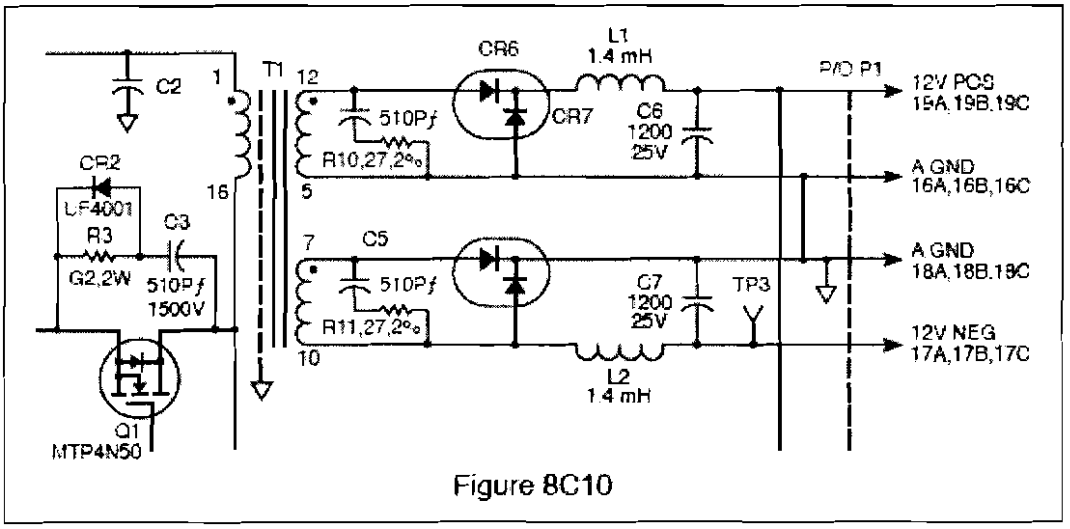

Figure 8C10

8-26C4 With regard to the comparator shown in Fig. 8C11, the input is a sinusoid. Nominal high level output of the comparator is 4.5 volts. Choose the most correct statement regarding the input and output.

A. The leading edge of the output waveform occurs 180 degrees after positive zero crossing of the input waveform.

B. The rising edge of the output waveform trails the positive zero crossing of the input waveform by 45 degrees.

C. The rising edge of the output waveform trails the negative zero crossing of the input waveform by 45 degrees.

D. The rising edge of the output waveform trails the positive peak of the input waveform by 45 degrees.

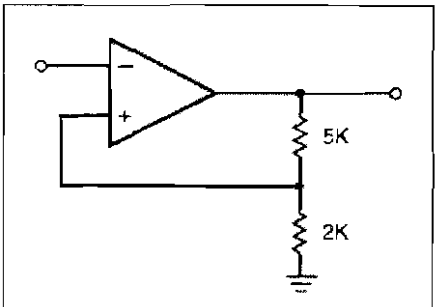

Figure 8C11

8-26C5 When monitoring the gate voltage of a power MOSFET in the switching power supply of a modern RADAR, you would expect to see the gate voltage change from "low" to "high" by how much?

A. 1 volt to 2 volts.

B. 300 microvolts to 700 microvolts.

C. Greater than 2 volts.

D. 1.0 volt to 20.0 volts.

8-26C6 The nominal output high of the comparator shown in Fig. 8C11 is 4.5 volts. Choose the most correct statement which describes the trip points.

A. Upper trip point is 4.5 volts. Lower trip point is approximately 0 volts.

B. Upper trip point is 2.5 volts. Lower trip point is approximately 2.0 volts.

C. Upper trip point is 900 microvolts. Lower trip point is approximately 0 volts.

D. Upper trip point is +1.285 volts. Lower trip point is -1.285 volts.

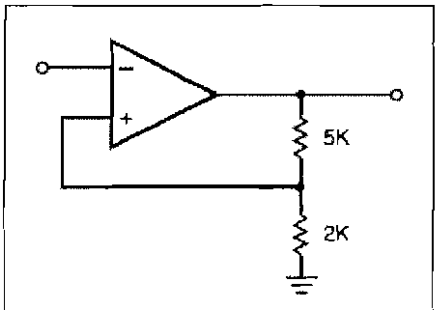

Figure 8C11

Answer Key: 8-26C1: B 8-26C2: C 8-26C3: D 8-26C4: A 8-26C5: C 8-26C6: D

Key Topic 27 – Interference Issues

8-27C1 One of the best methods of reducing noise in a RADAR receiver is?
- A. Changing the frequency.
- B. Isolation.
- C. Replacing the resonant cavity.
- D. Changing the IF strip.

8-27C2 The primary cause of noise in a RADAR receiver can be attributed to:
- A. Electrical causes.
- B. Atmospheric changes.
- C. Poor grounding.
- D. Thermal noise caused by RADAR receiver components.

8-27C3 Noise can appear on the LCD as:
- A. Erratic video and sharp changes in intensity.
- B. Black spots on the screen.
- C. Changes in bearings.
- D. None of the above.

8-27C4 RADAR interference on a communications receiver appears as:
- A. A varying tone.
- B. Static.
- C. A hissing tone.
- D. A steady tone.

8-27C5 In a RADAR receiver the most common types of interference are?
- A. Weather and sea return.
- B. Sea return and thermal.
- C. Weather and electrical.
- D. Jamming and electrical.

8-27C6 Noise can:
- A. Mask larger targets.
- B. Change bearings.
- C. Mask small targets.
- D. Increase RADAR transmitter interference.

Answer Key: 8-27C1: B 8-27C2: D 8-27C3: A 8-27C4: D 8-27C5: A 8-27C6: C

Key Topic 28 – Miscellaneous

8-28C1 The purpose of the discriminator circuit in a RADAR set is to:

A. Discriminate against nearby objects.
B. Discriminate against two objects with very similar bearings.
C. Generate a corrective voltage for controlling the frequency of the klystron local oscillator.
D. Demodulate or remove the intelligence from the FM signal.

8-28C2 The MTI circuit:

A. Acts as a mixer in a RADAR receiver.
B. Is a filter, which blocks out stationary targets, allowing only moving targets to be detected.
C. Is used to monitor transmitter interference.
D. Will pick up targets, which are not in motion.

8-28C3 Where is a RF attenuator used in a RADAR unit?

A. Between the antenna and the receiver.
B. Between the magnetron and the antenna.
C. Between the magnetron and the AFC section of the receiver.
D. Between the AFC section and the klystron.

8-28C4 The condition known as "glint" refers to a shifting of clutter with each RADAR pulse and can be caused by a:

A. Improperly functioning MTI filter.
B. Memory failure.
C Low AFC voltage.
D. Interference from electrical equipment.

8-28C5 An ion discharge (TR) cell is used to:

A. Protect the transmitter from high SWRs.
B. Lower the noise figure of the receiver.
C. Tune the local oscillator of the RADAR receiver.
D. Protect the receiver mixer during the transmit pulse.

8-28C6 When the receiver employs an MTI circuit:

A. The receiver gain increases with time.
B. Only moving targets will be displayed.
C. The receiver AGC circuits are disabled.
D. Ground clutter will be free of "rabbits."

Answer Key: 8-28C1: C 8-28C2: B 8-28C3: C 8-28C4: A 8-28C5: D 8-28C6: B

Key Topic 29 – Displays

8-29D1 Modern liquid crystal displays have a pixel count of:
A. Greater than 200 pixels per inch.
B. Greater than 50 pixels per inch.
C. Can have no more than 125 pixels per inch.
D. Can implement 1,000 pixels per inch.

8-29D2 Voltages used in CRT anode circuits are in what range of value?
A. 0.5-10 mV.
B. 10-50 kV.
C. 20-50 mV.
D. 200-1000 V.

8-29D3 The purpose of the aquadag coating on the CRT is:
A. To protect the electrons from strong electric fields.
B. To act as a second anode.
C. To attract secondary emissions from the CRT screen.
D. All of the above

8-29D4 LCD patterns are formed when:
A. Current passes through the crystal causing them to align.
B. When voltage is reduced to the raster scan display.
C. When the deflection coils are resonant.
D. When the ships antenna's bearing is true north.

8-29D5 In a raster-type display, the electron beam is scanned:
A. From the center of the display to the outer edges.
B. Horizontally and vertically across the CRT face.
C. In a rotating pattern which follows the antenna position.
D. From one specified X-Y coordinate to the next.

8-29D6 Select the statement, which is most correct regarding a raster scan display.
A. Raster displays are the same as conventional T.V. receivers.
B. The scan rate for a RADAR system is 30 frames per second.
C. Raster scanning is controlled by clock pulses and requires an address bus.
D. Raster scanning is not used in RADAR systems.

Answer Key: 8-29D1: A 8-29D2: B 8-29D3: D 8-29D4: A 8-29D5: B 8-29D6: C

Key Topic 30 – Video Amplifiers and Sweep Circuits

8-30D1 What are the usual input signals to the video amplifier?

A. Low level video.
B. Fixed range rings.
C. Variable range rings.
D. All of the above.

8-30D2 Which of the following would not normally be an input to the video amplifier?

A. Fixed range rings.
B. Variable range rings.
C. Resolver signal.
D. Low level video.

8-30D3 The purpose of the sweep amplifier is to:

A. Increase the power of the video amplifier.
B. Drive the CRT deflection coils.
C. Drive the resolver coils.
D. All of the above.

8-30D4 How many deflection coils are driven by the sweep amplifier?

A. 4
B. 3
C. 2
D. 1

8-30D5 The main purpose of the sweep generator is to provide:

A. Antenna information.
B. Range rings.
C. Composite video to the cathode of the CRT.
D. The drive signal to the sweep amplifier.

8-30D6 The main purpose of the video amplifier is to provide:

A. Composite video to the cathode of the CRT.
B. Resolver signals
C. Antenna X and Y signals.
D. Provide the drive signal to the sweep amplifier.

Answer Key: 8-30D1: D 8-30D2: C 8-30D3: B 8-30D4: C 8-30D5: D 8-30D6: A

Key Topic 31 – Timing Circuits

8-31D1 Timing circuits are used to provide what function?
- A. *Develop synchronizing pulses for the transmitter system.*
- B. Synchronize the antenna and display system.
- C. Adjust the sea return.
- D. Control the North Up presentation.

8-31D2 The circuit that develops timing signals is called the:
- A. Resolver.
- B. Synchronizer.
- C. Pulse forming network.
- D. Video amplifier.

8-31D3 Which of the following functions is not affected by the timing circuit?
- A. Resolver output.
- B. Pulse repetition frequency.
- C. Sweep drive.
- D. Modulation.

8-31D4 The synchronizer primarily affects the following circuit or function:
- A. Mixer.
- B. Receiver.
- C. Modulator.
- D. I.F. Amplifier.

8-31D5 The output from the synchronizer usually consists of a:
- A. Sine wave.
- B. Pulse or square wave.
- C. Triangle wave.
- D. None of the above.

8-31D6 The sweep drive is initiated by what circuit?
- A. Resolver.
- B. Sweep amplifier.
- C. Video amplifier.
- D. Synchronizer.

Answer Key: 8-31D1: A 8-31D2: B 8-31D3: A 8-31D4: C 8-31D5: B 8-31D6: D

Key Topic 32 – Fixed Range Markers

8-32D1 Accurate range markers must be developed using very narrow pulses. A circuit that could be used to provide these high-quality pulses for the CRT is a:

A. Ringing oscillator.
B. Monostable multivibrator.
C. Triggered bi-stable multivibrator.
D. Blocking oscillator.

8-32D2 Range markers are determined by:

A. The CRT.
B. The magnetron.
C. The timer.
D. The video amplifier.

8-32D3 A gated LC oscillator, operating at 27 kHz, is being used to develop range markers. If each cycle is converted to a range mark, the range between markers will be:

A. 3 nautical miles.
B. 6 nautical miles.
C. 8 nautical miles.
D. 12 nautical miles.

8-32D4 What would be the frequency of a range ring marker oscillator generating range rings at 10 nautical miles intervals?

A. 24 kHz
B. 16 kHz
C. 12 kHz
D. 8 kHz

8-32D5 What is the distance between range markers if the controlling oscillator is operating at 20 kHz?

A. 1 nautical miles.
B. 2 nautical miles.
C. 4 nautical miles.
D. 8 nautical miles.

8-32D6 What would be the frequency of a range ring marker oscillator generating range rings at intervals of 0.25 nautical miles?

A. 161 kHz
B. 322 kHz
C. 644 kHz
D. 1288 kHz

Answer Key: 8-32D1: D 8-32D2: C 8-32D3: A 8-32D4: D 8-32D5: C 8-32D6: B

Key Topic 33 – Variable Range Markers

8-33D1 The variable range marker signal is normally fed to the input of the:
- A. Sweep amplifier.
- B. Low voltage power supply regulator.
- C. Video amplifier.
- D. Range ring oscillator.

8-33D2 The purpose of the variable range marker is to:
- A. Provide an accurate means of determining the range of a moving target.
- B. Provide a bearing line between own ship and a moving target.
- C. Indicate the distance between two different targets.
- D. Provide a means of calibrating the fixed range rings.

8-33D3 How is the variable range marker usually adjusted for accuracy?
- A. Adjusting the frequency of the VRM oscillator at the maximum range.
- B. Adjusting the frequency of the VRM oscillator at the minimum range.
- C. Adjusting the readout to match at the median range ring.
- D. The minimum and maximum ranges are aligned with the matching fixed range ring.

8-33D4 The panel control for the variable range marker is normally a:
- A. Variable resistor.
- B. Variable inductance.
- C. Variable capacitance.
- D. Variable resolver.

8-33D5 An important component of the VRM system is the:
- A. Resolver.
- B. Interference rejection circuit.
- C. STC sensitivity control.
- D. Shift register.

8-33D6 Which of the following statements about the Variable Range Marker system is correct?
- A. The VRM is an auxiliary output of the fixed range marker oscillator.
- B. The VRM system develops a single adjustable range ring.
- C. The VRM system is calibrated using a frequency counter.
- D. The VRM system is controlled by a crystal oscillator.

Answer Key: 8-33D1: C 8-33D2: A 8-33D3: D 8-33D4: A 8-33D5: D 8-33D6: B

Key Topic 34 – EBL, Azimuth and True Bearing

8-34D1 The purpose of the Electronic Bearing Line is to:
A. Indicate your own vessel's heading.
B. Measure the bearing of a specific target.
C. Indicate True North.
D. Display the range of a specific target.

8-34D2 The Electronic Bearing Line is:
A. The ships heading line.
B. A line indicating True North.
C. Used to mark a target to obtain the distance.
D. A line from your own vessel to a specific target.

8-34D3 Which of the following inputs is required to indicate azimuth?
A. Gyro signals.
B. Synchronizer
C. Resolver.
D. Range rings.

8-34D4 Bearing information from the gyro is used to provide the following:
A. The heading of the nearest target.
B. Range and bearing to the nearest target.
C. Vessel's own heading.
D. The range of a selected target.

8-34D5 Which of the following statements about "true bearing" is correct?
A. The ship's heading flasher is at the top of the screen.
B. True North is at the top of the screen and the heading flasher indicates the vessel's course.
C. The true bearing of the nearest target is indicated.
D. The relative bearing of the nearest target is indicated.

8-34D6 A true bearing presentation appears as follows:
A. The bow of the vessel always points up.
B. The course of the five closest targets is displayed.
C. North is at the top of the display and the ship's heading flasher indicates the vessels course.
D. The course and distance of the closest target is displayed.

Answer Key: 8-34D1: B 8-34D2: D 8-34D3: A 8-34D4: C 8-34D5: B 8-34D6: C

Key Topic 35 – Memory Systems

8-35D1 *In a digitized RADAR, the 360 degree sweep is divided into how many digitized segments?*

A. 16
B. 64
C. 255
D. 4,096

8-35D2 While troubleshooting a memory problem in a raster scan RADAR, you discover that the "REFRESH" cycle is not operating correctly. What type of memory circuit are you working on?

A. SRAM
B. DRAM
C. ROM
D. PROM

8-35D3 The term DRAM stands for:

A. Digital refresh access memory.
B. Digital recording access memory.
C. Dynamic random access memory.
D. Digital response area motion.

8-35D4 How does the dual memory function reduce sea clutter?

A. Successive sweeps are digitized and compared. Only signals appearing in both sweeps are displayed.
B. The dual memory system makes the desired targets larger.
C. It reduces receiver gain for closer signals.
D. It increases receiver gain for real targets.

8-35D5 How many sequential memory cells with target returns are required to display the target?

A. 1
B. 2
C. 4
D. 8

8-35D6 What is the primary purpose of display system memory?

A. Eliminate fluctuating targets such as sea return.
B. Display stationary targets.
C. Display the last available targets prior to a power dropout.
D. Store target bearings.

Answer Key: 8-35D1: D 8-35D2: B 8-35D3: C 8-35D4: A 8-35D5: B 8-35D6: A

Key Topic 36 – ARPA - CAS

8-36D1 The ship's speed indication on the ARPA display can be set manually, but does not change with changes in the vessel's speed. What other indication would point to a related equipment failure?

A. "GYRO OUT" is displayed on the ARPA indicator.
B. "LOG OUT" is displayed on the ARPA indicator.
C. "TARGET LOST" is displayed on the ARPA indicator.
D. "NORTH UP" is displayed on the ARPA indicator.

8-36D2 What does the term ARPA/CAS refer to?

A. The basic RADAR system in operation.
B. The device which displays the optional U.S.C.G. Acquisition and Search RADAR information on a CRT display.
C. The device which acquires and tracks targets that are displayed on the RADAR indicator's CRT.
D. The device which allows the ship to automatically steer around potential hazards.

8-36D3 Which of the following would not be considered an input to the computer of a collision avoidance system?

A. Own ship's exact position from navigation satellite receiver.
B. Own ship's gyrocompass heading.
C. Own ship's speed from Doppler log.
D. Own ship's wind velocity from an anemometer.

8-36D4 Which answer best describes a line on the display which indicates a target's position. The speed is shown by the length of the line and the course by the direction of the line.

A. Vector.
B. Electronic Bearing Line.
C. Range Marker.
D. Heading Marker.

8-36D5 What is the purpose or function of the "Trial Mode" used in most ARPA equipment?

A. It selects trial dots for targets' recent past positions.
B. It is used to display target position and your own ship's data such as TCPA, CPA, etc.
C. It is used to allow results of proposed maneuvers to be assessed.
D. None of these.

8-36D6 The ARPA term CPA refers to:

A. The furthest point a ship or target will get to your own ship's bow.
B. Direction of target relative to your own ship's direction.
C. The combined detection and processing of targets.
D. The closest point a ship or target will approach your own ship.

Answer Key: 8-36D1: B 8-36D2: C 8-36D3: D 8-36D4: A 8-36D5: C 8-36D6: D

Key Topic 37 – Display System Power Supplies

8-37D1 The display power supply provides the following:
- *A. +18 volts DC for the pulse forming network.*
- B. 5 volts DC for logic circuits and ± 12 volts DC for analog and sweep circuits.
- C. 80 volts AC for the antenna resolver circuits.
- D. All of the above

8-37D2 The display power supply provides the following:
- A. 5 volts DC for logic circuits.
- B. ± 12 volts DC for analog and sweep circuits.
- C. 17kV DC for the CRT HV anode.
- D. All of the above

8-37D3 In a display system power supply what is the purpose of the chopper?
- A. It acts as an electronic switch between the raw DC output and the inverter.
- B. It interrupts the AC supply line at a varying rate depending on the load demands.
- C. It regulates the 5 volt DC output.
- D. It pre-regulates the AC input.

8-37D4 In a display system power supply, what is the purpose of the inverter?
- A. Inverts the polarity of the DC voltage applied to the voltage regulators.
- B. Provides the dual polarity 12 volt DC supply.
- C. Acts as the voltage regulator for the 5 volt DC supply.
- D. Produces the pulsed DC input voltage to the power transformer.

8-37D5 What would be a common switching frequency for a display system power supply?
- A. 18 kHz
- B. 120 Hz
- C. 60 kHz
- D. 120 kHz

8-37D6 What display system power supply output would use a tripler circuit?
- A. The logic circuit supply.
- B. The sweep circuit supply.
- C. The HV supply for the CRT anode.
- D. The resolver drive

Answer Key: 8-37D1: B 8-37D2: D 8-37D3: A 8-37D4: D 8-37D5: A 8-37D6: C

Key Topic 38 – Miscellaneous

8-38D1 The heading flash is a momentary intensification of the sweep line on the PPI presentation. Its function is *to:*

A. Alert the operator when a target is within range.
B. Alert the operator when shallow water is near.
C. Inform the operator of the dead-ahead position on the PPI scope.
D. Inform the operator when the antenna is pointed to the rear of the ship.

8-38D2 The major advantage of digitally processing a RADAR signal is:

A. Digital readouts appear on the RADAR display.
B. Enhancement of weak target returns.
C. An improved operator interface.
D. Rectangular display geometry is far easier to read on the CRT.

8-38D3 In order to ensure that a practical filter is able to remove undesired components from the output of an analog-to-digital converter, the sampling frequency should be:

A. The same as the lowest component of the analog frequency.
B. Two times the highest component of the analog frequency.
C. Greater than two times the highest component of the sampled frequency.
D. The same as the highest component of the sampled frequency.

8-38D4 Bearing resolution is:

A. The ability to distinguish two adjacent targets of equal distance.
B. The ability to distinguish two targets of different distances.
C. The ability to distinguish two targets of different elevations.
D. The ability to distinguish two targets of different size.

8-38D5 The output of an RC integrator, when driven by a square wave with a period of much less than one time constant is a:

A. Sawtooth wave.
B. Sine wave.
C. Series of narrow spikes.
D. Triangle wave.

8-38D6 How do you eliminate stationary objects such as trees, buildings, bridges, etc., from the PPI presentation?

A. Remove the discriminator from the unit.
B. Use a discriminator as a second detector.
C. Calibrate the IF circuit.
D. Calibrate the local oscillator.

Answer Key: 8-38D1: C 8-38D2: B 8-38D3: C 8-38D4: A 8-38D5: D 8-38D6: B