

Service Technician Level III Syllabus

Advanced Waveguide theory and operation

Energy switch for standing wave, Feedback loop for travelling wave

Learning objective: Understand how waveguide configuration is related to beam energy and linac operating values.

Advanced Klystron

Klystron, mode of operation, electron bunching, practical examples

Learning objective: Understand the klystron's mode of operation and how they work in a medical linac

Advanced Magnetron

Magnetron, mode of operation, performance charts, magnetic field dependence

Learning objective: Understand the Magnetron's mode of operation and how they work in a medical linac

Advanced Modulator

High voltage modulator: HV power supply: 3 phase (208 VAC), step start circuit, step-up transformer, 6-way bridge, charging choke, charging HV diodes, PFN, stand transformer, step-up voltage to the klystron, main thyatron, De-Q thyatron. Simplified diagrams of thyatron and power supply. Charging cycle, power supply voltage doubling, De-Q circuit, PFN discharge.

Learning objective: Understand the charging and discharging cycles in a high voltage modulator

Waveforms

Waveform shapes, waveform troubleshooting. High voltage charging and discharging. Modulator voltage and current pulses, pulse timing, RF reflected, gun triggers. Duty cycle. Examples of realistic waveforms and use in troubleshooting.

Learning objective: Understand pulsed waveforms and how to use these to interpret machine performance

Advanced RF systems

Circulator, High power load, Waveguide window

Learning objective: Understand the medical linac RF systems

Water systems and Automatic Frequency Control

Sources of heat in medical linacs, Water cooling, Cooling circuits for two accelerator configurations, accelerator temperature control, Principles of an automatic frequency control system, AFC systems for linear accelerator frequency control, AFC components.

Learning objective: Understand how heat and temperature affect the linac operation

Advanced Labs

1. PFN Charging cycle
2. deSpiking circuit
3. RF Reflected Pulse
4. Electron Gun
1. Klystron pulse voltage
2. Magnetron output power
5. RF feedback phase adjustment
6. Effect of feedback loop on travelling wave load line

7. *Effect of energy switch on load lone for standing wave accelerator*

Learning objective: Understand the how components respond to changes to help in troubleshooting process