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## The Electrical System

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hen you think of a flexible endoscope, the electrical system isn't the first thing that comes to mind. Although an endoscope is a mechanical device, its electrical system provides us with some important features that are often overlooked. Electrical systems on pre-video endoscopes were very simple and provided some features that were rarely used. Most important, the connection between the light source and a camera made it possible to take still photographs. Through the years this basic system has become an integral part of the now very sophisticated endoscope.

There are several wires that travel from electrical contact pins on the light guide connector to contact pins on the eyepiece. These wires supply power to a camera attachment and communicate information from the camera to the light source to control automatic exposure systems within the light source.

There are electrical contact pins in various locations on the light guide connector. These control auto brightness and special features on certain models such as the color wheel on black and white chip endoscopes. There are also pins located inside the electrical connector, which transfer signals from the remote switched near the top of the control body to the documentation system.

Most endoscopes have an S-cord connector/grounding port on the light guide connector or elsewhere on the scope, usually the control body. All metal scope components are connected to this port to conduct any leakage current to ground on an electrosurgical unit.

The automatic brightness system controls the light level during an endoscopic examination in all video scopes and some fiberoptic endoscopes. Illumination diminishes quickly as the distance from the object decreases and intensifies as the distance from the object increases. Other factors that affect the brightness intensity are: how much of the image is on the same plane, how reflective the image is (for example forceps vs. mucosa), and the color of image. The auto brightness feature compensates for this occurrence. To use this feature, set the Brightness control on the light source to "Automatic". Place the distal tip fifteen millimeters from an object. Adjust the light level up or down to achieve the proper illumination level. Readjust once inside the body if necessary. The overall light level should remain fairly constant. A photo sensor in the camera of endoscope signals the light source whenever a brightness adjustment is needed. The light source then makes a correction by moving a shutter back and forth in front of the lamp. Some light sources make electronic adjustments by varying the voltage to the lamp.

Videoscope systems have the ability to capture information in several different media, including video tapes, computer files, and prints. The switches on the top of the control body are used to control the various

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recording devices or change certain settings on the video processor. The switch assembly consists of several components:

- The rubber cover serves as a waterproof seal and allows for easy operation while wearing exam gloves
- A plunger depresses the switch when pushed
- The electric switch transfers electricity through the wires when the switch is activated
- Two wires supply electricity to and from the switch
- The switch assembly parts are mounted together within the control body

The number one switch fails often due to the prominent location rising above the control body. The plunger becomes misaligned with the switch cover due to an impact. This problem can usually be corrected by gently pulling up on the switch and reseating the internal plunger. Tears in the rubber switch covers can allow fluid into the scope, and will interrupt the electrical signals. The switches should be examined closely every time a leakage test is performed.

Although we often take the electrical system for granted, it has evolved over the years to become an essential part of the modern endoscopy system. When it malfunctions or is damaged, we realize how vitally necessary