

# TEST SYSTEM COMPONENTS

## Blackbody

### Cavity Blackbodies

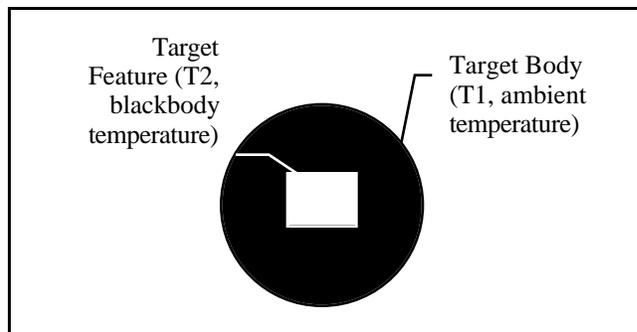
Cavity blackbodies are used when high temperatures and high IR flux are required. These blackbodies are incorporated into test systems that are used to test bare detectors. They are also used when filtering of the IR energy will be required. These blackbodies will often be used with a chopper/modulator, and apertures from .010 to .75 inches in diameter. Standard cavity blackbodies have an aperture size of one inch diameter, and a temperature range of 50 to 1000°C.

### Other High Temperature Blackbodies

Santa Barbara Infrared offers high temperature flat-plate type blackbodies. These systems are used when a high flux is required in combination with a scene or other extended target. The temperature range of these blackbodies is 50 to 650°C in sizes up to 2.75 inches square.

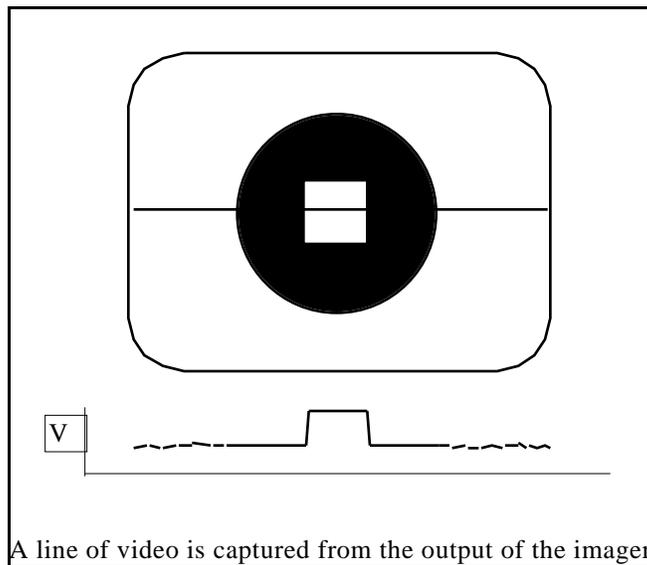
### Differential Blackbodies

Differential blackbodies produce a temperature differential between two surfaces: an uncontrolled ambient temperature surface (T1) and the blackbody emitting surface (T2). These blackbodies are used to test thermal imagers or other systems that are sensitive to small differences in scene temperature. T1 is measured by an ambient temperature probe in thermal contact with the target. The blackbody controller maintains the commanded temperature difference between the ambient temperature and the blackbody temperature. In most instances is the same as the temperature of the body of the target. This temperature is also called the background temperature, because it is seen by the unit under test as the uniform temperature region that surrounds the target features. T2 is the blackbody temperature. The blackbody is seen through the cutout features of the target.



## Targets

Targets are solid disks of copper through which slots or holes are machined to create the target features. If the target features are very small, then the target is fabricated from thin sheets of metal (usually phosphor bronze) and the features are chemically etched through the material. The target is coated with a special high emissivity (black) coating. Many target patterns are possible. However, there are two target types that are standard for particular tests. These are: window or aperture targets and bar targets. Window and aperture targets are used for tests in which a line of video is stripped out of the UUT signal and signal levels from the T1 and T2 areas of the image are measured. Bar targets are used in resolution and focus tests.



A line of video is captured from the output of the imager. This video signal is then analyzed to determine the differential voltage produced by the differential temperature between target and background.

## Collimator

The collimator plays an important role in the test system. It projects an image of the target, back lit by the blackbody, to the infrared imager under test. The collimator preserves the apparent angular size of the target features regardless of the distance from the unit under test to the target. The image produced by the collimator is an erect virtual image at infinite distance from the UUT.

## Target Wheel

As mentioned, targets are coated with a special high emissivity coating. This coating is delicate; touching it contaminates it with dirt and skin oils and crushes its felt-like surface, causing a reduction in the emissivity, and causing nonuniformities. The target wheel eliminates the risk of damage to these delicate surfaces by keeping them enclosed and changing them without the need for handling. But a target wheel is more than just a repository for a group of test targets. The target wheel establishes the position of the targets with great accuracy and repeatability.