Cameras See in the Dark

(Continued from p. 135)

red, is black and leaves of trees, which reflect infrared for their own protection against heat, are recorded as white.

This kind of film is used to detect the difference in many camouflage installations. Cut leaves or many materials will not look like the surrounding area although otherwise the camouflage might fool the unaided eye.

Earlier infrared films were not sensitive enough to do what is possible today. Now an eye that is very sensitive to these infrared rays has been developed. It gives a black to white picture difference when the temperature difference of the object being photographed is only a fraction of a degree.

Infrared Sandwich

A key component of one of the newly developed systems is a unique infrared-sensitive detector, or retina. The retina is a three-layer sandwich only a few millionths of an inch thick.

The center layer of the sandwich is a support film of aluminum oxide about one millionth of an inch thick. This film is made by chemically dissolving away all of the aluminum metal in a piece of suitably treated household aluminum foil, leaving only the thin layer of aluminum "rust" that coats the foil's surface.

The front surface of the oxide support film is coated with an even thinner layer of nickel, deposited in such thickness that it strongly absorbs infrared radiation. The back surface of the film is coated with a thin layer of a photoemitting material called cesium bismuth, which is capable of releasing electrons when light shines upon it. Of importance is the fact that the photoemitter's ability to release electrons under the stimulus of light varies with its temperature, changing two percent or three percent for every degree of temperature change.

To increase the overall sensitivity and performance of the detector, it is cooled to about 180 degrees below zero Fahrenheit.

In use, the infrared radiation from an object is focused on the heat-absorbing layer of the retina, forming a temperature pattern of the scene. This temperature pattern transfers through the thin support layer to the photoemitting surface, where it can be perceived merely by scanning a spot of light across the surface.

As the light spot scans the photoemitting surface, many or few electrons flow from the surface in exact conformity to the heat pattern on it. These electrical signals are then amplified and fed to a standard television picture tube, on which a visible picture appears. Thus, a point by point description of the temperature scene is created on a television screen.

Although much interest and money are being spent on infrared for military detection systems that we must have, the future for peaceful use is bright.

Outer space medicine, navigation and world communications will profit from the unseen light, the infrared.

• Science News Letter, 83:135 March 2, 1963

PHYSICS

First Thorium Fuel Power Reactor at Full Operation

See Front Cover

➤ FULL POWER operation has been achieved at Con Edison's Indian Point atomic electric generating station in Buchanan, N. Y., seen on this week's front cover, 35 miles from the center of New York.

At full power Indian Point generates 275,000 kilowatts for Con Edison's six-million-kilowatt system serving New York area residents. The steam that drives the turbine at Indian Point gets approximately two-thirds of its heat from the atomic reactor and one-third from oil fired superheaters.

The reactor, according to its designer and builder, the Babcock and Wilcox Company, has operated smoothly since it achieved criticality.

The core of the reactor, the first power reactor to use thorium as fuel, will last approximately two years without refueling, the company reported.

• Science News Letter, 83:141 March 2, 1963