

6 Points to Consider Before Putting TV to Work in Your Plant

1 Color

Wide use of color for ITV seems unlikely at present. Additional expense, added complications of operation, and extra maintenance make currently available color equipment undesirable for use in industry.

In the medical field, however, where color is extremely important, it is worth the added expense. Only intermittent service is required, and conditions are such that delicate TV adjustments will not be disturbed.

Watching furnace operation in color appears attractive at first glance, but considerable development is needed before color TV will serve continuously.

Severe conditions at the camera location, restricted space, additional cost and maintenance, plus need for reliable, continuous service, indicate more rugged black-and-white television for industry.

2 Black and White

As mentioned on the previous pages, there are three basic camera types available for ITV: image-dissector, vidicon image orthicon. Each has distinct features that make it adaptable to one or more applications in the industrial field. Some of the factors an engineer must juggle in selecting a camera and its related system are first cost, life expectancy, picture quality, maintenance.

Two tube types make up for lack of total sensitivity in the image-dissector camera. (1) Cesium-oxide silver (or red) tube is most sensitive to light waves in red and infra-red areas of the spectrum. It picks up a good image of coal or oil flames, is used for general observation. (2) Where subject being viewed gives off blue light, as a natural-gas flame, a cesium-oxide-antimony (blue) tube provides good definition. This tube also transmits a good picture of smokestack emissions, is used for viewing standby oil flames.

Image-dissector cameras scan at 350 lines, picture resolution is 300 lines, not interlaced. (With interlacing, image is alternately scanned in two sets of lines, one between the other.) Auxiliary lighting is usually required, and best results are obtained with 150 to 250 foot-candles illumination. Acceptable picture is ordinarily obtained with 100 ft-c. Because the circuit is different from commercial equipment, home-type receiver will not work with an image-dissector camera, without modification.

Vidicon-tube system has sensitivity and spectral-response characteristics that allow use of standard photographic lens filters. The camera uses any standard 16-mm motion-picture lens with a type C mount. This allows choice of any lens type—telescopic, wide angle, etc. for specific applications at low cost.

Vidicon cameras scan at 525 lines. Picture resolution is 400 lines, interlaced. Scene brightness of 100 ft-c is best,

Because its eye is unblinking, and special tube filters can be used to compensate for unfavorable lighting or glare conditions, you see more within than you could by full-time personal observation. But the equipment needed varies widely according to what it has to do. So let's look at six factors engineers often ask about

minimum brightness is 50 to 60 ft-c. Standard home receivers can be used for auxiliary viewers.

Image-orthicon cameras are used mainly in military installations. Picture quality may be as good as or better than broadcast TV. Image orthicon is used largely for electronic precision operations and picking up visual detail in hazardous locations.

3 Locating the Camera

Naturally, camera must be located so it sees what you want to see. This may require special mounting. For a new ITV location is figured in the original design. This reduces the cost of installation.

Angle of vision required to cover the scene must be considered, and camera located to give best possible picture. Auxiliary lighting arrangements have to bring scene brightness up to required levels. The lens type is another factor to consider in locating camera for best picture.

Remote-control indexing mountings may be necessary, keep camera at proper position. Where there is excessive vibration you also need shock mountings.

Ambient camera temperature should not exceed about 150 F. And if temperature is too low, lens may fog. So housing may have to protect camera against weather, dust, corrosive or explosive atmospheres, heat, cold.

Aircooled or watercooled windows keep temperature down when camera is viewing furnaces. Outdoor installation of watches stacks in cold, wet weather may need electric heat and windshield wipers. Explosionproof housings decrease operating hazards in dangerous areas.

4 Locating the Receiver

The place where an ITV receiver does most good is in the control room, on the control panel. Operator notes change in gage level, stack emission, or flame condition when it occurs, and takes proper steps to keep boiler operating efficiently. There is little time delay.

Auxiliary viewers should be placed at emergency control points, or wherever they are required for supervision. In a new plant, designer should allow for the TV viewer in the original control panel. ITV manufacturers make standard flush mountings. They build special receivers, too, if panel space is at a premium. But these increase the installation cost because they require extra engineering.

Duplicate viewers can be the same type as the original viewer. Or, in vidicon systems, they can be standard home-type receivers. These receivers require no modification. Just connect them to the control viewer with coaxial cable.

Camera and Receiver Installations Should Be Tailored for Each Job



Camera protects outdoor camera viewing power-plant stacks



RECEIVER shows boiler-water level to control-room operator

5 Limitations

Limitations include lighting conditions, temperatures, inherent equipment characteristics that limit distance between camera and viewing screen (or monitor).

To produce a good picture, image-dissector camera requires scene illumination—150 to 250 ft-c is best, 100 or less acceptable under special conditions. Vidicon camera needs 50 to 100 ft-c for good results.

Cameras must operate within limits of 0 to 150 F. Mountings, mentioned above under 3, may be necessary. Distance between control monitor and camera, in vidicon systems, held to maximum of 500 ft. But auxiliary viewers beyond the scene to 4000 ft, or further with amplifiers.

Image dissector, maximum separation between camera and viewer is 1500 ft, without booster amplification. Distance can be up to 100 ft between this camera and its separate power unit.

Compromises between several conflicting factors. High resolution, high sensitivity, broad spectral response and greatest range of broadcast TV require complex, expensive equipment. How much can be sacrificed and yet produce acceptable picture depends on the application.

For meter reading, checking furnaces, viewing smoke (normal in power plants today) any of the three systems can be used. In selecting a system for your plant, give careful thought to the needs of your application. How precisely does the picture be? Are there any auxiliary lighting

problems? What distances are involved? Do you need auxiliary viewers or receivers? When you know what the needs are you can see which system does the best job for you.

6 Maintenance

ITV maintenance depends on the type of installation and conditions surrounding the equipment. Where there is little vibration, no excessive heat or cold, no voltage fluctuation, the only maintenance ordinarily required is cleaning.

Ruggedness of equipment and total number of tubes play a large part in determining maintenance necessary. Simpler equipment generally requires less maintenance.

Chief maintenance required after initial adjustment is occasional cleaning. Based on equipment used up to the present, largely the image-dissector type, cost of maintenance is believed to be approximately comparable to upkeep costs of average control-panel instrument. Although plant instrument personnel can correct ordinary difficulties, manufacturers recommend regular preventive maintenance to avoid trouble before it starts. Where there is voltage fluctuation, they suggest voltage-regulating transformers to reduce maladjustments and need for servicing.

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