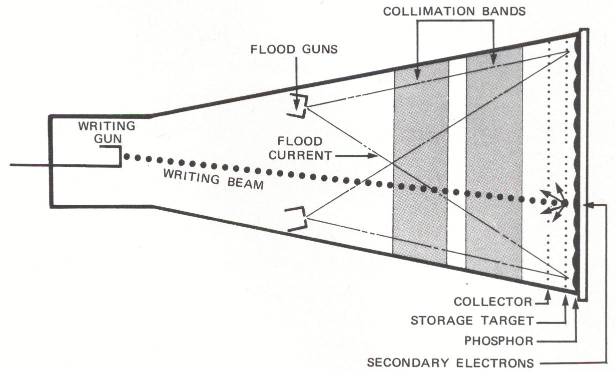
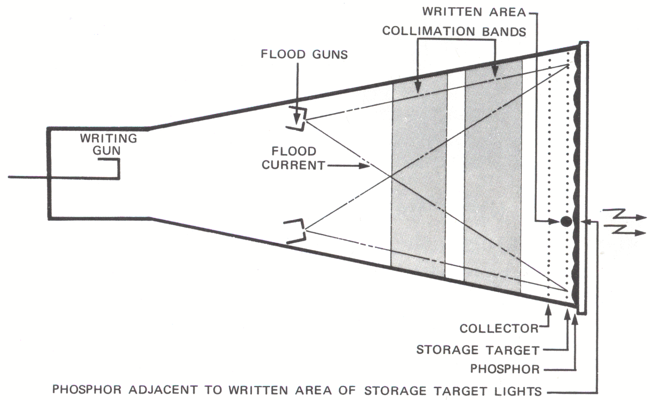
Fig. 2. *Halftone transmission storage.*



A.

Writing beam dislodges secondary electrons from storage target. The written area charges positive while the surrounding area of storage target remains negative.



B.

Flood gun electrons pass through written area of storage target and strike phosphor. Remainder of storage target blocks flood electrons.

PRINCIPLES OF HALFTONE TRANSMISSION STORAGE (VARIABLE PERSISTENCE)

The halftone transmission storage tube has a basic structure similar to the direct-view bistable tube. Two mesh-type elements are added in this tube near the faceplate to achieve transmission storage. The mesh nearest the electron-gun structure is a fairly coarse mesh which serves as the collector electrode to accelerate electrons toward the storage target and to collect secondary electrons emitted by the storage target. The second mesh is very fine (about 500 lines/inch) and serves as the storage target. A highly insulative dielectric layer is deposited on this mesh using thin-film techniques. It is on this dielectric layer that storage occurs.

In the storage mode, the flood guns cover the entire storage target with a continuous stream of low-velocity electrons. However, these electrons are prevented from reaching the phosphor screen unless a display has been written on the storage target. As the writing beam is scanned across the storage target, it dislodges secondary electrons from the dielectric (see Fig. 2A). These written areas charge positive while the unwritten areas remain negative.

An accelerating potential of approximately 7 kV exists between the storage target and an aluminized layer which is deposited over the phosphor. This potential attracts flood electrons through the written area of the storage target, to the phosphor screen (Fig. 2B). The flood electrons are blocked by the unwritten areas of the storage target so these areas of the phosphor remain dark. The result is a bright, high contrast display of the image originally written on the storage target.

The density of the writing beam striking the storage target determines the amount of positive charge on the dielectric. This positive charge, in turn, determines the amount of flood electrons reaching the phosphor and thereby determines the brightness of the stored trace. It is this ability to store and display changes in intensity that leads to the name halftone transmission storage.

The entire stored image can be erased by applying a positive pulse of about 10 volts to the storage target mesh. Although the dielectric is insulated from the storage target mesh, it goes positive also by capacitive coupling. However, the dielectric immediately begins to discharge back to about zero volts due to the flood gun electrons which are striking it. After about one-half second, the positive erase pulse is removed and the storage target mesh drops back to a quiescent level near zero volts. Again by capacitive action, the dielectric follows negative to about −10 volts. The storage target is now in a ready-to-write state.

A characteristic of the halftone transmission storage tube is that unwritten areas of the storage target begin to fade positive due to positive ion generation in the flood electron system of the tube. As a result, the entire screen reaches a stored condition after only a few minutes and the desired image is no longer visible. To prevent this from occurring and to provide for optimum viewing of the stored image, the entire screen is slowly erased during operation. This is done by applying variable-width erase pulses to the storage target every 10 ms. Each time a pulse is received, the storage target is partially erased. As the width of these pulses is increased,

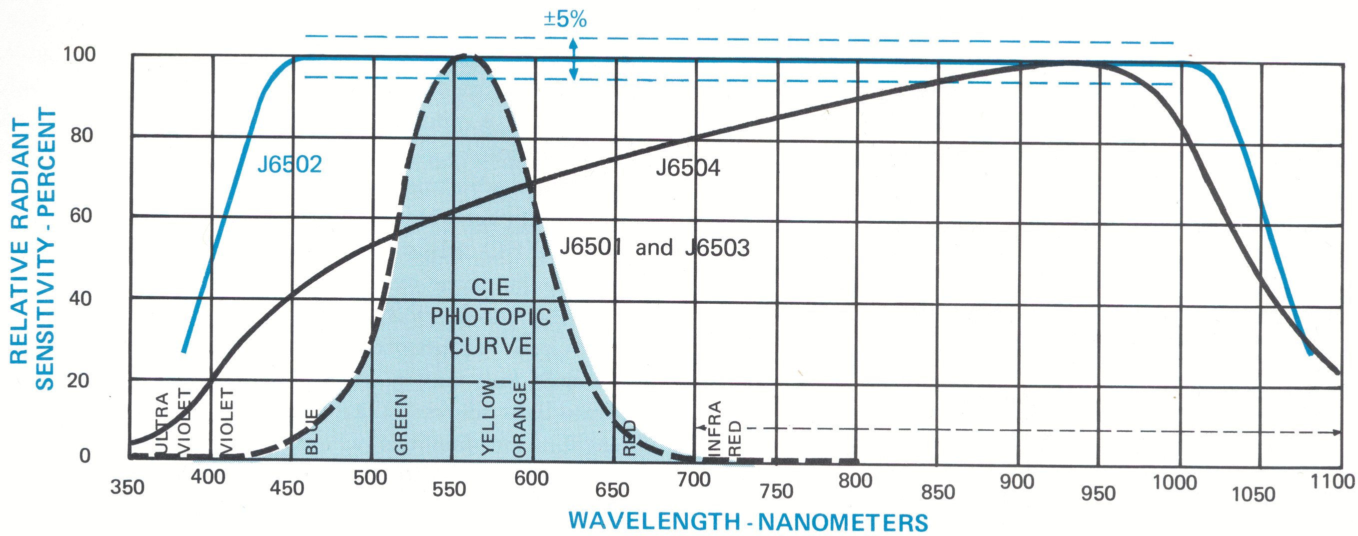


Fig. 3. *Spectral response of probes for J16.*

The J6501 Illuminance Probe is designed to measure light incident (falling) upon a surface. Measurements are made with the J6501 pointed at the light source. Response of this probe is very closely matched to the CIE Photopic Curve (see Fig. 3) to equal the spectral response of the average human eye. When this probe is installed, the front-panel FOOT CANDLES indicator is lit to indicate that measurements are in these units.

Typical applications for the J6501 are measurements of street lighting (see back cover), building lighting, television and movie scene illumination, and light levels falling on working surfaces.

The J6502 Irradiance Probe is corrected to provide a flat spectral response within 5% over the spectral range of 450 to 1000 nanometers (visible and near infrared). Measurements are made with the J6502 pointed at the light source. The front-panel μWATTS/SQ CM indicator is on when this probe is used.

Typical applications include measurement of radiant efficiencies and laser research experiments (see Fig. 4). For measurements of lasers exceeding about two milliwatts output, use neutral density filters to reduce the light intensity to the probe sensor.

The J6503 Luminance Probe measures light scattered, reflected, or emitted by a surface. Measurements are made with the J6503 pointed at the surface. Response of the probe is closely matched to the CIE Photopic Curve. Measurements with the J6503 are in FOOT LAMBERTS as shown by the front-panel indicator.

The J6503 can be used for typical applications such as measurement of television picture tube luminance and uniformity (see Fig. 5), storage CRT brightness, light reflected from work surfaces, and light output of electroluminescent devices.

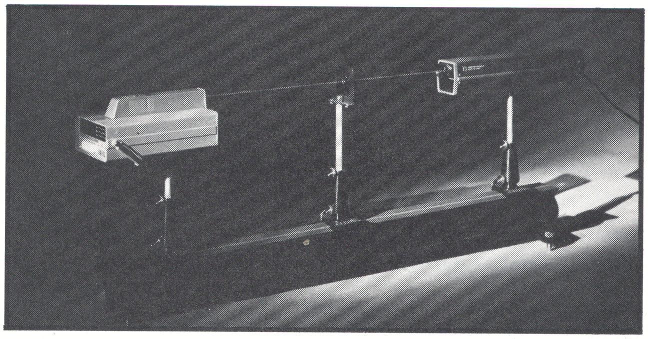


Fig. 4. *Measuring laser output power with the J6502 Irradiance Probe.*

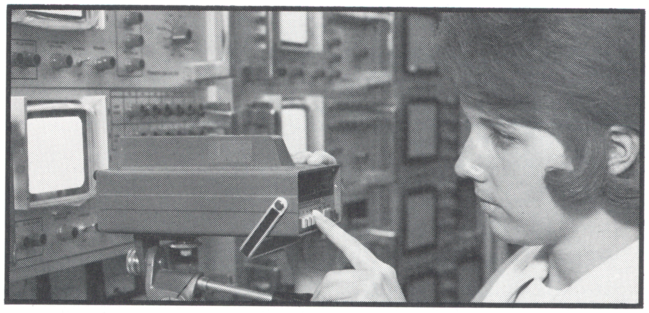


Fig. 5. *Tek employee Marilyn Bonin monitors the new 7623 Transfer Storage Tube with the J6503 Luminance Probe.*

Fig. 6. *The J6505 LED Test Probe being used for incoming inspection of light-emitting diodes by Brenda Bryant.*

Steps Prior to Washing

Some early TEKTRONIX instruments used water soluble ink for chassis markings. The chassis have a shiny appearance as compared to those with permanent markings. If you suspect you are washing such an instrument use very little detergent and cold water.

Paper covers on electrolytic capacitor should be replaced with plastic covers or sprayed with a water repellent such as WD-40.

Leather handles should be sprayed with WD-40 or other type water repellent to prevent cracking.

Capacitors leaking oil should be tagged for replacement.

Labels and adhesive should be removed unless specified otherwise.

We no longer consider it necessary to remove the CRT, shields, vacuum tubes, etc. to do a thorough cleaning job. Experience has shown that warm water and detergent under pressure penetrates these areas adequately without completely exposing them.

The cabinet sides and bottom are removed and washed separately. They can be put back on the instrument before placing the instrument in the oven for drying, if desired. The 7000-Series plug-ins are washed with the side panels in place. This saves time and prevents a mix-up in panels.

Washing Procedure

After preparation, place the instrument in the wash booth and spray lightly with detergent and warm water. (Do not spray detergent directly on power transformers or paper items.)

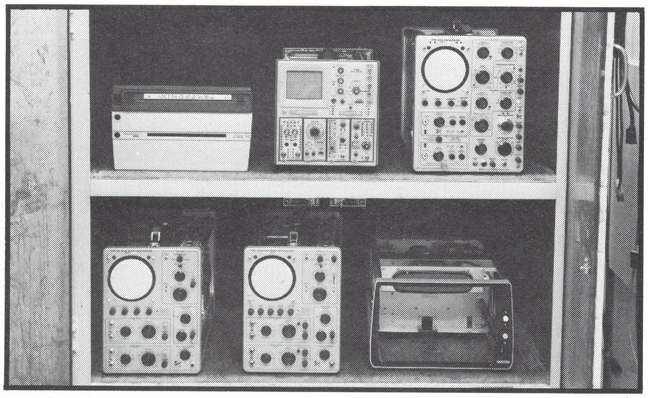
Clean connectors and knobs using appropriate brushes.

Rinse thoroughly with warm water.

Remove excess water from the instrument (especially the front panel) with air.

Place the instrument (with washed plug-ins installed) in the oven and dry for at least 24 hours.

The graticule and light filter are cleaned at the work bench using a glass or plastic cleaner.



After Washing and Drying

It is well to take a few minutes to apply lubricant to the switches, motors, etc., particularly on the older instruments. A lubrication kit designed specifically for this purpose is available under Tektronix Part No. 003-0342-01.

Switches—Lube detents with a light grease and contacts with No-noise.

Motors—Apply 1-2 drops of thin oil. (WD-40 is suitable).

Potentiometers—Apply 1-2 drops of No-noise to the shaft, contacts and open spots around the cover. Use a hypo and needle, or spray can with nozzle. Cover removal is neither necessary nor desirable.

The appearance of the instrument can be enhanced by applying WD-40 or furniture polish to the front panel. The polish should be sprayed on an absorbent towel, not directly on the instrument panel. A small amount sprayed on the one-inch paint brush is handy to get around the knobs.

Summary

You will find that the time spent in properly cleaning an instrument will result in fewer calibration problems, a longer period between calibrations and greater operator satisfaction with both the instrument and the service center.

About our author

Charles Phillips—Chuck has just completed 10 years with TEK. His career at TEK has been devoted entirely to service center activities. After serving six years in field service centers he transferred to Factory Service where he has contributed much to improving servicing techniques and solving new instrument problems. Chuck's "off-work" hours are filled with Laymen for Christ activities, managing his own TV sales and service business, and his family.