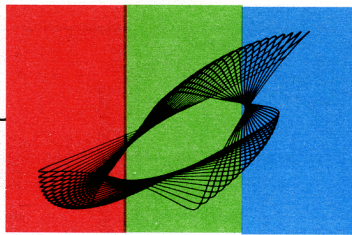


# OPTICAL PERCEPTIONS



technical & commercial  
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## PLUMBICON® APPLICATION BULLETIN NO. 35 THE XQ1410, A LIGHT BIAS PLUMBICON

In application bulletin #34 we discussed the methods by which rise time and decay lag in a color camera could be minimized. The conclusion indicated that the most effective way to accomplish this would be the uniform back layer lighting through balanced light pipes within the envelope of the tube. The XQ1410 family of tubes employs such a system.

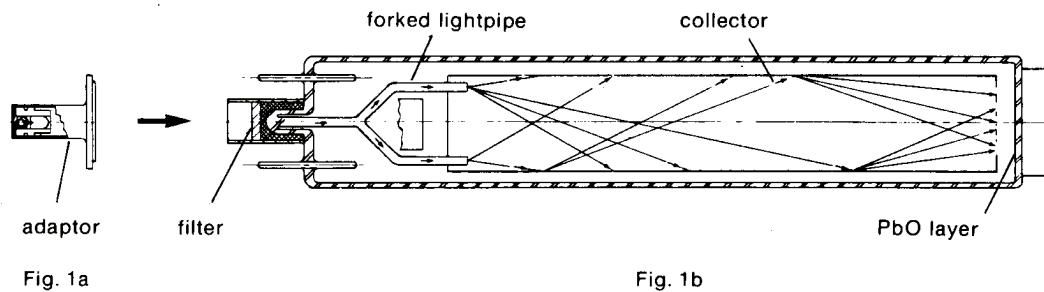


Fig. 1 Light Bias in the XQ1410

### METHOD OF LIGHT BIASING IN THE XQ1410

The XQ1410 family is so constructed as to provide two balanced light pipes traveling up the tube from the base or tipoff to within the G3 collector assembly. When the light bias adaptor (Figure 1a) is placed between the tube and the socket, light then is transmitted through the light pipes into the interior of the collector where it is diffused so as to evenly illuminate the scan side of the target. In the development of internal light biasing, it was determined that two light pipes, rather than one, provide the best overall illumination, thus the optimum uniformity of induced dark current.

### LAG IMPROVEMENTS WITH THE XQ1410

When compared to non-light biased 30mm lead oxide tubes, the XQ1410 shows a 37% improvement in rise time lag and a 50% reduction in decay lag. While the absolute values of performance with respect to rise time and decay lag are very important in color camera operation in preventing color fringing, in the final analysis it is the differential lag (difference in lag characteristics between the red, blue and green in any one camera) between the three tubes which can manifest itself in color fringing in a color picture. In the XQ1410 family it is possible to reduce the differential decay lag to less than 1%. This reduction in differential lag is accomplished by selecting the optimum induced dark current (red 4nA, blue 8nA, green 3nA) for each tube. The optimum dark current for all tubes is set in testing prior to shipment to you for use in your camera. Therefore, any replacement XQ1410 with light bias will have lag characteristics similar to the tube it is replacing. Figure 2a and 2b show the improvements of rise and decay lag of the XQ1410 over the non-light biased 30mm lead oxide tubes.

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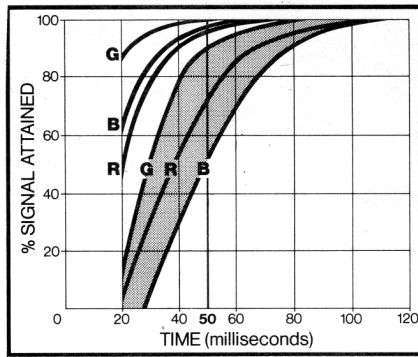


Fig. 2a

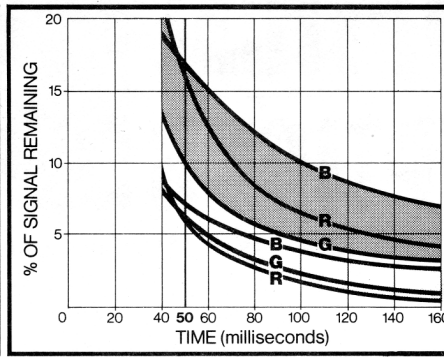


Fig. 2b

shaded curves: non-light biased tubes  
 unshaded curves: XQ1410 series

## INSTALLATION OF THE XQ1410 IN YOUR CAMERA

### ADAPTORS

The light bias adaptor has been designed for use with the XQ1410's in order to eliminate the need for modification to the camera wiring or the power supply. The adaptor is simply fitted over the pins of the tube before putting on the socket. (Figure 3). It is so designed as to connect the bias lamp and its series resistor directly to the heater pins of the tube. The adaptor draws an additional 95mA per tube from the filament supply. Most cameras will not require any modification to accommodate this added load. Note that each adaptor is color coded to indicate the color of tube with which it is intended to operate.

Example:

<u>TUBE</u>	<u>ADAPTOR</u>
XQ1410G	Green
XQ1410B	Blue
XQ1413/15R	Red
XQ1410L	Green

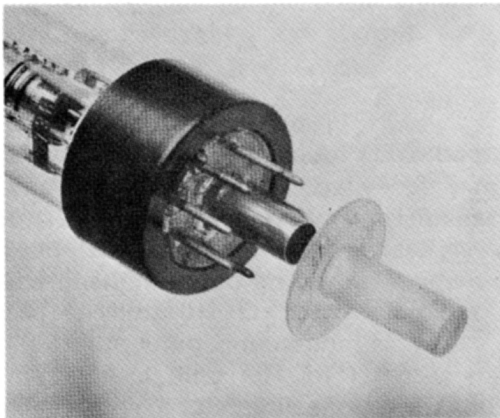


Fig. 3a

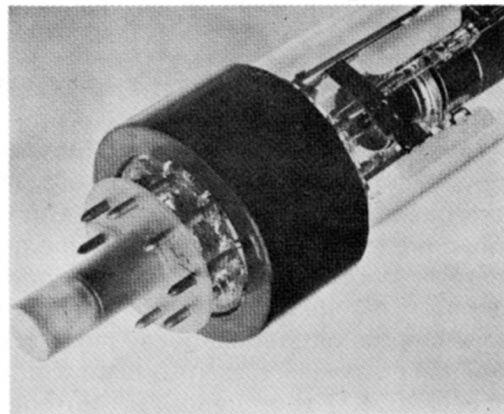


Fig. 3b

## TUBE COMPLEMENTS

Examples of tube complements are:

<u>PC70</u>	<u>TK44/45/46 *</u>	<u>HK312</u>	<u>TK47</u>
XQ1410B	XQ1410B	XQ1410B	XQ1410B
XQ1410G	XQ1410G	XQ1410G	XQ1410G
XQ1415R	XQ1413R	XQ1415R	XQ1415R

*\*The set-up procedure for the RCA TK45 and TK46 will require slight modification in order to obtain the most efficient use of the XQ1410 (See Bulletin #33).*

The XQ1413 and XQ1415 are similar to the XQ1023 and XQ1025, respectively, in that they both have extended red response. The XQ1415, like the XQ1025, has an IR filter as an integral part of the tube. It is intended for use in cameras that do not employ an IR blocking filter as part of its optics.

## ADJUSTMENTS

Most cameras that incorporate prism bias light have some method of compensating for the increase in black level (dark current) plus any non-uniformity in shading caused by the prism bias light. The controls which set the amount of correction will have to be readjusted. This is necessary because the XQ1410 with internal bias light normally produces less dark current and has a much more uniform dark current shading characteristic than prism bias lighting.

If you have any questions concerning the use of Amperex XQ1410 series tubes in your camera please direct them to the Amperex Regional Sales Engineers listed below:

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