

NASA TECH BRIEF



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Technique Increases Storage Capacity in Camera Tube Target

An investigation has been made in the development of techniques for increasing the signal current, where direct beam readout is used, in secondary electron conduction (SEC) camera tubes. Increasing the storage capacity and therefore the dynamic range of the SEC target permits satisfactory operation at reduced frame rates.

A large signal-to-noise ratio is required at the output of any camera tube to permit the presentation of high resolution images of pleasing quality. In SEC camera tubes, where direct beam readout is used, high signal-to-noise ratios are obtained when the signal current is large compared to the equivalent rms noise current of the preamplifier. The maximum signal current available from an SEC camera tube with a 1-inch diameter target results in a signal-to-noise ratio that is adequate for many applications. However, the signal current that can be generated with an SEC target of a given storage capacity per unit area is proportional to the frame rate and the raster area. Thus, in tubes with a small target operated at low frame rates, it is difficult to obtain a satisfactory maximum signal-to-noise ratio and hence an adequate dynamic range (the ratio of the weakest and the strongest illumination that can be presented in the same image without changing the operating parameters of the tube).

During the initial development of the SEC camera tube, 1-inch diameter targets were used to provide standard resolution performance (600 TV lines/picture height) at 30 frames/second, but recently there has been a growing interest in a wider range of operating conditions. Attention has been focused on (a) increased resolution with the 1-inch targets at 30 frames/second and (b) the development of camera tubes with 0.625-inch diameter targets operating at

extremely low rates. Both these trends require increased signal current in order to maintain or increase the signal-to-noise ratio.

A report has been written to describe how far the desired increase in signal current has been achieved by using an SEC target with a large storage capacity per unit area.

Notes:

1. The storage capacity and therefore the dynamic range of the SEC target has been considerably improved. With the high capacity target, an SEC camera tube could be operated at frame rates as low as 0.625 frames/second, as far as known, for the first time. The small signal gain seems to be approximately as good as the gain of the low capacity target. A disadvantage of the high capacity target, however, is its limited storage time which restricts the high capacity target to applications using the continuous scanning operation only.
2. Inquiries concerning the above-mentioned report may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B68-10213

Patent status:

No patent action is contemplated by NASA.

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