

# MULTISPECTRAL IMAGE DISSECTOR CAMERA FLIGHT TEST

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Two years ago I gave a report on the image dissector camera (IDC) operation and lab testing. Now I would like to extend that report to discuss results of a flight test program aboard a high altitude aircraft. But first I would like to briefly review the IDC operation.

Figure 1 shows how the IDC operates. Three earth scenes, each 185 kilometers by 60.96 meters are imaged through a single lens onto a photocathode surface containing three spectral filterstrips, thereby producing three separate spectral signatures on the photocathode surface. An electron image is formed, accelerated, focused, and electromagnetically deflected across an image plane which contains three sampling apertures, behind which are located three electron multipliers for signal pick-off.

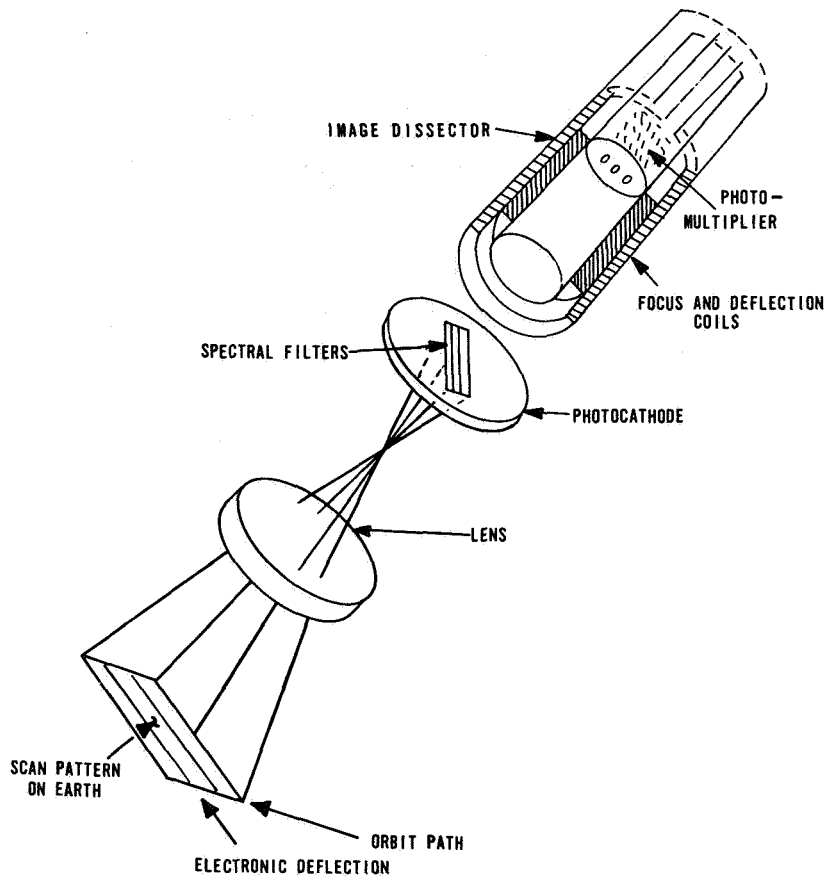


Figure 1. Schematic diagram of the IDC system.

In the two years since the first report, two significant tests have been performed. A transparency from Apollo 9's SO65 experiment was obtained and reproduced through the IDC with such good results that it was decided to extend testing to actual earth scenes. At this time Rome Air Development Center became interested in the cameras and a mutually agreeable program was worked out. They supplied the aircraft and recording instruments, NASA supplied the camera and film processing.

Figure 2 is a composite picture taken from 9.2 kilometers over Annapolis, Maryland. Like all experiments, the results were extremely good in some areas and somewhat discouraging in others.

On the plus side, we note in the fairly uniform radiance areas over water that there are no microphonics. This is not surprising since there are no mechanical moving parts to generate them. In the same area we note also that there is no striping. This too is not surprising as there is just one channel per band.

We observe overall high resolution. At this altitude and lens system we were expecting 1.2 meter ground resolution. This does not allow us to identify cars but does allow us to see trucks and buses, and we have been able to single them out in several of the photos. We observe overall good registration. This is a direct result of the single lens and camera concept.

You might wonder how we handled roll motions of the aircraft. Did we use a stable platform? No, the electronic deflection feature allows us to use a gyro error signal injected into the camera itself to correct for aircraft motion. We estimate that a reduction of 40 milliradians to less than 150 microradians, a single resolution element, was accomplished using this technique.

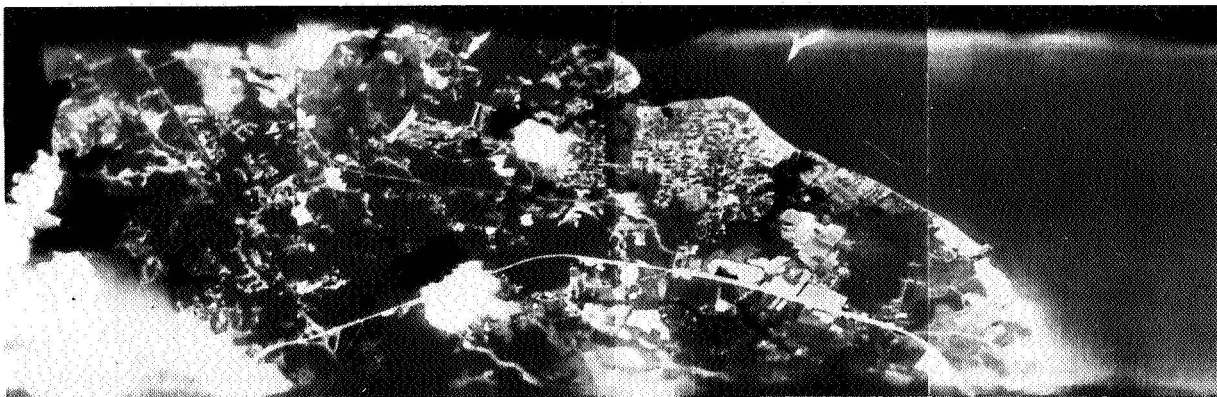


Figure 2. IDC image of Annapolis, Maryland. Original in color.

On the negative side we note a poor signal-to-noise ratio. This is attributed to an off-the-shelf lens, degraded photocathode, tape recorder noise, and the fact that the IDC is a non-integrating sensor.

In conclusion, we have demonstrated that it is possible to build a simple, lightweight, and potentially low cost system that can furnish high quality, registered multispectral images. As such, the MSIDCS should be seriously considered for future applications where such characteristics are important.