

I. INTRODUCTION

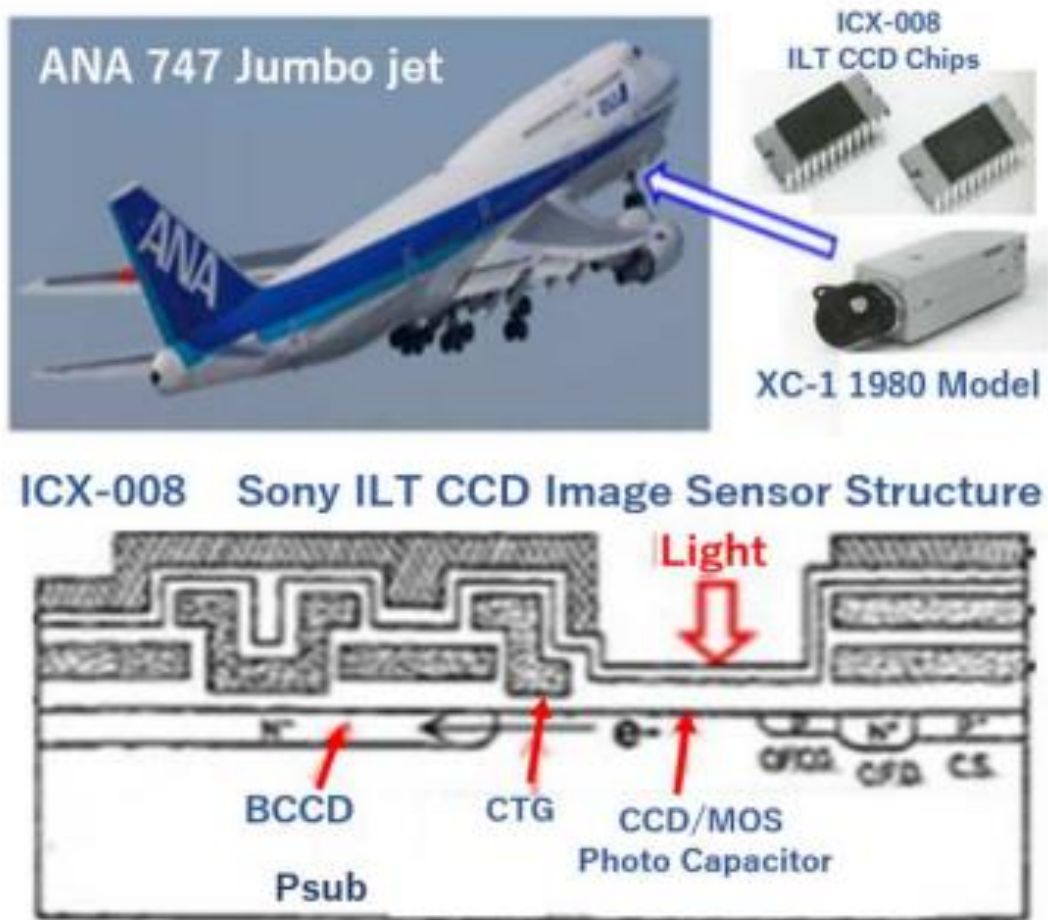


Fig. 2 SONY Two-chip CCD Color Camera XC-1 used in 747 Jumbo, with fast-action movie-pictures of landing and lifting-off with no image lag problem.

However, presently the high definition digital CMOS image sensors have replaced the CCD image sensors completely. The reason was very clear. The CCD/MOS type dynamic photo capacitors are formed with the metal-like polysilicon electrodes which do not let the short-wave blue light pass thru. Historically, Sony once used in early 1980s the thin polysilicon electrode for the CCD/MOS dynamic photo capacitors with the CCD type charge transfer device (CTD) [1]. See Fig. 2. Sony in 1980 commercialized the all-CCD type video cameras with the completely free-image-lag feature for fast-action and snapshot digital still pictures. However, the surface electric field under the CCD/MOS electrode induced the serious surface dark current and generated many white defects, causing serious chip-yield problems. Hagiwara proposed in 1975 a triple junction type Photodiode with the vertical overflow drain (VOD). See Fig. 3.

- [1] Y. Kanoh, T. Ando, H. Matsumoto, Y. Hagiwara and T. Hashimoto, "Interline Transfer CCD Image Sensor", Technical Journal of Television Society, ED 481, pp. 47-52, Jan 24, 1980.