

Cardiac Imaging System

Balloon angioplasty (see page 74) is a non-surgical procedure for clearing fatty deposits in the coronary arteries that block blood flow and cause heart attacks. The procedure involves insertion of a balloon-tipped catheter, a thin hollow tube, directly into the clogged artery; the cardiologist guides the catheter by viewing fluoroscopic images of the heart area and catheter on a monitor. When the catheter penetrates the blocked segment, he inflates the tiny balloon; that pushes aside the fatty plaque and clears the artery.

Although not available to all patients with narrowed arteries, balloon angioplasty has expanded dramatically since its introduction in 1977—from 12,000 procedures in 1982 to 195,000 in 1987, with an estimated further growth to 562,000 in the U.S. alone by 1992. This growth has fueled demand for higher quality imaging systems that allow the cardiologist to be more accurate and increase the chances of a successful procedure.

A major advance is the Digital Cardiac Imaging (DCI) System (far right top) designed by Philips Medical Systems International, Best, The Netherlands and marketed in the U.S. by Philips Medical Systems North America Company, Shelton, Connecticut. The Philips DCI incorporates image processing technology originally developed for NASA Earth resources survey satellites; it is, the company says, the most widely used digital cardiac imaging system with more than 300 units in operation worldwide, more than 100 in the U.S.

The Philips DCI offers major advantages over earlier angioplasty monitoring techniques. The key benefit is significantly improved real-time imaging and the ability to employ image enhancement techniques to bring out added detail.

The Philips system gives the cardiologist direct control of "roadmapping," in which freeze-frame images of a section of a blood vessel can be used to guide the progress of the balloon-tipped catheter. Using a cordless control unit like a remote TV channel selector (right center),

the cardiologist can manipulate images to make immediate assessment, compare live x-ray and roadmap images by placing them side-by-side on monitor screens, or compare pre-procedure and post-procedure conditions. The photo at lower right illustrates the system's capability for providing simultaneous viewing of the heart from two different planes.

The bottom line is that the Philips DCI improves the cardiologist's precision by expanding the information available to him and enhances his ability to get into the heart and out as quickly as possible, minimizing trauma and maximizing chances of a successful procedure.

The image processing technology incorporated in the Philips DCI originated some 15 years ago at International Imaging Systems (I²S), Milpitas, California. I²S was a pioneer developer of optical, analog and digital image processing equipment for NASA's Earth resources survey satellites, exemplified by the Landsat satellite family.

In the early 1980s, I²S found emerging interest among the medical industry in such applications as ultrasound, computer aided tomography (CT) and magnetic resonance imaging (MRI) body scanners. I²S entered into contracts with several medical equipment firms to supply their R&D laboratories with image processing hardware and software identical to that used in Earth resources remote sensing. Subsequently, I²S broadened its market and developed application-specific products for those companies. In 1984, I²S developed the M6705 high performance processor for Philips Medical. I²S engineers worked with Dr. Jos Bakker of Philips Medical Systems International in refining the technology for the Philips DCI application.

In addition to its work on medical applications, I²S produces a line of workstations which, used in conjunction with System 600 application software, can address a wide variety of remote sensing applications. At far right is the company's low cost image processing workstation with an IVAS 1K display processor and mouse for menu selection and image manipulation.

