

Programmable Pacemaker

Pacesetter Systems, Inc., Sylmar, California, manufacturer of heart pacemakers, introduced in 1979 an advanced cardiac pacing system which allows a physician to reprogram a patient's implanted pacer without surgery. Called Programalith[®], the system has two-way communications capability, an important innovation in heart-assist devices. It incorporates a number of technologies based on those employed by NASA to send coded instructions or queries to unmanned satellites and to receive information from satellites.

The Programalith system, shown below, consists

[®] Programalith is a registered trademark of Pacesetter Systems, Inc.



of the implantable pacemaker together with a physician's console containing the programmer and a data printer. Below, the physician is communicating with the patient's pacemaker by means of wireless telemetry signals transmitted through the communicating head held over the patient's chest.

Where earlier pacemakers deliver a fixed type of stimulus once implanted, the Programalith system enables surgery-free "fine-tuning" of the device to best suit the patient's needs, which may change over time with changes in physical condition. The system permits the physician to re-set as many as six different parameters—heart stimulating functions—of the pacemaker. He can, for example, send a message instructing the pacemaker to alter the heartbeat rate; he will get a return signal confirming that the rate has been changed as instructed. When reprogramming is completed, the system prints out a copy of the new settings for the patient's record.

As an aid to determining the effectiveness of the pacemaker itself, the two-way communications capability allows the physician to interrogate the device as to the status of its interaction with the heart. The pacemaker can be asked, for example, for information on the electrical resistance of the wires connected to the heart; the response tells the physician how effectively the heart is being paced and also warns of possible wire breaks or short circuits. Similarly, the physician can elicit information as to how much life remains in the pacemaker's lithium battery. One other safeguard is use of space technology known as pulse code modulation, which assures dependability because the pacemaker will accept only properly coded instructions and will not respond to false signals generated by electrical noise or other interference.

