# TEKTRONIX CLIMATE CONTROL

BY LOGAN BELLEVILLE

The air conditioning system at Tektronix is designed to provide maximum year-round comfort to the employees. (In answer to the small voice I hear in the back row, I know--we have been cold several mornings. We are sorry and every effort will be made to reduce the number of times this may happen.) Now, may I go on with my story.

The heating and air conditioning problem at Tektronix is one of the most complicated yet encountered in this area according to our heating and air conditioning engineer, Dick Blankenship, of the engineering firm of W. Bruce Morrison. Mr. Blankenship also provides the information that Tektronix is one of the three large buildings in Portland which is completely air conditioned. The other two are the Oregonian Building and the Equitable Building. Also, that Tektronix is the only completely air conditioned factory in Oregon. The complication of our air conditioning system is due to the varied activity of the various departments of Tektronix. At one extreme we have the offices on the east side of the building, which, in cold weather, require considerable heating. On the other extreme is the Test and Calibration Department, which is in the center of the building with no outside walls to lose heat and with a large amount of heat produced within the room by the many instruments in operation. As a result, even in cold weather the Test Department requires cooling rather than heating.

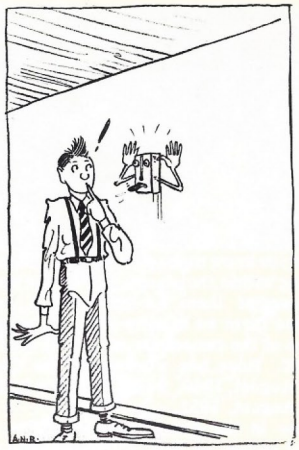
In an effort to satisfy these varied conditions, the building is divided into nine zones and the flow of heated or cooled air to each zone is controlled by a thermostat in that zone. Shipping and the General Office is one zone, the Front Office and Drafting another, the several Engineering Rooms comprise a zone as does Personnel, Conference Room and Howard Volum's office. Test is another zone and Assembly and Shop account for two zones each so that the two ends of such large rooms can be individually controlled.

Fresh air is taken in through an opening in the roof and mixed with the return air from the various zones. This mixed air is then passed through the Westinghouse Precipitron (an electrostatic air filter which removes nearly all of the dust particles, pollen, and even the very minute particles which constitute smoke). The cleaned mixed air then goes into the mixed-air chamber and at this point receives a push from two large fans each driven by a ten horsepower motor. Beyond the fans is another mixed-air chamber where the air divides, one part passing through heating coils and the other part passing through cooling coils. Beyond the heating coils is the hot chamber and beyond the cooling coils is a cold chamber. There are openings from each of these chambers into air ducts leading to each of the nine zones. Dampers in each opening permit the proper proportion of warm and cool air to be sent to each zone to suit its need as determined by the zone thermostat.

In order to make working positions near the windows as comfortable as those in the center of the rooms, there are pipes embedded in the cement floor through which warm water is circulated to provide the additional heat needed near the windows.

A furnace which burns heavy oil is located in the small building in the parking lot and generates the steam which is transmitted through pipes running underground to the heating coils in the equipment room. The oil furnace is also the source of heat for our hot water system.

Cooling is provided by means of two large refrigeration pumps rated at 25 horsepower each. These are large editions of the sealed units used in modern home refrigerators. The heat which they pump from the cooling coils is carried by hot freon gas to condensing coils on the roof. These condensing coils have a spray of water and a large fan blowing air on them. Due to the resulting cooling, the hot



freon gas condenses to freon liquid and is then returned to the cooling coils in the cold chamber. At the input to the cooling coils, the liquid freon is released through a reduction valve and at the reduced pressure again becomes a gas at low temperature. The vacuum side of the pump draws freon gas through the cooling coils where it picks up heat and is again compressed to repeat the cycle.

Control of the above operations is accomplished by means of electronic equipment manufactured by the Minneapolis Honeywell Company. This equipment includes sensing elements which check the outside temperature, the inside temperature, the hot and cold chamber temperatures, the mixed air temperatures, and the temperature of the circulating water in the floor. The information from these sensing elements is sent to electronic control units which in turn control the steam valves, the air dampers, and the refrigeration pumps. The colder the outside temperature, the warmer the hot air chamber and the water in the floor heating panel must be. When warm weather comes the cold chamber will run colder as the outside temperature rises. The proportion of fresh outside air is also controlled to meet the changing needs. In very cold weather or very hot weather a minimum of fresh air, about 25%, is taken in. In only slightly cool weather the proportion of outside air is increased to reduce the cooling load. All of these functions are controlled by electronic control equipment and the aid of a small boy, who hopes that with a little more practice and instruction the electronic equipment will require less and less aid.