

which themselves are a giant extension of factory production lines all across the continent.

First comes CTC, Centralized Traffic Control. Modern railroad operations almost always include Centralized Traffic Control. This is a control system which provides for the remote operation of signals and switches from consoles located at a central point, directing the movement of trains over great distances. Conditions of signals, positions of switches and location of trains are all indicated on a miniature track model on the upper portion of the control panel. Routing of trains is accomplished by pushing buttons to operate remotely switches and signals along the line. It is impossible to route two trains into a collision with this system. At present there are more than 30,000 miles of railroad tracks in the United States and Canada over which traffic is directed from similar control machines. Additional mileage is being added at the rate of about 2000 miles each year. And the state of the art of centralized control is such now that our latest control machines are being designed to push their own buttons.

These principles of centralized control have also been applied in many large industrial plants. Typical of these is Jones & Laughlin's Second Avenue plant in Pittsburgh where an interlocking of about 22 switches and signals are controlled remotely from one small control panel. Location of trains, positions of switches and aspects of wayside signals are automatically displayed on a model track layout to keep the operator informed of operating conditions and movement of trains. A similar installation of approximately the same size can also be found at the Jones & Laughlin Plant at Aliquippa.

The variety of materials I mentioned earlier begin to gather at a freight classification yard and where the cars assembled there arrive from all parts of the country. At Conway Yard on the Pennsylvania Railroad, 22 miles west of Pittsburgh, there are two separate yards, one for eastward traffic and the other for westward freight, with a total of 107 classification tracks ranging in length to more than a mile. This is a complex an automatic operation for handling freight as you will find anywhere. From a centrally located tower in the yard, and by

means of a modern control console, an operator literally sorts the freight cars arriving in lengthy trains so that they can be reassembled into new trains to continue their trip to consignee.

Automation is the heart of the Conway operation. The most modern techniques of automatic control for classifying freight cars have been incorporated here. Electronic computers, radar, automatic switching, coded circuits, inductive trainphone, cab signals, electronic weighing scales and portable two-way radios are all a part of this huge freight handling facility.

We have installed similar, but much smaller, classification facilities in large industrial plants. In the coal industry, for example, movement of railroad cars by gravity is a basic method of operation. Train loads of coal or ore are delivered to a facility at an inbound storage yard. Cars are unloaded and lading processed. They are then conditioned and sorted as to capacity. Bad order and surplus cars are diverted. Subsequently, cars are reloaded, weighed if necessary, and classified for delivery. Outbound cars are "spotted" in an outbound storage yard. We have supplied car retarders for almost two dozen such installations to control the movement of the cars in their progress through the facility. The use of car retarders in the coal industry has been going on for the last 30 years.

One of the most recent installations using radar automatic speed controlled retarders is at the Norfolk & Western's \$25 million modern coal handling facility at Pier 6, Lambert's Point, Norfolk, Va. This relatively new facility was put into service in September, 1963. In 1964, over 38 million tons of coal were dumped in the Hampton Roads area. Of this amount, approximately 26 million tons were handled over the N&W piers at Lambert's Point. This is why the N&W decided to invest 25 million dollars in Pier 6 and its supporting facilities.

Pier 6 is now designed to load vessels at a normal rate of 16,000 tons an hour. It is a dual facility; that is, every piece of apparatus is duplicated so that Lambert's Point can load two ships simultaneously.

At this modern facility, Union Switch & Signal's automatic speed control retarders are used at scale areas, in advance of and inside thawing sheds, at Barney pits, and at