SHUTTLE TRAIN AUTOMATION

Times Square
Grand Central

NEW YORK CITY TRANSIT AUTHORITY
370 JAY STREET, BROOKLYN 1, NEW YORK

CHARLES L. PATTERSON
Chairman

JOSEPH F. PERICONI
Member

JOSEPH E. O'GRADY
Member
AUTOMATION EQUIPMENT on the train receives and interprets rail-borne commands, and operates the train automatically.

COILS, suspended just above the rails, receive a continuous stream of electronic commands from the track. These commands are relayed to the automation equipment to control the train.

AUTOMATIC TRAIN DISPATCHER at the wayside reads orders from a continuous, punched tape, about 23 feet long, and programs train operation for a 24-hour period.

THIS TEST TRAIN made over 1500 runs, proving the feasibility of automation.
The automatic shuttle train is more evidence of your Transit Authority's keen interest in modern transportation techniques. Not only is this a "first", but—and more important—it is another step forward. After all, we have been gradually automating trains for more than 50 years. At one time brakes were set on each car by hand—now the motorman simply moves a handle to brake all the cars. Once, too, each door was swung shut with an arm, now all the doors are opened or closed by pushing a button. We are simply applying today's knowledge to today's railroading, in our continuing efforts to bring our patrons the best in service.
The New York City Transit Authority is very proud to announce that, with ‘Automation’ riding in the motorman’s compartment to control its operation, the Grand Central—Times Square shuttle train, one of New York City’s busiest routes, is now being placed in regular service on Track 4.

In October of 1960, the Transit Authority publicly demonstrated the practicability of operating a fully automated, crewless, three-car subway train on a section of the Sea Beach line which is similar in profile and distance to the Grand Central—Times Square shuttle track. After more than 1500 test runs, this type of operation has proved itself entirely safe and practical.

The operation was demonstrated to the Interstate Commerce Commission and others.

For the subway patron, there is no appreciable difference between this and the ordinary shuttle train operation. Anyone boarding this automatic train will ride just as safely, just as comfortably—perhaps even a little faster. Actually, unless you know the train is automated you can detect no difference.

A combination of electrical and electronic apparatus automatically provides all the commands, checks, safeguards and controls for smooth and efficient movement of this train from one end of the shuttle line to the other—and back again.

One of the key pieces of apparatus used in this operation is an electronic train dispatcher. This is a 35-millimeter, punched film, tape programmer which provides an automatic program for a 24-hour period with the provision that the program can be varied to take care of irregular schedule days, such as Saturdays, Sundays and holidays.

This automatic dispatcher reads the train dispatching order punched on the tape and transmits the order, via a wayside instrument case, to the running rails of the train in the form of electrical impulses.

There is no physical connection between the automatic controls on the train and those on the wayside. Instead, receiver coils mounted on the truck of each lead car, just above the rails, pick up signal impulses carried in the rails and deliver these impulses to amplifying equipment in the unoccupied cab. There it is fed to electrical and electronic circuits which interpret the commands. The doors close and the train starts. The train picks up speed and accelerates smoothly to 30 miles per hour. As the train nears the end of its run, it passes a predetermined point, where the frequency of the impulses fed to the amplifier changes, causing the brakes to be gently applied. When train speed reduces to approximately five miles per hour, the train passes into a section of track fed with impulses of still another frequency.

This commands the electronic brain to slowly and gently apply full brake pressure bringing the train smoothly and accurately to a full stop. Regardless of load variations, platform stops are made within a tolerance of a few inches.

The automatic equipment makes a silent but certain check that all is safe and then opens doors, changes headlights to tail lights, tail lights to headlights, and the destination sign rolls to display the opposite terminal. After a desired period of time, pre-programmed on the tape of the automatic train dispatcher, doors close and the train begins its return trip—all automatically.

Each end car is equipped with automation control gear, only one set being in control of the train at a time, depending on direction of travel.

An electronic axle-driven speed governor holds train speed within prescribed limits. Information from the rail-carried electrical impulses, from the speed sensing governor and from brake checking devices is delivered to the electrical and electronic control equipment on the train. Here the information is interpreted and the car propulsion, braking and door opening circuits are ordered to respond when and as required. The electrical impulses fed into the running rails are automatically selected and controlled by apparatus in a steel cabinet on the platform at each station.

“All of the equipment is of the ‘fail-safe’ type,” Mr. Patterson assures. “That is, in case anything abnormal develops while the train is moving, such as excessive speed, a compensating device will return the speed to normal. If at any time the train fails to receive a continuous stream of electrical command impulses through the rails, the motors immediately shut off and the train automatically stops.”

A tape recording is used to alert the passengers that car doors are about to close, and a visual sign, with the same message, flashes on.

A ‘catch-up’ device will maintain a rigid schedule. For example, if a passenger holds a car door open beyond set time limits, the ‘catch-up’ device will correspondingly decrease the length of time the train remains at the opposite terminal in order to return it to schedule. Numerous electric ‘scanning’ devices make a complete safety check before the train is allowed to start.

The automation system used for this automatic train operation installation is a joint development of Union Switch & Signal Division of Westinghouse Air Brake Company, with headquarters at Swisvale, Pa., and of the General Railway Signal Company, located at Rochester, N.Y. The automatic control equipment on the Grand Central end of the train was supplied by the General Railway Signal Company while that on the Times Square end was supplied by Union Switch & Signal. Both systems are compatible. The installation on the Times Square end was performed by Watson-Flagg Engineering Company and the Grand Central end by L. K. Comstock Company, Inc.