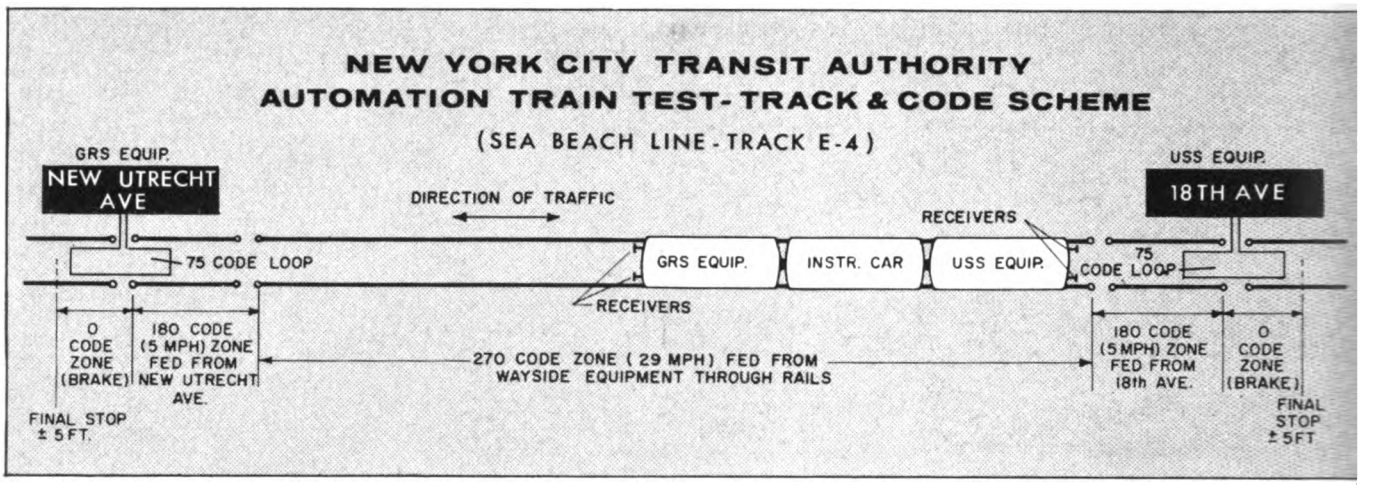


AUTOMATION

Subway Train Is Automatic

An automated train was demonstrated to transit officers last month by the New York City Transit Authority. The three-car train was designed as a rolling laboratory for automatic subway train operations. It has been operating for several months on BMT track in Brooklyn. Specifications, based on this train operation, are being prepared for the design and manufacture of equipment for automatic train operation on one track of the Grand Central Terminal-Times Square shuttle. Chairman Charles L. Patterson of the NYCTA says he expects the automatic subway train to be in operation in 5½ to 6 months.

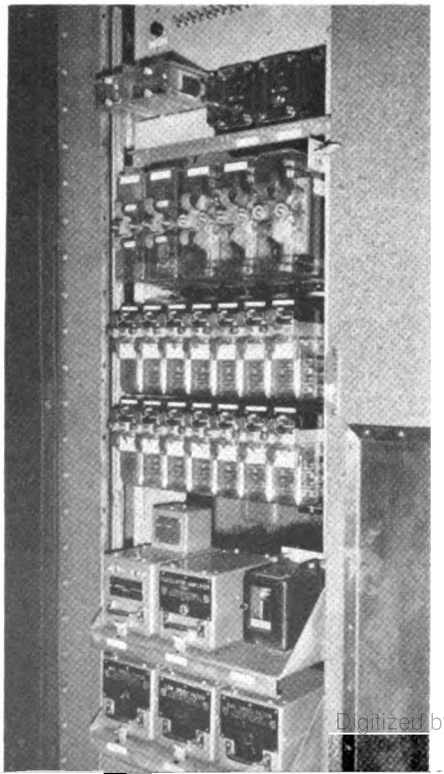
● The New York City Transit Authority's three-car automatic subway train has external automatic control with pre-programming equipment at the wayside location.

Brooklyn patrons of the Authority's Sea Beach line have seen the train in operation on 2,700 ft of BMT track between the New Utrecht Avenue and 18th Avenue stations. It is a forerunner of an automated subway train expected to be operating on track 4 of the Grand Central Terminal-Times Square shuttle line.

Train operation is completely automatic. The train is controlled by 100-cycle alternating current superimposed on the rails at varying code rates Here's how a typical train run oper ates (see diagram) between New Utrecht and 18th Avenue stations.

Programming for the train's move ment—when it is to depart from either station—is set by an automatic dis patching unit which has a time clock and a 35-mm film with holes in it. A light source is directed toward the film. A photoelectric cell responds to the light when it passes through one of the holes in the film. With the train at 18th Avenue station 270 code is applied to the rails by General Railway Signal equipment at New Utrecht Avenue. Receivers on the GRS-equipped lead car of the train pick up the code, which results in actuation of controls to start the train. It accelerates to 29 mph, and maintains this speed.

Application of 75 code to a wire loop with train at station controlled doors to open. Train is at 18th Ave. station. Receivers and control equipment (right) are US&S at this end of the train.



First Deceleration on 180 Code

At a predetermined point in approach to the New Utrecht Avenue station, the train passes an insulated joint onto rails carrying 180 code. Upon receipt of this code, the train is controlled to decelerate to 5 mph until it passes a second insulated joint in approach to the New Utrecht Avenue station. At this point, the train moves into a 0 or no code zone and is brought to a stop by service brake application within ± 5 ft of a specified stopping point. After the train comes to a stop, 75 code is fed into a wire loop laid between the rails. Receivers on the train pick up the code to actuate door controls for unlocking and opening the

doors. The headlights change to tail lights, the tail lights to headlights. The destination sign "Grand Central" becomes lighted, and the "Times Square" sign lighting is extinguished.

Next, the automatic dispatching unit at 18th Avenue station reads a film, initiating controls to remove the 75 code after the doors have been open for one minute. Removal of the code actuates controls for closing the doors and releasing the brakes. Union Switch & Signal equipment at 18th Avenue station then applies 270 code to the rails, which feeds down to the train and is picked up by the receivers on the US&S-equipped car. The train accelerates to 29 mph and returns to 18th Avenue station.

Now that initial tests are over, a reliability test is planned that will consist of continuous automatic operation of the test train for 24 hours daily for several days. Also, engineers must determine locations of code change points (insulated joints) to provide minimum running time between terminals. This will have to be determined for the Grand Central-Times Square shuttle track that will be equipped for automatic operation.

This Train for Automatic Shuttle

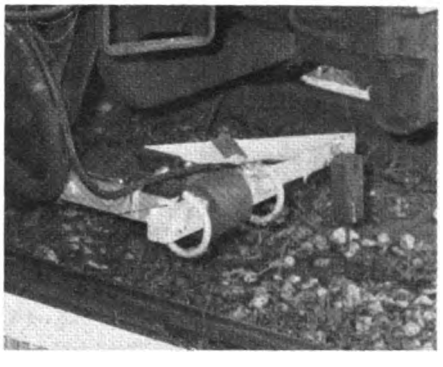
After completion of tests and all controls are working perfectly, this train is the one the NYCTA plans to put into operation on the northerly track of the Grand Central-Times Square shuttle. Before it goes into actual operation, the train will be equipped with a telephone system, keeping it in constant voice contact with dispatchers at Times Square and Grand Central. When in actual service, a tape recording will warn passengers that the doors are about to close; and a visual sign, with the same warning, will flash on.

All of the equipment is of the "fail-safe" type, says Charles L. Patterson, chairman, New York City Transit Authority. In case anything abnormal develops while the train is moving (e.g., excessive speed), a compensating device will get it back to normal; in the unlikely event that the adjusting mechanism doesn't work, the train will cease taking power and stop.

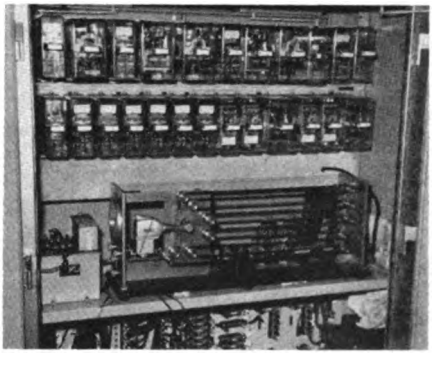
A "catch-up" will maintain a meticulous schedule. That is, if a passenger holds the door for 10 seconds at Grand Central, the "catch-up" device will correspondingly decrease the length of the next stop at Times Square and bring it back to schedule.

Numerous electric "scanning" devices are employed. A broken rail, or some such track condition, will simply detain the automatic train at its terminal. Any abnormal brake condition will do the same.

Control equipment is mounted in the rear motorman's compartment of each leading car. Motorman's control in the forward cabs will be for operation when not on the shuttle.



Receivers (above) and controls (top photo) are GRS. Receiver coils are encapsulated in an epoxy resin.



Automatic train dispatcher at 18th Ave. station includes a clock, photo-electric cell and 35 mm film with holes.

Mr. Patterson said the demonstration run last month for newspaper, magazine and radio and TV reporters had been preceded by 1,500 test runs in which the train gave satisfactory performance.

The equipment was built and installed by the General Railway Signal Co., Union Switch & Signal-Division of Westinghouse Air Brake Co. and the Air Brake Division of WABCo. According to Mr. Patterson, the two companies spent between $250,000 and $300,000 on the project, while NYCTA spent between $20,000 and $30,000.

Both signal companies will re-package the control equipment into a more compact design. This re-packaged equipment will be installed in the automatic train that will be in service on the GCT-TS shuttle.

Michael J. Quill, president, Transport Workers Union, which has contracts covering 3,100 motormen and about 5,000 conductors, said his union would fight the automatic train. NYCTA chairman Patterson says it is planned to have a conductor or an attendant on the Grand Central Terminal-Times Square automatic subway train.