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The

I.C.

Suburban

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CENTRAL ELECTRIC RAILFANS' ASSOCIATION
CHICAGO, ILLINOIS

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CERA Inspection Trip 19
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suburban electrification,
Sunday, May 26, 1940.



THE STORY OF THE

Illinois Central

SUBURBAN ELECTRIC

by *Bernard I. Stone*

INTRODUCTION:

The Chicago Terminal Electrification of the Illinois Central System includes 132 miles of track electrified for suburban service and 25 miles of track for freight. Electric suburban operation covers 29 miles along the main line from Randolph Street in downtown Chicago to Matteson, a 4.7 mile branch from 67th Street to South Chicago, and a 3.9 mile branch from Blue Island Junction near Kensington to Blue Island. All suburban service is operated with multiple unit electric cars on tracks assigned almost exclusively to this service. The freight electrification extends from South Water Street yards (near Randolph Street suburban station) to about 39th Street. Four electric locomotives are used in this territory performing switching and transfer moves.

HISTORICAL DATA:

Suburban service on the Illinois Central began on July 21, 1856, at which time a local train was put on between Chicago and Hyde Park. The line ran on piling from Randolph Street to about 25th Street and then ran along the shore. The city limit of Chicago was at 39th Street. From this time on, the suburban territory slowly but steadily increased. By 1871 service had extended to about 71st Street and in 1875 the first Sunday service was established. The branch to South Chicago was completed in 1883. In 1890, the equipment assigned to suburban service consisted of 21 locomotives and eighty-nine coaches. To handle the crowds to the World's Columbian Exposition in 1893, two additional tracks were constructed and the first express service was started. At the same time, forty-one locomotives and 300 cars were added to the suburban equipment. Between May 1 and October 31, 8,780,000 passengers were handled between Van Buren Street and the exposition grounds. The year 1892 marked the building of the Blue Island branch. Following the Fair, there was a period of marked development in the territory served and by 1900 there were 218 trains operated each week day as compared with 114 in 1890. The service, in 1900, extended to Homewood, South Chicago, and Blue Island. In 1923, electrification of suburban service was completed. The first revenue electric train service was operated on July 21st of that year along with some steam suburban service but by August 29th, the service was operated entirely with electric equipment.



RIGHT-OF-WAY:

The main line of the Illinois Central carries three types of service - through passenger, freight, and electric suburban. In general, separate and distinct tracks, stations, and other facilities are provided and are so located that the operation of one type of service does not interfere with the others. However, north of 31st Street the tracks are not in their final location as considerable changes are contemplated in connection with the building of a new through passenger terminal sometime in the future. The relation of the suburban tracks to the through passenger and freight tracks as well as the number and arrangement of the suburban tracks can be determined from the accompanying map.

The main line right-of-way varies in width from about 200 to 300 feet. North of 43d Street it is below the general street level while south of this point, the line is elevated above street level thereby eliminating all grade crossings with streets or highways along the Main line within the suburban zone.



POWER SUPPLY & OVERHEAD:

The power for train propulsion is supplied through catenary type overhead construction at 1500 volt direct current from seven substations. The substations are owned by two power companies but are located particularly to meet the railroad's requirements.

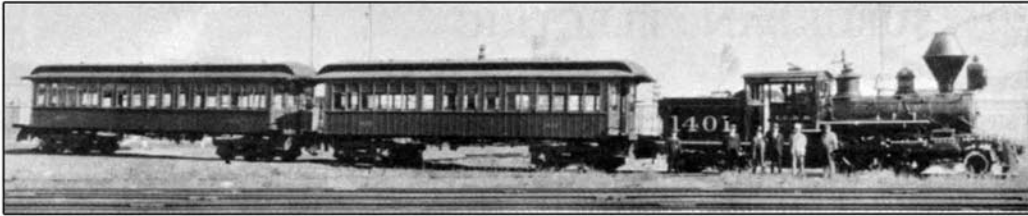
Power is converted from high voltage 60 cycle alternating current to direct current by both synchronous converters and mercury arc rectifiers, most substations being equipped with both. The synchronous converter sets consist of two 1500 kw 750 volt machines permanently connected in series to make up a 3000 kw unit. The mercury arc rectifiers consist of two 750 kw or two 1500 kw 1500 volt bowls operated in parallel.

The layout of the distribution system of the railroad is such that the catenary over each track is separate electrically from that over adjacent tracks and can be sectionalized at the substations and at certain other points. The sectionalizing points not at substations are known as tie stations, and all of the equipment at these points is owned by the railroad. The direct current power breakers at substations and the breakers at the tie stations can be operated by the Power Supervisor at Randolph Street although the substation breakers can also be operated manually by the substation operator. However, in case of severe trouble in a section, the breakers feeding that section will open automatically to isolate that section and will indicate to the Power Supervisor that they have opened.

The catenary system over all main tracks consists of a stranded composite main messenger, a copper auxiliary messenger and two grooved contact wires. In the section north of 67th Street the contact wires are #000 bronze wire while on the remainder of the lines contact wires are #0000 copper wire. The normal height of the contact wire is 22 feet above the top of the rail, although due to local conditions wire height is sometimes as low as 16 feet 6 inches. The catenary system over all tracks has sufficient current carrying capacity to make it unnecessary to provide additional feeders.

On the main line north of Kensington, the catenary is supported on steel bridge structures, while south of Kensington and on the Blue Island and South Chicago branches the catenary is supported on brackets on single steel columns.





FORNEY TYPE LOCOMOTIVE AND OPEN PLATFORM COACHES OPERATED
IN SUBURBAN SERVICE ON THE ILLINOIS CENTRAL RAILROAD
PRIOR TO ELECTRIFICATION

SIGNALING:

Practically all main line trackage in electrified territory is protected by automatic block signals. Three indication color light signals are used, the signal heads usually being mounted on the catenary structures. The signals are lighted by alternating current and in the daytime are burned at double the voltage used at night in order to improve the daytime visibility. Track circuits are operated by 60 cycle alternating current and are two rail circuits using impedance bonds except for some circuits through interlocking plants which are of the single rail type.

There are eight interlocking plants in the territory which are involved either partly or entirely with the operation of the electrified service. The unattended plant at 83d Street on the South Chicago Branch and the West Pullman plant operated by the Pennsylvania Railroad are mechanical plants while all others are modern electric type.

Power for the operation of the signal equipment is supplied over duplicate 2300 volt single phase transmission lines used exclusively for this service.

PASSENGER EQUIPMENT:

The passenger equipment used in Illinois Central Suburban Service consists of 140 motor cars and 140 trailers semi-permanently coupled into two car units. The motor and trailer bodies are alike with the exception that the motor car under frame is designed to carry the control apparatus and the roof to carry two pantographs one over each truck center. Each car is equipped with a control position in one end only with the cars coupled back to back so that the two car unit is double ended. The first 45 trailers were built and put in service before the electrification, but were designed with the intention that they would later be used in electric train service.

The car bodies are of all-metal construction and have completely vestibuled platforms. Each car is equipped with four power-operated sliding doors. All the doors in each two car unit can be controlled from four points. Two trap door steps are provided on the trailer at the end adjacent to the motor car. These steps are for emergency use only as high station platforms are used throughout the suburban zone. The exteriors of the cars are painted Pullman green with gold leaf lettering, while the interiors are a light brown and white. In each car there are 34 rattan-covered cross seats and four longitudinal seats, providing a seating capacity for 84 passengers.



Current is collected from the overhead system by pantographs, of which there are two on each motor car. Under normal conditions, only one pantograph per motor car is used. At one time the practice was to change pantographs at the end of each trip, but at present the south pantograph is used in both directions from about April 1st to October 1st and the north pantograph the remainder of the year. The pantographs are raised by springs, lowered by air, and held down by a latch which may be tripped by air or manually. Selector switches on each motor car determine which pantograph will be used, but all pantographs are raised and lowered together from the operating cab of the train.

(Con't on page 6)

FREIGHT EQUIPMENT:

Certain freight transfer and switching moves are handled by electric locomotives, of which there are four. These were built in January, 1930 by Baldwin Locomotive Company and Westinghouse. These engines weigh 195,250 pounds, all the weight being carried on the drivers. They are equipped with four Westinghouse type 360A motors and Westinghouse type PEP control. The maximum speed is 45 mph. The tractive effort is rated as follows:

- Starting - 50,000 to 70,000 lbs.
- 1 hour - 31,000 lb. at 17.5 mph
- Continuous - 23,500 lb. at 20.0 mph



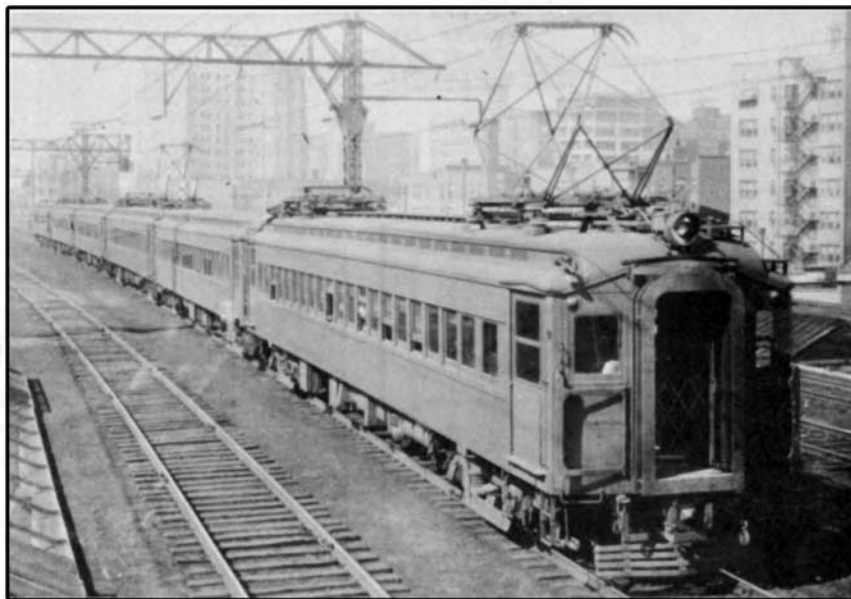
(Con't from page 3)

Each motor car is equipped with four series wound 750 volt motors rated at 250 horsepower each. The two motors on each truck are permanently connected in series for operation on 1500 volts. One half of the motors are General Electric Company GR-285A and half are Westinghouse Type 587-D5.

The motor control equipment is General Electric PC type which provides for multiple-unit control with automatic acceleration. The controller has seven full-field series steps, five full-field parallel steps, and one short-field parallel step. The master controller has five positions, namely: switching, series, series-by-pass, parallel-by-pass, and parallel. The by-pass positions of the controller are used in obtaining

and the other provides a holding feature so that brakes may be released in any number of steps providing a very smooth deceleration. Normal brake pipe pressure is 90 pounds while main reservoir pressure is 100 to 115 pounds. Each motor car is equipped with one compressor controlled by air compressor governors which are synchronized over a control wire so that all compressors start and stop together.

A door indicating signal is mounted in each cab. When all the doors in the train are closed and the reversing handle is in the forward position, a green light is lighted. In case the handle is in the reverse position, a yellow light appears instead of



RANDOLPH STREET EXPRESS TRAIN AT HYDE PARK STATION

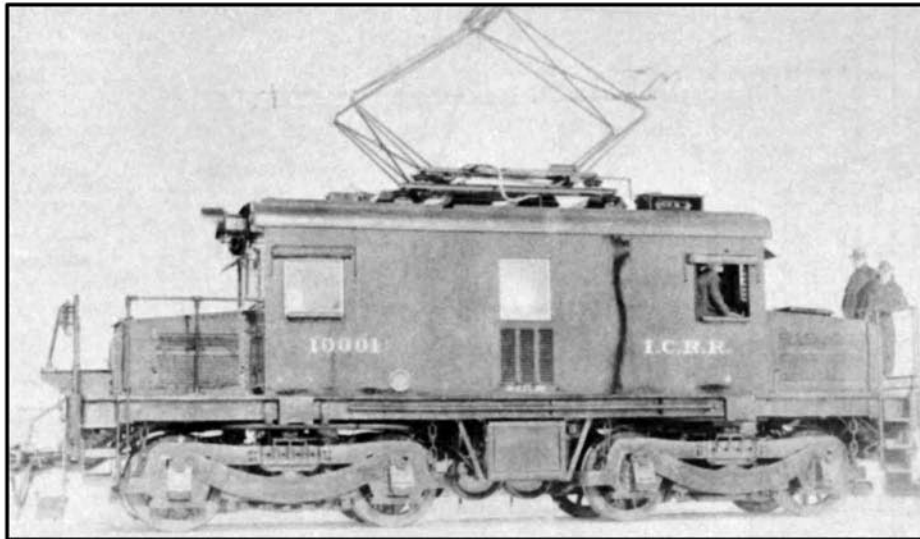
manual acceleration when desired. The master controller is equipped with a "dead man" handle which must be held down at all times except when the reverse handle is in the off position. All control circuits as well as the light and door operating circuits are operated on 32 volts direct current which is furnished by a storage on float across a motor-generator set. The motor-generator set is carried on the motor car while the battery is on the trailer.

The brake equipment is New York Air Brake Company Type PS electro-pneumatic schedule. The pneumatic portion of the control valve is a standard triple valve with separate emergency valve, while the electric portion consists of three magnet valves controlled by a drum switch contained in the engineer's brake valve. One magnet valve controls the service application one the emergency application,

the green. Under ordinary operating conditions the motorman starts his train upon receipt of the green door signal. In addition, an electric signal buzzer is provided which may be operated by a button in each car vestibule.

The cars are heated by electric heaters placed under the seats. The heater elements are connected in series for operation on 1500 volts and are controlled by thermostats on each car. Electric lighting is provided which is operated from the 32 volt battery.

The couplers used are of the Tomlinson automatic type made by the Ohio Brass Company. The



ONE OF FOUR BALDWIN-WESTINGHOUSE ELECTRIC LOCOMOTIVES FOR TRANSFER WORK

control train line is connected through the couplers by brass contacts under spring pressure. On the couplers at the ends of units 28 contacts are used all for 32 volt circuits, while between motor car and trailer 29 contacts are used for 32 volt circuits and one contact for the 1500 volt heater circuit. The couplers are equipped for semi-automatic operation between motor car and trailer of the same unit and for automatic operation between units. The full automatic couplers are operated from either adjacent motorman's cab by push buttons which uncouple the cars mechanically as well as disconnect the control circuits and air lines.

The traffic handled is characterized by a very high rush hour peak. About 40% of passengers carried on a week day are handled in the two hours from 8 to 9 AM and 5 to 6 PM, most of these being handled into the "Loop" in the morning and out in the evening. Occasionally, the Suburban Service has handled considerably over its normal load without undue difficulty. The largest number of passengers ever handled on a single day was on October 3, 1933 when, due to the World's Fair and the American Legion Convention, 212,315 passengers were carried.



TRAIN OPERATION AND TRAFFIC:

At the present time, over 400 trains are operated each week day and handle about 100,000 revenue passengers per day. The number of cars regularly used in each train ranges from two to eight.

Trains are operated to some 6 or 8 destinations and are classified as locals, expresses, and specials, depending on the stops made enroute. In the six track territory between Roosevelt Road and 51st Street, each class of train is regular operated on the track assigned to that class. Trains are operated under the direction of the Chicago Terminal Division Dispatcher located at Randolph Street. When operating with the current of traffic, trains proceed on authority of signal indication, written orders very rarely being used. The single track Blue Island Branch is operated by "Controlled Manual Block" from the Interlocking Plants at West Pullman and Kensington.

The minimum train crew consists of three men - an engineman, a conductor, and a flagman. With a two car train, the conductor and flagman each act as ticket collector for one car while with a four car train, each man handles a two car unit. For trains longer than four cars, a collector is assigned for each additional two car unit.

ILLINOIS CENTRAL RAILROAD - SUBURBAN ELECTRIFICATION

Bulletin 14 of the Central Electric Railfans' Association. Duplicate copies may be secured at 15¢ per copy by addressing the Association at 1240 Edison Building, Chicago, as may additional information about CERA and its publications.

CERA EDITORIAL STAFF FOR BULLETIN 14

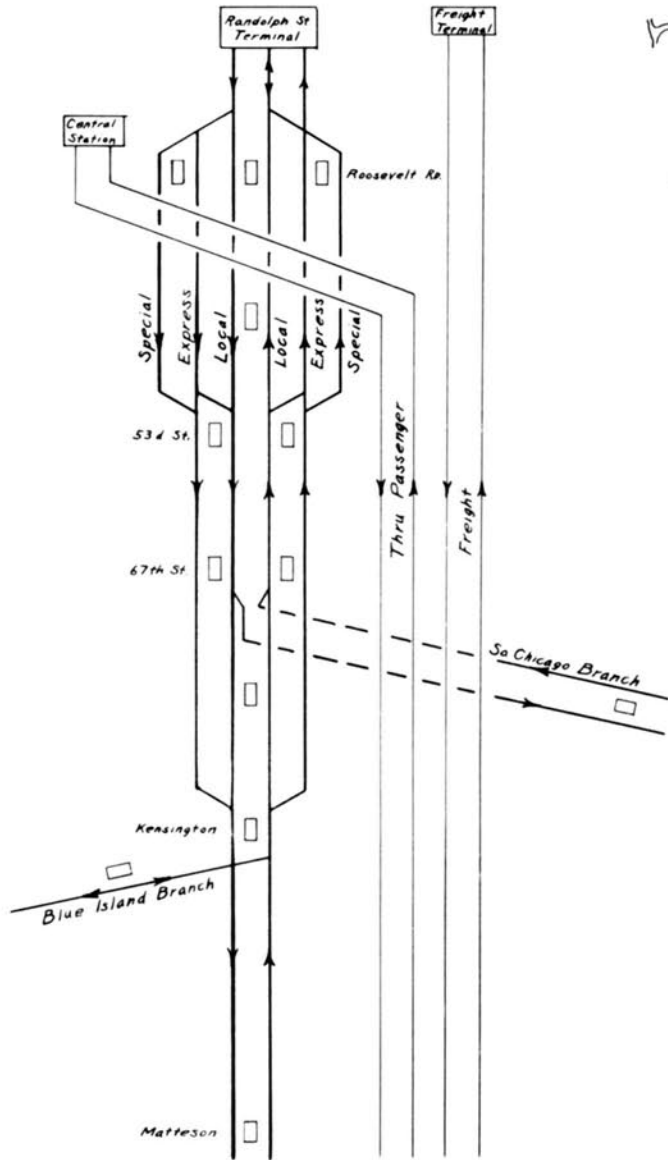
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MAP
OF THE
**ILLINOIS CENTRAL
SUBURBAN ELECTRIFICATION**
AT CHICAGO

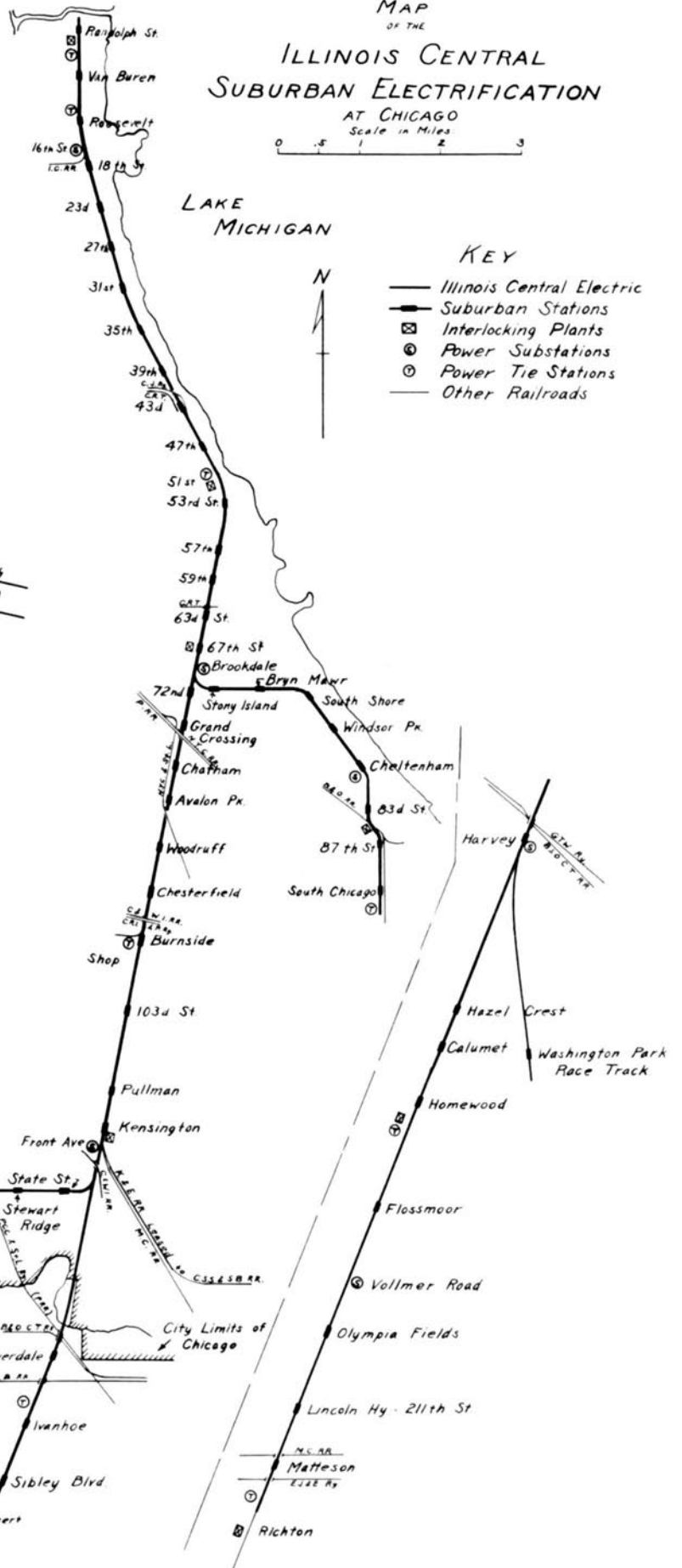
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- KEY**
- Illinois Central Electric
 - Suburban Stations
 - ⊠ Interlocking Plants
 - ⊙ Power Substations
 - ⊕ Power Tie Stations
 - Other Railroads



**SIMPLIFIED DIAGRAM
OF TRACK ARRANGEMENT**

- NOT TO SCALE
- Electrified Suburban Tracks
 - Other I.C. Tracks
 - Typical Suburban Station Platforms



For Continuation, see insert
at the right