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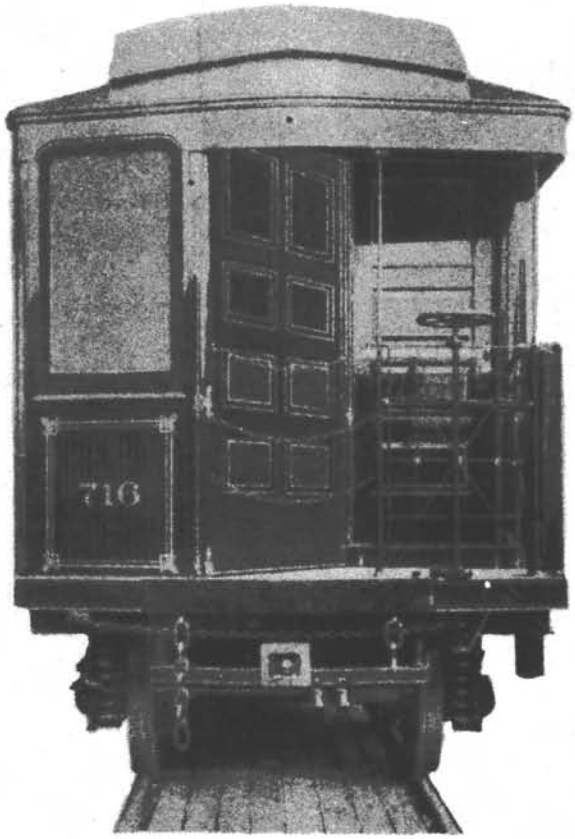
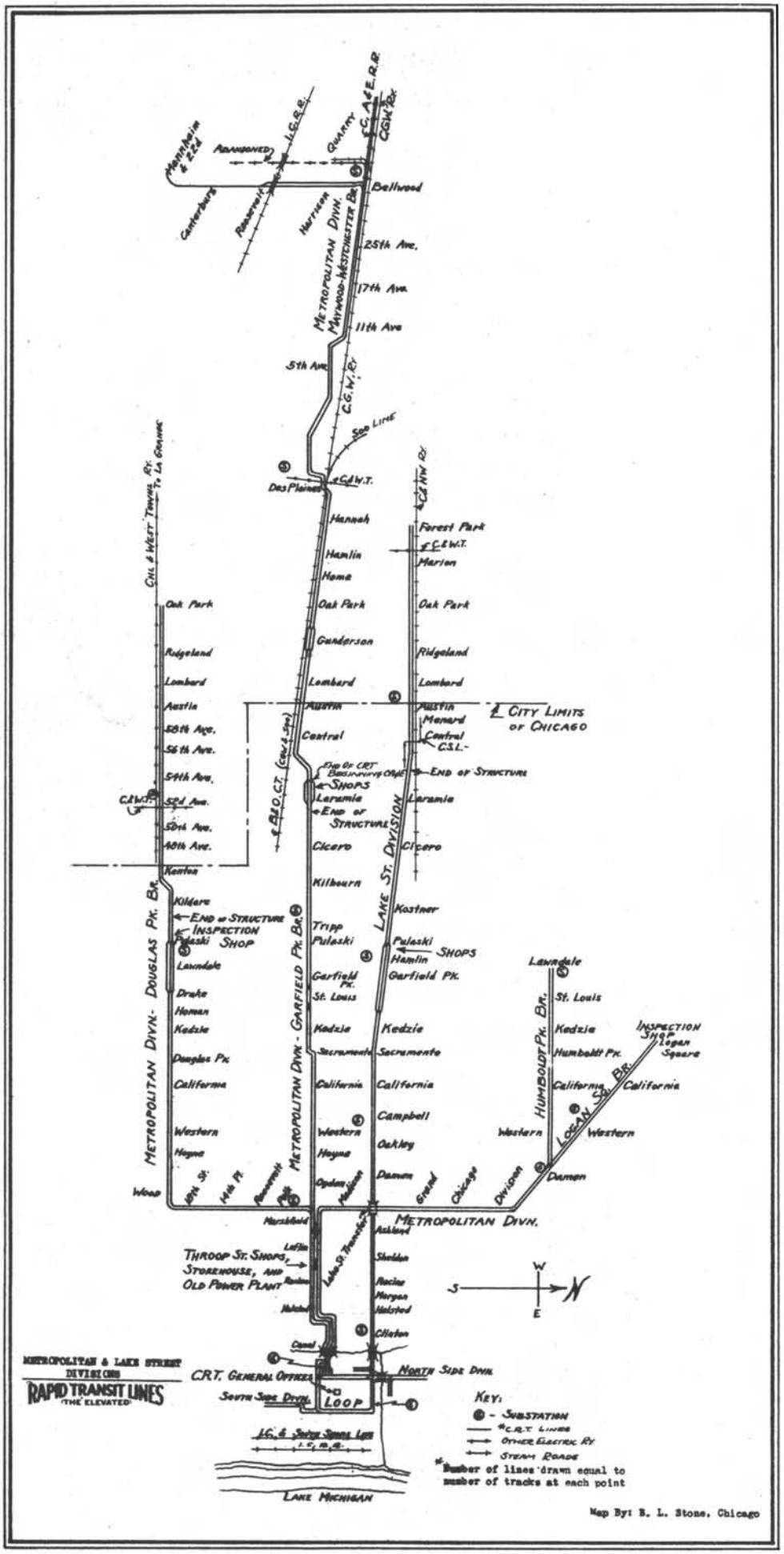
CHICAGO RAPID TRANSIT COMPANY

METROPOLITAN DIVISION





Prepared by CERA and issued on the occasion of CERA Trip Number Six, an inspection of the Garfield Park Maywood-Westchester Branch of the Chicago Rapid Transit Company, held Sunday, February 12th, 1939

Bulletin Number Two of the Central Electric Railfans' Association
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METROPOLITAN DIVISION

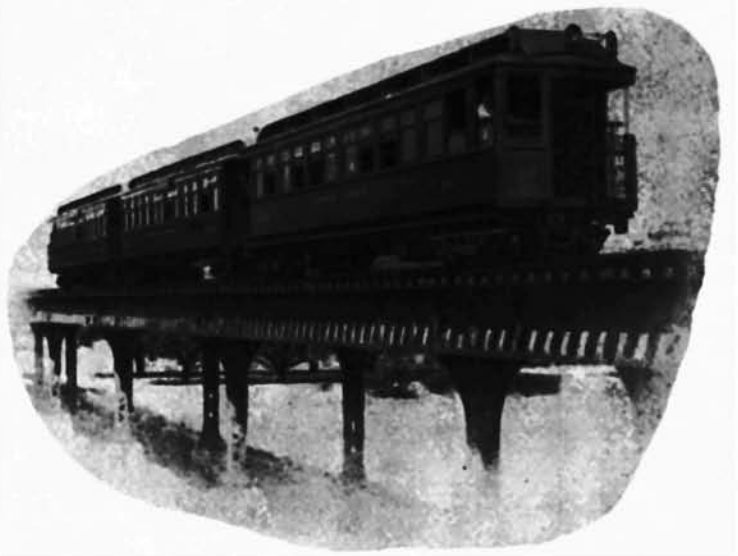
CHICAGO RAPID TRANSIT COMPANY

A Guide to its Equipment and Operation

Edited by B. L. Stone
and George Krambles

INTRODUCTION

The operation of a modern rapid transit railroad is so complex that an interesting and complete discussion of all its phases cannot hope to fit into a few pages of written matter. The Chicago Rapid Transit Company operates nearly 5400 trains a day and the aggregate daily mileage of its 1440 operating cars is equal to 5 times the circumference of the earth at the equator; this is many times the total train service of all the other railroads entering Chicago taken together, so that in the eight pages of this CERA bulletin we touch but lightly on some of the highlights of the operation of one division, the Metropolitan, popularly called the "Met", in the hope that our words will serve as a reminder of what was seen on the inspection trip of February 12th, 1939 to those who attended, and as an outline of the road to others.



HISTORICAL

The Chicago Rapid Transit Company is a specialized part of the local transportation system of Chicago, giving passenger service to the North, West and part of the South sides of the city with electric trains operating on private right-of-way with tracks mostly elevated, but partly surface, and with stations generally spaced ½ to ¾ mile apart. It is operated in divisions: the North Side, Metropolitan, Lake Street and South Side. These divisions were built as independent roads: the Northwestern Elevated Railroad, the Metropolitan-West Side Elevated Railroad, the Lake Street Elevated Railroad (later Chicago & Oak Park Elevated) and the South Side Rapid Transit Company. The Union Elevated Railroad built the "Loop" which connected the other companies and gave them a common entrance into the heart of the business section of Chicago, which derives its name from the railroad. In 1913 the operation of the roads was consolidated to improve service and in 1923 the companies were merged with the present name. Since 1913 trains have operated thru between North and South sides, but there is no other regular interdivisional service. Prior to the consolidation of operation the Lake Street and North Side ran their trains left-handed, while in the loop they used the outer track and ran around it clockwise. The Met and South Side used the inner loop in a counterclockwise direction. The L engineers tackled the gigantic problem of changing to uniform right hand operation in 1913 this change to be made overnight when the plans were completed. At the same time they foresaw that the capacity of the loop should be increased by rerouting the trains so that all would run counterclockwise around the loop, as they do at present, thus virtually four tracking this section of the road.

WAY & STRUCTURES

The Metropolitan L is built almost entirely on private right-of-way and crosses streets by permission from the City secured first by franchise in 1892. Most of the line within the City is laid on elevated structure consisting of a continuous steel girder bridge with wooden decking and 80 lb. or 90 lb. rail at an elevation of 19 ft. to 40 ft. above the streets. The tracks are generally about 20 ft. over the ground but rise to the greater height in a few locations where the L crosses lines of steam railroads which themselves are elevated above street levels.

One of the most interesting structures on the Met is the Chicago River bridge, east of Canal Street, which together with the nearby Van Buren Street city bridge was one of the first rolling lift bridges built. Instead of having a pivotal hinge, this type of bridge rolls back on a rack as it lifts.

At most locations at stations there are two platforms, one for each direction of trains, and these are served by a single waiting room on the ground. Fares are prepayed to agents located in the waiting rooms, except at some locations during off hours, when trainmen collect fares. Altho escalators were once tried at Douglas Park station, they are no longer used an platforms are reached by stairs.

Connection with the Loop is made at Van Buren and Wells Streets, and all Met trains circle the Loop counter-clockwise from this point. There is a stub terminal at Jackson & Wells Streets and this is used as the terminus of the Chicago Aurora & Elgin Railroad interurban trains and by rush hour trains, known as **Wells Street** trains, of the L.

The four tracks between Franklin and Marshfield junctions are used to allow express trains to pass locals. These tracks are numbered 1 to 4 from north to south. Track 1 is used by westbound expresses (and C A & E trains), track 2 by westbound locals, track 3 by eastbound expresses (and C A & E trains) and track 4 by eastbound locals. At the east end of Marshfield station these tracks are regrouped and tracks 1 and 2 are then used by Logan Square-Humboldt Park trains, while 3 and 4 are used by Garfield Park and Douglas Park trains. At the west end of Marshfield station there is another junction at which Douglas Park trains branch away. At Damen Avenue on the Northwest branch the Logan Square and Humboldt Park branches separate. All double track lines are normally operated right-handed.

Heavy material, including rail and other maintenance of way supplies, is received and stored at Kenton Yard, located at 46th Avenue on the Douglas Park branch. The main shop and storehouse is located at Racine Avenue station on the Main Line, and inspection shops are at Laramie Avenue, Garfield Park branch; Lawndale, Douglas Park branch; and Logan Square terminal on that branch. Car storage yards are located at each inspection shop and in addition at 56th Avenue, Douglas Park branch. There is a loop at Desplaines Avenue, Garfield Park branch but the other branches are stub ended.

TRAIN OPERATION

The Met consists of 3 branches, the Garfield Park, extending almost due west near the north-south center of the city to Laramie Avenue 6.39 miles from the loop; the Douglas Park branching away at Marshfield Avenue, 2 miles from the Loop and running south about 2 miles, then west over the city limits and thru Cicero and Berwyn to Oak Park Avenue, 9.82 miles from the Loop; and the Northwest, or Humboldt-Logan branch, turning north at Marshfield for 2 miles to Damen and North Avenues where it solits due west to Humboldt Park 6.63 miles from the Loop, and north-west to Logan Square, 6.39 miles from the Loop. At Lake Street the Northwest branch crosses over the Lake Street division, and altho passengers may transfer between divisions there are no direct track connections. It is of interest as a three level electric railway crossing, with the Chicago Surface lines running on Lake Street with the Lake Street L directly overhead and both crossed at right angles by the Northwest L.

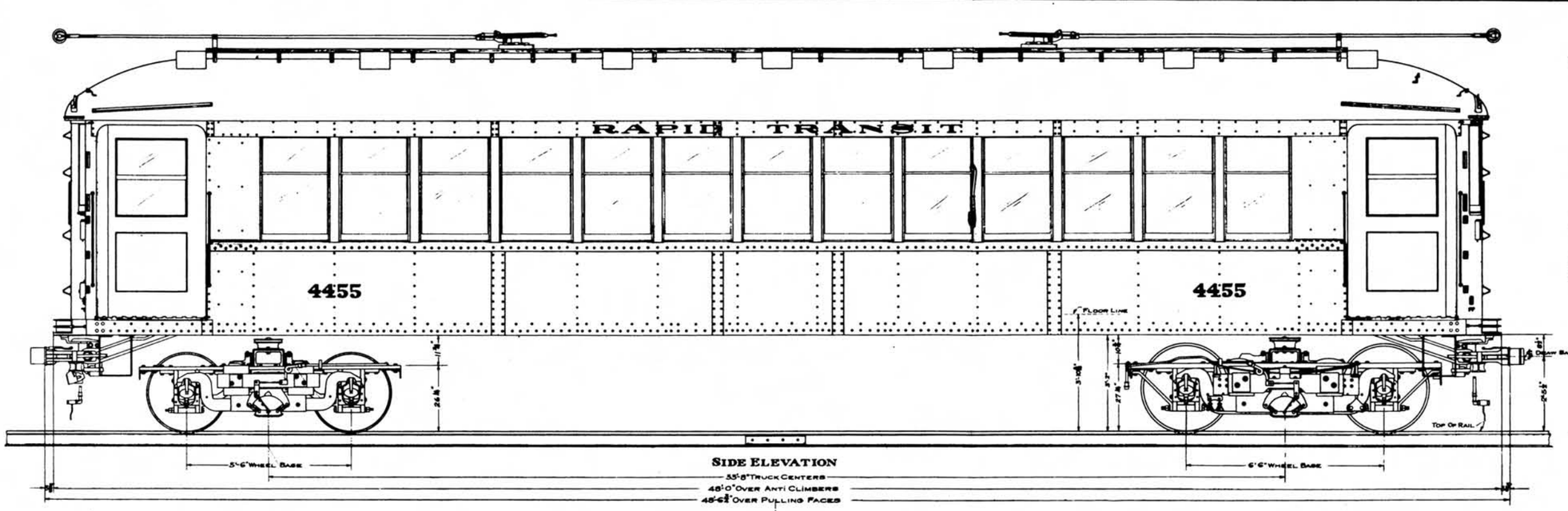
From Laramie Avenue west on the Garfield Park branch L trains run over the tracks of the Chicago Aurora & Elgin Railroad, which like the North Shore Line, reaches downtown Chicago over the facilities of the L. The territory west of Laramie Avenue is very much a part of Metropolitan Chicago and to serve it L trains run as far west as Bellwood, thru Forest Park, Oak Park and Maywood. At Bellwood a branch line continues to Roosevelt Road, terminal for certain L trains, and on to 22nd and Mannheim, far west end of the L Lines. During those periods of the day when trains make Roosevelt Road their terminal a shuttle service is maintained between there and 22nd and Mannheim Road. Both of these stations are located in the real estate development of Westchester, and the branch from Bellwood was built as the Chicago Westchester & Western Railroad, part of a service planned for the future to serve this area.

All parts of the Met division are double tracked except that from Franklin to Marshfield the so-called Met Main Line is four tracked. As may be seen on the frontispiece map there is also a short stretch of triple track and another of single track. Within the city local service is provided on all branches of the Met at intervals of 6 to 12 minutes thru the day and evening and owl service thru the late hours at intervals up to 30 minutes. On the Garfield Park Branch local service is supplemented with express during certain hours of the day. The stations skipped by expresses vary with the time and direction of train. During week-day p.m. rush hours the following trains operate on this branch:

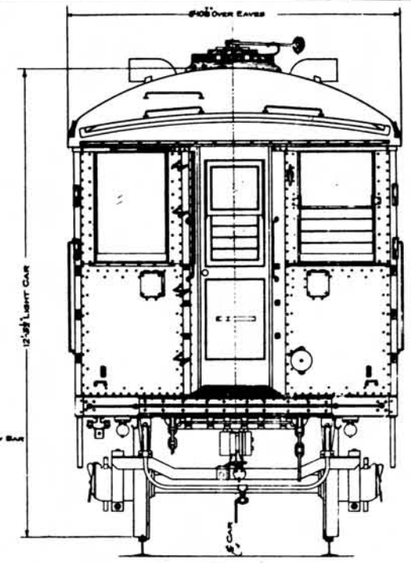
Head End Class. Lamps Right Side	Left Side	Stops Made, after Canal St., Westbound
RED	RED	All stops to Desplaines
WHITE	WHITE	All stops to Desplaines except Laflin
(none)	(none)	Laramie, Desplaines and all stops to Westchester.

The running times and average speeds of trains also depend on the time of day but the averages run thus:

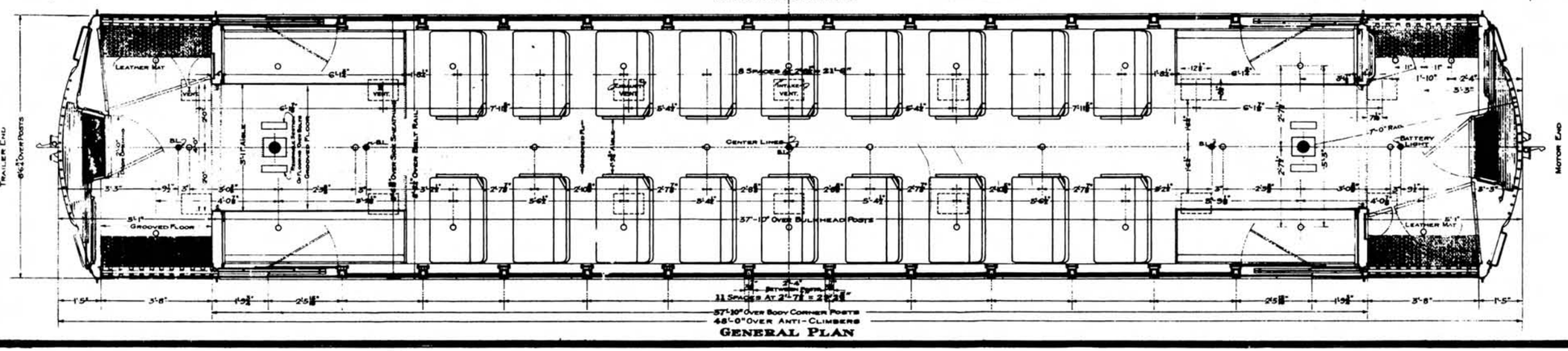
Line	Miles	Minutes	Average Speed, m.p.h.
Logan Square local	6.38	22½	17.0
Humboldt Park local	6.63	24½	16.2
Douglas Park local	9.82	40	14.75
Garfield Park local to Laramie	6.39	25½	15.0
" " " Desplaines	9.62	37½	15.4
Westchester Express	15.17	49	18.59



SIDE ELEVATION



END ELEVATION



GENERAL PLAN

CHICAGO RAPID TRANSIT COMPANY
1924 TYPE PASSENGER CARS
Series 4356 to 4455 Incl.
(Same as 1922 series of cars numbered 4251 to 4355 incl.)
Drawing courtesy of C. R. T. Co. CERA Bulletin No. 2

IMPORTANT DATES IN THE HISTORY OF THE METROPOLITAN DIVISION

May 6, 1895	Began operation Franklin to Marshfield
" " "	" " to Damen, Northwest branch
May 25, 1895	Extended to Logan Square terminal
Jun 17, 1895	" " Cicero, Garfield Park branch
Jul 29, 1895	" " Humboldt Park terminal
Apr 28, 1896	" " 18th St., Douglas Park branch
Sep 2, 1896	" " Western Av., " " "
Oct 11, 1897	" " Loop and abandoned Franklin Term.
Mar 10, 1902	" " Lawndale, Douglas Park branch
Jun 16, 1902	" " Crawford, " " "
Aug 17, 1902	" " Laramie, Garfield Park branch
Oct 3, 1904	" " Wells Street Terminal
Mar 11, 1905	" " Desplaines Avenue
May 22, 1907	" " Kenton Avenue, Douglas Pk. branch
Dec 12, 1907	" " 48th Avenue, Douglas Park branch
Aug 16, 1910	" " 52nd " " " "
Aug 1, 1912	" " 56th " " " "
Aug 1, 1915	" " 62nd " " " "
Mar 16, 1924	" " Oak Park " " "
Oct 1, 1926	" " Roosevelt Rd., Westchester branch
Dec 1, 1930	" " 22nd St. & Mannheim, Westchester branch

UNUSUALLY HEAVY TRAFFIC

Upon many occasions the L has been called upon to handle extremely heavy loads because of unusual occurences and special events. Of its high general efficiency in fulfilling these assignments the L is proud. Severe snow storms in 1929, 1932 and most recently in January 1939, paralysed street traffic and crippled other transportation systems, but L trains continued to roll.

The signing of the Armistice and the transporting of World's Fair crowds were other big days on the L, but the most unusual job of all to be done was that necessitated by the Eucharistic Congress in 1926, when almost incredible crowds were handled for several days in succession. The culmination came on June 24th, when 250,000 people rode 40 miles to Mundelein over the L and North Shore Line. Because the latter road was not able to supply enough equipment for this vast mass movement, several hundred cars of the Rapid Transit Lines were borrowed, together with the man-power required to operate and dispatch trains and handle the people. Since the L had its normal weekday rush hour traffic at the same time, some idea of the magnitude of the problem imposed by this extra service may be had. It was finally solved by equipping an entire series of Met cars with temporary trolley poles for a single day's use!

ROSTER OF ROLLING STOCK

CODE OF SYMBOLS:

ACF	American Car & Foundry Company	B	J. G. Brill Company
G	Gilbert Car Company	H&H	Harlan & Hollingsworth Car Company
J	Jewett Car Company	J&S	Jackson & Sharp Car Company
M-C	McGuire-Cummings Car Company	P	Pullman Car Company
StL	St. Louis Car Company	COP	Chicago & Oak Park Elevated Railroad
		C	Cincinnati Car Company

CAR NUMBERS	TYPE OF CAR PLATFORM OPEN-CLOSED	DOORS MANUAL-AIR	MOTOR or TRAILER	CONTROL SINGLE OR DOUBLE END	DATE CAR BUILT	BUILDER	EXCEPTIONS
SOUTH SIDE PASSENGER CARS							
1 - 49	O	M	*M	DE	1892	J&S	*These cars built trailers for steam
50	C	M	*M	DE	1892	J&S	service; all but 30 made motors 1897.
51 - 80	C	M	*M	DE	1892	G	The 30 were retired 1929, remainder
81 - 100	O	M	*M	DE	1892	J&S	retired 1937. #50 made tool car, #1
102 - 150	O	M	*M	DE	1892	G	preserved as relic.
151 - 179	O	M	*M	DE	1892	J&S	
181 - 210	O	M	M	DE	1900	J	185, 188 retired 1927 202 rebuilt 1914 w/ air doors
211 - 230	O	M	M	DE	1902	J	222 retired 1926
231 - 250	O	M	M	DE	1903	J	
251 - 320	O	M	M	DE	1905	J	267 retired; 260 w/ air doors
321 - 400	O	M	M	DE	1905	ACF	328, 376, 386, 394 retired 375 w/ air doors
NOTE: Cars 199, 202, 251, 252, 314, 260, 375 w/ universal valve brake equipment & operated only with other cars of this same group.							
NORTH SIDE PASSENGER CARS							
1001 - 1037	O	M	M	DE	1899	P	1012 retired 1902; 1002 w/ air doors
1038 - 1052	O	M	M	DE	1900	ACF	
1053 - 1059	O	M	M	DE	1901	St L	
1100 - 1199	C	M	T	DE	1899	P	1159, 1164 retired 1936
1200 - 1209	C	M	T	None	1899	P	1200 rebuilt w/ air doors & DE control
1210	C	M	T	DE	1900	ACF	
1211 - 1234	C	M	T	None	1900	ACF	1221 rebuilt w/ air doors & DE control
1235 - 1259	C	M	T	None	1901	St L	1229 and 1240 retired
1260 - 1269	C	A	T	DE	1907	ACF	
1270 - 1279	C	A	T	None	1907	ACF	1278 rebuilt 1927 w/ DE control
1700 - 1734	C	M	M	DE	1903	St L	1716 w/ air doors
1735 - 1768	C	A	M	DE	1906	J	
1769 - 1788	C	A	M	DE	1908	P	
1789 - 1808	C	A	M	DE	1907	ACF	Were built trailers 1280 - 1299
METROPOLITAN DIVISION PASSENGER CARS							
2100 - 2123	C	M	T	DE	1894	P	2103 retired 1916
2125 - 2199	C	M	T	None	1894	P	2-155, 161, 179, 184, 193, 194, 195, 196 retired 1930. 2157 w/ air doors and DE control. 2154 & 2167 DE control
2200 - 2224	C	M	T	None	1895	P	2209, 2212, 2220 Retired 1930 2202 SE control
2225 - 2249	O	M	T	None	1897	P	2227, 2236, 2238 Retired 1930
2250 - 2267	O	M	T	None	1899	H&H	2255 retired 1930 2262 rebuilt w/ air doors & DE control
2268 - 2311	C	M	T	None	1900	P	2-271, 273, 277, 282, 285, 287 ret. 1930 2288 retired 1923 2279 rebuilt 1901 w/ SE control 2281 rebuilt 1912 w/ DE control
2312 - 2340	O	M	T	SE	1901	ACF	
2500 - 2511	O	M	T	SE	1900	ACF	
2512 - 2520	O	M	T	SE	1901	ACF	
2702 - 2755	O	M	M	DE	1895	B&S	2-710, 723, 726, 732, 736, 738, 740, 742, 752 retired 1930 2717 rebuilt to steel car w/ air doors by ACF. 2721, 2750 made into closed vestibule baggage cars for use on CNS&M RR in 1919. Later used in same service on Chicago & Interurban Traction Company.
2756	O	M	T	DE			Built as funeral car, made Medical Car.
2757 - 2763	O	M	M	DE	1898	B&S	2760, 2761 retired 1930
2764 - 2781	O	M	M	DE	1899	B&S	2767, 2774, 2776 retired 1930
2782 - 2789	O	M	M	DE	1901	B&S	2783 retired 1907
2790 - 2857	C	A	M	DE	1904	J	2792 retired 1926. 2813-2857 are ACF
2858 - 2907	C	A	M	DE	1908	P	
2908 - 2927	C	A	M	DE	1907	P	

Roster of Rolling Stock, Continued

LAKE STREET DIVISION							
3001 - 3100	O	M	T	None	1893	G	3005 retired 1915, 3085 retired 1929 3-001, 022, 031, 051, 058, 067, 087, 089, made DE control trailers 1922. 3-012, 014, 028, 033, 039, 056, 063, 071, 072, 074, 075, 084, 085, 091 & 095 used in building motor cars. 3011, 3047 w/ air doors, no control
3101 - 3102	O	M	M	DE	1902	StL	
3103 - 3124	O	M	M	DE	1893	M-C	3119 - St L - 1902
3125 - 3138	O	M	M	DE	1893	G	Made from 3000 class trailers
3139 - 3146	O	M	M	DE	1901	StL	
3147 - 3166	C	A	M	DE	1909	B	
3201	C	A	M	None	1900	P	
3202 - 3215	C	M	T	None	1900	P	3203, 204, 210, 211, 213, 214 made DE control trailers
3216 - 3235	C	M	T	None	1901	StL	3-222, 223, 226, 235 made DE control
3236	C	M	T	DE	1902	COP	Made from the original 3101
3237	C	M	T	DE	1902	COP	Made from the original 3102
3238	C	M	T	DE	1902	COP	Made from the original 3119
STANDARD CARS, FOR ALL ROADS							
4001 - 4066	C	A	T	DE	1914	C	Cars have center doors as well
4067 - 4128	C	A	M	DE	1914	C	as end doors.
4129 - 4250	C	A	M	DE	1915	C	" " "
4251 - 4355	C	A	M	DE	1922	C	
4355 - 4455	C	A	M	DE	1924	C	

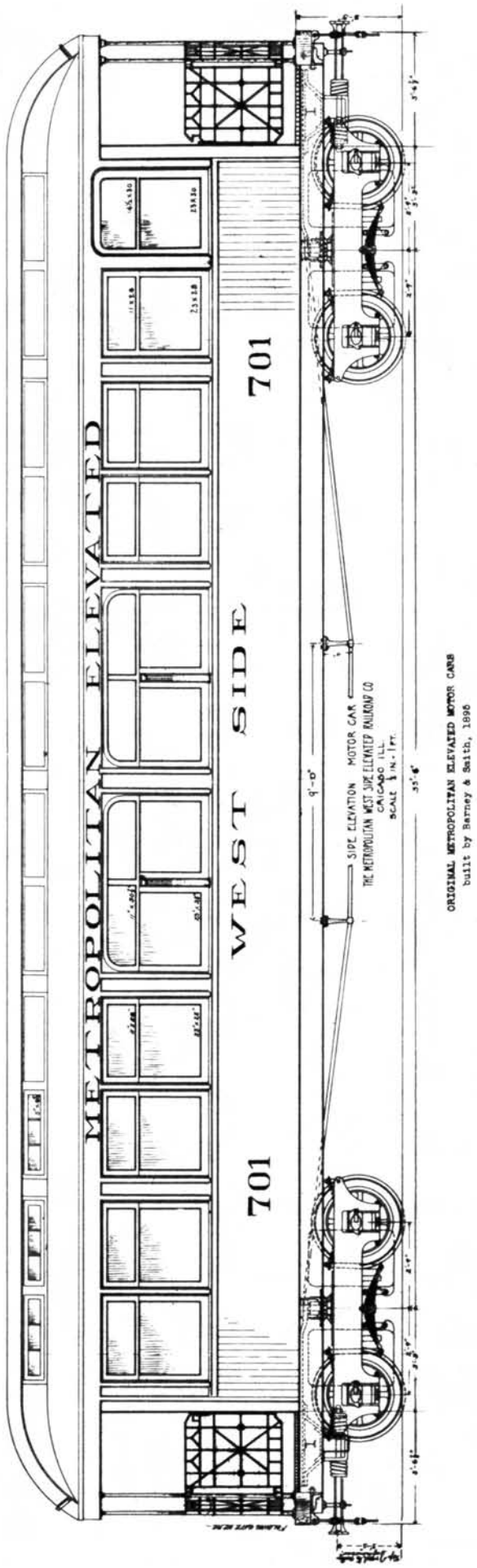
SERVICE EQUIPMENT

South Side				
S - 0, S - 1	Fire car, equipped with extinguishers;	Trail	1907	
S - 2	Tool car, made from passenger car #50	Trail	1939	Original S-2 replaced 1939.
S - 3	Fire Car	Trail	1907	
S - 5	Wheel Car	Motor	1927	Used for wheel & material transfer between divisions (all wheel turning done at Wilson)
S - 6	Flat car with hand operated derrick	Trail	1904	
S - 7	Flat car	Trail	1904	
S -8, S-11	Coal cars	Trail	1906	
North Side				
S - 100	Derrick car	Motor	1912	
S - 101	Fire Car	Trail	1912	
S - 102	Line Car	Motor	1913	
S - 103	Flat car	Trail	1906	
S - 104, S-105	Locomotives, Baldwin-Westinghouse	Motor	1920	Each w/ 4-#567 motors, HLF control
S - 106	Flat car	Trail	1924	Made from car 1012
O - 499	Caboose, 4 wheel	Trail		Purchased from C M & St P R R
S-107, S-108	Flat car	Trail	1938	Were CNS&MRR cars 1502, 1503
Metropolitan				
S - 200	Line Car, used by Lake Street div.	Motor	1916	Made from car 2783
S - 201	Derrick	Motor	1902	Made from car 2761
S-205, 206, 207, 208	Fire prevention cars	Trail	1904	
S-211, 212, 213, 214	Flat or coal cars	Trail	1895	(211 & 212) 1917 (213 & 214)
S - 216	Gasoline Locomotive Crane Gas	Motor	1926	Built by Industrial-Brownhoist Company
S - 217	Flat car	Trail	1926	
S - 218	Show plow	Trail	1930	Made from car 2792
S - 219	Snow plow	Trail	1930	Made from car 2723
S - 220	Snow plow	Trail	1930	Made from car 2710
S - 221	Snow plow	Trail	1930	Made from car S - 203
S - 222	Fire prevention car	Trail	1930	
2721	Tool car, used on Met.	see passenger car list for details		
2750	Tool car, used on North Side	" " " " " "		
2756	Medical car	" " " " " "		
Lake Street				
S - 300	Work car (flat with cab)	Motor	1898	
S - 301	Fire prevention car	Trail	1912	
S - 303	Flat Car	Trail	1893	

Prior to 1913, when the present divisions of the Chicago Rapid Transit Company were operated as independent railroads, the car number series of the various roads conflicted as each road had its own series. For example, both North and West sides had cars in the 700 series, and all four had cars in the 100 series. When the lines were merged the following system was used in renumbering the cars:

SOUTH SIDE	-	Retained original numbers
NORTH SIDE	-	Prefix original numbers with 1; i.e., add 1000
METROPOLITAN	-	" " " " 2 " " 2000
LAKE STREET	-	" " " " 3 " " 3000

Future equipment, regardless of owner, was to be interchangeable and numbered in the 4000 series.
Service car numbering took the same system except that the prefix numbers were in the hundreds instead of thousands.



CAR EQUIPMENT

On the "L" as on most local railway systems, the purchase of new equipment seems to coincide with the general expansion of the system, and on the Metropolitan-West Side Elevated the greatest expansion took place between 1894 and 1910. The original Met cars, built by the now defunct Barney & Smith Car Company at Dayton, Ohio had an unusual arrangement in which the motorman's cab was a permanent affair occupying the righthand part of the platform at each end, the remainder of the platform being open, protected with iron railings and swinging gates. At this time multiple unit control had not yet been developed and Met motors were equipped with type L "coffee-grinder" controllers and trains were made of a single motor car hauling as many trailers as needed. Old timers speak of a single motor car dragging as many as 14 trailers when no hills were to be encountered. The South Side Rapid Transit installed Frank Sprague's multiple-unit control system in 1897 and this made possible the operation of any number of motor cars in the same train, all controlled from any one operator's cab, and the Met soon followed with an installation of George Westinghouse' competing system of control. Sprague used a small pilot motor to drive a drum controller similar to those used in simple platform control, but Westinghouse used a group of switches closed by air pistons controlled by magnet-operated valves. There ensued a long and bitter legal battle as to patent rights, which has no place in a study of the L other than to note that both systems were used in Chicago from their inception.

The early trailers were light in weight and with open platforms, which it was expected would prove very popular with sight-seers, however, on any rapid transit line comfort, safety and speed of operation come first and the builders of the Met soon developed a special type of car to meet its needs, with enclosed vestibules, sliding air operated doors and cab with ingenious arrangement of door to fold and conceal all inoperative cabs and giving all possible floor space. The Met cars of this later type are distinctive in exterior appearance by their monitor-deck roofs, so called for their resemblance to the Civil War "cheese-box on a raft" boat, the Monitor.

After the combined operation of the L lines in Chicago was effected in 1913 the design of an all steel car incorporating the benefits of 20 years of operation was undertaken and the result was the series of 250 1914-15 cars, easily recognized by their center doors, which incidentally were never regularly used. These cars were designed so that they might be interchangeably operated on the various divisions in trains with the other cars of these roads with a minimum of change, altho it was never found necessary to make use of this feature. At present 10 cars of this type are used on the Met and the remainder on the North-South lines.

In 1922 and 1924 205 additional cars were built similar to the former steel cars but with additional improvements, including plush seats, and remote door control, by means of which the doors at both ends of the cars may be operated from either end. These doors have sensitive edges which cause them to reverse should they strike anything while closing, and green signal lights indicate to the guard when all doors in the car are closed. These cars are even more readily interchangeable than the first steel cars, having trolley poles for use on Lake Street, Evanston and Niles Center, and batteries to permit use in trains on the Met, which have battery control. Cars of this type are now on all divisions, together with the other equipment.

Cars of different divisions cannot be readily intercoupled and run in trains because different systems of motor control are used and also the couplers used on the North-South cars differ from the remainder.

The latest type of steel cars weigh 38 tons, are 48'-6" long, 8'-8" wide at platforms, have 2-Westinghouse 567 field tap motors of 170 h.p. each, geared 17:60 and at a normal line voltage (620 v.) balance train resistance in trains of one motor car to one trailer at slightly over 40 m.p.h. An acceleration rate of 1. m.p.h. per second is obtained in such trains. The control is type ABLFM, electropneumatic, meaning that it may be operated from either battery or line, provides automatic acceleration, utilizes field control to obtain high rates of acceleration and top speed and will operate properly in parallel with General Electric type M control, as when various types of cars are in the same train. The control requires 7 train line wires, 2 for direction, 1 for breaker trip, 1 for breaker reset, and 3 for speed control (series, parallel and progression). The air brake equipment is type AMU using U-4 universal valve, M-23 engineers' valve and with automatic slack adjuster to take up brake shoe wear. Car heating is provided by electric heat in 3 degrees, one a light circuit, the second a heavy circuit, and the third a combination of both.

Current is collected by third rail shoes on each side of each truck on motor cars, and trailers receive energy for heating and lighting thru a jumper between cars. In Evanston, Niles Center and on Lake Street overhead trolley wire is used and motor cars used on these branches have a trolley pole at each end, as well as third rail shoes. At no point on the Met is trolley wire used altho some cars have poles for use in such rare cases where a train might run onto a trolley wire branch.

All L motor cars in Chicago have 2 motors, and with the exception of cars 181 - 400, both motors are mounted on one truck. The motor truck usually is a larger truck, with longer wheelbase, than the trailer truck, and the end of the car under which it is mounted is refered to as the **heavy** end.

SIGNALS

(by C. A. Butts)

Trains are operated on the L at closer headways than on any other rapid transit system. On one track of the double track line between Chicago Avenue and the Loop, for example, 72 trains frequently pass within a single hour. Signaling, therefore, plays an important part in the operation of the L.

At many points on the road there may be seen between tracks at regular intervals white diamond shaped targets with a black circular center, called **spacing boards.** The operating rules provide that motormen must not pass a spacing board unless the next board can be seen. Since a preceding train will cut off the view of a spacing board from a right hand cab these boards **space trains** and are in effect block signals. Curves are protected by color light signals of the latest types. The majority of interlocking plants are operated electropneumatically, the signals being two position non-automatic semaphors.

The stop indications of interlocking signals are supplemented in many locations with track trips. These are tee-shaped devices, painted red, which are in the up position when the adjacent signal indicates stop. This trip will cause an emergency application of the brakes of any train which might run over it while in this position. They are thus used to enforce the indications of the accompanying signal at junctions, crossings and other points where train movements conflict.

