METROPOLITAN TRANSIT CTA

CHICAGO TRANSIT AUTHORITY

RAPID TRANSIT CARS

SERIES 2001–2180
THE AIR-CONDITIONED FLEET

"FIRSTS" FOR CTA's 180 "NEW LOOK" CARS

- First urban-type rapid transit cars designed and built as air-conditioned units.
- First welded aluminum rapid transit car bodies in the U. S. with high tensile steel underframes.
- First application of space-age developments, such as static inverters, static converters and silicon diodes to energize and control the functioning of the complex electrical equipment in a modern rapid transit car.
- First production use of reinforced fiberglass in the streamlining of the No. 1 end of each car.
- First back-lighting of car card area for display of continuous rows of color transparencies.

The "New Look," Series 2000, Rapid Transit Cars are the product of years of research and testing by CTA and co-operating manufacturers. The long series of tests of major components, such as trucks, brakes, motors and control equipment, began in 1955 when four prototype high-performance cars were produced for test purposes. In 1960, another four prototypes went into the test program with components modified as indicated by the earlier tests.

The excellent riding qualities and high-performance characteristics of these cars are the result of this extensive test program.

The cars were built by Pullman-Standard Co. at an approximate cost of $112,000 per car. Major suppliers of components were:

Control Equipment & Traction Motors	- General Electric Co.
Trucks	- Rockwell Manufacturing Co.
Door Operators, Heating, Lighting and Air Conditioning Control	- Vapor Corporation
Air Conditioning	- Safety Electrical Equipment Corp.
Couplers	- Ohio Brass
Cineston & Parking Brake Actuators	- Westinghouse Air Brake Co.
Seating	- Flxible Co.
Lighting	- Luminator Inc.
Doors	- Morton Manufacturing Co.

This brochure describes in non-technical terms the various components of the Series 2000 cars. Items are listed in alphabetical order and descriptions are written in outline form for ease in using the brochure as reference.

GENERAL SPECIFICATIONS

A. Car body constructed of steel, stainless steel, aluminum, and plastic
B. Length - 48 ft. 3 inches
C. Width (at widest point) - 9 ft. 4 inches
D. Height (rail to roof) - 12 ft.
E. Weight (empty) - approximately 47,000 pounds
F. Seating capacity
   1. Odd numbered car (Conductor's position in this car) - 47
   2. Even numbered car (no Conductor's position) - 51
G. Speed ranges

Cineston Position	Rate of Acceleration	Approx. Top Speed
1st Power	Very low (switching)	20 MPH
2nd Power	1.5 MPHPS	20 MPH
3rd Power	3.2 MPHPS	45 MPH
4th Power	3.2 MPHPS	58 MPH*

*Motors currently governed for this speed.

H. All electric operation
   1. 600 volt power operates
      a. Traction motors
      b. Converter and inverter
      c. Car heaters
      d. Car body lights (through inverter)
      e. Air conditioning system
      f. Blower fans for ventilating system
      g. End destination sign lights (through inverter)
   2. 40 volt power operates
      a. Buzzer signal system
      b. Door motors
      c. Emergency car lights
      d. End and side destination sign motors
      e. Headlights
      f. Horn
      g. Indicating lights and alarms as follows
         (1) In the motor cab
            (a) Circuit breaker buzzer
            (b) Door signal light - green
            (c) Parking brake light - yellow
         (2) Outside the car
            (a) Circuit breaker light - blue
            (b) Door signal lights - red
            (c) Parking brake lights - yellow
      h. Marker lights (classification)
      i. Public address system
      j. Rail sanding devices
      k. Relays and contactors for the following circuits
         (1) Acceleration control
         (2) Braking control
         (3) Destination sign control
         (4) Heating and air conditioning control
         (5) Lighting control
      l. Run number sign
      m. Tail lights
      n. Track Brake
      o. Windshield wiper
I. Trains consist of one or more units
   a. An odd numbered car and an even numbered car permanently joined at their number two ends constitute a unit
   b. Cars of a unit are coupled and uncoupled only by Shops or Emergency Service personnel

ITEMS ON AND IN CARS (LISTED ALPHABETICALLY)

ACTUATOR MANUAL RELEASE RODS

1. Provide for manual release of parking brakes in event electrical release fails
2. Two rods located at each truck
3. Operated by pushing or pulling by hand or with actuator/sleet scraper stick

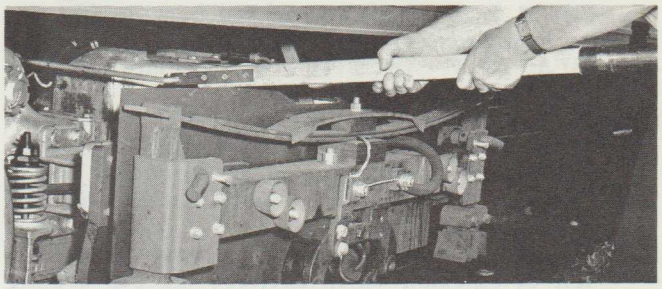

FIGURE 1 PULLING ACTUATOR MANUAL RELEASE ROD WITH ACTUATOR/SLEET SCRAPER STICK

ACTUATOR/SLEET SCRAPER STICK

1. Purposes
   a. To manually operate actuators of defective parking brakes
   b. To lower or raise sleet-scraping devices
2. Located in Motorman's cab on hook to right of cineston
3. Use
   a. To operate actuators
      (1) When actuator is on near side of car, place actuator stick at top of vertical actuator manual release rod and push
      (2) When actuator is on far side of car, engage "L" shaped extension of actuator manual release rod through the hole in the metal plate on the end of the actuator stick and pull
   b. To lower or raise sleet scraping devices
      (1) When sleet scraper is to be lowered, place tube end of stick on cam arm and raise stick
      (2) When sleet scraper is to be raised, place tube end of stick on cam arm and lower stick

AIR CONDITIONING SYSTEM

1. Consists of compressor, condenser, receiver, evaporator unit, cab cooling fan and associated controls
2. Location
   a. Compressor, condenser and receiver located beneath each car
   b. Evaporator unit suspended from ceiling at center of car
   c. Cab cooling fan located in rear bulkhead of cab, below seat level
3. Description of evaporator unit (See Figure 16)
   a. Contains two five-ton cooling units each discharging air in an opposite direction
   b. Contains four blower fans mounted on two motors (fans also operate for heating and normal ventilation)
   c. Air distribution accomplished through louvers set in each end of unit
   d. Return air drawn through grille set in bottom and side panels of unit and mixed with fresh air

4. Operation of system
   a. Cooling system circuitry operated by "P" type switches located in Motorman's switch cabinet. Switches provide train line control of all cars
      (1) "Air Conditioning On" switch activates system
      (2) "Air Conditioning Off" switch deactivates system
   b. When cooling system is turned "on," operation is automatically controlled by thermostats and functions as follows
      (1) Below 70° F - Blower fans on: no cooling
      (2) 70° F to 72° F - Overhead heat on (for dehumidification): partial cooling
      (3) At 72° F - Overhead heat off: partial cooling
      (4) 73° F and up - full cooling
   c. Each car has a knife type switch located in Motorman's switch cabinet. Switch is used to cut out air conditioning of an individual car in event of a malfunction. Switch is marked "Air Conditioning"
   d. Motorman's cab has a switch located on panel to left of cineston which operates the cab cooling fan

AUXILIARY SWITCHBOARD BOX

1. Located beneath each car near center
2. Houses the following switches, contactors, fuses, and resistors
   a. "P" switches for propulsion, door, heat, and cooling control
   b. Switches for main feeds to battery
   c. 600 volt d.c. auxiliary circuit switch
   d. Contactors to control heat, car lights, and overhead fans
   e. Relays to control emergency car lights, heat, and thermostats
   f. Fuse and breakers for heat, converter, inverter, car lights, and trainphone circuits
   g. Emergency converter start switch (odd numbered car only)

BATTERY

1. Provides 40 volt d.c. to operate controls, incandescent lights and auxiliary circuits when converter is not operating
2. One battery per unit, located under even numbered car, near center

BUZZER SIGNAL SYSTEM

1. Permits communication between Conductor and Motorman
2. Location of components
   a. Push buttons
      (1) Just forward of cineston in each motor cab
      (2) On each door control box
   b. Signal buzzers
      (1) Below switch cabinet in each motor cab
      (2) In door control box
3. Push button on door control box operative only if door control box is operative. Push button in motor cab operative at all times
4. Operated by power from 40 volt battery circuit

CAB HEAT (See "Heating")

CAB LIGHT (See "Lights, Interior")

CAR BODY HEAT (See "Heating")

CAR BODY LIGHTS (See "Lights, Interior")

CAR COOLING (See "Air Conditioning System")

CINESTON

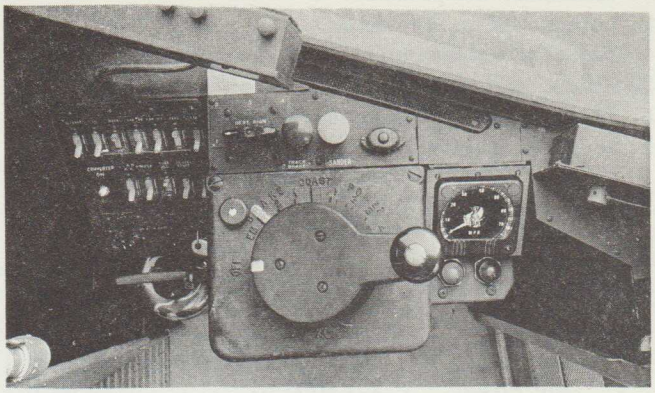

FIGURE 2

1. Purpose - to control acceleration and braking
2. Located in each motor cab
3. Cineston has four power positions, a coast position, four brake positions and an "off" position
4. Operation
   a. To make cineston operative
      (1) Insert reverse key in slot on left side of cineston
         (a) Move key forward for forward movement of train
         (b) Move key back for reverse movement of train
      (2) Move cineston handle to third point of brake, then depress, and move to desired power or brake position
   b. Cineston has a "Dead Man" feature - allowing the handle to rise in any position shuts off power, if on, and applies the third braking rate. Once allowed to rise, cineston handle can be re-depressed only in third or fourth brake positions
   c. Accelerate by moving cineston handle clockwise from "Coast" position (control positive switch, located on panel to left of Motorman, must be turned "on" before train will operate. Switch should always be left in "on" position)
      (1) First power position - Switching position, very slow acceleration, top speed 20 MPH
      (2) Second power position - 1.5 MPHPS acceleration, top speed 20 MPH
      (3) Third power position - 3.2 MPHPS acceleration, top speed 45 MPH
      (4) Fourth power position - 3.2 MPHPS acceleration, top speed 58 MPH
   d. Brake by moving cineston handle counterclockwise from "Coast" position
      (1) Moving the handle to coast or a braking position cuts off the external power feed to the propulsion motors
      (2) Motors then act as generators converting the mechanical energy of the train's motion into electrical energy
      (3) This electrical energy, which is dissipated as heat, produces a force opposite to the rotation of the armatures, causing the armatures, and in turn the train, to slow down. This process is called dynamic braking.

(4) Dynamic braking slows the train to about 3 MPH, then fades out. When it fades, parking brakes apply automatically to complete the stop

(5) Four rates of braking may be selected. Holding cineston handle at any brake mark will cause the train to come to a complete stop at the selected rate

(a) First brake position - 1.5 MPHPS deceleration

(b) Second brake position - 2.2 MPHPS deceleration

(c) Third brake position - 3.2 MPHPS deceleration

(d) Fourth brake position (Emergency braking) - Full dynamic, immediate track brake and immediate parking brake

(6) Brakes can be released when train has stopped after an emergency brake application only by moving the cineston handle to the third brake position and pausing momentarily

e. To make cineston inoperative

(1) Depress button on top left of cineston

(2) Keep cineston handle and button depressed and rotate the handle counterclockwise as far as it will go

(3) Release pressure on button and remove hand from handle

(4) Move reverse key to center slot and remove it from cineston

CIRCUIT BREAKER BUZZER

1. Sounds if any motor circuit breaker in train has blown
2. Located to left of cineston near floor level
3. Operative only in cab in which cineston is operative
4. Operated by power from 40 volt battery circuit

CIRCUIT BREAKER LIGHTS (See "Signal Lights, Exterior")

CLIMBING STEPS (See "Grab Handles and Climbing Steps")

CONDUCTOR'S POSITION

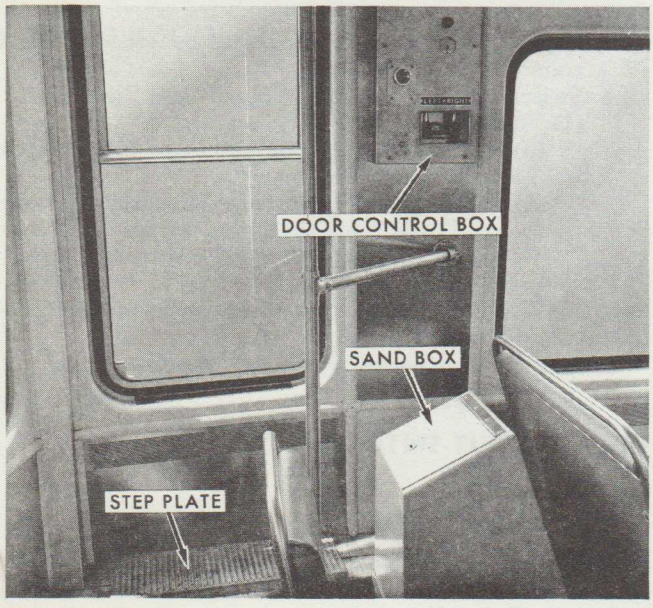

FIGURE 3

1. Located at No. 2 end of "A" car (odd numbered car)
2. Open position set off by stanchions with duplicate operating controls and items on each side of car
3. Contains following items which are described in detail elsewhere
   a. Conductor's window
   b. Step plate
   c. Sand boxes
   d. Door controls
   e. Signal buzzer
   f. Emergency cord
   g. Public Address microphone and "push to talk" switch

CONTROL POSITIVE SWITCH (See Figure 12)

1. Provides propulsion motor control feed from the batteries
2. Located on switch panel to left of cineston in each motor cab
3. Must be turned "on" in operating cab before train can be moved

CONVERTER. (See Figure 15)

1. Furnishes 40 volt direct current to charge the battery and operate the controls, incandescent lights and auxiliary circuits
2. Located beneath odd numbered car of unit, near center
3. Converter starts automatically when cineston is unlocked. It may be started manually in emergency by operation of "Emergency Converter Start Switch" located in auxiliary switchboard box beneath car.

COUPLER, ELECTRIC

1. Passes trainline circuits between units of a train
2. Located beneath mechanical coupler at No. 1 end of each car
3. Description
   a. Has sixty-eight (68) contacts which contact corresponding points of opposite coupler
   b. Has a cover which automatically opens when units are coupled and closes when units are separated
   c. Has a drum-type jumper switch used to connect or disconnect certain circuits going to the electric coupler
      (1) Jumper switch is manually operated and is operable from either side of car
      (2) Switch is closed (coupled position) when positioned away from Motorman's cab
      (3) Switch is open (uncoupled position) when positioned toward Motorman's cab

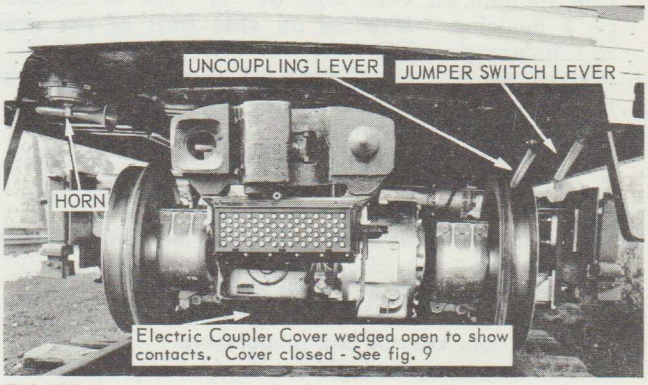

FIGURE 4

COUPLER, MECHANICAL (See Figure 4)

1. Located at No. 1 end of each car above electric coupler
2. Is manually unlocked by operation of uncoupling lever located at left front corner of car
3. Has a latch which holds unused drawbar in center position. Latch is automatically disengaged when jumper switch is thrown to "coupled" position
4. If necessary for emergency operation, cars may be operated coupled but with jumper switch "uncoupled" without damage to coupler center lock

DEFROSTER (See Figures 2 & 12)

1. Blows air on windshield
2. Controlled by two position switch on panel to left of cineston

DESTINATION SIGN BOXES (See Figures 9 & 15)

1. Locations
   a. End destination sign boxes located above end door on No. 1 end of each car
   b. Side destination sign boxes located one on each side of each car at the center of the car and above the side windows
2. Description
   a. Contain roller-curtain type signs
      (1) End sign illuminated by two fluorescent 20 watt lamps
      (2) Side signs illuminated by interior illumination of car
   b. Have maximum of 5 exposures, only one of which can be displayed at a time
   c. Viewing area from exterior
      (1) End sign - 7" x 21"
      (2) Side signs - 7" x 21"
3. Operation
   a. Sign curtains are 40 volt motor operated and cannot be set by hand
   b. Display of signs controlled by five-position, rotary type switch located just forward of cineston in each motor cab
   c. Control switch operative only in cab in which cineston is operative
   d. Cars added to train will automatically assume correct sign

DOOR CONTROL BOX (See Figure 5)

1. One located on each side of "A" car at Conductor's position. Mounted on side wall of car next to Conductor's window
2. Houses the following items all of which are operative only when the door control box is operative
   a. Door control switches
   b. Signal buzzer and push button
   c. Microphone for PA system
3. To make door control box operative
   a. Insert standard CTA train door key into keyhole mounting
   b. Turn key clockwise as far as it will turn
   c. Key remains in box while operative
4. To make door control box inoperative
   a. Turn key counterclockwise as far as it will turn
   b. Remove key from keyhole mounting

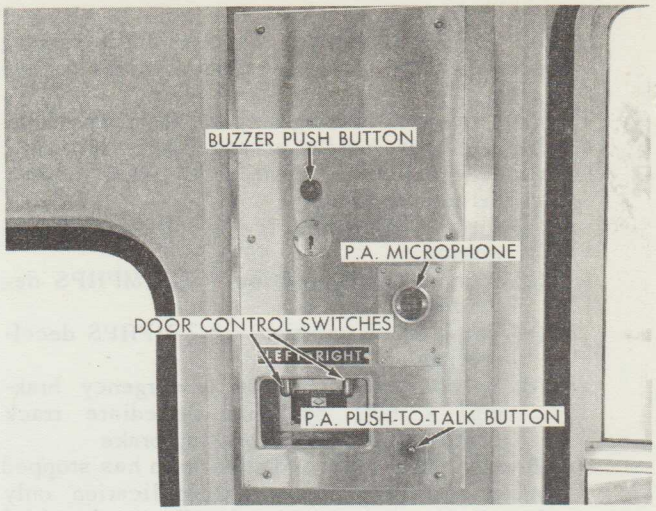

FIGURE 5

DOOR CONTROLS

1. Recessed in bottom of door box located on side wall of car at Conductor's position
2. Description
   a. Two toggle type switches control all doors on side of train on which switches are located
      (1) Left hand switch controls doors to Conductor's left
      (2) Right hand switch controls doors to Conductor's right
   b. Pulling a switch causes doors to open and takes train control power away from Motorman
   c. Pushing a switch causes doors to close and restores train control power to Motorman
   d. Door control switches operative only when door control box is unlocked

DOOR CONTROL ZONE SWITCH (See Figure 11)

1. Located in switch cabinet in each motor cab
2. Permits termination of door control circuit at various points in train
3. Description
   a. Key operated switch. Operated by standard CTA train door key
   b. Switch has two settings, "open" and "thru"
      (1) "Thru" setting
         (a) Passes door control circuit to zone switch of adjacent unit
         (b) When all zone switches in a train are set at "Thru," all the doors in the train may be controlled from any Conductor's operating position
      (2) "Open" setting terminates door control circuit at that point
   c. Zone switch normally set at "Thru" position

DOOR CUT-OUT SWITCH (See "Doors")

DOOR ENTRANCE SWITCH

1. Permits a door to be opened from outside of car
2. Located adjacent to No. 4 door (at No. 2 end of car) below window line

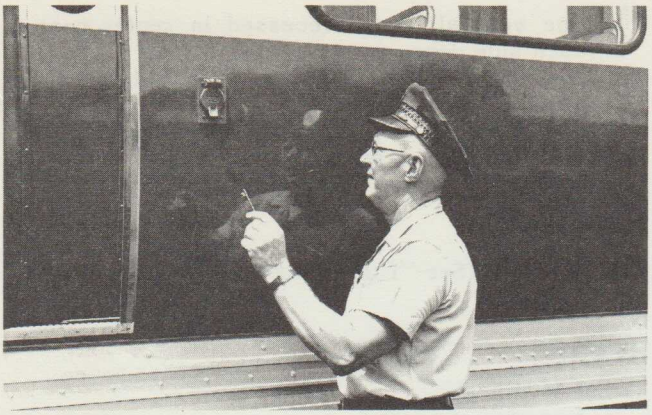

FIGURE 6

3. Switch operated by standard CTA train door key
   a. Key can only be inserted and removed in "door closed" position
   b. Opening protected by hinged cover
4. Switch operates only No. 4 door

DOOR OPERATOR MOTOR (See "Doors")

DOOR RESET PUSH BUTTON (See "Doors")

DOORS

1. End doors
   a. Allow passage between cars of a train
   b. One door located at each end of each car
   c. Each door has a rubber edge extending 24 inches above the lock which serves as a hand protector
2. Side doors
   a. Allow passengers to board and alight
   b. Two sets of doors on each side of car
      (1) Two separate doors at each opening, each consisting of two inward folding panels
      (2) Dividing rail channelizes boarding and alighting traffic and extends from a six inch post between doors to a stanchion in the car
   c. Each set of doors is eleven feet from the nearest end of the car
   d. Doors have a sensitive edge
      (1) Circuit enclosed in a rubber bumper extending full length of door
      (2) Attached to each edge which contacts an adjacent door edge in the door closed position
      (3) Slight pressure on sensitive edge causes a closing door to reverse and open
      (4) Circuit ceases to operate when door leaves are within 1½ inches of each other
   e. Electric door operator motor located in box above doors it operates
   f. Door cut-out switch
      (1) Located in left hand side of box above doors it controls
      (2) Purpose
         (a) To prevent defective door from opening when Conductor's switches are operated or to close door when it cannot be closed by normal means
         (b) To cut defective door out of the door circuit and permit normal operation of power control relay circuit
      (3) Two position toggle switch
         (a) Normal - up
         (b) Cut out - down

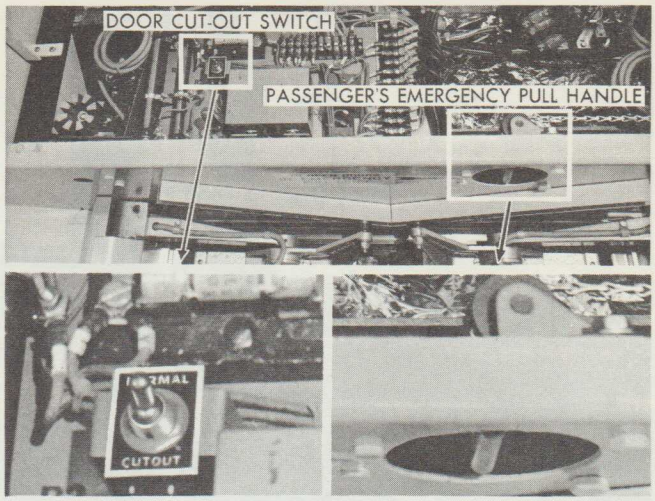

FIGURE 7

   g. Passenger's emergency pull handle
      (1) Located in bottom of door engine box (at left of center)
      (2) Purpose - to open a set of doors locally in an emergency
      (3) Operation
         (a) Pulling the handle down to the first position opens the door electrically
         (b) Pulling the handle all the way down allows the doors to be opened manually when battery power is lost
         (c) Does not operate electrically if doors are cut out
         (d) A door opened electrically by means of emergency pull handle can be closed in the following ways
            (1-a) By operating the door reset push button located in a cut out on the underside of the door engine box (left side)
            (2-a) By operating Conductor's door controls to "open" and then back to "close"
   h. Step plate
      (1) Location-cut into barrier panel at each set of doors
      (2) Provides a means to reach switches in door engine box

DOOR SENSITIVE EDGE (See "Doors")

DOOR SIGNAL LIGHTS-EXTERIOR (See "Signal Lights, Exterior")

DOOR SIGNAL LIGHT-INTERIOR (See "Signal Lights, Interior")

EMERGENCY CAR LIGHTS (See "Lights, Interior")

EMERGENCY CIRCUIT BY-PASS BUTTON

1. Electrically by-passes certain defects in the emergency relay circuit to permit moving the train
2. Located on bulkhead between front window and side window of each motor cab
3. Description
   a. Button mounted in a box having a breakable glass window
   b. To operate train, depress and hold button while operating cineston normally

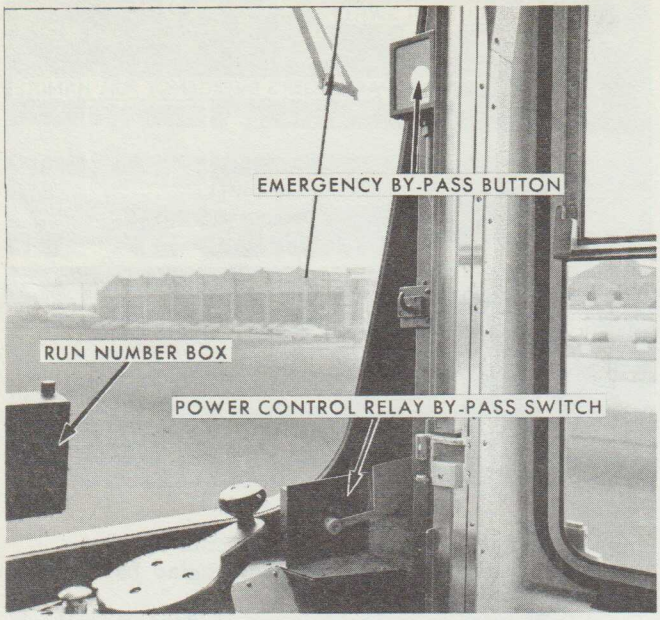

FIGURE 8

c. Release of button will cause immediate application of full dynamic and parking brakes regardless of position of cineston

EMERGENCY CORD

1. Operates a switch which cuts off power and sets brakes (maximum dynamic and immediate parking) on all cars of train. Switch recloses automatically when cord is released but train must come to stop before brakes can be released
2. Locations where accesible
   a. At No. 2 end of each car attached to bottom of bulkhead
   b. In each motor cab on bulkhead to left of cineston

FIRE EXTINGUISHERS (See Figures 12 & 16)

1. Cab
   a. Located on floor at left of cineston in each motor cab
   b. 1½ gallon pump type water can
2. Car body
   a. Mounted horizontally in a box at No. 2 end of "A" car
   b. Dry powder extinguisher

FLAG SWITCH (See "Power Control Relay By-Pass Switch")

GANG PLANK

1. Used to transfer passengers between trains in event of emergency
2. One mounted vertically on bulkhead next to end door at No. 2 end of each car

GRAB HANDLES AND CLIMBING STEPS (Fig. 9 & 15)

1. To assist persons boarding from or alighting to track level
2. Locations
   a. One horizontal handle under each end window at No. 1 end
   b. One vertical handle on the front of each corner post at No. 1 end
   c. One vertical handle on each of the end door posts
   d. One vertical handle recessed in center post at each side door
   e. One vertical handle recessed in side sheet at each side door
   f. One climbing step under the headlights at each corner of the car at the No. 1 end
   g. One climbing step below each side door

HEADLIGHTS (See "Lights, Exterior")

HEATING

1. Car body heat
   a. Location of heaters
      (1) Finned strip heaters run the full length of each side of the car except at side door opening. Heaters located at floor level
      (2) Strip heaters and four blower fans are located in the overhead unit at the center of the car
   b. Description (all heaters operate from 600 volt d.c. feed)
      (1) Layover heat
         (a) Provides 10 K.W. of floor heat whenever car temperature falls below 32° F
         (b) Activated automatically provided P32 and 600 Volt d.c. circuit breakers in auxiliary switch panel below cars are turned "on." (Heat comes "on" regardless of position of heat switches in Motorman's cab)
         (c) Provides heat to avoid frosting in laid-up cars
      (2) Main heat
         (a) Provides two stages of heat (10 or 20 K.W.) if cineston is not operative. Provides three stages of heat (10, 20, or 30 K.W.) if cineston is operative
         (b) Controlled by operation of 4 "P" type switches located in switch cabinet in Motorman's cab
            (1-a) First stage of heat - "No 1 Heat On" switch turns on all No. 1 heating circuits in train. "No 1 Heat Off" switch turns them off
            (2-a) Second stage of heat - "No 2 Heat On" switch turns on all No. 2 heating circuits in train. "No 2 Heat Off" switch turns them off
            (3-a) Third stage of heat - Both No. 1 and No. 2 heat switches must be operated for third stage of heat
         (c) Cars will heat to a maximum of 65° F (Thermostat shuts off heaters when car temperature reaches 65° F)
         (d) Each car has 3 knife type switches located in switch cabinet in Motorman's cab. Switches are used to cut out heat of an individual car in event of a malfunction
            (1-a) No. 1 heat
            (2-a) No. 2 heat
            (3-a) Overhead heat
2. Motorman's Cab Heat
   a. Heater mounted under cineston in Motorman's cab
   b. Description
      (1) Two 500 watt, 300 volt, enclosed heater elements

(2) Controlled by circuit breaker type switch on panel located to left of cineston in motor cab
(a) Two position switch
(b) Heat can be turned "on" only if cineston is operative

HORN (See Figure 4)

1. Located under car at right front corner
2. Description
   a. Electric horn operated by power from 40 volt battery circuit
   b. Controlled by pull cord located on door post to left of cineston in each motor cab

INVERTER (See Figure 15)

1. Provides 600 volt alternating current for fluorescent lighting system
2. Located beneath odd numbered car of unit, near center
3. Starts when car body lights are turned "on"

JUMPER SWITCH (See "Coupler, Electric")

LIGHTS, EXTERIOR

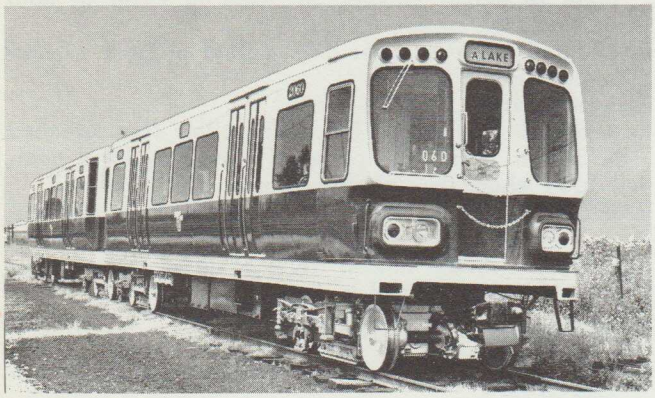

FIGURE 9

1. Headlights
   a. Are below each end window on No. 1 end of each car (next to tail lights)
   b. Description
      (1) Sealed beam lights
      (2) Controlled by two position circuit breaker type switch on panel located to left of cineston in motor cab
      (3) Power for headlights from 40 volt battery circuit
2. Marker lights
   a. Purpose
      (1) Front of train - to indicate train classification
      (2) Rear of train - to mark rear of train
   b. Two four lens marker lights on No. 1 end of each car (one above each end window). Colors from side of car inward are
      (1) Red
      (2) Yellow
      (3) Green
      (4) White
   c. Power for lights from 40 volt battery circuit
   d. Color controlled by two, four position, rotary type switches on panel to left of cineston in Motorman's cab. One switch for each set of lights. Left switch controls lights on left side; right switch controls lights on right side of train
   e. Lights "on" or "off" controlled by two position circuit breaker type switch on panel to left of cineston
3. Tail lights
   a. Used to mark rear of train
   b. Description
      (1) One below each end window on No. 1 end of each car (next to headlight)
      (2) Red, sealed beam, high intensity lights
      (3) Controlled by two position switch on panel to left of cineston in each motor cab
      (4) Power for tail lights from 40 volt battery circuit

LIGHTS, INTERIOR (See Figure 16)

1. Car body lights
   a. Run the length of car along roof line except at door openings where they are set in bottom of door box
   b. Description
      (1) Fluorescent lighting
      (2) Operates on a.c. power supplied by static inverter operating off the 600 volt d.c. supply
      (3) Controlled by a relay operating from a train line wire energized from two 40 volt d.c. circuit breaker type switches in the Motorman's cab (car lights "on" switch and car lights "off" switch). All lights in train are controlled by switches in Motorman's operating cab
      (4) Lights remain "on" if either car of unit is on live rail
2. Emergency car lights
   a. Light interior of car when regular car body lights go off due to power interruption
   b. Location - one light over each side door opening and one in motor cab (total of five lights)
   c. Description
      (1) Incandescent lamps
      (2) Derive power from the 40 volt d.c. battery circuit
      (3) Controlled by relay on switchboard under car
      (4) Light only when car body light system is turned "on" and its source of power is interrupted
3. Cab light
   a. Location - mounted on ceiling of each motor cab
   b. Description
      (1) A fluorescent light operating on 600 volt a.c. and a incandescent lamp fed from the 40 volt d.c. battery circuit mounted in the same fixture
      (2) Fluorescent light wired to light whenever car body lights are turned "on" and cab door is positioned for passenger use of cab
      (3) Incandescent lamp turned "on" and "off" by switch on Motorman's panel. Also arranged to light when the emergency car lights are "on" and the cab door is positioned for passenger use

MARKER LIGHTS (See "Lights, Exterior")

MOTORS, TRACTION

1. Four 100 horsepower, 300 volt (d.c.) motors per car (two per truck). Two on each truck are permanently connected in series

2. Purpose
   a. To provide propulsion power to the axle of a pair of wheels through a drive shaft and hypoid gearing
   b. To act as generators to provide dynamic braking
      (1) Convert mechanical energy of train into electrical energy
      (2) Electrical energy produces a force opposite to the rotation of the armatures, causing the armatures and, in turn, the car to slow down
      (3) Electrical energy is dissipated in heat of braking resistors

MOTOR CONTROL CUT-OUT SWITCH (7 pt. Switch)

(See Figure 11)

1. Purpose - to cut out motors and electrically release parking brakes under certain conditions
2. One switch located in switch cabinet in each motor cab and controls motors and parking brakes only on its car
3. Three position switch
   a. Handle "down" (Marked "Contr On") - motors operative
   b. Handle "up" (Marked "Contr Off, Brks Off") - motors inoperative and electrical coils of parking brakes energized to release brakes
   c. Handle "centered" (Marked "Contr Off, Brks On") - motors inoperative but parking brakes remain applied

MOTORMAN'S CAB

1. Houses necessary motor control and other equipment for operation of train
2. Located in right front corner of each car.
3. Description
   a. Solid metal partition extends across back from floor to ceiling
   b. A door hinged to the end door post performs following functions according to its position
      (1) Completes side of cab for use by Motorman
      (2) Encloses train operating equipment so cab seat is available for passenger use
   c. Door can be locked in either position

PARKING BRAKES

1. Purpose
   a. To supply final braking action when dynamic brakes fade out (at approximately 3 MPH)
   b. To supplement the dynamic brake when cineston is placed in fourth (emergency) braking position, when side trip opens or when emergency cord is pulled
   c. To prevent rolling of parked cars
2. One on each motor drive shaft - four per car
3. Description
   a. Disc type brakes
   b. Applied by spring action
   c. Held in release position by battery powered magnet
   d. Can be released manually by operating actuator rods if electrical release fails
   e. Intensity of parking brake pressure is greater in third or fourth braking position than in first or second position

PARKING BRAKE SIGNAL LIGHTS, EXTERIOR (See "Signal Lights, Exterior")

PARKING BRAKE SIGNAL LIGHT, INTERIOR (See "Signal Lights, Interior")

PASSENGER'S EMERGENCY PULL HANDLE (See "Doors")

POWER CONTROL RELAY (See Figure 11)

1. Controls feed of battery current to the motor control system
2. Located in switch cabinet in each motor cab
3. Description
   a. Relay must be closed before train can be moved
   b. Relay held closed by 40 volt battery power supplied through door signal light relay circuit
      (1) Power relay will close only when all door relays on train are closed
      (2) Power relay will open whenever any door relay opens
   c. Relay only operative in cab in which cineston is operative

POWER CONTROL RELAY BY-PASS SWITCH (Fig. 8)

1. Electrically by-passes the power control relay contacts to permit moving the train in event of door relay circuit failure
2. Located at lower right hand corner of front window in each motor cab
3. Description
   a. Switch mounted in box with yellow flag attached
   b. Switch in by-pass position when flag is in position where it is visible through front window
      (1) To place on by-pass, rotate flag counterclockwise until it latches
      (2) To return normal relay control, rotate flag clockwise until it latches

PUBLIC ADDRESS SYSTEM

1. Allows Conductor to make announcements in all cars of train
2. Locations of components
   a. Speakers (3)
      (1) One located at center of car in bottom of evaporator unit and one at each end in end bulkheads
      (2) Openings covered with perforated metal grilles
   b. Microphone and "press-to-talk" push button mounted on each door control box at each Conductor's position
3. System interconnected with train-phone system so that announcements can be broadcast to passengers if desired

RUN NUMBER BOX (See Figures 2 & 9)

1. Located at lower left corner of windshield
2. Illuminated when headlight is on
3. Numbers changed manually by rotating roller curtains

SAND BOXES (See Figure 3)

1. Located on the wall side of the single passenger seats just forward of the Conductor's area (No. 2 end of odd numbered car)
2. Purpose - to hold sand supply for rail sanding devices
3. Description
   a. Approximately 38" high and 12" wide
   b. Has hinged cover with lock operated by standard CTA train door key

c. Has removable wire screen to sift sand

SANDING DEVICES

1. Purpose - to provide increased traction for braking and accelerating on slippery rail by distributing sand on the running rails through a pipe attached by flexible tubing to the sand box
2. Two rail sanding devices attached to No. 2 truck of "A" car - one for each rail
3. Description
   a. Electrically operated, gravity fed devices
   b. Pipe fixed just above rail level and connected to sand box by flexible tubing
   c. Fed by two sand boxes located at the Conductor's position
   d. Operated by sand button located just forward of cineston in Motorman's cab
      (1) Button yellow in color
      (2) Depressing button causes sand to flow
   e. Operable only in cab where cineston is operative

SEATS

1. Seats are fixed except for Motorman's cab seat which is adjustable up, down, forward, and backward
2. Certain seats have stanchions from seat back to ceiling
3. Seating capacity
   a. "A" car - 47
      (1) 22 two passenger seats
      (2) 3 single passenger seats
   b. "B" car - 51
      (1) 24 two passenger seats
      (2) 3 single passenger seats

SEVEN PT. SWITCH (See "Motor Control Cut-Out Switch")

SIDE TRIPS

1. Opens the emergency relay circuit whenever the side trip contacts a track trip. This cuts off traction power and applies maximum dynamic braking with immediate parking brakes
2. One device located at the left front corner of the No. 1 truck of each car
3. Has automatic spring reset which closes switch immediately. Traction power cannot be restored until train comes to a complete stop and cineston is moved to third point of brake momentarily

SIGNAL LIGHTS, EXTERIOR (See Figure 15)

1. Circuit breaker lights
   a. Indicate car on which circuit breaker has blown
   b. One light located below each side door at No. 2 end of each car
   c. Description
      (1) Blue lens
      (2) Light "on" indicates circuit breaker has blown
      NOTE: Light will remain "on" even though Motorman has reset circuit breaker. Light remains "on" until Shop Department personnel check and reset breaker
      (3) Power for lights from 40 volt battery circuit
2. Door signal lights
   a. Indicate whether passenger doors are open or closed
   b. One light located above each side door
   c. Description
      (1) Red lens
      (2) Light comes "on" to indicate that door at which it is located is open
      (3) Lights operative whenever any cineston in train is "unlocked"
      (4) Power for lights from 40 volt battery circuit
3. Parking brake signal lights
   a. Indicate whether parking brakes on car are applied or released
   b. One light located on each side of each car at No. 2 end just below roof line
   c. Description
      (1) Yellow lens
      (2) Light "on" indicates that one or more parking brakes on car are applied or that one or more parking brakes had to be released manually
      (3) Light "off" indicates that all parking brakes on car have released electrically
      (4) Lights operative whenever any cineston in train is "unlocked"
      (5) Power for lights from 40 volt battery circuit

SIGNAL LIGHTS, INTERIOR

FIGURE 10

1. Door signal light
   a. Enables Motorman to determine when all passenger doors on train are closed
   b. Located to right of cineston in each motor cab
   c. Description
      (1) Green lens
      (2) Light comes "on" to indicate that all passenger doors of train are closed
      (3) Light operative only in cab where cineston is operative
      (4) Power for light from 40 volt battery circuit
2. Parking brake signal light
   a. Enables Motorman to tell whether parking brakes on train are applied or released
   b. Located to right of cineston in each motor cab
   c. Description
      (1) Amber lens
      (2) Light "on" indicates one or more parking brakes applied somewhere on train
      (3) Lights operate whenever a cineston is operative. Lights operate in each cab of train
      (4) Power for lights from 40 volt battery circuit

3. "Converter On" Light (See Figures 2 & 12)
   a. Located in each cab on panel to left of cineston
   b. Neon powered, white-capped light
   c. Indicates only for the converter of the unit in which lamp is located. Does not show condition of converters in other units of train
   d. Indications
      (1) Lamp glowing (orange-red) - indicates converter of that unit is delivering output
      (2) Lamp off - indicates converter not delivering output
      NOTE: Lamp will wink out when going through gaps and when converter circuitry cuts it off. Trouble is indicated if light is off for sustained period

SLEET SCRAPING DEVICES (See Figure 13)

1. Scrape sleet and snow from trolley rail
2. One located on each end of each trolley block at No. 1 truck. Four per car
3. Raised and lowered with actuator/sleet scraper stick by means of cam and leaf spring

SPEEDOMETER (See Figure 10)

1. Speedometers installed in cars with numbers ending in 1 or 5
2. Speedometer located to right of cineston
3. Description
   a. Equipment consists of magnetic pick-up unit having a toothed wheel mounted on the pinion shaft of the gear box
   b. Speedometer dial reads from 0 to 75 MPH
   c. Dial illuminated when cineston is operative

STEP PLATE (See Figure 3)

1. Located along each side wall approximately 12 inches above floor at Conductor's position
2. Approximately 8" x 20"
3. Provides elevation for Conductor from which he can view boarding and alighting passengers

SUN VISOR

1. Fixed to bar attached to bulkhead on left of windshield
2. Adjusted manually
   a. Twist gently to tilt visor
   b. Squeeze pistol-grip handle to move vertically

SWITCH CABINET

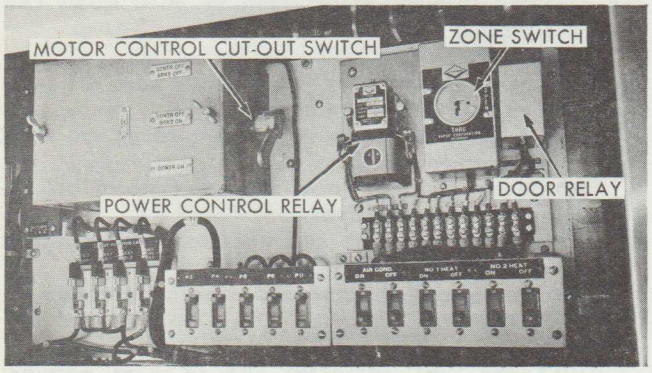

FIGURE 11

1. Located above seat in each motor cab
2. Has a hinged door equipped with a lock operated by standard CTA train door key
3. Contains the following
   a. Air conditioning switches - "P" type and knife type
   b. Circuit breaker switches for the following circuits
      (1) P3 - Power reset and control positive circuits
      (2) P4 - Parking brake control circuit
      (3) P5 - Emergency braking and parking brake release circuit
      (4) P6 - Battery circuit
      (5) P11 - Power control circuit
   c. Door control zone switch
   d. Door relay
   e. Heat switches - "P" type and knife type
   f. Motor control cut-out switch (7 pt. switch)
   g. Power control relay
   h. Ammeter receptacle for motor circuit

SWITCH PANEL

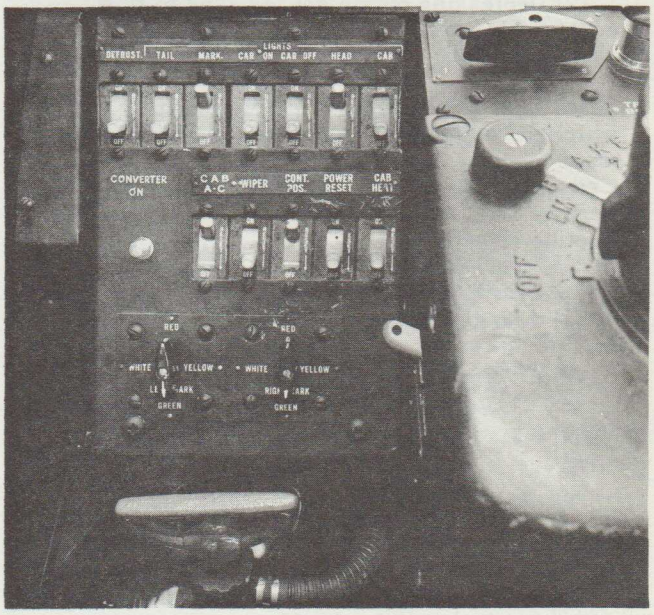

FIGURE 12

1. Located to the left of the cineston in each motor cab
2. Has three rows of switches
3. Contains the following switches - from left to right
   a. Top row
      (1) Defrost
      (2) Tail lights
      (3) Marker light "on" and "off"
      (4) Car lights "on"
      (5) Car lights "off"
      (6) Headlight
      (7) Cab light
   b. Middle row
      (1) "Converter On" Light
      (2) Cab cooling fan
      (3) Windshield wiper
      (4) Control positive
      (5) Power reset
      (6) Cab heat
   c. Bottom row - marker light color switches
4. All switches except bottom row are circuit breaker type switches which center when blown. To reset, move to "off" position, then back to "on" position

TAIL LIGHTS (See "Lights, Exterior")

TOOL COMPARTMENT (See Figure 9)

1. Located under each car near center
2. Door marked with yellow "T"
3. Contains trolley shoe slippers and rope

TRACK BRAKES (See Figures 2 & 13)

1. Supply additional braking action, supplementing dynamic and parking brakes
2. One on each side of each truck, between wheels - 4 per car
3. Operation
   a. By placing cineston in 4th point of braking (apply with dynamic and parking brakes)
   b. By depressing track brake button - red button located just forward of cineston in motorman's cab

TRACK TRIP SWITCHES (See "Side Trips")

TRAIN PHONE COMPONENTS

1. Consist of connection plug, cable, and mounting bracket
2. Mounting bracket located on inside of Motorman's cab door. Connection plug and cable located just forward of door

TROLLEY BLOCKS

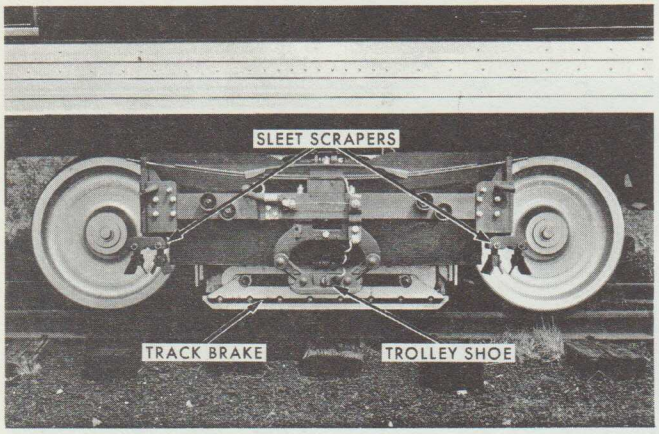

FIGURE 13

1. Support trolley shoes and sleet scraping devices and insulate them from ground
2. Two blocks per truck, one on each side of car - 4 blocks per car
   a. Blocks on No. 1 truck have sleet scraper assembly
   b. Blocks on No. 2 truck do not have sleet scraper assembly
3. "Permali" current collector beam

TROLLEY SHOES (See Figure 13)

1. Collect current from trolley rail to run traction motors, converter, inverter, fluorescent lights, heat, air conditioning and ventilating fans
2. One on each trolley block
3. Description
   a. Shoes hang horizontally but are free to move vertically
   b. Shoes have eyebolt which can be engaged by hook on trolley shoe bracelet in event shoes must be raised from rail

TRUCKS - two, four-wheel, swiveling trucks to each car

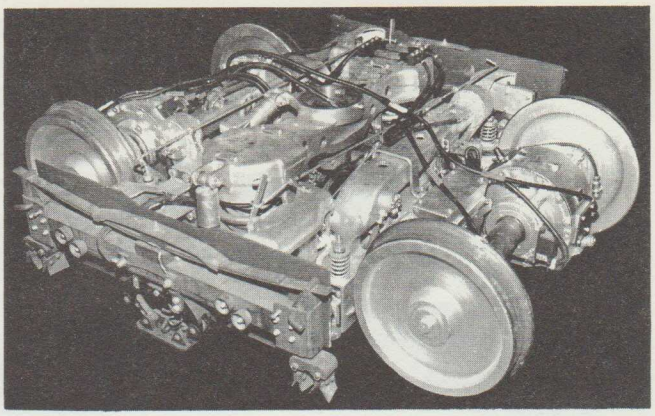

FIGURE 14

VENTILATING FANS

1. Four fans located in overhead evaporator unit in each car
2. Come on whenever a cineston is unlocked anywhere in train

WHEELS - four, 28 inch, steel wheels on each truck - eight wheels per car

WINDOWS

1. Conductor's windows
   a. Allow Conductor to view outside of train when operating doors
   b. One window on each side of odd numbered car
   c. Description
      (1) Two section windows
         (a) Lower section fixed
         (b) Upper section drops outside lower section and has two positions
            (1-a) Fully closed
            (2-a) Fully open
      (2) Window glazed with tinted laminated safety sheet glass
2. End windows - glazed with tinted laminated safety sheet glass set into end sheets with rubber glazing channels
3. Motorman's front window - glazed with untinted safety plate glass set into end sheets with rubber glazing channels
4. Motorman's side window
   a. Located to right of Motorman in each cab
   b. Description
      (1) Two section window
         (a) Lower section fixed
         (b) Upper section lowers outside lower section
      (2) Window glazed with tinted laminated safety sheet glass
5. Passenger's side windows
   a. Five large and two small windows on each side of car
   b. Fixed windows
   c. Glazed with tinted laminated safety sheet glass

WINDSHIELD WIPER

1. Located on front window of each cab
2. Description
   a. 40 volt d.c. electric wiper
   b. Controlled by two-position switch on panel to left of cineston
   c. Automatically parks at right hand end of stroke when control switch is turned "off"

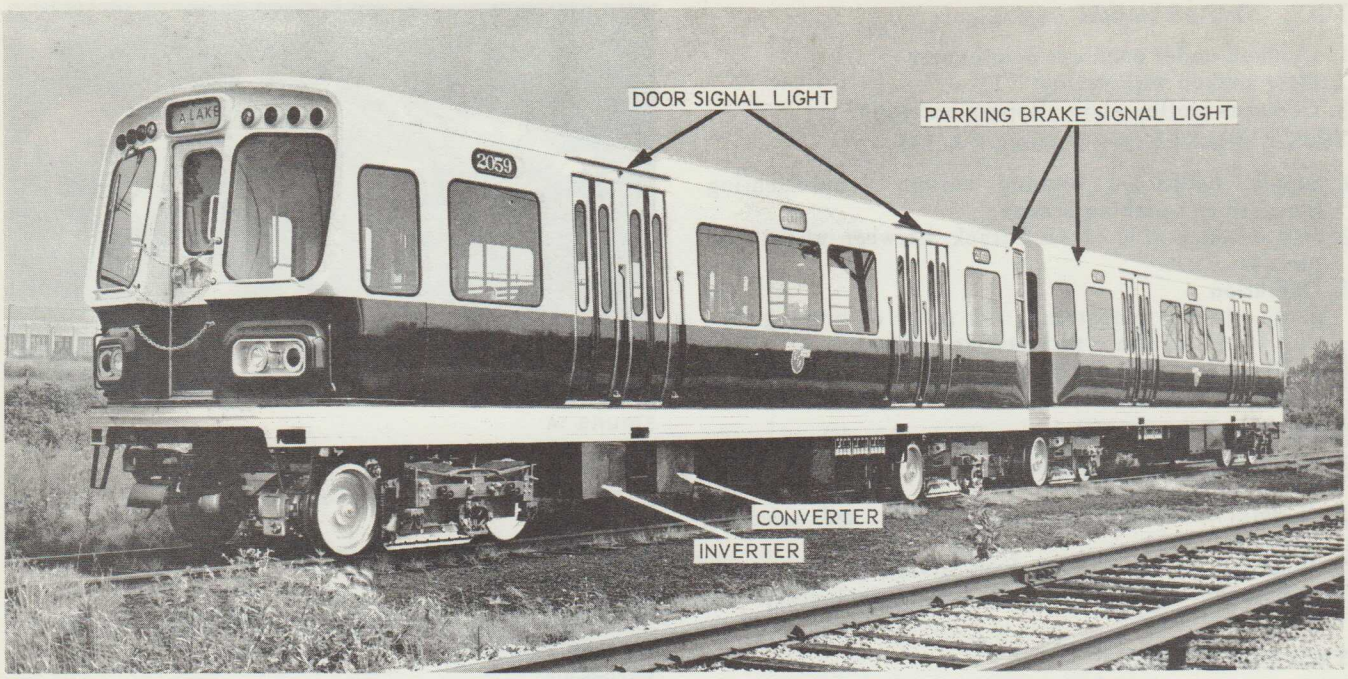

FIGURE 15

FIGURE 16

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