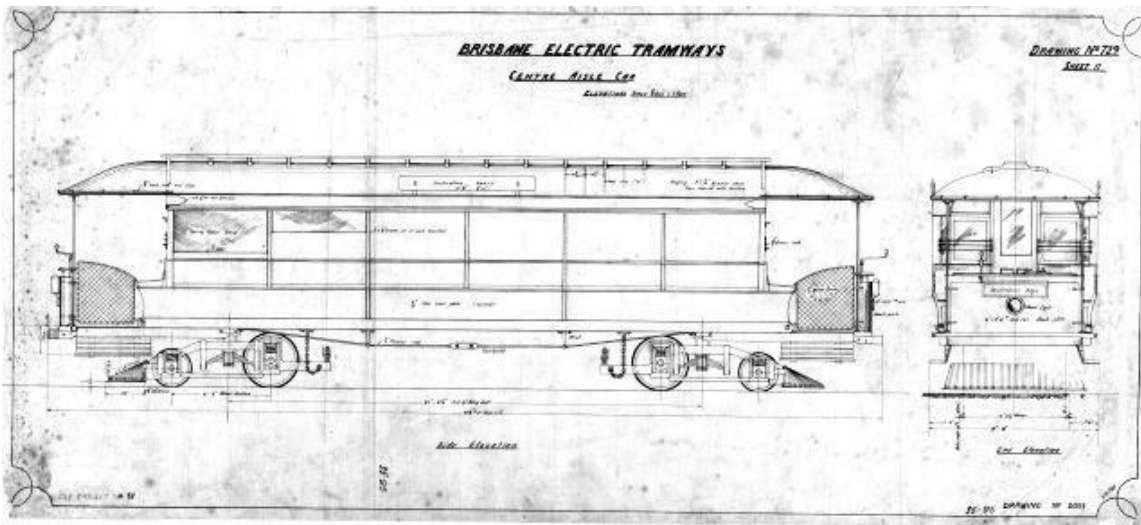


## Description of the Construction of Centre Aisle Cars



The following is a description of the construction of Centre Aisle Cars No. 121 - 150 from a Brisbane Tramways Company paper found in the BTMS Archives.

Principle Dimensions: The principle dimensions of this type of car are as follows:

Length over bumpers 38' 0"  
Width over sill rails 7' 0"  
Height from floor to ceiling 7' 3"  
Height of floor level from rails 3' 2 1/2"  
Width of car body 7' 6 5/16"

**Main Underframe:** The main underframe is constructed of the best quality thoroughly seasoned Australian hardwood, consisting of two side sills 6" x 3" connected by two bolster beams 6" x 5", two bulkhead beams 6" x 3 1/2" and five intermediate beams 5" x 3" of the same material carefully fitted and drawn up by five 7' 3" x 3/4" iron tie rods and diagonally braced by 4" x 2" pieces. The two side sills are strengthened by mild steel side plates 6" x 1/2" extending the whole length and secured by 3/4" bolts. The platforms are carried by four bearers, two outside of 7" x 3" hardwood and two inside 5 3/4" x 2 3/4" hardwood.

**Bumpers:** Curved bumpers constructed of 5" x 4" x 1/2" angle section are fitted to each end of the car and project 6" beyond any other part of the car.

**Timber:** All timber used in the construction of these car bodies is of the best description of its class, thoroughly well seasoned, square straight and out of winding, free from sap, shakes, knots, pipes or any imperfections whatever.

**Flooring:** The floor of the car is of dressed tongued and grooved hardwood 2 1/2" x 3/4", fixed to the wooden framing by 1 1/2" No. 12 iron screws and nails. The tongued and grooved joints are painted immediately upon fixing. The boards are properly cramped up before being fastened in place, the floor being nailed except round the openings and at the two ends where screws are

used. All butt ends are secured by two screws to each board. All parts of the floor except under the seats are covered with renewable strips of  $\frac{3}{4}$ " x  $\frac{1}{2}$ " yellow-wood spaced  $\frac{1}{2}$ " apart and fastened by 1" No. 3 iron screws at intervals of not more than 9"; all heads are countersunk, the strips being painted on the underside with one coat of paint before being fixed. The ends of all strips are rounded off.

Floor Coverings: Two openings are provided in the floor of the car and fitted with trap doors, one over each motor. These trap doors are built in two pieces and are provided with finger holes for lifting same.

Body Frame: All body framing is carried out in the most substantial manner. The main frame work, posts, pillars etc. are the best quality thoroughly seasoned hardwood and yellow-wood, tenoned where required and fitted closely into mortices and properly pinned. The main frame work is securely braced by strong diagonal braces wherever possible. All joints, mortices, tenons, ends etc. which subsequently cannot be painted are thoroughly white leaded before being put together. All nuts coming against wood are provided with washers. The body frame is braced by two  $\frac{7}{8}$ " adjustable mild steel trusses under each sill.

Roof: The roof is of the plain arched type. The roof sticks are of straight grained yellow-wood  $1\frac{1}{8}$ " x 1", properly steamed to shape and are secured by  $1\frac{1}{4}$ " No. 12 iron screws. A trolley board of Queensland pine is fitted and securely fastened on the roof.

The whole of the roof is of beaded strips of first quality Queensland pine 3" x  $\frac{5}{16}$ " neatly curved at each end to conform with the curve of the canopy and planed and sandpapered on the under-side after machining.

The strips are closely cramped up and securely fastened by countersunk head screws and nails. All joints are painted and the whole is covered with No. 6 cotton duct properly stretched and securely fastened round the roof edge.

Bulkheads: The bulkheads at each end of the car are of yellow-wood with fixed window of 21 oz. plain glass. Bulkhead windows are of embossed glass. Four bevelled mirrors are fitted to inside lining.

Windows: Four removable sashes, two at each end provided with sash lifts or fasteners are fitted to each car. Two of these are swing sashes on brass hinges. The sashes are of cedar and a bevelled mirror is fitted in the upper panel. All other sashes are of yellow-wood. The glass used in these windows is 21 oz. glass.

Curtains: Each car is fitted with 12 Pantosote curtains, six on each side, with strong spring rollers. These curtains are of the Brill pattern and are fitted with slats running in grooves formed in the side pillars.

Dash Plate: The dash plate is of No. 12 S.W.G. sheet metal fastened to stanchions.

Panels: All side panels are  $\frac{3}{16}$ " mild steel rolled to shape and carefully fitted and rubbed down with em-ery stone before being fitted in place.

Doors: The doors are of the single sliding type constructed of cedar with figured glass panels. The upper panel is fitted with 21 oz. glass. The doors are hung on brass roller hangers so ar-

ranged so that they will not move from the open or closed position with the .....(line missed in photocopying)... iron plates provided with flanges to act as guides for the door. The sheaves of the door hangers are 2 ½" diameter. The doors are provided with strong looped brass handles.

Seats: Ten double and four single seats are provided inside the car and four single seats on the outside platform. The seats are made of alternate laths of yellow-wood and cedar and are fastened to the seat frames which are se-cured to legs morticed to the floor.

Steps: Four steps of 3'5" x 9" x 1 ½" hardwood are provided. These steps are carried on 2"x 1 ½"wrought iron step hangers. The outside edges are bound by 1"x 1/8" iron securely fastened by 1" No. 10 screws.

Sand Boxes: One sand box is carried under the front seat on each end of these cars. The box is constructed of 20 gauge galvanised iron and provided with pedal connections to platform and one 2"iron pipe leading to the rails.

Lifeguards: Each car is fitted with two lifeguards of the cow-catcher type - one at each end of the car.

Brakes: All these cars are fitted with the Ackley adjustable hand brake complete, one at each end of the car. In this type of brake all movable parts revolve on roller bearings reducing the friction and giving ease of action in applying brake shoes and releasing the brakes. This type of brake gear gives ease of operation, high efficiency, quick action and is absolutely reliable either as a service or emergency brake. Using a gear ratio of 12.36, a 50 lb. pull on a 12"handle gives a chain tension of 1,152lbs.

Gongs: A brass foot gong 11"diameter is fitted at each end of the car under the platform in a convenient position for the motor-man and a movable button is provided.

Signal Bells: Two signal bells with 4 ½"diameter gongs are fixed in each platform and are operated by leather cords running the full length of the car, supported by proper runners, one on each side of the car within each reach of the passengers.

Lockers and Tool Chests: Three lockers are provided on each car under the seats, for tools, lamps, and use of the motor-man and conductor.

Destination Signs: Electrically lighted destination signs are fitted to each dash plate of the car. These signs are constructed of 24 gauge G.I. with sliding steel signs painted black with white letters perforated to allow the light to pass through. They are illuminated by five incandescent lamps behind frosted glass. On each side of the roof, destination signs are carried on iron brackets. These signs are of pine 6' 5" x 8" x 1" with letters 6"high and are arranged so as to be easily interchanged.

Headlights: Two electric headlamps are provided for each car. These lamps are fitted with 9" parabolic nickel plated reflectors with front glass fitted into a brass frame clamped on to the body of the lamp. The lamp is let in and securely fastened in the centre of each dash board, one at each end of the car.

Car: Each car has three lighting circuits separately controlled by switches and fuses.

Lights: One circuit comprises of a three lamp cluster and a two lamp cluster in the body of the car.

The second circuit consists of a three lamp cluster, two platform lights and two headlights with the necessary changeover switches to interchange platform and headlights, so that only one headlight at the front and platform light on the rear end will be alight. The third circuit consists of the destination sign lights at each end of the car. All lamps are of the metallic filament type. The wires are of suitable size and are insulated with pure vulcanised india rubber of best quality taped and braided.

Handles: The following handles, brackets etc. are fitted to each car body.

Four inside seat grab handles and four outside seat grab handles. These handles are of brass and securely fastened in place. Four 11' x 1 1/8" hardwood rods fastened between brass brackets to the roof are provided for carrying twenty-four hand straps. Twelve brass rods, 2'6" x 1/2" with brass brackets are provided, six at each end, for window guards. Four 2'6" x 5/8" rods with brass brackets are provided as grab rails and fitted, two at each end, under the platform roof. Two brass roof steps secured to the corner pillar are provided for climbing on to the roof.

Painting and Varnishing: The whole of the woodwork of the interior of the car body, with both sides of window sashes and sliding doors, the seats and underside of the roof are varnished. The whole of the remainder of the car body is painted.

Under Trucks: The entire under trucks, including life guards etc. are first thoroughly cleansed of all rust, dirt, oil and grease and covered with one coat of distilled tar applied hot.

Body: All wood work except the underframe is first cleaned down with glass paper and given one coat of oil colour mixed with white lead, lamp black raw linseed oil, turps and trebene driers. When properly dry, all wood work outside is given three coats of dry white lead filling, mixed with gold size turps and with a little lamp black. When dry and hard it is faced down with sand paper until a smooth surface is obtained and then a coat of lead colour is applied. The ground colours are then applied in three coats properly flattened down between each coat and then three coats of hard body varnish.

Lining: Panels, dashes and ends are lined with green picker edged with yellow, the dashes are lined with yellow picker and a fine orange line. Each dash plate has the car number painted on in plain block letters 8' high and shaded. All visible painted work is then given three coats of the best pale carriage varnish, each coat except the last being properly rubbed down. The whole of the outside of the roof including the trolley board, is painted in three coats of best quality white paint and one coat of Bon Accord and the trolley pole and base are painted in three coats of black. The whole of the floor on upper and underside, wood and iron under frame are painted in three coats, wood work being first primed and stopped and iron work being given a preliminary coat of paint after having been thoroughly cleaned and scraped.

Inside of Body: The parts before mentioned as being varnished are cleaned down, stopped, scraped if necessary and smoothed with glass paper. The whole is properly varnished in four coats of the best pale carriage varnish, properly rubbed down between each coat. The cars are finished in what is known as 'best carriage finish'. In the above paint and varnish work, none but the very best materials are used. The varnish is the best pale carriage varnish and contains no gold size trebene or other driers or thinners.

**Trucks:** The trucks on which these cars are mounted are Standard Brill No. 39F and 39E1 manufactured by Messrs J. G. Brill Co. Philadelphia U.S.A. This type of truck is the Brill standard single motor truck for all round city service. It is of the maximum type with 30" driving and 20" pony wheels the latter being turned outwards towards the end of the car. This truck is well adapted to work in limited space because the pivotal point is near the driving axle. The larger part of the load is therefore on the driving wheels. The right proportion of the load is placed on the pony wheels to keep them safely on the rails under all conditions. This type of truck is suitable for speeds up to 30 miles per hour.

**Wheels:** The wheels used with this truck are 30" driving and 20" pony made by Miller & Co. Edinburgh, of standard section at the tread and flange. They are of the best quality cast iron, chilled at the tread and flange to a depth of approximately  $\frac{3}{4}$ ".

**Axles:** The axles are of the best quality axle steel. The diameter at the journals is  $3\frac{9}{16}$ " and  $4\frac{7}{8}$ " at the larger part. The wheels are pressed on to the axles by hydraulic pressure of not less than 20 tons. Each axle is stamped with the maker's name and a distinguishing number. Pony axles are  $3\frac{1}{2}$ " diameter at the largest part and 3" diameter at journals.

**Gears:** The gear wheels are of the split cast steel type bolted together with four  $1\frac{1}{4}$ " bolts and all nuts locked by split pins (or lock washers). These wheels are secured to the axles by keys, are free from shrinkage, cracks and spongy portions and are manufactured by the G.E. Co. U.S.A. The number of teeth is 69, machine cut and with 5" face.

**Springs:** The springs are of standard type as supplied with this truck and have sufficient strength and flexibility to safely carry a car loaded and yet give easy running with car half loaded.

**Pinions:** Are of best quality forged steel with teeth cut from the solid, securely fastened to the armature shaft in such a way that they can easily be removed for renewal. These pinions are manufactured by the General Electric Co. U.S.A. and are classed as grade F, the characteristics of which are forged steel, oil tempered, high carbon content and uniform composition throughout. No. of teeth are 17 with a 5" face. In addition to the ordinary pinion a special type of tool steel pinion supplied by Ackley Brake Co. are fitted as supplies become available.

**Lubrication:** Axle journals are lubricated by Armstrong oilers. Armature bearings of the self oiling type in which oil is fed through waste packed against the shaft, the oil coming from a well which can be kept at economical level. All bearings are interchangeable.

**Brakes:** Each truck is provided with the Brill standard brake rigging as supplied with this type of truck. This brake gear is intended for use as the service brake and is operated from either end of the platform. An equalising device is provided to properly distribute the pressure on all wheels. The four brake blocks are inside hung and are mounted so that they are easily renewed when necessary.

**Equipment:** The whole of the motor equipment on the cars is supplied by the General Electric Co. U.S.A. and includes the following:

Two steel clad four pole inter pole motors type G.E. No.202 with pinions and gear wheels.

Two series parallel controllers. G.E. Type R.G. and C.G. Cast grid resistors.

Two canopy switches. G.E. Type M.S.8.

One main fuse. G.E. Type M.A. 13 B. Fuse Box.

One lightning arrestor. G.E. Type M. Form D.

One kicking coil. One trolley base with 13 pole and head. G.E. Type U.S. No. 5 and No. 6.

One set of made up cables. All necessary spare cables.

**Motors:** Each car is fitted with two motors of not less than 50H.P. each. All parts are interchangeable. These motors are the G.E. Co. U.S.A. type 202 fitted with interpoles, series wound for 550 volts direct current. They are of the split frame type allowing the lower half to swing back thus rendering the interior easily accessible.

**Bearings:** The armature bearings are of gun metal with high grade babbit metal and are interchangeable. Motor axle bearings are cast iron lined with high grade babbit metal and are also inter-changeable. The bearings and oil guards are outside the motor casing and are fitted with oil wells for oil and waste lubrication.

**H.P. Rating and Efficiency:** The rating on this type of motor is based on a temperature rise by thermometer of not more than 75 degrees C above the surrounding air, taken at 20 degrees C after an hour's run at a rated load of 50 H.P. on 600 volts. Its efficiency including gear loss is not less than 80% at full rated load and 82% at half rated load.

**Controllers:** The controllers are of the series parallel type arranged for mounting on car platforms and are known as G.E.K11 type controllers. All contacts are of rolled copper and fitted so as to give good contact and prevent overheat-ing or undue wear and tear. Arcing between contacts is prevented by means of magnetic blow out. The reversing switch is mounted inside the controller case and interlocked with the power cylinder so that the revers-ing switch can be operated only when the power cylinder is in the 'off' position. Motor cut out switches are fitted to each controller so that each motor may be cut out without affecting the operation of the remaining motor.

**Trolley Base:** The trolley base is manufactured by the G.E. Co. U.S.A. and is of the type know as No. 6 which is a single spring type, or U.S. No. 5 which has six springs. The springs are so proportioned and attached to the trolley arm to give a practically uniform upward pressure throughout the working range. A revolving contact at the bottom of the trolley base allows the pole and head to revolve continually in one direction. The trolley pole is a tapered steel tube 13 feet long capable of easy removal. The trolley harp is the standard G.E. malleable harp so designed that it shall not readily catch in the overhead line con-struction if the trolley leaves the wire. The trolley wheel is the Union standard trolley wheel.

**Cable Equipments:** All wires and cables used in connecting up the various parts of the motor equipment are of ample sectional area, of high conductivity copper covered with best quality insulating material, suitably protected by tape or braiding and especially made by G.E. Co. for traction purposes. The motor cables are enclosed in canvas hose, well taped and coated with insulating compound.

**Resistances:** Car resistances are of substantial construction and are securely fastened to the car under the floor. They are of sufficient capacity to avoid risk of overheating in ordinary service. They are the R.G. and C.G. type cast grid resistance supplied by the G.E. Co.

**Main Fuse:** The main fuse is of the copper ribbon type and carried in a fuse box made by the G.E. Co. and known as type M.A. 13B fuse box. It is placed in an easily accessible position and protected from the weather.

Lightning Arresters: Lightning arresters are of the magnetic blow out type made by the G.E. Co. and known as type M. form D. They are enclosed in a wooden box to protect them rain and dirt.

Barriers: Two barriers are provided for each car and carried one on each platform. They are interchangeable and are built of heavy wire netting carried on a 1/2" round iron frame - the whole being painted with aluminium paint.

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