7.04 List of Drawings

Dwg.No.& Reference	*Subject of Drawing*
2-9h1	Standard Assignment of Wire Numbers
3-1a1	Clearance Diagram (100" wide car)
3-1a2	Clearance Diagram (104" wide car)
3-1a3	Clearance Diagram (108" wide car)
3-1b1	General design and dimensions of P.C.C. car
3-1c1	Diagram of ventilation
3-1k1	Arrangement of foot pedals and operator's seat
3-2b1	Body bolster
3-2b1a	King pin
3-2b2	King pin conical washer
3-2c1	Motor ventilating ducts
3-2d1	Cable duct (cross section)
3-7c1	Seat
3-8a1	Door mounting with through shaft
3-8a2	Door mounting with overhead shaft
3-8c1	Door leaf & rubber door edges for option No. 1
3-8c2	Door leaf & rubber door edges for option No. 2
3-10b1	Characteristics of M.G. set blower
3-10i1	Diagram of pressure ceiling ventilation
3-11b1	Suspension of M.G. set
3-11d2	Gang switches
3-11d4	Diagram of (typical) circuits
3-12b2	Bumpers
3-12c2	Roof steps
3-12c2a	Rubber roof mats
3-12d1a	Draw bar socket
3-12d1b	Draw bar socket (external type)
3-12d2	Draw bar
3-12p4	Rear view with trolley catcher
3-12r1	Windshield
3-12r2	Operator's desk
4-2b1	Speed - time, distance - time curves
4-2h1	Shaft brake rate versus car weight
4-3d1	Traction motor by General Electric Company
4-3d2	Traction motor by Westinghouse Electric Corporation
4-3g1	Motor lead terminal
4-3g2	Motor terminals clamping bridge
4-4n1	Braking sequence
4-5b1	Reverser lever handle
4-5b1a	Reverser lever handle (For use with back-up control)
4-5e1	Springs for trolley board
B2-1b1	Truck B-2
B2-2d1	Truck cross member with lower part of motor clamp for truck B-2
B2-2d2	Upper part of motor clamp for truck B-2
B2-2g1	Arrangement of motor leads for truck B-2
B2-3c1	Rubber bolster stop for truck B-2
B2-4a1	Axle for truck B-2
B2-6a1	Axle assembly for truck B-2
B2-6e4	Transversal stop for track brake
B2-6e5	Longitudinal stop for track brake
B2-8a1	Torque Arm and Track Brake Suspension Assembly for Truck B-2
B2-8c1	Torque Arm Stabilizer Bracket Bushing for Truck B-2

7.04 List of Drawings (Cont'd)

Dwg. No. and Reference	*Subject of Drawing*
B2-12a1	Vertical snubber for truck B-2
B2-12a2	Swing link snubber for truck B-2
B3-1b1	Truck B-3
B3-1b2	Arrangement of electrical leads for truck B-3
B3-2a1	Side beam for truck B-3
B3-2b1	Axle assembly for truck B-3
B3-3a1	Bolster for truck B-3
B3-3b1	Insulating washer for center bearing of truck B-3
B3-4a1	Axle for truck B-3
B3-8a1	Motor support for truck B-3
B3-11a1	Dampers for truck B-3
B3-14a1	Support of motor bellows for truck B-3
C2-1a1	Arrangement of C-2 spring in truck B-2
C2-1a2	Assembly of spring C-2
C2-2a1	Rubber element for spring C-2
C2-2a2	Load deflection curve for spring C-2
C2-3a1	Umbrella for rubber element of spring C-2
C2-5a1	Bottom plate for steel spring C-2
C2-5b1	Rubber cup for steel spring C-2
C2-5c1	Base plate for steel spring C-2
C2-5c2	Top plate for coil of steel spring C-2
C3a-1a1	Assembly of spring C-3a
C3a-2a1	Rubber element for spring C-3a
C3a-2a2	Load deflection curve for spring C-3a
D1-1a1	Original P.C.C. resilient wheel for all gauges B-1, B-2 and B-3 trucks
D1-1a2	Rubber sandwich for wheel D-1
D1-8a1	Press ring for resilient wheel
D2-1a1	Superresilient wheel (Carnegie) for narrow gauge B-1 truck and standard gauge B-2 truck
D2-1a2	Three plate sandwich for wheels D-2, D-2a, D3 and D-3a
D2-4b1	Spacer bolt for wheel D-2 (Carnegie)
D2a-1a1	Superresilient wheel (Naco) for narrow gauge B-1 truck and standard gauge B-2 truck
D2a-4b1	Spacer bolt for wheel D-2a (Naco)
D3-1a1	Superresilient wheel (Carnegie) for wide gauge B-2 truck and all gauges B-3 truck
D3-4b1	Spacer bolt for wheel D-3 (Carnegie)
D3a-1a1	Superresilient wheel (Naco) for wide gauge B-2 truck and all gauges B-3 truck
D3a-4b1	Spacer bolt for wheel D-3a (Naco)
E1-1a1	Drum brake (Westinghouse Air) with internal shoes
E2-1a1	Drum brake (Clark) with external shoes
E2-1a2	Drum brake (Westinghouse Air) with external shoes
F1-1a1	Actuator for spring applied brake
F1-2a1	Actuator base plate for Truck B-2
F1-2a2	Actuator base plate for Truck B-3
F2-1a1	Actuator for magnetically applied brake

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE A-1 - BASIC P.C.C. CAR BODY, 100" WIDE

(1) This Schedule covers the basic P.C.C. car body, 100" wide, 46'5-3/8" long over-all, as described in the various Sections and on the drawings referred to in Section 3.

(2) Any departure from this Schedule shall be described by the purchaser in Section 6.11. These departures may comprise the following items:

(a) Changes in the length of the car

(b) Details of pressure ventilation

(c) Inclusion of doors at the left side of the car

(d) Arrangement of double end car

(e) Arrangement for multiple unit operation

(f) Provision for metallic circuit

(g) Any other special requirements

(3) Except for such changes as may be requested in paragraph (2) above, the body shall conform to specifications as outlined in Section 3.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE A-2 - BASIC P.C.C. CAR BODY, 104" WIDE

(1) This Schedule covers the basic P.C.C. car body, 104" wide, 46'5-1/2" long over-all, as described in the various Sections and on the drawings referred to in Section 3.

(2) Any departure from this Schedule shall be described by the purchaser in Section 6.11. These departures may comprise the following items:

(a) Changes in the length of the car

(b) Details of pressure ventilation

(c) Inclusion of doors at the left side of the car

(d) Arrangement of double end car

(e) Arrangement for multiple unit operation

(f) Provision for metallic circuit

(g) Any other special requirements

(3) Except for such changes as may be requested in paragraph (2) above, the body shall conform to specifications as outlined in Section 3.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE A-3 - BASIC P.C.C. CAR BODY, 108" WIDE

(1) This Schedule covers the basic P.C.C. car body, 108" wide, 46-5-1/2" long over-all, as described in the various Sections and on the drawings referred to in Section 3.

(2) Any departure from this Schedule shall be described by the purchaser in Section 6.11. These departures may comprise the following items:

(a) Changes in the length of the car

(b) Details of pressure ventilation

(c) Inclusion of doors at the left side of the car

(d) Arrangement of double end car

(e) Arrangement for multiple unit operation

(f) Provision for metallic circuit

(g) Any other special requirements

(3) Except for such changes as may be requested in paragraph (2) above, the body shall conform to specifications as outlined in Section 3.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE B-2 - STANDARD AND WIDE GAUGE P.C.C. TRUCK B-2

1. General

(a) This Schedule covers the detailed design of the P.C.C. truck B-2 for use on standard or wide gauge track.

(b) The truck structure as shown on T.R.C. Drawing No. B2-1b1 consists essentially of a flexible frame formed by the axle housings and the torque arms, supporting by means of springs, a rigid frame formed by two longitudinal side tubes and two cross members. The side tubes engage the springs by means of vertical tubular members, support the motors by means of the cross members and the truck bolster by means of swing-links.

2. Upper Frame

(a) The side frames of the truck shall be made of cold drawn seamless tubes conforming to the latest revision of A.S.T.M. specification A 83 for Lap-Welded and Seamless Steel and Lap-Welded Iron Boiler Tubes, and shall be of Grade A type as defined in said A.S.T.M. specification. Outside diameter of these tubes shall be 6" with a wall thickness of 3/8". They shall have a Brinell hardness after complete fabrication, not to exceed 170.

(b) Vertical tubular pedestal members, two for each journal, shall be attached near each end of the side frame tubes as shown on T.R.C. Drawing No. B2-1b1. These pedestal tubes shall be made of cold drawn seamless steel tubes of S.A.E. X 4130 or S.A.E. 4140 steel. They shall have an outside diameter of not less than 2.260" nor more than 2.270" with a wall thickness of 5/16". They shall be heat treated to produce a minimum tensile strength of 90,000 lb. per sq. in.

(c) The pedestal tubes shall be accurately spaced to center in the journal spring containers, and shall be tied together beneath the journal housing by an easily removable cross tie. Sufficient clearance to avoid interference with the action of springs shall be provided between the journal housing, the crosstie below and the side frame above.

(d) The side frame tubes shall be connected across the truck by two cast steel members which shall serve as mounting frames for the driving motors. These cross members shall be welded at their ends to the side frame tubes, using two seams per end at each tube and on opposite sides thereof. Each seam shall be 7" long, parallel to the axis of the side tube and capable of resisting in shear 3000 lb. per linear inch. Further details shall be as shown on T.R.C. Drawings No. B2-2d1 and B2-2d2.

2. Upper Frame (Cont'd)

(e) The cross members shall be arranged with tongued openings of the proper shape and dimensions to receive and lock the motors firmly in position, and also a hole to receive a locating dowel pin provided on the motor frame. Grooves and pin provided on the motors for that purpose are shown on T.R.C. Drawings No. 4-3d1 and 4-3d2. The parts shall be universally interchangeable and shall conform to T.R.C. Drawings No. B2-2d1 and B2-2d2.

(f) Two rectangular steel bars, each with section area of 1-1/4 sq. in., shall be welded to the outer flanges of the cross members so as to extend between them in a position parallel to and below the side frame tubes. The shapes and sections of the cross members shall be such that, in combination with side tubes, the rectangular reinforcing bars and the motor frames, they produce a substantially rigid frame capable of withstanding the distorting forces experienced in operation of the type specified herein. The assembly of this rigid frame shall be so arranged as to permit the removal of the motors from above.

(g) The cross members and other parts of the truck shall be designed for the passage and attachment of motor leads as shown on T.R.C. Drawing No. B2-2g1.

3. Swing Links and Bolster

(a) Swing links shall be swung from tubes 2-1/2" in diameter, made of S.A.E. 1020 steel, firmly held from cast steel brackets welded on the inner central part of the side frame, and providing a suspension base not less than 15" over-all length. They shall be 11" long between centers of articulation and so installed that their angle with the vertical is 1/8" per in. Each swing link shall be vertically split in two halves bolted together with seven 1/32" thick shims in the joint. Each half shall be provided with a journal hole at the top to engage with the corresponding end of the supporting tube, and one at the bottom to engage with the tubular extension of the bolster end articulation. When the two halves are bolted together, the corresponding journal holes shall line up together. Each journal hole shall be provided with a sleeve 3/16" thick, 4" long, made of S.A.E. 64 bronze having lubricating means and holes for holding the lubricant, and with a pressure lubrication fitting engaging through the steel wall of the journal into the bronze of the sleeve, to prevent its rotation. The inside diameter of the sleeves shall be 0.02" larger than that of the tubular members they engage. At its end toward the split, the metal of the journal shall bear against a thrust washer made of S.A.E. 64 bronze, 1/4" thick. At its other end, it shall be provided with a cover protecting the articulation against dust and water. The split of the swing link shall be so arranged that it permits ready take-up by the removal of the proper number of shims to compensate for the wear of the thrust washers.

3. Swing Links and Bolster (Cont'd)

(b) The bolster shall be provided at both ends with articulations mounted on cylindrical extensions of these ends and engaging into the lower journal holes of the swing links. The cylindrical extensions at both ends shall line up together and have a diameter of 4" and a bearing length of 3". The articulation engaging each extension shall be fitted with a sleeve made of S.A.E. 64 bronze, with an inside diameter 0.020" larger than the cylindrical extension. The sleeve shall be 3/16" thick and its inner surface shall be provided with spider lubrication grooves. A pressure lubrication fitting shall be mounted through the steel of the articulation, into the bronze of the sleeve, to prevent its rotation. The articulation shall bear against the bolster by means of a thrust washer 1/4" thick, made of S.A.E. 64 bronze. Each articulation shall engage with the lower journal holes of the corresponding swing link by means of two cylindrical extensions 2-1/2" in diameter and approximately 4" long, properly lined up together. The end articulations shall permit the bolster to rock about a horizontal axis parallel to its long dimension and, in combination with the swing links, to swing between stops in a direction across the track. The journals permitting swinging across the track are hereafter referred to as the trunnions. Those permitting the bolster to rock are referred to as the bolster journals. The end articulation or bolster journals extending from the bolster shall be covered with a pressed steel sleeve which can be easily replaced when wear becomes excessive.

(c) The swing links and bolster shall have sections sufficiently strong to carry safely both the load of the car acting in a vertical direction and the accelerating and decelerating forces acting in the horizontal direction. They shall be so shaped as to provide sufficient clearance for the propeller shafts and universal joints and clear other parts of the truck. The transverse swing of the bolster shall be limited to 1-1/2" each side of the central position by means of rubber stops shown on T.R.C. Drawing No. B2-3c1.

(d) The vertical tubular member at the center of the bolster which carries the king pin shall be fitted with a bearing sleeve near its lower end. This shall be made of S.A.E. 64 bronze with not less than 1/4" wall thickness. Its inner diameter shall be nominally 5-1/2" and it shall fit over the finished bearing surface of the end sleeve on the body bolster center pin with a clearance of 0.003" (+0.000"-0.002") all as shown on T.R.C. Drawing No. 3-2b1a. The upper part of the cylindrical part of the swing bolster shall carry a body supporting center bearing. This shall be made of cast iron and the bearing surface shall be conical with an included angle of 100°. The horizontal projection of the bearing surface shall have an area of not less than 50 sq. in. The upper and lower parts of this center bearing shall be so dimensioned and fabricated as to make trucks universally interchangeable.

3. Swing Links and Bolster (Cont'd)

(e) The housing of this center bearing shall be arranged to carry a felt ring contacting with the underside of the body bolster structure and serving to exclude dirt from the center bearing. The receptacle for this felt ring shall be provided by the Truck Builder. The Car Builder shall supply and place the felt ring just before assembly of car body and truck. This ring shall be made of S.A.E. Grade F-1 material. The ends of the material shall be cut at an angle giving an overlap of not less than 3/4" and they shall mate properly when in place. This felt ring shall be cemented in place or held by other approved means. The Car Builder shall also provide in accordance with Section 3.02(b)(2) a perforated bronze or micarta conical washer, fitted snugly to the center bearing and provided with perforations of 1/2" diameter spaced 3/4" apart.

(f) The body bolster center pin shall be locked into the swing bolster as shown on T.R.C. Drawing No. 3-2bla to enable picking up of the truck when the body is raised. The body bolster center pin and the attachments herein specified shall be supplied by the Car Builder, but the Truck Manufacturer must cooperate with the latter to insure proper dimensional relations and adequate provision for holding the felt seal between truck bolster and the bottom of the body bolster center pin.

(g) Pressure lubrication by means of easily accessible Alemite hydraulic fittings shall be provided at all bolster and swing link bearings. Lubrication of the vertical center pin bearing shall be provided by lubricant stored in the structure and filled through an Alemite hydraulic fitting. All lubrication fittings shall be so arranged as to prevent the use of the wrong type of gun on any individual bearing.

4. Axles

The design of the axles shall be as shown on T.R.C. Drawing No. B2-4al. It shall conform to Sections 2.02(b) and 5.05.

5. Transmission

(a) The transmission gearing shall be of the right angle, hypoid type with 1-3/4" offset. The ring gear shall be made of S.A.E. 2315 steel and the pinion of S.A.E. 2515 steel. Both shall be suitably heat treated. The pinion shall have 6 teeth and the gear 43 teeth. Other details of the design shall be as shown on T.R.C. Drawing No. B2-6al.

(b) The ring gear shall be mounted on its pilot with a light tap fit and fastened by means of 18 heat treated, 1/2" cap screws. The heads of these screws shall be drilled and wired.

(c) The hub shall be forged of S.A.E. 1020 steel. It shall be pressed on the axle and the fit and finish of the hub shall be such as to require apressure of not less than 35 tons nor more

5. Transmission (Cont'd)

(c) (Cont'd)

than 75 tons when lubricated with white lead. The ends of the hub shall be tapered to a thickness of 3/16" at the extremities and over such a distance as to prevent excessive concentrations of stress in the axle.

6. Axle Housing and Assembly

(a) The axle housing and assembly shall be as shown on T.R.C. Drawing No. B2-6a1. The housing shall be designed for a wall thickness of 5/16" and be free of defects such as sand holes, cold shots, shrinkage holes and porosity. The metal shall conform to steel castings specifications, Section 2.02(c)(2).

(b) The gear housing bearing shall be the locating bearing between axle and gear housing and the outer pinion bearing shall be the locating bearing between pinion and housing.

(c) When the axle is assembled in the housing with one journal bearing and the center bearing in place, the bearing seat for the second journal bearing shall not be out of center with the axle by more than .005".

(d) The housing shall be provided with oil seals and oil return drains sufficient to prevent leakage.

(e) The housing shall comprise the spring pots, as shown on T.R.C. Drawing No. B2-6a1, the necessary bosses and brackets to mount the shock absorbers, the torque arms as shown on T.R.C. Drawings No. B2-8a1 and No. B2-8c1, the transversal stops for the track brakes as shown on T.R.C. Drawing No. B2-6e4, the longitudinal stops as shown on T.R.C. Drawing No. B2-6e5, and an insulated box for the grounding brush.

7. Propeller Shafts

(a) Two propeller shafts shall be supplied in each truck.

(b) These shall be of lightweight, tubular construction. The outside diameter shall be not less than 3" and the tube shall have a nominal wall thickness of 3/32". To insure uniform wall thickness it shall be made of S.A.E. 1025 sheet steel formed into a tube and welded along the longitudinal seam.

(c) The propeller shaft shall be so constructed that it incorporates electrical insulation between the motor and the pinion of the transmission.

(d) The propeller shaft after attachment of complete universals shall be geometrically centered within 0.015" on the diameter, shall operate smoothly up to 3500 r.p.m. and be free of objectional vibrations up to a speed of 4800 r.p.m.

7. Propeller Shafts (Cont'd)

(e) The companion flange of the universal at the transmission end shall be splined and secured to the pinion shaft, the fit being S.A.E. 10-A.

(f) The outer flange of the universal at the motor end shall be piloted and fitted on the end flange of the motor shaft. The diameter of the pilot shall be 3.750"-3.752" and its depth 3/16". The radius of the bolt circle shall be 2.623"-2.626" and there shall be 8 bolt holes 0.443"-0.450" in diameter, equally spaced within 0.004".

(g) The length of the propeller shaft shall be equal to the distance between the motor flange and the pinion flange ±1/16", when the center line of the motor is located 1/2" above or below the pinion center line.

(h) The make of the universals shall be as specified in Section 6.09(51).

(i) In case the universals have insufficient elasticity to take care of length variations, the shaft must be provided with a sliding spline having provision for lubrication and protected against dust and water. There must be no continuous end thrust on the motor bearings and the momentary end thrust shall not exceed 140 lb. per 100' lb. torque.

8. Torque Arm and Track Brake Suspension

(a) Two torque arms as shown on T.R.C. Drawing No. B2-8a1, made of plate steel, shall be provided to resist torque of motors and tread brakes.

(b) One end of each of the two torque arms per truck shall be securely bolted with close fitting bolts and doweled to the bracket provided for the purpose on each of the two journal housings per truck.

(c) The other end of the torque arm shall be attached to the brackets provided for that purpose in the remaining journal housings, using two cylindrical halves of rubber, as shown on T.R.C. Drawing No. B2-8c1.

(d) Each torque arm shall be provided with necessary brackets for the support of the magnetic track brake suspension.

9. Springs

Load springs shall be provided according to Schedule C-2 unless otherwise specified in Section 6.09(48).

Schedule B-2 - Truck B-2

10. Drum Brakes

Drum Brakes shall be provided according to Schedule E-1, E-2 or E-2a with actuators according to Schedule F-1 or F-2. They shall be operated electrically on all motor shafts. They shall be able to produce braking rates as shown on T.R.C. Drawing No. 4-2h1.

11. Magnetic Track Brakes

Magnetic track brakes with cradle and suspension of approved design shall be provided as specified in Sections 5.10 and 6.09(45).

12. Damping Means

Damping means shall be provided as specified in Sections 5.11 and 6.09(49). Vertical rubber snubbers as shown on T.R.C. Drawing No. B2-12a1, (which also prevent torque arm failures), and swing link snubbers as shown on T.R.C. Drawing No. B2-12a2 are available. If these are not sufficient, hydraulic shock absorbers are also available.

13. Wheels

Wheels shall be provided as specified in Sections 5.12 and 6.01(a) and corresponding Schedule.

14. Painting

Painting shall conform to Sections 2.06(1) and 5.13.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE B-3 - STANDARD AND WIDE GAUGE P.C.C. TRUCK B-3

1. General

(a) This Schedule covers the detailed design of the P.C.C. truck B-3 for use on standard or wide gauge tracks.

(b) The truck structure as shown on T.R.C. Drawing No. B3-1b1 consists of a frame formed by the axle housings and the side beams, practically rigid in horizontal directions and relatively flexible in vertical directions. This frame supports the motors, brakes, and bolster by means of springs.

2. Frame

(a) The side beams of the truck shall be made of AISI-C1018 steel sheets welded into box sections with cast steel ends and proper means to support the various parts attached to them as shown on T.R.C. Drawing No. B3-2a1.

(b) The axle housings shall be made of cast steel as shown on T.R.C. Drawing No. B3-2b1.

(c) In order to form the rectangular frame ends, the side beams shall be rigidly attached to the axle housings and doweled to it by means of one cylindrical and one conical dowel at two diagonally opposed ends. At the two other ends, it shall be attached to the axle housings with a cylinder of rubber interposed. The assembly shall be such that the wheels line up at each side of the truck.

(d) Bosses shall be provided for the eventual mounting of wheel grinders.

3. Bolster

(a) The bolster shall be made of cast steel, as shown on T.R.C. Drawing No. B3-3a1. It shall be provided with inverted pockets fitting on the main springs of the truck and, at the center, with a vertical tubular member.

(b) The vertical tubular member which carries the body king pin shall be fitted at its lower end with a bearing sleeve made of micarta, or equivalent, for insulation. The inner diameter of this sleeve shall be nominally 5½". This bearing sleeve shall properly seat the steel sleeve of the king pin and permit its free rotation. At its upper end it shall be provided with a machined conical surface with an included angle of 100° dimensioned so as to fit the king pin bearing. The center bearing as shown on T.R.C. Drawing No. B3-3b1 shall be so dimensioned and fabricated as to make trucks interchangeable.

3. Bolster (Cont'd)

(c) The housing of the center bearing shall be arranged to carry a felt ring contacting with the underside of the body bolster structure and serving to exclude dirt from the center bearing. This ring shall be provided by the Truck Builder. It shall be made of SAE grade F1 Material. The ends of the material shall be cut at an angle giving an overlap of not less than 3/4" and they shall mate properly when in place. The Car Builder shall cement or otherwise securely insert the felt ring when assembling the car body on the truck.

(d) A perforated bronze or micarta conical washer in accordance with Section 3.02 (b) (2) shall be provided by the Car Builder. It shall be provided with 1/2" diameter pockets, 1/8" deep, 3/4" apart. An insulating fabric and synthetic rubber shall be inserted at the lower face of this washer and shall fit snugly to the center bearing surface of the bolster.

(e) The body bolster center pin shall be locked into the swing bolster as shown on T.R.C. Drawing No. 3-2b1a to enable picking up of the truck when the body is raised. The body bolster center pin and the attachments herein specified shall be supplied by the Car Builder, but the Truck Manufacturer must cooperate with the latter to insure dimensional relations and adequate provision for holding the felt ring between truck bolster and the bottom of the body bolster center pin.

(f) Pressure lubrication by means of easily accessible Alemite hydraulic fittings shall be provided at all king pin bearings.

4. Axles

The design of the axles shall be as shown on T.R.C. Drawing No. B3-4a1. It shall conform to Sections 2.02 (b) and 5.05.

5. Transmission

(a) The transmission gearing shall be of the right angle, hypoid type with 1-3/4" offset. The ring gear shall be made of SAE 4820 steel and the pinion of SAE 3312 steel. Both shall be suitably heat treated. The pinion shall have six teeth and the gear 43 teeth. Other details of the design shall be as shown on T.R.C. Drawing No. B3-2b1.

(b) The ring gear shall be mounted on its pilot with a light tap fit and fastened by means of 18 heat treated, 1/2" cap screws. The heads of these screws shall be drilled and wired.

(c) The hub of the ring gear shall be forged of SAE 1045 steel. It shall be pressed on the axle and the fit and finish shall be such as to require a pressure of not less than 35 tons nor more than 75 tons when lubricated with white lead. The ends of the hub shall be tapered to a thickness of 3/16" at the extremities and over such a distance as to prevent excessive concentration of stresses in the axle.

6. Axle Housing and Assembly

(a) The axle housing and assembly shall be as shown on T.R.C. Drawing No. B3-2bl. The housing shall be designed for a wall thickness of 3/8" and be free of defects such as sand holes, cold shots, shrinkage holes and porosity.

(b) The gear housing bearing shall be the locating bearing between axle and housing and it shall be possible to disassemble the two parts of the housing without disturbing the pinion or the bearings.

(c) When the axle is assembled in the housing with one journal bearing and the center bearing in place, the bearing seat for the second journal bearing shall not be out of center with the axle by more than 0.005".

(d) The bearing lubrication shall be automatic from the gear case and the housing shall be provided with oil seals and oil return drains sufficient to prevent leakage.

(e) The housing shall comprise the seats for the mounting of the side beams of the truck and a box with grounding brushes and insulated leads.

7. Bearings

(a) The axle assembly shall be provided with the following anti-friction bearings: Two journal bearings, nominal bore 100 mm, of the self centering roller type; one center bearing, nominal bore 100 mm, of the double row, deep angle, preloaded, ball thrust type; one pinion radial bearing, nominal bore 70 mm, of the roller type; one pinion thrust bearing, nominal bore 70 mm, of the double row, deep angle, preloaded, ball thrust type.

(b) The fit of the bearings shall be that recommended by the bearing Manufacturer.

8. Propeller Shafts

(a) Two propeller shafts shall be supplied in each truck.

(b) These shall be of light weight, tubular construction. The outside diameter shall be not less than 3" and the tube shall have a nominal wall thickness of 3/32" made of SAE 1030 sheet steel formed and welded along a longitudinal seam.

8. Propeller Shafts (Cont'd)

(c) The propeller shaft shall be so constructed that it incorporates electrical insulation between the motor and the pinion of the transmission.

(d) The propeller shaft, after attachment of complete universals, shall be geometrically centered within 0.015" on the diameter, shall operate smoothly up to 3500 r.p.m. and be free of objectionable vibration up to a speed of 4800 r.p.m.

(e) The companion flange of the universal at the transmission end shall be splined and secured to the pinion shaft, the fit being SAE 10-A.

(f) The outer flange of the universal at the motor end shall be piloted and fitted on the end flange of the motor shaft. The diameter of the pilot shall be 3.750"-3.752" and its depth 3/16". The radius of the bolt circle shall be 2.623"-2.626" and there shall be 8 bolt holes 0.443"-0.450" in diameter, equally spaced within 0.004".

(g) The length of the propeller shaft shall be equal to the distance between the motor flange and the pinion flange ±1/16", when the center line of the motor is within 1/2" of the center line of the pinion.

(h) The make of the universal shall be as specified in Section 6.09(51).

(i) In case the universals have insufficient axial elasticity to take care of length variations, the shaft must be provided with a sliding spline having provision for lubrication and protected against dust and water. There must be no continuous end thrust on the motor bearings and the momentary end thrust shall not exceed 140 lb. per 100' lb. torque.

9. Motor Supports

(a) Each truck shall be provided with two cross beams as shown on T.R.C. Drawing No. B3-8a1 for the purpose of supporting the traction motors and brake actuators.

(b) Each cross beam shall be articulated in rubber.

(c) The motor shall be suspended under the cross beam by a wide steel band fastened as shown on T.R.C. Drawing No. B3-8a1.

(d) The actuator end of the beam shall be provided with vertical jaws which, in the truck assembly, are located between vertical guides made of rubber blocks of 60° durometer, for the purpose of restraining the motions and damping possible oscillations.

9. Motor Supports (Cont'd)

(e) The extreme end of the beam at the sprung side shall be provided with vertical base plate of proper form and in proper position to receive the brake actuator.

(f) Assembly and details shall be as shown on T.R.C. Drawing No. B3-8a1 and shall permit removal of the motor alone from under the car over a pit, or removal of the motor with the beam from above the truck.

10. Main Springs

Load springs shall be provided according to Schedule C-3a.

11. Drum Brakes

(a) Drum brakes shall be installed on the motor coupling flange and motor housing facing this flange. Each motor shall be equipped with one drum and one electric actuator mounted on the motor support.

(b) The drum brakes shall be of the internal or external approved type as shown in Schedule E-1, E-2 or E-2a, and the electric actuators shall be of the spring applied or magnetically applied type as shown in Schedule F-1 or F-2. In any case, complete failure shall cause full application of these brakes.

(c) All drum brakes, actuators and motors shall be interchangeable.

12. Magnetic Track Brakes

Magnetic track brakes with cradle and suspension of approved design, shall be provided as specified in Sections 5.10 and 6.09(45).

13. Rubber Dampers and Shock Absorbers

(a) Rubber dampers shall be provided at each side of the bolster as shown on T.R.C. Drawing No. B3-11a1. They shall comprise rubber blocks 3-7/8" wide and 3-7/8" high with a thickness of 2-7/8", and the rubber, natural or synthetic, shall have a hardness of 60° durometer.

(b) These blocks shall be shimmed in their retainers so as to come in contact with the corresponding surface of the bolster without pressure.

(c) These blocks shall also serve laterally as bumpers stopping the lateral motion of the bolster when it reaches 1-1/2" either side of the center. Lateral steel safety straps shall also be attached to the side frame as shown on T.R.C. Drawing No. B3-2a1.

(d) If desired and specified in Section 6.09(49)(a), one hydraulic shock absorber at each end to damp vertical oscillations of the bolster, and one hydraulic shock absorber at one end to damp horizontal oscillations of the bolster shall be added

13. Rubber Dampers and Shock Absorbers (Cont'd)

(d) (Cont'd)

to supplement the action of the rubber snubbers, but these shall be required only for use in cars which run on tracks producing excessive oscillations.

14. Wheels

Wheels shall be provided as specified in Sections 5.12 and 6.01(a) and corresponding Schedule.

15. Motor Bellows

Motor bellows shall be provided by the Manufacturer and supported from the bolster as shown on T.R.C. Drawing No. B3-14a1.

16. Painting

Painting shall conform to Sections 2.06(1) and 5.13.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE C-2 - P.C.C. RUBBER AND STEEL COIL COMBINATION SPRING FOR TRUCK B-2

1. This spring combination, adapted for use in Truck B-2, consists per journal, of a rubber spring at one side and a double coil spring at the other. In order to preserve the correct balance of loads, the location of these two types of springs shall be reversed at the journal at the other end of the axle, as shown on T.R.C. Drawing No. C2-1a1. The assembly of the two springs is shown on T.R.C. Drawing No. C2-1a2.

2. The rubber spring shall be of the all-rubber type as shown on T.R.C. Drawing No. C2-2a1. The rubber shall have a durometer hardness of 40 ± 2 at a temperature between 70° and 90°F., shall have good elastic qualities, and shall give a deflection curve approximately as shown on T.R.C. Drawing No. C2-2a2.

3. The rubber spring in the finished assembly shall fit tightly in the spring pot and on the pedestal tube. It shall rest directly on the bottom of the spring pot and be surmounted by an umbrella as shown on T.R.C. Drawing No. C2-3a1.

4. The double (nested) coil spring shall be made of two coils having the following specifications:

	Outer Coil	*Inner Coil*
Outside diameter.....	9-1/8" to 9-1/4"	6-11/16" to 6-13/16"
Free length, approx.....	14-7/8"	13-7/8"
Wire diameter.....	7/8"	5/8"
Total coils, approx.....	6.5	8.7
Direction of winding.....	Right Hand	Left Hand
Solid length, max.....	5-1/2"	5-1/2"
Rate, approx.....	280 lb./in.	126 lb./in.
Ends.....	Closed and ground	

The springs shall be made of one of the following S.A.E. steels: 1095, 6150 or 9260. The coils shall be submitted to such heat treatment that they can function successfully under conditions which submit them regularly to a compressed length varying between 6" and 8", with accidental shocks which may reduce them to a length of 5-1/2". They shall be protected with a layer of Japan lacquer.

5. The coil springs shall be surmounted by a top plate as shown on T.R.C. Drawing No. C2-5c2 and shall be supported in the assembly by:

(a) A bottom plate as shown on T.R.C. Drawing No. C2-5a1.

Schedule C-2 - P.C.C. Rubber and Steel Coil Combination Spring

5. (Cont'd)

   (b) A rubber cup as shown on T.R.C. Drawing No. C2-5b1 intended for electrical insulation of the lower frame.

   (c) A base plate as shown on T.R.C. Drawing No. C2-5c1.

6. The load deflection curve of one complete journal assembly shall be approximately as shown on T.R.C. Drawing No. C2-2a2.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE C-3A - P.C.C. RUBBER AND STEEL COIL COMBINATION SPRING FOR TRUCK B-3

1. This spring combination, adapted for use in Truck B-3, consists of a rubber and a double coil spring at each side of the bolster. The assembly of the springs is shown on T.R.C. Drawing No. C3a-1a1.

2. The rubber spring shall be of the all-rubber type as shown on T.R.C. Drawing No. C3a-2a1. It shall be made of natural rubber and have a durometer hardness of 45 ± 2 at a temperature between 70° and 90°F. It shall have good elastic qualities and shall give a deflection curve approximately as shown on T.R.C. Drawing No. C3a-2a2.

3. The steel spring shall be made of a double coil having the following characteristics:

	Outer Coil	*Inner Coil*
Outside diameter	14-3/8"	9"
Wire diameter	1-3/8"	1"
Total turns (approximately).....	5	6
Direction of winding	Right hand	Left hand
Solid length (maximum).....	6-7/8"	6"
Rate (approximately).....	610 lb./in.	400 lb./in.
Height (Light Load).....	10"	10"
Ends	Closed and ground	

The springs shall be made of NE steel 8655. The coils shall be so heat treated that they can function successfully under service conditions. They shall be protected with a layer of Japan lacquer.

4. The load deflection curve of this spring for a standard weight (36000#) car shall be as shown on T.R.C. Drawing No. C3a-2a2.

5. The bearing members above coil covers and under coil plates shall be made of case hardened steel, the hardness of which shall exceed 400 Brinell or equivalent.

6. Auxiliary springs, as shown on T.R.C. Drawing No. C3a-1a1, shall permit regulation of the lateral motion of the bolster.

Revised June 1, 1950

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE D-1 - ORIGINAL P. C. C. RESILIENT WHEEL (CARNEGIE) FOR ALL GAUGE TRUCKS B-1, B-2 AND B-3

1. General

This Schedule covers the original P. C. C. resilient wheel as shown on T.R.C. Drawing No. D1-1a1, utilizing the sandwiches shown on T.R.C. Drawing No. D1-1a2.

2. Hubs

(a) The hub shall be bored to the dimensions shown on T.R.C. Drawing No. D1-1a1 and the finish shall be such that the wheel can be pressed on the axle with a pressure as indicated in Section 5.12(e).

(b) The outer end of the main hub shall be provided with an American (National) Standard thread 5" in diameter and 10 threads per inch.

(c) The threaded portion shall be 1-1/4" long to provide ample shear strength for use in removing the wheel from the axle. The tolerances on this threaded portion before the hub is pressed on the axle and the tolerances on the thread of the nut that mates with it, shall fall within those given on T.R.C. Drawing No. D1-1a1.

(d) The inner end of the main hub shall be cupped to prevent concentration of stress in the axle.

(e) The auxiliary hub shall be bored to fit over the portion of reduced diameter of the main hub with a 0.010" clearance on the diameter after the latter is expanded by pressing it onto the axle.

(f) The auxiliary hub shall engage the keyways provided for it on the main hub with a tangential clearance of not more than 0.005".

(g) The outer end of the auxiliary hub shall be finished conical to center it in the hub nut when the wheel is assembled.

(h) The metal of the two hubs shall have a tensile strength not less than 90,000 lb. per sq. in. and an elongation not less than 20% in 2".

3. Hub Nut

(a) The hub nut shall be made of S.A.E. 1030 steel and shall be faced conical on its inner surface to mate with the conical end of the auxiliary hub. Thread fit shall be as specified

3. (Cont'd)

(a) (Cont'd)

above for the thread on the hub of the wheel. See T.R.C. Drawing No. D1-1a1 for details of hub nut design.

(b) Provision shall be made for locking the hub nut in position by means of a hub cap formed of S.A.E. 1020 steel. This cap shall be locked through a depression in the hub with a screw and lock washer, entering a threaded hole in the end of the axle, or by other approved means.

4. Cheek Plates

(a) The cheek plates, consisting of plates contacting the rubber sandwiches, and of conical reinforcing plates welded to them, shall be made of S.A.E. 1030 hot rolled steel.

(b) The cheek plate located on the inside of the wheel shall be welded to the main hub, and that located on the outside of the wheel shall be welded to the auxiliary hub. All welding shall conform to the specifications in Section 2.07. All parts are to be annealed at 1100° F. after welding.

(c) The surfaces of the cheek plates which contact the rubber sandwiches shall be faced after annealing so as to give a true conical surface with respect to the axis of the bore of the hub and with a dish reaching 1/64" at the hub. The metal used shall be of such thickness that it will not be reduced to less than 1/4" after this facing operation.

(d) The conical reinforcing plates shall be made of 3/16" steel plate and, after all welding, annealing and machining operations are completed, shall not be more than 1/32" convex.

5. Rubber Sandwiches

(a) These sandwiches shall have the shape and dimensions shown on T.R.C. Drawing No. D1-1a2.

(b) The nominal free thickness of the sandwich over the metal plates shall be 29/32".

(c) Every sandwich shall conform to the dimensional tolerances for thickness and flatness when measured in the manner indicated hereinafter with micrometer caliper. The Manufacturer shall supply necessary facilities for such inspection.

(d) Average thickness shall be obtained from the average of 24 measurements taken at the following locations: eight measurements at equally spaced circumferential intervals 1/2" from the outer periphery; eight measurements at equally spaced circumferential intervals 1/2" from the inner periphery; eight measurements equally spaced circumferentially and intermediate circumferentially with the other two sets of points. Any sandwich from which the average of these 24 thickness measurements departs

5. (Cont'd)

(d) (Cont'd)

by more than ±1/32" from the specified thickness of 29/32" shall not be accepted.

(e) The thickness at any point of any one sandwich shall not vary more than ±1/32" from this measured average thickness, nor shall there be a variation in thickness of more than 1/32" between any two points 6" or less apart. The average of the eight measurements adjacent the inner periphery, or the average of the eight intermediate measurements, shall not be greater than the average of the eight measurements adjacent the outer periphery.

(f) Warp shall be construed as the greatest clearance that can be measured between the metal on one side of the sandwich and a straight edge resting thereon, the straight edge to be tangent to the central hole. Sandwiches with warp not in excess of 1/16" shall be accepted, providing the thickness throughout the warped portion does not vary more than 1/32".

(g) The rubber in these sandwiches shall be so compounded, fabricated and cured that it shall be capable of withstanding the continuous reversal of stresses which occurs in a wheel of the car covered by these complete Specifications.

(h) When two sandwiches are assembled in this wheel with the correct axial pressure of 35,000 lb., as indicated elsewhere in this Schedule, and applied with all parts at 70°F., a radial load of 8,000 lb. shall produce a radial deflection of 3/16" +1/32" -0" between tire and hub. The axial load shall be run up to 8,000 lb. and back to zero a few times before the deflection test is made. The rubber Manufacturer shall test at his expense one sandwich in each lot of 100 or fraction thereof to check the fulfillment of this deflection specification.

(i) When an assembled wheel is loaded radially for 240 hours with a load of 4,000 lb., the increment of deflection between the end of the first 24 hours and the end of 240 hours shall not exceed 0.0035". The Manufacturer shall test at his expense one sandwich in each lot of 200 or fraction thereof to check fulfillment of this drift specification.

(j) The Manufacturer shall test at his expense for strength of bond, at least one sandwich in each lot of 400 or fraction thereof. This shall be done by cutting a piece out of the sandwich and testing it in accordance with the latest revision of A.S.T.M. specification D 429, "Standard Test for Adhesion of Vulcanized Rubber to Metal." The failure must then be through the body of the rubber, not between metal and cement or between cement and rubber.

(k) The rubber Manufacturer shall supply at his expense all equipment required for all the checks and tests mentioned above.

6. Bonds

Two armored flexible bonds of shape as shown on T.R.C. Drawing No. D1-1a1 capable of passing 100 amperes each without undue heating, and consisting of stainless steel and Hi-Ten-So bronze wire, or approved equal, shall be installed on each wheel. One end of each bond shall be attached to the inside cheek plate and the other end to the web of the tire member as shown on T.R.C. Drawing No. D1-1a1. The plug ends of these bonds which are fastened into the cheek plates shall be expanded into threaded holes therein. Those plug ends which are fastened into the tire member shall be driven into holes therein and tack welded at the free end. The bonds shall be so installed as to prevent contact with the inside of the tire and with the cheek plate in any operating position.

7. Tire

The tire member shall be rolled or forged of high carbon steel and shall be heat treated to produce a Brinell hardness between 321 and 363 on the front face of the tire near the tread surface. The hardness measurement shall be made at a point near the tread which is so located that the edge of the impression is not less than 3/16" from the tangent point of the curve joining face and tread. At least 10% of each order shall be tested for hardness and the wheels used for test shall be so chosen as to be representative of the entire lot. If one or more of the wheels tested fail to meet the specification the Manufacturer may test at his expense all the wheels of the order, and those falling within the specification shall be accepted. Wheels which fall outside the specification may be retreated and retested at Manufacturer's expense.

8. Assembly Pressure

In assembling the wheel, the sandwiches shall be compressed between the check plates by means of a pressure applied on the latter which shall vary with the temperature of the parts as follows:

M.M.-T.B DRG X 1418 RE PRESSURE & TEMPERATURE

Temperature, deg. Fahr.	*Set up pressure, pounds*
0	19,100
20	23,700
40	28,200
60	32,800
70	35,000
90	39,600
110	44,000

This pressure shall be distributed on the outer cheek plate by means of a ring as shown on T.R.C. Drawing No. D1-8a1.

9. Tolerances

(a) When finally assembled the gauge line of the tire shall not depart in an axial direction by more than 1/32" either side of a

9. Tolerances (Cont'd)

(a) (Cont'd)

"true" position. That is, the tire wobble when rotated shall not be greater than twice this amount (1/16").

(b) The plane of the gauge line of an assembled wheel shall not be more than 1/32" either side of the designed dimension (2-1/16") from the inner face of the wheel hub. The tire, in an assembled wheel, shall not be eccentric with respect to the bore of the hub by more than 1/64".

10. Painting

The wheel Manufacturer shall clean all dirt and oil from all external surfaces of the parts of the wheel. Before assembly, the threads of the hub and of the hub nut shall be covered with white lead. After assembly, a coat of approved metal primer shall be applied over all external surfaces except the bore and the tire surfaces, which shall be oiled to protect against rust.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE D-2 - SUPERRESILIENT P.C.C. WHEEL (CARNEGIE) FOR NARROW GAUGE TRUCK B-1 AND STANDARD GAUGE TRUCK B-2

1. General

This Schedule covers the superresilient P.C.C. wheel as shown on T.R.C. Drawing No. D2-1a1, utilizing the sandwich as shown on T.R.C. Drawing No. D2-1a2.

2. Hub

(a) The hub shall be bored to the dimensions shown on T.R.C. Drawing No. D2-1a1 and the finish of the hub bore shall be such that the wheel can be pressed on the axle with a pressure as indicated in Section 5.12(e).

(b) The outer end of the hub shall be provided with six holes tapped with American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, and the inner end shall be cupped to reduce stress concentrations in the axle.

(c) The metal of the hub shall have a tensile strength not less than 90,000 lb. per sq. in. and an elongation not less than 20% in 2".

3. Cheek Plates

(a) The cheek plates, which contact the rubber sandwiches, shall be made of S.A.E. 1030 hot rolled steel.

(b) The inner cheek plate shall be 3/8" thick and shall be welded on the hub. All welding shall conform to the specifications in Section 2.07. All parts are to be annealed at 1100° F. after welding.

(c) The outer cheek plate shall be 5/8" thick and shall be fastened on the outer face of the hub with cap screws in locations shown on T.R.C. Drawing No. D2-1a1.

(d) When the cheek plates are assembled on the hub and rotated about its axis, a flat plate applied on either of the faces contacting the sandwiches shall not run out of true more than 1/64" measured near the periphery. A dial indicator applied on the surface of these faces shall not show more than 1/32" difference between extreme variations.

4. Screws and Bolts

(a) The six cap screws mounting the outer cheek plate on the hub shall have American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, 1-9/16" threaded length, hexagonal head 21/32" high and 1-1/8" across flats.

4. Screws and Bolts (Cont'd)

(b) The six spacer bolts shall conform to T.R.C. Drawing No. D2-4b1. They shall be screwed in the 3/8" cheek plate and tack welded on the inner face of the wheel.

(c) Screws and bolts shall be made of S.A.E. 1035 steel and heat treated to produce 90,000 lb. per sq. in. elastic limit.

5. Rubber Sandwiches

(a) The sandwiches shall have the shape and dimensions shown on T.R.C. Drawing No. D2-1a2.

(b) The nominal free thickness of the sandwich over the metal plates shall be 1-19/32".

(c) Every sandwich shall conform to the dimensional tolerances for thickness and flatness when measured in the manner indicated hereinafter with micrometer caliper. The Manufacturer shall supply necessary facilities for such inspection.

(d) Average thickness shall be obtained from the average of 16 thickness measurements taken at the following locations: eight measurements at equally spaced circumferential intervals 1/2" from the outer periphery; and eight measurements at equally spaced circumferential intervals 1/2" from the inner periphery and radially intermediate with the first set of points. Any sandwich from which the average of these 16 thickness measurements departs by more than +3/64" or -1/64" from the specified thickness of 1-19/32" shall not be accepted.

(e) The thickness at any point of any one sandwich shall not vary more than + or - 3/64" from the average thickness as determined above, nor shall there be a variation in thickness of more than 3/64" between any two points 6" or less apart.

(f) Warp shall be construed as the greatest clearance that can be measured between the metal on one side of the sandwich and a straight edge resting thereon, the straight edge to be tangent to the central hole. Sandwiches with warp not in excess of 3/32" shall be accepted, providing the thickness throughout the warped portion does not vary more than 3/64".

(g) The rubber in these sandwiches shall be so compounded, fabricated and cured that it shall be capable of withstanding the continuous reversal of stresses which occur in a wheel of the car covered by these complete Specifications.

(h) When two sandwiches are assembled in this wheel so that the overall thickness of each is reduced to 1-1/2" with all parts at 70° F., a radial load of 8000 lb. shall produce a radial deflection of 3/8" +1/16" -0" between tire and hub. The radial load on the assembly shall be run up to 8000 lb. and back to zero a few times before this deflection test is made. The rub-

5. Rubber Sandwiches (Cont'd)

(h) (Cont'd)

ber Manufacturer shall test at his expense one sandwich in each lot of 100 or fraction thereof to check the fulfillment of this deflection specification.

(i) When an assembled wheel is loaded radially for 240 hours with a load of 4000 lb., the increment of deflection between the end of the first 24 hours and the end of 240 hours shall not exceed 0.007". The rubber Manufacturer shall test at his expense one sandwich in each lot of 200 or fraction thereof to check fulfillment of this drift specification.

(j) The Manufacturer shall test at his expense for strength of bond, at least one sandwich in each lot of 400 or fraction thereof. This shall be done by cutting apiece out of the sandwich and testing it in accordance with the latest revision of A.S.T.M. specification D 429, "Standard Method of Test for Adhesion of Vulcanized Rubber to Metal." The failure must then be through the body of the rubber, not between metal and cement or between cement and rubber.

(k) The rubber manufacturer shall supply at his expense all equipment and material required for the checks and tests mentioned above.

6. Bonds

Two armored flexible bonds of shape as shown on T.R.C. Drawing No. D2-1a1 capable of passing 100 amperes without undue heating, and consisting of stainless steel and Hi-Ten-So bronze wire, or equivalent, shall be installed on each wheel. One end of each bond shall be attached to the outside cheek plate and the other end to the web of the tire member as shown on T.R.C. Drawing No. D2-1a1. The plug ends of these bonds which are fastened into the cheek plates shall be expanded into threaded holes therein. Those plug ends which are fastened into the tire member shall be driven into holes therein and tack welded at the free end. These bonds shall be so installed as to prevent contact with the inside of the tire and with the cheek plate in any operating position.

7. Tire

The tire member shall be rolled or forged of high carbon steel and shall be heat treated to produce a Brinell hardness between 321 and 363 on the front face of the tire near the tread surface. The hardness measurement shall be made at a point near the tread which is so located that the edge of the impression is not less than 3/16" from the tangent point of the curve joining face and tread. At least 10% of each order shall be tested for hardness and the wheels used for test shall be so chosen as to be representative of the entire lot. If one or more of the wheels tested fail to meet the specification,

7. Tire (Cont'd)

the Manufacturer may test at his expense all the wheels of the order, and those falling within the specification shall be accepted. Wheels which fall outside the specification may be retreated and retested at Manufacturer's expense.

8. Assembly Pressure

Correct assembly pressure is obtained by complete tightening of the screws in the hub and of the nuts on the spacer bolts.

9. Tolerances

(a) When finally assembled, the gauge line of the tire shall not depart in an axial direction by more than 1/32" either side of a true position. That is, the tire wobble when rotated shall not be greater than twice this amount (1/16").

(b) The plane of the gauge line of an assembled wheel shall not be more than 1/32" either side of the designed dimension (2-1/16") from the inner face of the wheel hub. The tire, in an assembled wheel, shall not be eccentric with respect to the bore of the hub by more than 1/64".

10. Painting

The wheel Manufacturer shall clean all dirt and oil from all external surfaces of the parts of the wheel. After assembly he shall apply a coat of approved metal primer to all external surfaces except the bore and the tire surfaces, which shall be oiled to protect against rust.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE D-2A - SUPERRESILIENT P.C.C. WHEEL (NACO) FOR NARROW GAUGE TRUCK B-1 AND STANDARD GAUGE TRUCK B-2

1. General

This Schedule covers the superresilient P.C.C. wheel as shown on T.R.C. Drawing No. D2a-1a1, utilizing the sandwich as shown on T.R.C. Drawing No. D2-1a2.

2. Hub

(a) The hub shall be bored to the dimensions shown on T.R.C. Drawing No. D2a-1a1, and the finish of the hub bore shall be such that the wheel can be pressed on the axle with a pressure as indicated in Section 5.12(e).

(b) The outer end of the hub shall be provided with 6 holes tapped with American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, and the inner end shall be cupped to reduce stress concentrations in the axle.

(c) The metal of the hub shall have a tensile strength not less than 90,000 lb. per sq. in. and an elongation not less than 20% in 2 in.

3. Cheek Plates

(a) The inner cheek plate shall be cast integral with the hub.

(b) The outer cheek plate shall be made of S.A.E. 1030 (AISI C-1030) hot rolled steel 1/2" thick, or cast of the same metal as the hub. It shall be fastened on the outer face of the hub with cap screws in locations shown on T.R.C. Drawing No. D2a-1a1.

(c) When the cheek plates are assembled on the hub and rotated about its axis, a flat plate applied on either of the faces contacting the sandwiches shall not run out of true more than 1/64" measured near the periphery. A dial indicator applied on the surface of these faces shall not show more than 1/32" difference between extreme variations.

4. Screws and Bolts

(a) The six cap screws mounting the outer cheek plate on the hub shall have American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, 1-1/8" threaded length, hexagonal head 21/32" high and 1-1/8" across flats.

(b) The six spacer bolts shall conform to T.R.C. Drawing No. D2a-4b1. They shall be screwed in the inner cheek plate and tack welded on the inner face of the wheel.

4. Screws and Bolts (Cont'd)

(c) Screws and bolts shall be made of S.A.E. 1035 (AISI C-1038) steel and heat treated to produce 90,000 lb. per sq. in. elastic limit.

5. Rubber Sandwiches

(a) These sandwiches shall have the shape and dimensions shown on T.R.C. Drawing No. D2-1a2.

(b) The nominal free thickness of the sandwich over the metal plates shall be 1-19/32".

(c) Every sandwich shall conform to dimensional tolerances for thickness and flatness when measured in the manner indicated hereinafter with micrometer caliper. The Manufacturer shall supply necessary facilities for such inspection.

(d) Average thickness shall be obtained from the average of 16 thickness measurements taken at the following locations: eight measurements at equally spaced circumferential intervals 1/2" from the outer periphery; and eight measurements at equally spaced circumferential intervals 1/2" from the inner periphery and radially intermediate with the first set of points. Any sandwich from which the average of these 16 thickness measurements departs by more than +3/64" or -1/64" from the specified thickness of 1-19/32" shall not be accepted.

(e) The thickness at any point of any one sandwich shall not vary more than + or - 3/64" from the average thickness as determined above, nor shall there be a variation in thickness of more than 3/64" between any two points 6" or less apart.

(f) Warp shall be construed as the greatest clearance that can be measured between the metal on one side of the sandwich and a straight edge resting thereon, the straight edge to be tangent to the central hole. Sandwiches with warp not in excess of 3/32" shall be accepted, providing the thickness throughout the warped portion does not vary more than 3/64".

(g) The rubber in these sandwiches shall be so compounded, fabricated and cured that it shall be capable of withstanding the continuous reversal of stresses which occurs in a wheel of the car covered by these complete Specifications.

(h) When two sandwiches are assembled in this wheel so that the over-all thickness of each is reduced to 1-1/2" with all parts at 70° F., a radial load of 8000 lb. shall produce a radial deflection of 3/8" +1/16" -0" between tire and hub. The radial load on the assembly shall be run up to 8000 lb. and back to zero a few times before this deflection test is made. The rubber Manufacturer shall test at his expense one sandwich in each lot of 100 or fraction thereof to check the fulfillment of this deflection specification.

5. Rubber Sandwiches (Cont'd)

(i) When an assembled wheel is loaded radially for 240 hours with a load of 4000 lb., the increment of deflection between the end of the first 24 hours and the end of 240 hours shall not exceed 0.007". The rubber Manufacturer shall test at his expense one sandwich in each lot of 200 or fraction thereof to check fulfillment of this drift specification.

(j) The Manufacturer shall test at his expense for strength of bond, at least one sandwich in each lot of 400 or fraction thereof. This shall be done by cutting a piece out of the sandwich and testing it in accordance with the latest revision of A.S.T.M. specification D 429, "Standard Method of Test for Adhesion of Vulcanized Rubber to Metal". The failure must then be through the body of the rubber, not between metal and cement or between cement and rubber.

(k) The rubber Manufacturer shall supply at his expense all equipment and material required for the checks and tests mentioned above.

6. Bonds

Two armored flexible bonds of shape as shown on T.R.C. Drawing No. D2a-1a1, capable of passing 100 amperes without undue heating, and consisting of stainless steel and Hi-Ten-So bronze wire, or equivalent, shall be installed on each wheel. One end of each bond shall be attached to the outer cheek plate and the other end to the web of the tire member as shown on T.R.C. Drawing No. D2a-1a1. The plug end of these bonds which are fastened into the cheek plates shall be expanded into threaded holes therein. Those plug ends which are fastened into the tire member shall be driven into holes therein and tack welded at the free end. These bonds shall be so installed as to prevent contact with the inside of the tire and with the cheek plate in any operating position.

7. Tire

The tire member shall be cast of spun steel. The steel shall conform to the requirements of American Transit Engineering Association Manual Section E7. It shall be heat treated to produce a Brinell hardness between 262 and 302 on the front face of the tire near the tread surface, with at least 75% of all tires in any lot above 269. The hardness measurement shall be made at a point near the tread which is so located that the edge of the impression is not less than 3/16" from the tangent point of the curve joining face and tread. The tread surface of the tire shall be ground or machined. At least 10% of each order shall be tested for hardness and the wheels used for test shall be so chosen as to be representative of the entire lot. If one or more of the wheels tested fail to meet the specification, the Manufacturer may test at his expense all of the wheels of the order, and those falling within the specification shall be accepted. Wheels which fall outside the specification may be retreated and retested at Manufacturer's expense.

8. Assembly Pressure

Correct assembly pressure is obtained by complete tightening of the screws in the hub and of the nuts on the spacer bolts.

9. Tolerances

(a) When finally assembled, the gauge line of the tire shall not depart in an axial direction by more than 1/32" either side of a true position. That is, the tire wobble when rotated shall not be greater than twice this amount (1/16").

(b) The plane of the gauge line of an assembled wheel shall not be more than 1/32" either side of the designed dimension (2-1/16") from the inner face of the wheel hub. The tire, in an assembled wheel, shall not be eccentric with respect to the bore of the hub by more than 1/64".

10. Painting

The wheel Manufacturer shall clean all dirt and oil from all external surfaces of the parts of the wheel. After assembly he shall apply a coat of approved metal primer to all external surfaces except the bore and the tire surfaces, which shall be oiled to protect against rust.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE D-3 - SUPERRESILIENT P.C.C. WHEEL (CARNEGIE) FOR WIDE GAUGE TRUCK B-2 AND ALL GAUGES TRUCK B-3

1. General

This Schedule covers the superresilient P.C.C. wheel as shown on T.R.C. Drawing No. D3-1a1, utilizing the sandwich as shown on T.R.C. Drawing No. D2-1a2.

2. Hub

(a) The Hub shall be bored to the dimensions shown on T.R.C. Drawing No. D3-1a1 and the finish of the hub bore shall be such that the wheel can be pressed on the axle with a pressure as indicated in Section 5.12(e).

(b) The outer end of the hub shall be provided with six holes tapped with American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit and the inner end shall be cupped to reduce stress concentrations in the axle.

(c) The metal of the hub shall have a tensile strength not less than 90,000 lb. per sq. in. and an elongation not less than 20% in 2 in.

3. Cheek Plates

(a) The cheek plates, which contact the rubber sandwiches, shall be made of S.A.E. 1030 hot rolled steel.

(b) The inner cheek plate shall be 5/8" thick and shall be welded on the hub. All welding shall conform to the specifications in Section 2.07. All parts are to be annealed at 1100° F. after welding.

(c) The outer cheek plate shall be 5/8" thick and shall be fastened on the outer face of the hub with cap screws in locations shown on T.R.C. Drawing No. D3-1a1.

(d) When the cheek plates are assembled on the hub and rotated about its axis, a flat plate applied on either of the faces contacting the sandwiches shall not run out of true more than 1/64" measured near the periphery. A dial indicator applied on the surface of these faces shall not show more than 1/32" difference between extreme variations.

4. Screws and Bolts

(a) The six cap screws mounting the outer cheek plate on the hub shall have American (National) Standard thread, 7/8" diameter,

4. Screws and Bolts (Cont'd)

(a) (Cont'd)

14 threads per in., Class 3 fit, 1-9/16" threaded length, hexagonal head 21/32" high and 1-1/8" across flats.

(b) The six spacer bolts shall conform to T.R.C. Drawing No. D3-4b1.

(c) Screws and bolts shall be made of S.A.E. 1035 steel and heat treated to produce 90,000 lb. per sq. in. elastic limit.

5. Rubber Sandwiches

(a) These sandwiches shall have the shape and dimensions shown on T.R.C. Drawing No. D2-1a2.

(b) The nominal free thickness of the sandwich over the metal plates shall be 1-19/32".

(c) Every sandwich shall conform to dimensional tolerances for thickness and flatness when measured in the manner indicated hereinafter with micrometer caliper. The Manufacturer shall supply necessary facilities for such inspection.

(d) Average thickness shall be obtained from the average of 16 thickness measurements taken at the following locations: eight measurements at equally spaced circumferential intervals 1/2" from the outer periphery; and eight measurements at equally spaced circumferential intervals 1/2" from the inner periphery and radially intermediate with the first set of points. Any sandwich from which the average of these 16 thickness measurements departs by more than +3/64" or -1/64" from the specified thickness of 1-19/32" shall not be accepted.

(e) The thickness at any point of any one sandwich shall not vary more than + or - 3/64" from the average thickness as determined above, nor shall there be a variation in thickness of more than 3/64" between any two points 6" or less apart.

(f) Warp shall be construed as the greatest clearance that can be measured between the metal on one side of the sandwich and a straight edge resting thereon, the straight edge to be tangent to the central hole. Sandwiches with warp not in excess of 3/32" shall be accepted, providing the thickness throughout the warped portion does not vary more than 3/64".

(g) The rubber in these sandwiches shall be so compounded, fabricated and cured that it shall be capable of withstanding the continuous reversal of stresses which occurs in a wheel of the car covered by these complete Specifications.

(h) When two sandwiches are assembled in this wheel so that the over-all thickness of each is reduced to 1-1/2" with all parts at 70° F., a radial load of 8000 lb. shall produce a radial

5. Rubber Sandwiches (Cont'd)

(h) (Cont'd)

deflection of 3/8" +1/16" -0" between tire and hub. The radial load on the assembly shall be run up to 8000 lb. and back to zero a few times before this deflection test is made. The rubber Manufacturer shall test at his expense, one sandwich in each lot of 100 or fraction thereof to check the fulfillment of this deflection specification.

(i) When an assembled wheel is loaded radially for 240 hours with a load of 4000 lb., the increment of deflection between the end of the first 24 hours and the end of 240 hours shall not exceed 0.007". The rubber Manufacturer shall test at his expense one sandwich in each lot of 200 or fraction thereof to check fulfillment of this drift specification.

(j) The Manufacturer shall test at his expense for strength of bond, at least one sandwich in each lot of 400 or fraction thereof. This shall be done by cutting a piece out of the sandwich and testing it in accordance with the latest revision of A.S.T.M. specification D429, "Standard Method of Test for Adhesion of Vulcanized Rubber to Metal". The failure must be through the body of the rubber, not between metal and cement or between cement and rubber.

(k) The rubber Manufacturer shall supply at his expense all equipment and material required for the checks and tests mentioned above.

6. Bonds

Two armored flexible bonds of shape as shown on T.R.C. Drawing No. D3-1a1 capable of passing 100 amperes without undue heating, and consisting of stainless steel and Hi-Ten-So bronze wire, or equivalent, shall be installed on each wheel. One end of each bond shall be attached to the inside cheek plate and the other end to the web of the tire member as shown on T.R.C. Drawing No. D3-1a1. The plug ends of these bonds which are fastened into the cheek plates shall be expanded into threaded holes therein. Those plug ends which are fastened into the tire member shall be driven into holes therein and tack welded at the free end. These bonds shall be so installed as to prevent contact with the inside of the tire and with the cheek plate in any operating position.

7. Tire

The tire member shall be rolled or forged of high carbon steel and shall be heat treated to produce a Brinell hardness between 321 and 363 on the front face of the tire near the tread surface. The hardness measurement shall be made at a point near the tread which is so located that the edge of the impression is not less than 3/16" from the tangent point of the curve joining face and tread. At least 10%

7. Tire (Cont'd)

of each order shall be tested for hardness and the wheels used for test shall be so chosen as to be representative of the entire lot. If one or more of the wheels tested fail to meet the specification, the Manufacturer may test at his expense all the wheels of the order, and those falling within the specification shall be accepted. Wheels which fall outside the specification may be retreated and retested at Manufacturer's expense.

8. Assembly Pressure

Correct assembly pressure is obtained by complete tightening of the screws in the hub and of the nuts on the spacer bolts.

9. Tolerances

(a) When finally assembled, the gauge line of the tire shall not depart in an axial direction by more than 1/32" either side of a true position. That is, the tire wobble when rotated shall not be greater than twice this amount (1/16").

(b) The plane of the gauge line of an assembled wheel shall not be more than 1/32" either side of the designed dimension (2-1/16") from the inner face of the wheel hub. The tire, in an assembled wheel, shall not be eccentric with respect to the bore of the hub by more than 1/64".

10. Painting

The wheel Manufacturer shall clean all dirt and oil from all external surfaces of the parts of the wheel. After assembly he shall apply a coat of approved metal primer to all external surfaces except the bore and the tire surfaces, which shall be oiled to protect against rust.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE D-3A - SUPERRESILIENT P.C.C. WHEEL (NACO) FOR WIDE GAUGE TRUCK B-2 AND ALL GAUGES TRUCK B-3

1. General

This Schedule covers the superresilient P.C.C. wheel as shown on T.R.C. Drawing No. D3a-1a1, utilizing the sandwich as shown on T.R.C. Drawing No. D2-1a2.

2. Hub

(a) The hub shall be bored to the dimensions shown on T.R.C. Drawing No. D3a-1a1 and the finish of the hub bore shall be such that the wheel can be pressed on the axle with a pressure as indicated in Section 5.12(e).

(b) The outer end of the hub shall be provided with six holes tapped with American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, and the inner end shall be cupped to reduce stress concentrations in the axle.

(c) The metal of the hub shall have a tensile strength not less than 90,000 lb. per sq. in and an elongation not less than 20% in 2".

3. Cheek Plates

(a) The inner cheek plate shall be cast integral with the hub.

(b) The outer cheek plate shall be made of S.A.E. 1030 (AISI C-1030) hot rolled steel or cast of the same metal as the hub. It shall be fastened on the outer face of the hub with cap screws in locations shown on T.R.C. Drawing No. D3a-1a1.

(c) When the cheek plates are assembled on the hub and rotated about its axis, a flat plate applied on either of the faces contacting the sandwiches shall not run out of true more than 1/64" measured near the periphery. A dial indicator applied on the surface of these faces shall not show more than 1/32" difference between extreme variations.

4. Screws and Bolts

(a) The six cap screws mounting the outer cheek plate on the hub shall have American (National) Standard thread, 7/8" diameter, 14 threads per in., Class 3 fit, 1-1/8" threaded length, hexagonal head 21/32" high and 1-1/8" across flats.

(b) The six spacer bolts shall conform to T.R.C. Drawing No. D3a-4b1.

4. Screws and Bolts (Cont'd)

(c) Screws and bolts shall be made of S.A.E. 1035 (AISI C-1038) steel and heat treated to produce 90,000 lb. per sq. in. elastic limit.

5. Rubber Sandwiches

(a) These sandwiches shall have the shape and dimensions shown on T.R.C. Drawing No. D2-1a2.

(b) The nominal free thickness of the sandwich over the metal plates shall be 1-19/32".

(c) Every sandwich shall conform to dimensional tolerances for thickness and flatness when measured in the manner indicated hereinafter with micrometer caliper. The Manufacturer shall supply necessary facilities for such inspection.

(d) Average thickness shall be obtained from the average of 16 thickness measurements taken at the following locations: eight measurements at equally spaced circumferential intervals 1/2" from the outer periphery; and eight measurements at equally spaced circumferential intervals 1/2" from the inner periphery, and radially intermediate with the first set of points. Any sandwich from which the average of these 16 thickness measurements departs by more than +3/64" or -1/64" from the specified thickness of 1-19/32" shall not be accepted.

(e) The thickness at any point of any one sandwich shall not vary more than + or - 3/64" from the average thickness as determined above, nor shall there be a variation in thickness of more than 3/64" between any two points 6" or less apart.

(f) Warp shall be construed as the greatest clearance that can be measured between the metal on one side of the sandwich and a straight edge resting thereon, the straight edge to be tangent to the central hole. Sandwiches with warp not in excess of 3/32" shall be accepted, providing the thickness throughout the warped portion does not vary more than 3/64".

(g) The rubber in these sandwiches shall be so compounded, fabricated and cured that it shall be capable of withstanding the continuous reversal of stresses which occurs in a wheel of the car covered by these complete Specifications.

(h) When two sandwiches are assembled in this wheel so that the over-all thickness of each is reduced to 1-1/2" with all parts at 70° F., a radial load of 8000 lb. shall produce a deflection of 3/8" + 1/16" -0" between tire and hub. The radial load on the assembly shall be run up to 8000 lb. and back to zero a few times before this deflection test is made. The rubber Manufacturer shall test at his expense one sandwich in each lot of 100 or fraction thereof, to check the fulfillment of this deflection specification.

5. Rubber Sandwiches (Cont'd)

(i) When an assembled wheel is loaded radially for 240 hours with a load of 4000 lb., the increment of deflection between the end of the first 24 hours and the end of 240 hours shall not exceed 0.007". The rubber Manufacturer shall test at his expense one sandwich in each lot of 200 or fraction thereof to check fulfillment of this drift specification.

(j) The Manufacturer shall test at his expense for strength of bond, at least one sandwich in each lot of 400 or fraction thereof. This shall be done by cutting a piece out of the sandwich and testing it in accordance with the latest revision of A.S.T.M. specification D429, "Standard Method of Test for Adhesion of Vulcanized Rubber to Metal". The failure must then be through the body of the rubber, not between metal and cement or between cement and rubber.

(k) The rubber Manufacturer shall supply at his expense all equipment and material required for the checks and tests mentioned above.

6. Bonds

Two armored flexible bonds as shown on T.R.C. Drawing No. D3a-1a1 capable of passing 100 amperes without undue heating, and consisting of stainless steel and Hi-Ten-So bronze wire, or equivalent, shall be installed on each wheel. One end of each bond shall be attached to the inside cheek plate and the other end to the web of the tire member as shown on T.R.C. Drawing No. D3a-1a1. The plug ends of these bonds which are fastened into the cheek plates shall be expanded into threaded holes therein. Those plug ends which are fastened into the tire member shall be driven into holes therein and tack welded at the free end. These bonds shall be so installed as to prevent contact with the inside of the tire and with the cheek plate in any operating position.

7. Tire

The tire member shall be cast of spun steel. The steel shall conform to the requirements of American Transit Engineering Association Manual Section E7. It shall be heat treated to produce a Brinell hardness between 262 and 302 on the front face of the tire near the tread surface, with at least 75% of all tires in any lot above 269. The hardness measurement shall be made at a point near the tread which is so located that the edge of the impression is not less than 3/16" from the tangent point of the curve joining face and tread. The tread surface of the tire shall be ground or machined. At least 10% of each order shall be tested for hardness and the wheels used for test shall be so chosen as to be representative of the entire lot. If one or more of the wheels tested fail to meet the specification, the Manufacturer may test at his expense all of the wheels of the order, and those falling within the specification shall be accepted. Wheels which fall outside the specification may be retreated and retested at Manufacturer's expense.

8. Assembly Pressure

Correct assembly pressure is obtained by complete tightening of the screws in the hub and of the nuts on the spacer bolts.

9. Tolerances

(a) When finally assembled, the gauge line of the tire shall not depart in an axial direction by more than 1/32" either side of a true position. That is, the tire wobble when rotated shall not be greater than twice this amount (1/16").

(b) The plane of the gauge line of an assembled wheel shall not be more than 1/32" either side of the designed dimension (2-1/16") from the inner face of the wheel hub. The tire in an assembled wheel shall not be eccentric with respect to the bore of the hub by more than 1/64".

10. Painting

The wheel Manufacturer shall clean all dirt and oil from all external surfaces of the parts of the wheel. After assembly he shall apply a coat of approved metal primer to all external surfaces except the bore and the tire surfaces which shall be oiled to protect against rust.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE E-1 - DRUM BRAKE (WESTINGHOUSE AIR) WITH INTERNAL SHOES

1. General

This Schedule covers the motor mounted drum brake with internal shoes as shown on T.R.C. Drawing No. E1-1a1.

2. Brake Drum

The brake drum shall be of formed steel and shall be mounted on the motor shaft between the motor flange and the companion flange of the corresponding universal joint. It shall be balanced and free of objectionable vibrations at any service speed.

3. Brake Shoes

The brake shoes shall be mounted on brackets fixed on the motor end housing and be provided with suitable lining as specified in Section 6.09(52).

4. Capacity

(a) The brakes shall be capable of producing a deceleration rate as shown on T.R.C. Drawing No. 4-2h1.

(b) The brake lining shall be able to supplement the extended dynamic brake for 100,000 miles of normal service operation until it is worn and requires replacement. The wear on the brake drum shall be very slight.

(c) In case of failure of the dynamic brake, the drum brake shall be capable of doing all the braking service during completion of the car operating cycle and return to the barn, without breakdown, at speeds not exceeding 20 m.p.h.

5. Brake Rigging

(a) There shall be provision in the brake rigging so that the lining may be easily inspected and adjusted, as necessary, during its life.

(b) The mounting of the brake rigging shall be such that it does not develop noises in service and that it permits the car to stop smoothly.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE E-2 - DRUM BRAKE (CLARK) WITH EXTERNAL SHOES

1. General

This Schedule covers the motor mounted drum brake with external shoes as shown on T.R.C. Drawing No. E2-1a1.

2. Brake Drum

The brake drum shall be of formed steel and shall be mounted on the motor shaft between the motor flange and the companion flange of the corresponding universal joint. It shall be balanced and free of objectionable vibrations at any service speed.

3. Brake Shoes

The brake shoes shall be mounted on brackets fixed on the motor end housing and be provided with suitable lining as specified in Section 6.09(52).

4. Capacity

(a) The brakes shall be capable of producing a deceleration rate as shown on T.R.C. Drawing No. 4-2h1.

(b) The brake lining shall be able to supplement the extended dynamic brake for 100,000 miles of normal service operation until it is worn and requires replacement. The wear on the brake drum shall be very slight.

(c) In case of failure of the dynamic brake, the drum brake shall be capable of doing all the braking service during completion of the car operating cycle, and return to the barn without breakdown at speeds not exceeding 20 m.p.h.

5. Brake Rigging

(a) There shall be provision in the brake rigging so that the lining may be easily inspected and adjusted, as necessary, during its life.

(b) The mounting of the brake rigging shall be such that it does not develop noises in service and that it permits the car to stop smoothly.

SPECIFICATIONS FOR P.C.C. CAR

Effective April 1, 1947

SCHEDULE E-2A - DRUM BRAKE (WESTINGHOUSE AIR) WITH EXTERNAL SHOES

1. General

This Schedule covers the motor mounted drum brake with external shoes as shown on T.R.C. Drawing No. E2-1a2.

2. Brake Drum

The brake drum shall be of formed steel and shall be mounted on the motor shaft between the motor flange and the companion flange of the corresponding universal joint. It shall be balanced and free of objectionable vibrations at any service speed.

3. Brake Shoes

The brake shoes shall be mounted on brackets fixed on the motor end housing and be provided with suitable lining as specified in Section 6.09(52).

4. Capacity

(a) The brakes shall be capable of producing a deceleration rate as shown on T.R.C. Drawing No. 4-2h1.

(b) The brake lining shall be able to supplement the extended dynamic brake for 100,000 miles of normal service operation until it is worn and requires replacement. The wear on the brake drum shall be very slight.

(c) In case of failure of the dynamic brake, the drum brake shall be capable of doing all the braking service during completion of the car operating cycle, and return to the barn without breakdown, at speeds not exceeding 20 m.p.h.

5. Brake Rigging

(a) There shall be provision in the brake rigging so that the lining may be easily inspected and adjusted, as necessary, during its life.

(b) The mounting of the brake rigging shall be such that it does not develop noises in service and that it permits the car to stop smoothly.

Revised December 15, 1948

ALPHABETICAL INDEX

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE F-1 - ACTUATOR (WESTINGHOUSE AIR) FOR SPRING APPLIED BRAKE

1. General

This Schedule covers the electric brake actuator with spring application and magnetic release as shown on T.R.C. Drawing No. F1-1a1.

2. Mounting

The base plate of the actuator shall be as shown on T.R.C. Drawing No. F1-2a1 for interchangeable assembly on truck B-2, or on Drawing No. F1-2a2 for interchangeable assembly on truck B-3.

3. Operating Lever

The operating lever shall be located as shown on T.R.C. Drawing No. B2-1b1 for application on truck B-2, or on T.R.C. Drawing No. B3-1b1 for application on truck B-3.

4. Capacity

The strength of the brake applying spring and the arrangement of the mechanism shall be such that without current in the magnet a force of 160 lb. is developed at the brake connected end of the operating lever over a stroke of 3/4". The strength of the magnet shall be such that under a potential of 32 volts it is capable of retracting the operating lever against the force of the spring.

5. Rigging

The rigging shall be so designed that it remains tight and does not develop noises in service.

6. Housing

The mechanical parts of the actuator shall be protected by a housing for the purpose of preventing dust, dirt or water from interfering with its functions.

7. Emergency Release

The actuator shall be provided with a device easily accessible from the side of the truck, for the purpose of releasing the brakes by hand when the magnet fails. It shall be possible to reset the brakes in normal function by bringing this device into its original position, when the action of the magnet is reinstated.

8. Adjusting Means

An adjustable arrangement, easily accessible from the side of the car, shall permit regulation of the length of the rod connecting the operating lever of the actuator with the operating lever of the brake rigging.

SPECIFICATIONS FOR P. C. C. CAR

Effective April 1, 1947

SCHEDULE F-2 - ACTUATOR (GENERAL ELECTRIC) FOR MAGNETICALLY APPLIED BRAKE

1. General

This Schedule covers the electric brake actuator with magnetic service application, gravity release and spring emergency application, as shown on T.R.C. Drawing No. F2-1a1.

2. Mounting

The base plate of the actuator shall be as shown on T.R.C. Drawing No. F1-2a1 for interchangeable assembly on truck B-2, or T.R.C. Drawing No. F1-2a2 for interchangeable assembly on truck B-3.

3. Operating Lever

The operating lever shall be located as shown on T.R.C. Drawing No. B2-1b1 for application on truck B-2, or on T.R.C. Drawing No. B3-1b1 for application on truck B-3.

4. Capacity

The strength of the brake applying magnet and the arrangement of the mechanism shall be such that, with the current in the magnet resulting from a 32 volt potential, a force of 120 lb. is developed in the brake connected end of the operating lever over a stroke of 3/4".

5. Rigging

The rigging shall be so designed that it remains tight and does not develop noises in service.

6. Housing

The mechanical parts of the actuator shall be protected by a housing for the purpose of preventing dust, dirt or water from interfering with its functions.

7. Emergency Application

(a) The actuator shall be provided with an emergency mechanism responding to the action of preloaded springs which automatically develop a force of 160 lb. at the brake connected end of the operating lever, whenever current to a secondary holding magnet is interrupted.

(b) Under normal operating conditions, current flowing through the secondary holding magnet shall prevent the action of the preloaded springs.

Schedule F-2 - Actuator for Magnetically Applied Brake

8. Emergency Release

The actuator shall be provided with a device easily accessible from the side of the truck for the purpose of releasing the brakes by hand when the low energy magnet fails to prevent the action of the preloaded spring.

9. Resetting of Emergency Spring

Resetting of the emergency mechanism shall be accomplished by operating a reset lever in the gang switch assembly.

10. Adjusting Means

An adjustable arrangement, easily accessible from the side of the car, shall permit regulation of the length of the rod connecting the operating lever of the actuator with the operating lever of the brake rigging.