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'W' CLASS TRAM GOVERNOR
REF WM/DU/93-1
PART 'A'

PUBLIC TRANSPORT CORPORATION
Victoria

The MET

G.E. Governors

"W" Class Trams



Reference : Spec 284

Prepared by : Brian Whelan

Approved by : J. J Evans.

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Overhaul of G.E. Governors M.L. Type "W" Class Trams (Sch/ Item 35/107)

1. Scope

1.1 This specification covers the overhaul, performance, testing and supply of the G.E. Governors Type M.L. for the "W" Class Trams.

2. Drawings

2.1 The Corporation's drawings. listed below, in their latest revision, shall form part of this specification.

Drawing No.	Title
R8814	G.E. Governor General Arrangement
R8810	Sub-Assembly Arrangement of Operating Levers.
R8521	Sub-Assembly of Arc Chute
R8779	Mechanism Base Fulcrum Pin
R8776	Piston
R8775	Piston Rod
R8768	Piston Rod Pin
R8771	Diaphragm
R6243	Operating Spring
R8763	Spring Adjusting Ring
R8764	Operating Lever
R8731	Operating Lever Fulcrum Pin
R8766	Operating Lever Pin
R8765	Operating Lever Brackets RH & LH
R8737	Operating Spring Adjusting Pin For Yoke
R8772	Intermediate Lever
R8769	Intermediate Lever Tension Spring Bar
R8791	Frame
R8787	Frame Head
R8783	Yoke for Contact Finger
R6631	Tension Spring And Eye
R8730	Contact Finger
R8725	Insulation Block
R8724	Insulation Collar
R8727	Cable Connector
R8726	Insulation Plate
R8505	Arc Chute Base Assembly
R8506	Details Of Arc Chute
R8520	Blow Out Coil
R8519	Lower Contact Tip Support
R2215	Contact Tip
R8518	Terminal Plate
R8800	Mechanism Base

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2.1 (Cont.)

R8516	Blow-Out Coil terminal
R8508	Field Plate RH & LH
R12-615	G.E. Governor - Overhaul I.D. Plate

3. Mechanical Overhaul

3.1 The Governor shall be stripped, cleaned and measured for compliance to the Corporation's drawings as listed in Section 2.1 .

3.2 All non-conforming parts shall be replaced.

3.3 The assembly of the governor shall be as shown on the Corporation drawing number R8814 -G.E. Governor General Arrangement.

4. Mechanical Adjustments

4.1 The G.E. governor's mechanical mechanism shall be adjusted and tested to,open and close within its required operating range.

4.2 Operating range as shown on the test pressure gauge.
Contacts to close at 60 p.s.i. +3, -3
Contacts to open at 73 p.s.i. +3, -0

Notes
1. Pressure gauge shall be calibrated annually against a N.A.T.A. certified master gauge.
2. Test date tag shall be visible on the master and test gauges. The certification date shall be recorded by the supplier.

4.3 The test arrangements shall be carried out in accordance with the requirements specified in drawing No. X2251 - "Test Arrangement for G.E. Governor".

4.4 The G.E. governor shall be tested through 10 operating cycles to ensure that the final mechanism adjustments are correct.

5. Electrical Overhaul

5.1 The electrical components shall be stripped, cleaned and tested for compliance to the Corporation's drawings as listed in Section 2.1 .

5.2 All non-conforming parts shall be replaced.

5.3 (Cont) The assembly of the arc chute and contact finger shall be as shown in the Corporation's drawings.

R8521	Assembly of Arc Chute G.E. Governor
R8730	Contact Finger G.E. Governor
R8814	G.E. Governor General Arrangement

5.4 Insulation shall be tested to frame, using 1000 V.megger - Min. resistance 1 M. ohm.

5.5 Continuity +ve to -ve. Test Lamp.

5.6 Test the arc blow out direction;

- connect the + ve supply to the moving contact.

- place a magnetic compass at L.H.S. of the blow out coil, ensure that the north seeking pole of compass is repelled.

5.7 Blow out coil resistance - approx. 0.2 ohm.

6. Asbestos

6.1 The G.E. governor, when fully overhauled, shall be free of any asbestos components as required by the asbestos removal program.

7. Paint

7.1 The assembled and covered G.E. governor shall be painted with a non-conducting black paint.

8. Identification for traceability

8.1 Every overhauled G.E. governor shall be fitted with a new metal identification plate.

8.2 The plate shall be stamped with the G.E. governor's identification (I.D.) number and the overhaul date (month and year). This date shall be stamped on completion of testing after overhaul. Identification numbers shall begin at G001 to G999, as required in order.

8.3 This data shall be recorded by the supplier, and this record shall be available for the information of the Quality Assurance Engineer.

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8.4 Details of the identification plate and location are specified in the Corporation's drawing R12-615 - "G.E. Governor I.D. Plate".

8.5 (Cont) Overhaul records shall be retained for a minimum of ten (10) years.

9. Service Life Duration

9.1 The expected service life, between complete overhauls, shall be a minimum of five (5) service years.

9.2 The supplier shall list the items that are considered as consumables or service maintenance items.

9.3 The supplier shall specify the warranty period prepared to be given for any in-service defects relating to sub-standard parts or workmanship.

10. Implementation of this Specification

10.1 All G.E. governors overhauled, shall comply with this specification after February 1st, 1992.

11. Quality Assurance Requirements

11.1 The supplier shall establish and maintain a Quality System relevant to this maintenance activity, and comply with the Quality Assurance requirements specified in the "Operations Engineering Group - Quality Assurance Standard"- Issue 1.
It shall be applied in strict accordance with the requirements of AS 3902- 1987/ ISO 9002- 1987 Quality Systems for Production and Installation.

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Public Transport Corporation
Tram and Bus Division
Operations Engineering Group

Quality Assurance Standard

QA.001

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1. Quality System.

1.1 The supplier shall establish and maintain a Quality System relevant to this maintenance activity, and shall be applied in strict accordance with the requirements of AS 3902- 1987/ ISO 9002- 1987 Quality Systems for Production and Installation.

1.2 Where the supplier does not have an established Quality System, Operations Engineering (O.E.) will accept documented evidence that the supplier is in the process of introducing an appropriate Quality System. This document should include an activity timetable defining the implementation plan. The time for completion of the implementation of the Quality System shall be an agreed time between the supplier and Operations Engineering.

1.3 Quality Assurance requirements detailed in this specification shall be in addition to the requirements of all relevant standards.

2.0 System Verification.

2.1 Upon receipt of the Supplier Quality System documentation or during the maintenance activity, Operations Engineering may conduct quality audits to verify the supplier's Quality System.

2.2 The supplier shall provide the Operations Engineering's representative all reasonable facilities to ensure production and supply is in accordance with this Specification.

2.3 The Operations Engineering's representative shall have access to all relevant areas of the supplier.

2.4 The Operations Engineering's representative shall undertake to protect the confidentiality of all information received.

3.0 Quality Plan.

3.1 The supplier shall prepare and maintain a quality plan which shall define as a minimum:-

-The allocation of responsibility and authority for quality;

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-The testing, inspection, examination and audits at appropriate stages;

-The specific procedures, methods and work instructions to be applied including controls over the material used.

3.2 The quality plan shall list, the inspection and test records that will be maintained.

3.3 The supplier shall submit a quality plan to Operations Engineering for evaluation and amendments as considered necessary and approval by Operations Engineering.

4.0 General.

4.1 All materials supplied shall be manufactured and finished with workmanship to at least industry standards and the material used shall be free from faults and defects in accordance with the requirements of this Specification and any of its appended documents.

5.0 Acceptance.

5.1 The acceptance of all goods and work under this maintenance activity shall be subject to acceptance by the Operations Engineering's representative, that the requirements of the maintenance activity have been fulfilled. The Operations Engineering's representative reserves the right to reject any equipment, material or workmanship which differ in any respect to the Specification.

5.2 The supplier shall supply to the Operations Engineering with each delivery a Certificate of Compliance which states especially whether the equipment and system complies with each paragraph of this Specification and shall clearly indicate any deviations. The non-provision of such specific information shall be sufficient cause for rejection.

The Certificate shall include :-

a) Certificate Date
b) Inspection and test results as per quality plan.
c) I.D. number and manufacture, or overhaul date.
d) Statement of Compliance with Specification.
e) Signature of supplier's Quality representative.
f) Any agreed concessions or variations.

5.3 All goods and items shall be delivered subject to the approval and acceptance of the Operations Engineering, Quality Assurance Engineer.

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5.4 Additional Tests.

The Operations Engineering may, after delivery, carry out any further tests considered necessary to determine whether the overhaul complies with this Specification. The supplier will be notified of the intention to carry out such tests at least twenty-four (24) hours previously, but should their representative fail to be present, the tests may be carried out in their representative's absence.

6.0 Records.

6.1 The supplier shall establish and maintain records for a minimum of ten (10) years from completion of each overhaul which are sufficient to provide objective evidence to substantiate conformance with the specified requirements.

6.2 The supplier shall make the records available for evaluation, by Operations Engineering, during the period of the maintenance activity and shall supply copies of records as required by Operations Engineering.