

METROPOLITAN TRANSIT AUTHORITY

PROTOTYPE ARTICULATED L.R.V. - MELBOURNE, AUSTRALIA

CONTRACTOR

Comeng (Victoria),
Frankston Road,
Dandenong, Victoria Australia

in conjunction with
A.E.G. Telefunken (Berlin),
DUWAG (Dusseldorf)

DESCRIPTION

An LRV designed for use in Melbourne. The LRV is double-ended and articulated with six axles and three trucks. The LRVs can be operated as single units and can also be coupled as a pair of LRVs. They are fitted with thyristor (Chopper) control electrical traction equipment which provides smooth, jerk free acceleration and regenerative braking.

These LRVs will be fitted with pantographs for current collection. The LRVs will be equipped with a door/step arrangement which the driver can programme for two levels of operation, i.e., street level, or for an elevated loading platform at the same level as the vehicle floor. The safety doors and steps operate together.

DEVELOPMENT STATUS

Order placed 2 February 1983.
Commissioning of the first LRV expected April 1984.
Two LRVs on order.

PERFORMANCE - SEATED LOAD

Speed (max.)	72 km/h
Grade (max.)	9%
Acceleration (max.)	1.3m/sec ²
Retardation (service max. cont.)	1.5m/sec ²
Retardation (emergency)	3.9m/sec ²
Jerk (max.)	1.3m/sec ³
Horizontal curve radius (min.)	16.3m
Vertical curve radius (min.)	138m

POWER TRUCKS (continued)

Gears	Thyssen Henschel - Hypoid, right angle drive, hollow shaft with spider type flexible rubber coupling. Ratio 1:5.666.
Service Brakes	Electro-dynamic, regenerative operation down to 8km/h.
Low speed, parking and stand-by brake	Spring applied caliper pads, operate on ventilated brake disc, one per each axle. Pads pneumatically released. 4 step control.
Pneumatic	Compressed air system provided by Knorr Bremse
Emergency brakes	Electro dynamic plus electro-magnetic track brakes
Suspension	Primary - Chevron rubber Secondary - Clouth rubber rolling ring type plus rubber plate springs. Incorporates load weighing cell under one clouth spring.
Axle bearings	SKF twin spherical roller races.
Dampers	2 vertical, 1 transverse, 1 longitudinal
Coupling to body	Large diameter roller race incorporating angular movement stops.
Mudguards	Fibreglass

CENTRE TRUCK

This truck is non-powered. It has two spring applied, pneumatically released pairs of calipers operating on ventilated B.S.I. brake discs mounted on the axles. A pneumatic load-weighing cell controls excessive braking under light loading conditions. This truck has similar suspension elements to the power trucks. Electro-magnetic track brakes are fitted. A DUWAG articulated joint is fitted above the centre truck.

ELECTRICAL CONTROL SYSTEM

Line voltage	600 volts, D.C.
Line current (max.)	550 amps
Power collection	Stemman pantograph mounted close to centre trucks
Power control system	A.E.G. thyristor "chopper" using independent chopper systems to each truck. This power system also provides the regenerative braking capability
Control system	Siemens electronic control
Emergency control	In addition to the duplication of the chopper system, a switch is provided to by-pass most of the electronic control system and thereby provide "get home" capability at reduced performance.
Overspeed control	Automatic power shut-off and brake application held down to 7km/h.
Wheel spin and slip	Detection and correction provided with automatic sanding.
Controls	Foot operated, 3 pedals (accelerator, brake and safety pedals).
Indications	Hand operated sand, gong, disc brake, points, turn indicators, and doors, speedometer, battery voltmeter and indicator lights.
Motor alternator	3 phase claw pole generator without slip rings. Outputs at 220V and 22V at 100 Hertz. Coupled to 600V D.C. motor. Rating 7KVA
Battery	Lead acid, 309 Amp.hr @ 5 hour rate, 24V

BODY

Numbers	2001 and 2002
Frame	Steel truss - all welded
Truck centres	8500mm
Exterior walls	Aluminium
Roof	Fibreglass - clerestory design, full length.
Interior walls	Indian Teak finish laminate on aluminium sheet "Decoral".
Lining, ceiling and coves	Ceiling- ventilated, punched aluminium
Insulation	50mm "Wonderwool".
Floor	28mm plywood top surfaced with "Treadmaster" (cork and neoprene rubber) and 0.8mm "Galvabond" undersurface.
Windows - passenger	10 per side Beclawat "Tempest", half drop, "anti-sun" glass.
Blinds	Roll-up, louvre type to be fitted
Windscreen	Laminated, clear
Doors	Aluminium framed, Beclawat, 2 four leaf folding doors and 1 two leaf folding door per side.
Door operators	DUWAG (W.Germany). Electric with mechanical clutch over-ride in operating struts.
Door system	Safety interlocked with LRV motion. Uses step treadle mats and pressure-pulse sensitive door edges.

BODY (continued)

Ventilation

Two Ziel-Abeg tangential fans mounted in enclosures over each driver's cabin supplement ram air which enters above windscreens. 50 cubic metres per minute per fan.

Two element safety barrier rail, power interlocked available on two O/S doors.

Thermostatic control: above 20°C ambient at half speed and above, 30°C ambient at full speed.

Heating

10 SEICO electric heaters individually thermostatically controlled, located under passenger seats. Fans operate on 220V system and heater elements on 600V, 2kW each including driver's heater-demister.

Seating

Upholstered over high resilience fire retarded polyurethane foam, (Hendiform).

Destination equipment

"Brose", polyester blind type, back lit, lower case letters. Route numbers placed beside destination in roof end canopy.

Side destinations fitted in deadlight panels.

COUPLERS

Provision is made for fitting of couplers.

WORK EXECUTED AT PRESTON TRAM WORKSHOPS

Power truck assembly.

Manufacture - fibreglass canopy and dash panel.

Manufacture and installation of all passenger seat frames and upholstery, fibreglass seat surrounds.

Installation of stanchions and rails.

22 November 1983