METROPOLITAN TRANSIT AUTHORITY

A CLASS TRAM - MELBOURNE, AUSTRALIA

CONTRACTOR

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

in conjunction with -

A.E.G.-Telefunken (Berlin),
DUWAG (Dusseldorf)

DESCRIPTION

A tram designed for use in Melbourne. The tram is double-ended non-articulated with four axles in two trucks. The trams can be operated as single units only and are not equipped to be coupled. They are fitted with thyristor (Chopper) control electrical equipment which provides smooth, jerk free acceleration and regenerative braking.

These trams are being built to continue the replacement of W2 class trams. The body is 1.6 metres shorter than the Z3 class. The "A" class has a new body structure, a new ventilation system, load weighing control of acceleration and braking and is designed for use with a roving conductor.

DEVELOPMENT STATUS

Order placed 22 November, 1982.
First tram. Commissioning expected FEBRUARY 1984.
28 trams on order. Delivery to be completed by October 1984.

PERFORMANCE - SEATED LOAD

Speed (max.)	72 km/hr
Grade (max.)	9%
Acceleration (max.)	1.6m/sec.^{2}
Retardation (service max. cont.)	1.6m/sec.^{2}
Retardation (emergency)	3.0m/sec.^{2}
Jerk (max.)	1.3m/sec.^{3}
Horizontal curve radius (min.)	16.3m
Vertical curve radius (min.)	138m

CAPACITY

42 seats

75 standees (area per standee based on 6 per metre^2)
117 total

DIMENSIONS

Length	15,060mm
Width (outside)	2,670
Height - rail to top clerestory roof	3,346
Floor height above rail	862
Width (inside)	2,558
Headroom at centre line	2,240
Aisle width	702
Doorway width - clear opening between handrails	1,008 (double) 801 (single)
Doorway height	2,422
Step heights -	
Ground to first step at tare (new wheels)	337
Other 2 steps	262

MASS

Tare	21,500Kg. (est.)
Laden (crush load)	29,170Kg.

TRUCKS

Type	In-board bearing, monomotor
Design	DUWAG, Dusseldorf, West Germany
Construction of frames and bolsters	Welded steel by Comeng (Vic.)
Assembly	M.T.A. at Preston Workshops
Gauge	1,435 mm
Axle centres	1,800 mm
Wheels	Bochum 54, resilient
Wheel diameter	660 mm
Motors	Monomotors (1 per truck)
	A.E.G. - type ABS 3322 self ventilated, designed for thyristor control, laminated stator. Continuous rating 195 kW at 600 volts.

TRUCKS (contd.)

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 8 km/hr.
Low speed, parking and standby-by brake	Spring applied caliper pads, to ventilated brake disc (Knorr-Bremse), one per each axle. Pads hydraulically released.
Hydraulic system	Hydraulic pump and actuator mounted on truck (Hanning and Kahl).
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 device.
Axle bearings	SKF twin spherical roller races.
Dampers	2 vertical, 1 transverse.
Coupling to body	Large diameter roller race incorporating angular movement stops.
Mudguards	Fibreglass.

ELECTRICAL CONTROL SYSTEM

Line voltage	600 volts, D.C.
Line current (max.)	550 Amps
Power collection	Trolley pole with M.T.A. carbon block collector head.
Power control system	A.E.G. Thyristor "Chopper" using independent chopper systems to each truck. This power system also provides the regenerative braking capability.

ELECTRICAL CONTROL SYSTEM (contd.)

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 7 km/hr.
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 3.3KVA.
Battery	Lead acid, 171 Amp.hr.

BODY

Numbers	231 to 258.
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.

BODY (contd.)

Insulation	50mm "Wonderwool".
Floor	28mm plywood top surfaced with "Treadmaster" (cork and neoprene rubber) and 0.8mm "Galvabond" undersurface.
Windows - passenger	6 per side Beclawat "Tempest", half drop, "anti-sun" glass.
Windscreen	Laminated, clear.
Doors	Aluminium framed, Beclawat, 2 four leaf folding doors and one 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 tram motion. Uses step treadle mats and pressure pulse sensitive door edges.
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	6 SEICO electric heaters individually thermostatically controlled, located under passenger seats. Fans operate on 220V system and heater elements on 600V, 2 kW each including driver's heater-demister.

BODY (contd.)

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.

WORK EXECUTED AT PRESTON TRAM WORKSHOPS

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.

Manufacture and installation of current collection equipment.