BOOK 50
VOLUME 1
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TRANSIT VEHICLE

CHAPTER 1

GENERAL INFORMATION AND SPECIFICATIONS

The Bay Area Rapid Transit District's 150 C-cars/80 C2 cars are designed to add seating capacity to the transit vehicle fleet while meeting updated standards for fire safety, operational flexibility, reliability, and maintainability, and meeting the needs of the handicapped. The cars are also equipped with the second generation automatic train control equipment, which is described in a separate book.

Each car is equipped with 52 transverse and 12 longitudinal seats, for a total of 64 seated passengers. Each car is equipped with 34 seats (two-passenger type): 26 transverse seats, 6 longitudinal seats, and 2 flip seats for a total of 68 seated passengers. The seats are cantilevered over the floor, as on A and B cars, for maximum leg and luggage space and ease of maintenance. Each seat is foam cushioned, fabric covered, and constructed of a steel frame with fiberglass/ plastic shell.

The materials used in construction of the C-car meet rigid standards for flammability and smoke emissions. All major components--such as the wiring insulation, carpet pad, 100% wool carpet, Nomex honeycomb floor panels, polyester resin interior linings, foam seat cushions, fiberglass/ plastic seat shells, and fiberglass insulation material in the sidewalls and roof--have been carefully tested and certified especially for the C-car.

Greater operational flexibility is achieved with the C-cars by use of a blunt Y-end nose equipped with hinged bi-parting doors (flipper doors) and a fully functional electromechanical coupler. These features allow the C-car to be placed in the middle of a train as well as in the leading or trailing position. When in the middle of a train, the flipper doors are folded back and locked in the open position to allow passengers to walk between cars. The flipper doors are locked closed when the car is in the leading or trailing position. Safety interlocks prevent operation of the train if the flipper doors are not properly positioned.

The Y-end is also equipped with vertical intercar closure cushions on the flipper doors, and a horizontal fixed cushion (eyebrow), which mate with the adjacent car's cushions to enclose the vestibule. In addition to headlights and taillights, the Y-end has a pair of inspection lights which are angled downwards 16 degrees to illuminate the area in front of the train.

High levels of reliability are achieved by the use of proven components where possible, such as in the traction motors, motor control box, side door operators, air compressors, and couplers.

Maintainability has been improved in many areas such as the propulsion and brake logic modules (located inside the passenger compartment), the unitized heating-ventilating-air conditioning (HVAC) systems, and specially-designed test equipment.

Accommodation has been made for handicapped passengers with the removal of a seat and windscreen/ addition of a flip seat adjacent to a side door at each end of the car, and the addition of an inside vertical grab handle at the same locations. Each seat is spring loaded and remains in the up position to allow easy access for handicapped passengers. This provides an efficient area where passengers in wheelchairs can safely board, ride, and exit the car.

The interior is equipped with recessed overhead lighting fixtures, full length ceiling hand rails, a passenger intercom at each end of the car, emergency door operating levers, and fire extinguishers. Windows are tinted and heat resistant glass, and the operator cab windshield is high-impact resistant glass.

Door systems include the flipper doors described above, two pairs of sliding doors on each side of the car, and manually operated sliding doors at each end of the car. The operator's cab door is hinged and can be locked in either of two positions: to close off only the operator's area in the right front corner of the car, or to close off the entire Y-end of the car. The first position permits passenger movement through the middle of the train, and the second position isolates the cab when it is leading or trailing the train.

The car body shell is constructed of welded aluminum extrusions and stampings. The aluminum exterior has a brushed finish except for the welded aluminum Y-end structure, which has a white painted finish. The side of the car is accented with blue stripes and the BART logo.

Propulsion is supplied by four 150-hp traction motors, which are powered from the 1000 Vdc third rail by means of a microprocessor-controlled thyristor chopper. Three modes of braking are employed under microprocessor control: regenerative braking, in which braking energy is returned to the third rail; dynamic braking, in which energy is dissipated as heat through resistor grids; and blended braking, which combines the first two modes with hydraulic calipers acting on discs.

Each car is equipped with a pair of two-axle trucks. An air suspension system is combined with vertical and horizontal shock absorbers to provide a smooth ride. In the event the air suspension is deflated, rubber stops provide a safe ride at speeds up to 80 mph. The compressed air system also operates the air horn, windshield wiper, uncoupling mechanism, and certain propulsion switches.

An auxiliary electrical system powered from the third rail, provides three phase 120/208 Vac at 60 Hz as well as 36.5 Vdc. These supply the HVAC system, auxiliary equipment motors, battery charging power, and low voltage for lighting, communication, and control circuits.

Table 1-1/Table 1-1A

VEHICLE DIMENSIONS

Item	Measurement
Car body	
Width	10 ft. 6 in.
Length/coupler face to coupler face	70 ft.
Height, top of rail to top of car, less antenna	10 ft 6 in.
Height	
Ceiling, center of aisle	6 ft 9 in.
Floor, top of rail to top of floor	39 in.
Maximum, top of floor to bottom of all undercar equipment	33-1/4 in.
All door openings	6 ft 4 in.
Station platform, from top of rail	39 in.
Width	
Side door	4 ft 6 in.
X-end door	46-3/4 in.
Y-end door	36 in.
Cab door	30 in.
Flipper door	36/35 in.
Wheel	
Diameter - new	30 in.
Diameter - worn	28 in.*
Truck spacing, center-to-center	50 ft
Wheel gauge, ± 1/16 in. between gauging points	5 ft 5-1/4 in.
Truck gauge, ± 1/8 in. tangent and curved	5 ft 6 in.
Running clearance	2 in.

*Not less than 28 in.

Table 1-2

VEHICLE VOLTAGE REQUIREMENTS

Type	Source	Value
Primary	dc Contact rail (third rail)	850 min - 1,250 max
Auxiliary	ac Bus	120/208, 3-phase, regulated + 5%
Low	Vehicle battery	36.5 Vdc nominal

Table 1-3

VEHICLE AND COMPONENT WEIGHTS

Component	Weight, lb.	
Car shell		13,863
Trucks		
Y-end	10,744	
X-end	10,680	
Subtotal (trucks)		21,424
Accessories		
Insulation and paint	1,136	
Interior liners	2,074	
Flooring, carpet, and pad	1,829	
Doors	1,799	
Exterior fittings	113	
Windows	1,145	
Intercar closure	399	
Interior fittings	3,247	
Couplers	1,376	
Air conditioning	3,015	
Pneumatic and hydraulic equipment	1,225	
Lighting and destination sign	266	
Underframe wiring	630	
Car-body wiring	624	
Electrical equipment	8,563	
Car body-to-truck connections	327	
Subtotal (accessories)		27,768
Subtotal (car body, trucks, accessories)		63,055
ATC Equipment 430	430	
TOTAL		63,485

Table 1-3A

VEHICLE AND COMPONENT WEIGHTS

Component	Weight, lb.	
Car shell		14,778
Trucks		
Y-end	10,826	
X-end	10,691	
Subtotal (trucks)		21,517
Accessories		
Insulation and paint	652	
Interior liners	3639	
Flooring, carpet, and pad	1,829	
Doors	1,691	
Exterior fittings	113	
Windows	835	
Intercar closure	399	
Interior fittings	1,207	
Couplers	1,497	
Air conditioning	3,095	
Pneumatic and hydraulic equipment	1,349	
Lighting and destination sign	266	
Underframe wiring	789	
Car-body wiring	615	
Electrical equipment	8,702	
Car body-to-truck connections	327	
Subtotal (accessories)		27,005
Subtotal (car body, trucks, accessories)		63,055
ATC Equipment	400	
TOTAL		63,700

Table 1-4

VEHICLE PASSENGER LOADING

Load	Description	Weight, lb.
AW-0	Empty car including ATC equipment (no passengers)	63,485
AW-1	Full seated load (AW-0 + 13,000 lb.)	76,485
AW-2	Full seated load and 75 standees (AW-0 + 21,000 lb.)	84,485
AW-3	Full seated load and 144 to 216 standees (AW-0 + 37,000 lb.)	100,485