High-Speed Trainsets

Safety

With safety the top priority, Amtrak's Acela Express incorporates high-powered braking and microprocessor controlled wheel-slide protection along with in-car emergency features. In addition, each car features energy absorption and crashworthiness characteristics, thus providing inherent design security.

Reliability

No other manufacturing consortium has put so many highspeed trainsets into operation. Leading-edge control technology ensures on-time performance and total reliability. Optimal propulsion provided by advanced traction motors and solid-state electronics. All supported by world-class maintenance facilities, information networks and systems integration technology.

Speed and Comfort

Amtrak's Acela Express derives its high-speed technology from the unsurpassed TGV, combining aerodynamic design with lightweight stainless steel carbodies. Passenger comfort is provided by revolutionary high-speed tilting technology, developed by Bombardier Transportation and proven in service for over 15 years. Luxurious, ergonomically designed interior appointments further contribute to passenger comfort. Advanced controls ensure optimum temperature, noise level and lighting. All cars are fully adapted for physically challenged passengers.











BOMBARDIER TRANSPORTATION

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The choice was clear...

Bombardier and Alstom - two names synonymous with innovation, performance, reliability and superior high-speed rail expertise - joining forces to reshape train travel in America.

Under the contract, the Bombardier Alstom team was given the mandate to design and manufacture 20 trainsets – each consisting of two power cars and six coaches.

Management Services

The consortium also built three maintenance facilities where all ser-

vice and inspection activities for the high-speed trainsets are taking place. The consortium provides management services of all maintenance activities for up to 10 years to meet the demanding performance standards of this high-speed rail service.

The

Intercity Transport

High-Speed Trainsets United States

Bombardier Alstom Consortium was selected on March 15, 1996, to build North America's first high-speed trainset for Amtrak's Northeast Corridor (NEC). The train comprises Bombardier's advanced tilting system and Alstom's TGV technology

for high speed and comfort, including TGV derived traction equipment and wheel/truck assemblies, and advanced crashworthiness features. It also showcases Bombardier's expertise in stainless steel carbody manufacturing.

The trainsets are being manufactured and assembled in Bombardier's Barre, VT, Plattsburgh, NY and La Pocatière, Québec plants, while Alstom's equipment is being produced mainly in their Hornell, NY and Medford, OR facilities.

NONSTOP







General Data

Type of Vehicle Incremental High-Speed Electric Trainset Owner National Railroad Passenger Corporation (Amtrak) **Orders Dates** 1996 and 1998 Quantity 20 high-speed trainsets **Train Consist** 2 Power cars and 6 Passenger cars (3 Coach cars, 1 First Class car, 1 Cafe car and 1 End Coach car)



Amtrak's Acela Express high-speed truck derived from the TGV truck which was proven at world record speed - is the most dependable in the industry and provides a safe and comfortable ride. It can also operate at reduced speed on share-use tracks similar to those on the Northeast Corridor.

Technical Characteristics

Propulsion System 2 Power cars per trainset Continuous 4,600 kW / 6,000 hp per Power car Motor 4 asynchronous AC traction motors per Power car **Traction Control** GTO-Type inverters, water cooled Transmission Fully truck (bogie) suspended gear box and motor assembly **Power Input** Overhead catenary wire 25 kV, 60 Hz; 12.5 kV, 60 Hz; 11 kV, 25 Hz **Auxiliary Power** One static inverter per Power car providing redundant power supply Voltage 480 Vac / 3 phase / 60 Hz Low Voltage 72 Vdc battery back-up on each vehicle **Braking System** - Power car Blended regenerative/rheostatic dynamic braking supplemented by friction braking; cheek disc and tread brakes on each wheel; redundant wheelslide protection; non rotating axle detection. - Passenger Car Tread brakes on each wheel and three high-powered discs on each axle; redundant wheel-slide protection; non rotating axle detection.

Monitoring System

Dedicated computers that control, diagnose and monitor systems and subsystems for optimum safety and reliability Carbody Stainless steel **Tilting System** Computer-controlled and hydraulically activated **Bogie Type (or Truck)** Outboard bearing, fabricated frame Designed for high-speed stability operation Coupler Front: Tightlock with type H head Rear: semi-permanent draw bar Suspension - Power Car Primary and secondary helicoil springs - Passenger Car Primary helicoil springs Secondary air springs Air Comfort Two self-contained overhead mounted HVAC systems complemented with floor heating Doors Outside sliding plug type, high platform boarding Passenger Services - Fully ADA compliant - Public phone booths - ADA and unisex toilet - Audio entertainment (Passenger cars) - Video entertainment (Cafe car) - Public address system - Information sign displays

- Rotating seats with folding tables
- Meal service (Cafe car and
- First Class car)

Performance and Capacity

Operating Speed 240 km/h / 150 mph Maximum Speed Design 264 km/h / 165 mph Starting Tractive Force - Power Car 225 kN / 49,400 lb Service Braking Distance 3,170 m / 10,400' **Emergency Braking Distance** 2,695 m / 8,840' Minimum Radius of Horizontal Curve 76 m / 250' Minimum Radius of Vertical Curve 610 m / 2,000' **Buff Load** 3,500 kN / 800,000 lb

Numbers of Passengers

(in whe Coach car First Class car Cafe car End Coach car Total

Weight (empty)

Power Car 90,750 kg / 200,000 lb **Coach Car** 57,600 kg / 127,000 lb First Class Car 58,500 kg / 129,000 lb Cafe Car 59,900 kg / 132,000 lb End Coach Car 58,500 kg / 129,000 lb

Dimensions

	Power Car		Passenger Car	
	Metric	Imperial	Metric	Imperial
_ength	21,219 mm	69' 7 ³ /8"	26,645 mm	87' 5"
Width (over side sheets)	3,175 mm	10' 5"	3,162 mm	10' 4 ¹ /2''
Rail to Roof Height	4,318 mm	14' 2"	4,232 mm	13' 10 ⁵ /8"
Side Doorway Width	N/A	N/A	825 mm	32 1/2"
Floor Height Above Rail	1,466 mm	57 ³ /4''	1,295 mm	51"
Fruck Centre Distance	10,744 mm	35' 3"	18,135 mm	59' 6"
Coupler Height Above Rail	876 mm	34 1/2"	876 mm	34 ¹ /2"
Wheel Diameter	1,016 mm	40''	914 mm	36"
Fruck Wheelbase	2,845 mm	9' 4''	3,000 mm	9' 10''
Frack Gauge	1,435 mm	4' 8 ¹ /2"	1,435 mm	4' 8 ¹ /2"

Seats	
cluding	Wheelchai
elchairs)	locations
65	1
44	1
0	0

65	1
304	5

Tilting System





A state-of-the-art tilting sytem with an advance tilt command – developed by Bombardier and based on proven trainsets in service in Canada for over 15 years – assures full stability and passenger comfort when negotiating curves at the highest speeds. Microprocessors control the tilting system allowing the cars to counteract lateral forces.