SPECIFICATIONS

MODEL AS-16
ALL-SERVICE LOCOMOTIVE

(4 Axles—4 Motors—1600 H.P.)

Baldwin —
Westinghouse

DIESEL ELECTRIC LOCOMOTIVES
THE BALDWIN LOCOMOTIVE WORKS • EDDYSTONE, PA.
INDEX TO SPECIFICATIONS

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THE MODEL AS-16 ALL-SERVICE DIESEL ELECTRIC LOCOMOTIVE

The model AS-16 all-service diesel electric locomotive, described in this specification, is a 121 ton, four axle, 1600 HP unit of the hood type, arranged for operation in either direction.

The AS-16 locomotive is a motive power unit of great versatility, being designed for operation in any, or all, of these railroad services:

1. Main line or branch line freight service
2. Suburban or branch line passenger service
3. Switching service
4. Transfer service
5. Helper service
6. Humping service

Current models of the AS-16 locomotive, covered by this specification, carry these significant improvements:

1. The diesel engine capacity has been increased to 1600 HP for traction. This rating can be maintained up to 8000 feet altitude.
2. The continuous tractive effort ratings of the electric drive have been increased 23 percent.
3. The arrangement of equipment has been modified to further simplify maintenance, to provide easier inspection, and to present an improved appearance.
LOCATION OF PRINCIPAL PARTS

1. Switchmen's Steps
2. Headlight
3. Supercharger
4. Cooling System, Radiator Cores, Fan & Drive
5. Lube Oil Filter
6. Traction Motor Blower
7. Lube Oil Filler
8. Engine Compartment
9. Diesel Engine
10. Main Generator
11. Air Compressor
12. Storage Batteries
13. Electrical Equipment Cabinet
14. Helper's Seat
15. Fire Extinguisher
16. Handbrake
17. Cab Heater
18. Operator's Controls
19. Operator's Seat
20. Air Brake Equipment
21. Motor Truck
22. Fuel Oil Tank
23. Fuel Oil Tank Filler
24. Air Reservoir
25. Water filter, Diesel Engine
26. Sand Box Filler
27. Pilot
28. Marker & Number Light
29. Rear Compartment

AS-16 ALL SERVICE LOCOMOTIVE
1600 H.P. AVAILABLE FOR TRACTION
4 AXLES – 4 MOTORS

DESIGN 98-6-289
THE BALDWIN LOCOMOTIVE WORKS
# Locomotive Weights, Dimensions and Ratings

<table>
<thead>
<tr>
<th>Model</th>
<th>AS-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horsepower for Traction</td>
<td>1600</td>
</tr>
<tr>
<td>Type — AAR Classification</td>
<td>8-B</td>
</tr>
<tr>
<td>Locomotive Weight — Lbs.</td>
<td></td>
</tr>
<tr>
<td>In Working Order</td>
<td>242,000</td>
</tr>
<tr>
<td>On Drivers</td>
<td>242,000</td>
</tr>
<tr>
<td>Per Driving Axle</td>
<td>60,500</td>
</tr>
<tr>
<td>Locomotive Dimensions</td>
<td></td>
</tr>
<tr>
<td>Gauge</td>
<td>4' 8½&quot;</td>
</tr>
<tr>
<td>Overall Length — Inside Knuckles</td>
<td>58' 0&quot;</td>
</tr>
<tr>
<td>Width</td>
<td>10' 0&quot;</td>
</tr>
<tr>
<td>Height</td>
<td>14' 0&quot;</td>
</tr>
<tr>
<td>Length Between Center Pins</td>
<td>32' 3&quot;</td>
</tr>
<tr>
<td>Overhang — Front and Rear</td>
<td>12' 10½&quot;</td>
</tr>
<tr>
<td>Wheelbase — Total</td>
<td>42' 1&quot;</td>
</tr>
<tr>
<td>— Truck</td>
<td>9' 10&quot;</td>
</tr>
<tr>
<td>Wheel Diameter</td>
<td>42&quot;</td>
</tr>
<tr>
<td>Minimum Curve — Light</td>
<td>30°</td>
</tr>
<tr>
<td>— With Train</td>
<td>22°</td>
</tr>
<tr>
<td>Supplies</td>
<td></td>
</tr>
<tr>
<td>Fuel Oil — Gals.</td>
<td>900</td>
</tr>
<tr>
<td>Lubricating Oil — Gals.</td>
<td>200</td>
</tr>
<tr>
<td>Cooling Water — Gals.</td>
<td>300</td>
</tr>
<tr>
<td>Sand — Cu. Ft.</td>
<td>30</td>
</tr>
<tr>
<td>Locomotive Tractive Effort — Lbs.</td>
<td></td>
</tr>
<tr>
<td>Starting at 25% Adhesion</td>
<td>60,500</td>
</tr>
<tr>
<td>Starting at 30% Adhesion</td>
<td>72,600</td>
</tr>
<tr>
<td>Continuous — Std. Gear Ratio 15:68</td>
<td>52,500</td>
</tr>
<tr>
<td>Continuous — Optional Gear Ratio 15:63</td>
<td>48,600</td>
</tr>
<tr>
<td>Continuous — Optional Gear Ratio 17:62</td>
<td>42,200</td>
</tr>
<tr>
<td>Dynamic Braking (Modification)</td>
<td></td>
</tr>
<tr>
<td>Approximate Maximum Retarding Effort</td>
<td></td>
</tr>
<tr>
<td>15:68 Gear Ratio</td>
<td>40,500 lbs.</td>
</tr>
<tr>
<td>15:63 Gear Ratio</td>
<td>37,500 lbs.</td>
</tr>
<tr>
<td>17:62 Gear Ratio</td>
<td>32,500 lbs.</td>
</tr>
</tbody>
</table>
## Locomotive Construction

<table>
<thead>
<tr>
<th>Section II</th>
</tr>
</thead>
</table>

### Underframe

All-welded structural steel beam unit, providing inherent strength and rigidity characteristics. Body bolsters, center plates, draft gear pockets, buffer plates, side bearings, combination lifting lugs and jacking pads are built integral with the main frame. Removable steel wear plates are applied to center pins which are oil lubricated.

### Couplers

2 — AAR Standard type E. Top operated with 11” knuckle, 6½” x 8” shank and coupler horn. Height, 34”. Uncoupling lever on both sides, independently operated.

### Draft Gear


### Operating Cab

Welded construction. Cab includes operating controls, gauges and instruments, hand brake, fire extinguisher, engineman’s and fireman’s seats, cab lights, sun visors, window wipers, heaters, emergency fuel shut-off, arm rests, inspection card frames, ventilators, etc. Walls and ceiling are lined with Masonite Presswood.

### Front Hood

Welded steel structure, bolted to underframe to allow lifting for engine removal. Hood is provided with side doors, roof hatches, louvres, removable panels on left side near top of hood, exhaust stacks and inspection lamps. Hood has been designed with particular emphasis on access to equipment for maintenance purposes.

### Rear Hood

Welded steel structure, removable as a unit, with access door from operator's cab and inspection doors on each side. Houses rear sand boxes and headlight. Also houses dynamic brake equipment, or train heating boiler, when applied.

### Radiator Compartment

Welded steel structure, located at No. 1 end. Contains radiators, thermostatically controlled fans and shutters, water expansion tank, heat exchanger type lube oil cooler, traction motor blower, lube oil filter, front headlight and sand boxes. Cooling air for the radiators is directed through compartment by ducts, isolating the air from other apparatus.

### Electrical Equipment Compartment

Welded steel structure, located forward of operator’s cab. Provided with access doors from the cab.
Section II

Cab Doors
Steel doors with 1/4” shatterproof glass, weather-sealed. Doors are provided with rim lock and lever handles. Location of doors shown on locomotive arrangement drawing.

Cab Flooring
Hardwood, 3/8” maple, tongue-and-groove. 1” thick Fiberglas insulation is provided between steel deck and wood flooring.

Cab Sash and Glass
Double metal sliding sash, fitted with latches. 3/16” shatterproof glass is mounted in rubber. 3/16” shatterproof glass, mounted in rubber, is provided for all stationary windows.

Handrail
Steel pipe, mounted on hood at height of 65 inches from top of running board. Handrail posts are cast iron, attached to hood. Provided with eyes to facilitate hood removal.

Steps
Hood roof — individual forgings attached to equipment compartment for access to hood roof.
Side steps — Pullman type, removable grille type treads. Located at each corner for access to running boards.
Switching steps — 4 per locomotive, metal grating, removable and adjustable for height.

Walkways
All walkways are provided with non-skid material.

Gutters
Located over all doors and movable windows.

Pilots
Located at each end between switching steps. Pilots are solid type, made of structural shapes and plates, bolted to cab underframe.

Fuel Oil Tank
900 gallons capacity. Welded structure, located on rear of underframe beneath rear hood and partially beneath cab floor. Tank provides support for rear hood. One gill light and one full depth sight level gauge at rear of tank, spark arrester vent, flushing and clean out holes, safety cut-out valve and baffles are provided. This tank is used for water when train heating boiler is installed as a modification. An additional 1000 gallon tank for fuel oil then is located between the trucks.
The 900 gallon tank is omitted when dynamic braking is installed. The fuel oil then is carried in the additional (extra cost) 1000 gallon tank between the trucks.

Battery Boxes
Two per locomotive, located forward of cab, one on either side.
Welded steel box, hinged lid, painted inside with acid resisting paint, ventilated and provided with drain holes. Boxes are welded to cab supports and underframe. Each box houses four 4-cell trays.

Sand Boxes
Four per locomotive, providing total capacity of 30 cu. ft. Boxes are equipped with double seal protection against water, sifting screens, clean out holes and two traps per box.
TRUCKS

Construction
Two 6-wheel, 3-motor, single piece cast steel, swivel, rigid bolster, single shoe brakes on all wheels, motor cooling ducts, spring motor nose suspension, removable centerpin wear plates, coil and semi-elliptic springs, cast steel equalizers, forged pedestal tie bars, renewable spring steel pedestal and side bearing wear plates. Wheel spacing, 53 3/8” back to back.

Axles
AAR Specification M-126. Carbon steel forging. 6 1/2” x 12” journal. 8 1/4” axle diameter through motor bearing. Wheel fit, 9 3/4”; gear fit, 9-13/16”.

Center Pin
Hardened centerpin liner, grooved for oil lubrication and having felt dust guard.

Driving Boxes
AAR, 6 1/2” x 12” friction type, waste lubricated, protected with basswood dust guards, spring type lid. Provided with renewable spring steel liners, spring seat. ATA 6 1/2” x 12” babbit-lined brass. Brass thrust bar at end of axle with cast-in oil well hair-packed to lubricate end of axle. Drop-forged steel wedge.

Side Bearing Safety Device
Two per truck. Bolted to cab underframe to prevent sluing and to keep truck attached to locomotive when lifted.

Wheels
42” diameter, rolled steel. AAR Specification M-107, class BR, heat-treated, multiple wear type. AAR flange, 2 1/2” thick rims, 5 3/4” tread.
PAINTING

The locomotives will be painted in accordance with the following schedule:

**Locomotive Exterior**
1. 1 Coat Priming
2. 1 Coat Knife Glazing
3. Multiple Coats Surfacer
4. 1 Guide Coat
5. Wet Sand Rub Down
6. 1 Coat Sealing Surfacer
7. Multiple Coats Lacquer
8. Letter, Stripe and Number

Final design and color arrangements to be in accordance with railroad's requirements.

**Trucks and Undercarriage**
All parts below the deck line to receive the following:
1. 1 Black Prime Coat
2. Multiple Coats Underframe Black Enamel

**Cab Interior**
1. 1 Coat Shellac Sealer
2. Multiple Coats Pickett — Gray Enamel
3. Multiple Coats Black Enamel

**Engine and Interior of Engine Compartment**
1. Multiple Coats of Suede-Gray Oil and Heat Resistant Enamel.

All parts under the hood such as air compressor, generator, etc., are finished in suede-gray oil and heat resistant enamel.
Diesel Engine

Type
Model 608A. 8 cylinder, supercharged, in-line engine 4 cycle, 12 3/4" bore x 15 1/2" stroke.

Horsepower
1750 B.P.H. at 625 R.P.M., sea level to 8,000 feet. 1600 H.P. available for traction.

Direction of Rotation
Engine rotation is counter-clockwise when viewed from generator end.

Bedplate
Welded steel structure, with four-point mounting to the locomotive underframe, extending the length of the engine, with reinforced extensions for supporting main generator. Serves as a reservoir for engine lubricating oil. Heavy cast steel transverse webs support main bearings. Precision boring of main bearing bores eliminate necessity for shims between bearing caps and bedplate. Hollow dowels around engine mounting bolts at generator end serve as shear blocks and eliminate individual fitting of welded collision blocks.

Frame
Welded, carbon molybdenum steel structure which forms the cylinder housing and upper part of the crankcase. Neoprene seals used throughout.

Crankshaft
Heat-treated, steel forging drilled for pressure lubrication of all bearings. Shaft is counterweighted and dynamically balanced. Coupling flange for bolting crankshaft to generator is integral with the shaft.

Bearings —
Main & Crankpin
Thin shell, heavy-duty, cooper lead, strip type, fitted to bedplate. Removable through crankcase openings without disturbing crankshaft. Strip type replacement bearings are considerably cheaper than other types.

Cylinder Liners
Alloy cast iron, porous chrome-plated for wear resistance. Flanged upper end fits into frame counterbore, lower end provided with rubber sealing rings between liner and frame. This arrangement permits expansion and contraction of liner due to thermal changes.
Section III

Pistons

Heat-treated aluminum alloy, cooled by a continuous flow of oil passing through steel coils cast into piston crown. Provided with four taper-faced and twisted compression rings, and three oil control rings.

Connecting Rod

Drop forged, heat-treated alloy steel, with interchangeable bearing shells. Connecting rod bolts are heat-treated alloy steel. Bronze wristpin bushing. Rods are drilled for pressure lubrication of wristpin bearings and are held within specified weight tolerances for improved engine balance.

Cylinder Heads

Annealed high grade iron, attached to frame by six heat-treated alloy steel studs. Each head provided with two exhaust and two intake valves, with fuel injector located in the center. Valves and actuating mechanisms enclosed by removable aluminum covers.

Valves

Exhaust and intake valves (two each) are heat-treated alloy steel. Each valve is provided with two alloy steel springs concentrically arranged. Valves are actuated by rocker arms mounted on brackets attached to the cylinder heads. Rocker arms are actuated by hollow push rods socket-mounted in cam followers with solid, full floating, bronze bushings and hardened steel rollers and pins, pressure lubricated. Valves, rocker arms and push rods are lubricated from the engine pressure system.

Camshaft

Camshaft, with integral cams, consists of two sections bolted together, with each section removable. Supported in split-type removable bearing shells, it is driven by a roller type chain.

Governor

Hydraulic relay, variable speed, isochronous type (maintains same average engine speed, regardless of load), gear-driven from camshaft and pneumatically operated by throttle. Maintains proper engine speed by controlling quantity of fuel delivered by the injection pumps.

Overspeed Stop

Centrifugal trip type, gear-driven from the crankshaft. Shuts down engine when engine speed exceeds predetermined maximum speed setting.

Fuel System

Solid injection type with spring loaded, multi-hole spray nozzles and individual pumps for each cylinder. Fuel oil is supplied to the pumps by motor-driven fuel supply pump. Strainer is provided in suction line between tank and supply pump, cartridge type filter is located in pressure line between supply pump and injection pumps. A shut-off valve, manually operated from either the inside or outside of locomotive is supplied in the suction line to the supply pump. A fuel injection pump relief valve and a fuel supply pump discharge relief valve are provided.
Section III

**Lubricating Oil System**
A positive displacement gear pump, chain-driven from the crankshaft, draws lubricating oil from the engine base and circulates it through the system. The oil passes through a suction strainer before entering the pump, then through proper filters and a heat exchanger before delivery to the engine parts. An engine shut-down device is provided which will stop the engine if the lubricating oil pressure drops below a predetermined setting. Adequate pressure relief valves are provided for heat exchanger, lube oil pump and filters.

**Cooling Water System**
An engine mounted, chain-driven, centrifugal pump of Baldwin design circulates water through the engine, radiator and heat exchanger. Water temperature is thermostatically controlled.

**Supercharger**
Exhaust gas turbine and centrifugal blower mounted on a common shaft. The exhaust gas turbine utilizes energy in exhaust gases to drive the centrifugal blower which furnishes air to engine through an air intake manifold. Supercharger assures full engine power up to 8,000 ft. altitude.

**Air Filter & Silencer**
Combination air filter and Baldwin designed silencer, utilizing standard removable panel-type filters. Drip pan provided to prevent dripping of oil onto generator.

**Air Intake Manifold**
Reinforced welded steel structure directs supercharged intake air to cylinders.

**Exhaust Manifold**
Welded steel tubing, insulated, conducts exhaust gas from cylinder to supercharger.

**Exhaust Temp. Switch**
Protects exhaust manifold and supercharger from excessive temperatures. Bell alarm warns engineman to reduce throttle setting.

**Crankcase Ventilation**
Provided by slight negative pressure created by suction line to the air intake manifold. Oil separator in this line prevents admittance of oil vapors into the manifold. Oil condensed in separator is trapped for return to the crankcase.
**ELECTRICAL EQUIPMENT**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Generator</td>
<td>Westinghouse type 471, direct current, interpole, self-ventilated, separately excited type. Directly connected to engine crankshaft with the free end suspended in a self-aligning roller bearing.</td>
</tr>
<tr>
<td>Auxiliary Generator and Exciter</td>
<td>Westinghouse type YG-42, mounted on main generator and driven by V-belts. Generator provides power for battery charging, fuel pump motor, heater fans, control and lighting circuits. The exciter provides power for exciting the fields of the main generator.</td>
</tr>
<tr>
<td>Traction Motors</td>
<td>Westinghouse type 370, 6 pole, series wound, force ventilated with single reduction gearing to the axle. Motor is axle hung and supported on truck transom by spring loaded suspension. Armature bearings are of the roller type, grease lubricated. Axle bearings are provided with Felpax lubricators. Traction motors are permanently connected in series-parallel.</td>
</tr>
<tr>
<td>Main Control</td>
<td>Electro-pneumatic control equipment to operate traction motors from generator. Permanent series-parallel motor connections make transition unnecessary. Unit switches and reverser are electro-pneumatically operated.</td>
</tr>
<tr>
<td>Engineman’s Controller</td>
<td>Pneumatic throttle type, giving an infinite number of throttle positions.</td>
</tr>
<tr>
<td>Load Regulator</td>
<td>Commutator and fixed resistor type, operated in conjunction with engine governor, properly loads engine at all times.</td>
</tr>
<tr>
<td>Field Shunting</td>
<td>Four steps, automatically controlled.</td>
</tr>
<tr>
<td>Protective Equipment</td>
<td><em>Slip relays</em> which reduce engine speed until driver slipping disappears. Wheel slipping is indicated by a buzzer in the cab. <em>Ground relay</em> to detect insulation failure or flashing. Upon detection of trouble, engine is reduced to idling speed and all main electrical circuits are opened. Indicating light in cab. Relay is provided with a reset push button and cut-out switch.</td>
</tr>
</tbody>
</table>
All control circuits are protected by manually reset circuit breakers.

**Radiator Fans**

Two motor driven, axial flow type fans per locomotive, operating from main generator. Synchronized with radiator shutters.

**Traction Motor Blowers**

Two, mechanically driven from engine. One blower for each truck. Down blast discharge, double inlet, 2375 R.P.M., 9000 C.F.M. 2700 C.F.M. required for each traction motor.

**Battery**

32 Cell (eight 4-cell trays), 425 ampere-hour capacity (8 hour rate). Charged from auxiliary generator under voltage regulator control and protected by a reverse current relay and charging resistor. Battery charging ammeter located in cab.

**Starting**

Engine is started by the locomotive main generator operating as a motor, receiving its power from the storage batteries.

**Lights**

*Cab Instruments* — “Black lighting” is used on engine control panel instruments, load ammeter and air brake gauges.

*Cab light* — Center of cab ceiling. Switch on control stand.

*Classification* — Combined with Number light. Four per locomotive, one on each corner. Movable interior turret has red and green glass. Two 5” dia. clear glass lenses are mounted in rubber.

*Headlight (Sealed Beam)* — Two Pyle-National Type C-195-BPL, with two 200 watt, PAR 56, 30 volt, sealed beam lamps.

*Number* — Combined with Classification light. Four per locomotive, one on each corner. Will accommodate four 4½” numerals.
# Locomotive Equipment

**Bell**
Cast brass, 12¾” diameter. Located in front of radiator compartment above headlight. Internal, quick-acting, air-operated ringer protected by moisture trap, oil cup lubrication. Engineer's operating valve integral with brake pedestal. Fireman's operating valve on left side adjacent to cab seat.

**Cab Arm Rests**
2 on each side of cab, hinged, cushioned.

**Cab Heaters**
2 — Hot water, fin type, connected to engine water system. Variable speed, motor-driven blower. Valve is located in cab for shutting off flow of water when heat is not required.

**Cab Seats**
Engineer — Swivel type, 3” vertical and horizontal adjustment, foam rubber cushion seat and back rest. Fireman — Bench type, hinged, foam rubber seat, foot rest, combination storage. 16” x 23” x 36”. Suitable for two persons.

**Cab Ventilators**
2 per cab. Flush type, one in front of engineman, one in back of fireman at roof line. Size — 4½” x 10”.

**Fire Extinguisher**
1 — Carbon dioxide type, 10 lb. capacity, complete with floor bracket. Located in cab.

**Flag Brackets**
4 — One on each corner of locomotive.

**Gauges — Meters**
Air pressure (main and equalizing reservoirs). 1 — 4½” dia. duplex air gauge. Range, 0-200 lbs. Located in cab.
Air pressure (brake cylinder and brake pipe): 1 — 4½” dia. duplex air gauge. Range, 0-160 lbs. Located in cab.
Battery charging ammeter — Range, 100-0-100. Shock-mounted. Located in cab.
Control air — Single pointer control air gauge. Range, 0-160 lbs. Located in cab.
Fuel pressure — Range, 0-60 lbs. Located in cab.
Fuel tank level — Full-length, liquid-level sight gauge. Located on rear side of fuel tank in rear compartment. Located on right and left side of underframe tank when furnished.
Load ammeter — Range, 0-4000 amps. Shock-mounted. Located in cab.
Lube oil pressure at engine — Range, 0-120 lbs. Located in cab.
Lube oil pressure at supercharger — Range, 0-60 lbs. Located in cab.
Water tank level — 1 — ½” brass water gauge in expansion tank. Located on tank.
Water temperature — Range, 32°-212° F. Located in cab.
Heat Exchanger

Oil-to-water plate type. Maintains lube oil in proper operating temperature range.

Horn

1 — Type E2, air-operated. Located forward of cab.

Inspection Card Holder

2 — Metal frame holders with removable glass.

Manuals

3 sets — For the first locomotive on order.
2 sets — For each additional locomotive on order.
The manuals are:

1. Renewal Parts Manual
5. Trouble Shooting Handbook

Radiator

Fin type. Rubber mounted. Top and bottom headers, bolted flange connections for water inlet and outlet. Waterline connections are wire reinforced flexible hose.

Radiator Shutters

Thermostatically controlled. Located on top of radiator compartment above cooling fan air discharge. Blade type, steel, with oilitre bearings. Approx. size, 94" x 43". Air actuated cylinder operates shutters through cranks, rods and linkages.

Sanders

8 — Air operated. Controlled by "E" valves actuated by operating valve in cab. Sanding is provided for leading wheels of each truck when traveling in either direction. Traps are the one-line type providing cleaning and sanding features.

Sun Visors

2 — Automotive type. Located in front of engineman and fireman.

Tools

One set for every 3 locomotives.

Window Wipers

4 per cab. Air operated type. Located in front and back of engineman and fireman.
BRAKE EQUIPMENT

Type
Schedule 6-SL. Pedestal brake stand with independent self-lapping brake valve, automatic and independent air brakes on all driving wheels. Train line connections at each end of locomotive are 1 3/8" x 22" rubber hose with F-P5 coupling.

Air Compressor
3 cylinder, 2 stage, air cooled, directly driven by flexible connection to main generator. Equipped with unloading control. Minimum free air capacity: 70 C.F.M. at 315 R.P.M., 139 C.F.M. at 625 R.P.M. Minimum displacement: 88.8 C.F.M. at 315 R.P.M., 176 C.F.M. at 625 R.P.M.

Air Reservoir —
Main
2 — 20 1/2" diameter, 96" long, 29,400 cu. in. capacity each. Enamelled welded construction. Located under running boards for easy access.

Brake Cylinders
4 per truck — single — 10" x 8".

Brake Shoes
AAR Type A-30-C. Cast iron with carbon inserts. Flangeless.

Foundation Brakes
Clasp — all wheels. 187,500 lbs. braking force with 50 p.s.i. cylinder pressure.

Hand Brake
Vertical wheel type, 18" diameter, located in cab, connected to one truck by means of pulleys, chain and linkage. 42,640 lbs. braking force.
# Locomotive Modifications

The following is a partial listing of modifications available at extra cost. In some cases, modifications will increase the locomotive weight.

<table>
<thead>
<tr>
<th>Modification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Brake Equipment</strong></td>
<td>W.A.B. Co. 24-RL equipment.</td>
</tr>
<tr>
<td><strong>Air Compressor</strong></td>
<td>Gardner-Denver WBH-9004, 6 cylinder, water cooled. Free air capacity: 127 C.F.M. @ 315 R.P.M., 253 C.F.M. at 625 R.P.M. Displacement: 161 C.F.M. @ 315 R.P.M., 320 C.F.M. @ 625 R.P.M.</td>
</tr>
<tr>
<td><strong>Air Filter Panels (Engine)</strong></td>
<td>Farr.</td>
</tr>
<tr>
<td><strong>Battery Charging Receptacle</strong></td>
<td>Pyle-National, 100 amp. receptacle located on left side under battery box.</td>
</tr>
<tr>
<td><strong>Boilers (Train Heating)</strong></td>
<td>Vapor Car Heating, 1600 lbs./hr. or 2500 lbs./hr. capacity, or Elesco, 2500 lbs./hr. capacity. 900 gallons of water carried in tank under boiler. Application of boiler will include the installation of train line signal equipment and an engine water heating connection from the train heating line.</td>
</tr>
<tr>
<td><strong>Cab Awnings</strong></td>
<td>Metal, located over right, left, or both side windows, as desired.</td>
</tr>
<tr>
<td><strong>Cab Insulation</strong></td>
<td>For extreme cold, or hot, weather operation. Walls and ceiling lined with 1” Fiberglas.</td>
</tr>
<tr>
<td><strong>Cab Seats</strong></td>
<td>One or two arm rests.</td>
</tr>
<tr>
<td><strong>Engineerman’s Seat</strong></td>
<td>Swivel seat (armless type), for fireman, in lieu of tool-box seat.</td>
</tr>
<tr>
<td><strong>Fireman’s Seat</strong></td>
<td>Swivel seat (armless type), for head brakeman.</td>
</tr>
<tr>
<td><strong>Head Brakeman’s Seat</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Clothes Locker</strong></td>
<td>Located on electrical equipment cabinet door. Size, 44” x 20” x 6”.</td>
</tr>
<tr>
<td><strong>Defroster Fans</strong></td>
<td>Diehl Auto-Bus. Located in front of, and behind, engineman and fireman.</td>
</tr>
<tr>
<td><strong>Drinking Cup Dispenser</strong></td>
<td>Type and size according to customer’s specifications.</td>
</tr>
<tr>
<td><strong>Dual Station Control (Two Station)</strong></td>
<td>Complete set of operator’s controls, including swivel seat. Located on fireman’s side of cab facing in opposite direction.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
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</tr>
<tr>
<td>Dynamic Braking</td>
<td>Equipment located in rear compartment with separate tanks. (Refer to Locomotive Ratings for retarding efforts.)</td>
</tr>
<tr>
<td>Extension Cord</td>
<td>Located inside of engine hood. 25 ft. of cord, handle and lamp guide provided. May be permanently connected.</td>
</tr>
<tr>
<td>Fire Extinguisher</td>
<td>CO-Two, American-LaFrance, Pyrene, E.T.C., or Dugas. Number, size and location according to railroad specifications.</td>
</tr>
<tr>
<td>Fireman’s Arm Rest</td>
<td>Arm rest installed on fireman’s box-type seat. Rear end location only usually requested.</td>
</tr>
<tr>
<td>Fireman’s Back Rest</td>
<td>Installed on box seat. Not particularly recommended as it obstructs vision from side window.</td>
</tr>
<tr>
<td>Flange Oilers</td>
<td>Swanson, Nathan or Magnus. Four per locomotive, on leading and trailing wheels of locomotive, or as specified by customer.</td>
</tr>
<tr>
<td>Ground Observation Light</td>
<td>One or two lights located under cab. Switch control on engineer’s switch box.</td>
</tr>
<tr>
<td>Headlight</td>
<td>Pyle-National C-175-A. 14” dia. uranium non-glare reflectors, flush type, mounted forward and rear of locomotive. Medium screw base.</td>
</tr>
<tr>
<td>Headlight (Pre-focused)</td>
<td>Pyle-National 175-BST. Prefocused 14” headlight with bayonet base lamp and socket in place of medium screw base.</td>
</tr>
<tr>
<td>Horns</td>
<td>Leslie A-125-LP, A-200-LP; Nathan or W.A.B. Co. chime horn; etc.; in place of standard E-2 horn. Also, any one of the above, or a W.A.B. E-2 horn, is available for location on the rear compt roof, facing to the rear.</td>
</tr>
<tr>
<td>Hot Water Temperature Switch</td>
<td>Reduces engine speed to idle if engine water temperature exceeds 200° F.</td>
</tr>
<tr>
<td>Humping Control</td>
<td>Rheostat mounted in cab, controlled by engineman, to permit slow locomotive speed at full ratedtractive effort.</td>
</tr>
<tr>
<td>Lube Oil Filters</td>
<td>Nugent, Briggs, Purolator “Micronic.”</td>
</tr>
<tr>
<td>Multiple Unit Control</td>
<td>At both ends, unless otherwise specified. Provides control of power circuits, braking circuits and sander circuits in multiple. Air compressors are synchronized. Gangway provided between units with illuminating light. All piping is provided with pipe connectors on either side of coupler, but with one set of hose provided at each end. Hot water temperature switch is included with this installation.</td>
</tr>
<tr>
<td>Roller Bearings</td>
<td>Hyatt, SKF, Timken or Fafnir roller bearings on all axles.</td>
</tr>
<tr>
<td>Sanders</td>
<td>Sarefo, Brewster, Viloco or King. All sanders are one line and will fit present standard sanding system.</td>
</tr>
</tbody>
</table>
Signal Lights
Mars figure eight, white or red. Located above standard headlight; or, Pyle-National Gyralight, same location.

Speed Indicator
Chicago Pneumatic. Located in cab.

Speed Recorder
Chicago Pneumatic, or Barco. Combination speed indicator and recorder. Located in cab.

Standby Heater
(Electric)
5 to 20 kw. capacity. Voltage as required by the customer. Electric immersion heater and circulating pump in engine water system. Provided with external receptacle for A.C. power supply with cut-off switch in electrical equipment cabinet. Thermastically controlled.

Standby Heater
(Oil Fired)
Vapor Car Heating Co. E-4915, 150,000 B.T.U. oil fired hot water heater connected into engine water system.

Standby Heating Line (Steam)
Check valve and cut-off valve to by-pass engine fill line. Railroad steam line may be connected to engine fill line to keep engine and radiators warm when locomotive is not in service.

Switching Step Lights
Four per locomotive. Attached to front and rear bumper, to illuminate switching steps. Switch control on engineman's switch box.

Train Air Signal
Desirable when locomotive is to be used in passenger service, or M.U. operation. Provides means for signalling the operating cab. Furnished as part of boiler installation.

Water Coolers
Dayton Mfg. Co. — Ice-cooled water cooler of 5 to 7 gallons capacity. Located in cab. Sunroc (Electric) — 3 to 5 gallons capacity, spigot type. Marquette (Electric) — 1 to 5 gallons capacity, bottle type.

Wheels
Special heat-treatment.
Class BE, Class "B" heat treatment, entire wheel.
Class AE, Class "A" heat treatment, entire wheel, thermal crack resistant.

Windshield Wings
One, or two, on each side.

Winterization
Modifications for operation in heavy snow areas, or very cold weather, as follows:
1. Removable plates over louvres in engine hood.
2. Filters at louvre openings along top of engine hood to filter all air entering engine compartment. Louvre plates are hinged outward to permit snow removal.
3. Weatherstripped doors and hatches.
4. Adjustable doors in front of radiators to reduce cooling air intake area.
5. Double glass for cab windows to prevent frosting.
6. Hot water heater in fuel oil tank.
7. Reinforced bumper plate for heavy snow operation.
8. Fiberglass cab insulation.
GENERAL PROVISIONS

Warranty Clause

Seller guarantees that the locomotive(s) covered hereby will be built as specified and will be free from defects in material and workmanship. Seller’s liability under this guaranty shall be limited to repairing, or furnishing parts to replace, f.o.b. point of manufacture, any parts which, prior to one year from shipment from Seller’s plant of the locomotive(s) of which they are a part, or to completion of the first 100,000 miles of service of such locomotive, whichever event occurs first, fail because of defective workmanship or material performed or furnished by Seller. As a condition hereof, such defects must be brought to Seller’s attention for verification when first discovered, and the material or parts alleged to be defective shall be returned to Seller if requested. Seller shall not be liable for transportation or installation charges, for expenses of Buyer for repairs or replacements, or for damages from delay or loss of use or for other indirect or consequential damages. Seller may use improved designs of the parts to be replaced. This warranty shall not apply to any material which shall have been repaired or altered outside of Seller’s plant in any way so as, in Seller’s judgment, to affect its strength, performance or reliability, or to any defect not existing at the time of shipment or due in any part to misuse, negligence, accident or any cause other than normal and reasonable use. In consideration of the foregoing guarantees, all implied warranties are waived by Buyer. Seller does not guarantee quality of material or parts specified or furnished by Buyer, or by other parties designated by Buyer, if not manufactured by Seller, and Seller assumes no parent responsibility of any kind for such materials or parts. As the quality of engine cooling water and its treatment are beyond Seller’s control, Seller shall not be responsible for pitting or other damage due to corrosion or to scale or other deposits on the internal surfaces of the equipment.

Patent Clause

In the event that any suit is instituted against Buyer for alleged infringement of any patent by reason of the use of equipment sold by Seller under this agreement in Buyer’s business for any of the purposes for which same was sold, Seller shall pay the amount of the final award of the damages which Buyer may be obliged to pay by reason of such suit; provided that Buyer shall have given to Seller immediate notice in writing of the institution of any such suit; shall have transmitted to Seller, immediately upon receipt, all processes and papers served upon Buyer; shall have given Seller the option to defend such suit thru Seller’s counsel; and in the event Seller shall have exercised its option to defend as aforesaid Buyer shall have given Seller all information and assistance and authority necessary to defend said suit either in Seller’s name or Buyer’s. Seller shall not be responsible for any compromise made without Seller’s written consent.

Buyer shall be responsible to Seller, its successors and assigns, for any damages which Seller may suffer by reason of the use of any and all patented inventions employed in and about the sale and/or operation of the equipment sold hereunder with regard to any devices or materials manufactured by a particular manufacturer specified by Buyer on the same terms and conditions that govern Seller’s responsibility to Buyer, as in this paragraph “Patent Clause” set forth.

Test Procedure

All Baldwin Locomotives receive a complete series of tests prior to shipment from the factory to the customer. These tests are designed to check the operation of each functional part of the locomotive quantitatively as well as qualitatively. Shop tests include the sequencing, adjusting, and inspection of all electrical equipment to meet I.C.C. requirements, full power load test of the Diesel Engine and adjustment of the load regulation feature, and adjustment of all control devices. After completion of the shop tests the locomotive is given a thorough operational test on the running track, at which time all previously made adjustments are given a final recheck and those tests requiring use of the track are made. Immediately following the track test an insulation and high potential test is applied to the electrical equipment. A final track test is made just prior to shipment.