SPECIFICATIONS

GENERAL MOTORS
MODEL SD38
2000 HP SIX-MOTOR
DIESEL-ELECTRIC LOCOMOTIVE

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION

LA GRANGE, ILLINOIS, U.S.A.

Specification 8058
June 1, 1965

Litho in U.S.A.

GENERAL MOTORS LOCOMOTIVES

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SECTION 1

General Information and Identification

GENERAL MOTORS LOCOMOTIVES

Model SD38 2000 HP Six-Motor Diesel-Electric Locomotive.

Type AAR designation (C-C), Common designation (0660).

Arrangement The general arrangement of the locomotive is shown on Elevation and Floor Plan Drawing attached.

The locomotive consists of one unit complete with engine, generator, trucks and all necessary accessories for single unit operation, with a control cab between the long and short hoods.

Major Dimensions

Distance, pulling face of coupler to centerline of truck	12' 10"
Distance between bolster centers	40' 0"
Truck - rigid wheel base	13' 7"
Distance, pulling face front coupler to rear coupler	65' 8"
Width over cab sheeting	10' 0"
Width over grab irons	10' 3-1/8"
Height, top of rail to top of exhaust stack	15' 5-1/4"
Width over basic arm rests	10' 4"

Drive

Driving motors	Six
Driving wheels	6 Pair
Diameter wheels	40"

Weights and Supplies

Total loaded weight on rails (approximately)	356,000 lbs.
Fuel	3,200 gal.
Sand	56 cu. ft.
Cooling water	260 gal.
Lubricating oil	243 gal.

Clearances EMD clearance diagram included on outline drawing illustrates clearance conditions. Truck swing designed for 21° curve or 274 ft. radius, when operated as single unit. Two units coupled limited to 16° curve or 359 ft. radius on account of footboard clearance.

Safety Appliances All steps, grab handles and other safety appliances cover EMD interpretation of Interstate Commerce Commission requirements.

SECTION 2

Carbody Construction

GENERAL MOTORS LOCOMOTIVES

Framing	Underframe is of constant section design and serves as main carrying member for hoods, cab and equipment. Two channel side sills supported by center sills support catwalk along side of hoods. Draft gear pockets are welded to the built-up platform construction between center sills. The structure is all welded construction.
Collision Posts	Collision posts are designed integrally with low front hood and welded to underframe.
Flooring	Floor plates with antiskid surface are welded to underframe on end platforms and along side of hoods. Plywood cab floor covered with linoleum.
Underframe Center Bearings	Welded to body bolster assembly.
Couplers	Type "E", 6-1/4" × 8" shank, 28-1/2" long. Maximum operational swing of coupler is 17° to either side of centerline. Maximum free (manual) swing is 4° from center.
Uncoupling Device	Each end of the locomotive is provided with a top operating device arranged to operate from either side of the locomotive.
Draft Gear	National Malleable M-381 rubber draft gear with alignment control.
Jacking Pads	Combination jacking pad and cable sling is provided near each bolster at side sill.
Platform Step and M.U. End Arrangement	Platform mounting steps are provided at both ends. A folding multiple unit ramp is provided at both ends including multiple unit hand railing and guard chains.
Foot Boards and Pilot	Each end of the locomotive is provided with two footboards, mud guards, hand railings, and grab irons.

SECTION 2

Carbody Construction

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Cab The floor is elevated above the top of the underframe. The narrow hood and large cab windows provide good vision. A trap door in cab floor and side drop doors provide access to equipment beneath cab floor. Doors are located at diagonally opposite corners leading to platform alongside of hoods. Side windows on both sides of cab are sliding double sash type and fitted with latches. End windows in doors and cab are stationary and set in a special rubber retainer. Cab is of fabricated steel construction. Divided center window is provided over low short hood.

Windows All windows and doors are provided with safety plate glass.

Door Locks The cab doors are fitted with an inside latch and provided with a lock.

Insulation Ceiling and walls are lined with perforated metal for sound reduction; backed up by insulation.

Battery Box Two battery boxes are provided, one on each side of the short hood. Trap doors in catwalk provided for servicing and side drop doors provided for removing batteries. Ventilation and drainage provided. Battery boxes are sized to fit either 17 or 25 plate batteries.

Hood The power plant compartment is designed to a minimum width to provide unobstructed vision from within the cab, as well as a walkway around the hood. Doors are provided which give access to power plant equipment and allow removal of complete power assemblies. Hatches supporting cooling fans can be removed separately for removal of radiators. The hood is bolted to the inertial filter compartment and to the deck and can be removed complete with radiators and cooling fans for major repairs. When provided, dynamic brake hatch can be removed separately. Lowered front short hood is provided for improved vision.

Hood Doors All side doors have suitable outside hinges and latches.

Lifting Eyes Provision is made for lifting eyes on hood and hatches to facilitate handling with a crane.

Ballast The locomotive is basically designed for balance.

SECTION 3

Trucks

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Truck Assemblies

Two fully flexible three motor, six wheel truck assemblies are provided per locomotive.

The truck frame is supported on each of the six journal boxes by two groups of double coil spring packs.

The center bearing load is distributed by an "H" shaped bolster and transferred to the truck frame through four double coil, vertical spring packs located at the corners of the bolster. The vertical spring suspension permits full-floating action between the bolster and the truck frame. Relative movement between the bolster and truck frame is controlled by snubbers.

The controlled floating action of the flexi-coil trucks results in excellent riding characteristics that permit a wide choice of gear ratios for locomotive application.

Each of the six motors is supported by the driving axle to which it is geared, and a special suspension on the truck transom provides a flexible support, dampening out the torque shocks of the motor.

Axles

Axles with journals to suit Hyatt roller bearings. Axle material conforms to physical properties of current AAR specifications.

Wheels

Rolled steel, heat treated, rim quenched, 40" diameter with 2-1/2" rim. Wheel treads are finished smooth and concentric.

Journal Boxes

Locomotive equipped with Hyatt roller bearings 6-1/2" journals of special EMD design. Lateral thrust is taken through a cushioning arrangement directly by the box. Journal box pedestal guides provided with spring steel wear plates.

Truck Frame and Bolster

EMD design, fully flexible.

Pedestals

Lined with manganese steel plates bolted to frame.

SECTION 3

Trucks

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Pedestal Tie Bars	Fitted and applied at the lower end of the pedestal legs, held in position by bolts.
Truck Center Bearing Receptacle	Truck center bearing receptacle provided with wear plates and dust guard.
Side Bearings	Friction type side bearings.
Interlocks	Body and truck interlocks provided each side of the center plate, serving as antisluing device in case of derailment.
Bolster Springs	Double coil.
Truck Brakes	Single shoe type brake rigging provided on each wheel, operated by brake rigging mounted brake cylinders.
Brake Pins	All pins and bushings hardened and ground. All holes in brake rigging bushed.
Hand Brake	Hand brake provided for the locomotive operates on two wheels of one truck. Both trucks provided with a lever for hand brake connection, making trucks interchangeable.

SECTION 4

Power Plant and Transmission

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Engine	General Motors sixteen (16) cylinder, 2 cycle diesel engine. Power assemblies arranged in 45 degree V, with 9-1/16" bore, 10" stroke, and unit injection. Roots blower scavenging through cylinder wall intake, and multivalve exhaust. Water cooled cylinder liners and heads, oil cooled pistons, ten (10) bearing crankshaft, drop forged connecting rods, and floating piston assembly. Isochronous governor speed control, separate overspeed trip and high crankcase pressure protection.
Main Generator	EMD 600 volt (nominal) direct current main generator, ventilated by blower. Armature shaft supported by single bearing with direct connection to engine crankshaft through alternator rotor and flexible coupling. Adequate capacity to continuously transmit the rated output of the engine under all conditions for which the locomotive is designed.
Alternator	EMD 170 volt, 3-phase, 16 pole alternator, built integral with main generator, to supply AC power to induction motors driving engine cooling fans.
Locomotive Control	Fully automatic transition forward and backward. High voltage circuits safeguarded by ground protective relay. Full range wheel slip control with automatic sanding under wheel slip conditions.
Load Control	Load control provided to automatically maintain horsepower output in accordance with the published tractive effort characteristics of the locomotive.
Traction Motors	Six EMD direct current, series wound, roller bearing, force ventilated, axle hung motors.
Auxiliary Generator	Direct current generator, driven from engine gear train, provides current for control circuits, lighting, battery charging, and separate excitation of main generator. Voltage automatically controlled by static voltage regulator.

SECTION 4

Power Plant and Transmission

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Engine Starting — By motoring of the main generator through use of special starting field energized by the locomotive storage battery.

Storage Battery — 32 cell, 64 volt, 420 ampere hour capacity (8 hour rating) battery housed in two boxes located under catwalks adjacent to short hood.

Engine Cooling — Pressurized cooling system consisting of two direct driven centrifugal water pumps on the engine, radiators, and AC motor driven cooling fans located above radiators at rear of long hood. Water cooled oil cooler and water tank mounted as a unit directly in rear of the governor end of engine, automatic water temperature control, hot engine alarm, and engine shutdown in the event of low water level, are included.

Engine Lubrication — The engine lubricating oil system is a pressure system using two positive displacement gear type pumps combined in a single unit. One pump delivers oil for the pressure lubricating system, the other for piston cooling. The oil supply to these pumps is drawn from the oil strainer chamber through a common suction pipe.

A scavenging oil pump is used to draw oil from the engine oil pan through a strainer, pump it through the full flow lube oil filter to the cooler core section of the cooler tank and return it to the strainer chamber. Low oil pressure and high suction protection are provided.

Engine Air Intake Filters — Inertial type dry air filtration.

Engine Exhaust — Two sets of dual fabricated chambers, each set with an independent exhaust.

Engine Fuel System — Return flow, single DC motor driven gear pump, protected by suction strainer, and increased capacity discharge filters to insure clean fuel for the engine. Sight glasses permit visual inspection of fuel flow, and relief valve offers protection against excessive pressures.

SECTION 4

Power Plant and Transmission

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Fuel Tank 3200 gallon capacity, fuel tank built of heavy gauge steel, with baffle plates, located underneath the locomotive body. One filling station each side. Tank equipped with venting, cleanout plug, and nonremovable water drain.

Direct reading fuel sight glasses with gallonage calibration plates are provided on each side of locomotive. Each filling station provided with electric emergency fuel cutoff actuating button. Similar push-button is located in cab. When operated, engine stops immediately.

Engineer's Control Station Control station, located conveniently to the left of the engineer's seat, includes the engine speed throttle, locomotive reverse lever, automatic and independent brake valve. The lever arrangement is such that the throttle must be in idle before the reverse lever can be removed to isolate the controller. The horn valve, bell valve and independent sander switch are also located in the control stand.

Engineer's Control Switches Control and lighting switches located within reach of the engineer, including switches for control and fuel pump, generator field, engine run, gauge lights, headlight "bright" front and rear, headlight "dim" front and rear. Engine start and stop, number and class light and isolation switches located on rear cab wall. Cab heater switches on cab heaters.

Engineer's Instrument Panel A lighted instrument panel is provided on top of the engineer's controller containing air brake gauges, wheel slip light, ground relay light, PCS "open" light, and the traction motor load indicating ammeter. A panel mounted on the rear cab wall contains the battery charging indicator.

Speedometer A combination instrument containing the speed indicating dial, speed recorder, tape, and mileage odometer is provided on the front cab wall in front of the engineer.

Equipment Air Supply An inertial separator, located in the roof behind the cab, supplies filtered intake air to all equipment. The separated contaminants are blown out by an AC fan incorporated in the separator. Filtered air is supplied to the traction motor blower, the main generator blower and the engine air filters. Traction motor blowers deliver air to a duct and plenum chamber system on the underframe and supplies the traction motors with cooling air. The main supply air duct forms the left side walkway. Generator discharge air is used to pressurize the engine compartment.

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Electrical Control Cabinet

A dirt proof, totally enclosed, readily accessible, cabinet houses the locomotive high and low voltage control equipment.

An additional cabinet, mounted in the engine room, houses the control equipment for the radiator cooling fan motors.

Multiple Control

Multiple control equipment is provided for operating two or more units from one cab, including electrical trainlining of sanding control. Sanding control trainlined pneumatically is available as a modification.

SECTION 5

Air Brakes

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Air Brakes	26L brake schedule including self-lapping independent and standard 26F control valve portions. Horn and bell ringer valves are provided. Manual sanding is actuated electrically.
Foundation Brakes	6" × 12" cylinders, 16" non-metallic brake shoes, 1.45 : 1 ratio.
Brake Piping	Wrought steel pipe with AAR fittings are used. Generally, all piping 1/2" O.D. and under uses nominal size steel tubing with SAE fittings.
Main Reservoir	Two (2) 15" diameter × 152" steel reservoirs mounted beneath the underframe. Total capacity: 49,000 cu. in. No. 1 main reservoir equipped with an air operated automatic drain valve.
Air Compressor	One two stage, three cylinder, water cooled direct coupled compressor, having a displacement of 254 cu. ft. per minute at 900 RPM. This is an extended maintenance compressor with large oil capacity and disposable intake air filter. Electric air compressor governor adjusted to maintain reservoir pressure between 130 and 140 psi.
Sand Capacity	Two sand boxes with a total capacity of 56 cu. ft. Sand boxes are filled from the outside of locomotive on top of hoods.
Sanding	Low pressure sanding system utilizing a constant supply of traction motor blower air. Manual sander switch or automatic sanding in power operates eight single line sand traps, four traps for forward movement and four traps for reverse movement. A separate switch is provided for lead axle sanding only. Sand trap cutoff valves are provided. Outside access is provided for maintenance of sand traps.
Emergency Valve	Conductor's emergency valve is provided on the left side of the cab.

SECTION 6

Equipment

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Cab Heating and Ventilating — Two combination hot water cab heaters and defrosters with fan driven air circulating system, and selective outside air intake. Each heater is provided with three speed switch for control of fan speed.

Window Wipers — Total of six (6) extra heavy duty air operated window wipers are provided for front and rear windows on both sides of cab and center windshields.

Sun Visors — Adjustable metal sun visors are provided.

Cab Seats — The two wall mounted upholstered cab seats have forward and backward as well as height adjustments. Both seats can be turned 180 degrees. Arm rests are provided outside the side windows.

Fire Extinguishers — Two (2) 20 lb. Ansul, one located in cab, the other in the engine compartment.

Headlight — Twin sealed-beam headlights, front and rear, are equipped with two 200 watt, 30 volt sealed beam units. Bright and dimmer switch for each light provided in operator's cab.

Warning Devices — Three chime diaphragm type air horn, two bells pointing forward and one to the rear with lever operated modulating horn valve. Horn is located on center line of cab roof.

One 12" locomotive bell with internal pneumatic ringer, located in underframe.

Locomotive Lighting — Lamps and outlets are as follows:

1. Two ceiling cab lights
2. Three engine room lights
3. Two ground lights
4. Eight number lights
5. Three gauge lights
6. Outlet receptacles: one in engine room, one in cab
7. One short hood compartment light
8. Four classification lights
9. Two platform lights, one each end

SECTION 6

Equipment

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Marker and Flag Brackets Four standard combination flag and light brackets are provided, two each are located at front and rear of locomotive.

Number Boxes Four lighted number boxes, two on each end of locomotive, mounted at an angle for both forward and side visibility. Numbers are painted on glass windows and are not removable.

Classification Lights Classification lights built into each corner of front and rear hood.

Miscellaneous Two (2) coat hooks provided in cab.

Multiple Control Multiple control equipment provided to allow operating two or more units from one cab. Locomotive equipped with one (1) 27 point power plant receptacle per end, one (1) power plant jumper cable provided. Sanding is trainlined electrically, pneumatic trainlining will be by additional modification.

SECTION 7

Locomotive Modifications

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The following modifications can be supplied on request to satisfy various operating requirements. The base price of the locomotive described in this specification does not include these modifications.

Air Compressor	Two stage, six cylinder air compressor, water cooled, having a displacement of 401 cu. ft. per minute at 900 RPM.
Ballast	Unit may be ballasted to weigh 393,000 lbs., maximum - within manufacturing tolerances.
Toilet	Toilet with water tank or dry hopper type is available.
Awnings	Cloth or metal awnings over cab windows can be provided.
Fuel Tank	4000 gallon fuel tank is available.
Cab Seat	Third cab seat, slide rail mounted.
Wind Deflectors	Wind deflectors can be provided at front and rear of side windows.
Battery Charging Receptacle	Battery charging receptacle can be provided.
Push Pole Pockets	Push pole pockets can be provided.
Deep Sump Oil Pan	Engine usable oil capacity increased 137 gallons and total system capacity increased 153 gallons.
Dynamic Brakes	Variable dynamic brakes use the traction motors as generators, with the power being dissipated through force ventilated grid resistors located in the engine hatch. Variable voltage type control is standard with dynamic brakes. Field loop type control available as an additional modification.

SECTION 8

Painting

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General	The best quality materials available are used with special attention given to methods of application to insure a maximum of protection and durability.
Engine Room	Inside finished in suede gray. All air, fuel, water and lube oil piping color coded at points of connection.
Outside Finish	Color arrangement and design to agree with railroad's requirement.
Under Carriage	Black unless otherwise specified.
Cab	Inside finished in suede gray.
Trucks & Tanks	Black unless otherwise specified.

SECTION 9

Performance Data

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The choice of gear combinations will depend upon the service contemplated.

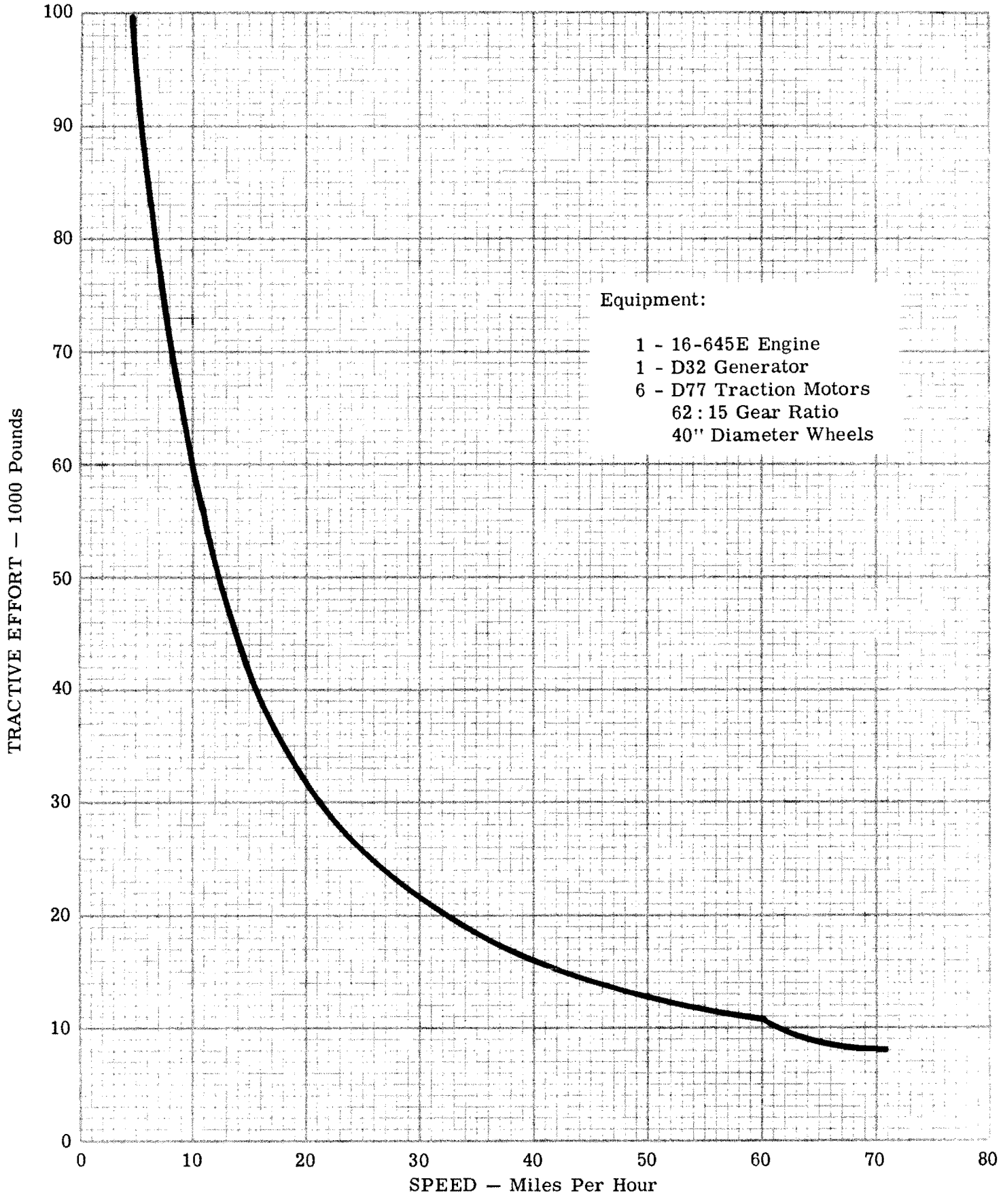
Optional Gear Ratios

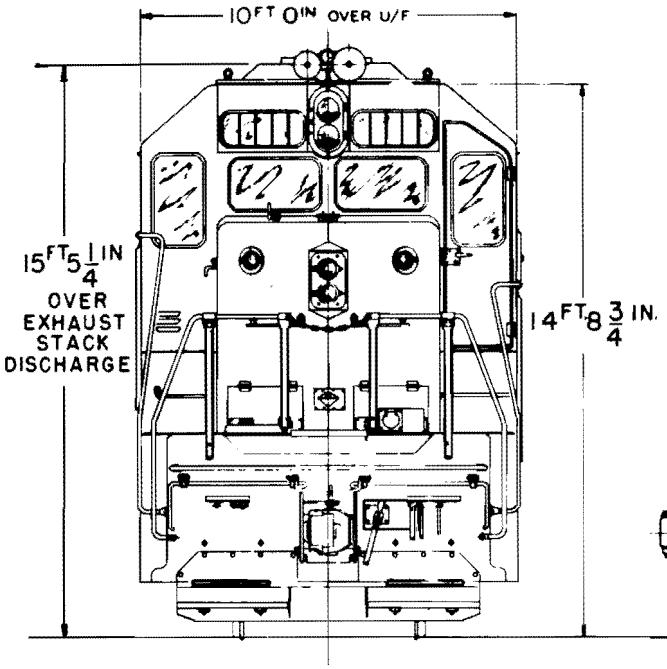
OPTION	1	2	3
GEARS	62:15	61:16	60:17
RATIO	4.135	3.81	3.53
*MAX. SPEED	60.5	65.7	71.0

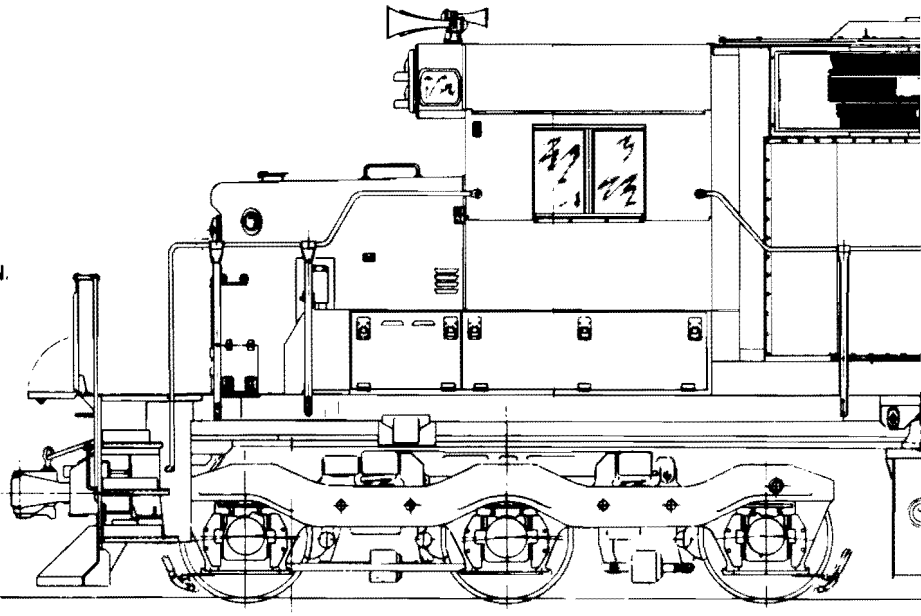
*Overspeed switch can be set 4 MPH above maximum.

Electro-Motive Division
General Motors Corporation
La Grange, Illinois, U.S.A.

SPEED — TRACTIVE EFFORT CURVE
2000 HP Model SD38 Locomotive

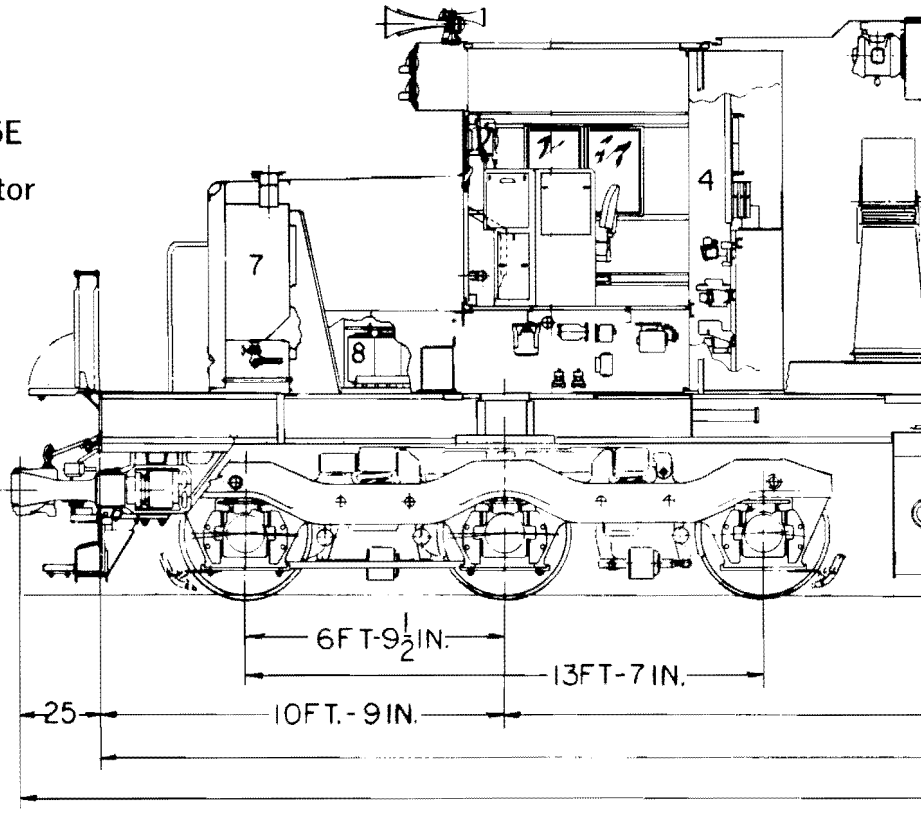


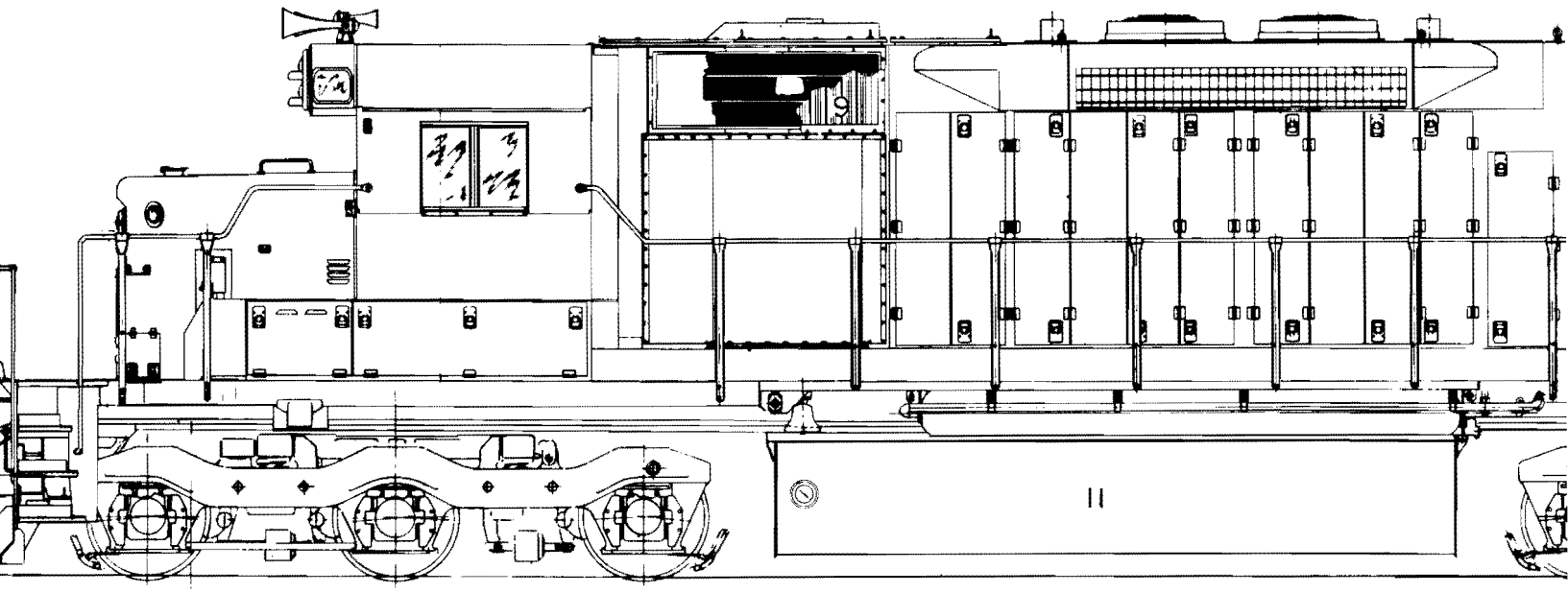


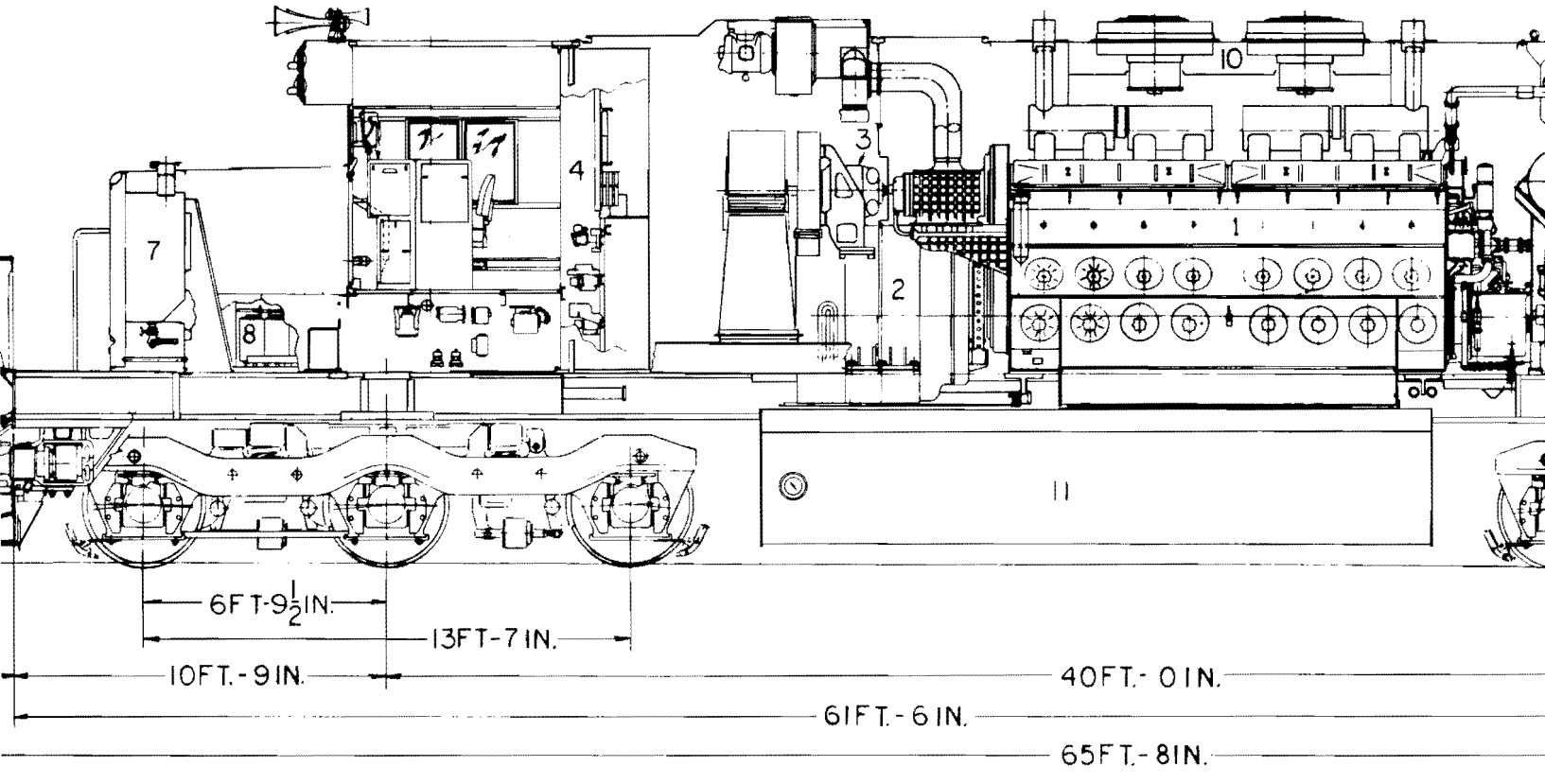


SD-38 Locomotive

1. Engine—EMD Model 16-645E
2. Main Generator and Alternator
3. Auxiliary Generator
4. Control Cabinet
5. Air Compressor
6. Cooling Fan and Motor
7. Sand Box
8. Batteries
9. Inertial Air Separator
10. Dynamic Brake
11. Fuel Tank







6FT-9½IN.

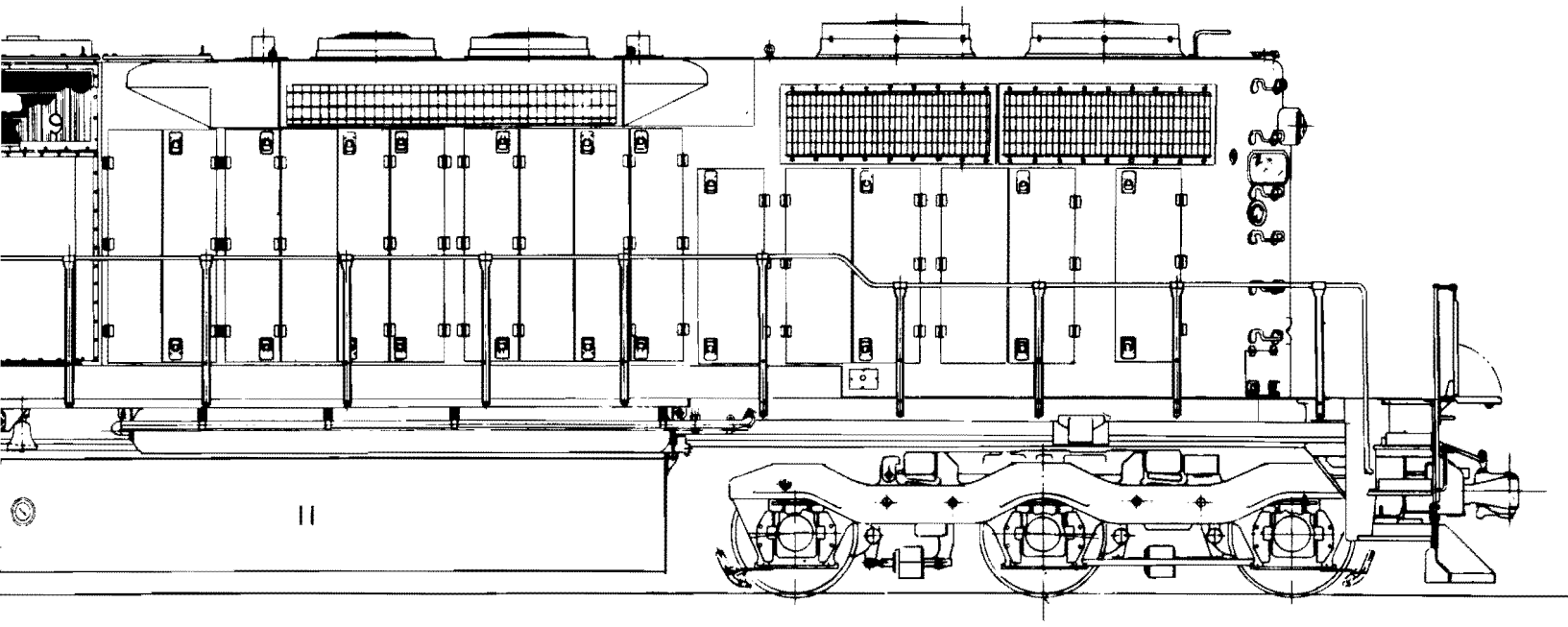
13FT-7IN.

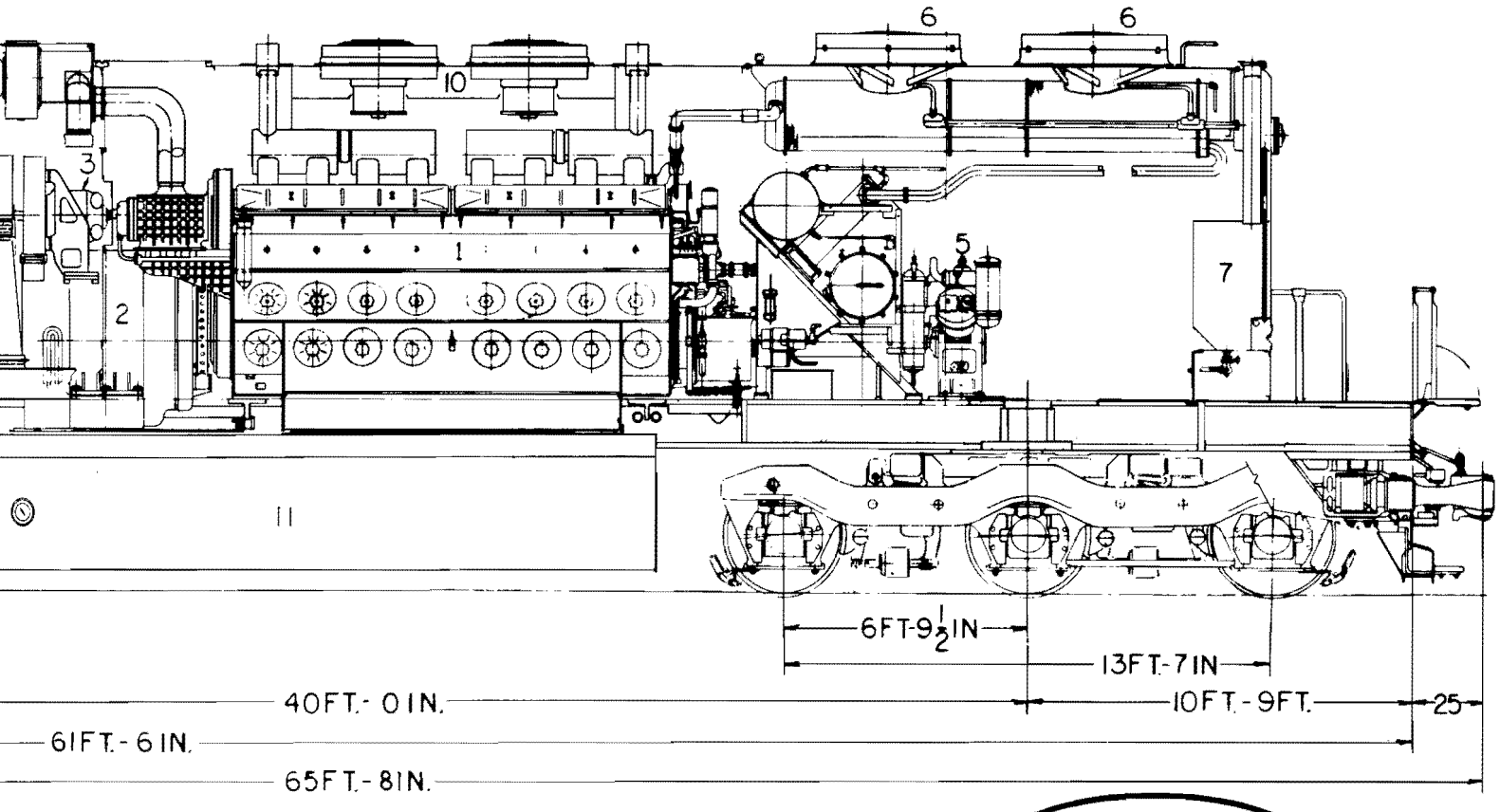
10FT.-9IN.

40FT.-0IN.

61FT.-6IN.

65FT.-8IN.





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