

S P E C I F I C A T I O N

900 H.P ., 125-TON DIESEL SWITCHING LOCOMOTIVES



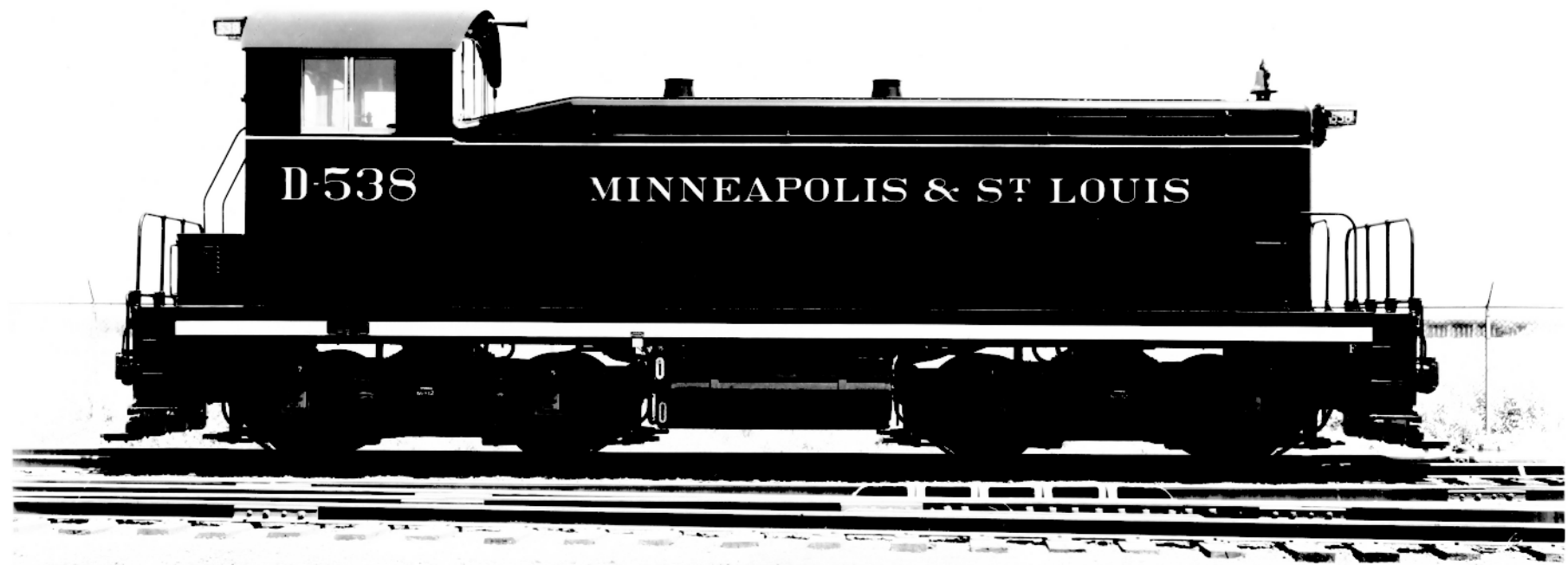
ELECTRO-MOTIVE CORPORATION
(Subsidiary of General Motors)
La Grange, Ill.

Specification #572-A

October 15, 1937

D-538

MINNEAPOLIS & ST LOUIS



ELECTRO-MOTIVE CORPORATION

STANDARD SPECIFICATION

DIESEL SWITCHING LOCOMOTIVE

Electro-Motive Corporation herein presents its latest type 900 H.P., 125-ton, 8-wheel Diesel Switcher with two 4-wheel motor trucks providing 4 pairs of 40-inch drivers.

"E M C" Diesel locomotives embody the latest engineering advances and have been designed to provide those features which are so necessary to secure maximum efficiency and economy under present day operating conditions. Realizing the demand for a highly dependable and economical type of railway motive power, "E M C" Diesel Switching Locomotives provide many outstanding superiorities, some of which are:

1. Diesel power plant of latest and improved design.
2. Superior materials and workmanship providing maximum life of the locomotive structure.
3. Maximum visibility providing safety for one-man operation.
4. Maximum accessibility for inspection, adjustment and replacement of working parts.
5. Maximum availability under varying atmospheric conditions.
6. Low operating, maintenance and service costs.
7. Complete enclosure of engine moving parts to exclude dust and grit.
8. Complete combustion of low price fuel, producing high efficiency and clean exhaust, thus eliminating smoke nuisance.
9. Unit Fuel Injection System providing accurate metering of fuel, thus obtaining complete control of the variable operating speeds.
10. Rapid acceleration and smooth operation over a wide range of speed and load due to the light weight, balance and uniformity of rotating and reciprocating parts.

TYPE: 900 H.P., 125-ton Switcher, Type O-4-4-0.

GENERAL

DIMENSIONS:

Track Gauge	4 ft. 8½ in.
Length over coupler pulling faces	43 " 7½ "
Width over side sills	10 " 0 "
Maximum height above rail	14 " 7 "
Height of cab floor above rail	7 " 0 "
Length of operator's cab	6 " 6 "
Width of operator's cab	9 " 11 "
Height of power plant hood roof above rail	11 " 6 "
Width of power plant compartment	6 " 6 "
Wheelbase - truck	8 " 0 "
Truck centers	22 " 0 "
Number of drivers	4 pairs
Diameter of drivers	40"
Size of journals	6½ in. x 12 in.
Minimum curve radius	100 ft. 0 in.

SPEED: Maximum permissible speed 40 M.P.H.

WEIGHTS:
(approx.)

Total weight (in working order)	250,000 lbs.
Weight on drivers	250,000 lbs.
Journal load per driving axle	55,100 lbs.

CAPACITY: Starting T.E. at 25% adhesion 62,500 lbs.

A black and white photograph showing the front view of a dark-colored locomotive, identified by the number 'G.N. 5102' on its front panel. The locomotive is positioned on a set of railroad tracks that curve to the right in the distance. A single headlight is visible at the top center of the locomotive's front. The background is bright and overexposed, with utility poles visible on the left side. The overall scene is captured from a low angle, looking directly at the locomotive.

G.N. 5102

B381-1548



8/4

UNDERFRAME DETAILS

- UNDERFRAME: EMC latest design of welded steel type. This construction, employing EMC especially developed welding process, provides a structure capable of withstanding the most severe buff and drag stresses.
- Welded integral with the underframe are the body bolsters, center plates, draft gear pockets, coupler strikers and top and bottom cover plates. Push pole pockets of malleable castings are welded to the ends of the side sills.
- Note: Cast steel underframe of latest design can be supplied as a special requirement.
- CENTER PLATES: Described under "Truck Details".
- COUPLERS: Type "E" of standard length. Maximum swing of coupler is 12 in. each side of center. Center line of coupler is $34\frac{1}{2}$ in. above rail.
- COUPLER YOKES: Cast steel, - AAR standard specification and size.
- COUPLER CARRIERS: Cast steel, - supported on a shelf and held in place with a 1- $\frac{3}{8}$ " through bolt. A spring steel wear plate is welded to the top face of the carrier to eliminate excessive wear.
- DRAFT GEAR: Provision made for application of standard draft gear.
- SIDE BEARINGS: Hardened steel wear plates. Side bearing clearances provided are: $\frac{1}{4}$ " clearance on front truck; $\frac{1}{2}$ " clearance on rear truck.
- UNCOUPLING DEVICE: Three-piece forged steel rod (as illustrated), arranged to operate from either side of the locomotive in accordance with AAR recommended practice.

**PLATFORM
STEPS:**

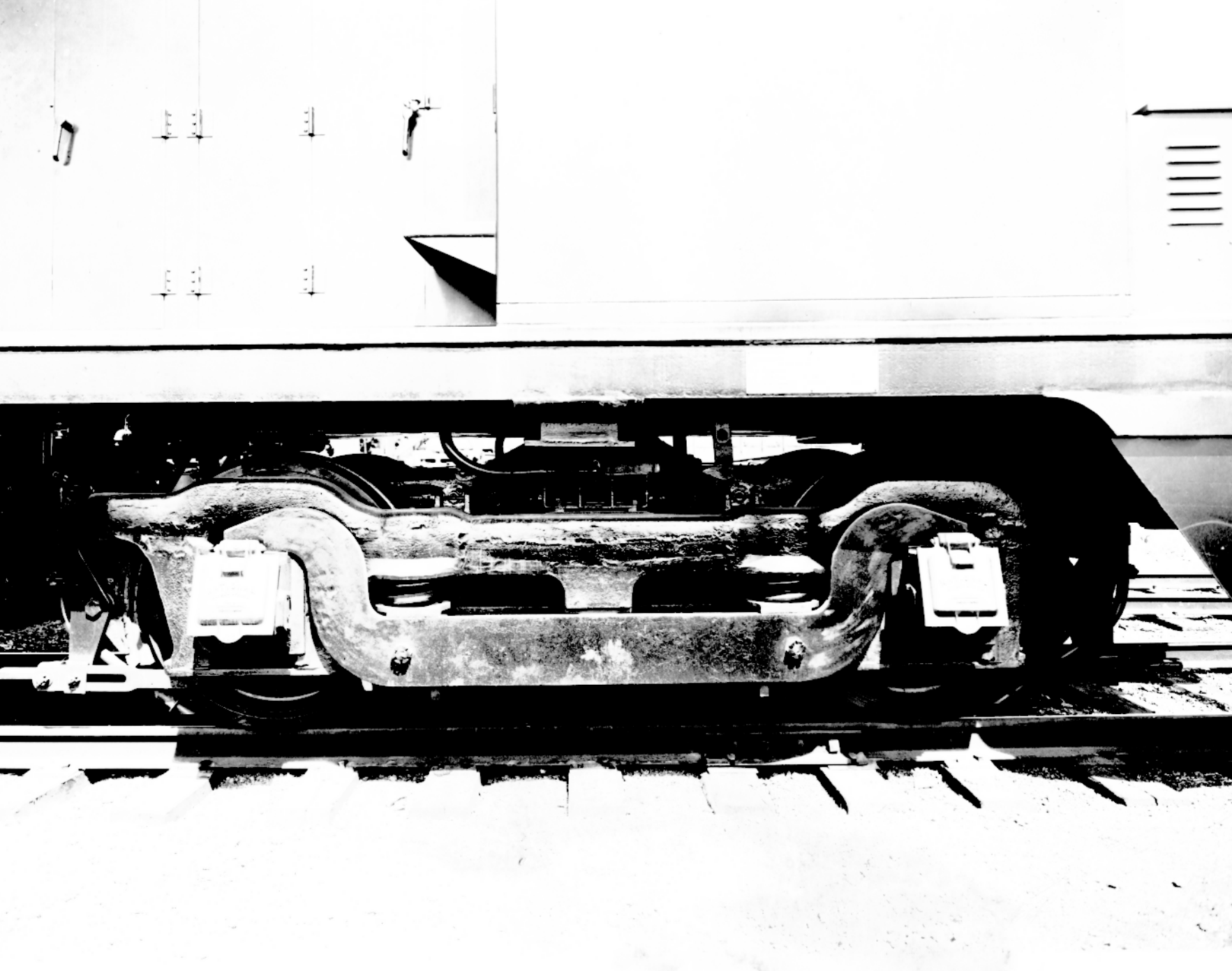
Welded structural three-step type at the four corners with heavy protective step skirts. Steps are recessed inside of side sill clearance to provide maximum safety for trainmen, thus permitting them to ride the locomotive without any possibility of injury from close clearances or side-swiping.

FOOT-BOARDS:

Two foot-boards are provided at each end, each foot-board being supported by two brackets and backed with mud-guard. All dimensions meet or exceed U.S. Safety Appliances requirements.

GRAB IRONS:

Numerous grab irons and hand rails are provided, as shown on photographs.



TRUCK DETAILS

- TRUCKS: Two 4-wheel motor trucks. Truck frames are cast steel, pedestal type, by General Steel Castings Corp., with side frames, hollow bolster, pedestal jaws and center plate cast integral. Truck frames are supported on triple helical and semi-elliptic springs in parallel, with provision for adjustment of height. The semi-elliptic springs are supported on swing hangers from double-forged equalizers which are supported by special waste packed journal boxes. Equalizers (AAR Spec. M-104-34) are machined at journal box contacts.
- MOTOR SUSPENSION: Each of the four traction motors is supported in the truck between a driving axle and a spring motor nose suspension on the truck bolster.
- TRUCK BOLSTERS: Truck bolsters, which are cast integral with the truck frame, carry unusually large center plates with hollow center to provide introduction of clean air from the engine compartment to the traction motors.
- PEDESTAL LINERS: Hardened spring steel of channel section welded to pedestals.
- PEDESTAL TIE BARS: Mild steel, with fitted lugs at each end, and attached to pedestals with two fitted bolts at each end.
- SIDE BEARINGS: Hardened spring steel wear plates. A keyed interlock at side bearings is provided to hold body and trucks together and prevent sluing in case of derailment.

CENTER
PLATES:

Center plates of both body and trucks are provided with special horizontal steel wear plates. Also, around the outside of the body center plate and around the inside of the truck center plate, are welded vertical special steel bands which are accurately machined to eliminate the usual center plate "slap". The horizontal wear plate of the body center plate is welded to the center plate, whereas the horizontal wear plate of the truck bolster is loose, thus permitting replacement or shimming.

JOURNAL
BOXES:

Cast steel, suitable for 6-1/2" x 12" journals. Journal boxes are provided with exclusive EMC "Satco" lined end-thrust arrangement to protect journal bearings.

JOURNAL
BRASSES:

"SATCO" lined and provided with deep skirt.

JOURNAL
WEDGES:

Standard for 6-1/2" x 12" journals.

DUST
GUARDS:

Special design.

AXLES:

Normalized and tempered forged steel, conforming to AAR specifications. Axles are ground for all bearings, wheel and gear seats. Axle diameter through motor bearing is 8 1/4". Truck journals, 6-1/2" x 12". All axle dimensions are strictly in accordance with American Transit Association recommendations for E-12X axles.

WHEELS:

Solid rolled steel, heat-treated. Contour of tread and flange conform with latest AAR standards. Wheel diameter at tread 40"; width 5 1/2".

AIR BRAKE DETAILS

- AIR BRAKE EQUIPMENT: Schedule 14-EL air brakes, both straight air and automatic, including quick release valve.
- AIR RESERVOIRS: Two 22½ x 84" steel reservoirs mounted under the power plant between the trucks, provide more than 60,000 cubic inches capacity.
- BRAKE CYLINDERS: Four per locomotive; double-acting type of latest design.
- AIR BRAKES: Clasp type with two shoes per wheel.
- BRAKE SHOES: Flanged cast iron with steel backs and steel inserts.
- HAND BRAKE: Staffless (52/12 ratio), with 16" hand wheel in cab; arranged for braking on one pair of wheels.
- DEAD MAN CONTROL: None. Provision made for installation when desired.
- AIR COMPRESSOR: Three-cylinder, 2-stage, air-cooled, mechanically driven by a power take-off from the main engine. This compressor has a displacement of 167 cubic feet per minute at 750 r.p.m. of the main engine (full power speed), and a displacement of 56 cubic feet per minute at 250 r.p.m. (idling speed).
- SANDING EQUIPMENT: One sander valve operates eight sand traps, four traps for forward movement and four traps for reverse movement, thus providing sand on all eight wheels. Four sand boxes with a total capacity of approximately 35 cubic feet are provided, thus eliminating necessity for frequent filling. All sand boxes are filled from the outside of locomotive.



"EMC" DIESEL SWITCHER
OPERATOR'S VIEW AHEAD
(SITTING POSITION)



"EMC" DIESEL SWITCHER
OPERATOR'S VIEW ACROSS HOOD
(SITTING POSITION)



"E M C" DIESEL SWITCHER
OPERATOR'S VIEW ACROSS HOOD
(STANDING POSITION)



"EMC" DIESEL SWITCHER
OPERATOR'S VIEW
THROUGH REAR WINDOW

SUPERSTRUCTURE DETAILS

SUPER- STRUCTURE:

Consists of a cab and power plant compartment in separate units, substantially built of welded and riveted steel plates and structural members. A base is welded to the underframe top cover plate. The cab and hood structures are securely bolted to this base, thus permitting the removal of either unit without disturbing the power plant equipment which is mounted on the underframe.

CAB:

A single operator's cab is mounted at the No. 2 end. All posts are seamless steel tubing to provide maximum strength with minimum section, thus providing improved visibility. The main cab floor is elevated 26" above the platform level with operator's position elevated an additional 8" to provide unobstructed vision in all directions. Rear windows and rear door are glazed to within approximately 20 in. of cab floor to provide maximum visibility for operator to see trainmen riding on rear steps. All windows and doors are glazed with shatter-proof glass, the two rear windows being protected with guard bars. Side windows are of the sliding type. A center main door is located at the rear of the cab, and a door at the front left side of the cab permits access to the runway around the engine hood. Steel steps with hand railings are provided at both doors. A trap door is provided in the cab floor to permit access for inspection of piping, wiring, etc. Ceiling and walls of cab are treated for insulation and sound deadening.

CAB EQUIPMENT:

Consists of:

1. Cab heater, - hot water, motor blown.

CAB

EQUIPMENT:
(Cont'd)

2. Window wipers. Three (3) extra heavy "JUMBO" Air Push window wipers are provided for operator's front and rear windows and left front door to give maximum visibility under all weather conditions.
3. Mirror. A mirror is mounted on left side of cab to provide adequate vision for signals and clearances on left side of locomotive in forward movements.
4. Operator's seat, - well upholstered with rubber air cushion.
5. Arm rests, - (upholstered) at both side windows.
6. Tool box and tools.
7. Auxiliary seat. A locker box (Item 6) with upholstered cover is provided on left side of cab. This provides storage space for tool box and tools, etc.
8. Fire extinguishers (1-gallon size). Two fire extinguishers are provided; one in the operator's cab and one in the power plant compartment.
9. Ceiling lights. Two ceiling lights with guards are provided in the cab and four in the engine room, all controlled by a switch at operator's control station. Two convenience sockets are also provided in the engine room.
10. Marker and classification light brackets and wired sockets are provided.

CAB FLOOR:

Built of $1\frac{1}{4}$ in. T&G No. 1 maple flooring laid crosswise of the cab and bolted to steel members.

POWER PLANT HOOD:

Ahead of the cab is the power plant compartment. This portion of the superstructure has a reduced dimensional cross-section to provide a runway on each side of the locomotive from the cab to the No. 1 end platform, and is securely bolted to the base which is welded to the underframe top cover plate. The height of the hood has been reduced to provide improved visibility for the operator. The entire hood can be removed in one unit without dismantling. Four special eye-bolt castings are attached to the hood, two on each side, to receive crane hooks.

HOOD ROOF: Hatches and louvres are built in, also a well for exhaust muffler.

HOOD FRONT: Has grilled opening for air intake, as shown in photograph.

HOOD DOORS: Double doors on each side are provided for ease of inspection and maintenance of power plant equipment. All doors have suitable hinges, latches and locking device.

HAND-HOLD
RAILINGS: Provided along each side of hood above the doors, at both end platforms, steps, etc., as shown in accompanying photograph. This provision more than meets the I.C.C. Safety Appliances requirements.

STEAM HEAT
CONNECTION: Steam heat connection is provided for coupling to yard steam line to keep engine warm when idle in cold weather. If steam heat connection is not available and auxiliary heater is required, this can be provided at an additional cost.



POWER PLANT DETAILS

POWER PLANT: The engine is a 12-cylinder V-type, high compression, 2-cycle Diesel, with 8" bore and 10" stroke, direct-connected through a flexible coupling to a D.C. generator of sufficient capacity to continuously transmit the rated output of the engine to the traction motors under all conditions for which the locomotive is offered.

The engine is mounted on channel members securely welded to the underframe platform. The generator is bolted to brackets which in turn are bolted to the underframe platform to provide shimming for alignment. All engine and generator foundation bolts are fitted.

AUXILIARIES: Power plant auxiliaries consist of a 5 K.W. auxiliary generator (for charging the battery and operating lights, fuel pump and control equipment), a mechanically-driven two-stage air compressor, and a pair of air-intake fans for circulating air through the engine cooling radiators. These auxiliaries are accessibly located ahead of the power plant and are driven either direct or through "V" belts from a shaft extension of the main generator. Engine auxiliaries consist of a scavenging blower with silencer, water pump, and oil pressure and scavenging pumps. These auxiliaries are conveniently located at the gear case end of the engine. A motor driven fuel pump is provided to deliver filtered fuel to the twelve (12) Unit Injectors of the engine.

ENGINE
RATING:

900 H.P. at 750 r.p.m. is available for propulsion. Power for the auxiliaries is taken from the engine in excess of the propulsion rating.

ENGINE
BLOCK:

Cylinder block and crankcase have been combined into one unit of the most modern welded steel construction. Rolled plate is fashioned around the seven (7) cross members forming the framework for the engine block. Combustion stresses are transmitted to the main bearing seats through these frame members which are cut from heavy steel plate. Additional shapes of steel plate are welded in place to form air intake passages, top and bottom of the cylinder block, and webbing where needed.

A shallow crank pan with deep sumps at each end runs the full length of the engine from blower drive to the flywheel. The sumps are fitted with oil strainers to prevent foreign substance entering the scavenging pump suction lines.

CRANKSHAFT: A one-piece forged steel crankshaft, very accurately machined to close tolerances and well balanced, is mounted on seven (7) main bearings of 6-3/4 in. diameter. Counterweights integral with the crank cheeks relieve the main bearings of much of the centrifugal load.

MAIN
BEARINGS:

Main bearing seats are securely attached to the rigid legs of the arched engine block frame. Steel bearing caps are held in

MAIN

BEARINGS:
(Cont'd)

place by jackscrews acting against the frame arch below the cylinder block.

Bearing shells are made of steel, faced with "SATCO" bearing metal. No shims are used between the bearing halves.

Hand-hole cover plates permit ready access to main and connecting rod bearings for periodical inspection or maintenance.

Lubrication of all bearings is accomplished under high pressure through an oil manifold and passages drilled in the crankshaft.

**CONNECTING
RODS and
BEARINGS:**

Drop-forged connecting rods, of the conventional "I" section, have rod caps of the same material securely fastened by four studs. The rod is drilled for lubrication of the wrist pin bearing and spray-cooling of the piston head.

Tubular hardened steel wrist pins ride in the rods in pin roller bearings held in place by spring locks.

The crank pin bearing liners are made of steel, faced with "SATCO" bearing metal accurately bored to a 6-inch diameter.

**PISTON
ASSEMBLY:**

Pistons are cast nickel-aluminum alloy of special design. The head is recessed at the top to form the combustion chamber and to help create some turbulence during fuel injection, and is deeply ribbed on the lower side to facilitate transfer of the absorbed heat to the cylinder oil which is sprayed upon it from the connecting rod. The upper ring belt carries four compression rings and one oil control ring; the lower ring belt is provided with two oil control rings, which travel over the portion of the cylinder wall below the intake ports.

PISTON
ASSEMBLY:
(Cont'd)

The wrist pin is supported on bronze bushings in the piston pin bosses. These bosses are closed by snugly fitting discs to provide a continuous surface to the intake ports. The wrist pin is free to rotate in both the piston and the connecting rod.

CYLINDER
LINERS:

Heat treated cast iron construction. The cylinder liners with their integral water jackets are inserted in the crankcase, which also forms the chamber for the slightly compressed scavenging air. The twenty-four (24) intake ports pass transversely through the water jacket and are tilted radially to impart the correct turbulence for combustion. Passage for the cooling water from the bottom to the top of the cylinder is provided by cored holes between the intake ports. A centrifugal water pump provides positive circulation of water through each liner to the cylinder head, from where it is passed through the engine cooling system and back to the water pump.

The arrangement of air intake and the use of four (4) exhaust valves in each cylinder head insures complete scavenging at a minimum blower pressure.

CYLINDER
HEADS:

Individual cylinder heads are of close grained cast iron and are provided with ample water space. The heads are solidly bolted to the cylinder block and also to the cylinder liner with a copper-asbestos gasket clamped between the head and liner only.

An overhead valve mechanism, consisting of two rocker arms equipped with automatic tappet adjusters, operates four (4)

CYLINDER
HEADS:
(Cont'd)

exhaust valves, a third rocker arm operating the fuel injection valve. The three valve lifter roller plugs are grouped in that portion of the head which forms a cover for the camshaft tunnel.

A spring-locked thumb screw, providing micrometer adjustment of the unit injection valve, is accessible through a small drop plate fashioned on the outboard side of each cylinder head, permitting adjustment of fuel injection of each cylinder while the engine is running. Bolted to the head is a polished cast aluminum cylinder head cover which encloses the whole valve mechanism.

CAMSHAFT:

The two camshafts are mounted in split plain bearings which are lubricated by oil introduced under high pressure from the interior of the shaft. The speed of rotation is equivalent to that of the crankshaft.

CAMSHAFT
DRIVE:

A cast aluminum case, on the generator end of the engine, houses a dual link chain drive for the elevated camshaft. Drive is equipped with a spring-loaded slack adjuster, and an idler sprocket to eliminate chain whip between crankshaft and camshaft.

SCAVENGING
BLOWER:

Scavenging blower is mounted at the forward end of the engine block and is driven by a combination gear and chain drive from an extension of the crankshaft.

Single large capacity air intake silencer surmounts the blower intake. The discharge goes direct to the hollow cylinder block, which acts as a manifold to the multi-vaned intake ports in the cylinder liners.

SCAVENGING
BLOWER:

Lubricating oil and water circulating pumps are mounted on the rear of the blower drive housing and are driven through sprockets engaging the blower drive chain.

UNIT
INJECTION
SYSTEM:

The Unit Fuel Injection System employed on this 2-cycle Diesel engine is a principal and patented feature of the Electro-Motive Power Plant. This Unit System differs from the conventional air injector, common rail, or pump systems, in the fact that each cylinder of the engine is fitted with an individual unit which constitutes an independent and complete injection system which avoids the use of long, high pressure fuel lines and their attendant complications.

Injector unit consists essentially of a low pressure fuel supply connection, high pressure pump, spray valve complete with needle valve and a removable spray tip, and a control mechanism for regulating the effective stroke of the pump plunger. It is centrally located in the cylinder head, being securely fastened in a water cooled boss by means of two studs which pass through mounting lugs formed integral with the steel body of the unit.

Actuated by a cam, cam follower, push rod and a rocker arm, the pump plunger of the injector unit has a constant travel, and would have a constant rate of injection were it not for the very ingenious arrangement of controlling the effective stroke of the plunger. The effective stroke of each plunger is regulated by a rack and pinion arrangement operated by a

UNIT
INJECTION
SYSTEM:

common control shaft which, in turn, is moved by the governor which sets the engine speed.

A screw adjustment is provided in one end of the injector operating rocker arm for the purpose of close setting of the injector timing. Fine adjustments of fuel delivery can be made at the micrometer adjustment thumb screw attached to each rack control mechanism.

The pertinent requirements for a satisfactory fuel injection system have been accomplished in the following manner:

- (a) Metering - The plunger pump has a pumping stroke which can be varied to meter the desired amount of fuel per stroke.
- (b) Injection Timing - The plunger is operated by a cam driven from the ^{crank}~~crank~~shaft to effect a pumping stroke which begins and ends at the desired points in the crank travel.
- (c) Injection Rate - The rate of fuel discharge during the pumping stroke is controlled by the shape of the cam.
- (d) Atomization - The fuel is forced at high velocity into the cylinder through several small holes in the spray tip which atomizes it into a fine spray inside the cylinder.

ENGINE
COOLING
SYSTEM:

Consists of a series of fin tube radiators, a water supply tank, water circulating pump, and two large capacity fans for the circulation of air through the radiators.

Cooling radiators are arranged in long sections hung parallel to the power plant and fastened to the underside of the power plant compartment hood. The water supply tank (120 gallons) is situated below the level of the radiators to permit self-draining of the radiators during cold weather. Provision has been made to keep this water warm when the locomotive is not in service.

**ENGINE
COOLING
SYSTEM:**

Engine-driven air circulating fans, mounted behind a grilled opening at the front end, serve to force air through and around the engine cooling radiators. The large volume of air brought into the engine compartment finds restricted outlets, thereby causing an internal pressure slightly above atmosphere. This pressure is allowed to vent proportionally through the radiators, traction motors, and around the exhaust manifold. The air after passing the radiators leaves the hood through hatches and openings adjacent to the radiators.

SHUTTERS:

Manually operated from cab, are provided back of air intake grills.

**EXHAUST
SYSTEM:**

Single exhaust manifold muffler or silencer is carried in a well built into the power plant compartment roof. Individual exhaust stacks terminate in the manifold which vents to atmosphere through two stub riser pipes welded in the top. It is not necessary to disturb the muffler when dismantling the engine for maintenance work.

**LUBRICATING
OIL SYSTEM:**

Engine lubricating oil system is the dry sump type and has approximately seventy-five (75) gallons capacity. Two sumps, one at each end of the crank pan, are fitted with removable strainers. A dual scavenging pump draws the hot oil from these sumps and passes it through a large capacity filter and a water-cooled oil cooler to the oil supply reservoir. Cooled, filtered oil is taken from the supply tank by the pressure pump and then distributed throughout the engine at the required pressure as regulated by a relief valve.

FUEL HANDLING
EQUIPMENT:

One motor-driven tandem fuel pump of the gear type is provided. The pump is used to supply filtered fuel oil to the engines and return the excess fuel to the fuel storage tank. A pressure of approximately five (5) pounds is maintained at the injector header, regulated by a spring-loaded by-pass valve which empties back into the fuel tank.

FUEL TANK:

600 gallons capacity, mounted under the underframe and arranged to fill from both sides of locomotive. Tank is provided with float sight gauges and Protectoseal fillers on both sides. Tank has sump for draining off water and sediment.

GOVERNOR:

The engine governor is of the centrifugal, variable speed type, with intermediate speeds controlled by the main throttle, the movement of which sets the governor position.

TRANSMISSION
EQUIPMENT:

Power produced by the engine is delivered to the driving wheels through an electrical transmission consisting of generator, traction motors and automatic transition control apparatus. This equipment is supplemented by a storage battery and a battery charging generator, which with its attendant regulator provides a constant potential output at all normal engine speeds.

GENERATOR:

Main generator furnished with the transmission equipment is designed to provide characteristics most suitable for this particular engine. It has sufficient capacity to continuously transmit to the traction motors the rated output of the engine under all service conditions for which the equipment is offered.

TRACTION
MOTORS:

Four (4) railway type motors of rugged design are provided.
Westinghouse 367-E motors.



B370-1592



B370-1591

TRACTION
MOTORS:
(Cont'd)

Forced ventilation of the traction motors is obtained by use of two mechanically driven blowers mounted adjacent to the hollow center plates, through which cooling air enters the hollow truck bolsters and thence to the motors through rubber ducts permanently secured to the bolster castings and motor frames.

GEARS &
PINIONS:

Forged steel. Gears 59 teeth; pinion 16 teeth; ratio 3.69.

ENGINE
STARTING:

The main engine is cranked by motoring the main generator. Special starting fields are connected to the storage battery by heavy magnetic contactors, which are operated by a push-button switch located at the control station.

STORAGE
BATTERY:

32-cell, MVAH 25-plate Exide Ironclad battery furnishes power for the cab lights, engine starting and control of the power plant apparatus.

CONTROL
STATION:

Locomotive is equipped with a single control station although provision is made for convenient installation of a second control station when desired. The control station is provided with:

1. Operator's brake valve, arranged for both straight and automatic air brake applications.
2. Sander and warning signal valves.
3. "E.M.C." Control Station fitted with an engine throttle and electrical controls, including switches for the control of:

CONTROL
STATION:
(Cont'd)

Headlights, bright and dim.
Classification lights.
Gauge lights.
Master control switch.
Engine starting switch.
Fuel pump switch.
Exciter field switch.
Cab heater switch.

OPERATOR'S
INSTRUMENT
PANEL:

Operator's instrument panel located at the control station is arranged for the indirect lighting of the following instruments.

Air brake gauges.
Fuel oil pressure gauge.
Lubricating oil gauge.
Engine temperature indicator.

In addition to the operator's instrument panel, there is a small meter panel located on the forward cab wall and carries a battery charging ammeter, an engine R.P.M. indicator and multiple circuit pyrometer with a twelve (12) selector switch.

WARNING
SIGNALS:

Consist of:

1. One 12" stationary type bell operated by internal pneumatic type ringer, also by hand cord.
2. One "TYFON" pneumatic horn.

HEADLIGHTS:

Two 14" Pyle-National headlights, equipped with 32-volt, 100-watt lamps, and three-point dimming device.

GENERAL:

It is the intent of these specifications to portray only a general outline of dimensions, materials, and equipment, it being understood that Electro-Motive Corporation reserves the right to make such changes from time to time, as conditions may require, without impairing the performance of the locomotive in the service for which it is offered.

ENCLOSURES:

Locomotive Outline, 8022371.

Tractive Effort Curve No. SC-709-C

Warranty.

October 22, 1937

ELECTRO-MOTIVE CORPORATION
La Grange, Ill.

Speed-Tractive Effort Curve
900 H.P., 125-Ton Switching Locomotive

Equipment:

One 12-201-A Power Plant
Four Special R.P. Motors
68/18 Gearing
40" Wheels

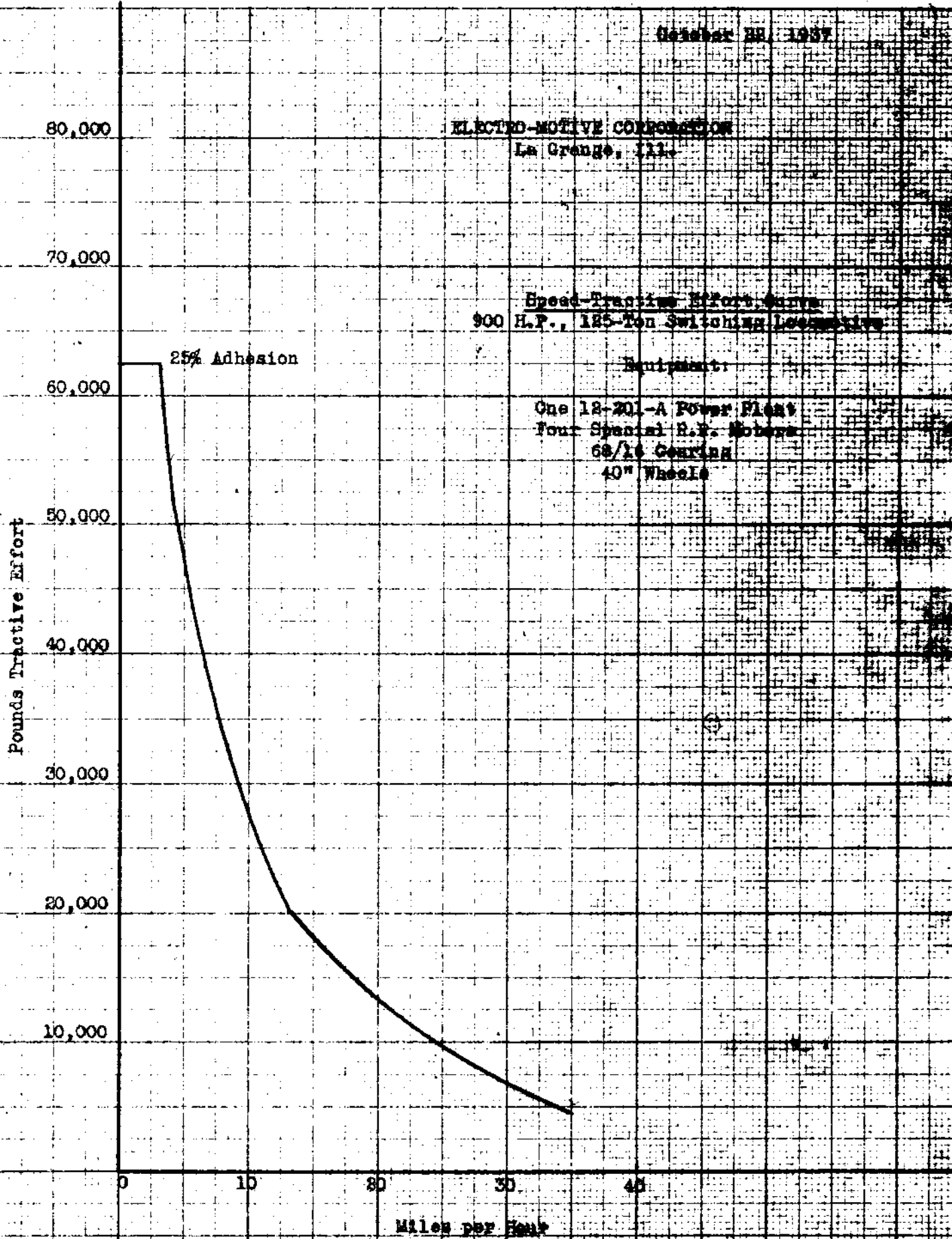
25% Adhesion

Pounds Tractive Effort

80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000

0 10 20 30 40

Miles per Hour



W A R R A N T Y

THIS IS TO CERTIFY That we, ELECTRO-MOTIVE CORPORATION of La Grange, Illinois, warrant all new equipment manufactured by us to be free from defects in material and workmanship under normal use and service; our obligation under this Warranty being limited to making good at our factory, any part or parts thereof, which shall within one (1) year after delivery of such equipment to the original purchaser, or before such equipment has been 100,000 miles in scheduled service, whichever event shall first occur, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective.

This Warranty being expressly in lieu of all other Warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any person to assume for us any other liability in connection with the sale of our equipment.

This Warranty shall not apply to any equipment which shall have been repaired or altered unless repaired or altered by us or by our authorized service representatives, if, in our judgment, such repairs or alterations affect the stability or reliability of the equipment, or if the equipment has been subject to misuse, negligence or accident.

We reserve the right to make changes in design or add any improvements on equipment at any time without incurring any obligation to install same on equipment previously purchased.