

# **SPECIFICATIONS**

**GENERAL MOTORS  
1500 H.P. DIESEL-ELECTRIC  
ROAD SWITCHING  
LOCOMOTIVE**



**ELECTRO - MOTIVE DIVISION  
GENERAL MOTORS CORPORATION**

**LA GRANGE, ILLINOIS, U. S. A.**

**Specification 8018-A  
November 30, 1949**

**GP-7**

**GENERAL MOTORS  
1500 H.P. DIESEL-ELECTRIC  
ROAD SWITCHING LOCOMOTIVE**

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SECTION 1

# General Information and Identification



**Model** GP-7 1500 H.P. Road Switching Locomotive.

**Type** A.A.R. designation (*B-B*). Common designation (*0440*).

**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 engine and boiler hoods.

<b>Major Dimensions</b>	Distance, pulling face of front coupler to centerline of truck.....	12' 4½"
	Distance between bolster centers.....	31' 0"
	Truck—rigid wheel base.....	9' 0"
	Distance, pulling face front coupler to rear coupler.....	55' 9"
	Width over cab sheeting.....	10' 0"
	Width over hand rails.....	10' 3"
	Height, top of rail to top of carline in cab.....	14' 6"
Overall height, over exhaust stacks.....	14' 6"	

<b>Drive</b>	Driving motors.....	Four
	Driving wheels.....	4 Pair
	Diameter wheels.....	40"

**Gear Ratio** 62:15 gear ratio for maximum speed of 65 MPH.

<b>Weights and Supplies</b>	Total loaded weight on rails (approximately).....	240,000 lbs.
	Truck—Total 2.....	75,600 lbs.
	Fuel.....	800 gallons
	Sand.....	18 cu. ft.
	Cooling water.....	230 gallons
Lubricating oil.....	200 gallons	

**Clearances** EMD Clearance Diagram included on outline drawing illustrates clearance conditions. Truck swing designed for 39° curve or 150' radius with 2¼" lateral motion in the truck bolster and ⅜" in Hyatt journal boxes. Two units coupled limited to 21° curve or 274' 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

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- Framing** Underframe consists of two fishbelly I-beam center sills which serve as main carrying members for hoods, cab, and equipment. Two channel side sills supported by center sills partly support water tanks when used and catwalk along side of hoods. Draft gear pockets are cast steel welded to the built-up platform construction between center sills. Push pole pockets are welded to step support at side sill. The structure is all welded construction.
- Flooring**  $\frac{1}{4}$ " floor plates with anti-skid surface are welded to underframe on platform and along side of hoods. Cab floor consists of 1" plywood covered with  $\frac{3}{16}$ " linoleum.
- Body Center Plates** Cast steel welded to body bolster assembly. Wear plates applied to bottom and outside surfaces.
- Couplers** Type "E",  $6\frac{1}{4}$ " x 8" shank,  $28\frac{1}{2}$ " long. Quadruple shear pin. Maximum swing of coupler is 12" each side of 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-375 rubber draft gear.
- Jacking Pads** Jacking has been provided for at each bolster on side sill and combination pad and cable sling is located on side sill next to step at all four corners.
- Platform Step** Safe and suitable wide box steps are provided at each corner leading to locomotive platform. They are recessed three step type.
- Footboards and Pilot** Each end of the locomotive is provided with two footboards, a small pilot between the footboards, mud guards, hand railings, and grab irons.
- Cab** The floor is elevated  $28\frac{1}{4}$ " above the top of the underframe. The narrow hood and large cab windows provide good vision in all directions. Trap door is provided in floor to facilitate servicing of traction motor blower. Hinged doors are provided at diagonally opposite corners leading to platforms along side of hoods. Side windows for operator and helper are the sliding double sash type and are fitted with latches. End windows in doors and cab are stationary and set in a special rubber retainer. Cab is of fabricated steel construction.

## SECTION 2

# Carbody Construction

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LOCOMOTIVES

- Windows** All windows and doors are glazed with safety plate glass.
- Door Locks** The cab doors are fitted with an inside latch and provided with a lock and Railway Coach key.
- Insulation** Ceiling and walls lined with perforated metal backed up by insulation for temperature and sound insulation.
- Battery Box** Two battery boxes, one on each side of the boiler hood, are provided with trap doors in the catwalk for servicing and also drop doors on the side serve for removing batteries. Ventilation and drainage provided.
- Hood** Hood over power compartment made in three sections bolted to each other, to cab, and to floor. The section next to cab contains four radiator sections, two cooling fans, generator, and blowers. The main generator cover door is accessible through double doors provided in hood and the engine turning jack can be operated through another door. The center section covers the engine and is provided with doors large enough to remove the pistons and cylinder liners, and otherwise service the engine. The third section contains six radiator sections, two cooling fans, plumbing stack, and compressor. Number boxes, headlight, and sand box are located in this section, with suitable side doors provided for servicing. Hatches supporting cooling fans can be removed separately from the two sections for removal of radiators. The section over the boiler room is bolted to cab and to the sub-structure forming part of battery box and boiler room floor. This section contains number boxes, headlights, and sand box.
- Hood Doors** All side doors have suitable outside hinges and latches or hasps for a padlock on the outside.
- Exhaust Stacks** Ventilation of engine room is assisted by means of the venturi type exhaust riser welded to top of hood.
- Filters** Air filters are provided in hoods for generator, engine and traction motors.
- Lifting Eyes** Lifting eyes are provided on hood sections to facilitate handling with a crane.

## SECTION 3

# Trucks

GENERAL MOTORS  
LOCOMOTIVES

### **Truck Assemblies**

Two four-wheel truck assemblies are provided per locomotive and are interchangeable. Improved riding qualities and greater stability are obtained by a new treatment of load suspension, strictly an EMD development.

The truck frame is supported on each of the four journal boxes by twin group coil springs. Bolster springs rest on each end of the spring plank which in turn is carried by swing hangers pivoted from outside of truck frame.

Each of the four 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**

Oversize ATEA E-12 with oversize wheel and gear seat and journals to suit Hyatt roller bearings. A.A.R. material specification M-126, Class D.

### **Wheels**

Rolled steel heat treated, 40" diameter, 2½" rim. Wheel tread ground smooth and concentric after assembly on axle.

### **Journal Boxes**

Locomotive equipped with Hyatt Roller Bearings 6½" 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**

Steel casting, heat treated, EMD design.

### **Pedestals**

Lined with spring steel plates bolted to frame.

### **Pedestal Tie Bars**

Fitted and applied at the lower end of the pedestal legs, held in position by bolts.

### **Truck Center Plates**

Truck center plate provided with wear plates, dust guard, and lubricating arrangement.

### **Side Bearings**

Friction type side bearings.

### **Interlocks**

Body and truck interlocks provided each side of the center plate, serving as anti-sluing device in case of derailment.

## SECTION 3

# Trucks



- Swing Hangers** Made from the same kind of steel as the axles.
- Bolster Springs** Full elliptic.
- Truck Brakes** Clasp brake rigging provided on each wheel, operated by individual brake cylinders.
- Brake Pins** All pins and bushings hardened and ground, large size. All holes in brake rigging bushed.
- Hand Brake** Hand brake provided for the locomotive connected to one brake cylinder lever only. All trucks provided with lever for hand brake connection, making trucks interchangeable.

## SECTION 4

# Power Plant and Transmission

GENERAL MOTORS  
LOCOMOTIVES

- Engine** G.M. Diesel sixteen (16) cylinder, 2-cycle, bore  $8\frac{1}{2}$ " , 10" stroke, unit injection Roots blower scavenging through cylinder wall intake, and multi-valve exhaust. Water cooled cylinder liners and heads, oil cooled pistons, ten (10) bearing crankshaft, drop forged connecting rods, floating piston pin bushings, and full floating piston assembly. Isochronous governor speed control, separate over-speed trip.
- Main Generator** EMD, nominally 600 volt direct current, ventilated by blower. Single bearing direct connected to engine crankshaft through alternator rotor and flexible coupling. Capacity suitable to continuously transmit to traction motors the rated output of the engine under all conditions for which the locomotive is offered.
- Alternator** EMD A.C. 149V, 3 phase, 16 pole, built integral with main generator, to supply A.C. power to induction motors driving engine cooling fans and traction motor blowers.
- Traction Motors** Four EMD direct current, series wound, roller bearings, forced ventilated, axle hung motors.
- Auxiliary Generator** Constant voltage provides current for control circuits, lighting and battery charging with automatic voltage regulator.
- Load Regulator** A load regulator is provided which automatically maintains a constant horsepower output, corresponding to each throttle position, over the entire range of locomotive speeds.
- Engine Starting** By motoring of the main generator through use of special starting fields energized by the locomotive storage battery.
- Engine Cooling** Consisting of two direct driven centrifugal water pumps on the engine, radiators and four A.C. motor driven cooling fans located above radiators. Water cooled oil cooler and water tank, mounted as a unit directly in rear of the governor end of engine. Automatic water temperature control and hot engine alarm.



## SECTION 4

# Power Plant and Transmission



### **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 lube oil filter to the cooler core section of the oil cooler tank and return it to the strainer chamber. Low oil pressure and high suction protection are provided.

### **Engine Fuel System**

Return flow, single D.C. motor driven gear pump, protected by suction filter in addition to discharge filters to insure clean fuel for the engine. An assembly of sight glasses and relief valves offers visual indication of any system trouble plus protection against excessive pressures.

### **Engine Exhaust**

Dual fabricated chambers, each with independent exhaust.

### **Fuel Tank**

Tank built of heavy gauge steel, with baffle plates.

Capacity 800 gallons, located underneath the locomotive body. Filling station each side, vent equipped with flame arrestors. Sump with cleanout plug and non-removable water drain located at bottom of tank.

Each fuel filling station has I.C.C. approved direct reading fuel gauge, indicating fuel level  $4\frac{1}{2}$ " from top of tank. Tank is also supplied with a hydrostatic distant type level gauge, indicating levels to within 1" of the bottom.

Each filling station fitted with pull ring for emergency fuel cut-off. Similar pull cord located at operator's control station.

### **Electrical Control Cabinet**

One cabinet houses the following locomotive high and low voltage control equipment—

- 1) High and low voltage control for Main Generator and Traction Motors.
- 2) Battery charging control.
- 3) Engine starting.

The cabinet is ventilated and readily accessible for servicing or unit replacement.

An additional cabinet houses the control equipment for the radiator cooling fan motors.

## SECTION 4

# Power Plant and Transmission



- Motor Control** Automatic forward and backward two step transition—Series-Parallel and Parallel.
- Storage Battery** 32 cell, 64 volt, 426 ampere hour capacity—(8 hour rating) battery located in two boxes under catwalk at boiler hood.
- Engineer's Control Station** Engineer's control station located conveniently to the left of the engineer's seat, includes the engine speed throttle, locomotive reverse lever. The lever arrangement is such that the throttle must be in idle before the reverse lever can be removed to isolate the controller.
- Engineer's Control Switches** Control and lighting switches located within reach of the engineer, including switches for control, generator field, fuel pump, number lights, gauge lights, classification lights, headlight bright front and rear, headlight dim front and rear. Engine start and stop, and cab heater switches located on rear cab wall.
- Engineer's Instrument Panel** At the left of the engineer is a lighted instrument panel having air brake gauges and wheel slip light. A panel mounted on the wall contains lubricating oil pressure gauge, engine water temperature indicator and electrical air pressure gauge. Traction motor ammeter provided for load indication.
- Speedometer** A combination speedometer, recorder and odometer is located at the left of the engineer.

## SECTION 5

# Air Brakes

**GENERAL MOTORS**  
LOCOMOTIVES

- Air Brakes** 6-BL Brake schedule including self-lapping independent and standard H-6 automatic valve portions. Sander and bell ringer valves incorporated in pipe bracket.
- Foundation Brakes** 9" x 8" cylinders, 5.65:1 lever ratio, 14" brake shoes, 290,000 lbs. braking force @ 100 lb. cylinder pressure.
- Brake Piping** Wrought steel pipe with A.A.R. fittings are used. All piping  $\frac{5}{8}$ " O.D. and under uses nominal size copper tubing with S.A.E. tube fittings.
- Main Reservoir** Two (2)  $22\frac{1}{2}$ " Dia. x 102" steel reservoirs mounted beneath the underframe. Total capacity: 74,150 cubic inches.
- Air Compressor** One Gardner-Denver, two stage, three cylinder, air cooled direct coupled compressor, having displacement of 178 cu. ft. per minute at 800 RPM, and displacement of 60 ft. per minute at 275 RPM (idling speed).  
Air compressor governor adjusted to provide main reservoir pressure with 10 lbs. differential.
- Sanding** One sander valve operates eight single line sand traps, four traps for forward movement and four traps for reverse movement, thus providing sand on all eight wheels.
- Sand Capacity** Two sand boxes with a capacity of approximately 9 cu. ft. each, total 18 cu. ft. Sand boxes are filled from the outside of locomotive at the top of hood.
- Air Signal Line** Air signal line provided for trainlining.

## SECTION 6

# Equipment

GENERAL MOTORS  
LOCOMOTIVES

### **Cab Heating and Ventilating**

Cab heating and ventilating is provided with forced air circulation including ducts and diffusers for defrosting all cab windows. Heat for winter operation obtained from two engine radiator sections with manually operated shutters for controlling air from outside.

### **Window Wipers**

Four extra heavy "Jumbo" air push window wipers are provided for operator and helper, front and rear windows.

### **Sun Visors**

Adjustable metal sun visors at each windshield.

### **Cab Seats**

The two upholstered cab seats have round cushions and are adjustable for height. The engineer's seat has a stationary back rest and a swivel seat cushion. The fireman's seat and back rest can be turned 180°. Upholstered arm rests are provided at both side windows.

### **Fire Extinguishers**

Two (2) 1-gallon carbon tetrachloride, one located in cab, the other in the power compartment.

### **Headlight**

Twin sealed-beam headlight, each 200 watt, 30 volt. Bright and dimmer switch for each light in operator's cab.

### **Warning Devices**

Two large diaphragm type air horns, one pointing forward and the other toward the rear. One 12" bell operated by internal pneumatic type ringer.

### **Locomotive Lighting**

Lamps and outlets are as follows:

- a) 2—Cab Lights.
- b) 12—Engine Room Lights
- c) 2—Ground Lights.
- d) 4—Number Lights.
- e) 4—Gauge Lights
- f) 1—Portable Light.
- g) Outlet Receptacles:
  - 1—In Cab.
  - 6—In Engine Room.
  - 2—In Boiler Room.
- h) 4—Boiler Room Lights.
- i) 4—Classification Lights.

## SECTION 6

# Equipment

**GENERAL MOTORS**  
LOCOMOTIVES

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  - 6—In Engine Room.
  - 2—In Boiler Room.
- h) 4—Boiler Room Lights.
- i) 4—Classification Lights.

## SECTION 6

# Equipment



- Charging Receptacle** One 100 ampere receptacle is provided for external charging of battery. It is conveniently located below side sill on left side of locomotive.
- Marker and Flag Brackets** Four standard combination flag and light brackets are provided, two each are located at front and rear of locomotive.
- Number Lights** Number lights are built into each corner of front and rear hoods. Four-digit 8" numbers at an angle for forward and side visibility.
- Classification Lights** Classification lights are also built into each corner of front and rear hood.
- Steam Heating Line** A  $\frac{3}{4}$ " line provided for standby steam heating. Connection located on endsill at rear end of locomotive.

## SECTION 7

# Locomotive Modifications

GENERAL MOTORS  
LOCOMOTIVES

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

- Air Brakes** 24-RL brake schedule and additional features can be applied.
- Multiple Control** Multiple control equipment available to allow for operating two or more units from one cab.
- Steam Generator** 2500# steam generator with 800 gallon water supply. 2" steam end connectors.
- Auxiliary Generator** Constant voltage 18 KW in order to provide power for steam generator in addition to control circuits, lighting and battery charging with automatic voltage regulator.
- Awnings** Cloth awnings over cab windows.
- Wind Deflectors** Wind deflectors front and rear of side windows on each side.
- Air Compressor** Gardner-Denver type WXG air compressor having a displacement of 356 cu. ft. per minute at 800 RPM.
- Trucks** Locomotive can be furnished with friction type journal bearings instead of Hyatt roller bearings. Note: This modification requires deletion of speed recorder.
- Toilet** Toilet with water tank can be provided.
- Fuel Tank** 1200 gallon fuel tank can be furnished when no steam generator is provided.
- Cab Seat** Third cab seat same as fireman's seat.
- Clothes Locker** Located in boiler compartment.
- Wash Stand** Located in boiler compartment.

## SECTION 8

# Painting

**GENERAL MOTORS**  
LOCO. MOTIVES

- General** Only the best quality materials available are used, with special attention given to both the selection of materials and methods of application to insure a maximum of protection and durability.
- Cab** Inside finished in green, trimmed in black.
- Engine Room** Inside finished in suede gray, trimmed in black.  
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.
- Trucks & Tanks** Black unless otherwise specified.



## SECTION 9

# Performance Data



Although Section 1 specifies 62:15 gear ratio, other gear combinations are available when requested to suit operating requirements. The following table and curve show the characteristics of these gear combinations:

**Gear Ratio:**

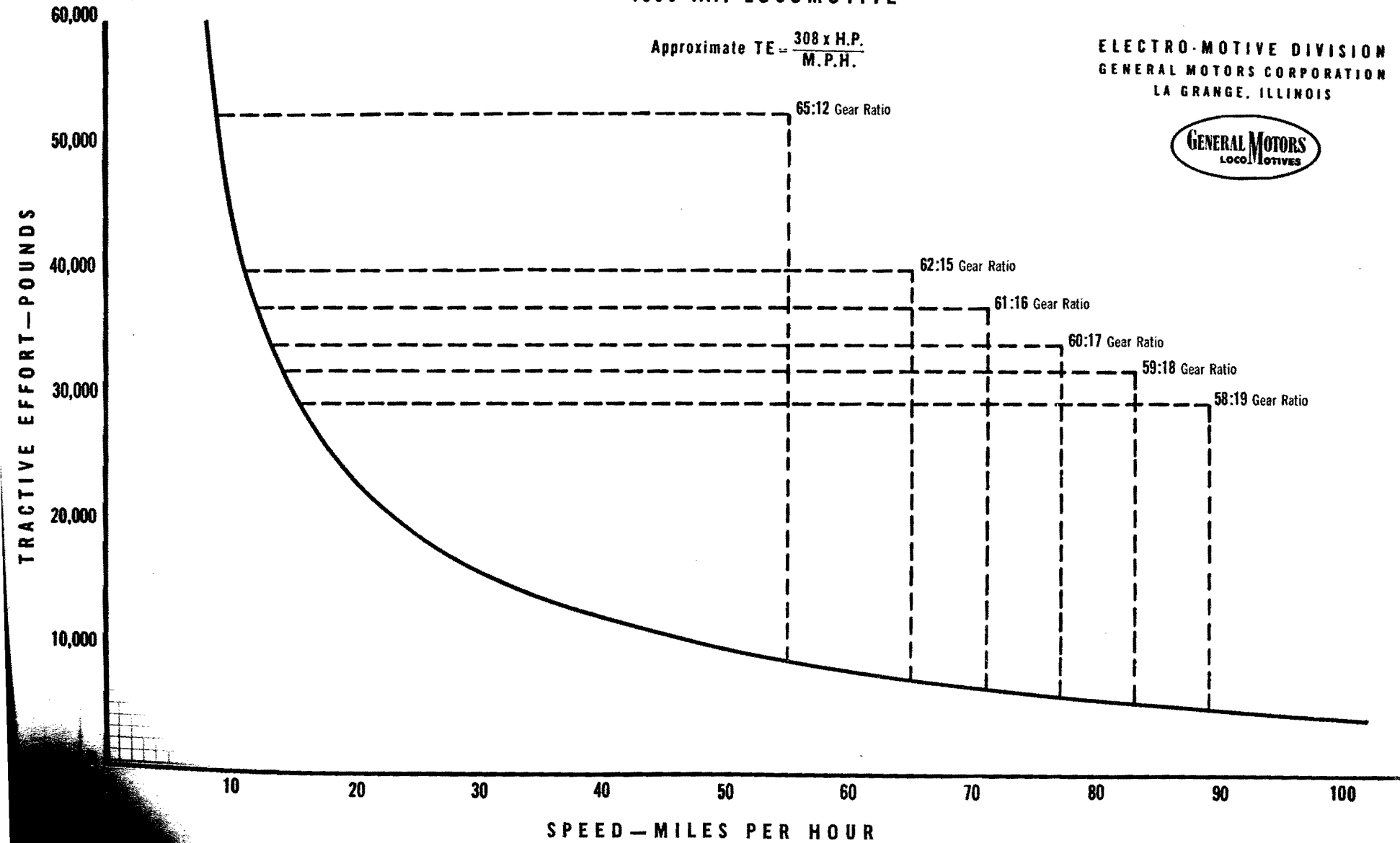
<b>Option</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>GEARS</b>	65:12	62:15	61:16	60:17	59:18	58:19
<b>RATIO</b>	5.416	4.135	3.81	3.53	3.28	3.05
<b>CONT. T. E.</b>	52,400	40,000	37,000	34,000	32,000	29,500
<b>MAX. SPEED</b>	55	65	71	77	83	89

*See speed-tractive effort curve.*

# SPEED-TRACTIVE EFFORT CURVE 1500 H.P. LOCOMOTIVE

$$\text{Approximate TE} = \frac{308 \times \text{H.P.}}{\text{M.P.H.}}$$

ELECTRO-MOTIVE DIVISION  
GENERAL MOTORS CORPORATION  
LA GRANGE, ILLINOIS



## SECTION 10

# Warranty and Patents

**GENERAL MOTORS**  
LOCOMOTIVES

**Warranty:**

THIS IS TO CERTIFY that we, ELECTRO-MOTIVE DIVISION, GENERAL MOTORS CORPORATION, LaGrange, Illinois, warrant all new locomotives 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 the locomotives have 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 locomotive components 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.

**Patents:**

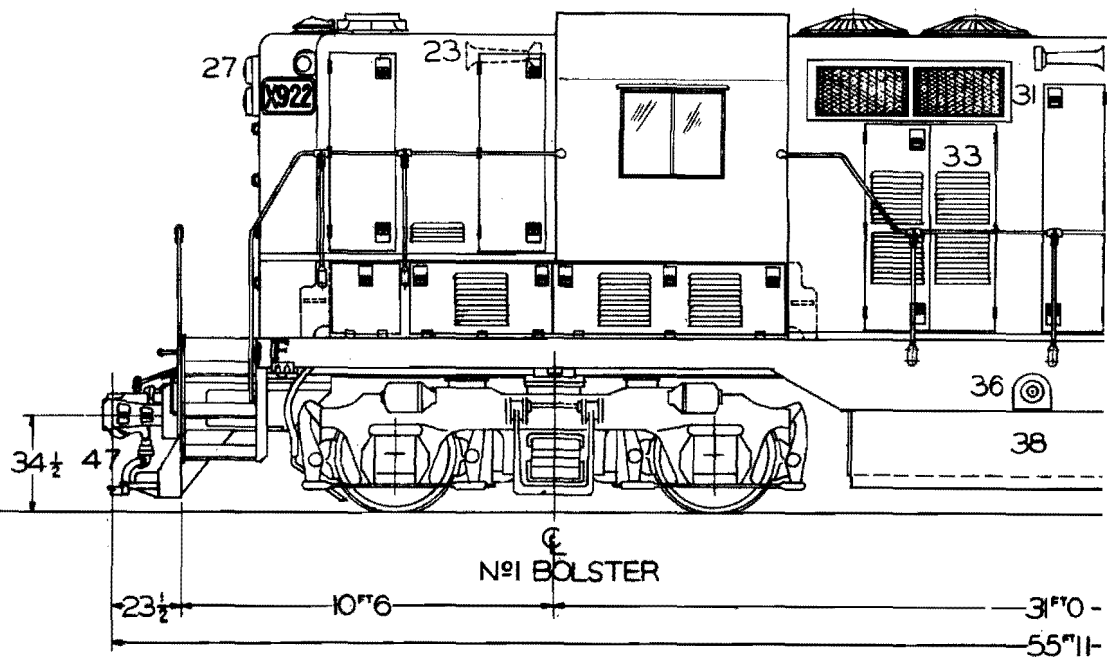
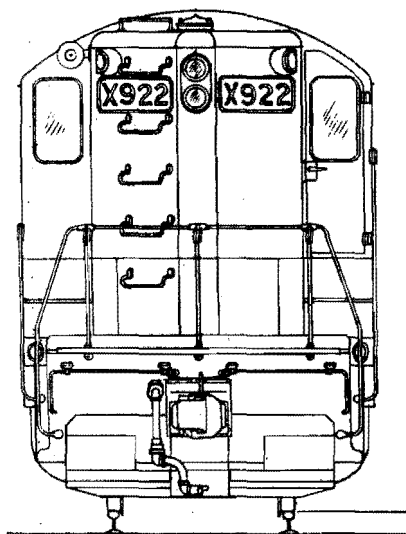
The Electro-Motive Division, General Motors Corporation, will not assume liability for patent infringement by reason of purchase, manufacture, sale, or use of devices or equipment not included in and covered by this Specification.

- 47 2" STEAM END CONN.
- 46 THIRD CAB SEAT
- 45 CLOTHES LOCKER
- 44 WASH STAND
- 43 TOILET

- 42 ENGINE AIR INTAKE SILENCER
- 41 DUAL FUEL FILTER
- 40 LUB. OIL FILTER
- 39 BOILER
- 38 BOILER WATER TANKS-800 GAL.
- 37 BOILER WATER SOFTENER
- 36 BOILER WATER FILLER
- 35 TRAP DOOR
- 34 FUEL TANK GAUGE
- 33 AIR INTAKE FOR ENGINE ROOM
- 32 EMERGENCY FUEL CUT-OFF
- 31 AIR INTAKE & SHUTTERS
- 30 MAIN AIR RESERVOIR
- 29 FUEL TANK- 800 GALLONS

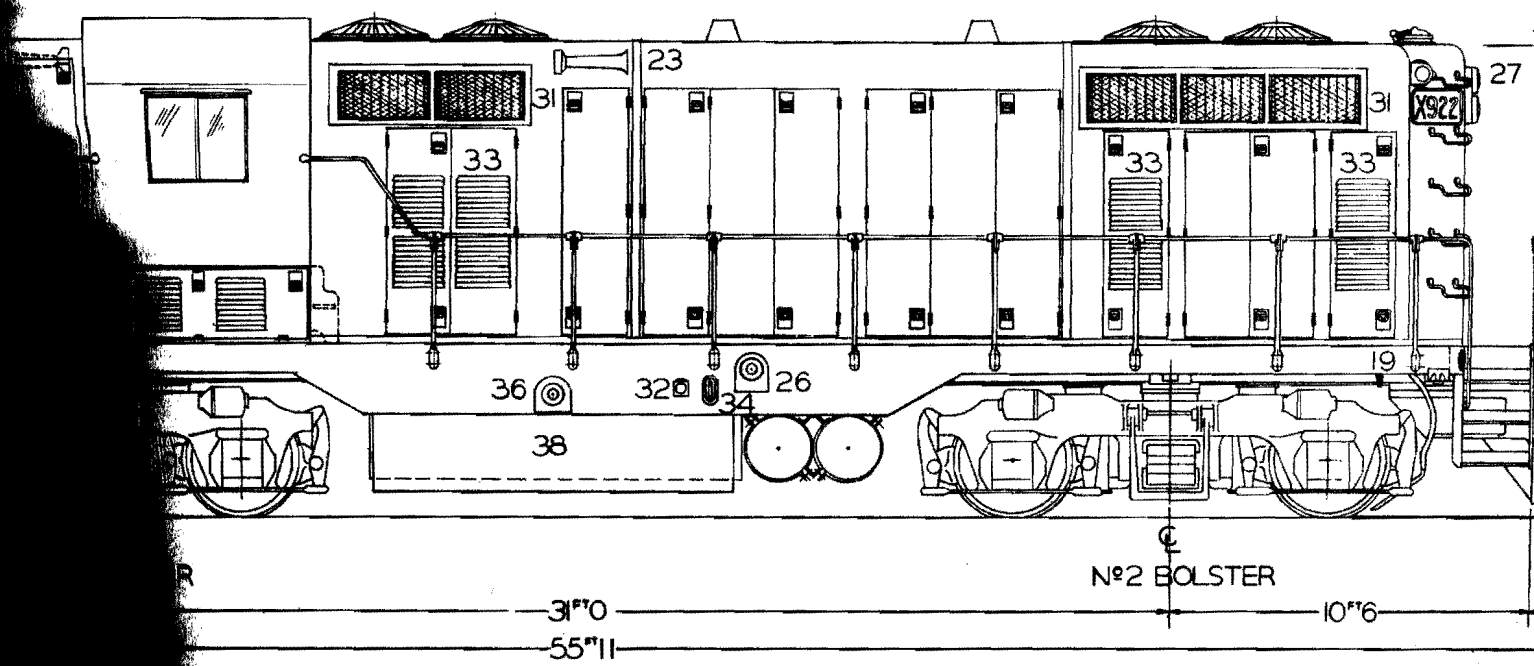
- 28 BATTERIES
- 27 HEADLIGHT-TWIN
- 26 FUEL FILLER
- 25 SAND BOX -9 CU
- 24 EXHAUST MANIFO
- 23 HORN
- 22 RADIATOR
- 21 36" FAN & MOTOR
- 20 LOAD REGULATOR
- 19 ENGINE WATER F
- 18 ENGINE WATER T
- 17 LUB. OIL COOLER
- 16 LUB. OIL FILLER
- 15 GAUGE PANEL

□ MODIFICATIONS



- |                       |                               |  |
|-----------------------|-------------------------------|--|
| AIR INTAKE SILENCER   | 28 BATTERIES                  | 14 HAND BRAKE                              |
| FUEL FILTER           | 27 HEADLIGHT-TWIN SEALED BEAM | 13 SEAT                                    |
| FILTER                | 26 FUEL FILLER                | 12 CAB HEATER                              |
| WATER TANKS-800 GAL.  | 25 SAND BOX -9 CU.FT.         | 11 AIR BRAKE VALVE                         |
| WATER SOFTENER        | 24 EXHAUST MANIFOLD           | 10 SPEED RECORDER                          |
| WATER FILLER          | 23 HORN                       | 9 CONTROL STAND                            |
| WHEEL                 | 22 RADIATOR                   | 8 CONTROL PANEL & INSTRUMENT BOARD         |
| WHEEL GAUGE           | 21 36" FAN & MOTOR            | 7 TRACTION MOTOR BLOWER                    |
| WHEEL FOR ENGINE ROOM | 20 LOAD REGULATOR             | 6 AIR COMPRESSOR                           |
| WHEEL FUEL CUT-OFF    | 19 ENGINE WATER FILLER        | 5 CONTROL CABINET                          |
| WHEEL & SHUTTERS      | 18 ENGINE WATER TANK          | 4 AUX. GENERATOR                           |
| RESERVOIR             | 17 LUB. OIL COOLER            | 3 GENERATOR BLOWER                         |
| 800 GALLONS           | 16 LUB. OIL FILLER            | 2 MAIN GEN. E.M.D. MODEL D-12-E, ALT. D-14 |
|                       | 15 GAUGE PANEL                | 1 ENGINE E.M.D. MODEL 16-567-B             |

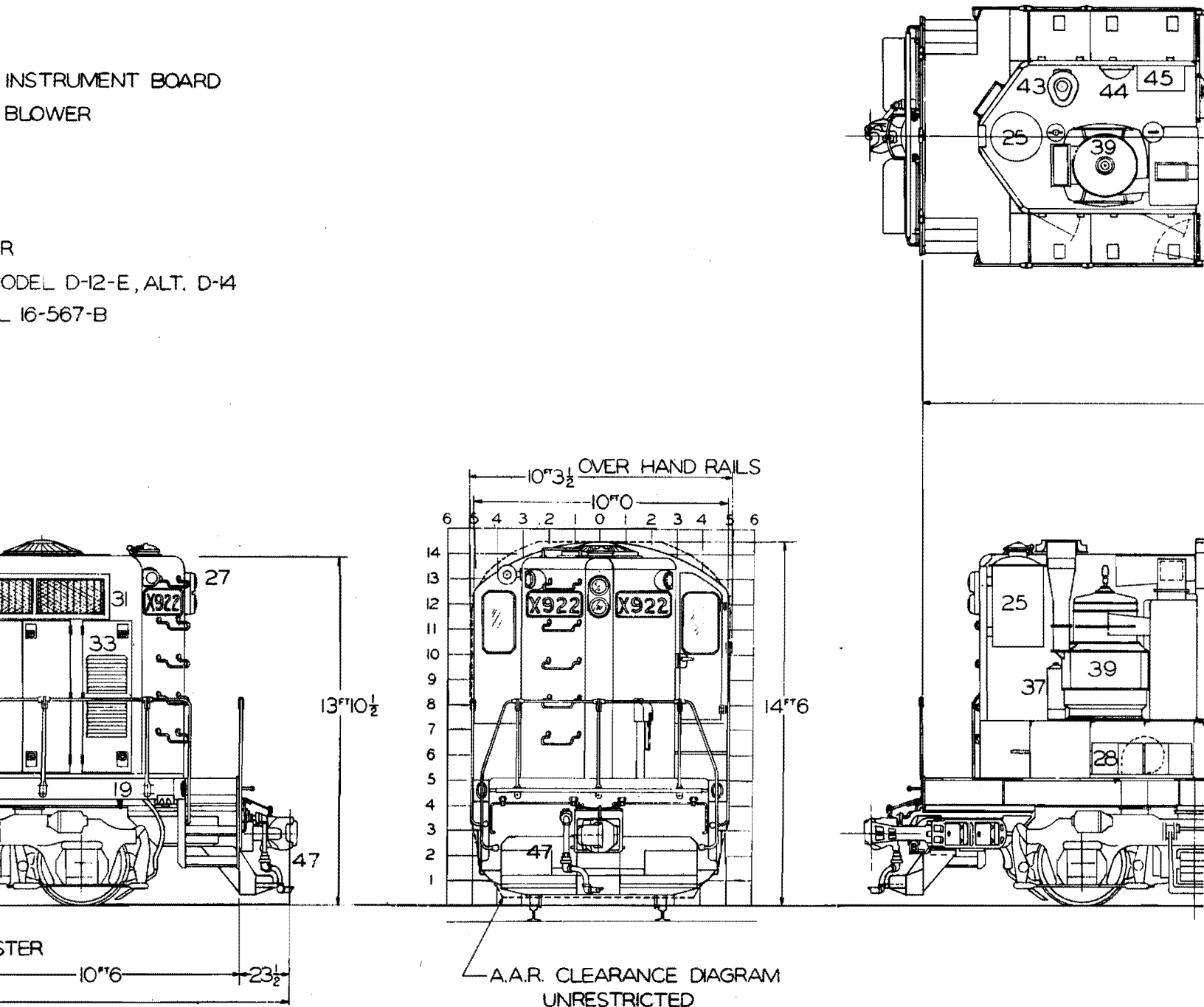
□ MODIFICATIONS



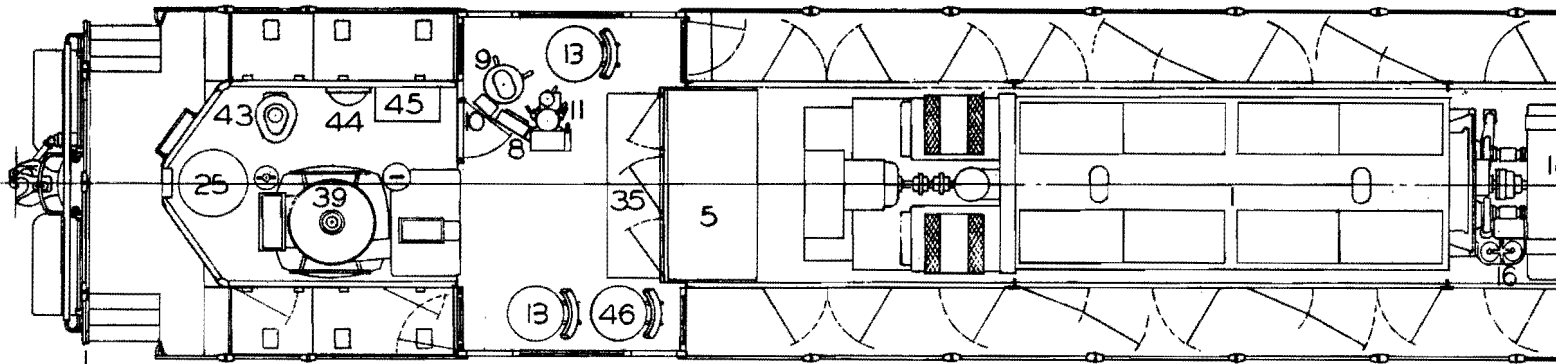
**1500 H.P. ROAD SWITCHER**

INSTRUMENT BOARD  
BLOWER

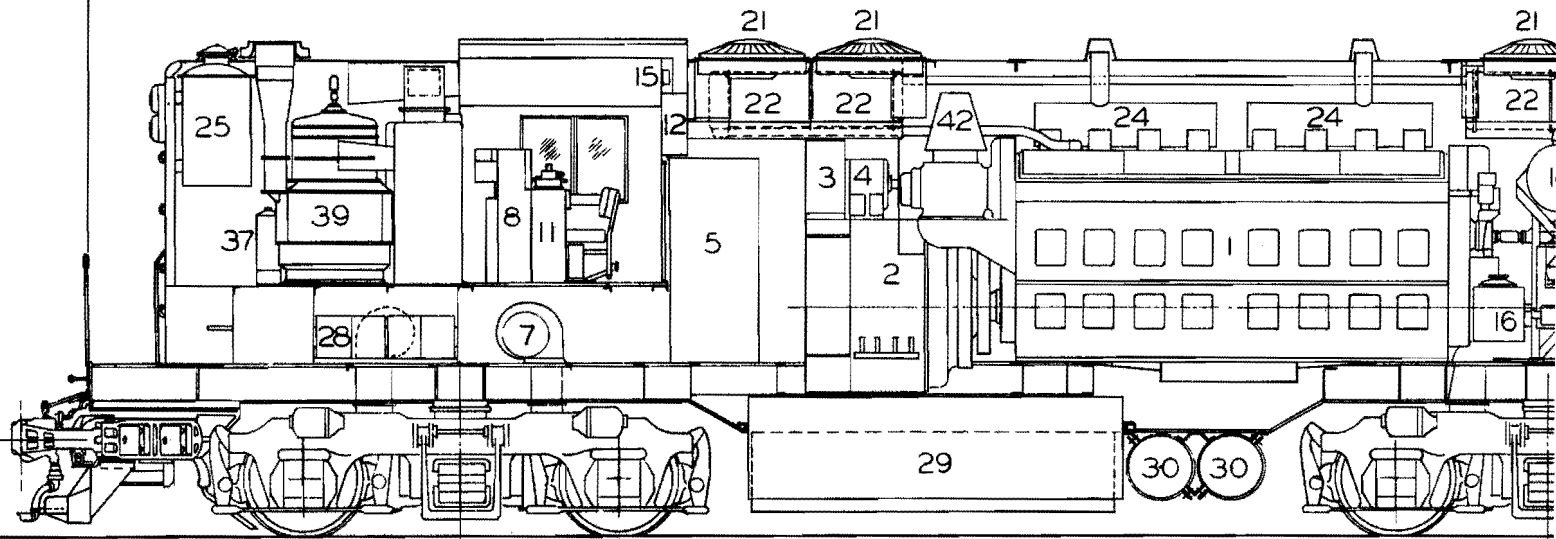
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MODEL D-12-E, ALT. D-14  
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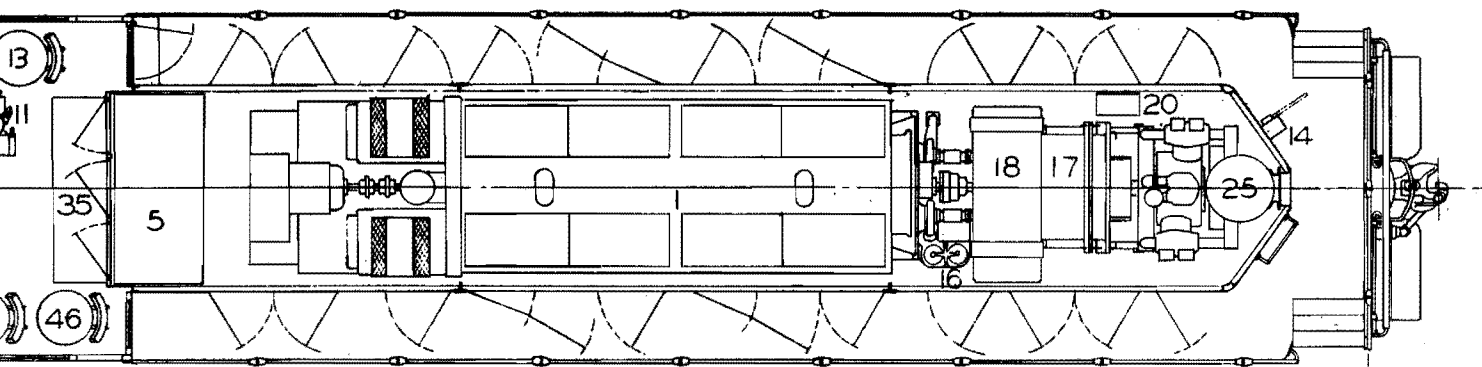


# H.P. ROAD SWITCHING LOCOMOTIVE—MODEL GP7

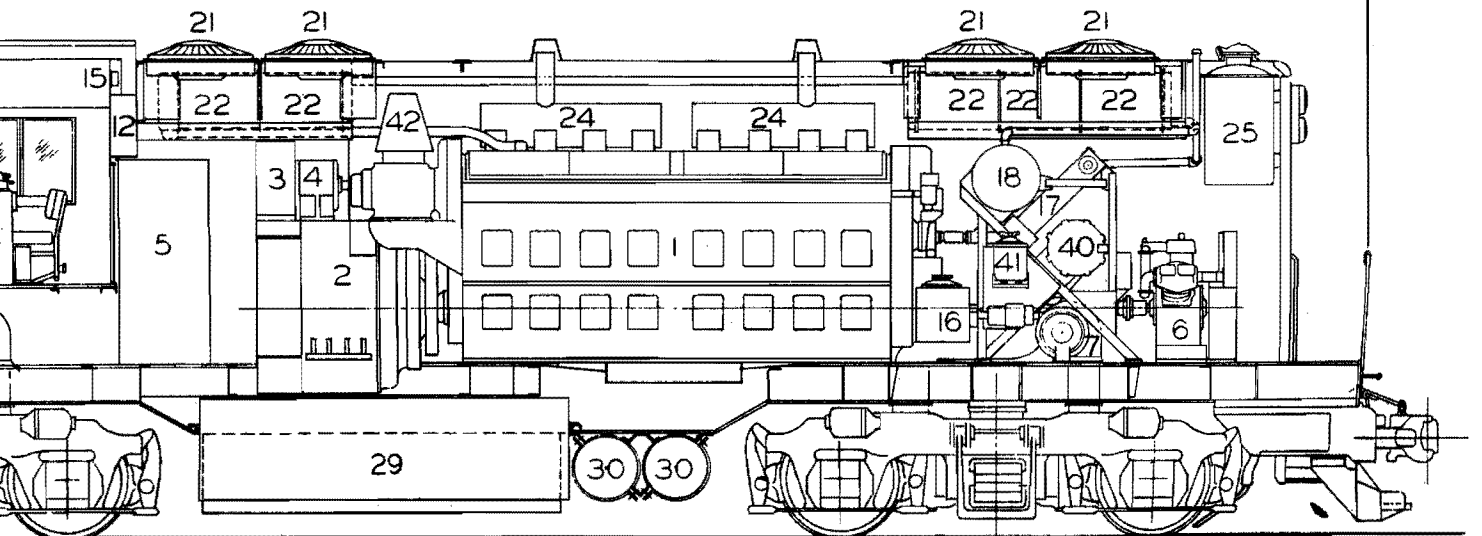


52'0" OVER END SILLS





52'0" OVER END SILLS



**ELECTRO-MOTIVE DIVISION  
 GENERAL MOTORS CORPORATION  
 LA GRANGE, ILLINOIS**