# SPECIFICATIONS GENERAL MOTORS

## GP30 2250 H.P. DIESEL-ELECTRIC ROAD LOCOMOTIVE



ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORPORATION

LA GRANGE, ILLINOIS, U.S.A.

Specification 8046

October 1, 1961

## GENERAL MOTORS 2250 HP DIESEL-ELECTRIC ROAD LOCOMOTIVE

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## General Information and Identification

GENERAL MOTORS

Model GP30 2250 Road Locomotive. Type AAR 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 long and short hoods. Major Distance, pulling face of front coupler to Dimensions Distance, pulling face front coupler to rear coupler . . . . . 56' 2" Width over basic arm rests . . . . . . . . . . . . . . . . . 10' 4" Drive Four 4 Pair Weights Total loaded weight on rails (approximately) . . . . . . . 245,000 lbs. and Supplies 1700 gal. 40 cu. ft. Cooling water 227 gal. 220 gal. Clearances EMD Clearance Diagram included on outline drawing illustrates clearance conditions. Truck swing designed for 39° curve or 150 ft. radius with 2-1/4" lateral motion in the truck bolster and 3/8" in Hyatt journal boxes. Two units coupled limited to 21° curve or 274 ft. radius on account of footboard clearance. Safety All steps, grab handles and other safety appliances cover EMD interpre-Appliance s tation of Interstate Commerce Commission requirements.

## Carbody Construction



#### Framing

Underframe consists of two 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 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. Ducts are provided on each side on top of underframe. Right side duct is used for traction motor ventilation; left side duct is used for traction motor cables, compressor aftercooler piping, control wiring, and ventilation and access are provided.

#### Flooring

1/4" floor plates with antiskid surface are welded to underframe on platform and along side of hoods. Cab floor consists of 1" plywood covered with 1/8" linoleum.

#### **Collision Posts**

Collision posts are designed integrally with front hood and welded to underframe.

#### Body Center Plates

Cast steel welded to body bolster assembly. Wear plates applied to bottom and outside surfaces.

#### Couplers

Type "E," 6-1/4"  $\times$  8" shank, 28-1/2" long. 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-380 rubber draft gear with alignment control.

#### 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.

#### Foot Boards and Pilot

Each end of the locomotive is provided with two footboards, mud guards, hand railings, and grab irons.

#### **Carbody Construction**

hood.

Hood



The floor is elevated above the top of the underframe. The narrow hood and large cab windows provide good vision. 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 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. Cab front is in the form of 15° vee and includes a divided center window over the low short

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.

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 short 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.

The power plant compartment is designed to a minimum height and 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 pistons and cylinder liners. Hatches supporting cooling fans can be removed separately for removal of radiators. The hood is bolted to the cab and to the deck and can be removed complete with radiators and cooling fans for major repairs. Cab extension and dynamic brake portions of long hood carry through the raised cab roof line. Lowered front short hood is provided for improved vision.

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

Filters Carbody filters are not required with this locomotive.

Lifting Eyes Lifting eyes are provided on hood to facilitate handling with a crane.

Ballast The locomotive is basically designed for balance without the use of extra ballast.

### **Trucks**



#### Truck Assemblies

Two four-wheel truck assemblies are provided per locomotive and are interchangeable.

Fully flexible bolster supported on springs providing lateral movement. The truck frame is supported on each of the four journal boxes by twin group coil springs.

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. Axle material conforms to physical properties of current A.A.R. specifications.

Wheels

Rolled steel heat treated, 40" diameter, 2-1/2" rim. Wheel tread finished smooth and concentric after assembly on axle.

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 Boister

EMD design, fully flexible.

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 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.

#### Trucks



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.

## Power Plant and Transmission



#### **Engine**

GM Diesel sixteen (16) cylinder, 2-cycle, 45° V, 8-1/2" bore, 10" stroke, with unit injection, turbocharger 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.

#### Main Generator

EMD, nominal 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.

#### Stactic Exciter

Excitation of generator is supplied from the alternator through rectifiers.

#### Alternator

EMD AC 200 volt, 3 phase, 16 pole, built integral with main generator, to supply AC power to induction motors driving engine cooling fans.

#### **Traction Motors**

Four improved design EMD direct current, series wound, forced ventilated, axle hung motors with roller bearings.

#### Auxiliary Generator

A direct current generator with direct drive from the engine gear train, provides current for control circuits, lighting and battery charging. The voltage is automatically controlled by a voltage regulator.

#### Load Control

Load control is provided which automatically maintains horsepower output commensurate with the published tractive effort characteristics of the locomotive.

#### Engine Starting

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

#### Engine Cooling

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 and hot engine alarm. Cooling system is pressurized.

#### 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.

#### Power Plant and Transmission



#### Engine Lubrication (Cont'd)

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 oil cooler tank and return it to the strainer chamber. Low oil pressure and high suction protection are provided.

#### Turbocharger Lubrication

An engine driven positive displacement gear type pump supplies oil to the turbocharger thru secondary filtration. An electrically driven cool down pump supplies oil to lubricate the turbine for a given time period after starting or stopping engine.

#### Engine Fuel System

Return flow, single DC motor driven gear pump, protected by suction strainer in addition to increased capacity 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**

Three series connected manifolds discharge into turbine of turbocharger which has single exhaust outlet through roof. Manifolds are equipped with heat shields.

#### Engine Air Intake Filters

Inertial type dry air filtration is provided for engine.

#### Fuel Tank

Tank built of heavy gauge steel, with baffle plates.

Capacity 1700 gallons, located underneath the locomotive body. Filling station each side, vent equipped with flame arrestors. Sump with cleanout plug and nonremovable water drain located at bottom of tank.

Direct reading type fuel sight glasses with gallonage calibration plates on both sides of tank.

Each filling station fitted with electric emergency fuel cutoff. Similar push button located at operator's control station.

#### Electrical Control Cabinet

One unitized, dirt proof, totally enclosed 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 readily accessible for servicing or unit replacement of the complete cabinet which is bolted in place.

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

A separate cabinet is supplied for various resistors and is located in the hood extension near the main generator with outside access to the resistors.

#### Power Plant and Transmission



#### 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.

#### Storage Battery

32 cell, 64 volt, 420 ampere hour capacity (8 hour rating) battery located in two boxes under catwalk by short hood.

#### Engineer's Control Station

Control station, located conveniently to the left of the engineer's seat, includes the engine speed throttle and 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 automatic sand, control and fuel pump, generator field, gauge lights, headlight bright front and rear, headlight dim front and rear. Engine start and stop, and isolation switches located on rear cab wall. Cab heater switches on cab heaters.

#### Engineer's Instrument Panel

At the left of the engineer is a lighted instrument panel having air brake gauges, wheel slip light, ground relay light and PCS "open" light. Traction motor ammeter provided for load indication. A panel mounted on the rear cab wall contains the battery charging indicator.

#### Speedometer

A combination speedometer, recorder and odometer is located at the left of the engineer.

#### Equipment Air Supply

An inertial separator located in roof behind cab supplies air to all equipment, free from dirt, snow, etc. Dirt so separated is 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 blower delivers air to a duct and plenum chamber system on the underframe and supplies the four traction motors with cooling air. The main supply air duct is on top of the right side walkway. The air compressor is supplied air from the rear plenum chamber. Generator discharge air is used to pressurize the engine compartment.

### Air Brakes



Air Brakes

26L brake schedule including self-lapping independent and standard 26D control valve portions. Sander and bell ringer valves are provided. Manual sanding is actuated electrically.

Foundation Brakes  $9^{\prime\prime}\times8^{\prime\prime}$  cylinders, 5.65:1 lever ratio, 14" brake shoes.

Brake Piping Wrought steel pipe with A.A.R. fittings are used. All piping 5/8" O.D. and under uses nominal size copper tubing with S.A.E. tube fittings.

Main Reservoir Two (2) 22-1/2" dia.  $\times$  102" steel reservoirs mounted beneath the underframe. Total capacity: 74,150 cu. in. No. 1 main reservoir equipped with an air operated automatic drain valve.

Air Compressor Two stage, three cylinder, water cooled direct coupled compressor having displacement of 235 cu. ft. per minute at 835 RPM. This is an extended maintenance compressor with large oil capacity.

Electric air compressor governor adjusted to provide main reservoir pressure with  $10\ \mathrm{lbs}$ . differential.

Sanding

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. Sand trap cutoff valves are provided. Outside access is provided for maintenance of sand traps.

Sand Capacity

Two sand boxes with a capacity of approximately 20 cu. ft. each, total 40 cu. ft.

Sand boxes are filled from the outside of locomotive at platform height.

Emergency Valve Conductor's emergency valve is provided on the left side of the cab.

### **Equipment**



#### 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 a 3-speed switch for control of fan speed.

#### Window Wipers

Four extra heavy air push window wipers are provided for front and rear windows on both sides of cab and center windshields.

#### Sun Visors

Adjustable metal sun visors at each windshield.

#### Cab Seats

The two wall mounted upholstered cab seats have forward and backward as well as height adjustments. Both seats can be turned 180°. Upholstered arm rests are provided at side windows.

#### Fire Extinguishers

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

#### Warning Devices

One 3-chime horn having two bells facing forward and one to the rear with lever operated modulating horn valve. One 12" bell operated by internal pneumatic type ringer.

#### Locomotive Lighting

Lamps and outlets are as follows:

- 1) Three cab lights.
- 2) Four engineroom lights.
- 3) Two ground lights.
- 4) Four number lights.
- 5) Four gauge lights.
- 6) Outlet receptacle in cab.
- 7) One shorthood compartment light.
- 8) Four classification lights.

#### Equipment



Charging Receptacle

One 100 ampere receptacle is provided for external charging of battery.

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

Lighted number boxes, mounted at an angle for both forward and side

visibility. Basic numbers are not removable.

Classification Lights

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

Miscellaneous

Two (2) folding coat hooks supplied in cab.

## Locomotive Modifications



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

6BL or 24RL 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. Sanding is trainlined electrically.

Steam Generator 2750 lb. steam generator with 1300 gallon water supply and 1250 gallon fuel supply, 2" or 2-1/2" steam end connectors. Modification may be expanded to include stand-by arrangement. Steam generator can only be provided by special modification of cab structure and short hood height.

**Awnings** 

Cloth or metal awnings over cab windows.

Wind Deflectors

Wind deflectors front and rear of both cab side windows.

Air Compressor

Two stage, six cylinder air compressor, water cooled, having a displacement of 372 cu. ft. per minute at 835 RPM.

Toilet

Toilet, either dry hopper or with water tank, can be provided.

Fuel Tank

2550 gallon fuel tank can be furnished when no steam generator is provided.

Cab Seat

Third cab seat, slide rail mounted.

Clothes Locker

Located in short hood compartment.

Dynamic Brakes Variable increased capacity 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 control is provided as standard with dynamic brakes with field loop circuit available only as an additional modification.

Air Signal

Air signal trainline can be provided.

### **Painting**



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 suede gray.

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.

Trucks & Tanks

Black unless otherwise specified.

## Performance Data

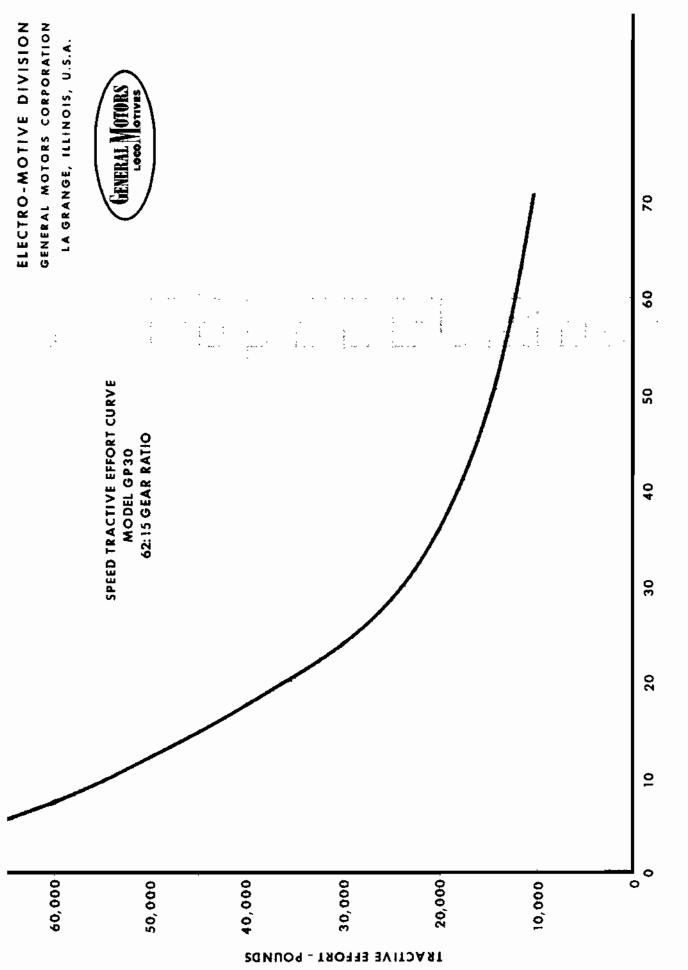


#### Optional Gear Ratios

Option	1	2	3		
GEARS	62:15	61:16	60:17		
RATIO	4.135	3.81	3.53		
MAX, SPEED*	71	77	83		

See speed-tractive effort curve.

<sup>\*</sup>Overspeed switch can be set 4 MPH above maximum speed.



SPEED - MILES PER HOUR

## Warranty and Patents



#### Warranty

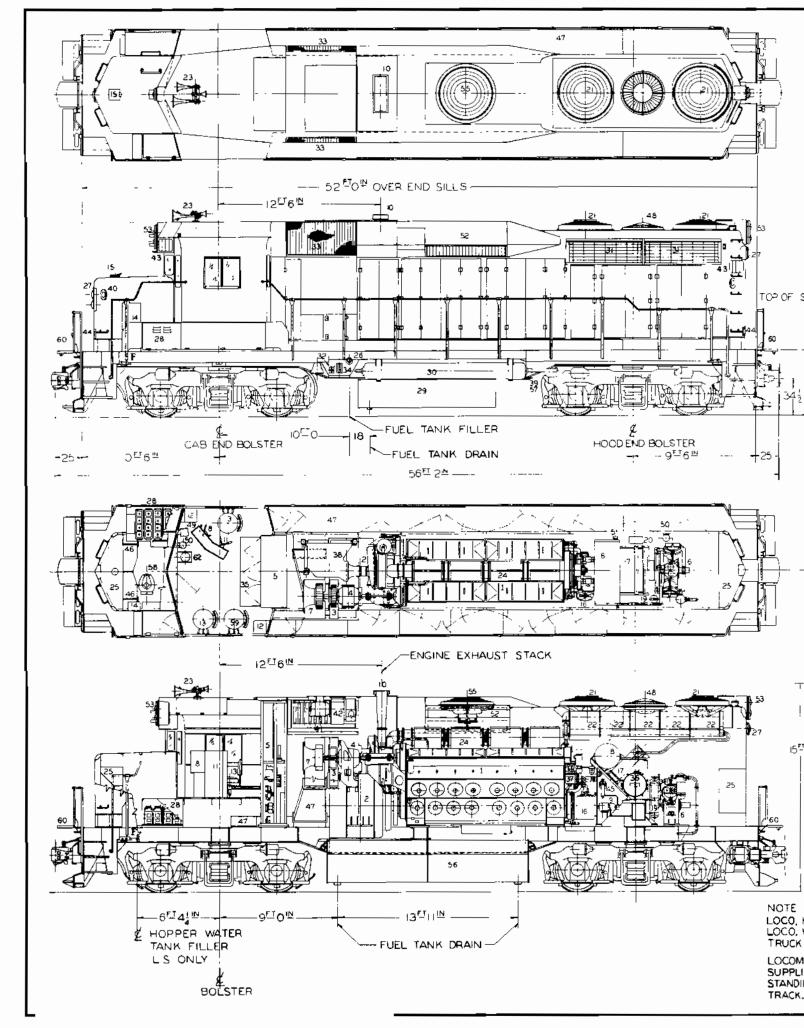
"The manufacturer warrants each locomotive manufactured or rebuilt by it, including all equipment and accessories, and replacement parts therefor, except tools or facilities, supplied by the manufacturer in accordance with its specifications, to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory, any part or parts thereof which shall, within one year after being placed in service by the original purchaser or before being operated 100,000 miles, whichever event shall first occur, be returned to it upon request with transportation charges prepaid and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities on its part and it neither assumes nor authorizes any other person to assume for it any other liability in connection with its products.

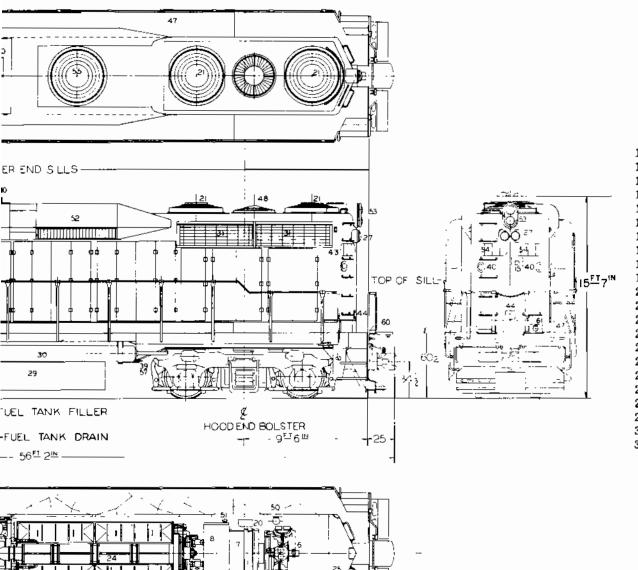
"This warranty shall not apply to any locomotive or component thereof which shall have been repaired or altered by other than an authorized Electro-Motive representative in any way so as in the judgment of the manufacturer to affect its stability and reliability nor which has been subject to misuse, negligence, or accident.

"The manufacturer reserves the right to make any changes in design or add improvements to equipment at any time, without incurring any obligation to install same on locomotives previously sold and delivered by it."

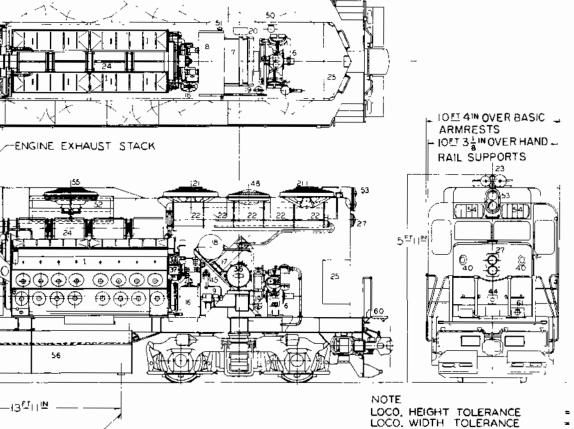
#### **Patents**

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.





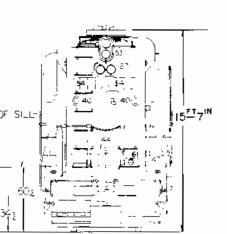
- 1. Engine EMD Model 16-50
- 2. Main Generator and Alterna
- 3. Generator Blower
- 4. Auxiliary Generator 10 8
- 5. Control Cabinet
- 6. Air Compressor
- 7. Traction Motor Blower
- 8. Engineer's Control
- 9. Fuel Pump
- 10. Engine Exhaust Stack
- 11. Air Brake Valve
- 12. Cab Heater
- 13. Sliding Seat
- 14. Hand Brake
- 15. Sand Box Filler
- 16. Lube Oil Filler
- 17. Lube Oil Cooler
- 10. Engine Weter To
- 18. Engine Water Tank19. Fuel Pressure Filter
- 20. Load Regulator
- 21. 48 Inch Fan and Motor
- 22. Radiator
- 23. Horns
- 24. Exhaust Manifold
- 25. Sand Box
- 26. Fuel Filler
- 27. Headlight Twin Sealed Be
- 28. Batteries
- 29. Fuel Tank 1700 Gallons
- 30. Main Air Reservoir
- 31. Air Intake And Shutters



JEL TANK DRAIN-

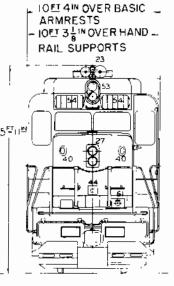
2250 HP

TRUCK LATERAL AT BOLSTERS \* ±2; NOM, LOCOMOTIVE IS SHOWN INCLUDING FULL SUPPLIES AND IN NEW CONDITION STANDING STILL ON LEVEL AND TANGENT TRACK.



- 1. Engine EMD Model 16-567 D3
- 2. Main Generator and Alternator
- 3. Generator Blower
- 4. Auxiliary Generator 10 KW
- 5. Control Cabinet
- 6. Air Compressor
- 7. Traction Motor Blower
- 8. Engineer's Control
- 9. Fuel Pump
- 10. Engine Exhaust Stack
- 11. Air Brake Valve
- 12. Cab Heater
- 13. Sliding Seat
- 14. Hand Brake
- 15. Sand Box Filler
- 16. Lube Oil Filler
- 17. Lube Oil Cooler
- 18. Engine Water Tank
- 19. Fuel Pressure Filter
- 20. Load Regulator
- 21. 48 Inch Fan and Motor
- 22. Radiator
- 23. Horns
- 24. Exhaust Manifold
- 25. Sand Box
- 26. Fuel Filler
- 27. Headlight Twin Sealed Beam
- 28. Batteries
- 29. Fuel Tank 1700 Gallons
- 30. Main Air Reservoir
- 31. Air Intake And Shutters

- 32. Emergency Fuel Cutoff
- 33. Engine Room Air Intake
- 34. Fuel Tank Gauge
- 35. Trap Door
- 36. Lube Oil Filter
- 37. Dual Fuel Filter
- 38. Engine Air Filter Unit
- 39. Automatic Drain Valve No. 1 Reservoir
- 40. Classification Lights
- 41. Inertial Air Separator
- 42. Dust Evacuating Blower
- 43. Number Box
- 44. Platform Light
- 45. Fuel Suction Filter
- 46. Collision Post
- 47. Traction Motor Air Duct
- 48. 36 Inch Fan and Motor
- 49. Speed Recorder
- 50. Fire Extinguisher
- 51. Engine Water Filler
- 52. Dynamic Brake
- 53. Signal Light
- 54. Number Box Changeable Numbers
- 55. Dynamic Brake Fan
- 56. Fuel Tank 2500 Gallons
- 57. Automatic Drain Valve No. 2 Reservoir
- 58. Toilet
- 59. Third Cab Seat
- 60. M.U. End Arrangement
- 61. M.U. Receptacle
- 62. Water Cooler
  - Modifications



E ) HEIGHT TOLERANCE = ± 1½ ), WIDTH TOLERANCE = ± ½ CK LATERAL AT BOLSTERS = ±2½\*NOM.

OMOTIVE IS SHOWN INCLUDING FULL PLIES AND IN NEW CONDITION DING STILL ON LEVEL AND TANGENT



ELECTRO - MOTIVE DIVISION GENERAL MOTORS CORPORATION LA GRANGE, ILLINOIS

## 2250 HP ROAD LOCOMOTIVE MODEL GP30