

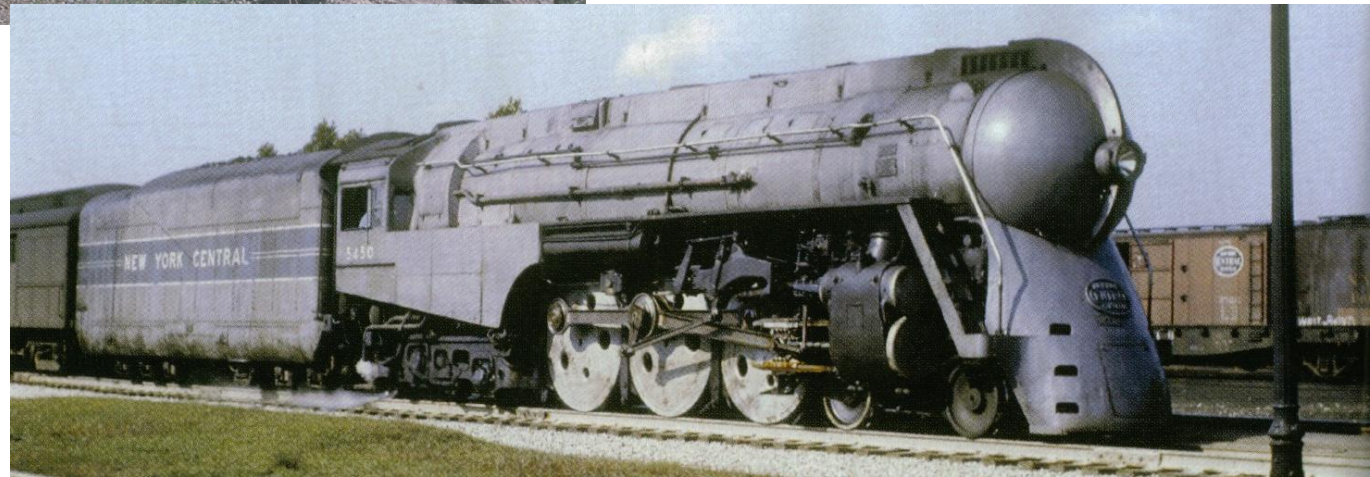


# CHAPTER 4

## The Locomotive



***Steam until  
mid 1950's***



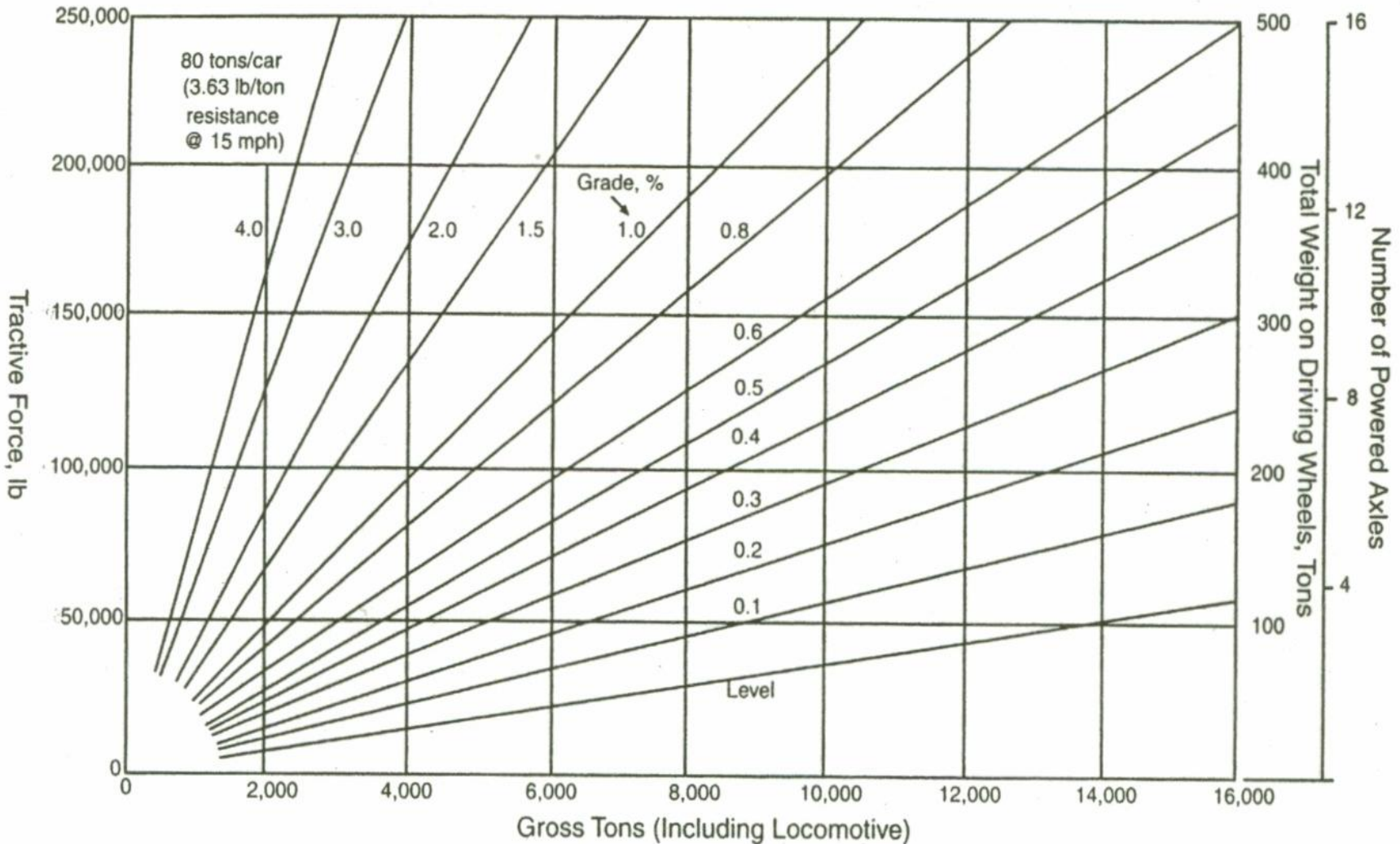


- ***Confine to diesel-electric or straight electric***



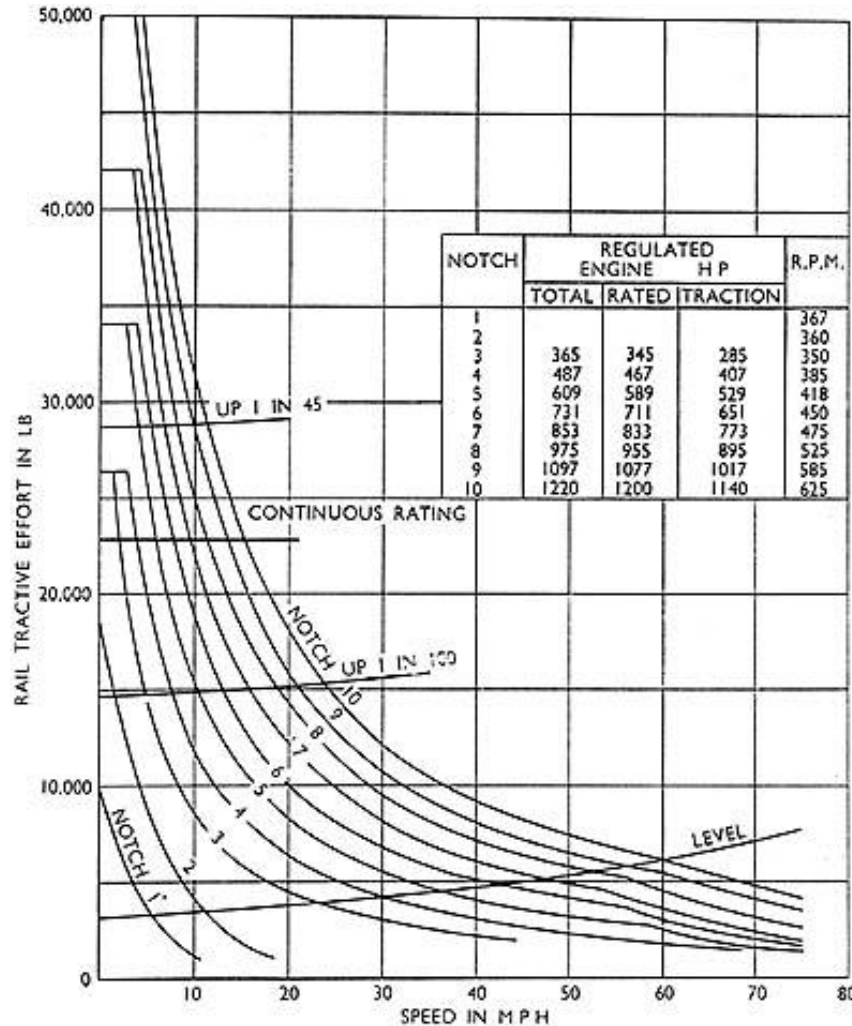
- Two primary factors – Tractive force (effort) and Horsepower
  - Tractive Force = Weight of Drivers times Coefficient of Adhesion
  - Horsepower = Rate of Doing Work
- Drawbar Horsepower

# Tractive Force vs. Tonnage and Grade



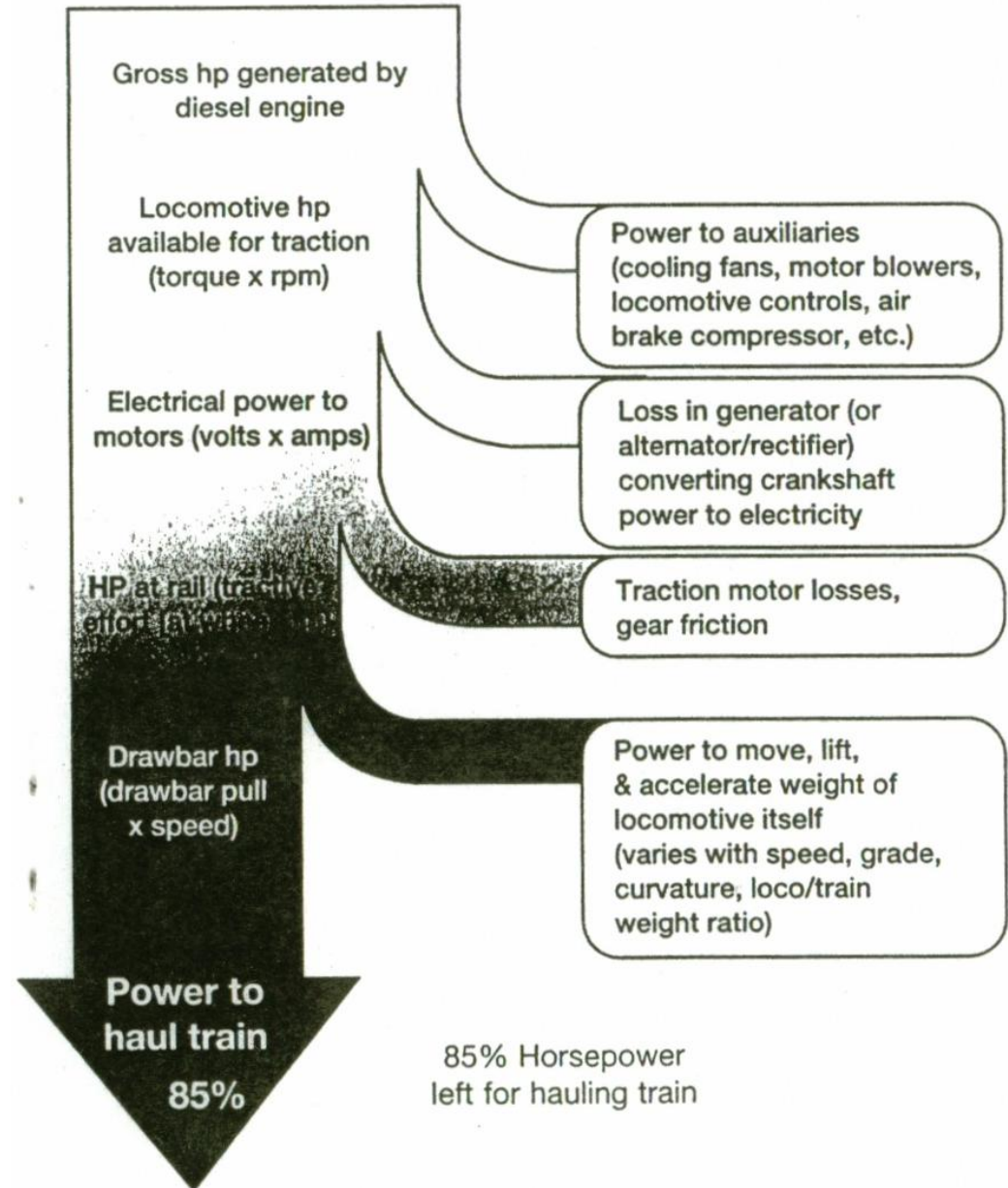
# Performance Curve of the locomotive

(with train resistance for 420 tons trailing load of passanger stock)

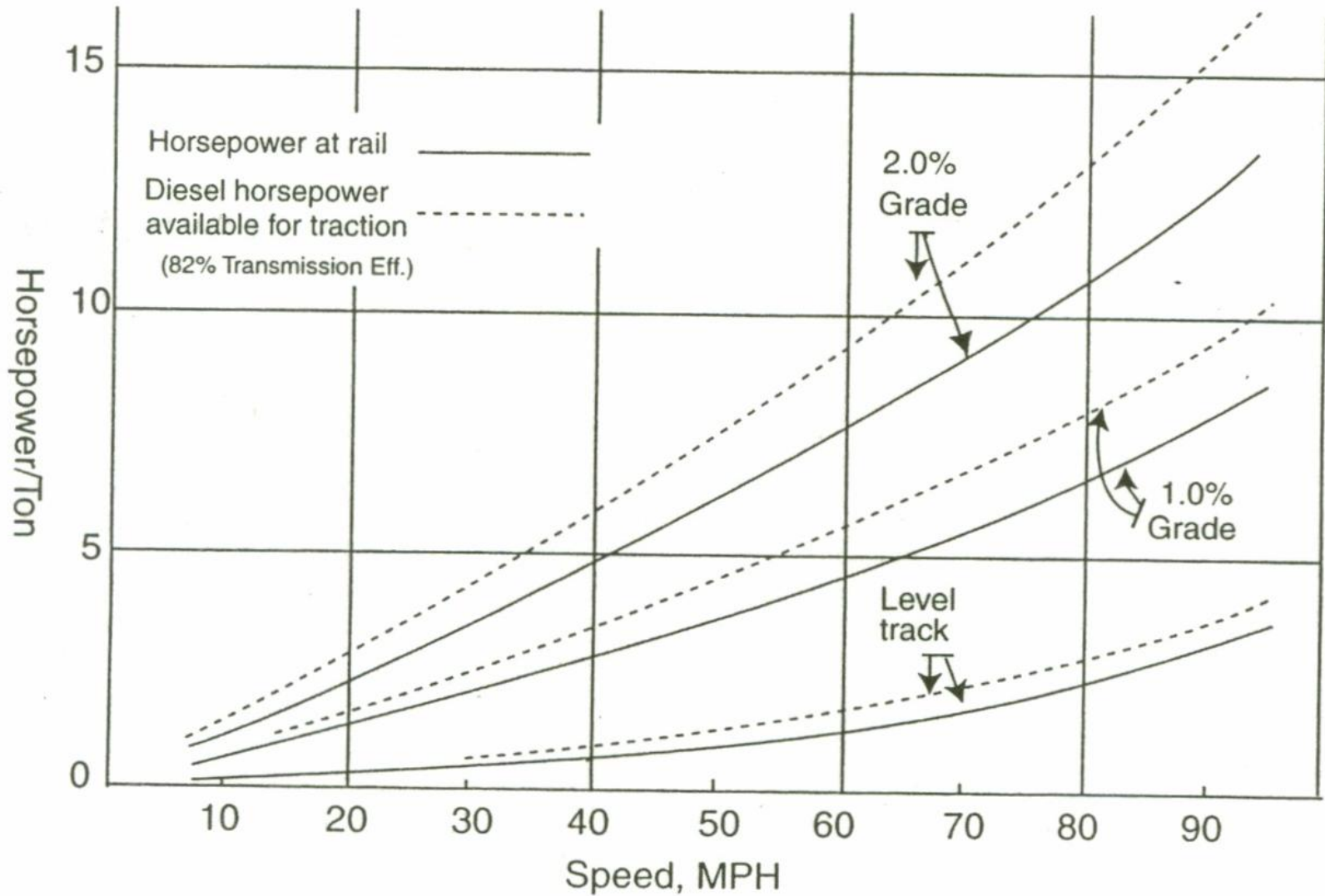




# ■ Different Horsepower Ratings

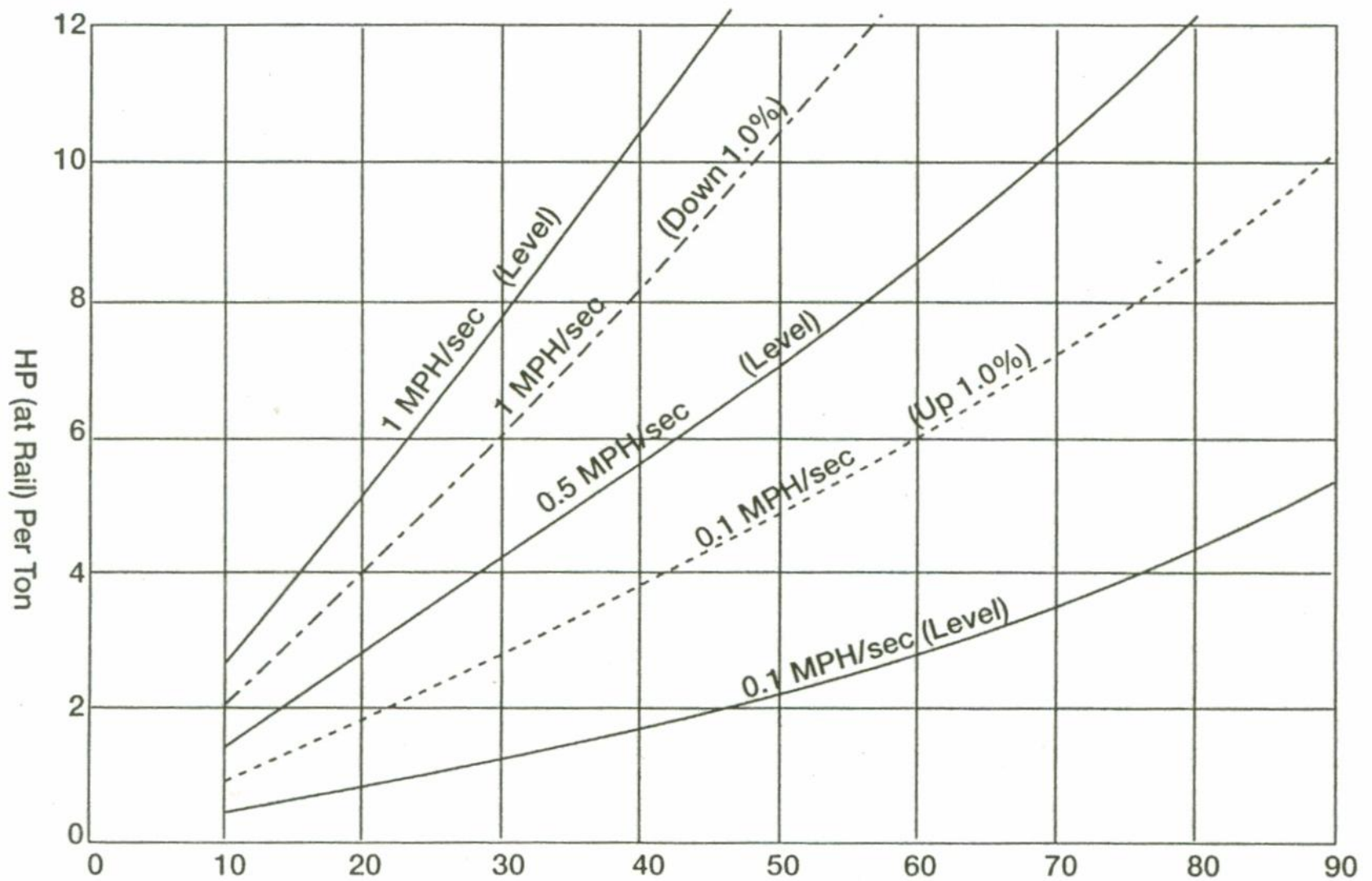


# Power Required vs. Speed and Grade





## Acceleration - Horsepower Requirements





## ■ Diesel – Electric Locomotive

- Diesel Engine - Prime Mover

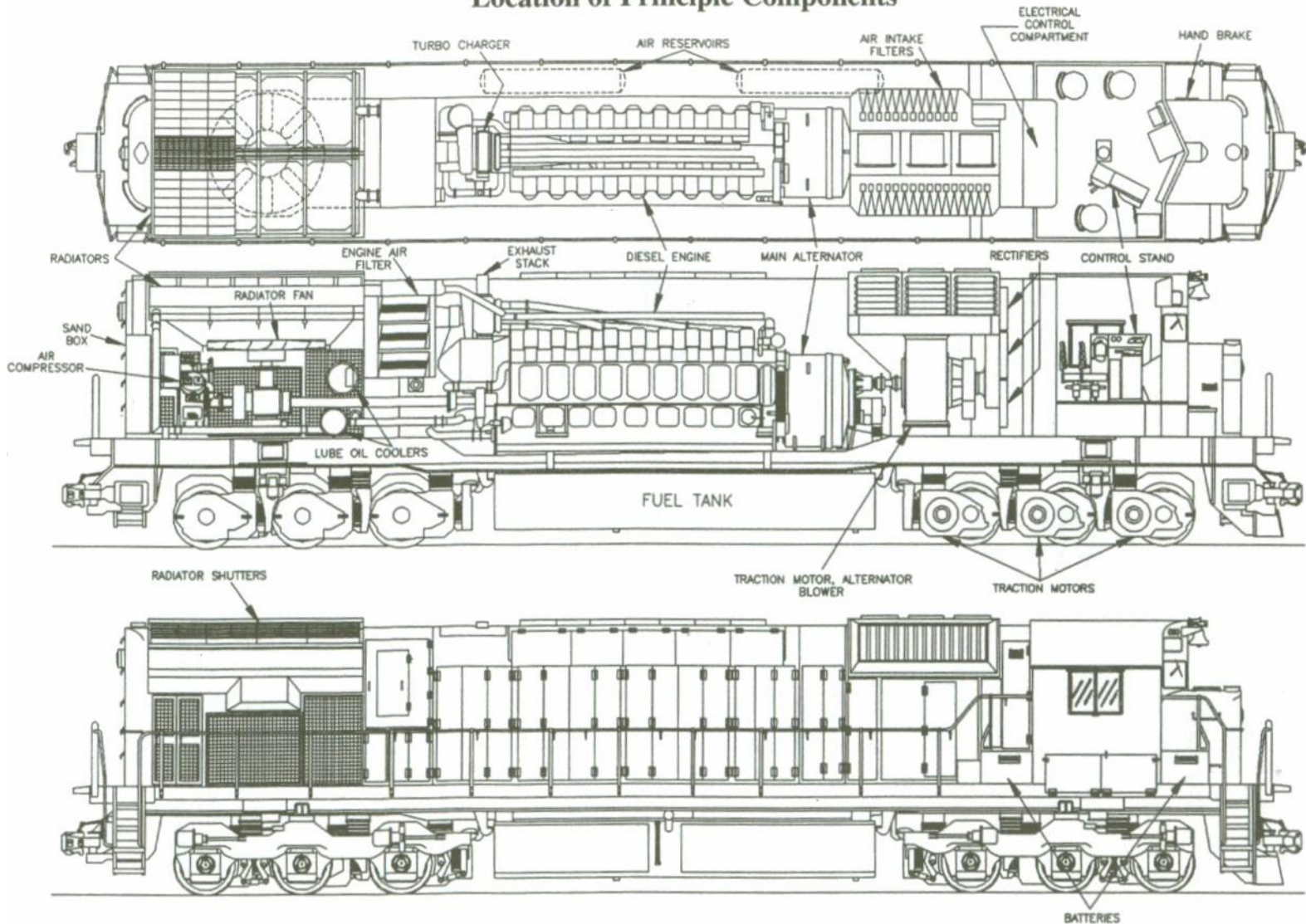
- Turbocharger / Electronic Fuel Injection

- Alternator / Generator / Fans / Batteries

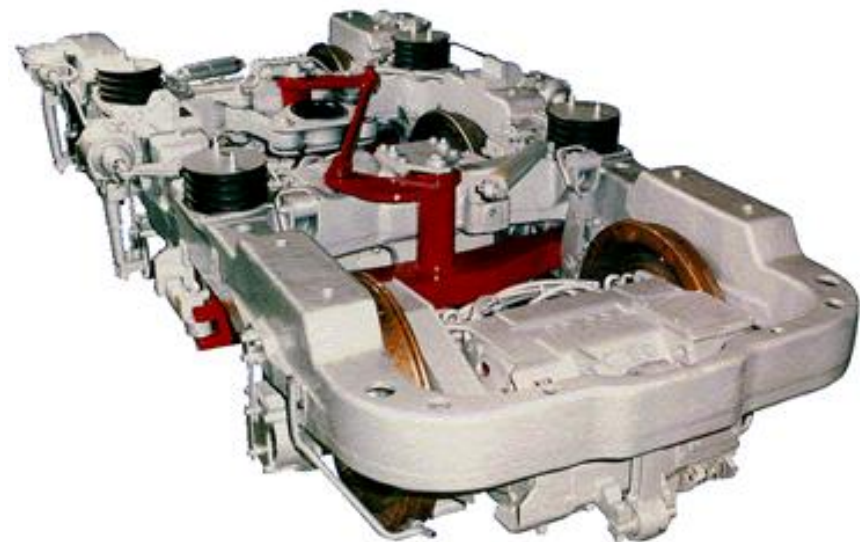
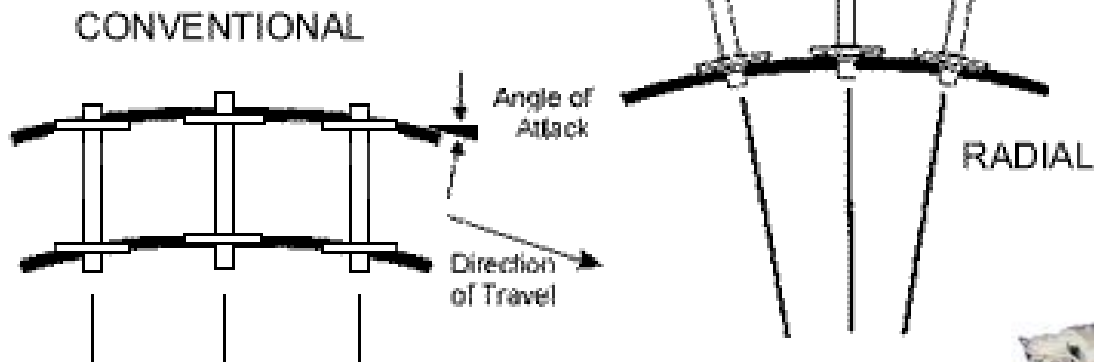
- AC/DC Traction Motors

# Locomotive Principal Components

Location of Principle Components



# ■ Radial Trucks





# Locomotive Controls



# ■ Six Axle



VS.



Four Axle

- Multiple Unit Arrangements

- Distributive Power / ECP





# ■ Slugs and Mates




BN TEBC6 No. 6299  
In BNSF Argentine Yards  
Kansas City, KS, March 27, 2001  
Copyright 2001, All Rights Reserved  
Doug Johnson Rail Graphics Image #P010327-39a





- 
- Head-End Power
  - Fuel Efficiency
  - Electric Locomotive
  - Hybrid Locomotive

- 
- Locomotive Maintenance
  - DC/AC Traction Motors
  - Inspection/Running Repairs/Major Repairs
  - Remote Diagnostics and New Technologies
  - Life