

# General Electric Company

Schenectady, N.Y.

## RAILWAY DEPARTMENT

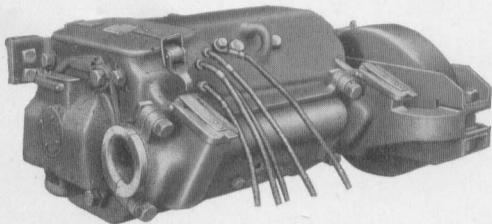
March, 1917

Copyright, 1917  
by General Electric Company

\*Bulletin No. 44406A

### GE-247 VENTILATED COMMUTATING-POLE RAILWAY MOTOR

The GE-247 railway motor has been developed by the General Electric Company especially for city service. Large numbers of this motor are now in use on various types of city cars in all kinds of service, and the satisfactory operation and low cost of main-



GE-247 RAILWAY MOTOR—AXLE SIDE

tenance that users of this motor have experienced, prove it to be admirably adapted to the service for which it was developed.

In design, the motor follows the lines of standard G-E ventilated, commutating-pole motors, and embodies those features in general demand by operating engineers, which have been found necessary for successful and economical operation. By the use of the box type of frame and a specially effective system of ventilation, and of pressed steel for certain parts, a motor sufficiently light in weight to be suitable for light weight cars has been obtained without any sacrifice of strength or reliability, the desirable features that are found in larger and heavier motors being retained. The excellent commutating qualities of the motor, and the effectiveness of the ventilation employed permit a high continuous output without overheating the motor.

The GE-247 motor is built in forms suitable for trucks with wheels 24 inches in diameter, or for those with wheels of 30 inches or more in diameter. It is, therefore, well adapted

both in characteristics and design for low floor cars and for a considerable range in types of light and moderate weight cars operating under all conditions of city service.

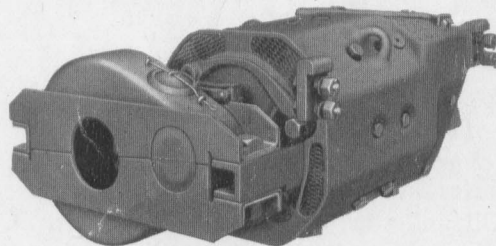
#### Rating

The GE-247 motor has an hourly rating of 40 horse-power on 600 volts, with an input of 60 amperes. The continuous rating for a temperature rise of 65 deg. C. by thermometer is 36.6 amp. at the same voltage.

#### Details of Construction

The motor possesses all the advantages of high structural strength for a minimum weight, great durability, together with the low cost of maintenance inherent to the box type of frame. Adequate openings are provided for the inspection of the interior.

The armature bearings are of bronze lined with babbitt, and are designed to prevent



GE-247 RAILWAY MOTOR—SUSPENSION SIDE

injury to the armature or shaft bearing surfaces in the event of the babbitt running from overheating. The armature bearings are held from turning by keys and the axle linings by means of dowels. The armature shaft may be removed, if necessary, without disturbing the windings or connections of the armature. The bearing surfaces are accurately ground and rolled giving a bearing surface which has reduced wear to a minimum. The

NOTE.—The data in this publication are subject to change without notice.

\* Supersedes Bulletin No. 44406.

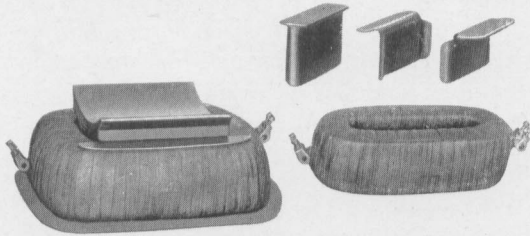
Class 19.

44406A-2 GE-247 Ventilated Commutating-Pole Railway Motor

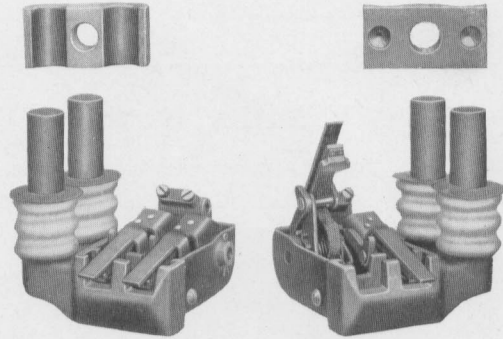
hot binding process is employed in banding the armature, this process having largely eliminated the possibility of loose coils.

The field coils are thoroughly impregnated with insulating compound by the vacuum process and are securely held in place by

closed by springs. The axle is enclosed between bearings by a sheet steel dust guard.



EXCITING AND COMMUTATING FIELD COILS

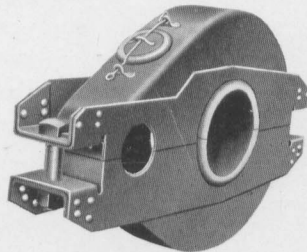


BRUSH HOLDERS

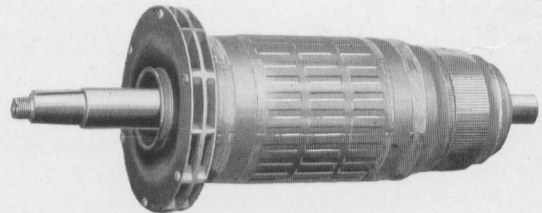
spring steel angle flanges. The gear case is of specially light and strong construction each half being pressed to shape from a steel plate, and welded to a supporting cradle. These are carried by a lug on the frame head and a horn made integral with the pinion end axle cap.

**Ventilation**

All parts of the motor are effectively cooled by air drawn into the motor by a double or multiple fan on the armature shaft. The cooling air passes through the motor in two parallel streams, one through the commutator shell and armature core, the other over and



PRESSED STEEL GEAR CASE



ARMATURE

**Lubrication**

Oil and waste are used throughout. Oil boxes are provided with auxiliary oil wells, and have felt lined, deep lipped covers held

around the armature and field coils. The air inlets are screened and are located to afford protection to the interior of the motor when operating under unfavorable conditions.

**WEIGHTS**

	APPROX. WT. IN LB.	
	24 in. Wheel Motor	30 in. Wheel Motor
Motor complete with gear, gear case, pinion and axle linings.....	1740	1870
Two motor equipment with two K-36 controllers complete.....	4590	4850
Four motor equipment with two K-35 controllers complete.....	8520	9040
Two motor equipment with Sprague G-E Type PC control complete.....	4680	4940
Four motor equipment with Sprague G-E Type PC control complete.....	8400	8920

GE-247 Ventilated Commutating-Pole Railway Motor 44406A-3

**SCHEDULE SPEED, GE-247, 600-VOLT MOTOR**

The following tables indicate the capacity of the GE-247 motor and will assist materially in determining whether this motor is suitable for the desired schedule. They are based on the following assumptions:

Average trolley potential 500 volts; acceleration and braking 1.5 miles per hour per second; duration of stops 10 seconds; coasting for 230 feet on all runs; straight level tracks, maximum temperature rise not exceeding 65 deg. C. Schedule speeds given are 10 per cent less than theoretical values to allow for

delays due to grades, curves, slow downs, or other factors that may affect the schedule.

It is strongly recommended that service data be supplied and the General Electric Company's engineers be consulted before the final selection of a motor and gear ratio, since co-operation has been found to be mutually beneficial.

Read assumptions on which schedule is based before applying tables.

**GE-247 24-INCH WHEEL MOTOR  
500 VOLTS, 24-INCH WHEELS, 10-SECOND STOPS**

Stops per Mile	Gear Ratio	MILES PER HOUR WITH LOAD IN TONS PER MOTOR						
		4.5	5	5.5	6	7	8	9
1	3.87	18.6	18.1	17.6	17.3	16.6	16.1	15.6
1	3.29	20.1	19.5	19.1	18.8	18.0	17.5	19.0
3	3.87	13.5	13.2	13.0	12.9	12.6	12.4	12.2
3	3.29	13.9	13.7	13.6	13.4	13.1	12.9	12.7
5	3.87	10.9	10.8	10.7	10.6	10.4	10.3	10.2
5	3.29	11.2	11.0	10.9	10.8	10.6	10.5	10.3
6	3.87	10.0	9.9	9.8	9.7	9.6	9.4	9.3
6	3.29	10.2	10.1	10.0	9.9	9.8	9.7	
7	3.87	9.2	9.1	9.0	8.9	8.8	8.7	8.7
7	3.29	9.4	9.3	9.2	9.1	9.0	9.0	
8	3.87	8.7	8.6	8.5	8.4	8.3	8.2	8.1
8	3.29	8.8	8.8	8.7	8.6	8.5	8.4	
9	3.87	8.0	8.0	7.9	7.8	7.7	7.6	7.6
9	3.29	8.2	8.1	8.0	8.0	7.9	7.8	
Max. free running speed four-motor equipments	3.87	25.2	24.0	23.1	22.4	21.3	20.4	19.4
	3.29	28.2	26.8	25.8	24.9	23.6	22.5	21.7

**GE-247 30-INCH WHEEL MOTOR  
500 VOLTS, 30-INCH WHEELS, 10-SECOND STOPS**

Stops per Mile	Gear Ratio	MILES PER HOUR WITH LOAD IN TONS PER MOTOR						
		4.5	5	5.5	6	7	8	9
1	4.20	19.9	19.4	18.9	18.5	17.9	17.3	16.8
1	3.59	21.1	20.6	20.1	19.8	19.1	18.5	18.0
3	4.20	14.0	13.8	13.7	13.5	13.2	13.0	12.8
3	3.59	14.4	14.2	14.0	13.9	13.6	13.4	13.2
5	4.20	11.0	10.9	10.8	10.7	10.5	10.4	10.3
5	3.59	11.4	11.3	11.1	11.0	10.8	10.7	10.6
6	4.20	10.2	10.1	10.0	9.9	9.8	9.7	9.6
6	3.59	10.4	10.3	10.2	10.1	10.0		
7	4.20	9.4	9.3	9.2	9.1	9.0	9.0	8.9
7	3.59	9.6	9.5	9.4	9.3			
8	4.20	8.7	8.7	8.6	8.6	8.5	8.4	
8	3.59	8.9	8.8	8.8	8.7			
9	4.20	8.1	8.0	7.9	7.9	7.8	7.7	
9	3.59	8.3	8.2	8.2	8.1			
Max. free running speed four-motor equipment.	4.20	27.9	26.5	25.5	24.8	23.4	22.3	21.4
	3.59	30.7	29.1	28.0	27.2	25.8	24.6	23.4

Max. free running speed of two-motor equipment approximately 90 per cent of above.

The approximate schedule speeds at voltages other than that on which the tables are based may be obtained as follows:

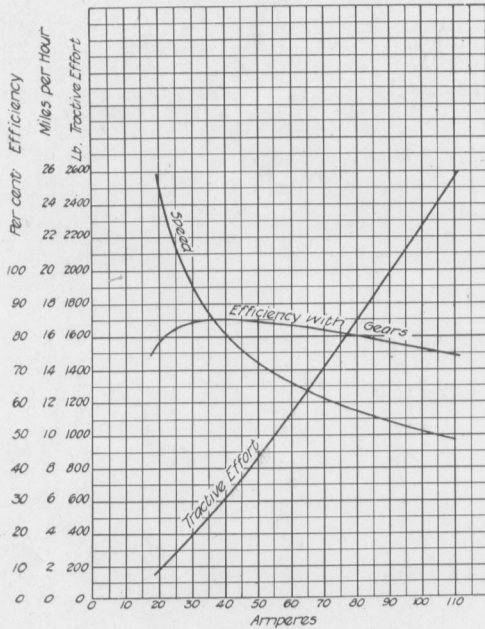
For each one per cent reduction or increase of voltage there will be approximately the following reduction or increase of schedule speed:

- At one stop per mile 0.5 per cent.
- At three stops per mile 0.2 per cent.
- At seven stops per mile 0.1 per cent.

It must be remembered, however, that an increase of voltage will increase the heating effect on the motors and make it desirable in some cases to check the temperature rise.

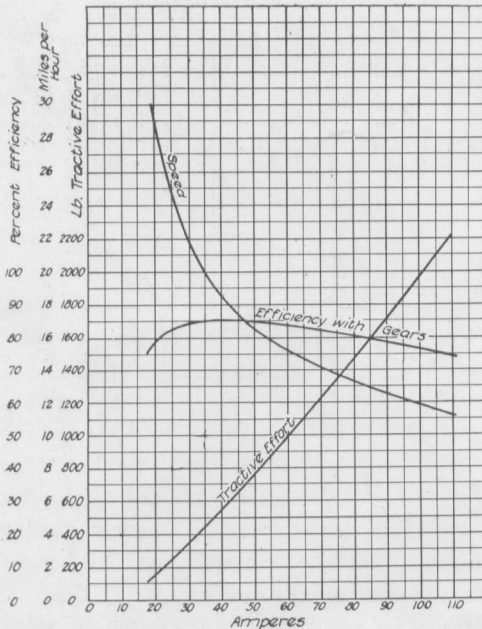
44406A-4 GE-247 Ventilated Commutating-Pole Railway Motor

GE-247—24-inch Wheel Motor  
 Characteristic Curves on 600 Volts  
 Diameter of Car Wheels 24 in.  
 Gear 58 teeth, Pinion 17 Teeth, Ratio 3.87  
**Maximum Gear Ratio**



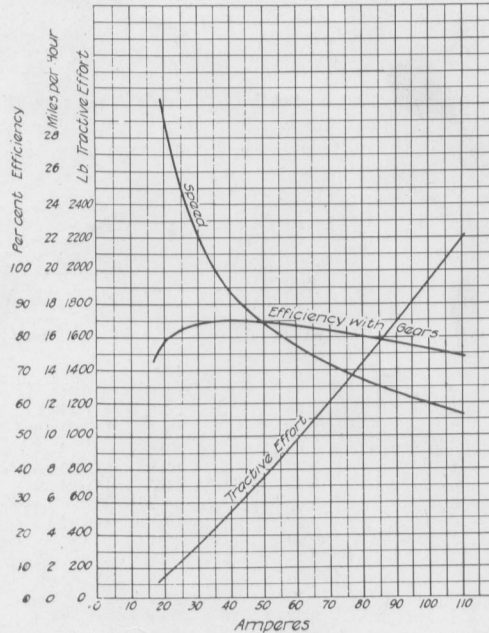
CHARACTERISTIC No. 277

GE-247—30-inch Wheel Motor  
 Characteristic Curves on 600 Volts  
 Diameter of Car Wheels 30 in.  
 Gear 63 Teeth, Pinion 15 Teeth, Ratio 4.20  
**Maximum Gear Ratio**



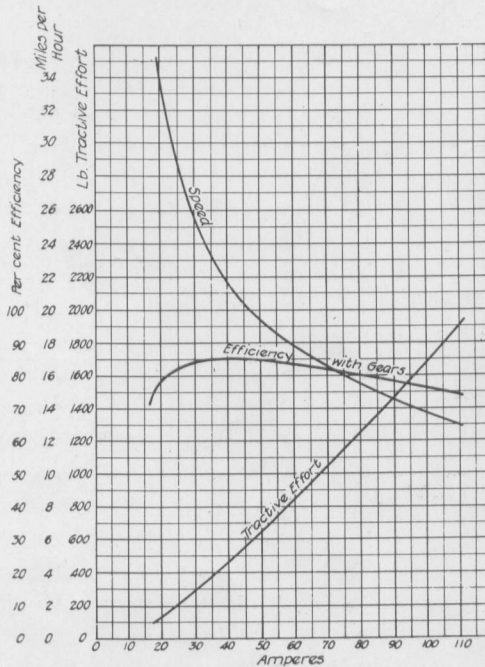
CHARACTERISTIC No. 281

GE-247—24-inch Wheel Motor  
 Characteristic Curves on 600 Volts  
 Diameter of Car Wheels 24 in.  
 Gear 56 Teeth, Pinion 17 Teeth, Ratio 3.29



CHARACTERISTIC No. 279

GE-247—30-inch Wheel Motor  
 Characteristic Curves on 600 Volts  
 Diameter of Car Wheels 30 in.  
 Gear 61 Teeth, Pinion 17 Teeth, Ratio 3.59



CHARACTERISTIC No. 283