

Average No. cars per sub-station..... 1.6

$\sqrt{\frac{\quad}{2}}$
Mean amps. per car 185.3

$\sqrt{\frac{\quad}{2}}$
Mean amps. per sub-station
= m279.0

With sub-stations 12 miles apart, 80 lbs. track rail and 60 lbs. 3rd rail, resistance between adjacent sub-stations is = r 0.9 ohms.

D.C. line loss per sub-station $r \frac{m^2}{6}$ =..... 16.1 K.W.

Average K.W. per sub-station at cars = 67.2×1.6
=107.5

Average K.W. per sub-station at sub-station.....123.6 K.W.

% loss in 3rd rail 15.5 %

% loss in step-down transformers 3.5 %

% loss in high tension line 2.5 %

% loss in step-up transformers 3.5 %

Total % loss from cars to P.H. 39.5 %

Average K.W. consumed by 8 cars at the cars ...537 K.W.

Average K.W. at power house for 8 cars750 K.W.

Max. load per sub-station — worst condition — 2 cars starting 560 K.W.

One 400-K.W. rotor will take care of this 40 % overload.

Average load on rotary... 30 %

Rotary sub-stations are of sufficient size so that one can be cut out temporarily.

Maximum load on P.H., say.....1,200 K.W.

Average No. cars per sub-station..... 1.6

$\sqrt{\frac{\quad}{2}}$
Mean apparent K.W. per car.....129.0

$\sqrt{\frac{\quad}{2}}$
Mean amps per car (3,000 volts) 43.0

$\sqrt{\frac{\quad}{2}}$
Mean amps per sub-station = m 68.8

With sub-stations 12 miles apart, 80lbs track rail and No. 0000 trolley, resistance between sub-stations allowing for increased rail resistance... 4.2 ohms.

Trolley and rail loss per sub-station = $r \frac{m^2}{6}$ = ... 3.32 K.W.

Average real K.W. per sub-station at cars =
 73.9×1.6 =118.0

Average real K.W. per sub-station at sub-station121.32 K.W.

% loss in regulator and car transformers..... 5 %

% loss in trolley and rails. 2.8 %

% loss in step-down transformers 3.5 %

% loss in high tension line 2.5 %

% loss in step-up transformers..... 3.5 %

Total % loss 18.4 %

Average real K.W. consumed by 8 cars at the cars591 K.W.

Average real K.W. at power house for 8 cars. 700 K.W.

Average apparent K.W. at power house, about...825 K.W.

Max. load per sub-station — worst condition — 2 cars starting (say 275 apparent K.W. each)...550 K.W.

One 350 K.W. transformer will take care of this with 50 % overload.

Average load on sub-station, about..... 40 %

These transformers are sufficiently large to take care of load if one is cut out.

Max. load on P.H. in apparent K.W., say.....1,400 K.W.