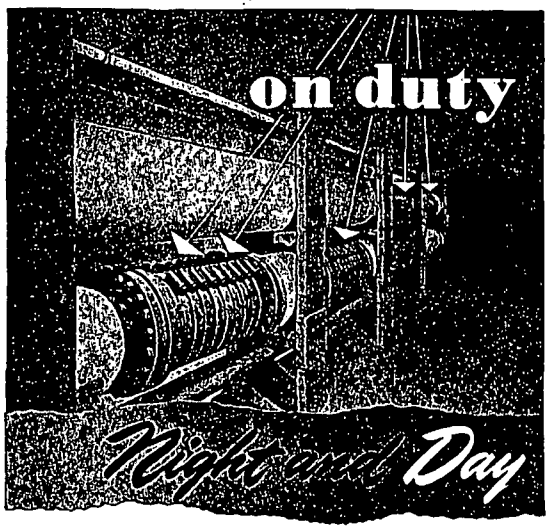

★ Here are two of the many Zallea Expansion Joints installed in high pressure steam lines from Capitol Power House to U. S. Government Printing Office, Washington, D. C.

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Zallea
EXPANSION JOINTS

LARGEST EXCLUSIVE MANUFACTURERS OF EXPANSION JOINTS EXCLUSIVELY

current as in test *A*, and with the ... short circuited. Take the fol... readings: input, 3500 watts; ... current, 42 amp; stator voltage be... terminals, 110 v.

Now analyze the results as fol... In test *C*, rotor is at rest. Copper ... in a 3-phase machine is $(3 \div 2)$ I^2R_1. Applied voltage is low, ther... core loss is small. Hence, resistan... stator and rotor windings as mea... on the stator side is determined thus:

$$3500 = \frac{3}{2} I^2R_1 = \frac{3}{2} \times 42^2 \times R_1$$

$$R_1 = \frac{3500 \times 2}{3 \times 42 \times 42} = 1.32 \text{ ohms}$$

From test *B*, core loss at 440 ... friction and windage losses may ... determined. Copper loss at no load ...

$$\frac{3}{2} I_0R_1 = \frac{3}{2} \times 15^2 \times 1.32 = 447 \text{ watts}$$

Losses that remain approximately constant at all loads, friction windage and core loss are $1500 - 447 = 1053$ watts.

From test *A*, horsepower to drive ... load, power factor, efficiency and ... may be determined.

Total copper loss $= \frac{3}{2} I^2R_1 =$

$$\frac{3}{2} \ 40^2 \times 1.32 = 3170 \text{ watts.}$$

$\text{Watts}_{out} = 25{,}000 - 3170 - 1053 = 20{,}773$

$$\text{Hp output} = \frac{20{,}773}{746} = 27.8.$$

$$\text{Power factor} = \frac{25{,}000}{1.73 \times 40 \times 440} = 0.817$$

$$\text{Efficiency} = \frac{20{,}773}{25{,}000} 100 = 82.8\%.$$

$$\text{Torque} = \frac{33{,}000 \text{ hp}}{2 \times 3.14 \times N_s} =$$

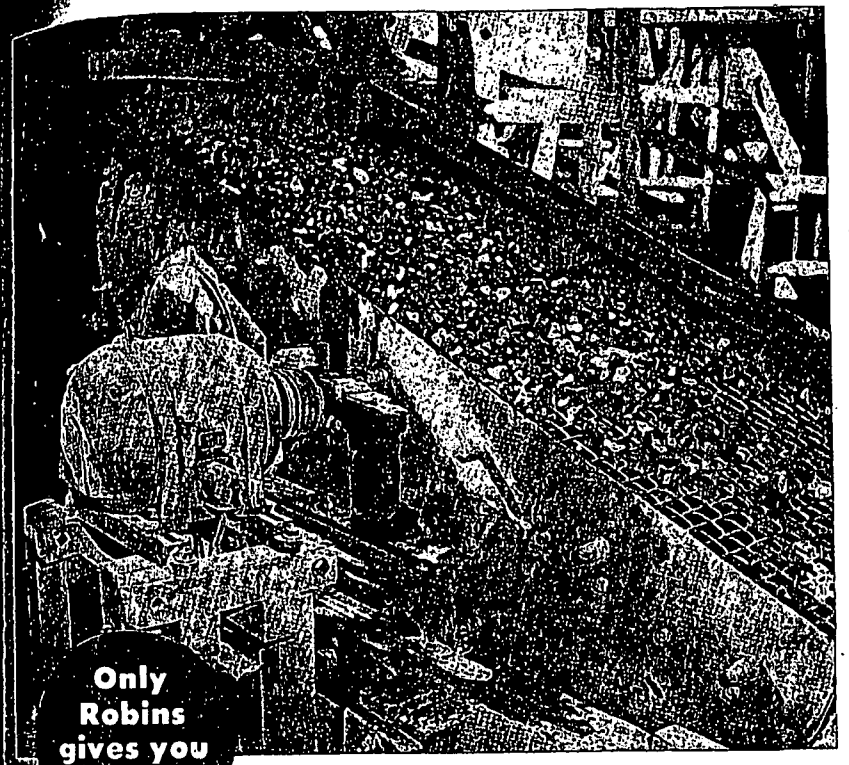
$$\frac{33{,}000 \times 27.8}{2 \times 3.14 \times 570} = 256 \text{ lb-ft.}$$

Now *JHV* has one point on his speed-torque curve for the rotor short circuited. To determine resistance required in the rotor circuit proceed as follows. Measured total resistance $R_1 = 1.32$ ohms (test *C*); ohmic stator resistance equals 0.65 ohm; ohmic rotor resistance is 0.58 ohm, and ohmic total resistance is 1.23 ohms.

Calculated (corrected) stator resistance $= (1.32 + 1.23)\ 0.65 = 0.7$ ohm; calculated (corrected) rotor resistance $= (1.32 + 1.23)\ 0.58 = 0.6$ ohm. From test *A*, stator copper loss $(3 + 2)\ I^2R = (3 + 2)\ 40^2 \times 0.70 = 1680$ watts; rotor copper loss $= 3170 - 1680 = 1490$ watts. Rotor current may be determined since 1490 watts $= (3 + 2)\ I^2R = (3 + 2)\ I^2 \times 0.6$

$$I_{rotor} = \sqrt{\frac{2 \times 1490}{3 \times 0.02}} = 40 \text{ amp.}$$

(*Continued on page 142*)



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