103848. FREQUENCIES

CALCULATION METHOD.

The system, such as for instance multiunit turbine-gear-compressor train, is represented by'a finite number of masspoints connected by weightless elastic elements of a certain torsional rigidity.

The method used in the analysis being developed by Holzer, is a calculation arranged in tabular form. The method is based upon the fact that a system vibrating at its natural frequency requires no external torques to maintain the motion, when damping is neglected. If the vibration torques acting within the system are in equilibrium, as shown by the last value on the total torque column being zero

$$\left\{\sum_{i=1}^{n} J\omega^2\theta = 0\right\}$$

then the correct natural frequency has been found.

Remember also that the natural frequency is independent of the vibration amplitude and, for convenience, the vibration amplitude at the first mass is assumed to be 1 rad. If the last value in the total torque column does not equal zero, then another frequency has to be chosen until the desired result is obtained. Given a frequency or running speed range and a speed increment the program computes this total torque at the initial speed to the final speed. The program senses those speeds at which the total torque becomes zero and provides these and the corresponding rotor mode shapes as the critical speeds.

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TITLE: TORSIONAL CRITICAL FREQUENCIES OF COUPLED ROTATING SYSTEM.

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DELAVAL STORK — HENGELO (O) HOLLAND

SHT. No. 1 OF 3

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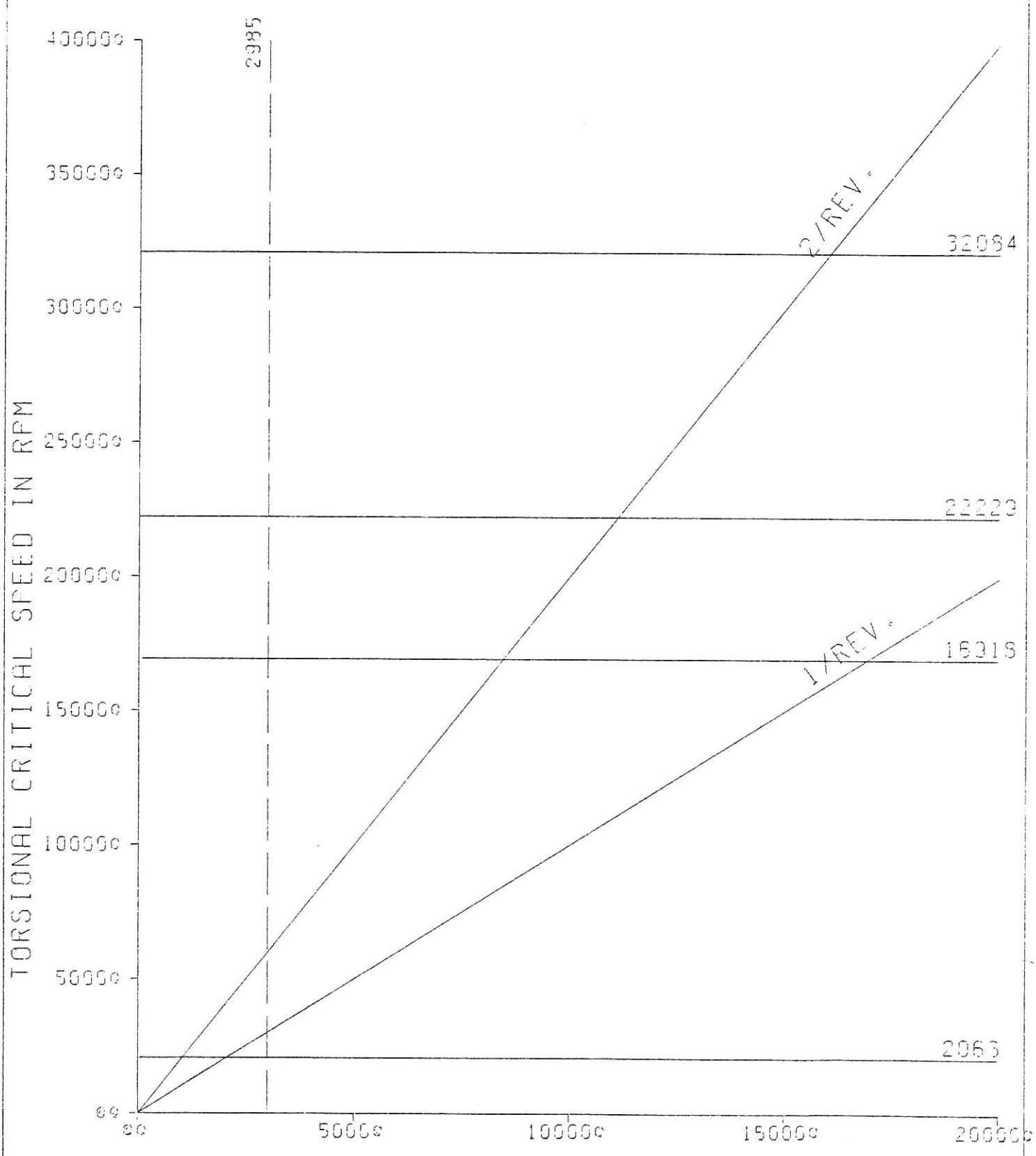
CAMPBELL DIAGRAM FOR SYSTEM TORSIONAL CRITICAL FREQUENCIES.



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