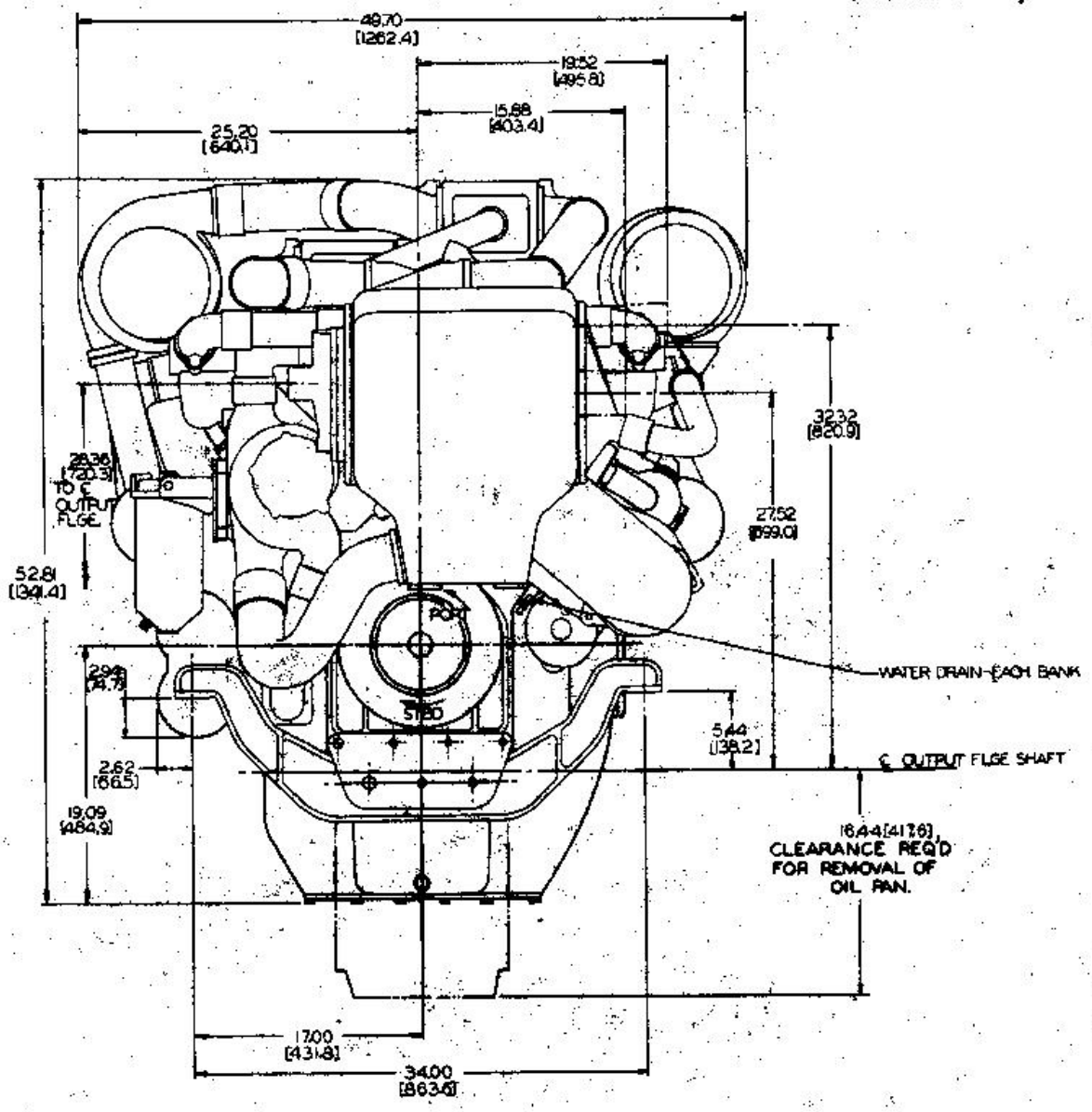calculated by scaling.