SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

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Procedure for Measuring Bore and Face Runout of Flywheels, Flywheel Housings, and Flywheel Housing Adapters

RATIONALE

The technical report covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE IC Powertrain Steering Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. Scope—This SAE Recommended Practice applies to any internal combustion engine which can utilize SAE No. 6 thru SAE No. 00 size flywheel housing. It provides instructions for correcting flywheel housing bore runout readings which are influenced by crankshaft bearing clearance. Limits for bore and face runout are specified in the various SAE Standards and Recommended Practices covering flywheels and flywheel housings.

1.1 Purpose—This document is intended to provide a uniform procedure for measuring bore and face runout of flywheels, flywheel housings, and flywheel housing adapters after assembly to an engine.

2. References

2.1 Applicable Publication—The following publication forms a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J617—Engine Flywheel Housing and Mating Transmission Housing Flanges

3. Measuring Procedures

3.1 General

3.1.1 All measurements shall be taken on the assembled engine held in its normal operating position.

3.1.2 A dial indicator with rigid extension bars is required.

3.1.3 Surfaces which are to be measured must be free from dirt and burrs.

3.1.4 When taking measurements on used flywheel housings, inspect the piloting bore for wear.

3.1.5 Prepare a chart similar to that shown in Figure 1, to record and aid in determining the flywheel housing or adapter bore and face runout.

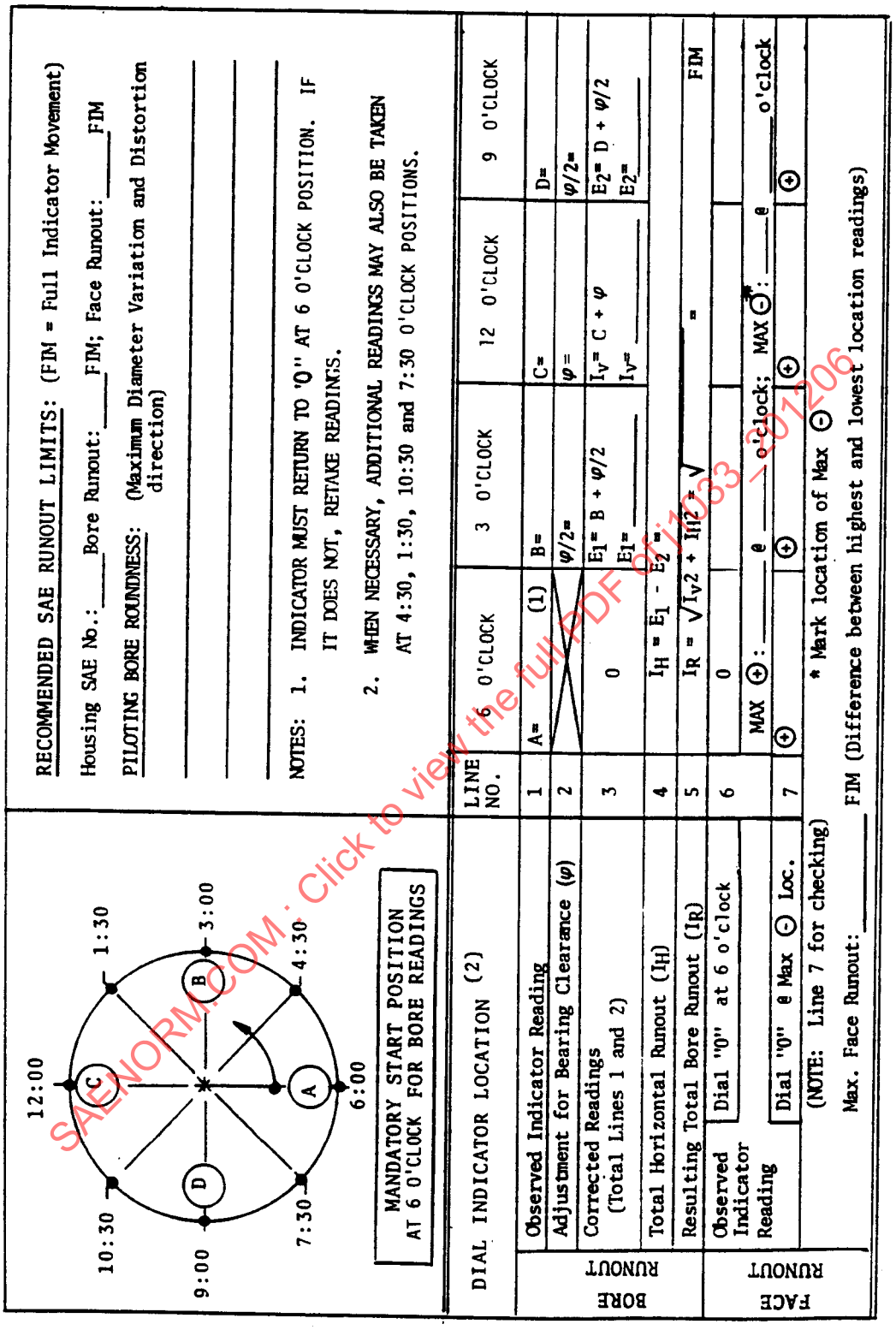

FIGURE 1—CHART FOR RECORDING FLYWHEEL HOUSING BORE AND FACE RUNOUT
(NOTE: CHART FOR COUNTERCLOCKWISE ROTATING ENGINE SHOWN)

3.2 Alignment Measurements for Flywheel Housings and Adapters

3.2.1 FLANGE PILOTING DIAMETER RUNOUT—This measurement is taken to determine the runout of piloting bore in relation to crankshaft rotation axis.

3.2.1.1 Mount the indicator base on the flywheel or on the crankshaft flange as close as possible to the housing pilot bore to minimize deflection.

3.2.1.2 Adjust the indicator point to be perpendicular to the housing pilot bore and set at zero in the 6 o'clock (lower vertical) mandatory position.

3.2.1.3 Slowly rotate the crankshaft in the direction of engine rotation, and record the indicator readings along with appropriate positive or negative sign at 3, 12, and 9 o'clock positions. Confirm that the 6 o'clock position is still zero. If necessary, repeat the measurements. Record the readings on line 1 in the chart shown in Figure 1, being sure to include the positive or negative sign.

CAUTION—Sign designation relative to direction of indicator tip movement is not the same for all indicators. For all measurements in the calculations performed in 3.2.1, outward movement of the indicator tip with respect to the center of the bore being measured is to be considered a negative reading.

3.2.1.4 Position the indicator tip at 12 o'clock position, and set it at "zero" and determine (φ), effect of main bearing clearance, by raising the crankshaft to its upper limit. Record the change in indicator reading as φ, on line 2 in the chart in the 12 o'clock column. This value will always be positive. This value should be within engine manufacturer's limits.

NOTE—A floor-mounted support with a padded prybar, or other suitable means can be used to raise the flywheel; however, it should not be forced beyond the point where the bearing clearance has been removed, nor should the housing be used as a fulcrum.

3.2.1.5 Divide the bearing clearance adjustment value (φ) by 2 and enter on line 2 at 3 and 9 o'clock positions.
$\varphi/2$ value is always positive.

3.2.1.6 Algebraically add the values on lines 1 and 2 and record on line 3.

3.2.1.7 Establish the corrected vertical indicator reading value I_V ($I_V = C + \varphi$) at 12 o'clock position, and horizontal indicator readings E_1 ($E_1 = B + \varphi/2$) at 3 o'clock position, and E_2 ($E_2 = D + \varphi/2$) at 9 o'clock positions.

3.2.1.8 Determine the total horizontal reading (I_H) by taking the algebraic difference between the 3 o'clock and 9 o'clock corrected readings ($I_H = E_1 - E_2$). Enter this value on line 4 in the chart.

3.2.1.9 Determine the resulting total bore runout (I_R) of the housing or adapter by locating the intersection point of the total vertical reading (I_V) and the total horizontal reading (I_H) in Figure 2 or calculate as shown in Equation 1:

$$I_R = \sqrt{(I_V)^2 + (I_H)^2} \qquad \text{(Eq. 1)}$$

NOTE—This value (I_R) is consistent with full indicator movement type reading limits specified in SAE J617. Housing bore eccentricity is equal to one-half of this value.