SURFACE VEHICLE STANDARD

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(R) Glossary - Automatic Belt Tensioner

RATIONALE

SAE J2198 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This glossary was written to provide a consistent and uniform definition of terms used in describing an automatic belt tensioner as it applies to an automotive accessory drive system.

2. REFERENCES

2.1 Related Publication

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.1.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J2436 Accessory Drive Tensioner Test Standards (Mechanical Rotary Type)

3. INTRINSIC TENSIONER CHARACTERISTICS

3.1 Tensioner types and constructions

3.1.1 Rotary Motion, Torsion Spring (Figure 1) - Tensioner whose pulley is attached to an arm that rotates about a pivot point with an arc motion. The force on the arm is provided by a torsionally expanding or contracting spring coiled about the pivot or a torsion bar spring in line with the pivot.

3.1.2 Rotary Motion, Linear Spring (Figure 2) - Tensioner whose pulley is attached to an arm that rotates about a pivot point with an arc motion. The force on the arm is provided by a linear expanding or contracting coiled spring acting offset from and perpendicular to the pivot.

3.1.3 Linear Motion, Linear Spring (Figure 3) - tensioner whose pulley moves in a linear direction. No pivot exists. The force on the pulley is provided by a linear expanding or contracting coiled spring acting directly on the pulley.

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https://www.sae.org/standards/content/J2198_202109

3.2 Tensioner Configurations

3.2.1 Arm Under Design (Figure 1) - Tensioner design where the arm is positioned between the belt and the tensioner mounting surface.

3.2.2 Arm Over Design (Figure 4) - Tensioner design where the belt is positioned between the arm and the tensioner mounting surface.

3.2.3 In line arm (long arm) (Figures 1 and 4) - Tensioner design where the belt sheave line is within the pivot shaft cross section.

3.2.4 Offset arm (short arm) (Figure 1) - Tensioner design where the belt sheave is outside of the pivot shaft cross section.

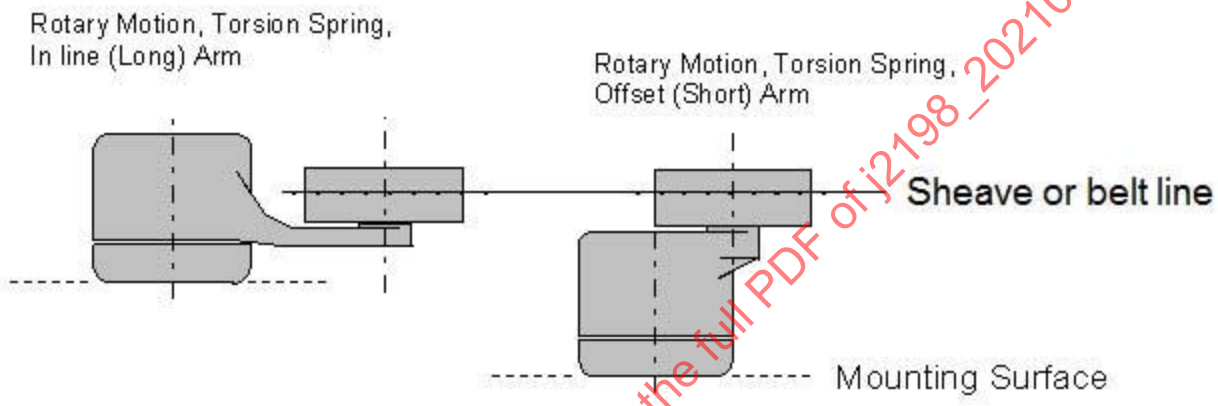

FIGURE 1 - ARM UNDER CONFIGURATION

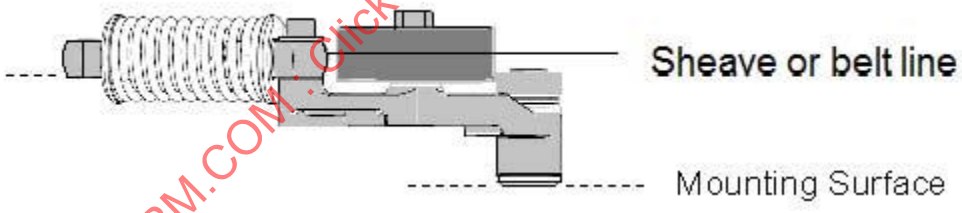

FIGURE 2 – ROTARY MOTION LINEAR SPRING DESIGN

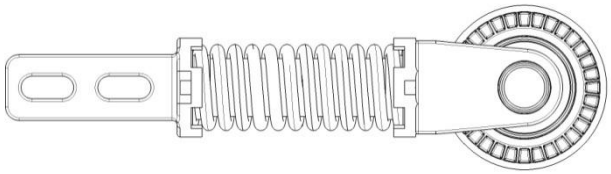

FIGURE 3 – LINEAR MOTION LINEAR SPRING DESIGN

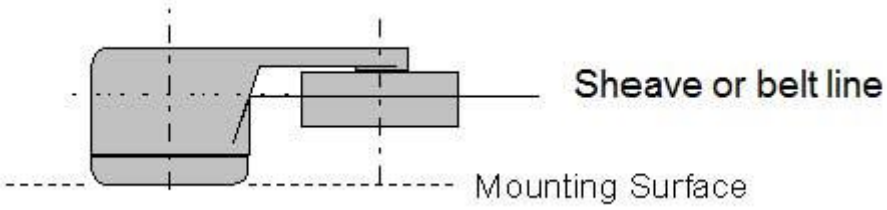

FIGURE 4 – ARM OVER CONFIGURATION

3.3 Tensioner Feature Definitions (Figures 5, 6, 7, 8, 9, 10)

3.3.1 Pivot Axis: The axis of rotation of the tensioner arm.

3.3.2 Pulley Axis: Center of rotation of the pulley on the arm.

3.3.3 Arm Length: Distance between the pivot axis and the pulley axis.

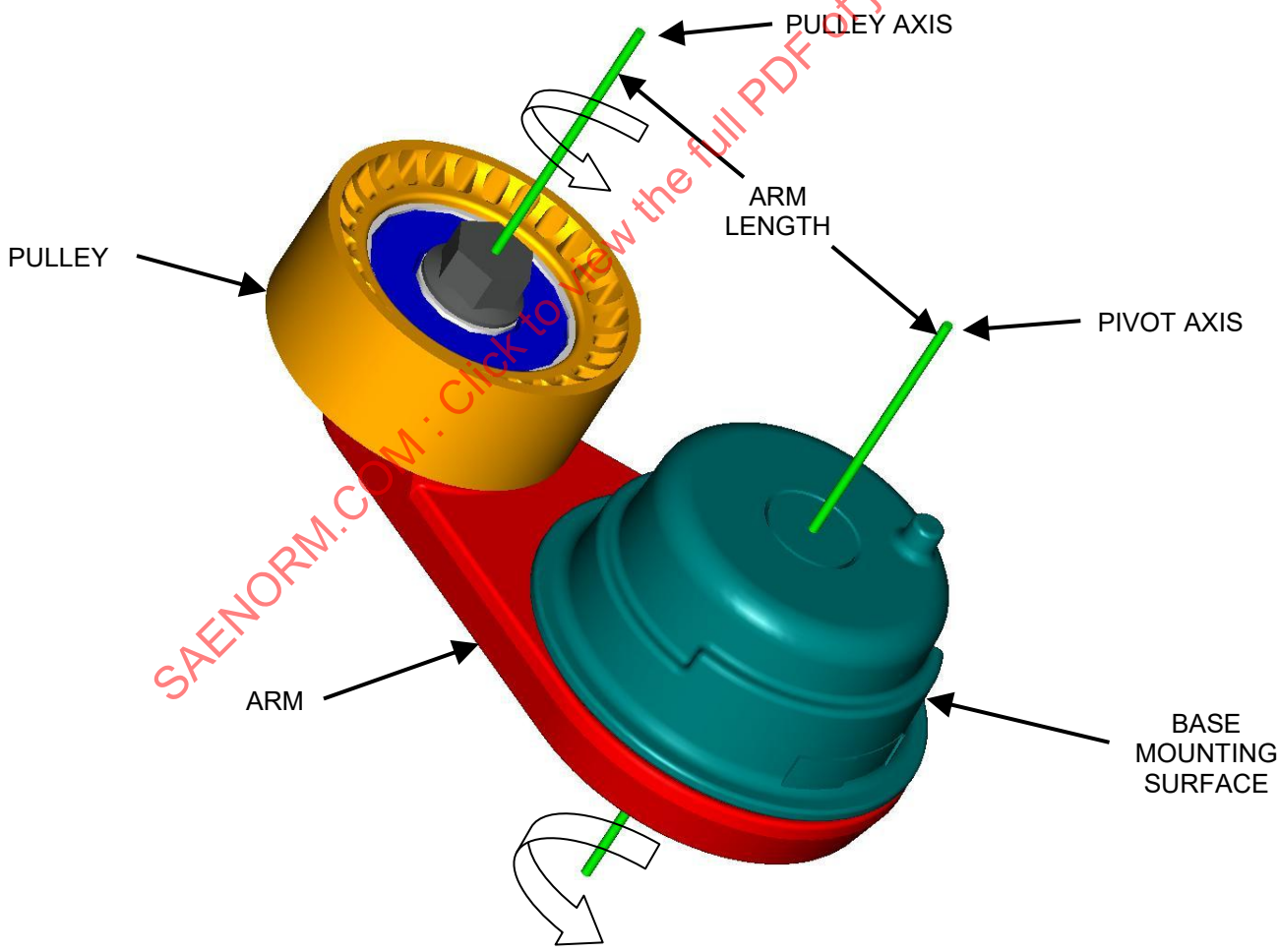

FIGURE 5

3.3.4 Arm Travel: The angle of rotation through which the tensioner arm moves from the installation position to the free arm position or vice versa.

3.3.5 Pulley Diameter: Size of the tensioner pulley measured through and perpendicular to its axis of rotation.

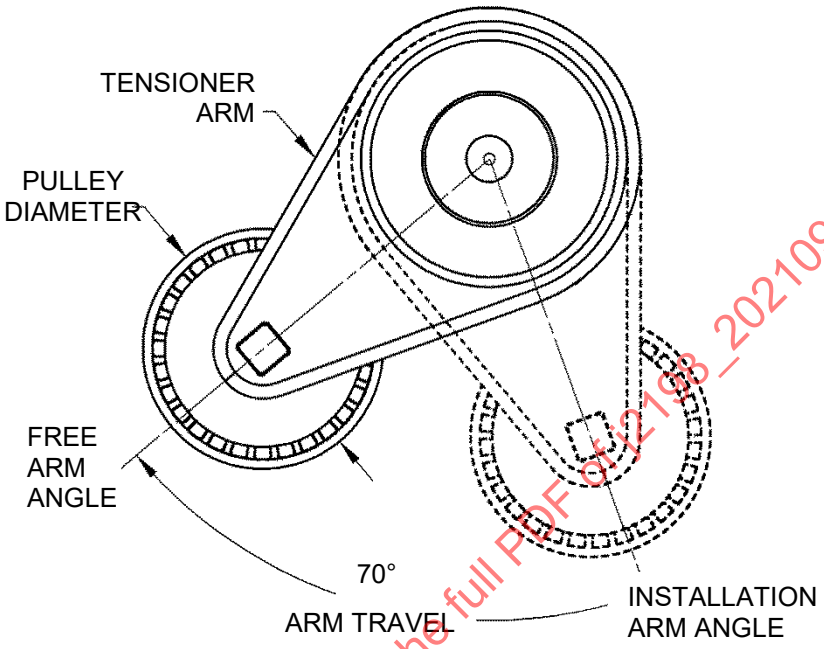

FIGURE 6

3.3.6 Free Arm Angle:The angular position of the arm relative to a reference, at which it rests without a belt installed on the system.

3.3.7 Belt Replacement Angle: The angular position of the arm relative to a reference, restrained by a belt at the end of its intended life.

3.3.8 Nominal Arm Angle: The angular position of the arm relative to a reference, restrained by a new belt with a nominal length.

3.3.9 Installation Arm Angle: The angular position of the arm relative to a reference, resting against its installation stop with the aid of a lifting tool.

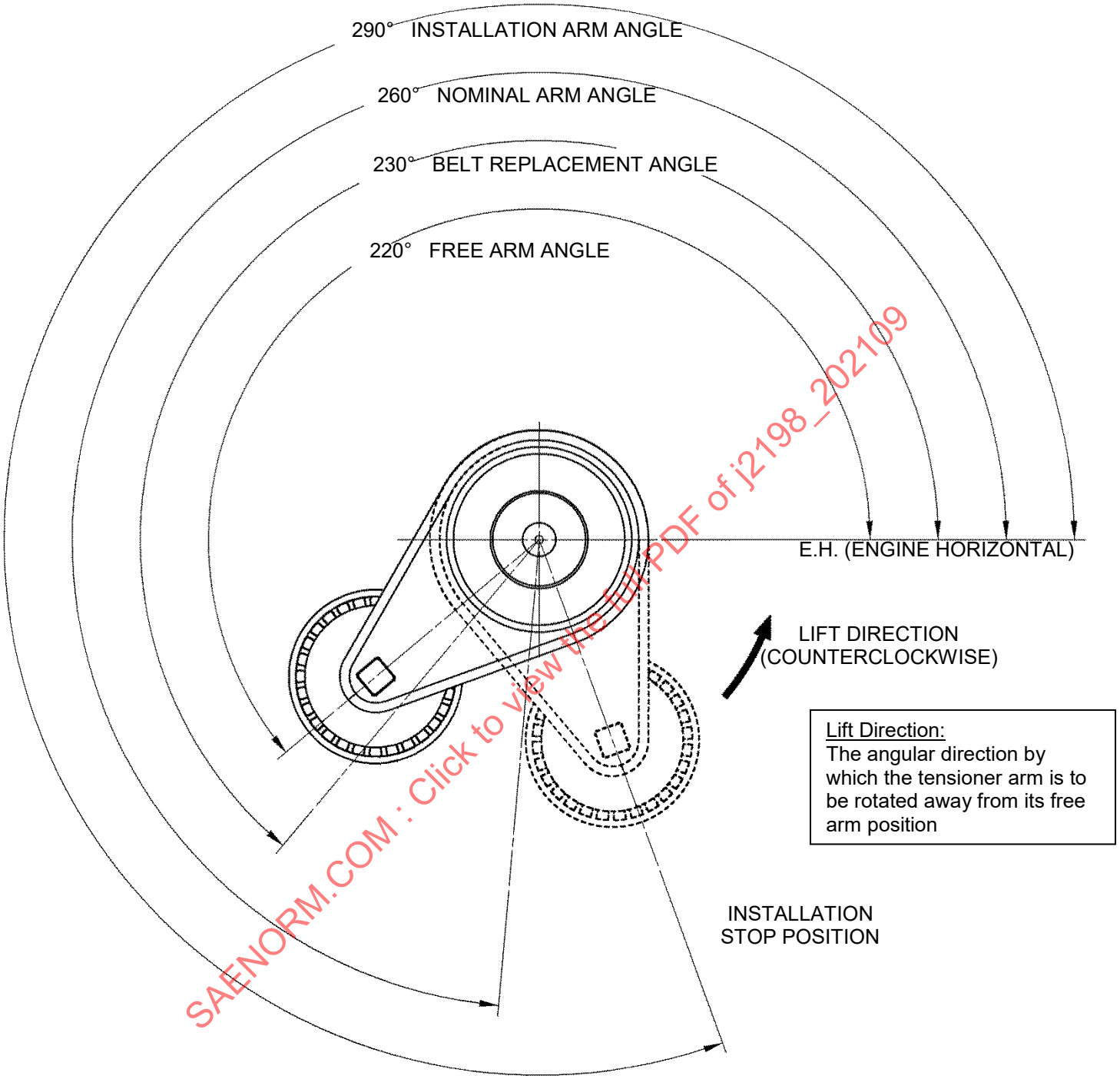

FIGURE 7

3.3.10 Hubload Angle: The angle of the hubload vector (from the belt reaction force) relative to engine horizontal.

3.3.11 Hubload to Arm Angle: The angular difference between the hubload angle and the nominal arm angle.

3.3.12 Pivot Location: The relative position of the pivot axis relative to the crankshaft axis.

3.3.13 Free Arm to Nominal Angle: The angle of rotation of the tensioner arm from the free arm position to the nominal position.

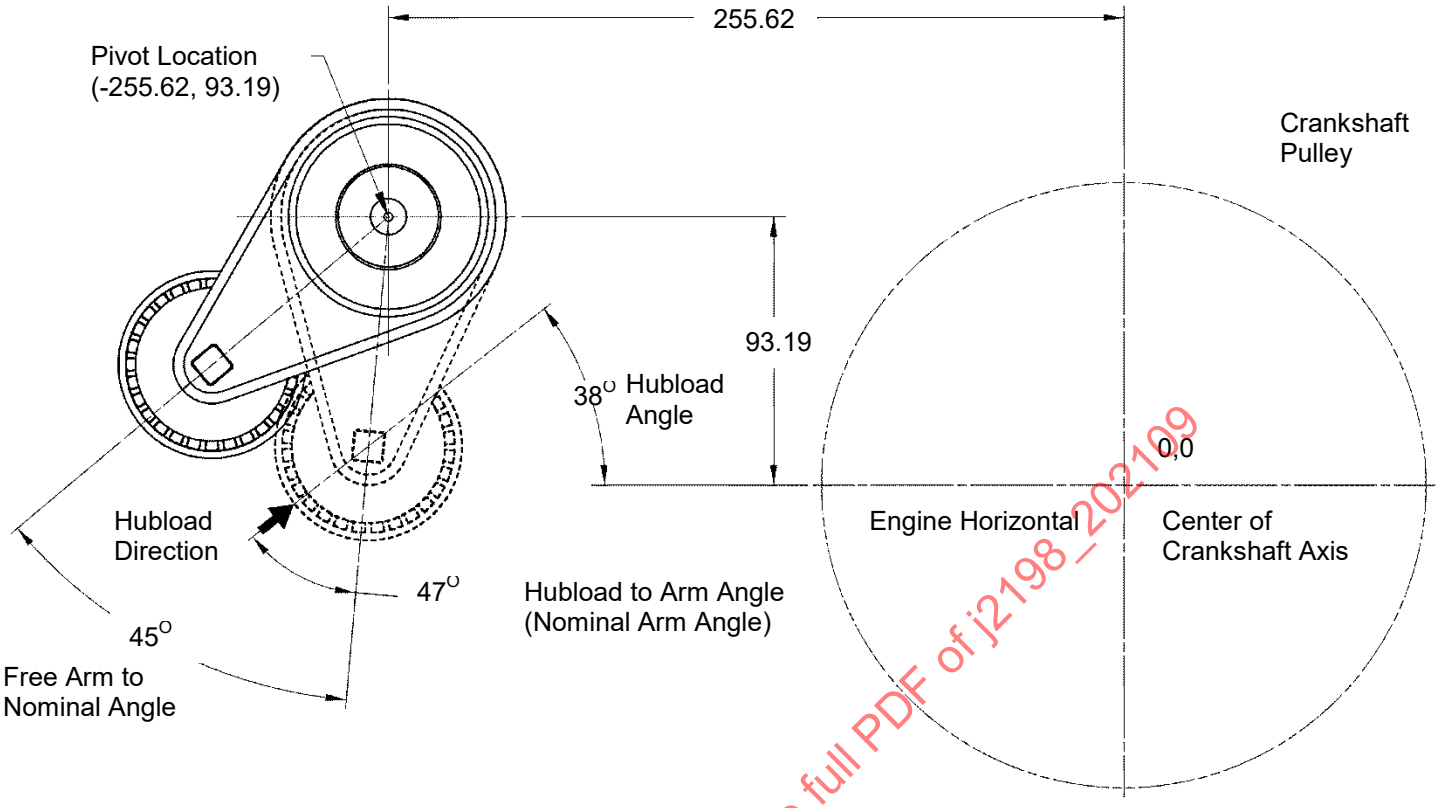

FIGURE 8

3.3.14 Offset - The distance from a mounting surface datum to the effective belt center plane (1), or to the bearing seat datum (2).

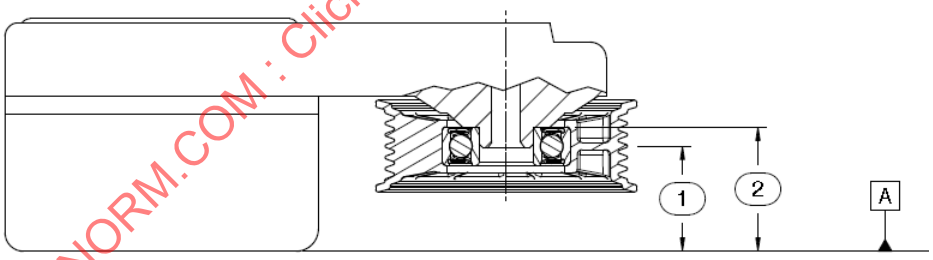

FIGURE 9

3.3.15 Angularity - A measure of the tensioner's guiding influence upon the belt tracking. It is a simplified angular value, representing the three dimensional planar deviation from ideal. Figure 10 illustrates directional subcategories of Toe (Pitch) and Camber (Yaw). In practice, the Consumer and Producer often define it in terms of alignment, parallelism or perpendicularity of the tensioner arm, back to the mounting datum. The pulley's influence upon belt routing is typically considered separately (e.g. bearing free rock, crown, etc.).

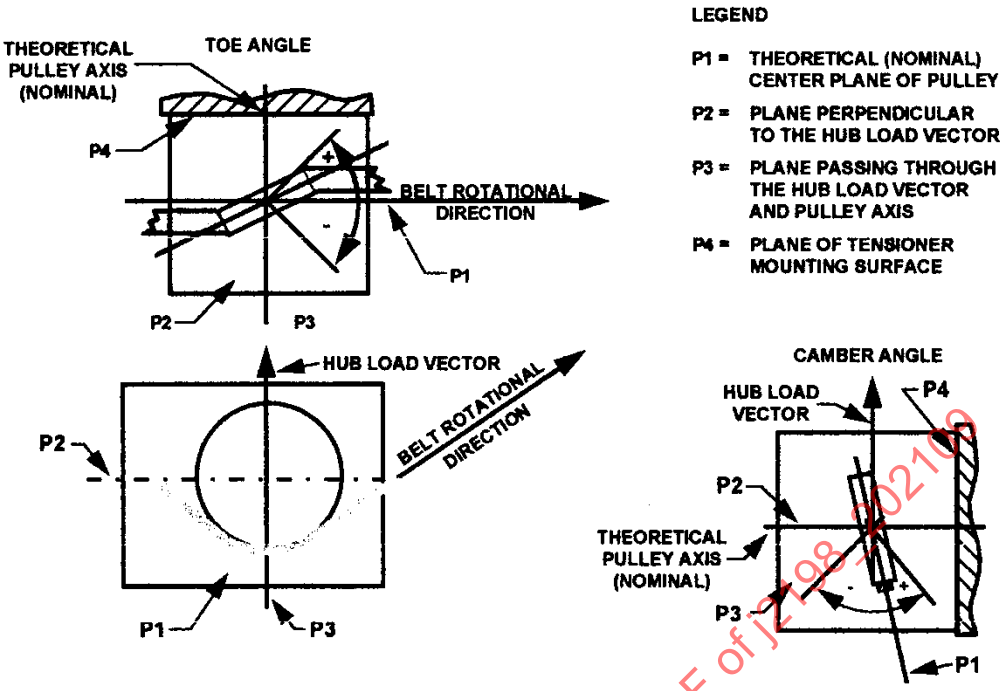

FIGURE 10

3.4 Tensioner Hardware (Figure 11)

3.4.1 Tensioner Base - Stationary tensioner component used to attach the tensioner onto the engine. It positions the tensioner, provides (support for) the arm pivot, directly or indirectly anchors one end of the spring, and may house the spring and the damping mechanism.

3.4.1.1 Locator Pin - Feature on the tensioner base that orients the tensioner in the correct angular position during installation.

3.4.1.2 Tensioner Pivot Shaft - Feature on the tensioner base or arm or, alternately, a separate component, which defines the axis of rotation for the tensioner arm.

3.4.2 Arm - The pivoting tensioner component that aligns and supports the pulley - bearing assembly. The arm anchors one end of the spring.

3.4.2.1 Pulley bearing seat - feature in direct contact with the face of the inner race of the bearing that controls the axial and angular positions of the bearing.

3.4.2.2 Pulley bearing post - feature that controls the radial position of the bearing.

3.4.2.3 Lift feature - feature whose shape and size allows engagement with a tool that assists in the process of belt installation and removal.

3.4.2.4 Travel stop(s) - features on the arm and base or stationary component which together limit the travel of the tensioner arm.

3.4.3 Spring - elastic component whose role is to provide the force or moment that actuates the tensioner arm.

3.4.4 Damping mechanism – tensioner mechanism that limits the displacement of the tensioner arm by creating a force or moment (energy absorption) in the direction opposing the motion.

3.4.5 Retention feature/component - the feature or components that holds the tensioner together.

3.4.6 Installation pin/component - component that constrains the tensioner in the “Belt Installation” position to aid with installation of the belt. This is an optional component.

3.4.7 Pulley - rotating component which supports and guides the belt.

3.4.7.1 Bearing -_component which enables rotation of the pulley relative to the bearing seat and supports the hubload on the pulley.

3.4.7.2 Dust Shield - component which protects the bearing seals from impact of solid or liquid contaminants.

3.4.7.3 Pulley Fastener - component which secures the pulley - bearing assembly onto the tensioner arm.

3.4.8 Pivot Bushing - radial bearing which allows the rotation of the tensioner arm around the pivot shaft with minimum friction resistance resulted from the action of the radial loads.

3.4.9 Thrust Washer - axial bearing which allows the rotation of the tensioner arm around the pivot shaft with minimum friction resistance resulted from the action of the axial loads.

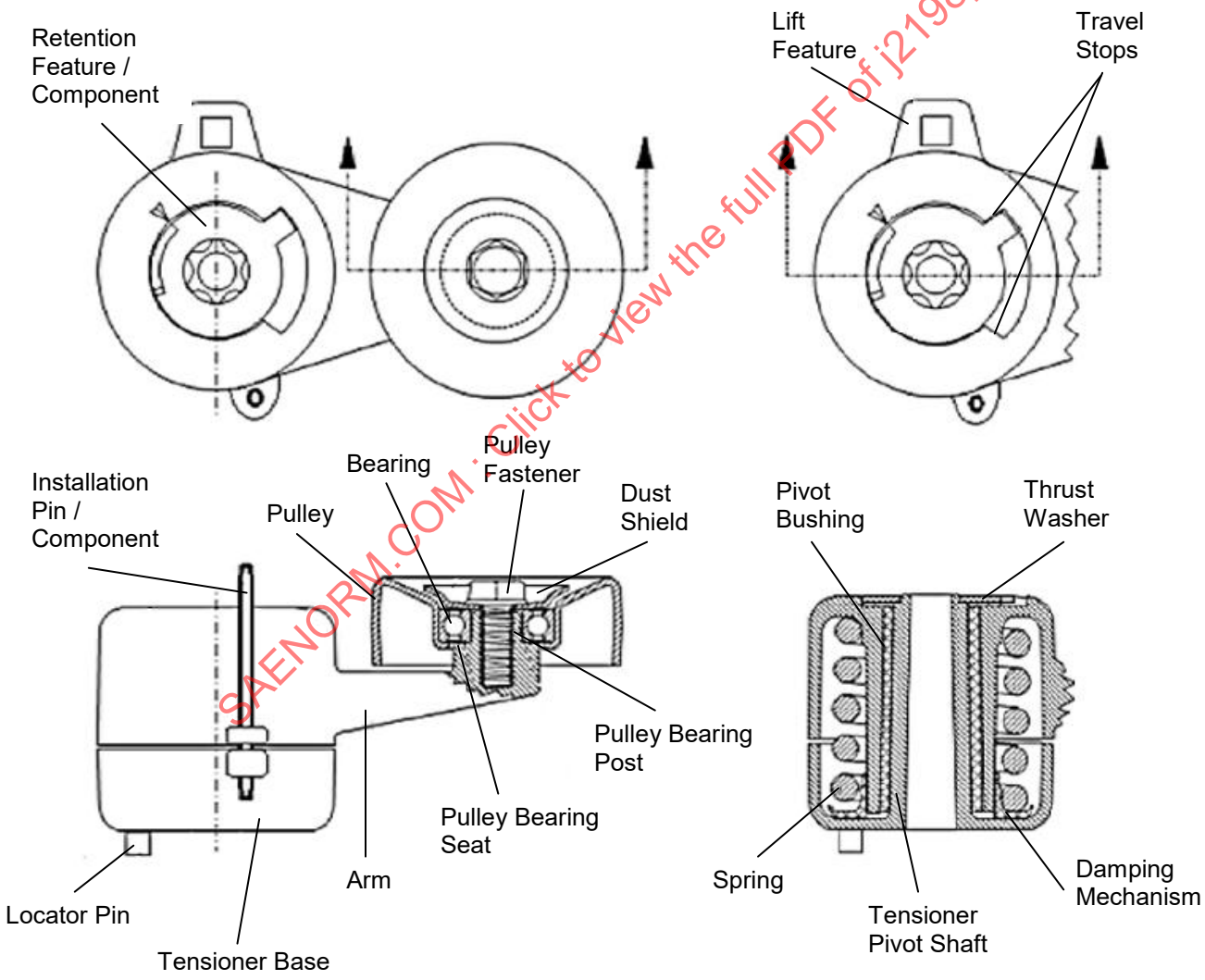

FIGURE 11