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SURFACE VEHICLE INFORMATION REPORT

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ONE-WAY CLUTCHES - NOMENCLATURE AND TERMINOLOGY

1. SCOPE:

The definitions and illustrations in this SAE Information Report are intended to establish common nomenclature and terminology for automotive transmission one-way clutches.

1.1 Definitions:

A mechanical device to transmit torque in one direction and permit free rotation in the opposite direction.

2. MOST COMMONLY USED TYPES:

2.1 ROLLER CLUTCH: A clutch having cylindrical elements which engage cam profiles on either the outer or inner elements.

2.2 SPRAG CLUTCH: A clutch having cam-profiled locking elements which engage cylindrical outer and inner races.

3. ROLLER CLUTCH:

3.1 Function Types:

3.1.1 SPRING ENERGIZED: A clutch which has the roller held in contact with the cam and race by individual springs, or by means of a spring actuated cage.

3.1.2 (R) CENTRIFUGALLY ENERGIZED: A clutch which has no mechanical means for holding the roller in contact with the cam and race.

3.1.3 CENTRIFUGALLY DISENGAGING: A clutch in which the rollers move out of contact with the race in over-running conditions.

3.2 Arrangements:

3.2.1 OUTER CAM CLUTCH: A roller clutch which has the cam profile surfaces on the outer element. (See Figures 1, 3, and 4.)

3.2.2 INNER CAM CLUTCH: A roller clutch which has the cam profile surfaces on the inner element. (See Figure 2.)

3.2.3 CAGED ROLLER CLUTCH: A roller clutch which has the rollers and springs contained as a unit. (See Figure 3.)

3.2.4 LOOSE ROLLER CLUTCH: A roller clutch which has the rollers individually placed between the cam and race, not located by a cage. (See Figures 1, 2, and 4.)

3.3 Nomenclature:

3.3.1 CAM: That element of the clutch that contains the ramped profiles through which the rollers transmit torque.

3.3.1.1 LEG TYPE: A cam which has integral legs projecting into the space between the rollers to provide reaction for the springs and may provide radial location of the race relative to the cam. (See Figure 4.)

3.3.1.2 HOOK TYPE: A cam which has no legs, thereby forming "hooks" at the free wheeling end of the cam ramps. (See Figures 1, 2, and 3.)

3.3.2 RACE: That element of the clutch providing the cylindrical surface through which the rollers transmit torque. (See Figures 1 through 4.)

3.3.3 ROLLER: The cylindrical locking element of the clutch. Several are usually used in each clutch. (See Figures 1 through 4.)

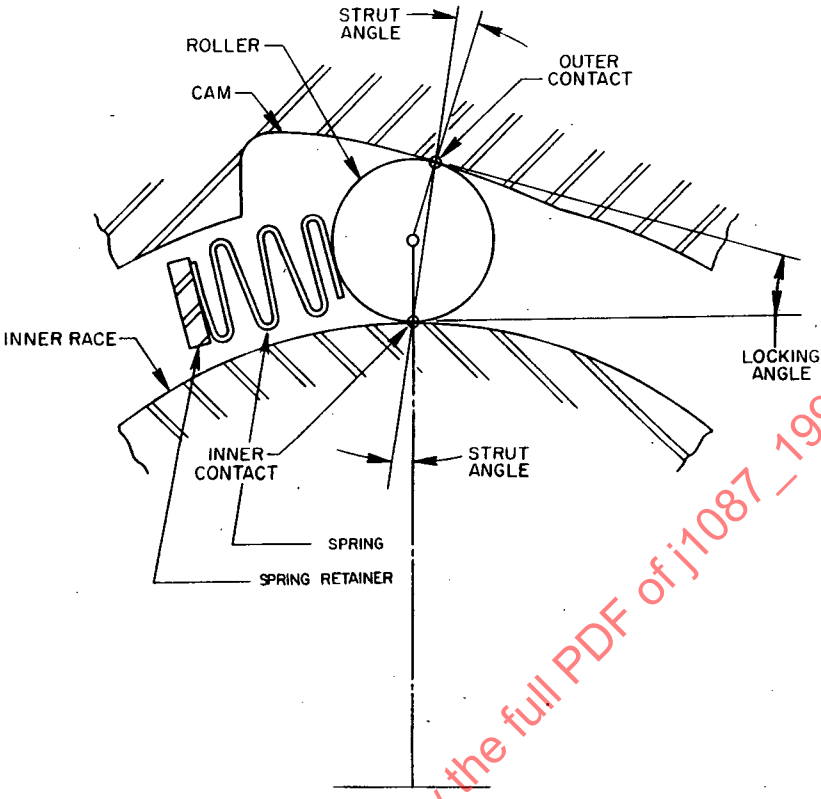
3.3.4 ENERGIZING SPRING: A spring used to actuate the roller into contact with the cam and race. (See Figures 1 through 4.)

3.3.5 CAGE: An element primarily used to contain the springs and rollers. (See Figure 3.)

3.3.6 SPRING RETAINER: That element which locates and provides reaction for the spring in loose roller clutches. (See Figures 1 and 2.)

3.4 Roller Clutch Terminology:

3.4.1 CAM OR LOCKING ANGLE: The angle between lines drawn tangent to the cam and race at the contact points of the roller (equal to twice the strut angle). (See Figures 1 and 2.)



(R) FIGURE 1 - Outer Cam Type Loose Roller Clutch Diagram (Hook Type Cam)

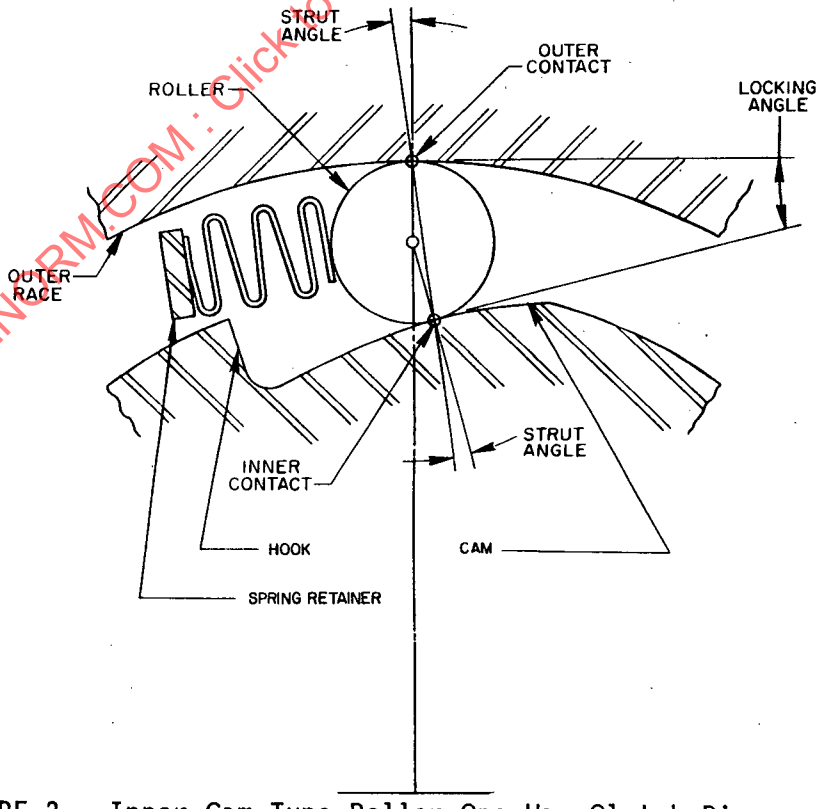
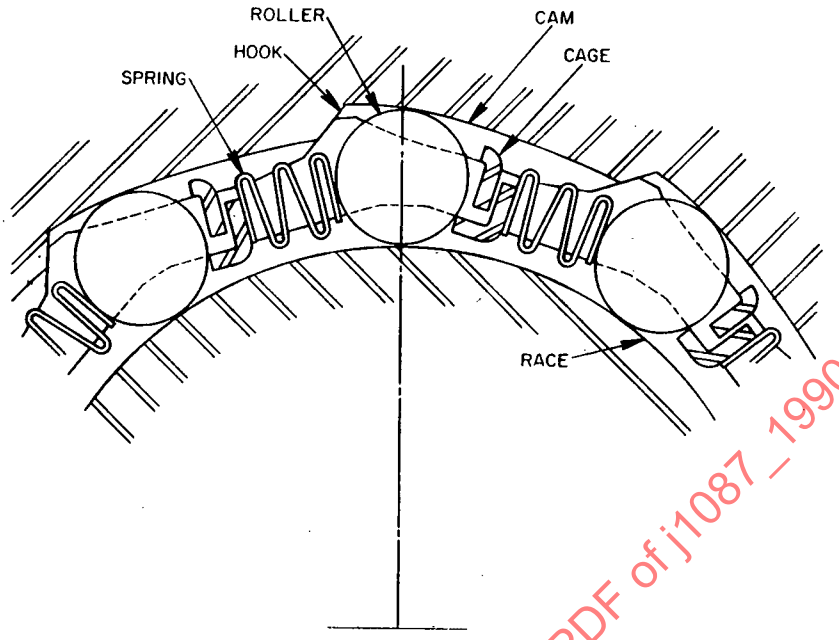


FIGURE 2 - Inner Cam Type Roller One-Way Clutch Diagram



(R) FIGURE 3 - Caged Roller Outer Cam Type Clutch Diagram (Hook Type Cam)

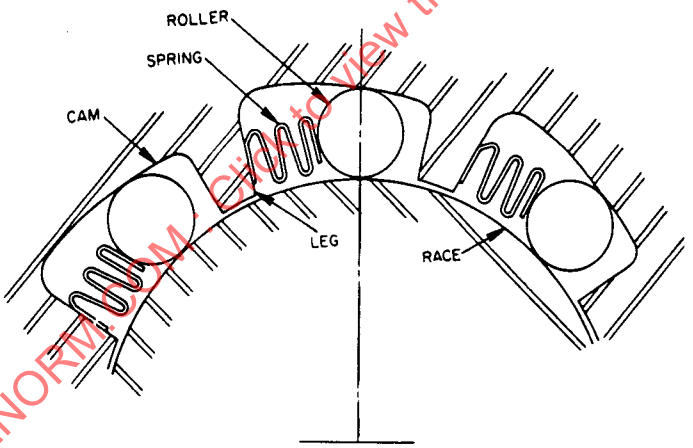


FIGURE 4 - Loose Roller Type Clutch Diagram (Leg Type Cam)

3.4.2 STRUT ANGLE: The angle between a line connecting the contact points of the roller at the cam and race and a radial line from the roller center to either contact point. (See Figures 1 and 2.)

4. SPRAG CLUTCH:

4.1 Functional Types:

4.1.1 CENTRIFUGALLY ENGAGING: A clutch in which the sprags maintain contact, (R) increasing sprag force with both races when acted on by centrifugal force.

4.1.2 CENTRIFUGALLY DISENGAGING: A clutch in which the sprags move out of (R) contact, decreasing sprag force with the inner race when acted on by centrifugal force.

4.2 Arrangements:

4.2.1 CAGED SPRAG CLUTCH: A clutch that utilizes one or more cages to space or control the sprag elements (See Figures 6 and 7.)

4.2.2 FULL COMPLEMENT SPRAG CLUTCH: A clutch in which the sprag configuration provides circumferential spacing. (See Figure 8.)

4.3 Nomenclature:

4.3.1 OUTER RACE: That element which provides the outer cylindrical surface through which the sprags transmit torque. (See Figure 5 through 8).

4.3.2 INNER RACE: That element which provides the inner cylindrical surface through which the sprags transmit torque. (See Figure 5.)

4.3.3 SPRAG: The cam profiled locking element of the clutch. Several are usually used in each clutch. (See Figures 5 through 8.)

4.3.4 ENERGIZING SPRING: A spring used to actuate the sprags into contact with the inner and outer races. (See Figures 6 through 8.)

4.3.5 CAGE: An element primarily used to contain and space the sprags. (See Figures 6 and 7.)

4.3.6 DRAG CLIP: An element sometimes used to provide frictional drag between the outer cage and the outer race. (See Figure 6.)

4.3.7 DRAG STRIP: An element sometimes used to provide frictional drag between the inner cage and the inner race. (See Figure 6.)

4.4 Sprag Clutch Terminology:

4.4.1 SPRAG SPACE: The radial distance between the inner and outer race cylindrical surfaces. (See Figure 5.)

4.4.2 STRUT: The straight line connecting the inner and outer contact points. (See Figure 5.)

4.4.3 STRUT ANGLE (INNER): The angle between a radial line through the inner contact point and the strut. (See Figure 5.)

4.4.4 STRUT ANGLE (OUTER): The angle between a radial line through the outer contact point and the strut. (See Figure 5.)

4.4.5 INNER CONTACT: The point of contact between the sprag and the inner race. (See Figure 5.)

4.4.6 OUTER CONTACT: The point of contact between the sprag and the outer race. (See Figure 5.)

The (R) is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

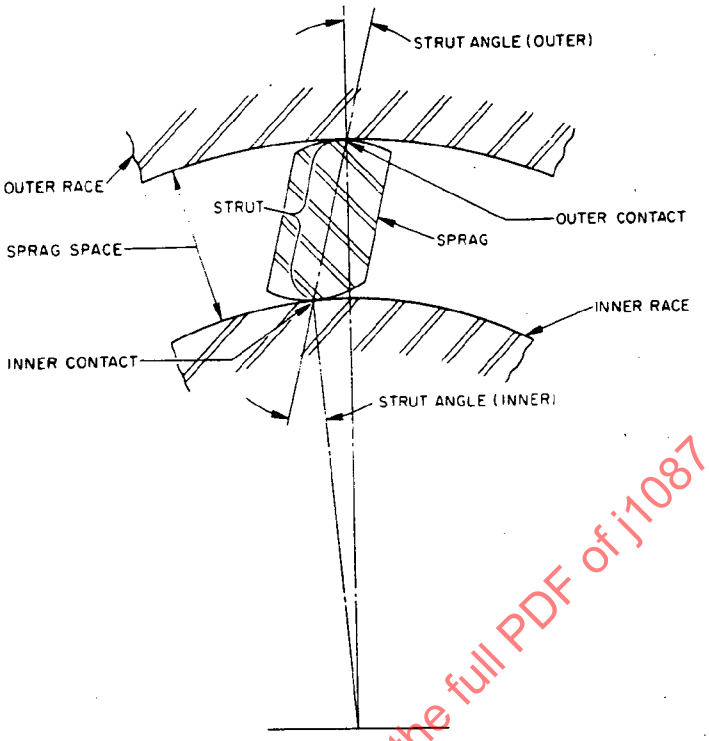


FIGURE 5 - Sprag One-Way Clutch Diagram

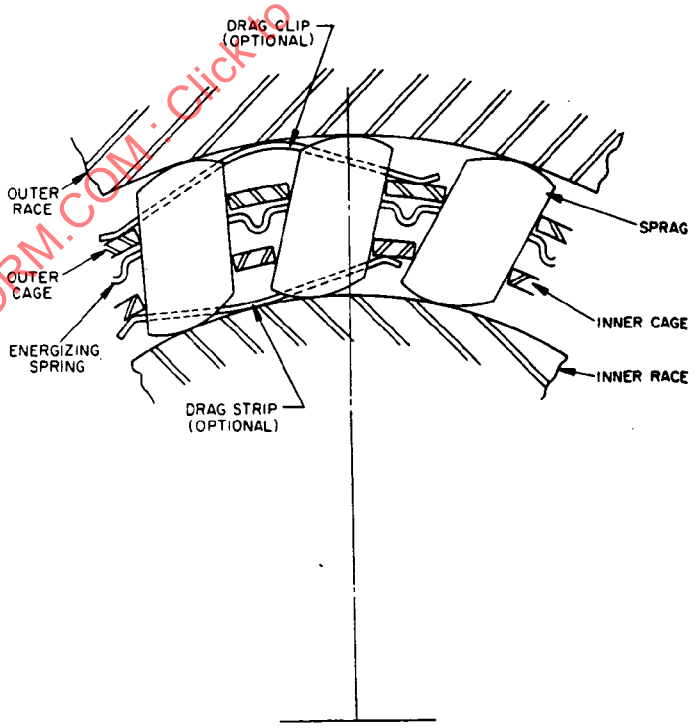


FIGURE 6 - Typical Double-Cage Sprag One-Way Clutch Diagram

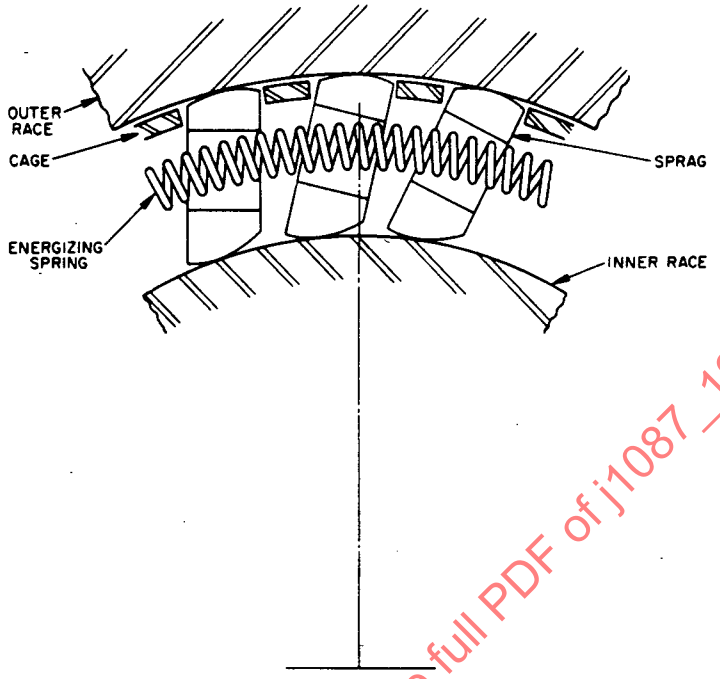


FIGURE 7 - Typical Single-Cage One-Way Clutch Diagram

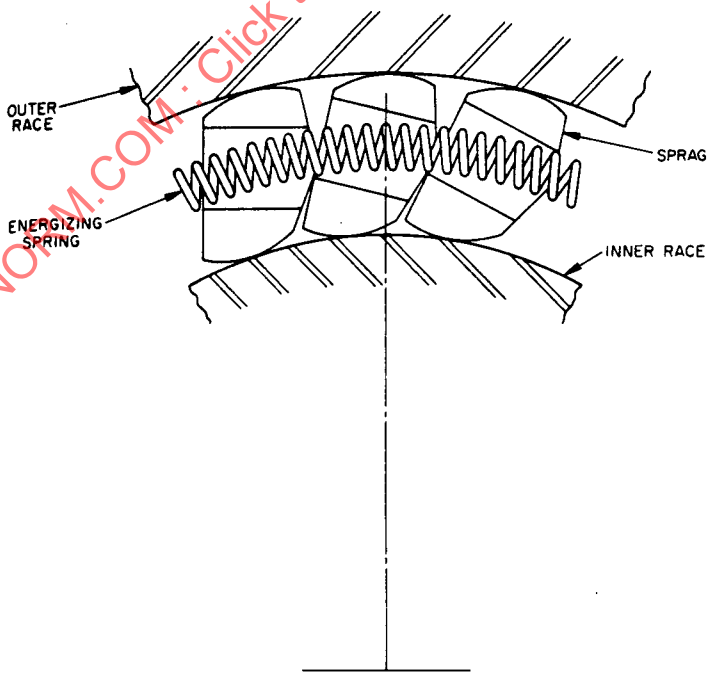


FIGURE 8 - Typical Full Complement Sprag One-Way Clutch Diagram