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MARINE PUSH-PULL CONTROL CABLES

***Foreword*—**This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board Format.

1. ***Scope*—**This SAE Standard covers dimensions and nomenclature of a push-pull control cable used in inboard marine engine applications. The dimensions are representative of existing design practice prevalent in the industry.

1.1 **Purpose—**The flexible push-pull cable is a common motion transfer device for the remote operation of the throttle and clutch levers (hydraulically applied clutches) on marine propulsion units. Satisfactory function of remote controls depend upon observing the limitations of this cable and providing adequate connection to the propulsion unit. This standard, therefore, establishes nomenclature, dimensions, and installation recommendations for marine push-pull control cables.

1.2 **General—**The conventional marine push-pull cable is a mechanism in which a core element is supported and guided by a stationary casing element. It works best at low loads and loses efficiency with each bend in the cable path. Both ends of both elements must be securely connected if the cable is to operate properly.

Application dimensions of the most commonly used push-pull control cable are shown in Figure 1. Maximum input and output loads minimum bend radii, maximum degrees of bend in the cable path and other specific details may vary between different makes of cable.

2. ***References*—**There are no referenced publications specified herein.

3. ***Definitions*—**The following definitions apply to components of marine push-pull control cable installations.

3.1 **Engine Throttle Lever or Engine Clutch Lever—**The lever on the carburetor, governor, or reverse gear (with hydraulically applied clutch) that is moved by the push-pull cable.

3.2 **Engine Throttle Control Shaft or Engine Clutch Control Shaft—**The rotatable shaft on which the engine lever is mounted and which operates the carburetor, governor or reverse gear valve.

3.3 **Cable—**The push-pull cable assembly which transmits motion from the pilot house control to the engine lever.

3.4 **Core—**The movable (usually) element of a push-pull assembly.

3.5 **Casing—**The fixed (usually) element of a push-pull cable assembly.

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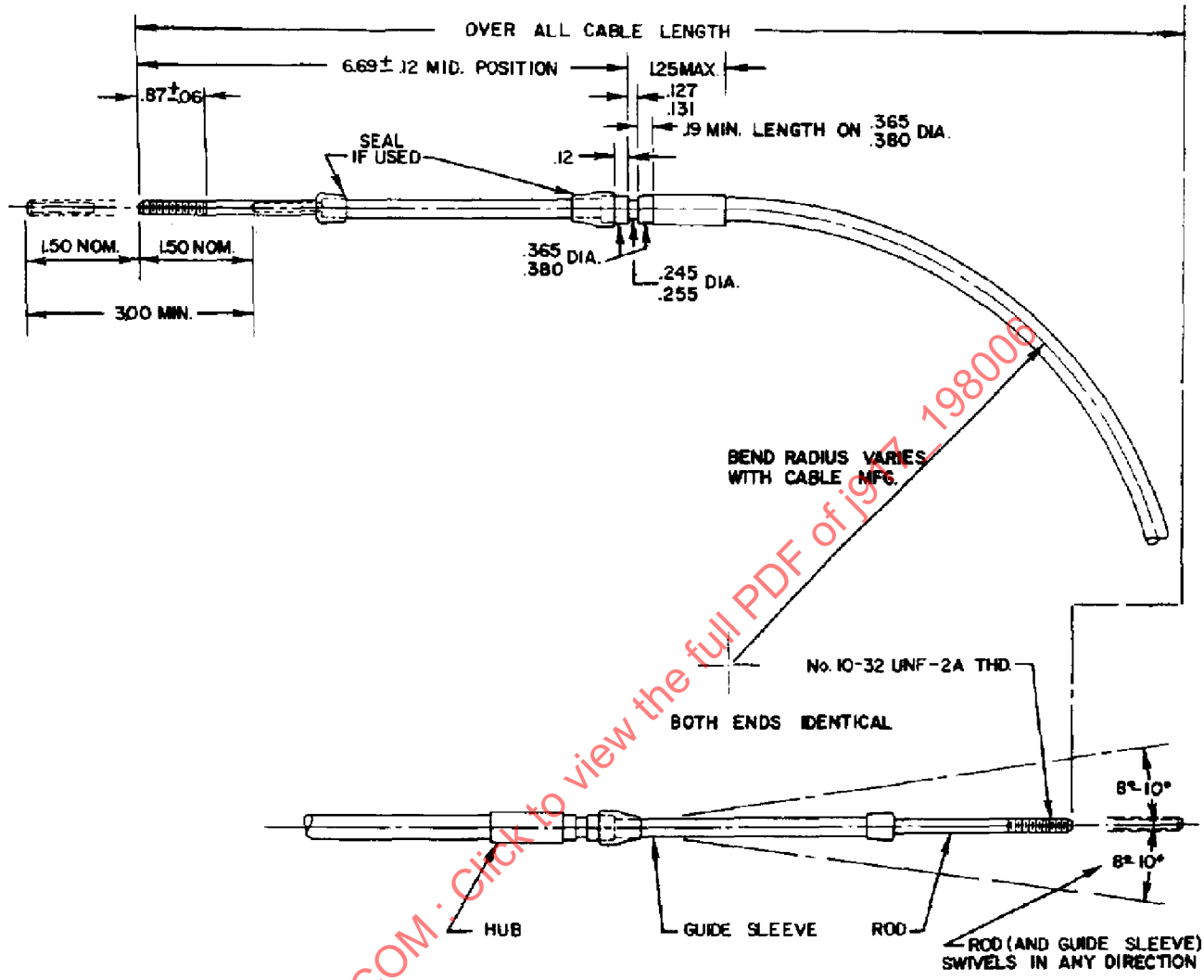

FIGURE 1—GENERAL DIMENSIONS OF COMMONLY USED PUSH-PULL CONTROL CABLE MARINE PUSH-PULL CONTROL CABLES

3.6 Hub—A permanently attached fitting on the end of the cable casing to provide a connection or anchoring point.

3.7 Rod—The rigid extension of the flexible core member.

3.8 Terminal—Any fitting attached to the end of the rod to connect the cable to the lever.

3.9 Bracket—A plate or arm extending from the vicinity of the engine lever to rigidly anchor the cable hub.

3.10 Clamp—Any device to rigidly anchor the cable hub to the bracket.

3.11 Bracket Support—Means in the vicinity of the engine lever or shaft to attach the bracket.

4. ***Limitations—***The push-pull cable can be used to position accurately the operating levers of the propulsion unit (engine clutch lever and engine throttle lever) if it is installed to operate in an efficient manner. Minor deficiencies at the points of connection, such as a crowded approach path, short travel range, offset or springy cable hub anchor points, can result in major deficiencies in overall performance. For satisfactory push-pull cable control of the propulsion unit, engine operating level travel should be as follows:

1. **Engine Throttle Lever**—Two 1/4 in. holes at radii to provide 1 3/4 in. and 2 3/4 in. linear travel, idle to full throttle.
2. **Engine Clutch Lever**—A 1/4 in. hole at a radius to provide 2 3/4 in. linear travel from forward to reverse, with neutral at the center.

5. ***Installation Considerations***

1. For maximum efficiency cables should be installed with as few bends as possible. Bends should be of as large a radius as possible.
2. The route of the cable at the engine throttle and clutch levers should be direct and uncrowded by accessory equipment.
3. Engine throttle and clutch lever length and arc of movement should be designed to utilize most of the nominal three inch travel of the push-pull cable. See Limitations (Section 4 paragraphs 1 and 2.)
4. A rigid bracket for anchoring the clutch and throttle cable hub should be provided at the correct distance from the engine levers.
5. The cable should not be installed in areas of excess heat, such as on or close to an engine exhaust manifold; an extension rod or other means should be used to avoid the heat area. If this is unavoidable, reflective shielding may be used; consult the cable manufacturer for suggestions.

PREPARED BY THE SAE MARINE TECHNICAL COMMITTEE