

METRIC

DOD-STD-2144(SH)

1 June 1983

MILITARY STANDARD

INDUCTION CLUTCHES, LOW MAGNETIC
FIELD DESIGN OF (METRIC)



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DOD-STD-2144(SH)

1 June 1983

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND

Washington, DC 20362

Induction Clutches, Low Magnetic Field Design of (Metric).

DOD-STD-2144(SH)

1. This Military Standard is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FOREWORD

1. This standard provides the designer of induction clutches with techniques for designing an induction clutch with a low stray magnetic field. A standard commercial form of induction clutch design can usually be modified so that the stray magnetic field is kept to a minimum, when required for certain applications, such as aboard minesweepers.

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1. SCOPE

1.1 Scope. This standard covers requirements for the design of induction clutches with low stray magnetic field.

1.1.1 Application. Induction clutches designed in accordance with the requirements of this standard are applicable to installations where a low stray magnetic field is required.

2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein.

STANDARDS

MILITARY

DOD-STD-2141 - Definitions and Systems of Units, Magnetic Silencing (Metric).

DOD-STD-2143 - Magnetic Silencing Requirements for the Construction of Nonmagnetic Ships and Craft (Metric).

DOD-STD-2146 - Direct Current Generators and Motors, Low Stray Magnetic Field, Design of (Metric).

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 General magnetic silencing terms. The meanings of general magnetic silencing terms used in this standard are in accordance with DOD-STD-2141.

3.1.1 Induction clutch. An induction clutch is an electromechanical device used to transmit torque. Figure 1 illustrates a typical induction clutch design for applications in which a low stray magnetic field is not required. The inner member, which is rotated by a prime mover, has a field coil supplied with direct current (d.c.). The magnetic field created by the rotating d.c. field penetrates the air gap and induces electric currents in the outer member. The magnetic field created by these currents interacts with the rotating d.c. field to turn the outer member. The outer member rotates at a speed that is lower than speed of the inner member by an amount identified as the slip speed. Slip speed, and consequently outer member speed, can be controlled by the level of supplied direct field current. Induction couplings are also known as electromagnetic or eddy current clutches or couplings.

3.1.2 Field coil. The field coil of an induction clutch is the electrical conductor wrapped around a field pole piece.

3.1.3 Field pole. The field pole of an induction clutch designed for low stray magnetic fields consists of a long and narrow magnetic pole piece.

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4. GENERAL REQUIREMENTS

4.1 General design of induction clutches. Induction clutches shall be designed in accordance with the specifications applicable to a particular clutch design, as modified by the detailed requirements of section 5.

4.2 Material. Material used in the construction of induction clutches shall conform to the material requirements of DOD-STD-2143.

5. DETAILED REQUIREMENTS

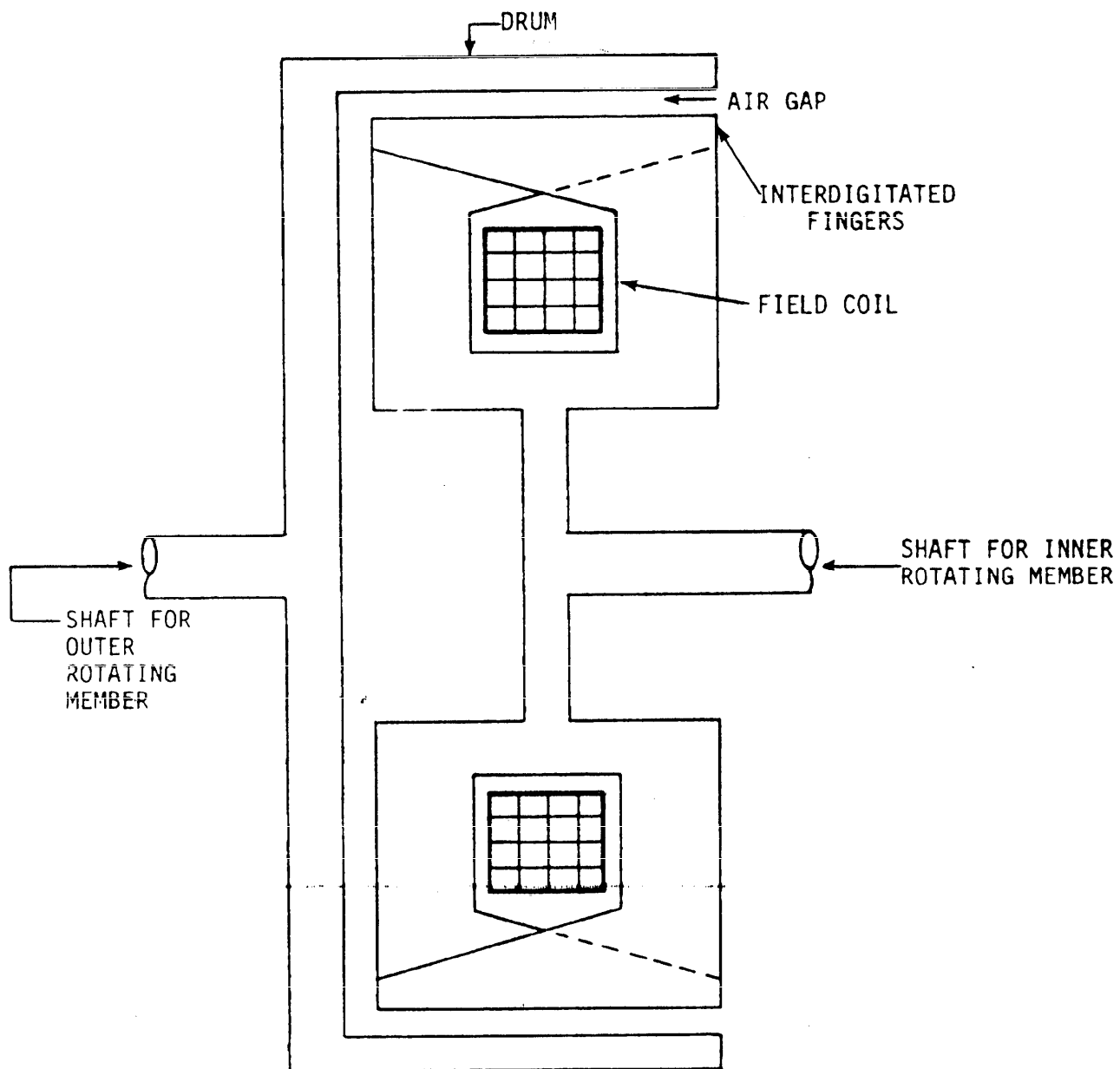
5.1 Field pole requirements. A series of long and narrow field poles, which are alternately north and south, shall be utilized in the induction clutch design. Field poles shall be wound with field coils. Pole pieces may be fixed on the outside of the inner member or the inside of the outer member. Figure 2 illustrates a typical design with the pole pieces on the outside of the inner member of the induction clutch.

5.2 Field coil requirements. Each field coil wound around a field pole piece shall be interconnected as for d.c. generator field coils in DOD-STD-2146, so that the connections will not set up a stray magnetic field. Figure 3 illustrates a typical interconnection for an 8-pole field. Field coil connections shall be at the same end of the clutch assembly and arranged as close together as possible. The connections shall be arranged to prevent a single concentric turn from being formed around the shaft of the machine.

5.3 Number of field poles. The preferred induction clutch design shall consist of 16 or more field poles.

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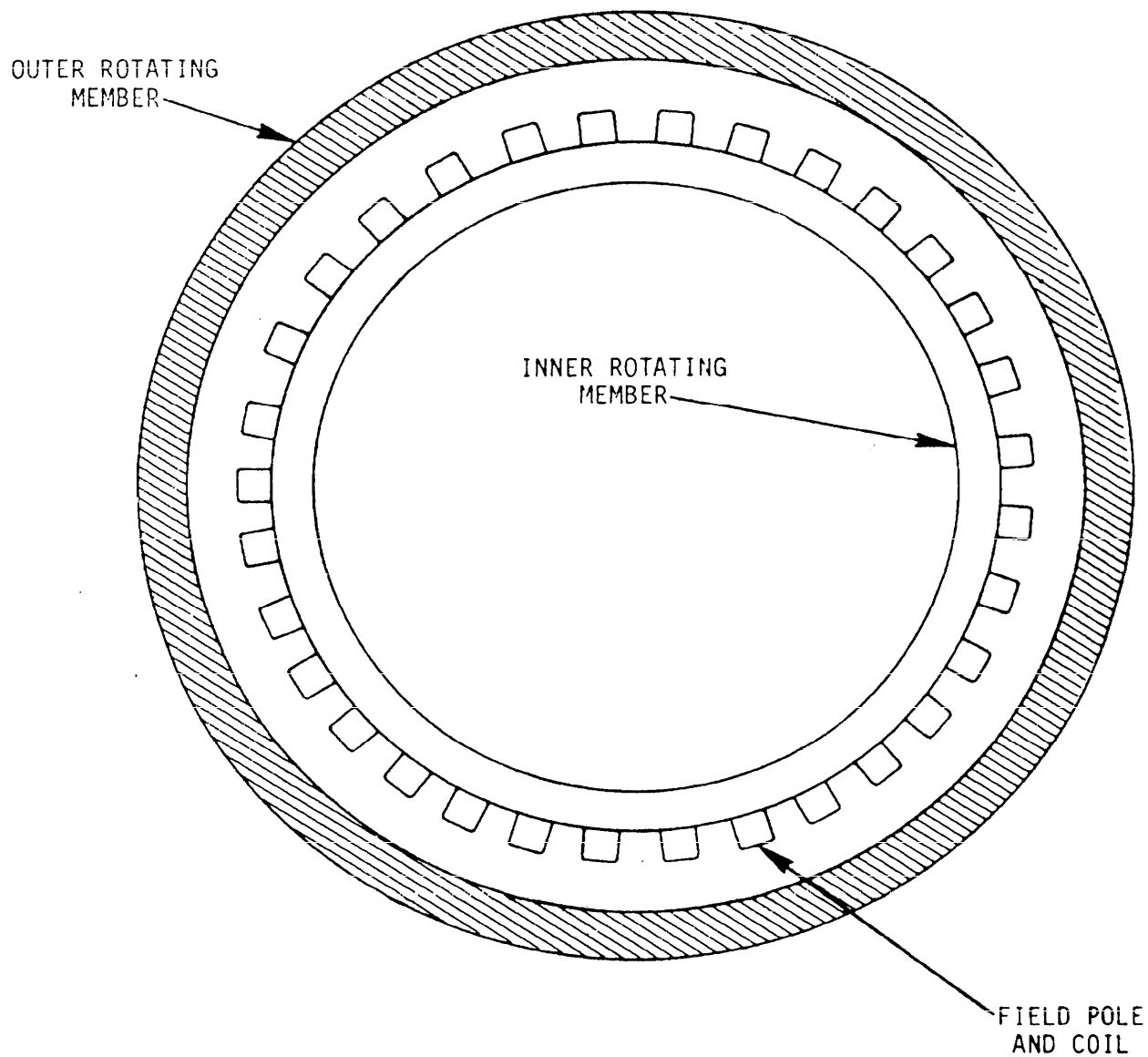
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SH 12225

FIGURE 1. Typical induction clutch design for applications in which a low stray magnetic field is not required (longitudinal section).

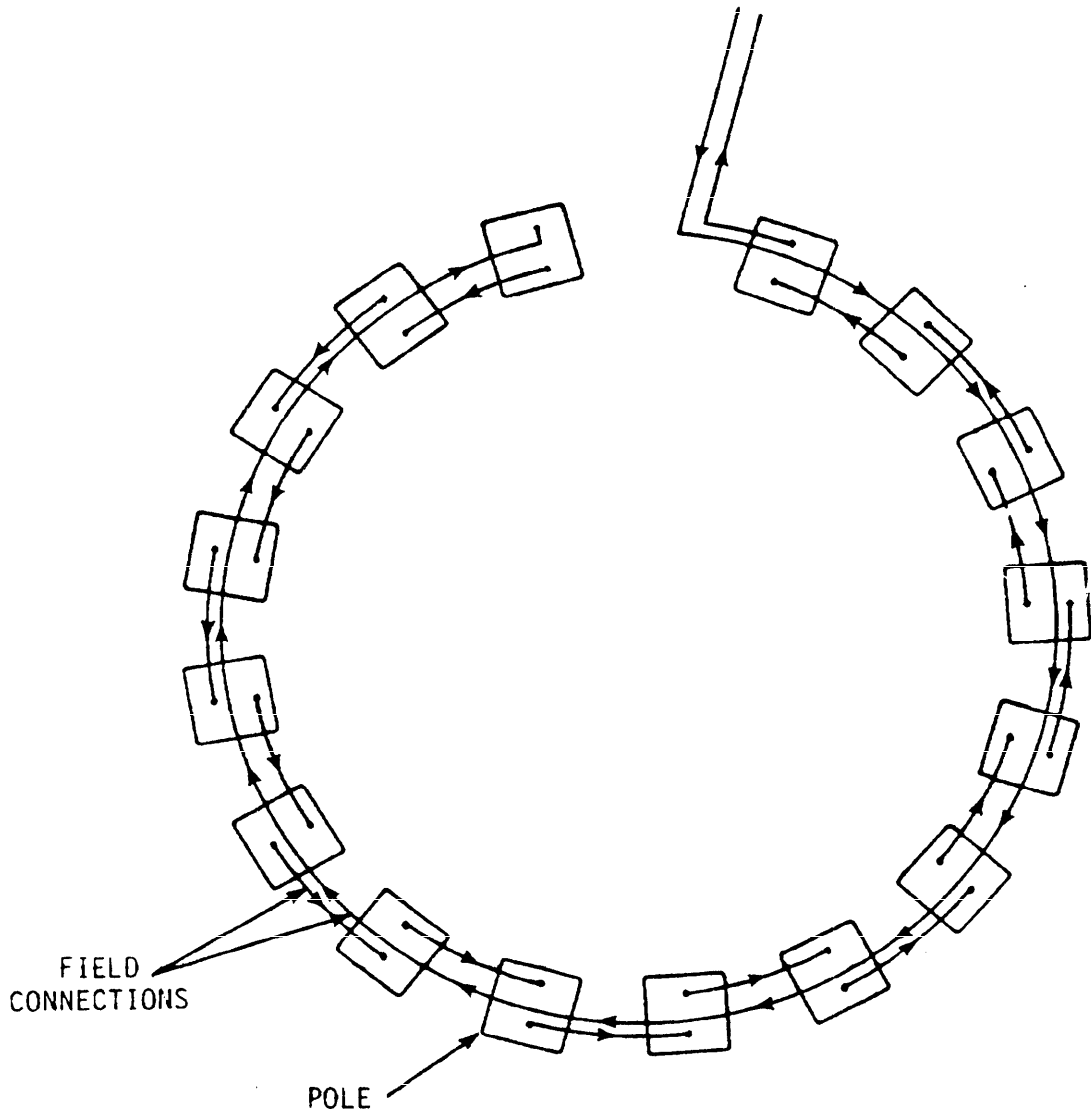
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FIGURE 2. Typical induction clutch design with multiple field poles for low stray magnetic field (end view).

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SH 12227

FIGURE 3. Typical inter-pole connections for an induction clutch design with low stray magnetic field.

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