Configuration Management Cover Page	
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1.0	Original release	2/21/19
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Selected Pages

SpaceCube

1 Introduction

The turbine engine powers the rotation of the generator. These work instructions instruct the generator assembly technician and the electrical assembly technician in assembling and testing a turbine engine. These work instructions provide generalized assembly guidelines that supplement the product drawing, engineering change notice (ECN), routing sheet, and/or bill of materials (BOM).

This document begins with an overview of the production process and then provides step-by-step instructions for assembling and testing the rotor, the brush housing, and the stator. Lastly this document provides instructions for assembling and testing the completed turbine engine. After reading this document, the assembly technician should understand the steps required to manufacture a turbine engine. These work instructions are based upon the Turboprop product line but product specifications in this document are to be used for reference only. Product requirements not mentioned in this document are addressed by the engineering instructions for each specific product application.

2 Process Overview

To assemble a turbine engine, you need six material components. Each component follows their own routing process and timeline from outside purchasing to subassembly finishing. The hierarchy map in Figure 1 illustrates a high-level overview of the process.

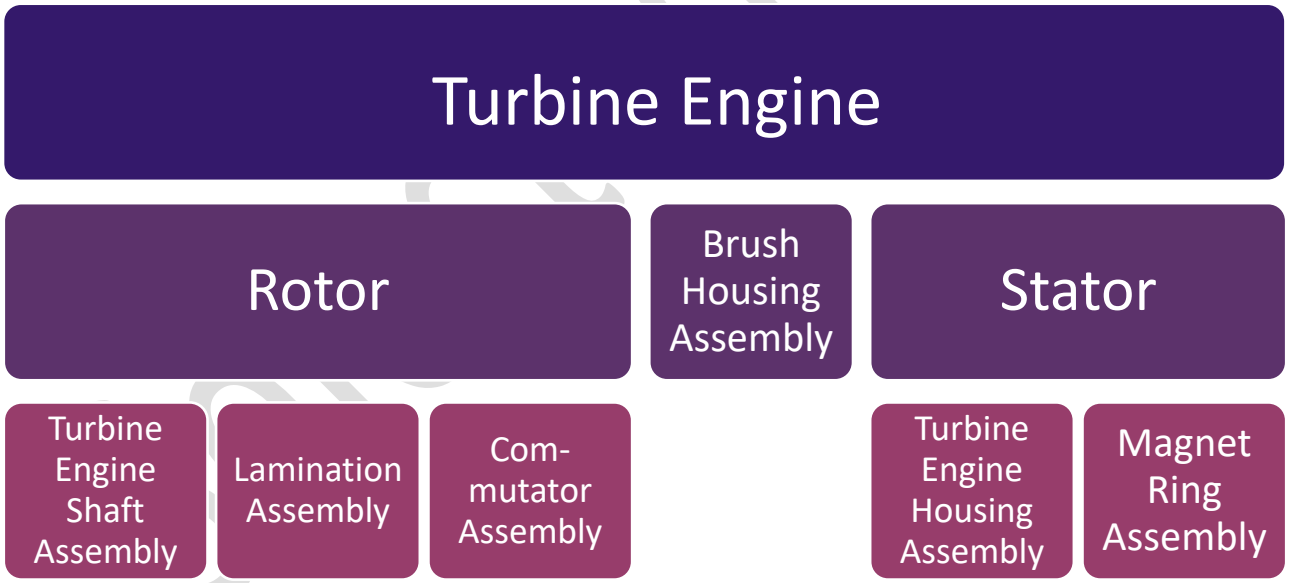

Figure 1. Hierarchy Map of Turbine Engine Production

The assembly technician assembles the rotor after the turbine engine shaft, lamination, and commutator have completed their individual finishing process. The assembly technician attaches the magnet ring to the turbine engine housing to form the stator. The assembly technician attaches the

rotor and the brush housing subassembly (brush ring) to the stator to make the completed turbine engine. Lastly, the assembly technician tests the turbine engine for runout and torque.

3 Production Instructions: Rotor

3.1 Generator Assembly: Commutator

To assemble the completed commutator the assembly technician attaches a set of copper commutator bars (combars) to a Teflon insulator ring and insulated with mica spacers. The commutator is ready for this assembly after the insulator ring, the commutator bars, and the mica spacers are received from outside processing, machined, and inspected.

The assembly technician screws the combars into the ring, inserts spacers between the combars, marks the combars, and wraps the completed assembly with a rubber band. This procedure takes place in generator assembly area 4100 on the surface plate. Step-by-step instructions are located in Section 3.1.1, please refer to the bill of materials, routing sheet, and the drawing for all product specifications.

3.1.1 Step-by-Step Instructions: Assemble the Commutator

3.1.1.1 Prepare work area by cleaning surface plate using alcohol and a clean cloth
3.1.1.2 Place insulator ring on flat surface with turbine engine shaft mounting surface down
3.1.1.3 Align first combar on ring at dowel pin location (Figure 2)

Figure 2. Dowel Pin Location

3.1.1.4 Attach first combar on ring using finger-tight torque on screw
3.1.1.5 Attach second combar
3.1.1.6 Insert one of varying sizes of mica spacers between combars until tight fit (Figure 3)

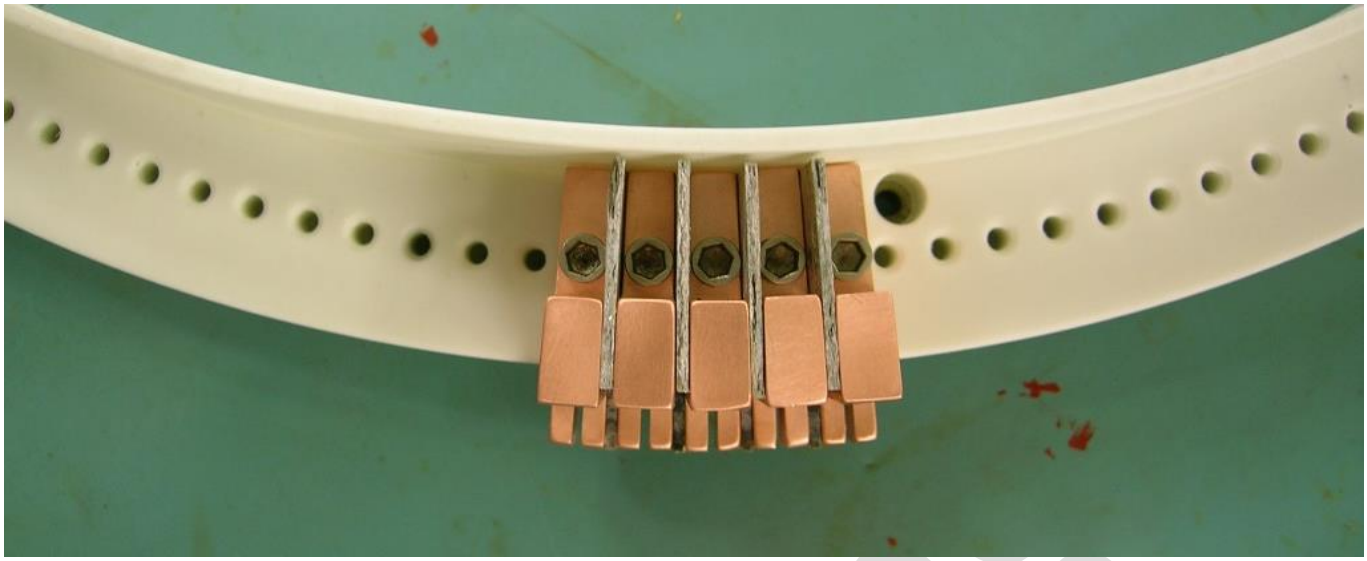

Figure 3. Commutator Bars Attached to Insulator Ring with Mica Spacers

3.1.1.7 Wrap the completed commutator using a rubber band, to secure mica during transit

4 Production Instructions: Stator

4.1 Generator Assembly Procedure: Magnet Ring

To assemble the completed magnet ring the assembly technician attaches alternating-polarity magnets to a nickel-plated steel ring field using anodized aluminum cleats. The magnet ring is ready for this assembly after the magnet ring field, magnets, and cleats are received from outside processing and inspected.

The assembly technician slowly inserts magnets of alternating north and south polarity into the drilled holes in the ring field and attaches them with cleats and screws. The assembly technician then wraps the magnet ring for protection using cardboard and bubble wrap. This procedure takes place in generator assembly area 4100 on a non-magnetic work surface. Step-by-step instructions are located in Section 4.1.1, please refer to the bill of materials, routing sheet, and the drawing for all product specifications.

 CAUTION: Magnetic Field. Interaction with metallic objects can cause bodily injury and product damage as a result of incorrect operation.

 MANDATORY: Eye protection is required.

4.1.1 Step-by-Step Instructions: Install Magnets in Magnet Ring

4.1.1.1 Prepare non-magnetic work surface using alcohol and clean cloth
4.1.1.2 Place outer diameter of magnet ring field on work surface, in vertical position (Figure 4)

Figure 4. Completed Magnet Ring in Vertical Position

4.1.1.3 Determine starting point for magnet placement on drawing
4.1.1.4 Attach cleat to drilled hole in ring field using finger-tight torque on screw
4.1.1.5 Verify magnet with north polarity using magnet checker
4.1.1.6 Slide north magnet into magnet ring field against the first cleat
4.1.1.7 Hold magnet in place and secure by attaching a cleat
4.1.1.8 Attach cleat to ring field using finger-tight torque on screw
4.1.1.9 Verify magnet with south polarity using magnet checker
4.1.1.10 Slide south magnet slowly into ring field next to the installed north magnet
4.1.1.11 Hold magnet in place and secure by attaching a cleat
4.1.1.12 Attach cleat to ring field using finger-tight torque on screw
4.1.1.13 Repeat Steps 4-12 until magnet ring field is full
4.1.1.14 Verify magnet polarity in ring field matches North, South, North, South pattern using magnet checker
4.1.1.15 Tighten screws
4.1.1.16 Wrap magnet ring using bubble wrap, to protect magnets during transit