Honeywell

COMPONENT MAINTENANCE MANUAL
2704442

TEMPORARY REVISION NO. 49-6

TO HOLDERS OF DIRECT CURRENT MOTOR COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST 49-42-02, REVISION 5, DATED 18 APR 2014.

INSERT THIS PAGE AS THE FIRST PAGE OF THE MANUAL.

Temporary Revision Number	Applicable Page Number
49-6	6002
	6012
	6023
	6024
	7002
	7021
	9004

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Component Maintenance Manual with Illustrated Parts List

Direct Current Motor

Part Number	CAGE
2704442-3	70210
2704442-4	70210
2704442-5	70210

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COMPONENT MAINTENANCE MANUAL
2704442

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TRANSMITTAL INFORMATION

REVISION NUMBER 5 DATED 18 APR 2014

TO HOLDERS OF DIRECT CURRENT MOTOR CMM ATA NO. 49-42-02 ISSUED FOR USE IN SUPPORT OF THE FOLLOWING:

Table TI-1 shows the applicable components.

Table TI-1. Applicable Components

Component PN	Nomenclature
2704442-3, -4, -5	Direct current motor

Revision History

Table TI-2 shows the revision history of this CMM.

Table TI-2. Revision History

Revision Number	Revision Date
0	24 Apr 1994
1	26 Jun 1998
2	15 Mar 2004
3	7 Apr 2006
4	20 Mar 2009
5	18 Apr 2014

This revision is a full replacement. All changed pages have a new date, as identified in the List of Effective Pages. Revision bars identify the changed data. A revision bar adjacent to the Fig./Item column identifies changes in the Detailed Parts List. See Transmittal information for history of revisions to this CMM.

Remove and discard all pages of the manual and replace them with the attached pages. Write the revision number, revision date, and replacement date on the Record of Revisions page.

Revision bars mark the technical data that changed in this revision; those changes are described in the Table of Highlights. Editorial changes are not marked with a revision bar.

The table of highlights tells users what has changed as a result of the revision. The table consists of three columns.

The Task/Page column identifies the blocks of changed information, such as a task, subtask, graphic, or parts list, and the page on which that block starts. The block of information often includes the MTOSS code. Revision marks, when provided, identify the location of the change within the block.

The Description of Change column tells about the change or changes within each block. The description of change is often preceded by a paragraph or figure reference that applies to the block of information.

The Effectivity column tells the user the part number(s) to which the block of information applies. The default value for this column is "All." "All" means that the block applies to all parts.

Table of Highlights

Task/Page	Description of Change	Effectivity
TRANSMITTAL INFORMATION	Global Change: Changed the content and format to agree with the Honeywell processes in effect at the time of the release of this revision.	All
TRANSMITTAL INFORMATION	Global Change: The editorial changes and data that were moved or reformatted are not identified with revision bars.	All
TRANSMITTAL INFORMATION	Global Change: All paragraphs, tables, and figures have been renumbered and are not identified with revision bars.	All
TRANSMITTAL INFORMATION	Record of Temporary Revisions: Added TR 49-5.	All
SERVICE BULLETIN LIST	Added 49-2389 and Revision 1 to 49-2380.	All
INTRODUCTION	Global Change: The content and format of the Introduction Section has changed. These changes are not identified with revision bars.	All
Subtask 49-42-02-99F-001-A01 (Page INTRO-1)	Paragraph 1.A. Added PN 2704442-5, Series 2 to Table INTRO-1.	All
Subtask 49-42-02-99C-003-A01 (Page 1001)	Paragraph 1.B. Table 1001. Added P66C-30660 DC power supply per TR 49-5.	All
Subtask 49-42-02-100-007-A01 (Page 4006)	Paragraph 2.G. Clarify requirement for all steel parts that need a magnetic particle check or a penetrant examination in 8 hours in Step (5).	All
Subtask 49-42-02-210-006-A01 (Page 5003)	Paragraph 2.F. Clarified torque requirement for springs (195) in Step (10).	All
Subtask 49-42-02-300-005-A01 (Page 6005)	Paragraph 2.E. Added Item call-outs for clarity in Steps (2)(a) and (f).	All
Subtask 49-42-02-300-005-A01 (Page 6005)	Paragraph 2.E. Added Note for clarity of shim requirements in Step (f).	All

Table of Highlights (Cont)

Task/Page	Description of Change	Effectivity
Subtask 49-42-02-300-006-A01 (Page 6008)	Paragraph 2.F. Figure 6002. Revised Diameter B in Rear End Bell Assembly Repair dimensional limits table.	All
Subtask 49-42-02-300-008-A01 (Page 6012)	Paragraph 2.H. Figure 6005. Revised Dimension D in Front End Bell Assembly Repair dimensional limits table.	All
Subtask 49-42-02-940-001-A01 (Page 9001)	Paragraph 1.B. Table 9001. Added P66C-30660 DC power supply requirement per TR 49-5.	All
Subtask 49-42-02-99C-024-A01 (Page 10001)	Paragraph 2.D. Deleted V07418 and added V40920, V80205, V81349, V88044, and V96906 to the vendor code list.	All
Parts list (Page 10021)	IPL Figure 1. Added (PRE SB 49-2358) in Item 1.	All
Parts list (Page 10021)	IPL Figure 1. Added (POST SB 49-2358) in Item -1A.	All
Parts list (Page 10021)	IPL Figure 1. Added (PRE SB 49-2389) and in Item -1B.	All
Parts list (Page 10021)	IPL Figure 1. Added (POST SB 49-2389) in Item -1C.	All
Parts list (Page 10021)	IPL Figure 1. Added (PRE SB 49-2380) in Item -1A.	All
Parts list (Page 10021)	IPL Figure 1. Added (POST SB 49-2380) in Item -1B.	All
Parts list (Page 10021)	IPL Figure 1. Added Items 1C, 5C, 10C, and 95B.	All
Parts list (Page 10021)	IPL Figure 1. Added Effectivity Code D to 1C, 5C, 71, 72, 73, -75B, -80A, 95B, -205A, -325A, and -375A.	All
Parts list (Page 10021)	IPL Figure 1. Added vendor codes in Items 35, 50, -60A, 65, 75A thru 85, 105, 110, 125, 130, 140, 150 thru 165, -175A, 180, 215, 265, -265A, 280, 285, 305, 330, 435 thru 450, 460 and 485.	All
Parts list (Page 10021)	IPL Figure 1. Added dimensional data in Items 35 and 65.	All

Table of Highlights (Cont)

Task/Page	Description of Change	Effectivity
Parts list (Page 10021)	IPL Figure 1. Added metric values in Items 250 thru 260, 335 thru 345, and 355 thru 370.	All
Parts list (Page 10021)	IPL Figure 1. Deleted Items 415A and 420A.	All
Parts list (Page 10021)	IPL Figure 1. Added optional part number references to Items 415 and 420.	All

RECORD OF REVISIONS

For each revision, write the revision number, revision date, date put in the manual, and your initials in the applicable column.

NOTE: Refer to the Revision History in the TRANSMITTAL INFORMATION section for revision data.

Revision Number	Revision Date	Date Put in Manual	By		Revision Number	Revision Date	Date Put in Manual	By

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RECORD OF TEMPORARY REVISIONS

Instructions on each page of a temporary revision tell you where to put the pages in your manual. Remove the temporary revision pages only when discard instructions are given. For each temporary revision, put the applicable data in the record columns on this page.

Definition of Status column: A TR may be active, replaced, incorporated, or not issued. “Active” is entered by the holder of the manual. If a TR is replaced by another TR, then put “Replaced by.” For example enter: Replaced by TR NN-NNNN. If a TR is incorporated, list the manual revision number. For example enter: INC Rev 7. Not issued indicates the TR will not be issued. For example enter: “Not Issued”.

Temporary Revision Number	Status	Page Number	Issue Date	Date Put in Manual	By	Date Removed from Manual	By
49-1	INC Rev 4						
49-2	INC Rev 4						
49-3	INC Rev 4						
49-4	INC Rev 4						
49-5	INC Rev 5						
49-6			18 Nov 2014	18 Nov 2014	H		

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SERVICE BULLETIN LIST

Service Bulletin / Revision Number	Title	Modification	Date Put in Manual
49-2358	Replace the carbon face seal and brush wear indicator housing assembly attaching screws.		26 Jun 1998
49-2380	Rework DC Motor, PN 2704442-4 Series 1 to PN 2704442-5 Series 1 by Adding Shims and Replacing the Cam, Ring, and Indicator Assembly		7 Apr 2006
49-2380, R1	Rework DC Motor, PN 2704442-4 Series 1 to PN 2704442-5 Series 1 by Adding Shims and Replacing the Cam, Ring, and Indicator Assembly		18 Apr 2014
49-2389	Modification of the Direct Current Motor from PN 2704442-5 Series 1 to PN 2704442-5 Series 2; Replacement of Brush Indicator Assembly		18 Apr 2014

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LIST OF EFFECTIVE PAGES

* indicates pages changed or added data
F indicates a right foldout
LF indicates a left foldout

LIST OF EFFECTIVE PAGES (Cont)

* indicates pages changed or added data
F indicates a right foldout
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LIST OF EFFECTIVE PAGES (Cont)

* indicates pages changed or added data
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INTRODUCTION

1. How to Use This Manual (TASK 49-42-02-99F-801-A01)

A. General (Subtask 49-42-02-99F-001-A01)

(1) This publication gives maintenance instructions for the equipment shown on the Title page.

(2) Refer to Table INTRO-1 for equipment identification data.

(a) The configuration of the equipment is shown by the part number, dash number, series number, and change number stamped on the identification plate. Compare this data with the data shown in Table INTRO-1 (through last alpha suffix).

(b) A part number, a service bulletin number (Pre SB, Post SB), or an effectivity code symbol identifies the special procedures or illustrations necessary for each configuration. The procedures and illustrations not identified are applicable to all the configurations of the equipment.

(c) The effectivity coding system identifies the differences between unit configurations.

1 Modifications to the basic unit make it necessary to re-identify the unit. For example: PN 123456-1 becomes PN 123456-2.

2 Each different part number and dash number has its own effectivity code.

3 In the text, if no effectivity codes or part numbers are shown, then the procedures are applicable to all the configurations of the unit.

4 In the text, if one or more effectivity codes or part numbers are shown, then the procedures are applicable only to the related configuration of the unit.

Table INTRO-1. Equipment Identification List

PN	Series Number	Effectivity Code Symbol	Description	Service Bulletin Number
2704442-3	1	A	Original configuration	-
2704442-4	1	B	Change the carbon face seal	49-2358
2704442-5	1	C	Added shims and changed the cam, ring, and indicator assembly	49-2380
	2	D	New brush wear indicator assembly	49-2389

(3) Standard maintenance procedures that technicians must know are not given in this manual.

(4) This publication is written in agreement with the ATA Specification.

(5) Refer to the Special Tools, Fixtures, and Equipment and Consumables tables in each section before the start of maintenance or repair procedures.

(6) An explanation on how to use the ILLUSTRATED PARTS LIST (IPL 49-42-02-10000) is given in the Introduction to that section.

(7) Honeywell recommends that you do the tests in TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000) before you disassemble the unit. These tests can show the condition of the unit or most possible cause of a malfunction. If a malfunction occurs, repair as necessary.

(8) Warnings, cautions, and notes in this manual give the data that follows:

- A WARNING gives a condition or tells personnel what part of an operation or maintenance procedure, which if not obeyed, can cause injury or death
- A CAUTION gives a condition or tells personnel what part of an operation or maintenance procedure, which if not obeyed, can cause damage to the equipment
- A NOTE gives data, not commands. The NOTE helps personnel when they do the related instruction.

(9) Warnings and cautions go before the applicable paragraph or step. Notes follow the applicable paragraph or step.

B. Observance of Manual Instructions (Subtask 49-42-02-99F-002-A01)

(1) Make sure that you carefully obey all safety, quality, operation, and shop procedures for the unit.

(2) All personnel who operate equipment and do maintenance specified in this manual must know and obey the safety precautions.

C. Symbols (Subtask 49-42-02-99F-003-A01)

(1) The symbols and special characters are in agreement with IEEE Publication 260 and IEC Publication 27. Special characters in text are spelled out.

(2) The signal mnemonics, unit control designators, and test designators are shown in capital letters.

(3) The signal names followed by an “*” show an active low signal.

(4) Some figures in this manual incorporate standard geometric characteristic symbols. Refer to Figure INTRO-1 for the geometric characteristic symbols.

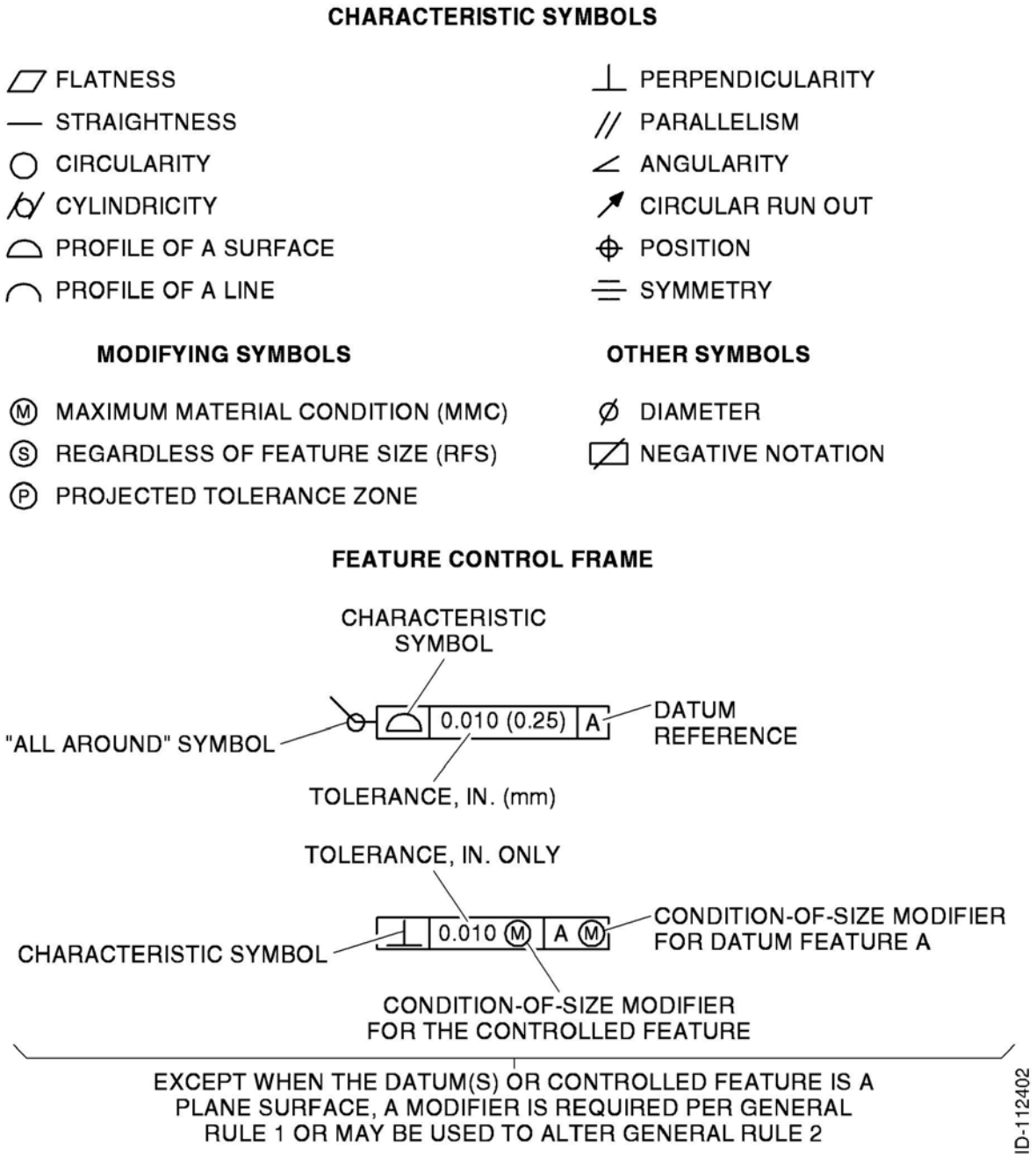


Figure INTRO-1. (Sheet 1 of 2) Geometric Tolerance Symbols (GRAPHIC 49-42-02-99B-801-A01)

GENERAL RULES

1. POSITION (⌖) TOLERANCES AND THEIR RELATED DATUMS APPLY AT MMC OR RFS AS SPECIFIED IN THE FEATURE CONTROL FRAME.
2. EXCEPT FOR POSITION (⌖), ALL TOLERANCES AND THEIR RELATED DATUMS APPLY RFS UNLESS OTHERWISE SPECIFIED.
3. ALL GEOMETRIC TOLERANCES ARE SPECIFIED AS TOTAL VALUES (TOTAL DIAMETER, TOTAL THICKNESS, TOTAL WIDTH, OR TOTAL ON RADIUS).
4. WHEN TWO DATUM FEATURES ARE REFERENCED IN HYPHENATED FORM, [D-C], A SINGLE DATUM IS ESTABLISHED BY THE TWO FEATURES.
5. WHEN TWO OR THREE DATUMS ARE REFERENCED IN SUCCEEDING FRAMES, [B][C][D], THE ORDER OF PRECEDENCE IS LEFT TO RIGHT.

SAMPLE INTERPRETATIONS

[-A-] THIS IS DATUM FEATURE A WHICH IS USED TO CREATE DATUM A IN THE PROCESSING EQUIPMENT.

[▱][0.010(0.25)] THIS SURFACE SHALL BE FLAT WITHIN 0.010 IN. TOTAL OR 0.25 mm TOTAL (MEETING EITHER SYSTEM WILL ACCEPT THE PART).

[//][0.010][B] THIS IS DATUM FEATURE C AND, RFS SHALL BE PARALLEL TO DATUM B, RFS, WITHIN 0.010 TOTAL.
[-C-]

[↗][0.002][A-B] EACH CIRCULAR ELEMENT OF THIS FEATURE, RFS, SHALL NOT RUN OUT MORE THAN 0.002 FIM, WITH RESPECT TO THE DATUM ESTABLISHED BY FEATURES A AND B, BOTH RFS.

[⌖][Ø 0.010 Ⓜ][A][B Ⓜ][C Ⓜ] THE AXIS OF THIS FEATURE, WHEN THIS FEATURES IS AT MMC, SHALL BE LOCATED WITHIN 0.010 DIAMETER OF THE TRUE (BASIC) LOCATION ESTABLISHED IN RELATION TO THE PRIMARY SURFACE DATUM A, SECONDARY DATUM B AT MMC, AND TERTIARY DATUM C AT MMC.

[⊥][Ø 0.010 Ⓜ][A]
[0.500 Ⓟ] THE AXIS OF THIS FEATURE, WHEN THIS FEATURE IS AT MMC, SHALL BE PERPENDICULAR TO DATUM A, RFS, WITHIN A 0.010 DIAMETER TOLERANCE ZONE PROJECTED 0.500 ABOVE THE SURFACE.

[∠][▱] THE ANGULAR ORIENTATION OF THIS FEATURE NEED NOT BE CONTROLLED WITH REPSECT TO ANY OTHER FEATURE.

ID-112403

Figure INTRO-1. (Sheet 2 of 2) Geometric Tolerance Symbols (GRAPHIC 49-42-02-99B-801-A01)

D. Units of Measure (Subtask 49-42-02-99F-004-A01)

(1) Measurements, weights, temperatures, dimensions, and other values are expressed in the USMS followed by the appropriate SI metric units in parentheses. Some standard tools or parts such as drills, taps, bolts, nuts, etc. do not have an equivalent.

E. Page Number Block Explanation (Subtask 49-42-02-99F-005-A01)

(1) The data in this manual is divided into sections. A standard page number block system is used. Page number blocks are shown in Table INTRO-2.

Table INTRO-2. Page Number Blocks

Section	Page Number Block
Description and Operation	1 thru 999
Testing and Fault Isolation	1001 thru 1999
Schematic and Wiring Diagrams	2001 thru 2999
Disassembly	3001 thru 3999
Cleaning	4001 thru 4999
Inspection/Check	5001 thru 5999
Repair	6001 thru 6999
Assembly	7001 thru 7999
Fits and Clearances	8001 thru 8999
Special Tools, Fixtures, Equipment and Consumables	9001 thru 9999
Illustrated Parts List	10001 thru 10999 [1]
Special Procedures	11001 thru 11999
Removal	12001 thru 12999
Installation	13001 thru 13999
Servicing	14001 thru 14999
Storage (Including Transportation)	15001 thru 15999
Rework (Service Bulletin Accomplishment Procedures)	16001 thru 16999

NOTE:

1 The IPL is the last page number block in the document.

F. Illustration (Subtask 49-42-02-99F-006-A01)

(1) Some of the exploded view illustrations shown in the ILLUSTRATED PARTS LIST (IPL 49-42-02-10000) section are also referenced in the DISASSEMBLY (PGBLK 49-42-02-3000), CLEANING (PGBLK 49-42-02-4000), INSPECTION/CHECK (PGBLK 49-42-02-5000), REPAIR (PGBLK 49-42-02-6000), ASSEMBLY (PGBLK 49-42-02-7000), and/or FITS AND CLEARANCES (PGBLK 49-42-02-8000) sections of this manual.

(2) Illustrations that support the individual items are shown by the item nomenclature, and in parenthesis, the item number followed by the basic figure number, i.e. washer (90, IPL Figure 1). Item numbers refer to the same IPL figure until a different IPL figure is specified.

(3) Supplemental illustrations use a suffix number to the basic figure number. For example, if Figure 501-5 is used, it signifies that it is an illustration of the item identified by index number 5 in Figure 501.

(4) If a code symbol (Code _____), part number, or Service Bulletin Number (Pre SB _____ or Post SB _____) is before the illustration title, it is applicable to a specific unit.

(5) Illustrations with no specific designation are applicable to all units.

G. Application of Maintenance Task Oriented Support System (MTOSS) (Subtask 49-42-02-99F-007-A01)

(1) In accordance with the ATA Specification 2200, this publication uses a Maintenance Task Numbering System which make the maintenance procedures in this manual compatible with an automated shop environment.

(2) The system uses standard and unique number combinations to identify maintenance tasks and subtasks.

(3) The MTOSS structure is the logical approach to organizing maintenance tasks and subtasks. The MTOSS numbering system includes the ATA Chapter-Section-Subject number as well as a function code and unique identifiers. The purpose of incorporating the MTOSS numbering system is to provide a means for the automated sorting, retrieval, and management of digitized data.

(4) Section and Sub-section Numbering System

(a) All procedures in this publication have TASK and SUBTASK numbers at key data retrieval points. The numbers provide the following:

- Identification of the hardware (part or parts) primary to the TASK
- Identification of the maintenance function applied to the part or parts
- A unique identifier for a set of instructions (known as TASK or SUBTASK)
- Identification of alternate methods and configuration differences that change the procedure applied to the TASK
- Identification of airline changes to a TASK or SUBTASK.

(5) Components of Task and Subtask Number

(a) The numbering system is an expansion of the ATA three-element numbering system. The number has seven elements. The first five elements are necessary for each TASK or SUBTASK. The sixth and seventh elements are applied only when necessary. Refer to Figure INTRO-2.

(b) Elements 1, 2, and 3 identify the ATA Chapter-Section-Subject number of the page block.

(c) Element 4 defines the maintenance function being performed. This element is a three position element. The third position is zero filled when further definition is not required. If required, the manufacturer will use the numbers 1 thru 9 or letters A thru Z, excluding the letters I and O. Refer to Table INTRO-3.

(d) Element 5 provides a unique identification for each TASK or SUBTASK number which is similarly numbered through the first four elements.

- TASKS are numbered from 801 thru 999
- SUBTASKS are numbered from 001 thru 800.

(e) Element 6 is a three position alphanumeric element used for identification of differences in configurations, methods or techniques, variations of standard practice applications, etc.

(f) Element 7 provides coding of those tasks or subtasks that have been changed by the customer (e.g., those tasks or subtasks accomplished by an outside repair source).

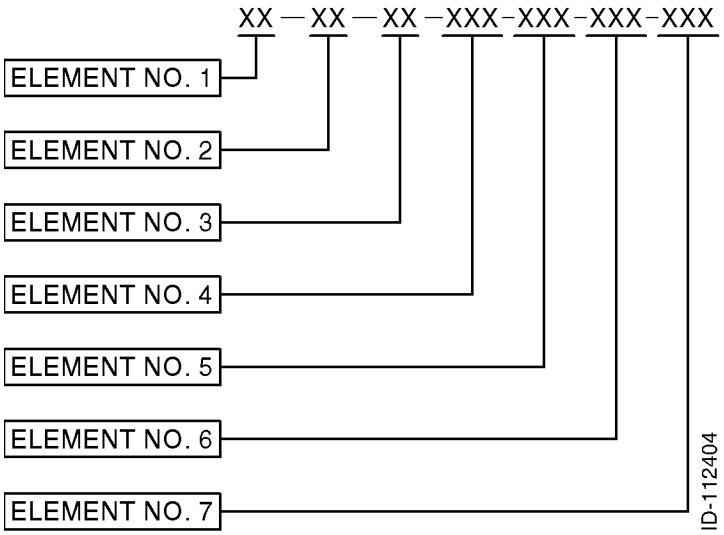


Figure INTRO-2. (Sheet 1 of 1) MTOSS Code Positions (GRAPHIC 49-42-02-99B-802-A01)

Table INTRO-3. MTOSS Function Code Definitions

Code	Function	Definition
000	REMOVAL AND DISASSEMBLY	
010	Removal	Removal of the engine/component from a workstand, transport dolly, test stand, etc., or aircraft.
020	Remove Modular Sections	This is the first echelon of disassembly which consists of sectionalization of the unit/engine into primary modular sections. Modular sections are identified by the third element of the ATA number when removed from the unit/engine.
030	Disassemble Modular Sections	This is the second echelon of disassembly which consists of disassembly of the modular sections into subassemblies after removal from the unit/engine. Modular section designations appear in the second element of the ATA number for this echelon of disassembly.
040	Disassemble Subassemblies	This is the third echelon of engine disassembly which consists of disassembly of subassemblies to the piece part level. The subassemblies are identified by the third element of the ATA number.
050	Remove Accessory/Power Plant Components	This consists of removing individual accessory/power plant components from either installed or uninstalled engines.

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
060	Disassemble Accessory	This involves disassembly of accessories /components into subassemblies.
070	Disassemble Accessory Subassembly	This involves disassembly of accessories /components subassemblies into piece parts.
080	Remove Test Equipment	This consists of removing equipment and instrumentation after accessory/component test.
090	Disassemble Support Equipment	This consists of disassembly of support equipment required to maintain said support equipment.
100	CLEANING	
110	Chemical	Removal of surface deposits from a part by use of a chemical cleaning agent. After being dissolved, the deposit is washed or rinsed away after a soaking period. Also includes chemical power flushing.
120	Abrasive	Removal of surface deposits from a part by wet or dry particle impingement.
130	Ultrasonic	Removal of surface deposits and entrapped material by use of high frequency sound waves to produce cavitation at the surface of the part. Cleaning is performed in a liquid bath that transmits the sound energy and keeps the removed material in suspension.
140	Mechanical	Removal of surface deposits from a part by use of a brush, felt bob, sandpaper, or other hand or mechanical action.
150	Unassigned	
160	Miscellaneous	Removal of deposits from parts with compressed air, miscellaneous hand cleaning, and various combinations of cleaning procedures.
170	Foam/Water Wash	Removal or post emulsified fluorescent penetrant via an agitated water wash, automatic spray rinse, or an aqueous remover aerated to produce a foam.
180	Testing of Solutions	Test used to assist in identifying certain materials by electro-mechanically determining the presence or absence of known constituents.

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
190	Unassigned	
200	INSPECTION	
210	Check	A thorough visual examination of components, accessories, subsystems, and piece parts to detect structural failure, deterioration or damage: and to determine the need for corrective action. For example: exterior surfaces, electronic circuit cards, gears, control systems, linkages, accessories, components, tubing, wiring and connections, safety wiring, fasteners, clamps, etc., are inspected to verify proper condition and acceptability for continued service.
220	Visual/Dimensional	A comparison of the dimensions and material conditions of parts, subassemblies, and assemblies with the specifications contained in technical manuals and/or blueprints, to detect deviations from established standard and limits and determine the acceptability for continued service, repair, or need to discard the item. A visual/dimensional function code is also required to verify that proper corrective maintenance has been accomplished. Although some of these tasks may not require measurements, a complete spectrum of tasks/sub tasks requires a variety of measuring equipment to determine runout, concentricity, flatness, parallelism, hardness, thickness, clarity, dimensions, etc.
230	Penetrant	Fluorescent penetrant inspection to detect surface cracks.
240	Magnetic	Magnetic particle inspection to detect surface cracks in magnetic materials.
250	Eddy Current	Inspection for subsurface cracks, porosity, inclusions, or other nonhomogeneous material structure by use of high frequency electromagnetic wave equipment. Parts are scanned and compared to similar parts or test specimens having known material defects.
260	X-Ray	Inspection for subsurface cracks, porosity, inclusions, or other nonhomogeneous material structure by use of x-ray techniques.

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
270	Ultrasonic	Inspection for subsurface cracks, porosity, inclusions, or other nonhomogeneous material structure by use of contact pulse echo ultrasonic techniques.
280	Special	Any special inspection to determine the integrity of a part for continued operation In-Service or qualitative analysis.
290	Unassigned	
300	REPAIR	
310	Welding and Brazing	The joining of pieces by welding (fusion, resistance, spot, electron beam, plasma arc), brazing (furnace, torch, induction), or soldering. This category includes hard facing.
320	Machining	The process of obtaining a desired shape or finish by grinding, turning, boring, reaming, broaching, milling, drilling, lapping, honing, sizing, polishing, buffing, cutting, forming, stamping, blanking, etc.
330	Stripping and Plating	Removing or applying a metallic coating on a surface by mechanical, chemical, or electrical means. Plating of chromium, cadmium, tin, etc., to build up the size of a part or provide surface protection. Includes masking or waxing prior to the process.
340	Plasma and Flame Spraying	The application of a protective coating to a part by feeding a powder into an ionized gas stream. Flame spraying uses a fuel oxygen flame to melt and propel metal onto parts to build up the size or provide surface protection.
350	Miscellaneous Repairs	Repairing parts by hand (cutting, drilling, polishing, grinding, lapping, riveting, blending, routing, fitting, burring, planishing, sanding, sawing, recambering, drilling, tapping, heating, chilling) and including miscellaneous disassembly and assembly required.
360	Bonding and Molding/Sealing	Joining and curing of parts with an adhesive or fusible material (including silicone, fiberglass, glues).

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
370	Heat Treating	Controlled heating and cooling of a material to obtain the desired physical property (includes annealing, tempering, quenching, stress relieving, solution heat treat, etc.).
380	Surface Treating	Treating the surface of a part by painting, varnishing, aluminizing, Teflon coating, zinc chromate priming, tumble finishing, shot peening, etc. Baking and masking processes are included.
390	Machine Riveting and Flaring	Joining of parts by riveting and flaring the rivet.
400	INSTALLATION AND ASSEMBLY	
410	Install	Installation of the unit/engine onto a workstand, transport dolly, test stand, or aircraft.
420	Install Modular Sections	The third echelon of assembly consisting of assembly of the modular assemblies into a complete unit/engine assembly. The modular sections are identified by the third element of the ATA number.
430	Assemble Modular Sections	The second echelon of assembly consisting of assembling subassemblies into modular sections. The modular section is identified by the second element of the ATA number.
440	Assemble Subassemblies	The first echelon of assembly consisting of assembling piece parts into subassemblies. The subassemblies are identified by the third element of the ATA number.
450	Install/Close Items Removed/Opened for Access	Installation or closing of access plates, closing of ports, installation of components, tubing or any item which was removed or opened in order to provide access to perform the task.
460	Assemble Accessory	Assemble accessory components.
470	Assemble Accessory Subassembly	Assembly of accessory subassembly components.
480	Install Test Equipment	Install equipment and instrumentation required for accessory component test.
490	Assemble Support Equipment	Any assembly required to maintain support equipment.
500	MATERIAL HANDLING	

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
510	Shipping	The movement of any part, subassembly, assembly, or component from the time it is packaged until it reaches its destination.
520	Receiving	The receipt activity for any incoming part, subassembly, assembly, or component.
530	Packing	Installing parts, subassemblies, assemblies, or components into shipping containers.
540	Unpacking	Removing parts, subassemblies, assemblies, or components from shipping containers.
550	Storage	Safekeeping of parts, subassemblies, assemblies, or components until required for use.
560	Marshaling/Positioning	Marshaling is collection of parts, subassemblies, and accessories prior to release for assembly. Positioning is movement from one fixed state to another.
570	Engine Ferry/Pod Maintenance	Necessary preparations before and after transporting an engine by aircraft ferry method.
580	Unassigned	
590	Unassigned	
600	SERVICING/PRESERVING/LUBRICATING	
610	Servicing	Action required to sustain a unit or system in proper operating status including priming with applicable fluids prior to use.
620	Preserving	Preparation of a unit, part, assembly, etc., for safekeeping from decomposition or deterioration. Includes preparation for storage (applying a preservative layer, desiccants, etc.).
630	Depreserving	Removing preservatives, desiccants, etc., from a unit, part, assembly, etc., prior to installation or operation.
640	Lubricating	Applying oil, grease, dry film, or silicon lubricants on moving parts to reduce friction or cool the item.
650	Unassigned	
660	Unassigned	
670	Unassigned	

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
680	Unassigned	
690	Unassigned	
700	TESTING/CHECKING	
710	Oil Flow	Measuring the flow of oil through components or compartments under specific conditions.
720	Air Flow	Measuring the flow of air through components or compartments under specific conditions.
730	Fuel Flow	Function checks and flow measurements through the part or system being tested.
740	Water Flow	Function checks and flow measurements through the part or system being tested.
750	Electrical/Return to Service	Functional tests (manual or ATE) of the system or component as well as measurement of electrical or electronic parameters designed to determine whether the item can be returned to service. May include fault isolation procedures for components that require close correlation between test results and fault indications.
760	Engine	Operation of an engine to establish systems function or operation under specific conditions to measure performance.
770	Accessory/Bite	Testing of an accessory to ensure proper operation or function.
780	Pressure Check	Testing to establish the ability of a normally pressurized component or system to operate properly.
790	Leak Check	Determine the ability of a component or system to operate without leaking.
800	MISCELLANEOUS	
810	Fault Isolation	Operation of an engine at constant thrust level or identical Engine Pressure Ratio (EPR) to locate the prime suspect deficient system: operating an improperly functioning system or component to locate the cause; or performing a series of checks to isolate a failed part or component.

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
820	Adjusting/Aligning/Calibrating	Making a physical correction to ensure proper placement or operation of a system or component.
830	Rigging	Hooking-up, arranging, or adjusting a component or accessory linkage for proper operation.
840	Service Bulletin Incorporation	Performing the work specified in the service bulletin. Provides for identification of modification tasks at the task level with subtasks recognizing any functional changes (chemical, visual/dimensional, cleaning, machining, etc.) necessary to incorporate the service bulletin.
850	Part Number Change/Re-identification	Change of part number, application of part number by transfer, engrave repair number, etc.
860	Unassigned	
870	Description and Operation	Electrical and mechanical description of the unit or component. Includes leading particulars, descriptions, limitations, specifications, and theory of operation.
880	Approved Vendor Processes	Includes processes that may be proprietary and controlled by a particular manufacturer, or by nonproprietary and approved for application by conforming vendors.
890	Airline Maintenance Program (Customer Use)	
900	Unassigned	
910	Special Equipment Maintenance	Identification of tasks to maintain special support equipment.
920	Standard Equipment Maintenance	Identification of tasks to maintain standard support equipment.
930	Tool Fabrication	Includes fabricating any tool for which procedures to use are included in the manual.
940	Special Tools, Equip, and Consumables Listing	Listing of all special tools, standard equipment, special equipment, and consumables required to perform maintenance on the unit or component.
94A	Consumables	
94B	Special Tools/Non Std Tools	
94C	Fixtures/Test Equipment	

Table INTRO-3. MTOSS Function Code Definitions (Cont)

Code	Function	Definition
94D	Standard Tools	
950	Illustrated Parts List (Detailed Parts List)	Section of IPL/IPC that contains parts description and identification in top-down break down sequence.
960	Illustrated Parts List (Equipment Designation Index)	Section of IPL/IPC that contains equipment designators cross-referenced to detailed parts list.
970	Illustrated Parts List (Numerical Index)	Section of IPL/IPC that contains an alphanumeric listing of all parts in the unit cross-referenced to the detailed parts list.
980	Illustrated Parts List (Alternate Vendor Index)	Optional section of IPL/IPC that contains an alphanumeric listing of all parts in the unit that have more than one vendor source.
990	Illustrations, Tables, Front Matter, Etc.	
99A	Tables	
99B	Illustrations	
99C	Front Matter Pageblock (TASK Level MTOSS) Front Matter Task (Collection of Subtask MTOSS)	
99D	Access	
99E	References	
99F	General/Introduction	

2. Customer Support (TASK 49-42-02-99F-802-A01)

A. Honeywell Aerospace Online Technical Publications Website (Subtask 49-42-02-99F-008-A01)

(1) Go to the Honeywell Online Technical Publications Website at (www.myaerospace.com).

- To download or see publications online
- To order a publication
- To tell Honeywell of a possible data error in a publication.

B. Global Customer Care Center (Subtask 49-42-02-99F-009-A01)

(1) If you do not have access to the Honeywell Technical Publications Website, or if you need to speak to personnel about non-Technical Publication matters, the Honeywell Aerospace Global Customer Care Center gives 24/7 customer service to Air Transport & Regional, Business & General Aviation, and Defense & Space customers around the globe.

- Telephone: 800-601-3099 (Toll Free U.S.A./Canada)
- Telephone: 602-365-3099 (International)

- Telephone: 00-800-601-30999 (EMEA Toll Free)
- Telephone: 420-234-625-500 (EMEA Direct).

3. References (TASK 49-42-02-99F-803-A01)

A. Honeywell/Vendor Publications (Subtask 49-42-02-99F-010-A01)

- Not applicable.

B. Other Publications (Subtask 49-42-02-99F-011-A01)

(1) These publications are standard references. Check for latest version of publication.

- The United States GPO Style Manual 2000 (available at http://www.gpoaccess.gov /stylemanual/browse.html)
- IEEE Std 260, Standard Letter Symbols for Units of Measurement (available from the American National Standards Institute, New York, NY)
- ASME Y14.38, Abbreviations for Use on Drawings and in Text (available from the American National Standards Institute, New York, NY)
- H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil)
- IEEE 315/ANSI Y32.2, Graphic Symbols for Electrical and Electronics Diagrams (available from the American National Standards Institute, New York, NY).

4. Acronyms and Abbreviations (TASK 49-42-02-99F-804-A01)

A. General (Subtask 49-42-02-99F-012-A01)

(1) The abbreviations are used in agreement with ASME Y14.38.

(2) Acronyms and non-standard abbreviations used in this publication are as follows:

List of Acronyms and Abbreviations

Term	Full Term
µm	micrometer
A	amperes
ANSI	American National Standards Institute
APU	auxiliary power unit
ASME	American Society of Mechanical Engineers
ATA	Air Transport Association
ATE	automated test equipment
C	Celsius
CAGE	commercial and government entity
cm3	cubic centimeter
CMM	component maintenance manual
CRES	corrosion resistant steel
CW	clockwise
DC A	direct current ampere
DC	direct current

List of Acronyms and Abbreviations (Cont)

Term	Full Term
DPL	detailed parts list
EMEA	Europe, the Middle East, and Africa
F	Fahrenheit
FAA	Federal Aviation Administration
ft-lb	foot-pound
g-in	gram-inch
g	gram
GPO	Government Printing Office
hp	horsepower
Hz	hertz
ID	inside diameter
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
in-lb	inch-pound
in3	cubic inch
inHg	inch of mercury
IPC	illustrated parts catalog
IPL	illustrated parts list
kg	kilogram
kPa	kilopascal
L	liter
mA	milliampere
mm	millimeter
mmHg	millimeter of mercury
MTOSS	maintenance task oriented support system
NHA	next higher assembly
NI	numerical index
Nm	Newton meter
No.	number
PN	part number
PSI	pound per square inch
PSIG	pound per square inch gage
rms	root mean square
rpm	revolutions per minute

List of Acronyms and Abbreviations (Cont)

Term	Full Term
SI	International System of Units
SPM	standard practices manual
TR	temporary revision
U.S.A.	United States of America
USMS	United States Measurement System
VAC	volt alternating current
VDC	volt direct current

5. Process Verification (TASK 49-42-02-99F-805-A01)

A. Verification Data (Subtask 49-42-02-99F-013-A01)

(1) Honeywell does a verification of these technical instructions by performance or by simulation of the necessary procedures. Performance shows that the procedures were checked by the use of the manual. Simulation shows that the applicable personnel looked at the procedure in the manual and that the procedure is technically correct. The dates of verification for this manual are given in Table INTRO-4.

Table INTRO-4. Verification Data

Section	Method	Date
Testing and Fault Isolation	Performance	22 Mar 1994
Disassembly	Performance	21 Mar 1994
Assembly	Performance	30 Apr 1998

6. Software History (TASK 49-42-02-99F-806-A01)

A. Software Data (Subtask 49-42-02-99F-014-A01)

(1) Not applicable.

7. History of Changes (TASK 49-42-02-99F-807-A01)

A. Modification/Configuration History (Subtask 49-42-02-99F-015-A01)

(1) Not applicable.

B. Change History for Parts List (Subtask 49-42-02-99F-016-A01)

(1) Not applicable.

DESCRIPTION AND OPERATION

1. Description (TASK 49-42-02-870-801-A01)

A. General (Subtask 49-42-02-870-001-A01)

(1) This section contains a description of the direct current motor.

(2) Refer to Table 1 for the leading particulars.

Table 1. Leading Particulars

Characteristic	Specification
Type	Direct current with isolated ground
Performance rating:	
Horsepower	8.0 hp
Operating speed	4,000 rpm
Operating voltage	16.0 VDC
Operating current	550 amps
Operating duty cycle	195 seconds on, 60 minutes off
Operating temperature range	-65 to 250°F (-54 to 121°C)
Direction of rotation	Clockwise [1]
Shop duty cycle	30 seconds on, 5 minutes off
Hand crank requirements	0.312 to 0.315 inch (7.924 to 8.001 mm) across hexagon flats X 0.25 inch (6.35 mm) minimum length
Dimensions:	
Length	11.25 inches (285.7 mm) (max)
Diameter	6.30 inches (160.1 mm) (approx)
Weight	38 pounds (17.24 kg) (approx)

NOTE:

1 Viewed from shaft end.

(3) Refer to Figure 1 for the direct current motor.

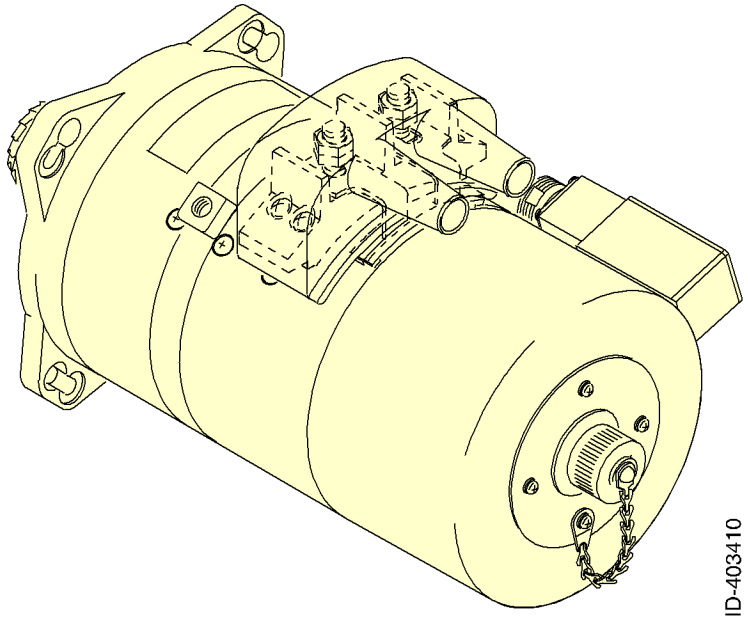


Figure 1. (Sheet 1 of 1) Direct Current Motor (GRAPHIC 49-42-02-99B-803-A01)

B. Job Setup Data (Subtask 49-42-02-99C-001-A01)

(1) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

C. Direct Current Motor (Subtask 49-42-02-870-002-A01)

(1) The direct current motor (hereafter referred to as the motor) starts the aircraft auxiliary power unit (APU) with DC power supplied by the aircraft batteries. The motor is a brush-type, direct current, series-wound motor with four field coil poles. The motor has an armature and field assembly installed between a front and rear end bell assembly. The end bell assemblies support and align the armature on two high-speed sealed bearings.

(2) The front end bell has a mounting flange to attach the motor to the APU and a reverse carbon face seal to keep oil out of the motor. The rear end bell assembly has an electrical brush-wear indicator and an access port for a hand crank. The hand crank can manually turn the armature. This motor has an isolated ground (the negative terminal is insulated from the motor housing).

2. Operation (TASK 49-42-02-870-802-A01)

A. Direct Current Motor (Subtask 49-42-02-870-003-A01)

(1) In operation, the motor changes electrical energy into mechanical energy. When you apply voltage to the terminals, current flows through the field coils, then through the brush assemblies to the commutator and the armature windings. The force between the electromagnetic fields in the field assembly and the armature windings causes the armature assembly to turn.

TESTING AND FAULT ISOLATION

1. Planning Data (TASK 49-42-02-99C-801-A01)

A. Reason for the Job (Subtask 49-42-02-99C-002-A01)

(1) Use the test procedures in this section to test and isolate faults.

(2) The function of the test procedures is to find if there is a failure in the operation of the direct current motor.

B. Job Setup Data (Subtask 49-42-02-99C-003-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 1001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 1001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	motor test stand	commercially available
	power cables (1 gage (minimum) insulated copper wire) (2 required)	commercially available
	printer/plotter (optional)	commercially available
	RPM measuring device (strobe light or revolution counter) (±1.0% full-scale accuracy)	commercially available
	shunt (100 mV at 1,000 amps)	commercially available
	stroboscope or revolution counter (used to measure rpm)	commercially available
	switch (SPST 500 amps)	commercially available
	timer (counter or stopwatch) (0 to 1 minute ±0.5% full-scale accuracy)	commercially available
Magtrol Model 6200	dynamometer controller/power supply with readout (0 to 250 in-lb (28.0 Nm) 0.01% accuracy of reading (speed) 0.2% full-scale (torque))	CAGE: 03692
Magtrol Model HD815-6N, -8N	dynamometer (0 to 250 in-lb (28 Nm) at 12,000 rpm (max) ±1.625 in-lb (0.17 Nm) accuracy)	CAGE: 03692
Model 103-2.5	dielectric strength tester (0 to 2,500 VAC, accuracy: 0 to 5 mA leakage, 0 to 0.005 MFD, 10 mA (maximum) sc current)	CAGE: 05611

Table 1001. Special Tools, Fixtures, and Equipment (Cont)

Number	Description	Source
Model 1864	megohmmeter (0 to 1,000 VDC, 5 mA ±2% accuracy)	CAGE: 0PK96
Model 25254-21B51	vacuum pressure gage (0 to 30 inHg (0 to 760 mmHg), ±1.5% full-scale accuracy)	CAGE: 52159
Model 25554-21B51CMY	positive pressure gage (optional) (0 to 30 inHg (0 to 760 mmHg) ±1.5% full-scale accuracy)	CAGE: 52159
Model 262-DDAU-EC5U	DC ammeter (0 to 1,000 DC amps ±5% accuracy)	CAGE: 0KC11
Model 4100 ATC	digital ohmmeter	Valhalla Scientific Inc., 9955 Mesa Rim Rd., San Diego, CA 92121
Model 7059-42	vacuum/pressure pump (0 to 20 inHg (0 to 508 mmHg) vacuum, 17 PSIG (117.2 kPa) pressure, 0.9 ft3/min (0.025 m3/min) capacity)	CAGE: 8L995
Model 931-1912001	DC voltmeter (0 to 28 VDC ±1% accuracy)	CAGE: 3N285
Model GFM170S	flow measuring device (0 to 10 mL/min, ±1.5% full-scale accuracy)	CAGE: 7S893
P66C-30660	DC power supply (Qty: 2)(0 to 26 vdc at 0 to 1,000 amps, ± 5% accuracy)	CAGE: 61987
PN 2024047-1	shaft adapter	CAGE: 06848
PN 2024061-1	air leakage test fixture	CAGE: 06848
PN 835643-1	mounting adapter	CAGE: 06848
PN EMP3500PO1	motor test stand	CAGE: 5W886

NOTE: If PN EMP3500PO1 motor test stand is not available, the following equipment can be used instead:

- Model 262-DDAU-EC5U DC ammeter
- P66C-30660 DC power supply
- Model 931-1912001 DC voltmeter
- Magtrol Model HD815-6N, -8N dynamometer
- Magtrol Model 6200 dynamometer controller/power supply with readout
- power cables (1 gage (minimum) insulated copper wire)
- printer/plotter (optional)

- RPM measuring device (strobe light or revolution counter)
- shunt
- switch
- timer (counter or stopwatch).

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 1002 for the specified consumable materials in this section.

Table 1002. Consumables

Number	Description	Source
Not applicable	Not applicable	Not applicable

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

2. Procedure (TASK 49-42-02-810-801-A01)

A. Job Setup (Subtask 49-42-02-810-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

B. General Test Conditions (Subtask 49-42-02-810-002-A01)

NOTE: Do the test procedures to find the condition or malfunction of the motor and the level of repair necessary. Test the motor and components before maintenance.

(1) The tests must be done with the motor at laboratory ambient temperature. The load tests cause a temperature increase in the motor. To keep the temperature increase to a limit, use the shop duty cycle as specified in Table 1.

NOTE: Brush replacement is required every shop visit. However, the test sequence shown below applies prior to the replacement of brushes or other recommended parts (reference Table 3003) unless otherwise specified.

(2) Before performing the test sequence and before any disassembly, check continuity on switch connector Pins 1 and 2 and record results.

(3) Replace all brushes every motor shop visit per DISASSEMBLY (PGBLK 49-42-02-3000) and ASSEMBLY (PGBLK 49-42-02-7000). However, complete the test sequence shown below prior to brush replacement unless otherwise specified.

C. Test Sequence (Subtask 49-42-02-810-003-A01)

(1) Do the tests in the following sequence:

(a) Dielectric strength test

(b) No-load test

(c) Rated-load test

(d) Alternate rated-load test

(e) Insulation resistance test

(f) Air leakage test.

D. Dielectric Strength Test (Subtask 49-42-02-810-004-A01)

NOTE: The dielectric strength test is done to find insulation that has flaws, cracks and deterioration. Components must pass a dielectric strength test of 100 VAC, 60 Hz for 1 second. Test an assembled motor between connector Pins 1 and 2 and the motor housing (ground).

CAUTION: DO NOT APPLY DIELECTRIC TEST VOLTAGE TO A DIRTY MOTOR OR COMPONENT. THIS CAN CAUSE INSULATION DAMAGE.

(1) Use a Model 103-2.5 dielectric strength tester to test at 600 VAC, 60 Hz from the positive terminal to the case or shaft (ground) for 1 minute minimum.

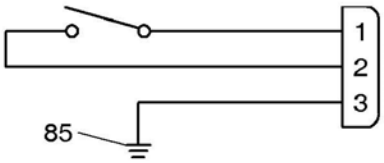
(2) Current leakage must be less than 2 mA.

(3) If the current leakage is 2 mA or more, disassemble the motor or component, clean it fully, and repair it. Refer to CLEANING (PGBLK 49-42-02-4000) and REPAIR (PGBLK 49-42-02-6000).

E. No-Load Test (Subtask 49-42-02-810-005-A01)

NOTE: The no-load test is done to isolate motor failures because of insulation breakdown, too much brush or bearing drag, incorrect armature balance, incorrect commutator surfacing or incorrect brush seating or not enough clearance for the armature to turn.

(1) Connect the motor to a dc power source. Refer to Figure 1001. Hold the motor in position with the PN 835643-1 mounting adapter. Refer to Figure 1003. Use a typical motor test stand to do the tests.



CONNECTION DIAGRAM

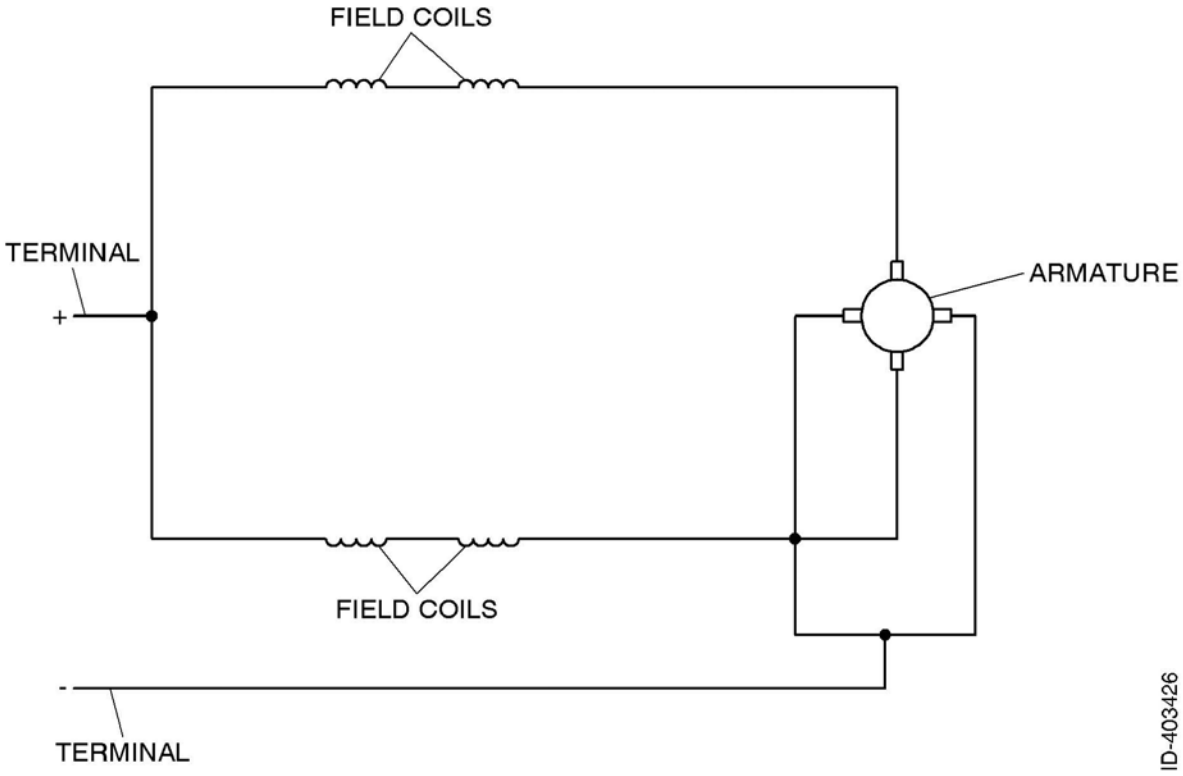


Figure 1001. (Sheet 1 of 1) Schematic Diagram of Test Setup (GRAPHIC 49-42-02-99B-804-A01)

Key for Figure 1001. (Sheet 1 of 1)

85	TERMINAL LUG		

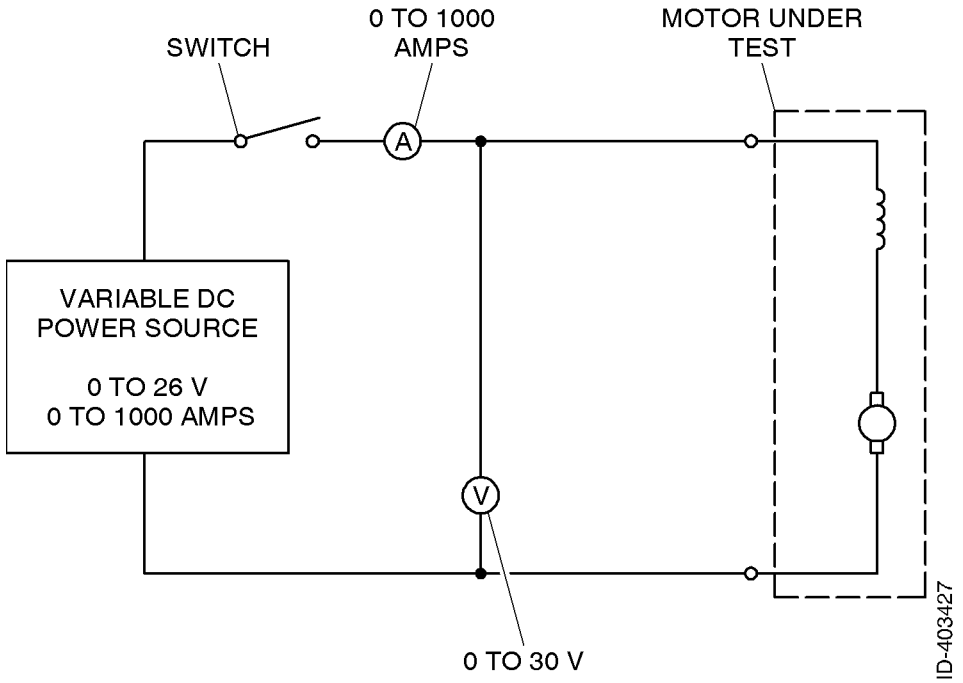


Figure 1002. (Sheet 1 of 1) Functional Test Schematic (GRAPHIC 49-42-02-99B-805-A01)

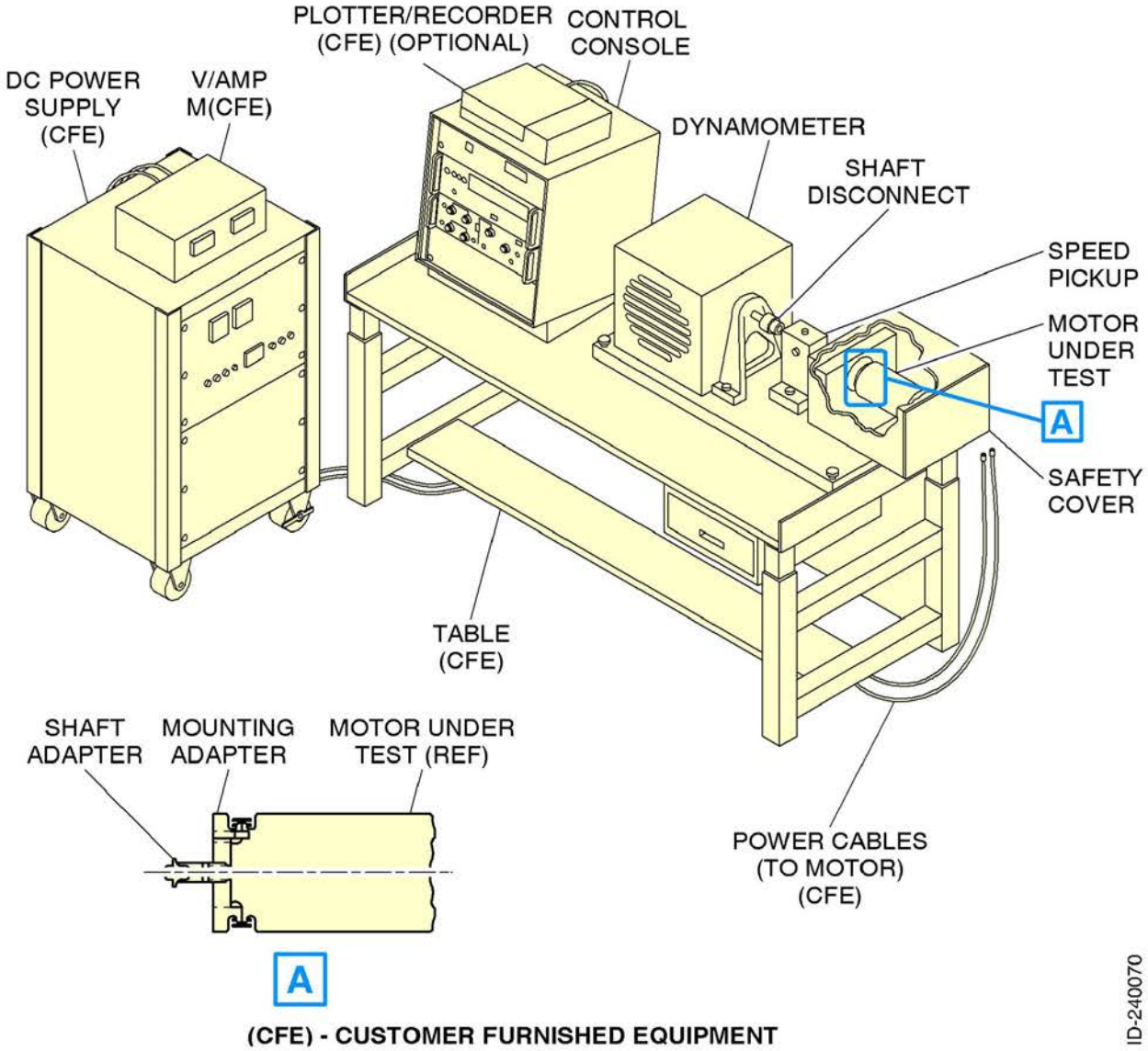


Figure 1003. (Sheet 1 of 1) Typical Motor Test Setup (PN EMP3500PO1 Motor Test Stand)
(GRAPHIC 49-42-02-99B-806-A01)

(2) Make a reference mark on the motor shaft with a piece of tape to help read the stroboscope or revolution counter.

WARNING: TO PREVENT INJURY TO PERSONS, INSTALL THE TEST STAND SAFETY COVER AND SECURE IT OVER THE MOTOR BEFORE YOU OPERATE THE MOTOR.

CAUTION: DO NOT CONNECT THE MOTOR OUTPUT SHAFT TO THE DYNAMOMETER FOR THIS TEST. EVEN AN UNLOADED DYNAMOMETER WILL CAUSE INCORRECT TEST RESULTS.

(3) Close the switch and slowly increase the DC voltage applied to the motor terminals until the motor has a speed of 7,000 to 8,000 rpm. The motor must turn in a clockwise direction when seen from the shaft end.

(4) Monitor the motor no-load current (across a shunt). Refer to Table 1003.

(5) The motor must operate without unusual noise or vibration and the current must not be more than 120 DC A.

Table 1003. No-Load Test Requirements

No-Load Voltage	No-Load Speed	No-Load Current (max)	Shaft Direction [1]
NA	7,000 to 8,000 rpm	120 amps	CW

NOTE:

1 Direction when seen from the shaft end.

F. Rated-Load Test (Subtask 49-42-02-810-006-A01)

NOTE: If the Magtrol Model HD815-6N, -8N dynamometer or load device cannot operate at the speed and torque necessary for this test, perform the alternate rated-load test at a decreased speed and torque. Refer to Paragraph 2.G. (Subtask 49-42-02-810-007-A01).

NOTE: The rated-load tests find the ability of the motor to operate and supply high torque when the motor has the load applied. The test is done at two load points. Failure of either test shows that the motor does not operate correctly.

(1) Remove the ratchet (290, IPL Figure 1). Refer to DISASSEMBLY, Paragraph 2.C. (Subtask 49-42-02-000-003-A01)

(2) Install the PN 2024047-1 shaft adapter on the motor gear shaft.

CAUTION: THE MOTOR CAN BE DAMAGED IF IT IS NOT CORRECTLY INSTALLED IN THE HOLDING FIXTURE. MAKE SURE THAT THE MOTOR TURNS FREELY AND HAS CLEARANCE.

(3) Use the PN 835643-1 mounting adapter. Install the motor in a test setup equivalent to that shown in Figure 1003. Attach the PN 2024047-1 shaft adapter to the load device.

CAUTION: TO PREVENT DAMAGE TO THE MOTOR, LET THE MOTOR TEMPERATURE DECREASE FOR 5 MINUTES FOR EACH 30 SECONDS OF OPERATION UNDER LOAD. DO NOT OPERATE THE MOTOR LONGER THAN NECESSARY TO DO THE TESTS.

(4) Apply a DC voltage of 18.4 to 19.0 volts across the motor terminals with a load of 4.9 to 5.1 ft-lb (6.4 to 6.9 Nm) applied to the motor output shaft. Refer to Table 1004.

Table 1004. Rated-Load Test Requirements

Load Voltage	Load Current (max)	Load Torque	Load Speed (min)
18.7 ±0.3 VDC	375 DC A	5.0 ±0.1 ft-lb (6.78 ±0.14 Nm)	6,765 rpm
9.9 ±0.3 VDC	985 DC A	20.0 ±0.4 ft-lb (27.12 ±0.54 Nm)	1,525 rpm

(5) The motor shaft speed must not be less than 6,765 rpm. The motor current must not be more than 375 DC A.

(6) Remove the power and let the motor temperature decrease for 5 minutes (minimum).

(7) Apply a DC voltage of 9.6 to 10.2 volts across the motor terminals with a load of 19.6 to 20.4 ft-lb (26.58 to 27.66 Nm) applied to the motor output shaft.

(8) The motor shaft speed must not be less than 1,525 rpm. The current must not be more than 985 DC A.

(9) Remove the power and let the motor temperature decrease for 5 minutes (minimum).

(10) Install the ratchet (290). Refer to ASSEMBLY, Paragraph 2.D. (Subtask 49-42-02-400-004-A01)

G. Alternate Rated-Load Test (Subtask 49-42-02-810-007-A01)

(1) Perform the rated-load test in Paragraph 2.F. (Subtask 49-42-02-810-006-A01) and use alternate load, voltage, current, and speed values. Refer to Table 1005.

Table 1005. Rated-Load Test Requirements

Load Voltage	Load Current (max)	Load Torque	Load Speed (min)
17.1 ±0.2 VDC	500 DC A (low torque)	7.5 ±0.1 ft-lb (10.17 ±0.14 Nm)	5,250 rpm
13.2 ±0.2 VDC	700 DC A (high torque)	14.5 ±0.1 ft-lb (19.66 ±0.14 Nm)	2,750 rpm

H. Insulation Resistance Test (Subtask 49-42-02-810-008-A01)

NOTE: The insulation resistance test is done to find hidden moisture, dirt, and carbon dust from the brushes, or other contamination of the electrical insulation. Remove the contamination before you do the dielectric strength test. Clean the motor. Refer to CLEANING (PGBLK 49-42-02-4000) before you do the test.

CAUTION: DO NOT APPLY INSULATION RESISTANCE TEST VOLTAGE TO A DIRTY MOTOR OR COMPONENT. THIS CAN CAUSE INSULATION DAMAGE.

(1) Use a Model 1864 megohmmeter to test the motor, field coils, armature windings, brush holders and terminals. Apply 500 VDC from the positive (POS) terminal bus bar to the motor housing (ground).

(2) Use a Model 1864 megohmmeter to test the brush indicator switch. Apply 500 VDC between Pins 1 and 2 and the motor housing (ground).

(3) The resistance must be more than 5.0 megohms. Refer to Figure 1003 for a schematic diagram of the motor.

(4) If the motor does not pass the test, clean and test the motor again. If the insulation resistance is still 5.0 megohms or less, repair the motor or component. Refer to REPAIR (PGBLK 49-42-02-6000) for these procedures.

I. Air Leakage Test (Subtask 49-42-02-810-009-A01)

NOTE: The air leakage test finds the ability of the front seal and components to prevent oil and dirt from entering the motor. Failure of this test indicates incorrect shaft sealing, a sealing leak between the end bell and the insert, or a leak in the structural assembly.

(1) Install the motor in the PN 2024061-1 air leakage test fixture or an equivalent test setup. Refer to Figure 1004.

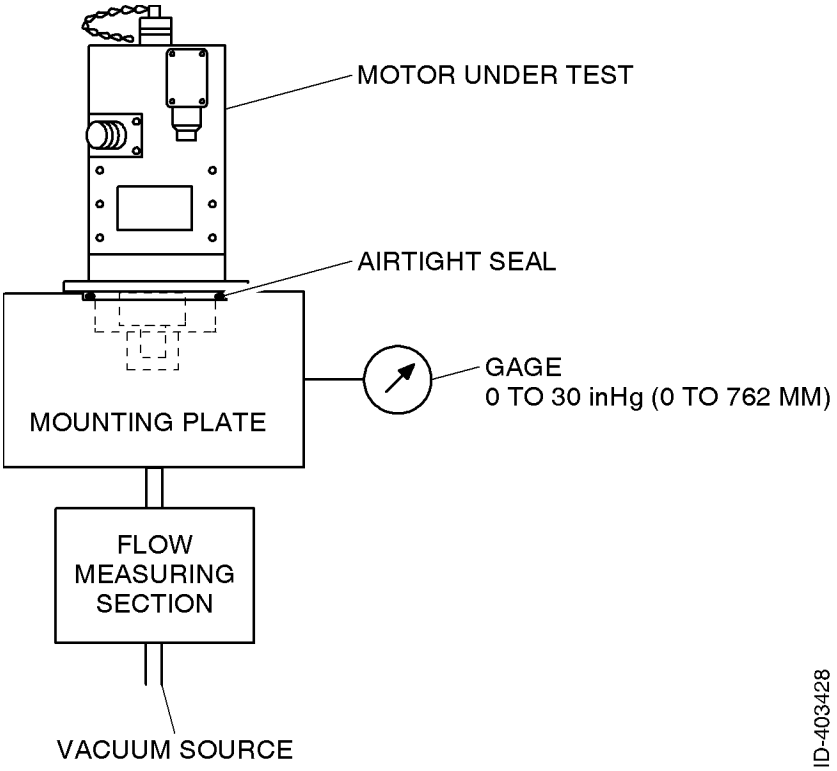


Figure 1004. (Sheet 1 of 1) Air Leakage Test Setup (GRAPHIC 49-42-02-99B-807-A01)

(2) Slowly apply a vacuum of 20.0 inHg (508 mmHg) with Model 7059-42 vacuum/pressure pump and Model 25254-21B51 vacuum pressure gage at the flow measuring section. Monitor the flow rate (leakage) through the flow measuring section with Model GFM170S flow measuring device. Leakage must not be more than 2.72 cm3 (1.071 in3).

(3) An alternate test to the vacuum test described in the previous step is to apply a positive pressure of 20.0 inHg (10 PSIG or 508 mmHg) to the motor in place of the vacuum. Leakage from inside the motor must not be more than 2.0 inHg (1.0 PSIG or 50.8 mmHg) in 5 minutes.

J. Fault Isolation of the Direct Current Motor (Subtask 49-42-02-810-010-A01)

(1) The no-load test shows that the mechanical assembly is serviceable and the rated-load tests show satisfactory electromagnetic operation. Refer to Table 1006 to help isolate the probable causes and corrections for most problems on the basis of the test results.

Table 1006. Fault Isolation

Trouble	Probable Cause	Correction
Motor does not operate (motor must begin to rotate with 3 to 5 VDC applied to the terminals).	Voltage applied to the terminals is not sufficient	Examine for the correct voltage at the terminals.
	Brush assembly (135, IPL Figure 1) shunt connections unacceptable	Examine the brush shunt connections. Repair the brush connections.
	Brush assemblies (135) not correctly seated	Replace brush assemblies. Do the brush run-in. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Worn bearing (415, 420)	Disassemble and examine the bearings. Replace worn bearings. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).
	Not enough clearance between the armature assembly (425) and the field assembly (430)	Examine for correct clearance. Repair or replace damaged parts. Refer to REPAIR (PGBLK 49-42-02-6000).
	Field assembly (430) is damaged	Repair or replace the field assembly. Refer to REPAIR (PGBLK 49-42-02-6000).
	Armature assembly (425) commutator filming damaged	Repair or replace the armature assembly. Do the brush run-in to apply film correctly to the commutator. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Armature assembly (425) is damaged	Repair or replace the armature assembly. Refer to REPAIR (PGBLK 49-42-02-6000).

Table 1006. Fault Isolation (Cont)

Trouble	Probable Cause	Correction
Motor runs at less than specified speed (electromagnetic deficiency or mechanical drag) and/or motor draws high current.	Brush does not seat correctly or brush spring needs more pressure.	Run-in until you get 75% brush contact. Examine the spring pressure. Make sure that the brush is free to move in holder. Make sure that the brush shunts are not hung up. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Not enough armature assembly endplay	Adjust the endplay. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Bearing (415, 420) drag	Examine the bearing fit. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).
	Interference to turn (armature to field poles, commutator to brush holders, bearings to end bells)	Remove the interference. Replace the damaged parts. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000) and ASSEMBLY (PGBLK 49-42-02-7000).
	Rough commutator or incorrect brush action	Resurface the commutator. Check the brush wear. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000) and REPAIR (PGBLK 49-42-02-6000).
Electrical brush wear indicator continuity is not as specified.	Brush assemblies (135) are worn	Replace the brushes.
	Damaged connector (55) or wiring	Replace the connector or repair the wiring. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000) and REPAIR (PGBLK 49-42-02-6000).
	Damaged switch assembly (70)	Remove and replace the switch assembly. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000) and REPAIR (PGBLK 49-42-02-6000).
	Switch assembly (70) leaf spring deformed/bent	Remove and replace the switch assembly.
	Indicator assembly (95) pin binding	Remove and replace indicator assembly.
	Cam (205) tangs broken	Remove and replace cam.

Table 1006. Fault Isolation (Cont)

Trouble	Probable Cause	Correction
Air leakage is too high.	Damaged seal (375)	Remove and replace the seal. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).
	Lapped face of ring (325 or 325A) is scratched or damaged.	Remove and replace the ring.
	Ring (325 or 325A) is incorrectly shimmed for correct seal operation	Examine and shim the ring. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Seal (375) is not correctly installed	Remove and install a new seal. Do not remove and re-install the old seal. Refer to ASSEMBLY (PGBLK 49-42-02-7000).
	Damaged front end bell assembly (400) or insert (405)	Repair or replace the front end bell assembly. Refer to REPAIR (PGBLK 49-42-02-6000) to replace the insert.

K. Job Close-up (Subtask 49-42-02-810-011-A01)

(1) Not applicable.

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SCHEMATIC AND WIRING DIAGRAMS

1. Not Applicable

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DISASSEMBLY

1. Planning Data (TASK 49-42-02-99C-802-A01)

A. Reason for the Job (Subtask 49-42-02-99C-004-A01)

(1) Use these procedures to remove parts from the direct current motor to do the cleaning, checks, and repair. Do only those procedures of disassembly that are necessary to remove the defective parts.

B. Job Setup Data (Subtask 49-42-02-99C-005-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 3001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 3001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	arbor press	commercially available
	heat gun	commercially available
PN 2024067-1	seal press fixture	CAGE: 06848
PN 2024173-1	motor support fixture	CAGE: 06848
PN 2024174-1	torque adapter	CAGE: 06848
PN 2024583-1	bearing puller	CAGE: 06848

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 3002 for the specified consumable materials in this section.

Table 3002. Consumables

Number	Description	Source
Not applicable	Not applicable	Not applicable

NOTE: Alternate means the two materials can be used alternatively and that one is not better than the other.

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

(6) Refer to Table 3003 for the recommended parts to be replaced at each disassembly.

NOTE: In-service experience can be used for actual replacement of parts.

Table 3003. Parts to Be Replaced at Each Disassembly

Figure Number	Item Number	Nomenclature	Quantity
IPL Figure 1	125	Packing	1
	135	Brush assembly	8
	160	Packing	1
	280	Packing	1
	285	Packing	1
	305	Packing	1
	330	Packing	1
	375	Seal	1
	415	Bearing	1
	420	Bearing	1

2. Procedure (TASK 49-42-02-000-801-A01)

A. Job Setup (Subtask 49-42-02-000-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

(2) The item numbers shown in the DPL are the same as the item numbers on the exploded view illustration(s). To find a part number, find the part on the illustration and note the item number. Find the item number in the parts list and read the correct part number. Item numbers refer to the same figure until a different figure is specified.

(3) Before disassembly, use TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000) to examine the condition of the unit or to find the malfunction. Do this to prevent disassembly that is not necessary.

(4) As an aid for assembly, tag the items that are disconnected to show where the connections were made.

B. General Disassembly Procedures (Subtask 49-42-02-000-002-A01)

CAUTION: BE CAREFUL TO PREVENT DAMAGE TO PARTS THAT CAN BE USED AGAIN.

(1) Disassemble in a dry, bright, clean room.

(2) Do not disassemble staked, welded, riveted, soldered, swaged, or press-fit assemblies. Do not remove plates, passage hole plugs, or threaded inserts unless replacement is necessary.

(3) Examine bearings for roughness, brinelling, and damaged races or retainers. These conditions can be an indication of possible damage.

C. Detailed Disassembly Procedures (Subtask 49-42-02-000-003-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) Use the PN 2024173-1 motor support fixture to support the motor in the vertical position on a stable work surface with the front end bell assembly (400) in the downward position.

(3) Do not remove the ident plate (10), or labels (15, 25, 30), from the motor unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(4) Remove the terminal boot (20) from the terminal assembly (455).

(5) Remove the screws (35). Carefully separate the cover (40) and gasket (45) from the housing assembly (100).

(6) Do not cut the lockwire to remove the screws (50), connector (55) or wiring from connector pins unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(7) Remove the switch assembly (70) by carefully disconnecting the leaf spring from the indicator assembly (95) pin and gently rotate the switch assembly out of the housing to avoid bending the leaf spring.

(8) Remove the screws (75), washers (80) and indicator assembly (95). Carefully separate the housing assembly (100) and gasket (90) from the cover (120). Do not remove the terminal lug (85) or the wiring unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(9) Remove the screws (105), washers (110), dust cover (115) and cover (120) from the motor.

(10) Remove and discard the packing (125).

CAUTION: DISENGAGE THE CAM (205) ARM FROM THE SPRING (195) BEFORE YOU REMOVE THE BRUSH ASSEMBLY (135). IF BRUSHES ARE REMOVED FIRST, THE FORCE OF THE SPRING CAN DAMAGE THE CAM ARM.

(11) Remove the screw assemblies (130) that secure the brush assembly (135) shunts to the holders (220).

(12) Lift the spring (195) and carefully remove the brush assemblies (135). Remove the top brush assembly first to prevent interference with the access port in the rear end bell assembly (170).

(13) Install the two screw assemblies (130) on the holders (220) to secure the bus bar assembly (235) in the rear end bell assembly (170). Loosen the nut (440) on the negative (NEG) terminal of the field assembly (430).

(14) Remove the nuts (150) and washers (155) from the end of the studs (395).

(15) Use a knife to separate the adhesive between the grommets (230, 480). Remove the rear end bell assembly (170), bus bar assembly (235), base assembly (210) and attached hardware from the motor.

(16) Remove the two screw assemblies (130) from the holders (220). Carefully remove the bus bar assembly (235) from the rear end bell assembly (170).

(17) Remove the grommet (230) from the rear end bell assembly (170).

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(18) Use a heat gun to apply heat to the rear end bell assembly (170) and screws (140, 165) to loosen compound. The threads of the screws have locking compound on them that can make them difficult to remove.

(19) Remove the screws (140) and support (145).

(20) Remove the packing (160) from the rear end bell assembly (170). Discard the packing.

(21) Remove the screws (165) and the base assembly (210) with attached components from the rear end bell assembly (170).

(22) Do not remove the inserts (175, 180, 185) from the end bell housing (190) unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(23) Remove the springs (195), sleeve (200) and cam (205) from the base assembly (210).

(24) Do not remove screws (215) or holders (220) from the base assembly (210) unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(25) Bend up the tab on the key (245) until it is disengaged from the grooves in nut (240).

(26) Remove the nut (240), key (245) and shim washers (250, 255, 260). Make a note of the size and quantity of shim washers to help in assembly.

(27) Remove the motor from the PN 2024173-1 motor support fixture and place it on the work bench.

(28) Hold the ratchet (290) and slide the shaft (310), with the attached hardware, out of the armature assembly (425).

(29) Bend down the tabs on the washer (270). Remove the bolt (265) and washers (270, 275) from the shaft (310).

(30) Remove the ratchet (290) with packings (280, 285) and washers (295, 300) from the shaft.

(31) Remove the packings (280, 285) from the ratchet (290). Discard the packings.

(32) Remove the packing (305) from shaft (310). Discard the packing.

(33) Bend up the tab on the key (320) until it disengages from the grooves in the nut (315).

(34) Temporarily install the shaft (310) into the armature assembly (425).

(35) Use a wrench to hold the hand crank hex head on the opposite end of the shaft (310). Use the PN 2024174-1 torque adapter to loosen the nut (315).

(36) Remove the nut (315), key (320), ring (325 or 325A) and shaft (310) from the armature assembly (425).

(37) Remove the armature assembly (425) with attached bearings (415, 420) from the field assembly (430).

(38) Remove the packing (330) and shim washers (335, 340, 345) from the armature assembly (425). Make a note of the size and quantity of shim washers to help in assembly.

(39) Use a rubber hammer to loosen the front end bell assembly (400) from the field assembly (430). Slide the front end bell assembly and studs (395) out of the field assembly.

(40) Remove wave washers (350) and shims (355, 360, 365, 370) from the front end bell assembly (400). Make a note of the size and quantity of shim washers to help in assembly.

CAUTION: DO NOT USE THE OLD SEAL (375) THAT HAS BEEN REMOVED FROM THE FRONT END BELL ASSEMBLY (400). DAMAGE TO THE SEAL IS NOT ALWAYS SHOWN AND CAN CAUSE EARLY MOTOR FAILURE.

(41) Use an arbor press and the PN 2024067-1 seal press fixture to press the seal (375) out of the front end bell assembly (400). Discard the old seal.

(42) Remove the sleeving (380, 390) and bushings (385) from the studs (395) in the front end bell assembly (400).

(43) Do not remove the studs (395) from the front end bell assembly (400) unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

(44) Do not remove the insert (405) from the machined end bell (410) unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

CAUTION: DO NOT USE THE OLD BEARINGS (415, 420) THAT HAVE BEEN REMOVED FROM THE ARMATURE ASSEMBLY (425). BEARING DAMAGE IS NOT ALWAYS SHOWN AND CAN CAUSE MOTOR FAILURE.

(45) Use the PN 2024583-1 bearing puller to remove the bearings (415, 420) from the armature assembly (425). Discard the old bearings.

(46) Do not remove the nuts (435, 440), screws (445, 460), terminal assembly (455), washers (450), insulator (465), stack assemblies (470), winding assembly (475), grommet (480) or pin (485) from housing (490) unless necessary. Refer to INSPECTION/CHECK (PGBLK 49-42-02-5000).

D. Job Close-up (Subtask 49-42-02-000-004-A01)

(1) Not applicable.

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CLEANING

1. Planning Data (TASK 49-42-02-99C-803-A01)

A. Reason for the Job (Subtask 49-42-02-99C-006-A01)

(1) Use these procedures to remove dust, dirt, and unwanted oil and grease. Be careful not to cause damage to the parts when you do these procedures.

B. Job Setup Data (Subtask 49-42-02-99C-007-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 4001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 4001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	copper wire brush	commercially available
	oven	commercially available
	soft-bristle brush	commercially available
	source of compressed air	commercially available
	steam cleaner	commercially available
	stiff-fiber bristle brush	commercially available
	vacuum chamber	commercially available

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 4002 for the specified consumable materials in this section.

Table 4002. Consumables

Number	Description	Source
	cotton swab	commercially available
	lint-free cloth	commercially available
	magnetic base oil	CAGE: 60519
ANSI B74.18	abrasive cloth	commercially available
Arrow 198	alkaline cleaner	CAGE: 0AKX3
Daraclean 212 or 282	alkaline cleaner (alternate)	CAGE: 09MM0
Desoclean 45	solvent (alternate)	CAGE: 83574

Table 4002. Consumables (Cont)

Number	Description	Source
MIL-DTL-5541F	chemical film	commercially available
MIL-PRF-680, Type II	stoddard solvent	commercially available
Ridoline 909	alkaline cleaner (MIL-S-5002)	Henkel Surface Technologies, 32100 Stephenson Hwy., Madison Heights, MI 48071
Super C	detergent	National Colloid, 411 E. Columbine Ave., Santa Ana, CA 92707
Super Ruststripper	rust stripper	CAGE: 01PQ6
TT-I-735	isopropyl alcohol	commercially available
Turco 4181	rust stripper (alternate)	Turco Products Inc., 7300 Bolsa Ave., Westminster, CA 92684-3600
Turco 5948 DPM	detergent (alternate)	Henkel Surface Technologies, 32100 Stephenson Hwy., Madison Heights, MI 48071

NOTE: Alternate means the two materials can be used alternatively and that one is not better than the other.

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

2. Procedure (TASK 49-42-02-100-801-A01)

A. Job Setup (Subtask 49-42-02-100-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

CAUTION: BEFORE YOU USE ISOPROPYL ALCOHOL, DO A TEST TO MAKE SURE THAT IT DOES NOT CAUSE DAMAGE TO THE PAINTED SURFACES.

CAUTION: DO NOT LET THE ISOPROPYL ALCOHOL TOUCH THE CONNECTOR BODY. IT CAN CAUSE DAMAGE TO THE PARTS. USE ISOPROPYL ALCOHOL CAREFULLY WHEN YOU CLEAN FLUX FROM THE SOLDER CONNECTIONS.

(1) Obey the precautions.

(2) This section describes physical and chemical processes that can make it necessary to use chemicals, compounds, solvents, and other customer furnished materials. Get the material safety data sheets (OSHA form 174 or equivalent) from the manufacturers or suppliers of the materials that you use. Become familiar with the manufacturer and supplier information. Keep to the procedures, instructions, warnings and cautions set forth for the safe use, mixing, handling, storage, and disposal of the materials.

(3) Each part must be cleaned with the procedures referred to in this section or the equivalent procedures used by an approved repair facility. Make the cleaning solutions with the instructions in this manual or the instructions supplied by the product manufacturer.

(4) When you use pressurized air to clean assemblies and parts, do not use more air pressure than is necessary.

(5) After you clean the assemblies and parts, supply protection from moisture, dust, and other contamination until you do a visual check and assemble the component.

B. Preparation of Cleaning Solutions (Subtask 49-42-02-100-002-A01)

WARNING: USE CORRECT PROTECTION IN A WELL VENTILATED AREA. ALKALINE CLEANER SOLUTION CAN CAUSE SKIN, EYE, AND LUNG DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(1) Prepare alkaline cleaner solution. Refer to Table 4003 for mixing concentrations. Keep the solution at 130 to 180°F (54.4 to 82.2°C).

NOTE: Drinking water is permitted for preparation of cleaning solutions.

Table 4003. Mixing Concentrations

Cleaner	Concentration
Arrow 198 alkaline cleaner	Mix 5 to 10 percent by volume of alkaline cleaner to water.
Daraclean 212 or 282 alkaline cleaner (alternate)	Mix 5 to 12 percent by volume of alkaline cleaner to water.
Ridoline 909 alkaline cleaner	Mix 4 to 6 ounces (113.4 to 170.1 g) of alkaline cleaner in each gallon (3.8 L) of water.

(2) Prepare rust stripper solution as follows:

WARNING: USE THE CORRECT PROTECTION. RUST REMOVER SOLUTION FUMES CAN BE DANGEROUS. MIX THE WATER AND ADD THE RUST REMOVER SO THE SOLUTION DOES NOT BECOME TOO HOT.

(a) Mix 2 to 3 pounds (0.9 to 1.3 kg) of Super Ruststripper rust stripper or Turco 4181 rust stripper (alternate) in each gallon (3.8 L) of water.

(b) Keep the solution at 160 to 200°F (71.1 to 93.3°C).

C. Cleaning Component Parts (Subtask 49-42-02-100-003-A01)

(1) The material composition or physical properties of each part is listed in REPAIR (PGBLK 49-42-02-6000).

(2) Clean the parts with the specified procedures as shown in Table 4004. When more than one procedure to clean a part is shown in the table, use only the procedure necessary to satisfactorily clean the part. Any or all of the procedures can be used, not used, or done again as necessary to clean the components.

Table 4004. Cleaning Procedures

IPL Figure No.	Item No.	Nomenclature	Cleaning Procedures				
			1	2	3	4	5
IPL Figure 1	20	Terminal boot		X			
	55	Connector	X				
	70	Switch assembly	X				
	120	Cover				X	
	135	Brush assembly	X				
	170	Rear end bell assembly			X		
	195	Spring	X			X	
	205	Cam	X				X
	220	Holder	X				
	225	Molded base assembly	X	X			
	230	Grommet	X				
	235	Bus bar assembly		X			
	290	Ratchet				X	
	310	Shaft				X	
	325	Ring				X	
	325A	Ring				X	
	400	Front end bell assembly			X		
	415	Bearing	X				
	420	Bearing	X				
	425	Armature assembly	X	X			
	430	Field assembly	X	X	X		
	480	Grommet	X				

D. PROCEDURE 1 - Cleaning Component Parts (Subtask 49-42-02-100-004-A01)

CAUTION: USE ONLY THE PROCEDURES RECOMMENDED TO CLEAN THE PART. PARTS CAN BE DAMAGED IF YOU USE THE INCORRECT CLEANING PROCEDURE. REFER TO TABLE 4004 FOR THE CORRECT CLEANING PROCEDURE.

(1) Clean the components with a cloth and solvent as follows:

(a) Refer to IPL Figure 1 for all the item numbers unless specified differently.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(b) Wipe the bearings (415, 420) with a clean lint-free cloth saturated with TT-I-735 isopropyl alcohol, Desoclean 45 solvent (alternate) or MIL-PRF-680, Type II stoddard solvent. Wipe the bearings with a different lint-free cloth before the solution dries from the surface.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(c) Wash all non-electrical parts with TT-I-735 isopropyl alcohol, Desoclean 45 solvent (alternate) or MIL-PRF-680, Type II stoddard solvent, except bearings (415, 420).

CAUTION: DO NOT PUT ELECTRICAL PARTS IN SOLVENT. SOLVENT CAN DAMAGE COMPONENTS.

CAUTION: KEEP THE SOLVENT AWAY FROM THE SWITCH ASSEMBLY (70). THE SWITCH ASSEMBLY IS HERMETICALLY SEALED AND CAN BE DAMAGED IF IT TOUCHES SOLVENT.

(d) The connector (55), terminal lug (85), and all the wires that connect components must be free of dirt and corrosion. Clean all electrical parts with a soft-bristle brush that is moist with solvent. Remove the remaining solvent with a clean, dry lint-free cloth.

(e) Clean the switch assembly (70) with a cotton swab or a dry lint-free cloth.

(f) Carefully clean between the bars of armature assembly (425) commutator with a copper wire brush.

E. PROCEDURE 2 - Steam Cleaning (Subtask 49-42-02-100-005-A01)

(1) Remove the dirt and grease from the parts with a steam cleaner spray as follows:

WARNING: CLEAN THE PARTS IN AN AREA OPEN TO THE AIR AND THAT HAS GOOD LIGHT AND SUFFICIENT SAFETY AND FIRE PREVENTION EQUIPMENT.

(a) Steam clean the surface of the parts with water at 25 to 30 PSIG (172 to 207 kPa). Add a small amount of Super C detergent or Turco 5948 DPM detergent (alternate) to the water to help in the cleaning procedure.

(b) Clean the parts until the contamination is removed.

(c) Remove any caked on grease or soft carbon with a stiff-fiber bristle brush.

(d) Flush the parts fully with a spray of hot tap water.

WARNING: USE THE CORRECT PROTECTION. COMPRESSED AIR WILL REMOVE LOOSE PARTICLES THAT CAN GET IN YOUR EYES. THE AIRSTREAM CAN CAUSE CUTS. DO NOT POINT THE AIRSTREAM TOWARD YOURSELF OR OTHER PERSONS.

(e) Use a clean, dry, filtered source of compressed air at a maximum of 20 PSIG (138 kPa) to remove as much moisture from the part as possible.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(f) Put the parts in an oven at 230 to 250°F (110 to 121°C) for 12 hours minimum, or until fully dry.

WARNING: USE THE CORRECT PROTECTION. COMPRESSED AIR WILL REMOVE LOOSE PARTICLES THAT CAN GET IN YOUR EYES. THE AIRSTREAM CAN CAUSE CUTS. DO NOT POINT THE AIRSTREAM TOWARD YOURSELF OR OTHER PERSONS.

(g) Remove the parts from the oven and blow with compressed air at 20 to 30 PSIG (138 to 207 kPa).

F. PROCEDURE 3 - Alkaline Cleaning of Aluminum Alloy Parts (Subtask 49-42-02-100-006-A01)

NOTE: Any of the alkaline cleaners shown in Table 4003 can be used. For more satisfactory cleaning, use the cleaners with rack agitation, ultrasonic, or spray wash equipment.

WARNING: CLEAN THE PARTS IN AN AREA OPEN TO THE AIR AND THAT HAS GOOD LIGHT AND SUFFICIENT SAFETY AND FIRE PREVENTION EQUIPMENT.

(1) Put the parts fully in a tank of Arrow 198 alkaline cleaner, Daraclean 212 or 282 alkaline cleaner (alternate) or Ridoline 909 alkaline cleaner solution for a maximum of 30 minutes.

(a) Clean the surfaces with a stiff-fiber bristle brush until clean.

(b) Soak the parts again until they are clean.

(2) Use an ANSI B74.18 abrasive cloth to remove small surface corrosion on aluminum alloy parts.

(3) Flush the parts with water at 80 to 100°F (26.7 to 43.3°C) to remove the cleaning solution.

WARNING: USE THE CORRECT PROTECTION. COMPRESSED AIR WILL REMOVE LOOSE PARTICLES THAT CAN GET IN YOUR EYES. THE AIRSTREAM CAN CAUSE CUTS. DO NOT POINT THE AIRSTREAM TOWARD YOURSELF OR OTHER PERSONS.

(4) Use a clean, dry, filtered source of compressed air at a maximum of 20 PSIG (138 kPa) to dry the parts.

WARNING: USE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. CHEMICAL FILM SOLUTION CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(5) Apply MIL-DTL-5541F chemical film to the bare metal.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(6) Dry all parts that have dissimilar metal inserts, crevices, or deep blind holes, in an oven at 140 to 270°F (60 to 132°C) for a minimum of 1 hour. Make sure the parts are fully dry.

G. PROCEDURE 4 - Cleaning Steel Parts (Subtask 49-42-02-100-007-A01)

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. RUST STRIPPER SOLUTIONS CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME. ADD RUST STRIPPER WHILE SOLUTION IS MIXED SO IT DOES NOT BECOME TOO HOT.

CAUTION: NON-STEEL PARTS CAN BE BADLY DAMAGED IF CLEANED WITH RUST STRIPPER SOLUTION.

(1) Put the parts in a Super Ruststripper rust stripper or Turco 4181 rust stripper (alternate) solution for 10 to 30 minutes.

CAUTION: USE ONLY A STIFF FIBER BRISTLE BRUSH ON HIGHLY FINISHED SURFACES.

(2) Remove the parts from the rust stripper solution. Flush the parts with water and clean them with a stiff-fiber bristle brush.

(3) Flush the parts in water at 80 to 110°F (26.7 to 43.3°C) to remove the cleaning solution.

WARNING: USE THE CORRECT PROTECTION. COMPRESSED AIR WILL REMOVE LOOSE PARTICLES THAT CAN GET IN YOUR EYES. THE AIRSTREAM CAN CAUSE CUTS. DO NOT POINT THE AIRSTREAM TOWARD YOURSELF OR OTHER PERSONS.

(4) Use a clean, dry, filtered source of compressed air at a maximum of 20 PSIG (138 kPa) to dry the parts.

(5) Steel parts may need a magnetic particle check or a penetrant examination. If an examination is within 8 hours, put these parts in a clean, dry container until checked.

WARNING: USE THE CORRECT PROTECTION TO PREVENT SKIN, EYE AND RESPIRATORY DAMAGE FROM THE OIL USED DURING THIS CHECK.

(6) Apply a layer of magnetic base oil to steel parts that you will keep for more than 8 hours and that need a magnetic particle check. Put the parts in a clean container.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. LUBRICATING OILS MAY CONTAIN THE ADDITIVE TRICRESYL PHOSPHATE. TRICRESYL PHOSPHATE CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE.

(7) Put the steel parts that do not need a magnetic particle check in a dip tank of oil. Remove the parts and let them drain. Put them in a clean container and keep them away from moisture and gases that can cause corrosion.

(8) Stainless steel and some corrosion-resistant steel parts that are usually used where there is no oil must be kept dry and protected from moisture that can cause corrosion.

(9) Apply corrosion preventive compounds to steel parts that you keep for more than six months or keep in humid conditions. Refer to MIL-C-15074.

H. PROCEDURE 5 - Cleaning the Holders (Subtask 49-42-02-100-008-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) Remove the holders (220) from the molded base assembly (225). Refer to REPAIR (PGBLK 49-42-02-6000) for removal and replacement of these items.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(3) Clean the holders (220) with a soft-bristle brush moist with TT-I-735 isopropyl alcohol, Desoclean 45 solvent (alternate) or MIL-PRF-680, Type II stoddard solvent. Remove the remaining solvent with a clean, dry lint-free cloth.

(4) Remove oil that has possibly gone into the material. Vacuum degrease the parts as follows:

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(a) Put the parts fully into a container of TT-I-735 isopropyl alcohol or Desoclean 45 solvent (alternate).

(b) Put the container with parts in a vacuum chamber and remove the air from the chamber until the solvent begins to boil.

(c) Release the vacuum until the boiling stops.

(d) Do Steps (a) thru (c) two times. If the solvent shows that it contains oil, continue to vacuum degrease until the solvent looks clean.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(e) Put the parts in an oven at 225 to 275°F (107 to 135°C) for 2 hours minimum, or until fully dry. Remove the parts from the oven.

I. Job Close-up (Subtask 49-42-02-100-009-A01)

(1) Not applicable.

INSPECTION/CHECK

1. Planning Data (TASK 49-42-02-99C-804-A01)

A. Reason for the Job (Subtask 49-42-02-99C-008-A01)

(1) Use these procedures to find damage or worn parts and parts that show signs of near failure.

B. Job Setup Data (Subtask 49-42-02-99C-009-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 5001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 5001. Special Tools, Fixtures, and Equipment

Number	Description	Source
Model 103-2.5	dielectric strength tester (0 to 2,500 VAC, accuracy: 0 to 5 mA leakage, 0 to 0.005 MFD, 10 mA (maximum) sc current)	CAGE: 05611
Model 1864	megohmmeter (0 to 1,000 VDC, 5 mA ±2% accuracy)	CAGE: 0PK96
Model 2501	growler	CAGE: 92381
Model 260	ohmmeter	CAGE: 6H316
Model H720	magnetizing unit	CAGE: 37676
Model SB2824T	demagnetizing unit	CAGE: 37676
Model ZA-28	penetrant examination unit	CAGE: 37676

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 5002 for the specified consumable materials in this section.

Table 5002. Consumables

Number	Description	Source
	magnetic base oil	CAGE: 60519
	penetrant oil (MIL-I-25135)	commercially available
Magnaglo Dry Concentrate No. 14A	magnetic particles compound	CAGE: 37676

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

2. Procedure (TASK 49-42-02-210-801-A01)

A. Job Setup (Subtask 49-42-02-210-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

(2) Replace all damaged or worn parts. This prevents possible failures of the equipment.

B. General Inspection/Check of the Direct Current Motor (Subtask 49-42-02-210-002-A01)

(1) Check all components in a clean, well-lighted area.

(2) Detailed checks are not necessary unless a visual check of the component indicates that a detailed check is necessary.

(3) Components that do not agree to the specified check requirements must be repaired or replaced.

(4) If a visual check indicates possible damage, refer to REPAIR (PGBLK 49-42-02-6000).

C. Visual Checks (Subtask 49-42-02-210-003-A01)

(1) Examine all parts for wear or damage. Examine all threaded parts for crossed, stripped or galled threads.

(2) Examine all bearings for roughness and damaged races or retainers. These conditions indicate possible damage to related parts.

(3) Examine all electrical parts and wiring for corrosion and deterioration of insulation.

(4) Examine machined surfaces for cracks, nicks, scratches and corrosion.

(5) Examine painted surfaces for blisters, flaking or chipping paint, and worn spots that expose bare metal.

D. Penetrant Examination (Subtask 49-42-02-210-004-A01)

NOTE: It is not necessary to do a penetrant examination on anodized, plated or painted surfaces unless the results of a visual examination requires a detailed examination.

(1) Do the penetrant examination as follows: (Refer to ASTM-E-1417, Type I, Method A Level 3.)

(a) Remove anodize or paint from the surface.

(b) Remove all rust, scale, burrs, dirt, grease and other contaminants. Make sure the part is dry. Refer to CLEANING (PGBLK 49-42-02-4000).

(c) Refer to the manufacturer's instructions to use the Model ZA-28 penetrant examination unit and penetrant oil.

(d) Remove all penetrant oil when done. Refer to CLEANING (PGBLK 49-42-02-4000).

(e) Apply anodize or paint if necessary. Refer to REPAIR (PGBLK 49-42-02-6000).

E. Magnetic Particle Examination (Subtask 49-42-02-210-005-A01)

NOTE: It is not necessary to do a magnetic particle examination on anodized, plated or painted surfaces, unless the results of a visual examination requires a detailed examination.

(1) Do the magnetic particle examination as follows: (Refer to ASTM-E-1444.)

WARNING: USE THE CORRECT PROTECTION TO PREVENT SKIN, EYE AND RESPIRATORY DAMAGE FROM THE OIL USED DURING THIS CHECK. THE ELECTRICAL CURRENT IS ALSO DANGEROUS AND CAN BURN THE SKIN.

(a) Use the wet continuous DC method with the Model H720 magnetizing unit, magnetic base oil and Magnaglo Dry Concentrate No. 14A magnetic particles compound to do the check.

(b) If necessary, remove paint from the surface of the part.

(c) Remove all rust, scale, burrs, dirt, grease or other contamination from the part.

(d) Magnetize the part in the longitudinal direction.

(e) Do the check.

(f) Magnetize the part in the circumferential direction.

(g) Do the check.

(h) The part must not have cracks, tears, corrosion pits or galling.

(i) Use the Model SB2824T demagnetizing unit to demagnetize the part to a maximum of 100 gauss.

(j) Fully remove all magnetic base oil from the part.

(k) If necessary, refer to REPAIR (PGBLK 49-42-02-6000) to paint the part.

F. Detailed Inspection/Check of the Direct Current Motor (Subtask 49-42-02-210-006-A01)

NOTE: This section is followed by a table which gives detailed dimensional checks for individual components. The detailed checks must be done when the motor is in for overhaul and is indicated based on the results of the visual checks done on removed components.

NOTE: Some parts were removed at DISASSEMBLY (PGBLK 49-42-02-3000) as the motor was disassembled to the level necessary for repair.

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) Examine the ident plate (10) and labels (15, 25, 30) for security and legibility. Refer to REPAIR (PGBLK 49-42-02-6000).

(3) Examine the gaskets (45, 90) for damage.

(4) Examine the connector (55) for bent or broken connector pins and poor solder connections. Do a continuity test of the wires between the connector pins and the terminal lug (85) and the terminals on the switch assembly (70). Refer to REPAIR (PGBLK 49-42-02-6000).

(5) Examine the switch assembly (70) as follows:

NOTE: It is assumed that the indicator assembly (95) and housing assembly (100) are removed from the motor as an assembly.

(a) Connect an Model 260 ohmmeter to Pins 1 and 2 on the connector and measure the continuity with:

1 Indicator assembly (95) pin in normal retracted position (manually move pin) - no continuity allowed.

2 Indicator assembly (95) pin in fully extended position - continuity required.

(b) Check for binding or sticking of the indicator pin assembly.

(c) Check for a bent, deformed, or damaged switch or leaf spring (as engaged with the indicator pin: Do not remove the indicator assembly or switch assembly). Refer to REPAIR, Paragraph 2.E. (Subtask 49-42-02-300-005-A01) if removal of either is required.

(d) If any of the above indicates a discrepancy, refer to REPAIR (PGBLK 49-42-02-6000).

(6) Examine the brush assemblies (135) for too much wear or damage. Examine the brushes for requirements specified in Table 5004.

(7) Examine the support (145) for stripped, crossed or worn threads and security on the rear end bell assembly (170).

(8) Examine the rear end bell assembly (170) for cracks or damage. Examine the inserts (175, 180) for stripped, crossed or worn threads. Refer to REPAIR (PGBLK 49-42-02-6000).

(9) Dimensionally examine the ID of insert (185) in the rear end bell assembly (170). Refer to Table 5004.

(10) Examine the springs (195) for cracks, breaks and distortion. Make sure the springs can apply a torque of approximately 1.2 to 1.7 in-lb (0.136 to 0.192 Nm) to keep a downward pressure on the brush assemblies (135).

(11) Examine the base assembly (210) as follows:

(a) Do not damage the holders (220). Make sure that they are secure in the molded base assembly (225). Refer to REPAIR (PGBLK 49-42-02-6000).

(b) Examine the holders (220) for oil impregnation. Refer to Paragraph 2.H. (Subtask 49-42-02-100-008-A01) for removal of oil from the holders.

(c) Examine the molded base assembly (225) for cracks, blisters or overheating. Small hairline cracks that do not extend more than halfway through the base material are acceptable. Refer to REPAIR (PGBLK 49-42-02-6000).

(d) Examine the molded base assembly (225) spring posts for security of attachment. Refer to REPAIR (PGBLK 49-42-02-6000).

(12) Examine the grommet (230) for cracks or damage. Replace if necessary.

(13) Examine the ratchet (290) as follows:

(a) Examine for wear or damage.

(b) Do a magnetic particle examination for cracks if there is wear or damage. Refer to Paragraph 2.E. (Subtask 49-42-02-210-005-A01) or ASTM-E-1444. Replace a cracked ratchet.

(14) Examine the shaft (310) as follows:

(a) Examine for wear or damage.

(b) Do a magnetic particle examination for cracks if there is wear or damage. Refer to Paragraph 2.E. (Subtask 49-42-02-210-005-A01) or ASTM-E-1444. Replace a cracked shaft.

(c) Examine for stripped, crossed or worn threads.

(15) Examine the keys (245, 320) for broken or missing tabs. Replace if necessary.

(16) Examine the surface of the ring (325 or 325A) that mates with the seal (375 or 375A). The surface must be 4 microinches (0.1016 µm) or better.

(17) Examine the studs (395) for security in the front end bell assembly (400) and for stripped, crossed or worn threads. Refer to REPAIR (PGBLK 49-42-02-6000).

(18) Examine the sleeving (380, 390) and bushings (385) for damage and security on the studs (395). Refer to REPAIR (PGBLK 49-42-02-6000).

(19) Dimensionally examine the ID of the insert (405) in the front end bell assembly (400). Refer to Table 5004.

(20) Examine the machined end bell (410) for cracks or damage. Replace if necessary.

(21) Examine the armature assembly (425) as follows:

(a) Examine the condition and finish for signs of rubbing.

(b) Examine the shaft for stripped, crossed or worn threads.

(c) Examine the shaft for scored bearing journals.

(d) Examine the dry-film lubricant on the stack assembly for damage.

(e) Examine the surface of the commutator diameter for grooves, nicks and chips. The surface finish must be at least 16 microinches (0.4064 µm).

(f) Use a Model 1864 megohmmeter or a Model 2501 growler to make sure that there are no open or shorted circuits.

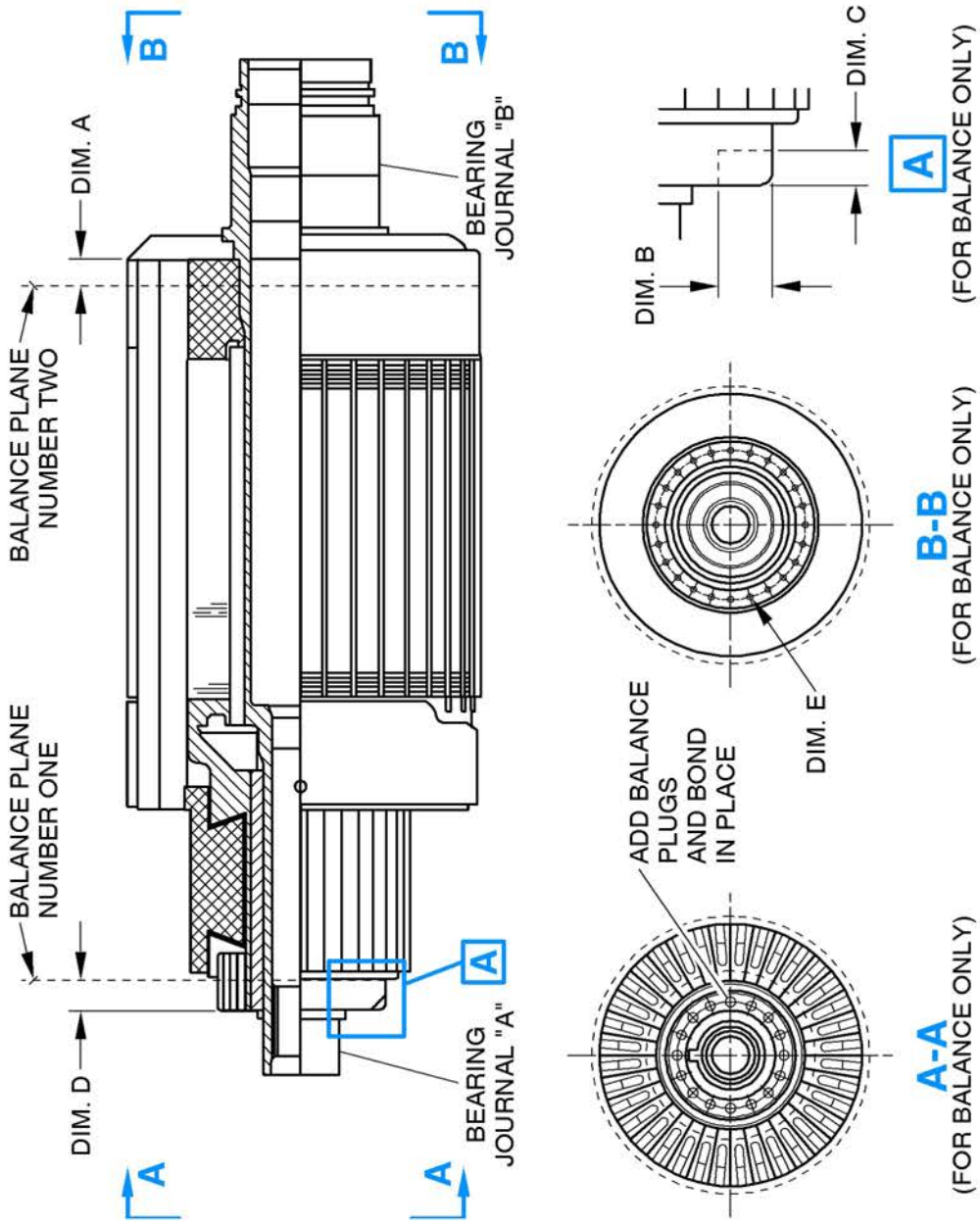
(g) Use a Model 1864 megohmmeter to measure the insulation resistance. Refer to Table 5004.

(h) Use a Model 103-2.5 dielectric strength tester to measure the insulation breakdown of the windings between the commutator bars. Refer to Table 5004.

(i) Dimensionally examine the shaft bearing journal surfaces. Refer to Table 5004.

(j) Dimensionally examine the commutator for concentricity and for dimensional requirements. Refer to Table 5004.

(k) Examine for balance (refer to Table 5004). Examine the two planes for requirements. Refer to Figure 5001.



NOTES:
1. Support armature assembly on bearing journals A and B when measuring and checking unbalance.
2. Dynamic unbalance to be no greater than 0.4 gram-inches in plane number one and 0.4 gram-inches in plane number two.
3. Limiting dimensions for material removal for balancing are shown.

Figure 5001. (Sheet 1 of 1) Armature Assembly Balancing Requirements (GRAPHIC 49-42-02-99B-808-A01)

Table 5003. Dimensional Limits

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIM. A	0.31 (7.9)	DIM. D	0.30 (7.6)
DIM. B	0.30 (7.6) MAXIMUM	DIM. E	DRILL 0.146 (3.71) X 0.65 (16.5) DEEP MAXIMUM
DIM. C	0.20 (5.1) MAXIMUM		

(22) Examine the field assembly (430) as follows:

(a) Make sure the nuts (435, 440) are all there and are not stripped.

(b) Examine the terminal assembly (455) studs for stripped, crossed or worn threads. Refer to REPAIR (PGBLK 49-42-02-6000).

(c) Examine the terminal assembly (455) for security of attachment to the housing (490). Refer to REPAIR (PGBLK 49-42-02-6000).

(d) Examine the inside of the field assembly for indications of scraping or wear. There must be no metal-to-metal contact between stack assemblies (470) and the armature assembly (425) or the housing (490). Refer to REPAIR (PGBLK 49-42-02-6000).

(e) Examine the grommet (480) for cracks, damage or signs of overheating. Refer to REPAIR (PGBLK 49-42-02-6000).

(f) Examine the insulator (465) for damage and security of attachment.

(g) Examine the pins (485) for damage and looseness in the housing (490). Refer to REPAIR (PGBLK 49-42-02-6000).

(h) Make sure that the field assembly does not have an open circuit.

(i) Use a Model 1864 megohmmeter to measure the insulation resistance. Refer to Table 5004.

(j) Use a Model 103-2.5 dielectric strength tester to measure the insulation breakdown of the winding assembly (475). Refer to Table 5004.

Table 5004. Dimensional Requirements

Component Item No. (IPL Figure 1)	Type of Check	Check	Requirements
Brush assembly (135)	Dimensional	Length	Brush length must not be less than 0.52 inch (13.2 mm) minimum as measured from shunt side of brush to center of wear-arc.
Rear end bell assembly (170)	Dimensional	Diameter of bearing bore insert (185)	Refer to FITS AND CLEARANCES (PGBLK 49-42-02-8000) for diametrical information. Refer to REPAIR (PGBLK 49-42-02-6000).
	Dimensional	Concentricity	Seal bore concentric with bearing bore within 0.002 inch (0.050 mm) total indicator reading.

Table 5004. Dimensional Requirements (Cont)

Component Item No. (IPL Figure 1)	Type of Check	Check	Requirements
Front end bell assembly (400)	Dimensional	Diameter of bearing bore insert (405)	Refer to FITS AND CLEARANCES (PGBLK 49-42-02-8000) for diametrical information. Refer to REPAIR (PGBLK 49-42-02-6000).
	Dimensional	Concentricity	Seal bore concentric with bearing bore within 0.002 inch (0.050 mm) total indicator reading.
Armature assembly (425)	Visual	Surface finish of commutator diameter	Examine for grooves, nicks and chips. Surface must be 16 microinches (0.4064 µm) or better.
	Electrical	Insulation resistance	With 500 VDC applied between conductor and ground, resistance must be 5 megohms (minimum). Refer to REPAIR (PGBLK 49-42-02-6000).
	Electrical	Dielectric strength (only if insulation resistance is good)	With 600 VAC, 60 Hz applied between commutator and shaft for 1 second, there must be no arcs or sparks. There must be less than 2.0 mA of leakage current.
	Dimensional	Concentricity of surfaces for bearings (415, 420)	Concentric within 0.001 inch (0.024 mm) total indicator reading.
	Dimensional	Diameter of surfaces for bearings (415, 420).	Refer to FITS AND CLEARANCES (PGBLK 49-42-02-8000) for (415, 420) diametrical information.
	Dimensional	Concentricity	Concentric with bearing surfaces for bearings (415, 420) within 0.001 inch (0.024 mm) total indicator reading. Refer to REPAIR (PGBLK 49-42-02-6000).
	Dimensional	Diameter of commutator surface	Must not be less than 2.230 inches (56.64 mm).
	Dimensional	Depth of mica and finish between bars of commutator	Mica between commutator bars must be 0.020 to 0.025 inch (0.508 to 0.635 mm) deep undercut with a 0.005 to 0.010 inch (0.127 to 0.254 mm) chamfer of bar edges at commutator surface.
	Dynamic balance	Balance in plane No. 1 and plane No. 2	Refer to Figure 5001 for balancing requirements. Refer to REPAIR (PGBLK 49-42-02-6000).

Table 5004. Dimensional Requirements (Cont)

Component Item No. (IPL Figure 1)	Type of Check	Check	Requirements
Field assembly (430)	Electrical	Insulation resistance	With 500 VDC applied between conductor and ground, resistance must be 1 megohm (minimum).
	Electrical	Dielectric strength (only if insulation resistance is good)	With 600 VAC, 60 Hz applied between leads of winding assembly (475) and housing (490) for 1 second, there must be no arcs or sparks. There must be less than 2.0 mA of leakage current. Refer to REPAIR (PGBLK 49-42-02-6000).

(23)

G. Job Close-up (Subtask 49-42-02-210-007-A01)

(1) Not applicable.

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REPAIR

1. Planning Data (TASK 49-42-02-99C-805-A01)

A. Reason for the Job (Subtask 49-42-02-99C-010-A01)

(1) Use these procedures for the direct current motor to replace defective parts and replace or repair defective subassemblies.

(2) Do only those procedures of DISASSEMBLY (PGBLK 49-42-02-3000) that are necessary to make repairs. When new parts are necessary, refer to ILLUSTRATED PARTS LIST (IPL 49-42-02-10000) for the correct part numbers and quantities.

B. Job Setup Data (Subtask 49-42-02-99C-011-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 6001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 6001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	diamond bit tool	commercially available
	oven	commercially available
	stiff-fiber bristle brush	commercially available
	thermocouple	commercially available
MIL-C-22520/1-01	crimp tool (with MIL-C-22520/1-02 positioner)	commercially available
MIL-C-22520/5-01	crimp tool (with MIL-C-22520/5-100 die)	commercially available
Model 4100 ATC	digital ohmmeter	Valhalla Scientific Inc., 9955 Mesa Rim Rd., San Diego, CA 92121
PN 2024062-1	brush holder alignment fixture	CAGE: 06848
PN 2024063-1	expansion arbor	CAGE: 06848
PN M81969/14-03	insertion/removal tool	commercially available

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 6002 for the specified consumable materials in this section.

Table 6002. Consumables

Number	Description	Source
446-21-7038/X-530	paint (gloss black)	Dexter Aerospace, Packaging Prod. Div., 1-7 E. Water St., Waukegan, IL 60085
44GN-11	primer	CAGE: 33461
	epoxy-polyamide primer (MIL-P-23377, Type I, Class 1 or 2)	commercially available
	lint-free cloth	commercially available
ANSI B74.18	abrasive paper (400 grit or finer)	commercially available
ANSI B74.18	crocus cloth	commercially available
Desoclean 45	solvent (alternate)	CAGE: 83574
GE Glyptal 1201	insulation enamel (red) (MIL-E-22118)	CAGE: 65313
Loctite 290	compound (MIL-S-46163, Type III, Grade R)	CAGE: 62377
Loctite RC/620	compound	CAGE: 62377
M16878/5BGE5	wire (20 AWG, green)	commercially available
MIL-DTL-5541F, Class 1A	chemical film	commercially available
MIL-S-22473, Grade T	primer	commercially available
MIL-S-46146, Grade II, Type I	sealant (gray)	commercially available
MMM-A-1617, Type III	adhesive	commercially available
MS20995C32	lockwire	commercially available
Temp-R-Tape, GV	masking tape (1-inch (25.4 mm) width)	Robert McKeown Company Inc., 111 Chambers Brook Rd., Branchburg, NJ 08876

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

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INSERT PAGE 2 OF 8 FACING PAGE 6002.

Reason: To change the specification number for sealant, MIL-S-46146, Grade II, Type I in the consumables table.

Table 6002 is changed as follows:

Table 6002. Consumables

Number	Description	Source
MIL-A-46146, Group II, Type I	sealant (gray)	commercially available

2. Procedure (TASK 49-42-02-300-801-A01)

A. Job Setup (Subtask 49-42-02-300-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

B. References for Repair (Subtask 49-42-02-300-002-A01)

(1) These references show where to find repair data that is located in other sections of this manual and in other manuals. The data in other sections of this manual is necessary for repair of the direct current motor and its primary subassemblies. The data in other manuals gives procedures that are not included in this manual.

(2) Refer to FITS AND CLEARANCES (PGBLK 49-42-02-8000) for:

- Component clearance
- Torque limits.

(3) Refer to ILLUSTRATED PARTS LIST (IPL 49-42-02-10000) for:

- Figure and item numbers
- Subassembly and component locations
- Correct part numbers
- Correct quantities.

(4) Refer to SPM, ATA No. 20-00-02/70-00-01. Standard repair procedures are shop repairs that use the same procedures on many types of assemblies. Use the standard repair procedures and approved local shop procedures.

C. General Repair Procedures (Subtask 49-42-02-300-003-A01)

(1) Replace all components that are found damaged during INSPECTION/CHECK (PGBLK 49-42-02-5000) and cannot be repaired.

(2) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(3) Replace packings (125, 160, 280, 285, 305, 330), brush assemblies (135), seal (375) and bearings (415, 420) regardless of condition. Refer to ASSEMBLY (PGBLK 49-42-02-7000) to install these components.

(4) If the finish on the outer surface of the motor is damaged, refinish as follows:

CAUTION: DO NOT APPLY PAINT ON THE IDENT PLATE (10), LABELS (15, 25, 30), THE FACE OF THE FRONT END BELL ASSEMBLY (400) OR THE TERMINAL ASSEMBLY (455) STUDS AND NUTS (435, 440).

(a) Apply Temp-R-Tape, GV masking tape to the ident plate (10), labels (15, 25, 30), ratchet (290), the face of the front end bell assembly (400), and the terminal assembly (455) studs and nuts (435, 440).

(b) Remove all loose paint with a stiff-fiber bristle brush.

(c) Lightly sand the paint around the damaged area with ANSI B74.18 abrasive paper (400 grit or finer). Make sure that the loose paint or sanding particles do not go into the motor.

WARNING: USE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. CHEMICAL FILM SOLUTION CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(d) Apply MIL-DTL-5541F, Class 1A chemical film to the bare aluminum surfaces with a brush. Refer to MIL-C-5541.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(e) Wipe the sanded area with a clean lint-free cloth that is moist with Desoclean 45 solvent (alternate). Immediately wipe the solvent dry with a clean lint-free cloth.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

CAUTION: DO NOT SPRAY PRIMER PAINT ON THE INTERNAL SURFACES OR PARTS.

(f) Apply a layer of 44GN-11 primer. Refer to the manufacturer's instructions to use the primer paint.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(g) Let the 44GN-11 primer dry at room temperature for 2 hours, or at room temperature for 30 minutes then in an oven at 150 to 275°F (66 to 135°C) for 30 minutes.

(h) Refer to the manufacturer's instructions to prepare the 446-21-7038/X-530 paint (gloss black).

WARNING: PAINT MUST BE HANDLED CAREFULLY AND USED ONLY IN WELL-VENTILATED, APPROVED AREAS. AVOID PROLONGED BREATHING OF VAPORS. AVOID EYE AND REPEATED SKIN CONTACT. KEEP AWAY FROM SPARKS OR FLAMES.

(i) Apply a layer of 446-21-7038/X-530 paint (gloss black) on the area painted with primer.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(j) Let the paint dry at room temperature for 30 minutes, then dry in an oven at 235 to 265°F (113 to 130°C) for 1 hour.

D. Replacement of the Identification Plate and Labels (Subtask 49-42-02-300-004-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) If it is necessary to replace the ident plate (10), or labels (15, 25, 30), attach the new label or ident plate as follows:

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(a) Use Desoclean 45 solvent (alternate) to remove the damaged ident plate or label and clean the remaining adhesive from the surface.

(b) Get all necessary data, such as serial number, from the damaged ident plate and put it on the new ident plate.

(c) Remove the paper from the back of the new ident plate or label by carefully moving your finger across the edge of the ident plate or label.

(d) Moisten the adhesive on the back of new ident plate or label with Desoclean 45 solvent (alternate). Put the ident plate or label on the motor and push down tightly with your fingers.

E. Installation of Indicator Assembly Components (Subtask 49-42-02-300-005-A01)

(1) Refer to Figure 6001 for all the item numbers unless specified differently.

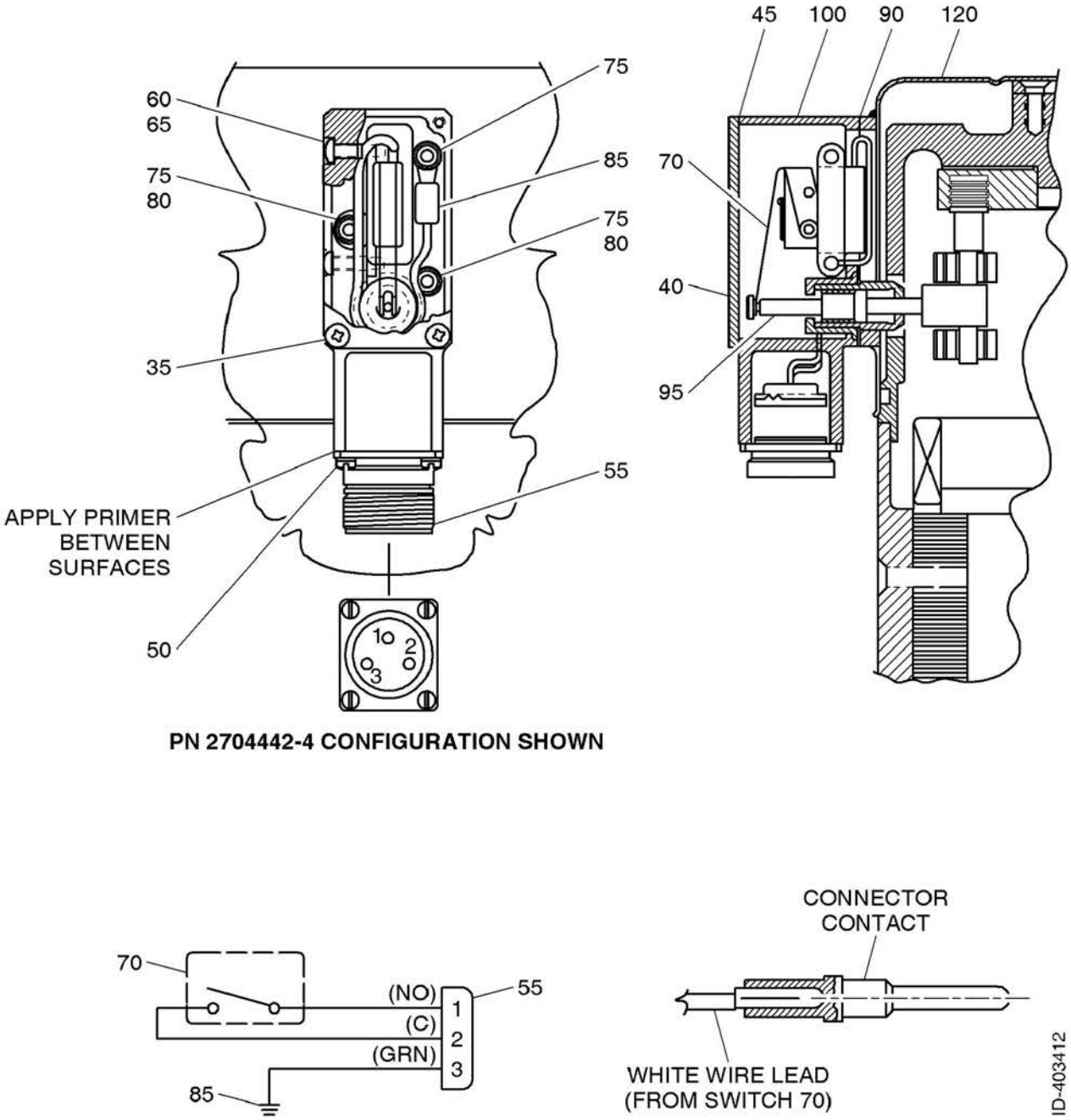

Figure 6001. (Sheet 1 of 1) Indicator Assembly Repair Requirements (GRAPHIC 49-42-02-99B-809-A01)

Key for Figure 6001. (Sheet 1 of 1)

35	SCREW	75	SCREW
40	COVER	80	WASHER
45	GASKET	85	TERMINAL LUG
50	SCREW	90	GASKET
55	CONNECTOR	95	INDICATOR ASSY
60	SCREW	100	HOUSING ASSY
65	WASHER	120	COVER
70	SWITCH ASSY		

(2) If it is necessary to replace damaged wiring, an unserviceable connector (55), switch assembly (70), indicator assembly (95), or housing assembly (100), remove and install as follows:

(a) To remove the switch assembly (70) or indicator assembly (95), disconnect the switch leaf spring from indicator pin assembly by removing the two screws (60) and washers (65) retaining the switch to the housing (100) and gently rotate the switch assembly (70) out to avoid bending the leaf spring when disconnecting from indicator. Then remove indicator assembly (95) if required.

(b) Cut the lockwire and remove the screws (50).

(c) Cut the connector (55) from the housing assembly (100) with a sharp knife or similar tool.

(d) Remove the connector contacts from the connector (55) with the PN M81969/14-03 insertion/removal tool.

(e) Remove the screws (60), washers (65), switch assembly (70), and shims (71, 72, 73, IPL Figure 1) from the housing assembly (100, Figure 6001).

(f) To install the switch assembly (70) or indicator assembly (95), with the switch retaining screws (60) and washers (65) removed, carefully engage the switch leaf spring with the indicator pin groove and rotate switch into position, taking care not to bend or distort the leaf spring beyond its normal position. Install the shims (71, 72, 73, IPL Figure 1 for PN 2704442-5) and the two switch assembly retaining screws (60) with washers (65) and tighten while putting finger pressure on the switch from the mounting side of the housing (100).

NOTE: If necessary for PN 2704442-5, adjust the number of switch shims (71, 72, 73) to center the slot in the switch assembly (70) actuator arm with the brush wear indicator assembly (95).

(g) Put the white wire leads of the switch assembly (70) through the connector lead hole in the housing assembly (100). Cut away the wire leads. Refer to Figure 6001.

(h) Cut a piece of M16878/5BGE5 wire (20 AWG, green) approximately 3.5 inches (88.9 mm) long.

(i) Remove the insulation on one end of the green wire approximately 0.25 inch (6.35 mm). Crimp terminal lug (85) on wire with MIL-C-22520/5-01 crimp tool. Refer to MIL-HDBK-454, Requirement 19.

(j) Put the green wire lead (the end without the terminal lug) through the connector hole in the housing assembly (100). Align the hole in the terminal lug (85) with the lug hole in the housing assembly.

(k) Cut the white and green wire leads to approximately 2.5 inches (63.5 mm) beyond the connector mount face of the housing assembly (100).

(l) Remove the insulation 0.25 inch (6.35 mm) from the end of the green wire lead. Put the wire in the connector (55) contact. Crimp the contact with MIL-C-22520/1-01 crimp tool. Refer to MIL-HDBK-454, Requirement 19.

(m) Remove the insulation 0.50 inch (12.7 mm) from the ends of the white wire leads. Fold back the copper lead and put the wires in connector (55) contacts. Refer to Figure 6001. Crimp contacts with MIL-C-22520/1-01 crimp tool. Refer to MIL-HDBK-454, Requirement 19.

(n) Use the PN M81969/14-03 insertion/removal tool to install the crimped contacts in the connector (55). Refer to Figure 6001.

(o) Use a Model 4100 ATC digital ohmmeter to make sure that there is continuity between connector Pins 1 and 2. Refer to Figure 6001 for the schematic diagram.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(p) Apply a thin layer of epoxy-polyamide primer between the mating surfaces of the connector (55) and the housing assembly (100). Immediately install the connector on the housing assembly.

(q) Twist the connector (55) when you install it on the housing assembly (100). Align the connector on the housing assembly. Refer to Figure 6001.

(r) Attach the connector (55) to the housing assembly (100) with screws (50). Wipe off the unwanted primer. Lock the screws (50) in place with MS20995C32 lockwire. Refer to NAS M33540.

(s) Install the indicator assembly (95) and the housing assembly (100) with the connector (55) and switch assembly (70). Refer to the procedures in the ASSEMBLY (PGBLK 49-42-02-7000).

F. Repair the End Bell Assembly (Subtask 49-42-02-300-006-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) If it is necessary to replace the insert (185) in the end bell housing (190), remove and install as follows:

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

CAUTION: ATTACH A THERMOCOUPLE TO THE ALUMINUM END BELL TO CORRECTLY MONITOR ITS TEMPERATURE.

(a) Heat the rear end bell assembly (170) in an oven to a maximum of 400°F (204°C). Remove it from the oven and immediately push the used insert (185) out of the end bell housing (190).

(b) Measure the ID of the end bell housing (190) after the insert (185) is removed. Replace the end bell housing if the ID does not agree with the dimensions shown in Figure 6002.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(c) Heat the end bell housing (190) in an oven at 340 to 360°F (171 to 182°C) for 30 minutes. Chill the new insert (185) to make it easier to install.

(d) Push the new insert (185) into the end bell housing (190). Seat the insert fully against the shoulder of the end bell housing.

WARNING: MACHINING OPERATIONS MAKE METAL PARTICLES WHICH COULD ENTER THE EYE. SAFETY GOGGLES MUST BE WORN.

(e) After the end bell housing has cooled, machine the ID of the insert (185) to the final dimensions shown in Figure 6002.

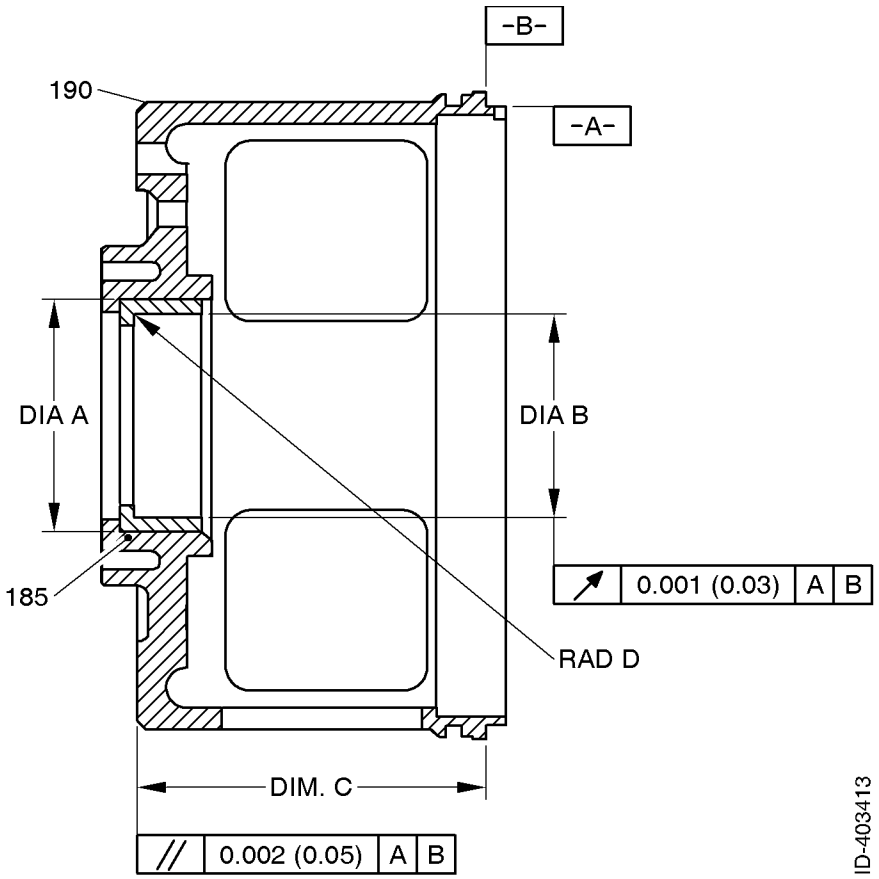

Figure 6002. (Sheet 1 of 1) Rear End Bell Assembly Repair (GRAPHIC 49-42-02-99B-810-A01)

Key for Figure 6002. (Sheet 1 of 1)

185	INSERT	190	END BELL HOUSING

Dimensional Limits for Figure 6002. (Sheet 1 of 1)

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIA A	1.999 TO 2.000 (50.7746 TO 50.8)	DIM. C	2.976 TO 2.980 (75.5904 TO 75.692)
DIA B	1.8503 TO 1.8509 (46.99762 TO 47.01286)	RADIUS D	0.020 TO 0.030 (0.508 TO 0.762)

(3) If it is necessary to replace the inserts (175, 180) in the rear end bell assembly (170), remove the unserviceable insert and install a new insert. Follow the procedures given in military specification sheet NAS MS33537 and remove the tang.

G. Replacement of the Molded Base Assembly or Holders (Subtask 49-42-02-300-007-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) For loose or damaged sleeve inserts in the base assembly (210), or damaged holders (220), replace the molded base assembly (225) or holders and reassemble as follows:

(a) Use a sharp knife or other applicable instrument to remove the sealant from the area around the heads of the screws (215).

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(b) Heat the molded base assembly (225) with the holders (220) in an oven at 300°F (149°C) for approximately 10 minutes so that the adhesive on the screw threads can weaken.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

CAUTION: DO NOT CUT INTO THE MOLDED BASE ASSEMBLY WHEN YOU REMOVE THE SEALANT.

(c) Remove the screws (215) and holders (220). Scrape off the unwanted sealant from the molded base assembly (225). Wipe with a cloth moist with Desoclean 45 solvent (alternate) to remove the remaining adhesive. Wipe dry with a clean lint-free cloth.

(d) Make sure that the surfaces to be bonded are clean and dry and have no dirt or oil.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(e) Apply a thin layer of MIL-S-22473, Grade T primer and Loctite 290 compound to the threads of the screws (215). Use the screws to attach the holders (220) to the molded base assembly (225).

(f) Use the PN 2024062-1 brush holder alignment fixture to align the holders (220) 90° apart on the molded base assembly (225). Refer to Figure 6003.

(g) Torque the screws (215) 28 to 32 in-lb (3.16 to 3.62 Nm).

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(h) Fill the empty space around the screw heads with MIL-S-46146, Grade II, Type I sealant (gray) to 0.02 inch (0.508 mm) below the surface of the molded base assembly (225). Dry the sealant for 8 to 24 hours at room temperature.

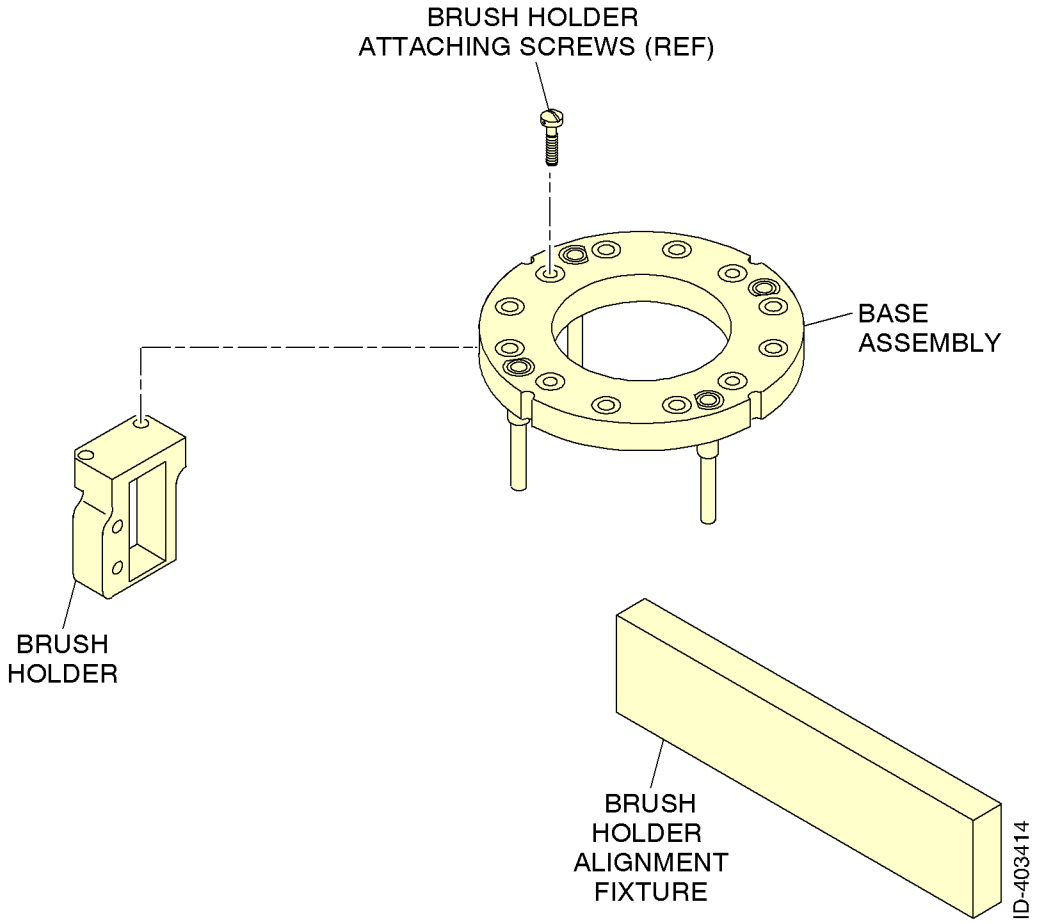

Figure 6003. (Sheet 1 of 1) Brush Holder Alignment Fixture (GRAPHIC 49-42-02-99B-811-A01)

H. Repair of the Front End Bell Assembly (Subtask 49-42-02-300-008-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) If the studs (395) in the front end bell assembly (400) are loose or damaged, or if it is necessary to replace the sleeving (380, 390) and bushings (385), remove and install as follows:

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(a) Put the end bell assembly (400) in an oven at 390 to 410°F (198.9 to 210°C) for approximately 30 minutes.

(b) Remove the end bell assembly from the oven, then loosen and remove the used studs (395) from the front end bell assembly (400).

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INSERT PAGE 3 OF 8 FACING PAGE 6012.

Reason: To change the specification number for sealant in the repair instructions.

Paragraph 2.G.(2)(h) is changed as follows:

WARNING: **SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.**

(h) Fill the empty space around the screw heads with MIL-A-46146, Group II, Type I sealant (gray) to 0.02 inch (0.508 mm) below the surface of the molded base assembly (225). Dry the sealant for 8 to 24 hours at room temperature.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(c) Apply a thin layer of MIL-S-22473, Grade T primer and Loctite RC/620 compound to the threads of the new studs. Immediately thread the wet studs into the front end bell assembly (400). Refer to the dimensions shown in Figure 6004.

NOTE: The sleeving (380, 390) and bushings (385) are not bonded to the studs (395). Temporarily remove them during assembly.

(d) Install sleeving (380, 390) and bushings (385) on each stud (395). Refer to the dimensions shown in Figure 6004.

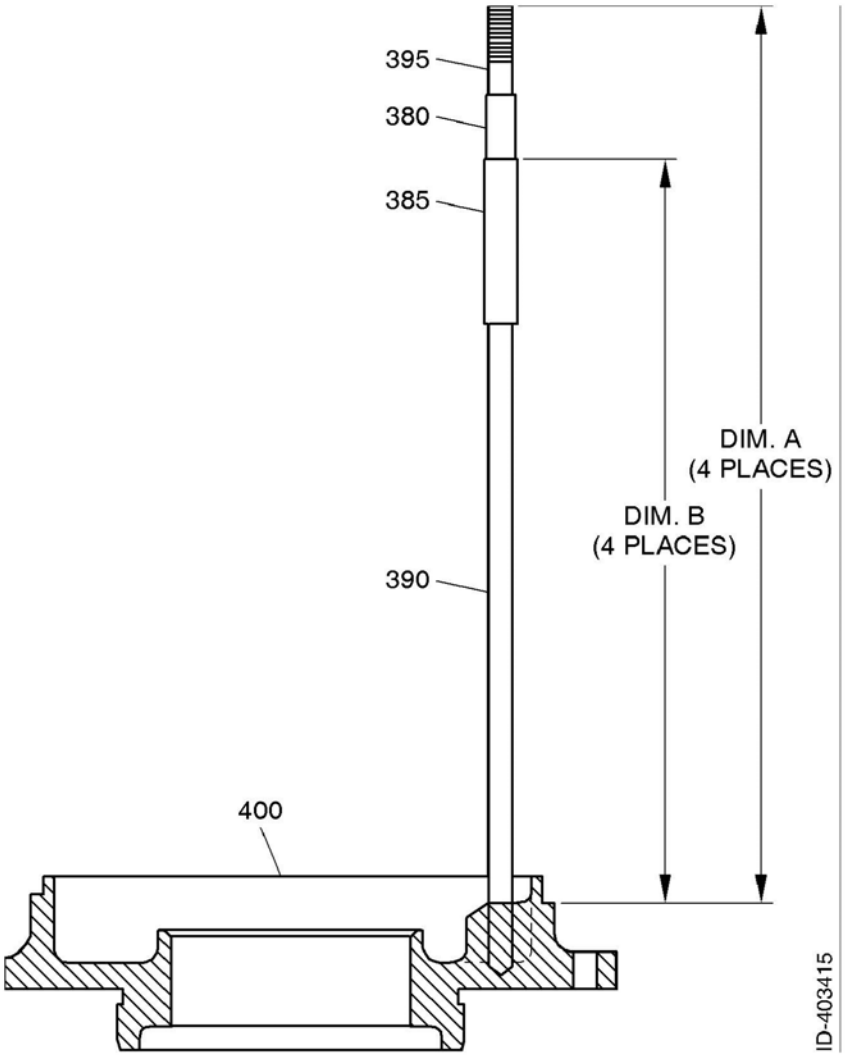

Figure 6004. (Sheet 1 of 1) Stud Repair and Replacement (GRAPHIC 49-42-02-99B-812-A01)

Key for Figure 6004. (Sheet 1 of 1)

380	SLEEVING	395	STUD
385	BUSHING	400	FRONT END BELL ASSY
390	SLEEVING		

Dimensional Limits for Figure 6004. (Sheet 1 of 1)

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIM. A	8.86 TO 8.90 (4 PLACES) (225.044 TO 226.06)	DIM. B	7.59 NOM (4 PLACES) (192.786)

(3) If the front end bell assembly (400, IPL Figure 1) does not agree with the requirements in INSPECTION/CHECK (PGBLK 49-42-02-5000), and it is necessary to replace the insert (405) in the machined end bell (410), remove and install as follows:

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

CAUTION: ATTACH A THERMOCOUPLE TO THE ALUMINUM END BELL TO CORRECTLY MONITOR ITS TEMPERATURE.

(a) Heat the front end bell assembly (400) in an oven to a maximum of 400°F (204°C). Remove it from the oven and immediately push the used insert out of the machined end bell. Refer to Figure 6005.

(b) The ID of the machined end bell must agree with the dimensions shown in Figure 6005 after the insert is removed. Replace the machined end bell if it is more than the specified dimensions.

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(c) Heat the machined end bell in an oven at 340 to 360°F (171 to 182°C) for 30 minutes. Chill the new insert to make it easier to install.

(d) Push the new insert in the machined end bell. Seat the insert fully against the shoulder of the machined end bell.

WARNING: MACHINING OPERATIONS MAKE METAL PARTICLES WHICH COULD ENTER THE EYE. SAFETY GOGGLES MUST BE WORN.

(e) After the machined end bell has cooled, machine the ID of the insert to the final dimensions. Refer to Figure 6005.

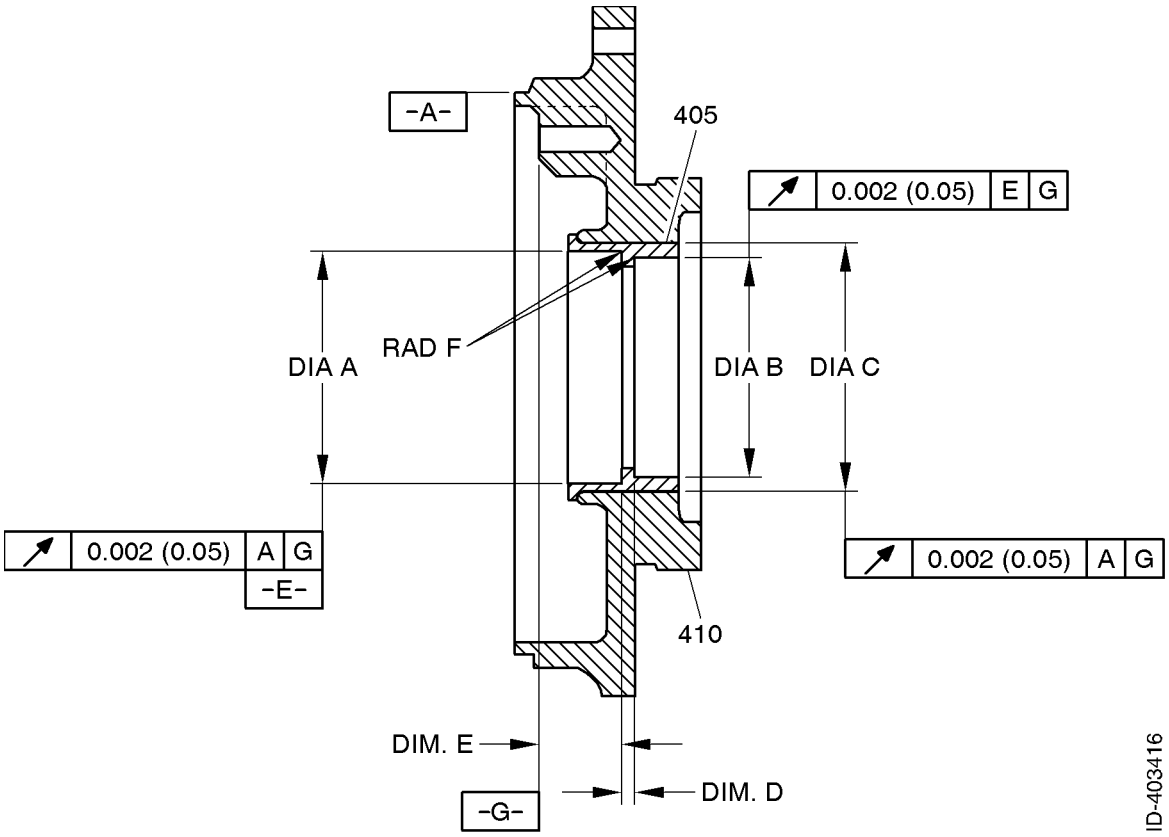

Figure 6005. (Sheet 1 of 1) Front End Bell Assembly Repair (GRAPHIC 49-42-02-99B-813-A01)

Key for Figure 6005. (Sheet 1 of 1)

405	INSERT	410	MACHINED END BELL

Dimensional Limits for Figure 6005. (Sheet 1 of 1)

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIA A	2.4408 TO 2.4414 (61.99632 TO 62.01156)	DIM. D	0.131 TO 0.135 (3.33 TO 3.43)
DIA B	2.3110 TO 2.3115 (58.6994 TO 58.7121)	DIM. E	0.813 TO 0.817 (20.6502 TO 20.7518)
DIA C	2.589 TO 2.590 (65.7606 TO 65.786)	RADIUS F	0.005 TO 0.015 (0.127 TO 0.381)

I. Repair of the Armature Assembly (Subtask 49-42-02-300-009-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) If the armature assembly (425) has an open circuit or a short circuit, replace the armature assembly. Refer to TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000) for the armature assembly testing.

(3) If the armature assembly (425) or the field assembly (430) has a low insulation resistance, the armature core stack and the windings and poles of the field assembly can be treated with insulating enamel as follows:

NOTE: Apply insulation enamel by brush, dip-coat or spray. If you use the dip or spray application, mask off areas to prevent getting enamel on the commutator bars and bearing journals. These areas must be fully free of enamel.

WARNING: USE IN A WELL-VENTILATED AREA. AVOID CONTACT WITH SKIN AND EYES. KEEP AWAY FROM HEAT, FLAME, SPARKS OR POSSIBLE IGNITION SOURCES.

(a) Apply a layer of GE Glyptal 1201 insulation enamel (red) on the core stack and windings of the armature assembly (425). Do not apply the enamel to the shaft, commutator or balancing ring surfaces.

WARNING: USE IN A WELL-VENTILATED AREA. AVOID CONTACT WITH SKIN AND EYES. KEEP AWAY FROM HEAT, FLAME, SPARKS OR POSSIBLE IGNITION SOURCES.

(b) Apply a layer of GE Glyptal 1201 insulation enamel (red) on the winding assembly (475). Do not apply the enamel to the uninsulated coil connections at the holders (220), outer surface of the housing (490) or mating surfaces of the rear and front end bell assemblies (170, 400).

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(c) Let the insulation enamel air-dry for approximately 2 hours at room temperature or put in an oven for 1 hour at 225 to 275°F (107 to 135°C).

(d) Test the armature assembly (425) and/or the field assembly (430). Refer to TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000).

(4) If the armature assembly (425) commutator concentricity is more than the specified limit, repair as follows:

WARNING: MACHINING OPERATIONS MAKE METAL PARTICLES WHICH COULD ENTER THE EYE. SAFETY GOGGLES MUST BE WORN.

(a) Machine a minimum quantity of metal from the commutator to restore concentricity. Use a diamond bit tool and machine the commutator slowly at maximum spindle speed. Replace the armature assembly if you cannot keep a minimum diameter of 2.230 inches (56.642 mm).

(b) Undercut the mica between the bars 0.020 to 0.025 inch (0.508 to 0.635 mm) deep by 0.025 to 0.035 inch (0.635 to 0.89 mm) wide, as shown in Figure 6006. Use care to remove minimum material from the bars. Chamfer the bar edges 0.005 to 0.010 inch (0.127 to 0.254 mm) at 40 to 50° at the commutator surface over the full length of the undercut.

CAUTION: DO NOT USE CROCUS CLOTH TO POLISH ALUMINUM PARTS. CROCUS CLOTH CONTAINS AN OXIDE OF IRON THAT CAUSES ALUMINUM TO QUICKLY CORRODE.

(c) Polish the commutator surface to a finish of approximately 16 microinches (0.4064 µm) rms with a ANSI B74.18 crocus cloth wrapped around the commutator. Do not apply crocus cloth continuously on small areas. This causes low spots on the commutator.

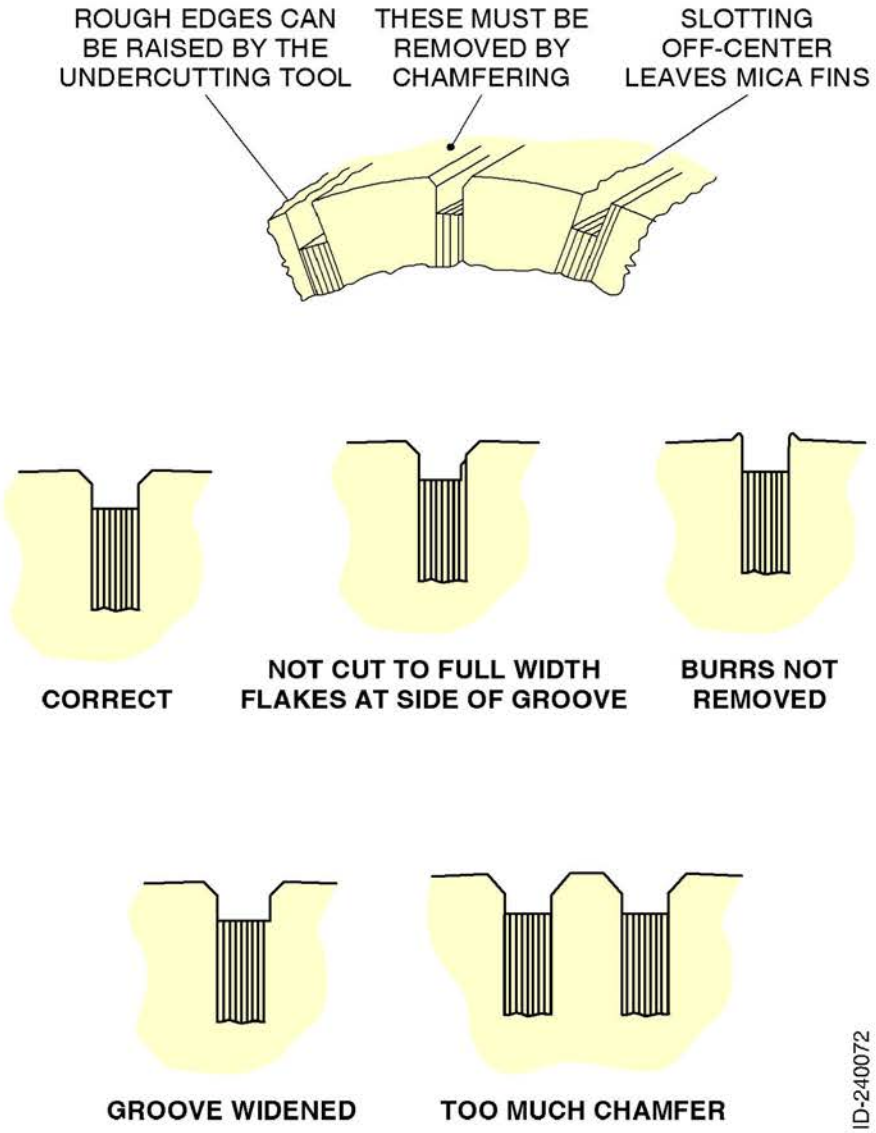

Figure 6006. (Sheet 1 of 1) Armature Commutator Repair (GRAPHIC 49-42-02-99B-814-A01)

(5) If armature assembly (425) balancing is necessary, balance as follows:

WARNING: USE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. CHEMICAL FILM SOLUTION CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(a) If the unbalance is more than 0.40 g-in in plane No. 1 or plane No. 2, remove material from the commutator. Apply MIL-DTL-5541F, Class 1A chemical film to exposed area. Refer to Figure 5001.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(b) Additional or alternate balance corrections may be used for balance plane No. 1 by adding plugs (427, 427A) to holes in the commutator. Bond in place with MIL-S-22473, Grade T primer and Loctite RC/620 compound. Weights may extend 0.03 inch (0.762 mm) maximum. Refer to Figure 5001.

J. Repair of the Field Assembly (Subtask 49-42-02-300-010-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) If it is necessary to replace the terminal assembly (455) on the field assembly (430), remove and install as follows:

(a) Remove the screws (445), washers (450) and terminal assembly (455) from the housing (490). Be careful not to bend the lead of the winding assembly (475) or crack the insulation.

(b) Install the new terminal assembly (455) on the housing (490). Carefully install the winding lead on the positive terminal post. Refer to Figure 6007.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(c) Apply a thin layer of MIL-S-22473, Grade T primer and Loctite 290 compound to the threads of the screws (445). Immediately install the screws (445) and washers (450) while the screws are wet.

(d) Torque the screws (445) 6 to 10 in-lb (0.68 to 1.13 Nm).

(e) Loosely install the nuts (435, 440) on the terminal assembly (455) posts.

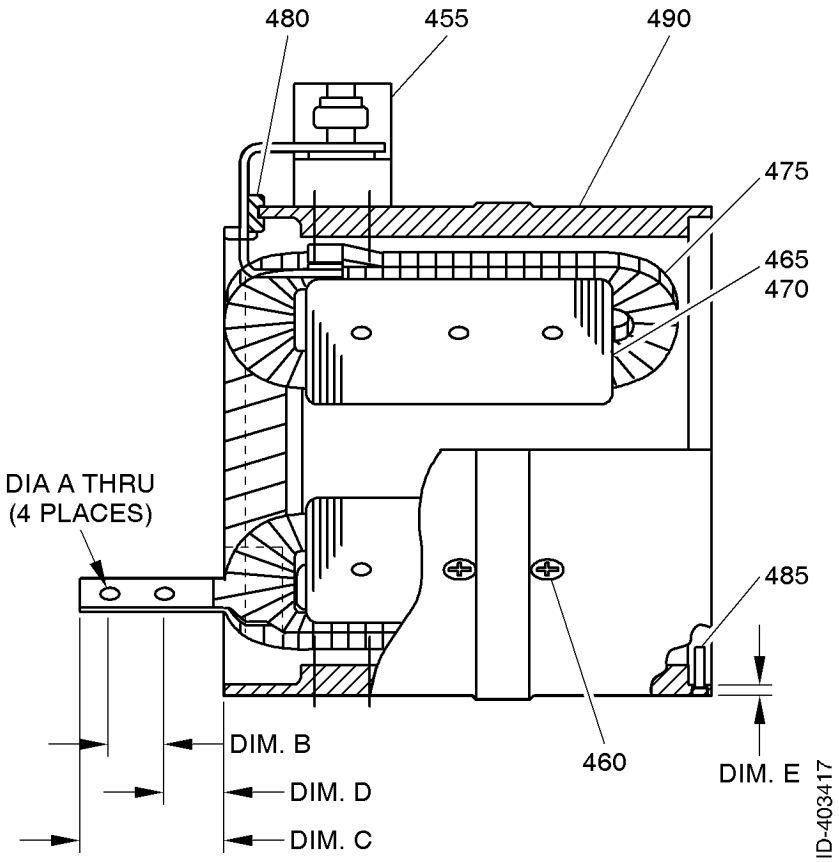

Figure 6007. (Sheet 1 of 1) Field Assembly Repair (GRAPHIC 49-42-02-99B-815-A01)

Key for Figure 6007. (Sheet 1 of 1)

455	TERMINAL ASSY	475	WINDING ASSY
460	SCREW	480	GROMMET
465	INSULATOR	485	PIN
470	STACK ASSY	490	HOUSING

Dimensional Limits for Figure 6007. (Sheet 1 of 1)

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIA A	0.195 TO 0.205 (4.953 TO 5.207)	DIM. D	0.732 TYP (18.592)
DIM. B	0.625 TYP (15.875)	DIM. E	0.00 TO 0.01 (0.00 TO 0.25)
DIM. C	1.62 TO 1.68 TYP (41.148 TO 42.672)		

(3) If it is necessary to replace the stack assemblies (470) in the field assembly (430), remove and install as follows:

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(a) Heat the field assembly (430) at approximately 350°F (177°C) for 15 minutes.

(b) Loosen the screws (460) until they have approximately 2 threads in the stacks.

(c) Hold the field assembly (430) and hit the screws lightly to release each stack assembly (470) from the winding assembly (475). Remove the stack assemblies and winding assembly from the housing (490).

(d) Before you install a new stack assembly (470), install a new insulator (465) on the stack assembly as follows:

WARNING: USE CORRECT PROTECTION IN A WELL-VENTILATED AREA. CHEMICAL GOGGLES MUST BE WORN. ADHESIVE CAN CAUSE SKIN, EYE, AND LUNG DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

1 Apply a small quantity of MMM-A-1617, Type III adhesive to the stack assembly (470).

2 Install the insulators with the smooth Nomex paper side adjacent to the stack assembly (470).

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(e) Heat the field assembly (430) to approximately 150°F (65°C) for 15 minutes before you install a new stack assembly (470).

(f) Install the stack assembly (470) in the field assembly (430). Make sure that there is no unwanted matter between the stack assembly and the housing (490).

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INSERT PAGE 4 OF 8 FACING PAGE 6023.

Reason: To change the specification number for sealant in the repair instructions.

Paragraph 2.J.(4)(d)3 is changed as follows:

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

3 Apply a thin layer of MIL-A-46146, Group II, Type I sealant (gray) to the grooves of the grommet (480). While the sealant is wet, install the grommet on the housing (490). Refer to Figure 6007.

CAUTION: PUT THE STACK ASSEMBLIES (470) FULLY AGAINST THE HOUSING (490).

(g) Install the PN 2024063-1 expansion arbor into the field assembly (430). Extend the expansion arbor to remove the distance between the stack assemblies (470) and the housing (490).

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(h) Apply a thin layer of MIL-S-22473, Grade T primer and Loctite 290 compound to the threads of the screws (460). Immediately install the screws while wet.

(i) Tighten the screws (460) to seat the stack assembly (470) firmly against the winding assembly (475). Torque the screws 25 to 30 in-lb (2.8 to 3.4 Nm).

(j) Remove the PN 2024063-1 expansion arbor from the field assembly (430).

(k) Do a dielectric test of the field assembly (430). Refer to TESTING AND FAULT ISOLATION, Paragraph 2.D. (Subtask 49-42-02-810-004-A01)

(4) If the winding assembly (475) does not pass the electrical test specifications in INSPECTION/CHECK (PGBLK 49-42-02-5000), remove and install as follows:

WARNING: USE THE CORRECT PROTECTION. HEATED PARTS CAN CAUSE BURNS.

(a) Heat the field assembly (430) at approximately 350°F (177°C) for 15 minutes.

(b) Loosen the screws (460) until they have approximately 2 threads remaining in the stacks.

(c) Hold the field assembly (430) and lightly hit the screws until you release each stack assembly (470) from the winding assembly (475). Remove the stack assemblies and winding assembly from the housing (490).

(d) If it is necessary to replace the grommet (480) on the field assembly (430), remove and install as follows:

1 Use a sharp knife or other applicable instrument to cut through the sealant and remove the used grommet (480) from behind the jumper bar.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

2 Use Desoclean 45 solvent (alternate) to remove the sealant.

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

3 Apply a thin layer of MIL-S-46146, Grade II, Type I sealant (gray) to the grooves of the grommet (480). While the sealant is wet, install the grommet on the housing (490). Refer to Figure 6007.

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

4 Apply a thin layer of MIL-S-46146, Grade II, Type I sealant (gray) in the recess for the jumper bar.

CAUTION: SEAT THE STACK ASSEMBLIES (470) FULLY AGAINST THE HOUSING (490).

(e) Install the stack assemblies (470) and the new winding assembly (475) in the housing (490).

(f) Install the PN 2024063-1 expansion arbor into the housing (490). Extend the expansion arbor to remove the distance between the stack assemblies (470) and housing.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(g) Apply a thin layer of MIL-S-22473, Grade T primer and Loctite 290 compound to the threads of the screws (460). Immediately install the screws while wet.

(h) Tighten the screws (460) to seat the stack assemblies (470) firmly against the winding assembly (475). Torque the screws 25 to 30 in-lb (2.8 to 3.4 Nm).

(i) Remove the PN 2024063-1 expansion arbor from the field assembly (430).

(j) Form the winding assembly (475) positive jumper back against the housing (490) and the grommet (480) and over the terminal assembly (455) stud. Refer to Figure 6007.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(k) Use a clean lint-free cloth moist with Desoclean 45 solvent (alternate) to clean the winding straps.

(l) Cut the winding assembly (475, IPL Figure 1) positive jumpers and drill holes in the jumper lead. Refer to Figure 6007. Deburr the holes and break all sharp edges.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(m) Use a clean, lint-free cloth moist with Desoclean 45 solvent (alternate) to clean the winding straps.

(n) Do a dielectric test of the field assembly (430, IPL Figure 1). Refer to TESTING AND FAULT ISOLATION, Paragraph 2.D. (Subtask 49-42-02-810-004-A01).

(5) If it is necessary to replace the pins (485), remove them and push the new pins in flush with the outside diameter of the housing (490) to within 0.01 inch (0.25 mm). Refer to Figure 6007.

K. Job Close-up (Subtask 49-42-02-300-011-A01)

(1) Not applicable.

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INSERT PAGE 5 OF 8 FACING PAGE 6024.

Reason: To change the specification number for sealant in the repair instructions.

Paragraph 2.J.(4)(d)4 is changed as follows:

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

4 Apply a thin layer of MIL-A-46146, Group II, Type I sealant (gray) in the recess for the jumper bar.

ASSEMBLY

1. Planning Data (TASK 49-42-02-99C-806-A01)

A. Reason for the Job (Subtask 49-42-02-99C-012-A01)

(1) Use these procedures to assemble the direct current motor. Do only those procedures that are applicable to the disassembly done.

B. Job Setup Data (Subtask 49-42-02-99C-013-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 7001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 7001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	micrometer depth gage	commercially available
	source of compressed air	commercially available
Model 4100 ATC	digital ohmmeter	Valhalla Scientific Inc., 9955 Mesa Rim Rd., San Diego, CA 92121
PN 2024064-1	bearing press fixture	CAGE: 06848
PN 2024065-1	bearing press fixture	CAGE: 06848
PN 2024067-1	seal press fixture	CAGE: 06848
PN 2024173-1	motor support fixture	CAGE: 06848
PN 2024174-1	torque adapter	CAGE: 06848
PN 2024742-1	endplay check fixture	CAGE: 06848

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 7002 for the specified consumable materials in this section.

Table 7002. Consumables

Number	Description	Source
	cotton swab	commercially available
	epoxy-polyamide primer (MIL-P-23377, Type I, Class 1 or 2)	commercially available
	high vacuum grease	CAGE: 5D028

Table 7002. Consumables (Cont)

Number	Description	Source
Desoclean 45	solvent (alternate)	CAGE: 83574
MIL-L-6085	oil	commercially available
MIL-S-22473, Grade H	sealant	commercially available
MIL-S-22473, Grade T	primer	commercially available
MIL-S-46146, Grade M, Type II	sealant (gray)	commercially available
MIL-S-46163, Type I, Grade K	sealant	commercially available
RTV 3145	sealant (clear) (MIL-A-46146, Group 2, Type I)	Dow Corning Corp., 18008 Skylark Blvd., Suite 145, Irvine, CA 92714

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

2. Procedure (TASK 49-42-02-400-801-A01)

A. Job Setup (Subtask 49-42-02-400-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

(2) The item numbers shown in the DPL are the same as the item numbers on the exploded view illustration(s). To find a part number, find the part on the illustration and note the item number. Find the item number in the parts list and read the correct part number. Item numbers refer to the same figure until a different figure is specified.

(3) If applicable, refer to the data written during disassembly for the location of the tie points and where to connect the components and wires.

B. General Assembly Procedures (Subtask 49-42-02-400-002-A01)

(1) Remove contamination from the parts and the compound that prevents corrosion. Refer to CLEANING (PGBLK 49-42-02-4000) for the procedures to clean the motor subassemblies and components.

(2) Tighten all nuts, bolts and screws to an approved torque unless shown differently in the instructions. Torque values shown do not include frictional torque by self-locking devices or rundown resistance. Add frictional torque values to the torque values given. Refer to Table 8004 for a list of specified torque values.

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INSERT PAGE 6 OF 8 FACING PAGE 7002.

Reason: To change the specification number for sealant, MIL-S-46146, Grade M, Type II in the consumables table.

Table 7002 is changed as follows:

Table 7002. Consumables (Cont)

Number	Description	Source
ASTM D5363 AN0311	sealant	commercially available

(3) When you use lockwire, make sure the lockwire fills a minimum of 75 percent of the lockwire hole.

(4) Lubricate all packings with high vacuum grease before installation.

WARNING: BE CAREFUL WHEN MOVING THE MOTOR TO PREVENT INJURY. THE MOTOR WEIGHS APPROXIMATELY 38 POUNDS (17.24 KG). HOLD THE MOTOR WITH THE CORRECT SUPPORT TO MOVE IT.

(5) Use the PN 2024173-1 motor support fixture or the equivalent alternative equipment to support the motor on a stable work bench when you do the assembly.

C. Detailed Assembly Procedures (Subtask 49-42-02-400-003-A01)

(1) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(2) Install eight springs (195), sleeves (200) and cam (205) on the slotted post in the base assembly (210) as follows:

(a) Place a spring (195) on a base assembly (210) post so that the flat of the inner coil is in the slot of the post. Refer to Figure 7001.

(b) Turn the spring counterclockwise (approximately 180°) to catch the outer coil of the spring in the holder.

(c) Do Steps (a) and (b) for the other three springs to get the correct spring load on the brush assemblies (135, IPL Figure 1) when installed.

(d) Install the sleeves (200) on three of the base assembly posts.

(e) Install the cam (205) on one of the base assembly posts so that the tang of the cam points upward.

CAUTION: DO NOT ENGAGE THE SPRING ON THE CAM ARM BEFORE YOU INSTALL THE BRUSH ASSEMBLY UNDER THE SPRING. WITHOUT THE BRUSH ASSEMBLY IN POSITION, THE FORCE OF THE SPRING CAN DAMAGE THE CAM ARM.

(f) Do Steps (a) thru (c) to install the four top springs on the top of the sleeves and the cam.

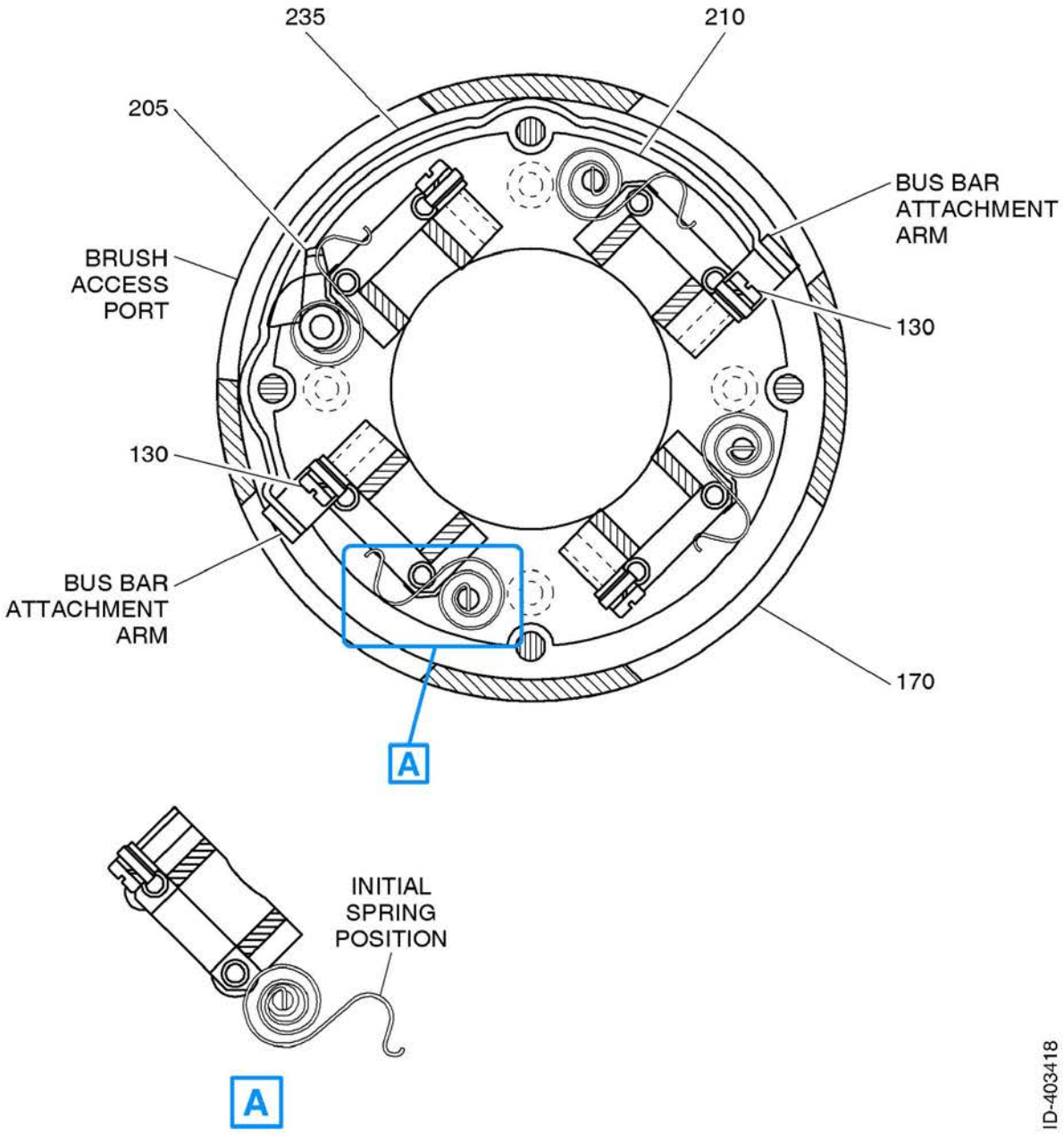


Figure 7001. (Sheet 1 of 1) Base Assembly, Bus Bar Assembly and Cam Installation
(GRAPHIC 49-42-02-99B-816-A01)

Key for Figure 7001. (Sheet 1 of 1)

130	SCREW	210	BASE ASSY
170	REAR END BELL ASSY	235	BUS BAR ASSY
205	CAM		

(3) Install the base assembly (210) in the rear end bell assembly (170) as follows:

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(a) Apply a thin layer of MIL-S-46163, Type I, Grade K sealant to the threads of the screws (165).

(b) Install the base assembly (210) in the rear end bell assembly (170). Align the tapped holes in the base assembly with the countersunk holes in the rear end bell assembly. Make sure the cam is below the notched radius in the brush access port of the rear end bell assembly. Refer to Figure 7001.

(c) Attach the base assembly with the screws (165, IPL Figure 1). Torque the screws 25 to 30 in-lb (2.83 to 3.39 Nm).

(4) Install the bearings (415, 420) on the armature assembly (425) as follows:

CAUTION: DO NOT USE THE OLD BEARINGS (415, 420) THAT HAVE BEEN REMOVED FROM THE ARMATURE ASSEMBLY (425). BEARING DAMAGE IS NOT ALWAYS SHOWN AND CAN CAUSE MOTOR FAILURE.

(a) Use the PN 2024064-1 bearing press fixture to push the bearing (415) on the armature assembly shaft. Put the bearing against the flange of the shaft.

(b) Use the PN 2024065-1 bearing press fixture to push the bearing (420) on the commutator end of the armature assembly shaft. Put the bearing against the flange of the shaft.

(5) Temporarily assemble the motor and measure the endplay of the armature assembly (425) as follows:

(a) Install the shaft (310) in the armature assembly (425) and attach with a nut (240).

(b) Install the front end bell assembly (400) on the PN 2024173-1 motor support fixture so that the attached studs (395) point up.

NOTE: Do not install the wave washers (350) or shims (355, 360, 365, 370) at this time. This procedure will find the amount of shim washers needed without the wave washers.

(c) Install the armature assembly in the front end bell assembly.

NOTE: Do not apply sealant between the components at this time. Do this in a subsequent step of assembly.

(d) Install the field assembly (430) on the front end bell assembly (400) as follows:

1 Carefully put the field assembly over the studs (395).

2 Align the pin (485) in the housing (490) with the keyway in the front end bell assembly.

3 Install the field assembly (430) against the front end bell assembly (400) with a rubber hammer.

(e) Install the sleeving (380) and bushings (385) on the studs (395) in the front end bell assembly (400).

(f) Install the rear end bell assembly (170) with the attached components on the field assembly (430) as follows:

1 Put the rear end bell assembly (170) on the studs (395) so the studs engage the outer holes in the rear end bell assembly.

2 Put the leads of the field assembly coils on the holders (220).

3 Align the pin (485) in the housing (490) with the keyway in the rear end bell assembly (170).

4 Install the rear end bell assembly against the field assembly (430) with a rubber hammer.

(g) Install the washers (155) and nuts (150) on each stud (395). Torque the nuts (150) 35 to 40 in-lb (3.96 to 4.52 Nm).

(h) Measure the endplay of the armature assembly (425) in the motor as follows:

1 Install the motor in the motor support base of the PN 2024742-1 endplay check fixture so that the front end bell is up. Refer to Figure 7002.

NOTE: Do not put the armature support plate in the base at this time.

2 Use a micrometer depth gage to measure the distance from the surface of the front end bell assembly to the armature assembly shaft. Record the results of the measurement.

3 Install the armature support plate as follows:

a Remove the motor from the motor support base.

b Place the armature support plate inside the base.

c Place the motor in the base so that the plate is supporting the armature assembly.

4 Do Step 2 again.

5 Subtract the second reading from the first reading to compute the armature total travel distance. Record this measurement.

6 Subtract 0.089 inch (2.26 mm) from the distance recorded in the last step to find the thickness of shim washers (355, 360, 365, 370, IPL Figure 1) you need to get the correct armature endplay. Make a note of the shim quantity and thickness.

NOTE: Armature endplay amount, without wave washers (350) installed, must be 0.087 to 0.090 inch (2.210 to 2.286 mm).

7 Remove the motor from the endplay check fixture.

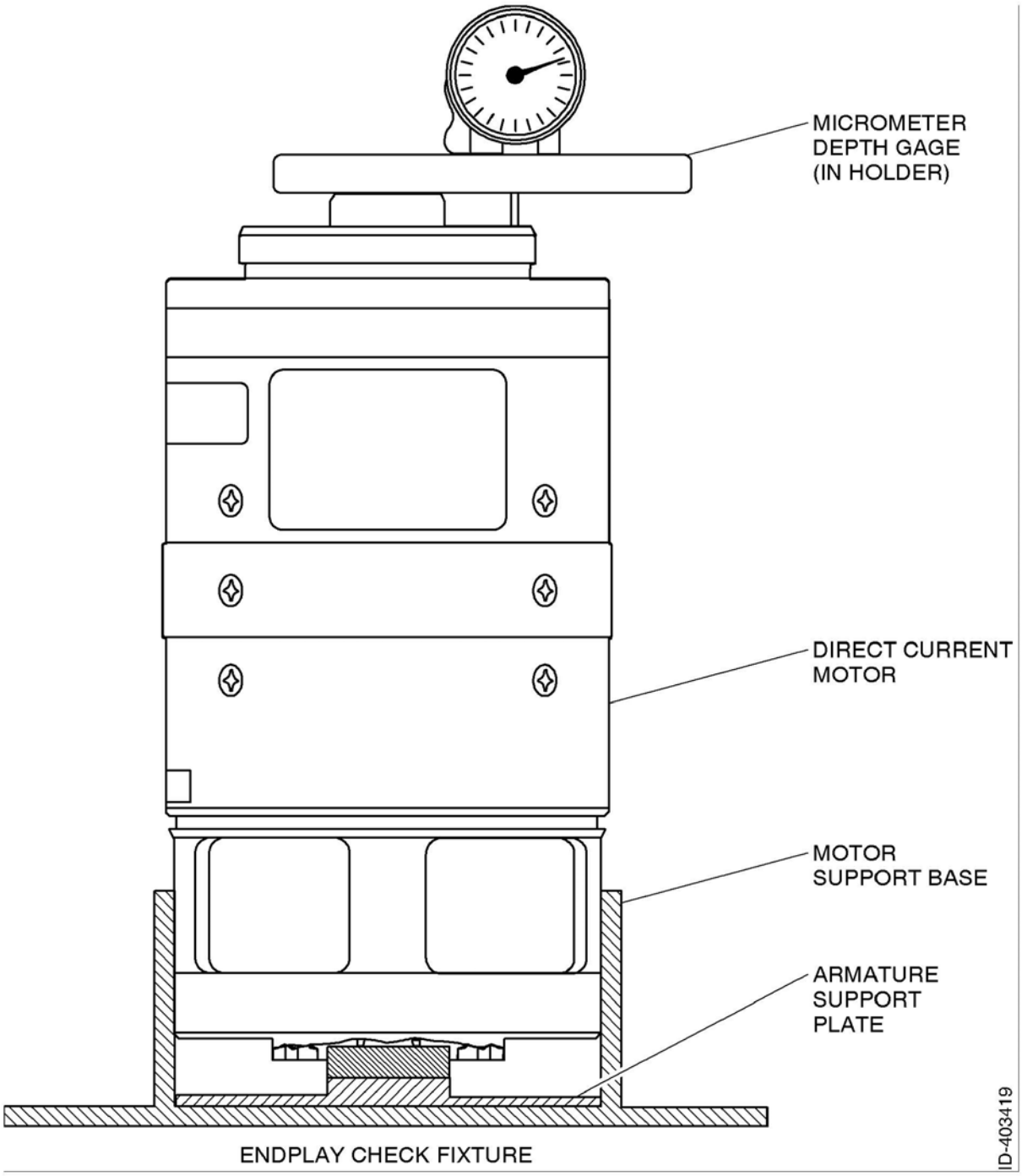


Figure 7002. (Sheet 1 of 1) Armature Endplay Measurement (GRAPHIC 49-42-02-99B-817-A01)

(6) Measure the ring (325 or 325A) shim necessary to get the correct seal (375) length operation and disassemble the motor as follows:

(a) Install the motor on the PN 2024173-1 motor support fixture so that the front end bell assembly (400) is up. Refer to Figure 7003.

(b) Measure for the thickness of shim washers necessary for the correct seal length operation as follows:

1 Place the PN 2024067-1 seal press fixture seal shim tool on the motor.

2 Measure the distance from the top of the seal shim tool to the top of the armature assembly (425, IPL Figure 1) shaft with a micrometer depth gage. Refer to Figure 7003.

NOTE: Insert the micrometer depth gage into the hole in the top of the seal shim tool. Make sure the tool is held firmly and exactly square to the motor centerline to insure accurate shim measurement.

3 Make a note of the measurement.

4 Subtract 1.00 inch (25.4 mm) from the measurement in Step 3 to get the thickness of shim washers (335, 340, 345) necessary for correct seal (375) length operation.

5 Make a note of the quantity of shim washers (335, 340, 345) necessary to get this thickness.

6 Optional shimming method without use of PN 2024067-1 seal press fixture seal shim tool: With the seal and ring shims removed, take a measurement with a 4-inch micrometer depth gage from the top of armature shaft to same step on armature shaft as shown in Figure 7003 seal shim measurement. Take a measurement from the top of the armature shaft to the inner surface of the front end bell assembly. Subtract these values for the necessary shims to achieve a Dimension B (Figure 7006) of 0.375 to 0.385 inch (9.525 to 9.779 mm).

(c) Turn the motor in the PN 2024173-1 motor support fixture so the rear end bell assembly (170) is up.

(d) Remove the nuts (150) and washers (155) from the studs (395). Remove the rear end bell assembly (170), armature assembly (425) and field assembly (430) from the front end bell assembly (400).

(e) Remove the nut (240) and shaft (310) from the armature assembly (425).

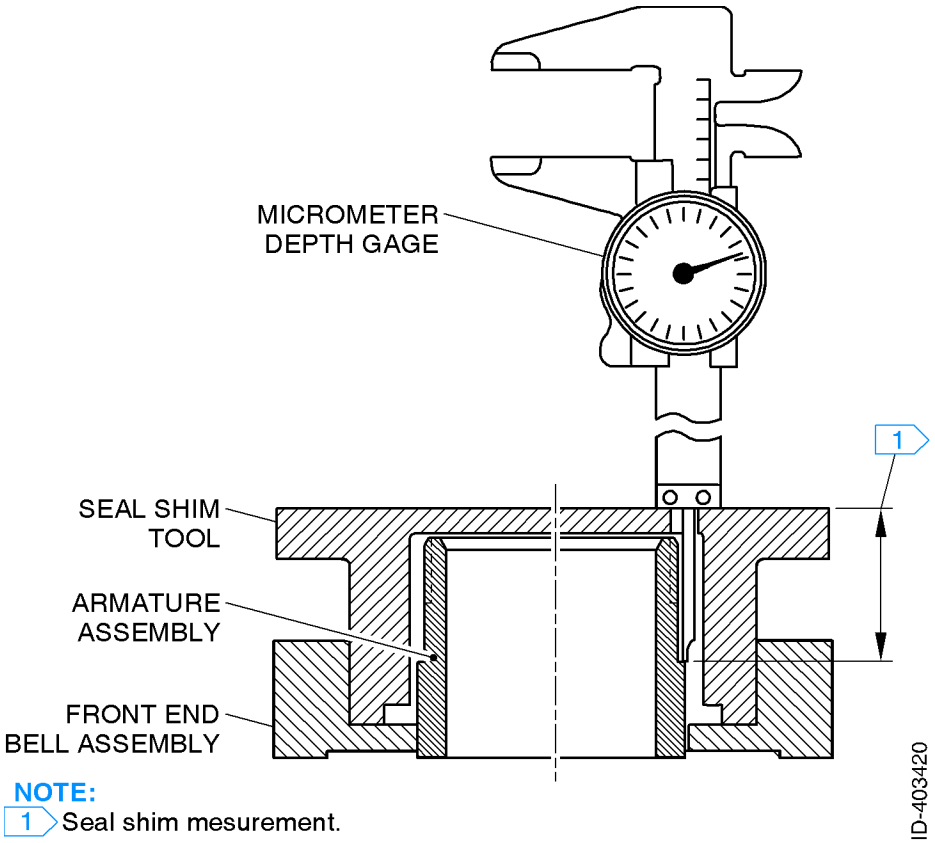


Figure 7003. (Sheet 1 of 1) Seal Operating Length Shim Requirements (GRAPHIC 49-42-02-99B-818-A01)

(7) Install the seal (375) in the front end bell assembly (400) as follows:

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

CAUTION: DO NOT USE THE OLD SEAL (375) THAT HAS BEEN REMOVED FROM THE FRONT END BELL ASSEMBLY (400). DAMAGE TO THE SEAL IS NOT ALWAYS SHOWN AND CAN CAUSE EARLY MOTOR FAILURE.

CAUTION: DO NOT LET THE PRIMER OR SEALANT GET INTO THE INNER SURFACE OF THE SEAL (375).

(a) Apply a thin layer of MIL-S-22473, Grade T primer to the outside surface of the seal. Let it air dry.

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(b) Apply MIL-S-22473, Grade H sealant to the outside surface of the seal.

(c) Use the PN 2024067-1 seal press fixture to install the seal.

1 Place the seal press tool of the seal press fixture on the front bell assembly (400). Refer to Figure 7004.

NOTE: Refer to Figure 7005 for the details of the PN 2024067-1 seal press fixture.

2 Place the seal in the seal press tool.

3 Press the seal into place with the seal shim tool until the seal touches the bottom of the insert. Rotate the tool clockwise while pressing to lock the carbon in the housing.

4 Remove all unwanted sealant from around the seal and end bell.

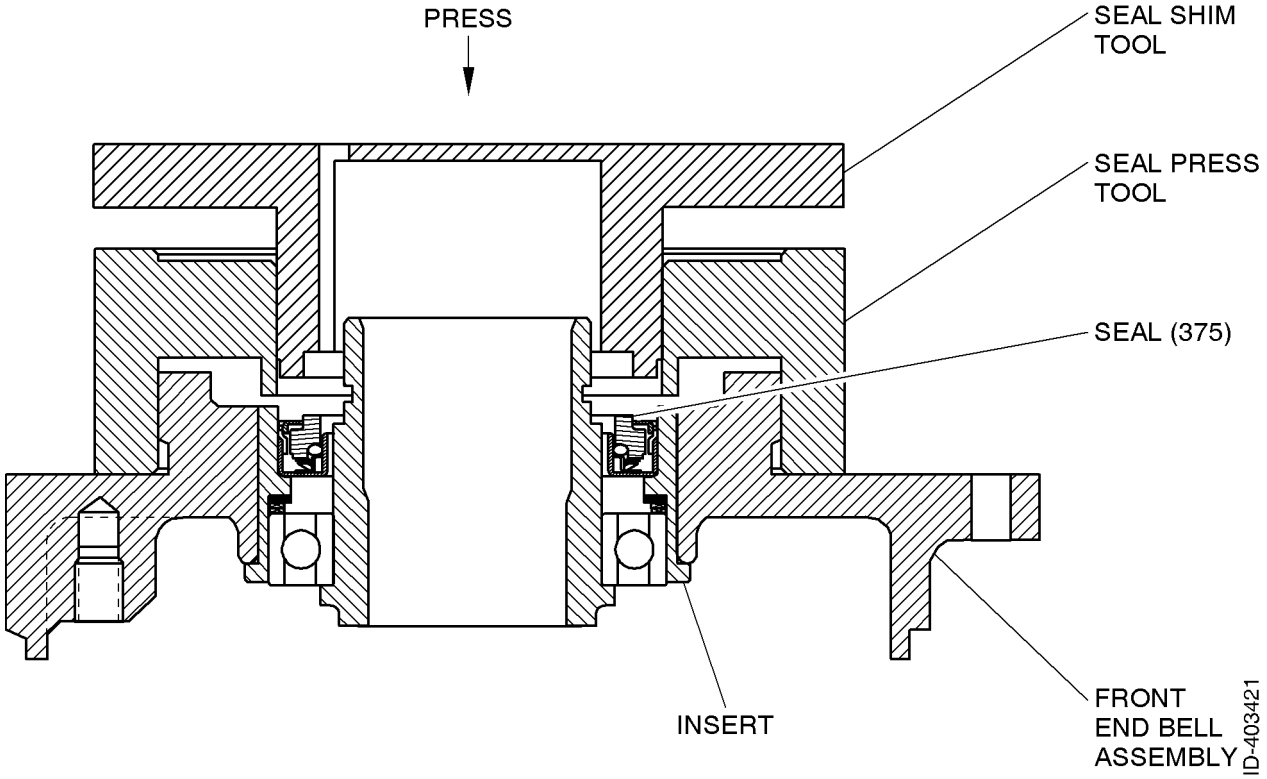


Figure 7004. (Sheet 1 of 1) Seal Installation (GRAPHIC 49-42-02-99B-819-A01)

Key for Figure 7004. (Sheet 1 of 1)

375	SEAL		

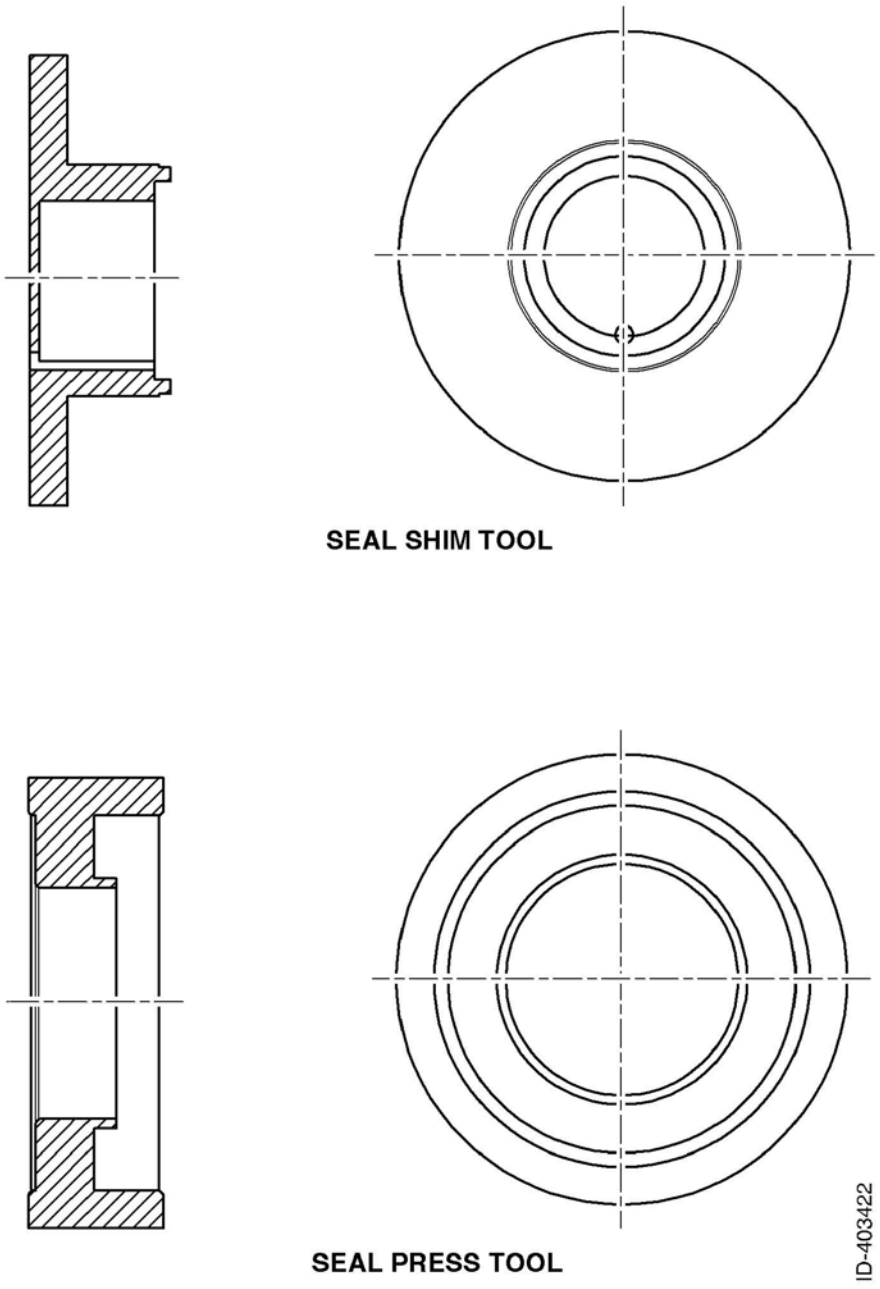


Figure 7005. (Sheet 1 of 1) Seal Press Fixture (GRAPHIC 49-42-02-99B-820-A01)

(8) Install the bus bar assembly (235, IPL Figure 1) on the base assembly (210) as follows:

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(a) Apply a thin layer of RTV 3145 sealant (clear) to the grooves of the grommet (230). Install the grommet on the rear end bell assembly while the sealant is wet.

(b) Install the bus bar assembly on the base assembly in the position shown in Figure 7001. Check the position of the cam (205, IPL Figure 1) related to the bus bar assembly before you temporarily attach the bus bar assembly to the holders (220) with screw assemblies (130).

(c) Engage the bus bar assembly (235) with the negative (NEG) terminal of the field assembly (430).

(9) Install the armature assembly (425), field assembly (430) and rear end bell assembly (170) on the front end bell assembly (400) as follows:

(a) Install the front end bell assembly (400) in the PN 2024173-1 motor support fixture so that the studs (395) point up.

(b) Install the quantity of shim washers (355, 360, 365, 370) computed in Step (5)(h) for armature endplay in the front end bell assembly (400). Refer to Figure 7006.

(c) Install the two wave washers (350, IPL Figure 1) on top of the shim washers (355, 360, 365, 370).

(d) Install the armature assembly (425) and bearings (415, 420) in the front end bell assembly (400).

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(e) Apply a thin layer of epoxy-polyamide primer to the mating surfaces of the front end bell assembly (400) and the field assembly (430).

(f) Install the field assembly (430) on the front end bell assembly (400) while the primer is wet as follows:

1 Carefully put the field assembly (430) over the studs (395).

2 Align the pin (485) in the housing (490) with the keyway in the front end bell assembly (400).

3 Install the field assembly (430) against the front end bell assembly (400) with a rubber hammer.

4 Wipe off unwanted primer from the front end bell assembly (400) and the field assembly (430).

(g) Install the sleeving (380) and the bushings (385) on the studs (395).

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(h) Apply a thin layer of epoxy-polyamide primer to the mating surfaces of the rear end bell assembly (170) and the field assembly (430).

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(i) Apply a thin layer of RTV 3145 sealant (clear) between the mating surfaces of both grommets (230, 480).

(j) While the primer and the sealant are wet, install the rear end bell assembly (170) on the field assembly (430) as follows:

1 Carefully put the leads of the winding assembly (475) in position at the base assembly (210).

2 Align the pin (485) in the field assembly with the keyway in the rear end bell assembly.

3 Install the rear end bell assembly against the field assembly with a rubber hammer.

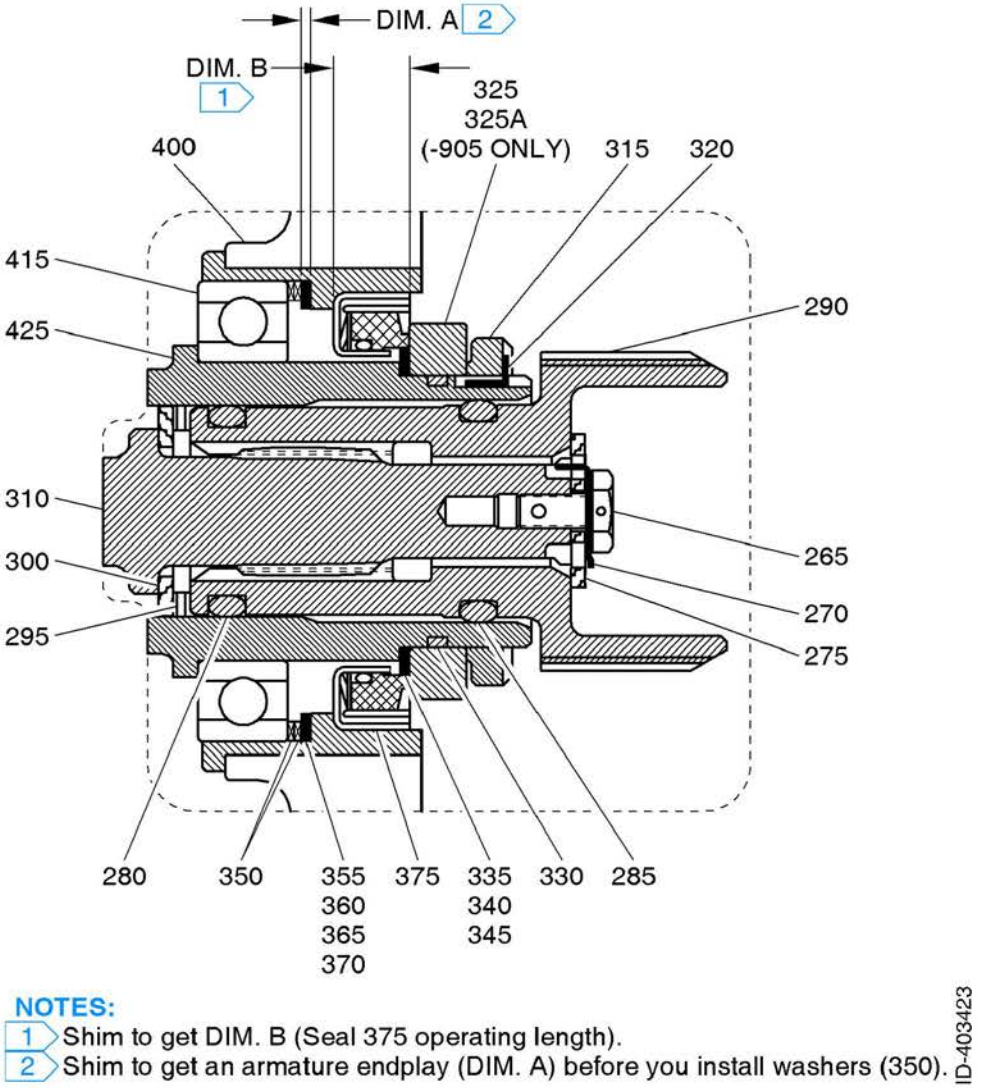
(k) Wipe off unwanted primer from the rear end bell assembly and the field assembly.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(l) Apply a thin layer of epoxy-polyamide primer around the stud holes in the rear end bell assembly (170) where the steel washers (155) will touch the aluminum end bell.

(m) Install the washers (155) and nuts (150) on each stud. Torque the nuts (150) 35 to 40 in-lb (3.96 to 4.52 Nm).

(n) Turn the armature assembly (425). The assembly must not rub.



NOTES:
1. Shim to get DIM. B (Seal 375 operating length).
2. Shim to get an armature endplay (DIM. A) before you install washers (350).

Figure 7006. (Sheet 1 of 1) Motor Front Assembly and Shimming Requirements
(GRAPHIC 49-42-02-99B-821-A01)

Key for Figure 7006. (Sheet 1 of 1)

265	BOLT	315	NUT	355	WASHER
270	WASHER	320	KEY	360	WASHER
275	WASHER	325	RING	365	WASHER
280	PACKING	325A	RING	370	WASHER
285	PACKING	330	PACKING	375	SEAL
290	RATCHET	335	WASHER	400	FRONT END BELL ASSY
295	WASHER	340	WASHER	415	BEARING
300	WASHER	345	WASHER	425	ARMATURE ASSY
310	SHAFT	350	WASHER		

Dimensional Limits for Figure 7006. (Sheet 1 of 1)

Reference	Limits Inches (mm)	Reference	Limits Inches (mm)
DIM. A	0.087 TO 0.090 (2.2098 TO 2.286)	DIM. B	0.375 TO 0.385 (9.525 TO 9.779)

(10) Install the brush assemblies (135) and do the brush run-in as follows:

(a) Carefully lift the springs (195) and install two brush assemblies in each holder (220). Refer to Figure 7007.

(b) Engage the slotted arm in the cam (205) with the spring (195).

CAUTION: CUT AWAY THE BRUSH SHUNTS SO THE INTERNAL SURFACES OF THE MOTOR ARE CLEAR. SHUNTS THAT ARE PREPARED INCORRECTLY CAN DAMAGE THE BRUSHES.

(c) Attach the brush shunts, bus bar assembly (235) and two winding assembly leads with the screw assemblies (130). Cut away the brush shunts. Refer to Figure 7007.

(d) Carefully lift up on the brush assemblies (135, IPL Figure 1) to make sure each brush moves freely in the holders (220) without binding.

(e) Do a dielectric strength test of the motor. Refer to TESTING AND FAULT ISOLATION, Paragraph 2.D. (Subtask 49-42-02-810-004-A01).

(f) Brush run-in (for motors with replaced brushes only)

NOTE: After you replace the brush assemblies (135), do the brush run-in to make sure that there is a good electrical contact between the brush assemblies and the armature assembly (425) commutator. Operation with poor brush contact and high current can cause damage to the armature assembly (425) commutator and brush assembly components.

NOTE: The brush run-in also puts a film on the commutator surface that is necessary for correct motor performance.

CAUTION: POINT A FLOW OF AIR DIRECTLY INTO THE BRUSH PORTS TO REMOVE THE HEAT. THE HOUSING TEMPERATURE MUST NOT BE MORE THAN 125°F (51.7°C) DURING RUN-IN. REMOVE THE COVER (120) TO PERMIT THE AIR TO FLOW DIRECTLY OVER THE BRUSHES.

1 Use a power supply to apply 6 to 8 VDC across the positive (POS) and negative (NEG) terminals of the motor.

2 The motor must turn in a clockwise direction when seen from the shaft end.

3 Operate the motor for 2 to 3 hours. The brush assemblies must seat on at least 75 percent of their contact area. At the completion of the brush run-in, the current draw must be between 90 and 100 amps.

WARNING: USE THE CORRECT PROTECTION. COMPRESSED AIR WILL REMOVE LOOSE PARTICLES THAT CAN GET IN YOUR EYES. THE AIRSTREAM CAN CAUSE CUTS. DO NOT POINT THE AIRSTREAM TOWARD YOURSELF OR OTHER PERSONS.

4 Use a source of compressed air at approximately 20 to 30 PSI (138 to 207 kPa) or a vacuum to remove as much carbon dust as possible from inside the motor.

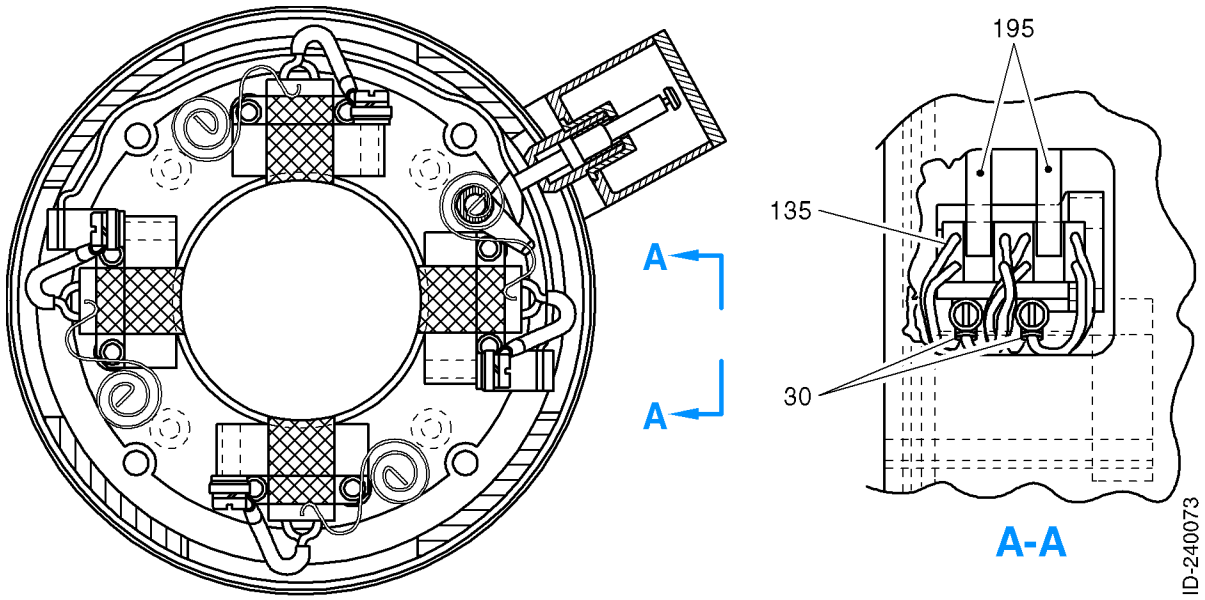


Figure 7007. (Sheet 1 of 1) Brush Assembly Installation (GRAPHIC 49-42-02-99B-822-A01)

Key for Figure 7007. (Sheet 1 of 1)

130	SCREW ASSY	195	SPRING
135	BRUSH ASSY		

(11) Install the shaft (310) and the ring (325 or 325A) as follows:

(a) Apply a thin layer of high vacuum grease to the packing (305). Install the packing on the shaft.

(b) Install the shaft through the armature assembly (425).

(c) Install the key (245) and nut (240) on the shaft. Refer to Figure 7008.

(d) Torque the nut 10 to 15 in-lb (1.13 to 1.70 Nm).

(e) Bend the tab of the key into the slot of the nut. If necessary, align the slot in the nut with the tab of the key as follows:

1 Remove the nut and key from the armature assembly (425, IPL Figure 1) shaft.

2 Add or remove shim washers (250, 255, 260) to align the slot in the nut with the tab of the key. Adding or removing 0.003 inch (0.076 mm) of shim washers will turn the nut approximately 30°.

3 Install the key and nut on the shaft.

4 Torque the nut 10 to 15 in-lb (1.13 to 1.70 Nm). Bend the tab of the key into the slot of the nut.

WARNING: USE THE CORRECT PROTECTION IN AN AREA WITH A GOOD FLOW OF AIR. SOLVENT CAN CAUSE SKIN, EYE, AND RESPIRATORY DAMAGE. DO NOT USE NEAR AN OPEN FLAME.

(f) Clean the lapped face of the ring (325 or 325A) and the contact surface of the seal (375) with Desoclean 45 solvent (alternate).

WARNING: USE IN A WELL-VENTILATED AREA. AVOID SKIN CONTACT. DO NOT BREATHE VAPORS.

CAUTION: REMOVE UNWANTED MATERIAL FROM THE CONTACT AREA OF THE SEAL (375) AND THE RING (325 OR 325A). UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE SEAL AND RING.

(g) Use a cotton swab to apply a thin layer of MIL-L-6085 oil to the carbon surface of the seal (375).

(h) Install the quantity of shim washers (335, 340, 345) for the seal operating length found in Step (6)(b) over the armature assembly (425) shaft. Refer to Figure 7006.

(i) Apply a thin layer of high vacuum grease to the packing (330, IPL Figure 1) and install the packing on the armature assembly (425) shaft.

(j) Install the ring (325 or 325A) on the armature assembly (425) shaft with the lapped side facing the seal (375).

(k) Install the key (320) in the slot of the armature assembly (425) shaft and install the nut (315) on the shaft.

(l) Hold the manual crank end of the shaft (310) and use the PN 2024174-1 torque adapter to torque the nut (315) 10 to 12 in-lb (1.13 to 1.36 Nm).

(m) To attach the nut (315) and prevent rotation, install the nut and bend the tab of the key (320) into the slot of the nut as shown in Figure 7006. Use the PN 2024174-1 torque adapter to torque the nut to 10 to 22 in-lb (1.13 to 2.49 Nm) to align the tab of the key with the slot in the nut. Add or remove shims to align the slots and achieve smallest Dimension B possible.

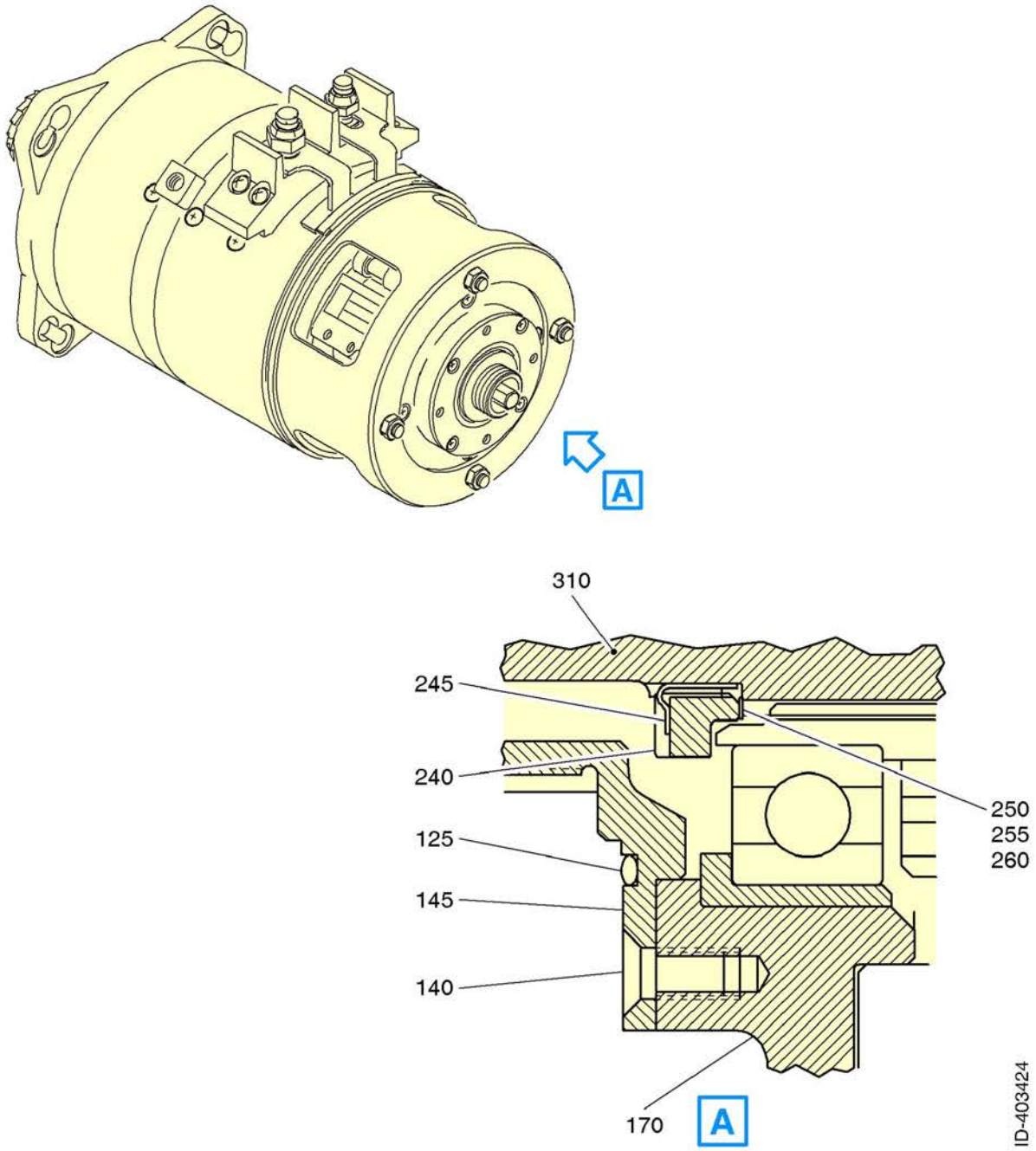


Figure 7008. (Sheet 1 of 1) Motor Rear Assembly Requirements (GRAPHIC 49-42-02-99B-823-A01)

Key for Figure 7008. (Sheet 1 of 1)

125	PACKING	245	KEY
140	SCREW	250	WASHER
145	SUPPORT	255	WASHER
170	REAR END BELL ASSY	260	WASHER
240	NUT	310	SHAFT

(12) Install the support (145) and brush assembly cover (120) as follows:

(a) Turn the motor on the PN 2024173-1 motor support fixture so the front end bell assembly (400) is down.

(b) Install the support on the rear end bell assembly (170) and attach it with the screws. Refer to Figure 7008.

(c) Apply a thin layer of high vacuum grease to the packings (125, 160, IPL Figure 1). Install one packing (160) on the rear end bell assembly and the other packing (125) on the support.

(d) Install the brush assembly cover (120) on the rear end bell assembly (170) with the indicator boss aligned. Refer to Figure 7009.

(e) Install the dust cover (115, IPL Figure 1) on the threaded end of the support. Position the chain. Refer to Figure 7009.

WARNING: SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(f) Apply MIL-S-46163, Type I, Grade K sealant to the threads of the screws (105, IPL Figure 1) and attach the brush assembly cover (120) and dust cover (115) chain with washers (110) and screws (105).

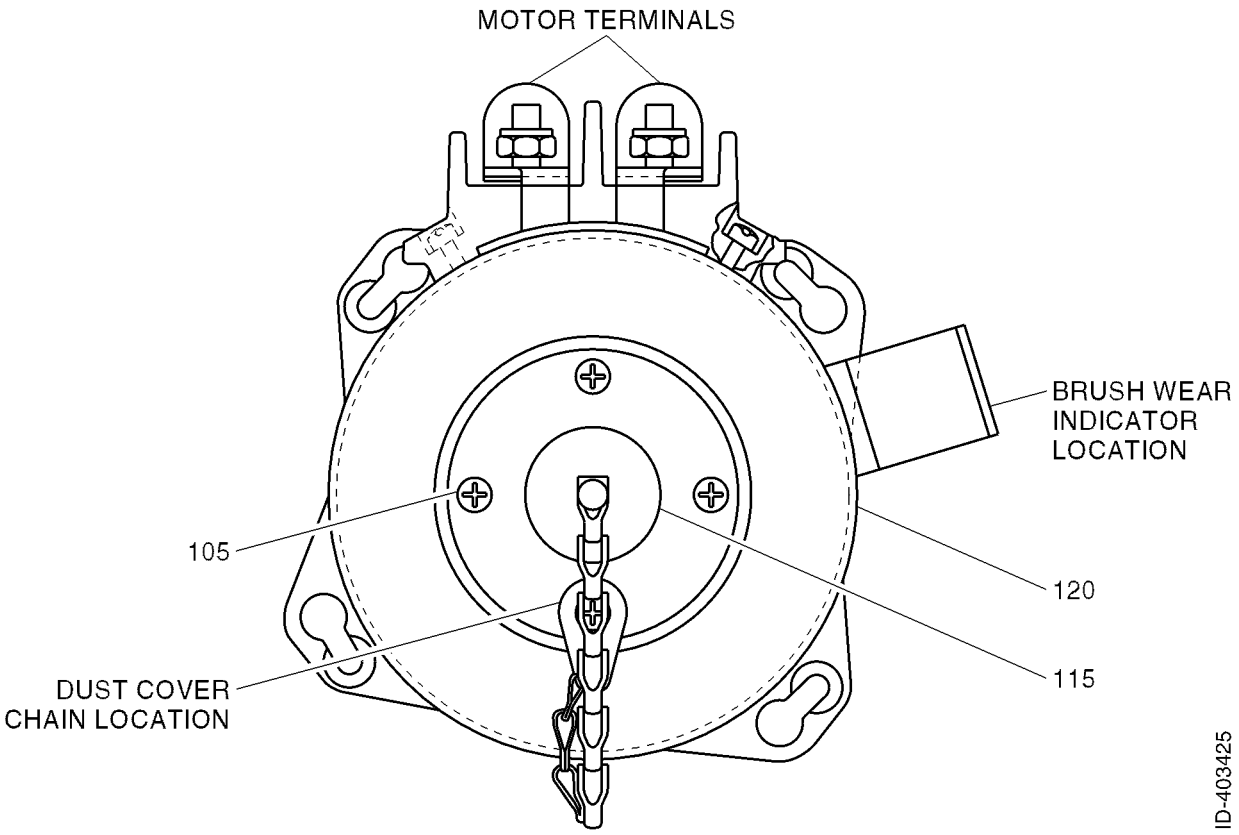


Figure 7009. (Sheet 1 of 1) Brush Assembly Cover Installation (GRAPHIC 49-42-02-99B-824-A01)

Key for Figure 7009. (Sheet 1 of 1)

105	SCREW	120	COVER
115	DUST COVER		

(13) Install the indicator assembly (95) and the housing assembly (100) with the switch assembly (70) on the brush assembly cover (120) as follows:

(a) Check the continuity between connector Pins 1 and 2 with a Model 4100 ATC digital ohmmeter. Refer to Figure 1001 for a schematic diagram of the motor.

(b) Install the indicator assembly (95, IPL Figure 1) in the bottom of the housing assembly. Engage the switch actuator spring with the indicator rod.

(c) Install the housing assembly and the assembled components on the brush assembly cover and attach with the gasket (90), washers (80), and screws (75).

(d) (PN 2704442-3) Attach the terminal lug (85) to the housing assembly with a screw (75) and a washer (80). Move the green wire lead so it does not touch the screw.

(e) (PN 2704442-4) Attach the terminal lug (85) to the housing assembly with a screw (75). Move the green wire lead so it does not touch the screw.

(f) Install the gasket (45) and the cover (40) on the housing assembly and attach with the screws (35).

Honeywell

COMPONENT MAINTENANCE MANUAL
2704442

TEMPORARY REVISION NO. 49-6

INSERT PAGE 7 OF 8 FACING PAGE 7021.

Reason: To change the specification number for sealant in the assembly instructions.

Paragraph 2.D.(1)(d) is changed as follows:

WARNING: **SEALANT IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.**

(d) Apply a thin layer of MIL-S-22473, Grade T primer and a layer of ASTM D5363 AN0311 sealant to the threads of the bolt (265).

(g) Use a Model 4100 ATC digital ohmmeter to make sure there is no continuity between connector Pins 1 and 2. The indicator assembly operates the switch when installed properly on the cam (205) arm.

(h) Use a Model 4100 ATC digital ohmmeter to make sure that there is continuity between the connector Pin 3 and the motor case ground.

(14) Test the direct current motor. Refer to TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000).

D. Final Assembly (Subtask 49-42-02-400-004-A01)

(1) After completing the functional test, do the final assembly of the motor as follows:

(a) Refer to IPL Figure 1 for all the item numbers unless specified differently.

(b) Apply a thin layer of high vacuum grease to the packings (280, 285). Install the packings on the ratchet (290). Refer to Figure 7006.

(c) Loosely install the washers (295, 300, IPL Figure 1) on the shaft. Install the washer (295) last.

WARNING: PRIMER IS FLAMMABLE AND TOXIC TO EYES, SKIN AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE ONLY IN WELL-VENTILATED AREAS. KEEP AWAY FROM OPEN FLAMES OR OTHER SOURCES OF IGNITION.

(d) Apply a thin layer of MIL-S-22473, Grade T primer and a layer of MIL-S-46146, Grade M, Type II sealant (gray) to the threads of the bolt (265).

(e) Install the ratchet on the shaft and attach with the washers (270, 275) and the bolt (265). Install the tang on the key washer (270) into one of the slots in the shaft.

(f) Torque the bolt 38 to 42 in-lb (4.29 to 4.75 Nm).

(g) Bend the tab up on the key washer to lock the bolt in position.

(h) Refer to the procedures in REPAIR (PGBLK 49-42-02-6000) to apply black enamel paint to scratches or bare spots on the motor.

(i) Install the two nuts (435, 440) on the field assembly (430) terminal posts.

(j) Install the terminal boot (20) on the terminal assembly (455).

E. Job Close-up (Subtask 49-42-02-400-005-A01)

(1) Not applicable.

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FITS AND CLEARANCES

1. Planning Data (TASK 49-42-02-99C-807-A01)

A. Reason for the Job (Subtask 49-42-02-99C-014-A01)

(1) This section gives the fits and clearances used when the direct current motor was made.

(2) This section gives the torque data required for repair and assembly of the direct current motor.

B. Job Setup Data (Subtask 49-42-02-99C-015-A01)

(1) Not applicable.

2. Procedure (TASK 49-42-02-220-801-A01)

A. Job Setup (Subtask 49-42-02-220-001-A01)

(1) Not applicable.

B. Fits and Clearances of the Direct Current Motor (Subtask 49-42-02-220-002-A01)

(1) Refer to Table 8001 when you do the procedures in REPAIR (PGBLK 49-42-02-6000) and ASSEMBLY (PGBLK 49-42-02-7000).

Table 8001. Fits and Clearances

Design Limits (Manufacturing)					
		Diameter		Diametrical Clearances	
Component (Item No., IPL Fig. 1)		Minimum Inches (mm)	Maximum Inches (mm)	Minimum Inches (mm)	Maximum Inches (mm)
Insert (185)	ID	1.8503 (46.998)	1.8509 (47.013)	0.0003T (0.0076)	0.0012L (0.0304)
Bearing (420)	OD	1.8497 (46.982)	1.8506 (47.005)		
Insert (405)	ID	2.4408 (61.996)	2.4414 (62.012)	0.0003T (0.0076)	0.0012L (0.0304)
Bearing (415)	OD	2.4402 (61.981)	2.4411 (62.004)		
Bearing (415)	ID	1.5741 (39.982)	1.5750 (40.005)	0.0011T (0.0279)	0.0003L (0.0076)
Armature assembly (425)	OD	1.5747 (39.997)	1.5752 (40.010)		
Bearing (420)	ID	0.7869 (19.987)	0.7875 (20.002)	0.0004T (0.0101)	0.0006L (0.0152)
Armature assembly (425)	OD	0.7869 (19.987)	0.7873 (19.997)		

NOTE: “L” indicates loose fit; “T” indicates tight fit.

C. Torque Values (Subtask 49-42-02-220-003-A01)

(1) Tighten nuts, bolts, screws, and tube fittings to the standard torque unless specified differently. Refer to FAA Manual FAA-H-8083-30, Aviation Maintenance Technician Handbook, for standard torque.

(2) Tighten nuts, bolts, screws, and tube fittings to the standard torque unless specified differently.

(3) Tighten fasteners installed through non-elastic boundaries to remove visible clearance between the parts. Monitor the rundown torque necessary just before the fastener becomes tight. Then tighten to the final torque (refer to Table 8002 for the correct thread size) and add the rundown torque. This procedure is sufficient for all fasteners not shown under torque values below. Refer to Table 8003 for final torque data after rundown torque.

(4) Tighten fasteners installed through elastic boundaries (sealed by means of a diaphragm or similar elastomeric gasket) equally to get a pressure tight seal.

Table 8002. Thread Size and Torque Data

	Torque in-lb (Nm)	
Thread Size	**Aluminum Fastener**	**CRES Fastener**
6-32	5 (0.565)	10 (1.13)
8-32	10 (1.13)	20 (2.26)
10-24	15 (1.695)	35 (3.955)
1/4-20	45 (5.085)	75 (8.475)
5/16-18	80 (9.04)	160 (18.08)
3/8-24	140 (15.82)	275 (31.075)

Table 8003. Final Torque Data

Thread Size	Approximate Turn After Run-Down
6-32	45°
8-32	60°
10-24	40°
1/4-20	40°
5/16-18	40°
3/8-24	60°

D. Specified Torque Values (Subtask 49-42-02-220-004-A01)

(1) Table 8004 gives information necessary to tighten fasteners to specified torque. Values shown do not include frictional torque caused by self-locking devices or rundown resistance. Frictional torque values must be added to the specified torque.

Table 8004. Specified Torque

Figure Number	Item Number	Nomenclature	Torque in-lb (Nm)
IPL Figure 1	150	Nut	35 to 40 (3.96 to 4.52)
	165	Screw	25 to 30 (2.83 to 3.39)
	240	Nut	10 to 15 (1.13 to 1.70)
	265	Bolt	38 to 42 (4.29 to 4.75)
	315	Nut	10 to 12 (1.13 to 1.36)

E. Job Close-up (Subtask 49-42-02-220-005-A01)

(1) Not applicable.

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SPECIAL TOOLS, FIXTURES, EQUIPMENT, AND CONSUMABLES

1. Planning Data (TASK 49-42-02-99C-808-A01)

A. Reason for the Job (Subtask 49-42-02-99C-016-A01)

(1) This section gives the special tools, fixtures, equipment, and consumable materials that are necessary for direct current motor maintenance.

B. Job Setup Data (Subtask 49-42-02-940-001-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 9001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 9001. Special Tools, Fixtures, and Equipment

Number	Description	Source
	arbor press	commercially available
	copper wire brush	commercially available
	diamond bit tool	commercially available
	heat gun	commercially available
	micrometer depth gage	commercially available
	motor test stand	commercially available
	oven	commercially available
	power cables (1 gage (minimum) insulated copper wire) (2 required)	commercially available
	printer/plotter (optional)	commercially available
	RPM measuring device (strobe light or revolution counter) (±1.0% full-scale accuracy)	commercially available
	shunt (100 mV at 1,000 amps)	commercially available
	soft-bristle brush	commercially available
	source of compressed air	commercially available
	steam cleaner	commercially available
	stiff-fiber bristle brush	commercially available
	stroboscope or revolution counter (used to measure rpm)	commercially available
	switch (SPST 500 amps)	commercially available
	thermocouple	commercially available
	timer (counter or stopwatch) (0 to 1 minute ±0.5% full-scale accuracy)	commercially available

Table 9001. Special Tools, Fixtures, and Equipment (Cont)

Number	Description	Source
	vacuum chamber	commercially available
Magtrol Model 6200	dynamometer controller/power supply with readout (0 to 250 in-lb (28.0 Nm) 0.01% accuracy of reading (speed) 0.2% full-scale (torque))	CAGE: 03692
Magtrol Model HD815-6N, -8N	dynamometer (0 to 250 in-lb (28 Nm) at 12,000 rpm (max) ±1.625 in-lb (0.17 Nm) accuracy)	CAGE: 03692
MIL-C-22520/1-01	crimp tool (with MIL-C-22520/1-02 positioner)	commercially available
MIL-C-22520/5-01	crimp tool (with MIL-C-22520/5-100 die)	commercially available
Model 103-2.5	dielectric strength tester (0 to 2,500 VAC, accuracy: 0 to 5 mA leakage, 0 to 0.005 MFD, 10 mA (maximum) sc current)	CAGE: 05611
Model 1864	megohmmeter (0 to 1,000 VDC, 5 mA ±2% accuracy)	CAGE: 0PK96
Model 2501	growler	CAGE: 92381
Model 25254-21B51	vacuum pressure gage (0 to 30 inHg (0 to 760 mmHg), ±1.5% full-scale accuracy)	CAGE: 52159
Model 25554-21B51CMY	positive pressure gage (optional) (0 to 30 inHg (0 to 760 mmHg) ±1.5% full-scale accuracy)	CAGE: 52159
Model 260	ohmmeter	CAGE: 6H316
Model 262-DDAU-EC5U	DC ammeter (0 to 1,000 DC amps ±5% accuracy)	CAGE: 0KC11
Model 4100 ATC	digital ohmmeter	Valhalla Scientific Inc., 9955 Mesa Rim Rd., San Diego, CA 92121
Model 7059-42	vacuum/pressure pump (0 to 20 inHg (0 to 508 mmHg) vacuum, 17 PSIG (117.2 kPa) pressure, 0.9 ft3/min (0.025 m3/min) capacity)	CAGE: 8L995
Model 931-1912001	DC voltmeter (0 to 28 VDC ±1% accuracy)	CAGE: 3N285
Model GFM170S	flow measuring device (0 to 10 mL/min, ±1.5% full-scale accuracy)	CAGE: 7S893

Table 9001. Special Tools, Fixtures, and Equipment (Cont)

Number	Description	Source
Model H720	magnetizing unit	CAGE: 37676
Model SB2824T	demagnetizing unit	CAGE: 37676
Model ZA-28	penetrant examination unit	CAGE: 37676
P66C-30660	DC power supply (Qty: 2)(0 to 26 vdc at 0 to 1,000 amps, ± 5% accuracy)	CAGE: 61987
PN 2024047-1	shaft adapter	CAGE: 06848
PN 2024061-1	air leakage test fixture	CAGE: 06848
PN 2024062-1	brush holder alignment fixture	CAGE: 06848
PN 2024063-1	expansion arbor	CAGE: 06848
PN 2024064-1	bearing press fixture	CAGE: 06848
PN 2024065-1	bearing press fixture	CAGE: 06848
PN 2024067-1	seal press fixture	CAGE: 06848
PN 2024173-1	motor support fixture	CAGE: 06848
PN 2024174-1	torque adapter	CAGE: 06848
PN 2024583-1	bearing puller	CAGE: 06848
PN 2024742-1	endplay check fixture	CAGE: 06848
PN 835643-1	mounting adapter	CAGE: 06848
PN EMP3500PO1	motor test stand	CAGE: 5W886
PN M81969/14-03	insertion/removal tool	commercially available

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 9002 for the specified consumable materials in this section.

Table 9002. Consumable Materials

Number	Description	Source
446-21-7038/X-530	paint (gloss black)	Dexter Aerospace, Packaging Prod. Div., 1-7 E. Water St., Waukegan, IL 60085
44GN-11	primer	CAGE: 33461
	barrier material	commercially available

Table 9002. Consumable Materials (Cont)

Number	Description	Source
	cotton swab	commercially available
	desiccant (MIL-D-3464)	commercially available
	epoxy-polyamide primer (MIL-P-23377, Type I, Class 1 or 2)	commercially available
	high vacuum grease	CAGE: 5D028
	lint-free cloth	commercially available
	magnetic base oil	CAGE: 60519
	penetrant oil (MIL-I-25135)	commercially available
	pH neutral paper	commercially available
	tape (MIL-T-21595)	commercially available
ANSI B74.18	abrasive cloth	commercially available
ANSI B74.18	abrasive paper (400 grit or finer)	commercially available
ANSI B74.18	crocus cloth	commercially available
Arrow 198	alkaline cleaner	CAGE: 0AKX3
Daraclean 212 or 282	alkaline cleaner (alternate)	CAGE: 09MM0
Desoclean 45	solvent (alternate)	CAGE: 83574
GE Glyptal 1201	insulation enamel (red) (MIL-E-22118)	CAGE: 65313
Loctite 290	compound (MIL-S-46163, Type III, Grade R)	CAGE: 62377
Loctite RC/620	compound	CAGE: 62377
M16878/5BGE5	wire (20 AWG, green)	commercially available
Magnaglo Dry Concentrate No. 14A	magnetic particles compound	CAGE: 37676
MIL-DTL-5541F, Class 1A	chemical film	commercially available
MIL-DTL-5541F	chemical film	commercially available
MIL-L-6085	oil	commercially available
MIL-PRF-680, Type II	stoddard solvent	commercially available
MIL-S-22473, Grade H	sealant	commercially available
MIL-S-22473, Grade T	primer	commercially available
MIL-S-46146, Grade II, Type I	sealant (gray)	commercially available
MIL-S-46146, Grade M, Type II	sealant (gray)	commercially available

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INSERT PAGE 8 OF 8 FACING PAGE 9004.

Reason: To change the specification numbers for sealant, MIL-S-46146, Grade II, Type I and MIL-S-46146, Grade M, Type II in the consumable materials table.

Table 9002 is changed as follows:

Table 9002. Consumable Materials (Cont)

Number	Description	Source
MIL-A-46146, Group II, Type I	sealant (gray)	commercially available
ASTM D5363 AN0311	sealant	commercially available

Table 9002. Consumable Materials (Cont)

Number	Description	Source
MIL-S-46163, Type I, Grade K	sealant	commercially available
MMM-A-1617, Type III	adhesive	commercially available
MS20995C32	lockwire	commercially available
Ridoline 909	alkaline cleaner (MIL-S-5002)	Henkel Surface Technologies, 32100 Stephenson Hwy., Madison Heights, MI 48071
RTV 3145	sealant (clear) (MIL-A-46146, Group 2, Type I)	Dow Corning Corp., 18008 Skylark Blvd., Suite 145, Irvine, CA 92714
Super C	detergent	National Colloid, 411 E. Columbine Ave., Santa Ana, CA 92707
Super Ruststripper	rust stripper	CAGE: 01PQ6
Temp-R-Tape, GV	masking tape (1-inch (25.4 mm) width)	Robert McKeown Company Inc., 111 Chambers Brook Rd., Branchburg, NJ 08876
TT-I-735	isopropyl alcohol	commercially available
Turco 4181	rust stripper (alternate)	Turco Products Inc., 7300 Bolsa Ave., Westminster, CA 92684-3600
Turco 5948 DPM	detergent (alternate)	Henkel Surface Technologies, 32100 Stephenson Hwy., Madison Heights, MI 48071

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

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SPECIAL PROCEDURES

1. Not Applicable

Blank Page

REMOVAL

1. Not Applicable

Blank Page

INSTALLATION

1. Not Applicable

Blank Page

SERVICING

1. Not Applicable

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STORAGE (INCLUDING TRANSPORTATION)

1. Planning Data (TASK 49-42-02-99C-809-A01)

A. Reason for the Job (Subtask 49-42-02-99C-017-A01)

(1) Use these procedures to prepare the direct current motor for storage or transportation. The function of these procedures is to make sure that the direct current motor has protection from dust, moisture, and other contamination.

B. Job Setup Data (Subtask 49-42-02-99C-018-A01)

(1) You can use equivalent alternatives for the special tools, fixtures, equipment, and consumable materials unless specified differently. The user must find equivalent alternatives.

(2) Refer to Table 15001 for the specified special tools, fixtures, and equipment in this section.

(3) Refer to H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil) for manufacturer's address.

Table 15001. Special Tools, Fixtures, and Equipment

Number	Description	Source
Not applicable	Not applicable	Not applicable

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

(4) Refer to Table 15002 for the specified consumable materials in this section.

Table 15002. Consumables

Number	Description	Source
	barrier material	commercially available
	desiccant (MIL-D-3464)	commercially available
	lint-free cloth	commercially available
	pH neutral paper	commercially available
	tape (MIL-T-21595)	commercially available

(5) The list that follows identifies Honeywell publications that are related to this section:

- Not applicable.

2. Procedure (TASK 49-42-02-550-801-A01)

A. Job Setup (Subtask 49-42-02-550-001-A01)

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURERS' MATERIAL SAFETY DATA SHEETS. SOME MATERIALS CAN BE DANGEROUS.

CAUTION: DO NOT USE MATERIALS THAT ARE NOT EQUIVALENT TO HONEYWELL SPECIFIED MATERIALS. MATERIALS THAT ARE NOT EQUIVALENT CAN CAUSE DAMAGE TO THE EQUIPMENT AND CAN MAKE THE WARRANTY NOT APPLICABLE.

CAUTION: DO NOT DROP OR HIT THE DIRECT CURRENT MOTOR DURING THESE PROCEDURES. THE DIRECT CURRENT MOTOR CONTAINS AN ASSEMBLY THAT CAN BE DAMAGED FROM INCORRECT USE.

CAUTION: DO THESE PROCEDURES IN A CLEAN ENVIRONMENT TO PREVENT DAMAGE TO MECHANICAL COMPONENTS.

(1) Obey the precautions.

B. Preservation (Subtask 49-42-02-550-002-A01)

(1) Clean the external surfaces with a clean lint-free cloth.

(2) Put the motor in pH neutral paper.

C. Packing (Subtask 49-42-02-550-003-A01)

(1) Put cushioning material at the sharp corners to prevent damage to the barrier material.

(2) Put the motor in an applicable size packing container with a desiccant. Use tape to seal the container.

D. Storage (Subtask 49-42-02-550-004-A01)

(1) Keep the motor in an area away from high temperatures, dust, moisture and corrosive fumes.

(2) Keep the motor at a continuous temperature below 100°F (38°C). The maximum storage temperature must not be more than 125°F (52°C). Control the humidity so that moisture will not collect on the motor.

E. Transportation (Subtask 49-42-02-550-005-A01)

(1) Not applicable.

F. Job Close-up (Subtask 49-42-02-550-006-A01)

(1) Not applicable.

REWORK (SERVICE BULLETIN ACCOMPLISHMENT PROCEDURES)

1. Not Applicable

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ILLUSTRATED PARTS LIST

1. Description (TASK 49-42-02-99C-810-A01)

A. General (Subtask 49-42-02-99C-019-A01)

(1) This section gives the parts that are used to make the direct current motor. It also supplies the necessary data to get replacement parts for REPAIR (PGBLK 49-42-02-6000) and TESTING AND FAULT ISOLATION (PGBLK 49-42-02-1000).

(2) The DPL part of the ILLUSTRATED PARTS LIST (IPL 49-42-02-10000) gives a breakdown, in disassembly sequence, of assemblies and detail parts of the unit.

(3) The illustrations show where you can find each part and are an important aid in DISASSEMBLY (PGBLK 49-42-02-3000) and ASSEMBLY (PGBLK 49-42-02-7000).

(4) The item numbers shown in the DPL are the same as the item numbers on the exploded view illustration(s). To find a part number, find the part on the illustration and record the item number. Go to the DPL to find the item number and related part number.

B. Job Setup Data (Subtask 49-42-02-99C-020-A01)

(1) The list that follows identifies references that are related to this section:

- H4/H8 CAGE Codes (available at http://www.logisticsinformationservice.dla.mil).

2. Contents of the IPL (TASK 49-42-02-99C-811-A01)

A. Vendor Code List (Subtask 49-42-02-99C-021-A01)

(1) The vendor code list shows the vendor CAGE code, name, and address in numerical sequence for all vendors shown in the IPL. Refer to Vendor Code List.

(2) The vendor CAGE code is given in the nomenclature column of the DPL to identify the vendor.

B. Equipment Designator Index (Subtask 49-42-02-99C-022-A01)

(1) Not applicable.

C. Numerical Index (Subtask 49-42-02-99C-023-A01)

(1) The NI is an alphanumeric list of all the part numbers shown in the part number column of the DPL.

(2) Also included in the index are the Honeywell part numbers that are equivalent to the manufacturer part number. Optional manufacturer part numbers are not included in the index.

(3) The figure item column gives all of the locations of a part. If a part number is in more than one figure item location, the part number is shown only one time in the part number column.

(4) The total required column shows the total number of parts that are used at each figure item location.

(5) The airline stock number column has space for customers to use.

D. Detailed Parts List (Subtask 49-42-02-99C-024-A01)

NOTE: Refer to Figure 10001.

(1) An item number is given to each part in the DPL and on the related illustration. The item numbers show the general disassembly sequence.

(2) To find a part number in the DPL.

(a) If the part number is known, refer to the NI to find the figure and item numbers in the DPL.

(b) If the part number is not known, turn to the illustration; locate the part, and record the item number. The part number is shown opposite the item number in the DPL.

(3) Revision codes for added, changed, or deleted data.

(a) Revision bars (I) in the left margin adjacent to an entry shows changed or added data to the part in the DPL.

(4) Figure item column.

(a) A part not shown on the illustration is identified in the DPL as non-illustrated by a dash (-) before the item number.

(b) When two or more items that are visually alike are listed in sequence, only the first item is illustrated. The illustration, however, is applicable to both items.

(c) When the detailed parts of an assembly or installation are illustrated, they can be identified by a bracket. The bracket identifies the next higher assembly or installation. If brackets are not used, the detail parts are illustrated, but the next higher assembly or installation is not.

(d) The parts that make up a select-from range group (i.e. calibration resistor assortments) have a non-illustrated item number or a different figure.

(5) Part number column.

(a) A part number that is prefixed usually indicates a type of part or method of procurement. Examples of these prefixes are AN, MS, and NAS. These standard part numbers may be suffixed by numbers only or numbers and letters. Suffix numbers usually indicate configuration or design difference. Suffix letters usually indicate material, color, or finish differences.

(b) All procurable components manufactured by Honeywell have a part number. The part number is stamped, etched, or cast on the part at time of manufacture when size, space, or shape is available. More manufacturing symbol(s), letter(s), or number(s) can be shown with the part number to identify a manufacturing process, a design change, or for a proprietary repair. Do not use this data to order a part. Use only the item part number and nomenclature as shown in the DPL.

(c) The letter “S” prefix of a part number designates a Honeywell standard part number. These standard part numbers have suffix letters and numbers.

(d) Honeywell commercial standard numbers are used in the parts lists to identify off-the-shelf items procured from another manufacturer. A commercial standard number can be a ten or eleven digit number.

(e) Nonprocurable part numbers are usually easy to identify and are primarily used for information purposes. The part numbers NONPROCXXX, ORDERNHA, GAREFXXX, TUCREFXXX, AIREFXXX, and TORREFXXX are not procurable and should not be ordered.

1 The part number NONPROCXXX is primarily used to sub-divide components into a logical, easy to use, subgroup. The subgroup is not procurable, but is used to identify a group of procurable components.

2 The part number ORDERNHA (Order Next Higher Assembly) is primarily used to identify nonprocurable details of an assembly.

3 The part number GAREFXXX, TUCREFXXX, AIREFXXX, and TORREFXXX is used when a procurable part number exceeds 15 digits. When the part number GAREFXXX, TUCREFXXX, AIREFXXX, and TORREFXXX appears in the PART

NUMBER column, refer to the nomenclature for the actual part number of the item desired.

(6) Airline stock number column.

(a) The airline stock number column has space for customers to use.

(7) Nomenclature column.

(a) The indenture code shows the relationship of each item to its NHA.

1 Each item goes in the nomenclature column one indenture (one dot) to the right of the assembly to which it belongs.

2 The items at the same indenture are all components of a single assembly or subassembly. Refer to Figure 10002 for an example of the indenture code system.

(b) Wherever possible, abbreviations will agree with the ASME Y14.38 specification. The non-standard abbreviations that spell words are not used.

(c) The vendor code data are as follows:

1 The vendors with a code number have the letter V before the number. This code, from H4/H8 CAGE Codes, identifies where to get that item.

2 No vendor code is shown in the nomenclature column of the DPL if the item is a U.S. standard part or Honeywell is the vendor.

3 The vendors with no code number (NCN) are identified by (VNCN__).

(d) A Honeywell specification drawing number will be shown if applicable.

(e) Refer to this list of possible explanation terms. These terms may be abbreviated.

1 OPTIONAL shows that the part is an optional alternative to other parts in the same item number variant group.

2 ALTERNATE shows that the part is an alternative to other parts in the same item number variant group.

3 SUPERSEDED BY shows that the part is replaced by the part number or item number shown and is not interchangeable.

4 SUPERSEDES shows that the part replaces the part number or item number shown and is not interchangeable.

5 REPLACED BY shows that the part is replaced by the part number or item number shown and is interchangeable. Part can be used until the supply is gone.

6 REPLACES shows that the part replaces the part number or item number shown and is interchangeable.

7 PRE SERVICE BULLETIN XXXX shows that the part is used if service bulletin XXXX was not done.

8 POST SERVICE BULLETIN XXXX shows that the part is used if service bulletin XXXX was done.

9 PRE SPARE PARTS BULLETIN XXXX shows that the part is used if spare parts bulletin XXXX was not done.

10 POST SPARE PARTS BULLETIN XXXX shows that the part is used if spare parts bulletin XXXX was done.

11 NONREPAIRABLE shows that the part cannot be repaired.

12 NONPROCURABLE shows that the part or assembled parts cannot be purchased and no part number exists for the assembly. The components of the assembled parts can be ordered unless differently specified.

13 ORDER NEXT HIGHER ASSEMBLY shows that the part number is part of a matched set and cannot be ordered independently. The next higher assembly can be ordered.

14 REFERENCE (GAREF, TUCREF, AIREF, TOREF etc.) shows the procurable part number that exceeds 15 digits in the NOMENCLATURE column as ORDER PN NNNN.

15 ORDER PART NUMBER shows a nonstandard or reference part number.

16 PART ADDED shows the part is added with no comparable component involved in the change. Interchangeability of other parts is not affected by the additions, unless specified.

17 DELETED shows the part is not available for use.

18 SEE FIGURE FOR DETAILS shows the part number details in a different figure.

19 SEE FIGURE FOR NEXT HIGHER ASSEMBLY refers the part number to the next higher assembly.

20 USE WITH (ITEM or PART NUMBER) shows a part is used with a different part.

21 COMPONENT OF (ITEM or PART NUMBER) shows that the part is a component of a different part.

22 MAY BE SUBSTITUTED shows that the part in the NOMENCLATURE column with its vendor code is an equivalent alternative for the part in the PART NUMBER column.

23 REFER TO ATA or PUBLICATION NUMBER identifies the assemblies that have their own Component Maintenance Manuals. These entries are also shown in the INTRODUCTION (PGBLK 49-42-02-0) of this manual under References.

24 Control Source Drawing (CSD) shows the Honeywell drawing number for the part in the PART NUMBER column.

25 Honeywell Control Source Drawing (HCSD) shows the Honeywell drawing number for the part in the PART NUMBER column.

(8) The effectivity code column.

(a) The effectivity code identifies the different configurations of the top assembly in each IPL figure.

(b) If this column is empty, the part is used in all configurations of the top assembly for that IPL figure.

(c) If this column has a letter code in it, the part is only used in the configuration of the top assembly that has the same letter code.

(d) If this column has more than one letter code, the part is used in each top assembly with the same letter codes.

(e) If a comma separates the column entry (A, C), the other codes do not apply. For example, a component coded “A, C” is applicable for Codes A and C only and not applicable for Code B.

(f) If a dash separates the column entry (A-C), the other codes do apply. For example, a component coded “A-C” is applicable for Codes A, B, and C.

(g) This column also shows “use with” and “component of” parts data. Use numbers when the effectivity code is not available or cannot be satisfactorily used to show this type of data. This code shows a relationship between parts in the same figure.

(9) The units per assembly column.

(a) The units per assembly column show the quantity of parts necessary in the assembly of one next higher assembly. The letters AR in this column show “as required” items and refer to bulk items or adjustable quantity items, such as shims or spacers. The letters RF are used to show an item that is shown in another area with a quantity.

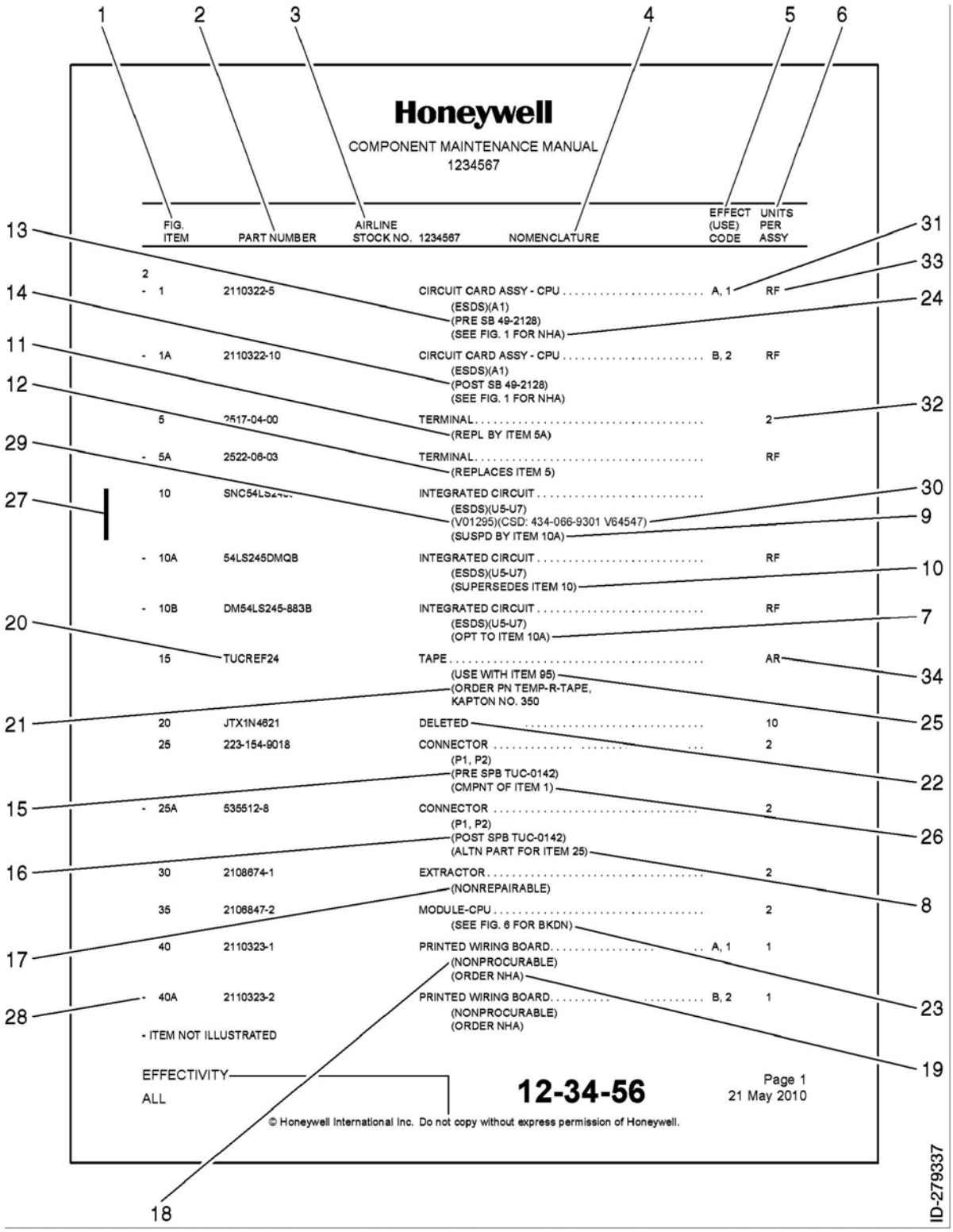

Figure 10001. (Sheet 1 of 1) DPL Example (GRAPHIC 49-42-02-99B-825-A01)

Key for Figure 10001. (Sheet 1 of 1)

1	FIGURE/ITEM column	18	NONPROCURABLE example
2	PART NUMBER column	19	ORDER NEXT HIGHER ASSEMBLY example
3	AIRLINE STOCK NUMBER column	20	REFERENCE example
4	NOMENCLATURE column	21	ORDER PART NUMBER example
5	EFFECTIVITY (USE) CODE column	22	DELETED example
6	UNITS PER ASSEMBLY column	23	SEE FIGURE FOR BREAKDOWN example
7	OPTIONAL example	24	SEE FIGURE FOR NEXT HIGHER ASSEMBLY example
8	ALTERNATE example	25	USE WITH (ITEM or PART NUMBER) example
9	SUPERSEDED BY example	26	COMPONENT OF (ITEM or PART NUMBER) example
10	SUPERSEDES example	27	Changed or added data indicator example
11	REPLACED BY example	28	Non-illustrated indicator example
12	REPLACES example	29	Vendor code example
13	PRE SERVICE BULLETIN example	30	Control Specification or Drawing Number for the related part in the Part Number column example
14	POST SERVICE BULLETIN example	31	Effectivity (A) and Use Code (1) examples
15	PRE SPARE PARTS BULLETIN example	32	Quantity example
16	POST SPARE PARTS BULLETIN example	33	RF indicates item referenced elsewhere.
17	NONREPAIRABLE example	34	As required example

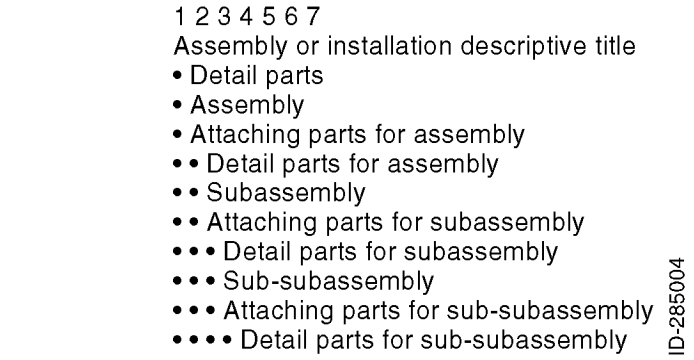

Figure 10002. (Sheet 1 of 1) Nomenclature Indentures (GRAPHIC 49-42-02-99B-826-A01)

3. Vendor Code List

NOTE: The vendor codes and part numbers that are shown in the DPL must not be construed as an authorization of the vendor, pursuant to the FAA regulations, to ship directly to the user. Neither must it be construed as a certification by Honeywell that parts shipped by vendors directly to users will conform to the type design or that such parts are airworthy or safe for installation.

Code	Vendor
V06324	GLENAIR INC 1211 AIR WAY GLENDALE, CA 91201-2405
V21335	TIMKEN AEROSPACE INC 336 MECHANIC ST LEBANON, NH 03766-2614
V40920	TIMKEN AEROSPACE & SUPER PRECISION 7 OPTICAL AVE KEENE, NH 03431-4320
V43334	GENERAL MOTORS CORP DELCO MORAINE NDH DIV 2509 HAYES AVE SANDUSKY, OH 44870-5359
V59364	HONEYWELL INTERNATIONAL INC., 1300 W. WARNER RD, TEMPE, AZ 85284-4282
V70210	HONEYWELL INTL INC AEROSPACE-TORRANCE 2525 W 190TH ST TORRANCE, CA 90504
V80205	NATIONAL AEROSPACE STANDARDS
V81349	MILITARY SPECIFICATIONS
V83086	NEW HAMPSHIRE BALL BEARINGS INC . DIV HITECH DIVISION 175 JAFFREY RD PETERBOROUGH, NH 03458-1767
V88044	AERONAUTICAL STANDARDS
V91587	REXNORD INDUSTRIES LLC, DIV SEAL OPERATION, 634 GLENN AVE., WHEELING, IL 60090
V96906	MILITARY SPECIFICATIONS

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4. Detailed Parts List

Equipment Designator Index

EQUIPMENT DESIGNATOR	FIG. ITEM	GEOGRAPHIC LOCATION	EQUIPMENT DESIGNATOR	FIG. ITEM	GEOGRAPHIC LOCATION

NOT APPLICABLE

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Numerical Index

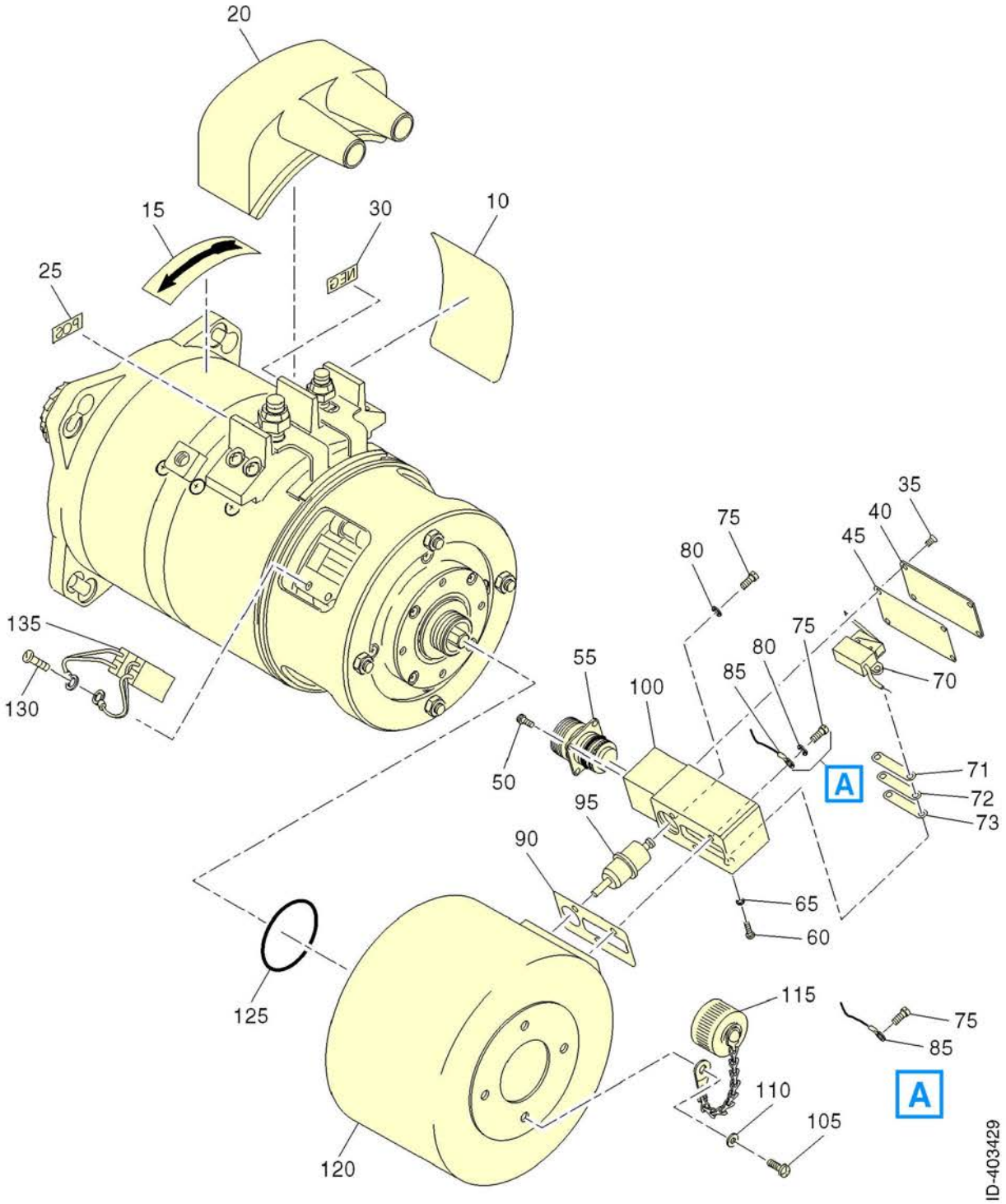
PART NUMBER	AIRLINE STOCK NO.	FIG. ITEM	TTL REQ
AN3-3A		1 265A	1
AN3C3A		1 265	1
AN960-6L		1 450	4
C008RRPP1P613LY231		1 415	1
GAREF1026		1 415	1
GAREF1027		1 200	3
G62055-2-7G		1 115	1
MS16562-209		1 485	2
MS21046C5S		1 435	1
MS21046C6S		1 440	1
MS21083N4		1 150	4
MS21097-004		1 60	0
MS21097-04004		1 60A	2
MS21209F0820L		1 180	4
MS21209F1-20L		1 175A	4
MS212209F1-20L		1 175	0
MS24693C3		1 35	4
MS24693S249		1 140	4
MS24693S273		1 165	4
MS24693S274		1 460	12
MS25036-101		1 85	1
MS35206-231		1 445	4
MS35207-264		1 105	4
MS35275-213		1 50	4
MS35276-264		1 215	8
M83248-1-014		1 305	1
M83248-1-027		1 330	1
M83248-1-030		1 125	1
M83248-1-160		1 160	1
M83248-1-212		1 280	1
M83248-1-213		1 285	1
NAS1191E06P5LKH		1 75B	3
NAS1352-06LL4P		1 75A	3
NAS1352C06LL6		1 75	0
NAS620-10L		1 110	4
NAS620-4L		1 65	2
NAS620-416L		1 155	4
NAS620-6		1 80A	2
NAS620-6L		1 80	3
NAS720-8-8		1 130	8
P204PPFS381A		1 420A	0
(DELETED)			
P204PPZ3FS50000		1 420	1
P9308PPFS371A		1 415	1
P9308PPFS371A		1 415A	0
(DELETED)			
REF2704442-5-2		1 1C	RF
R1908QQ4R6A1P712LY48		1 415	1
SK10423		1 375	1

Numerical Index

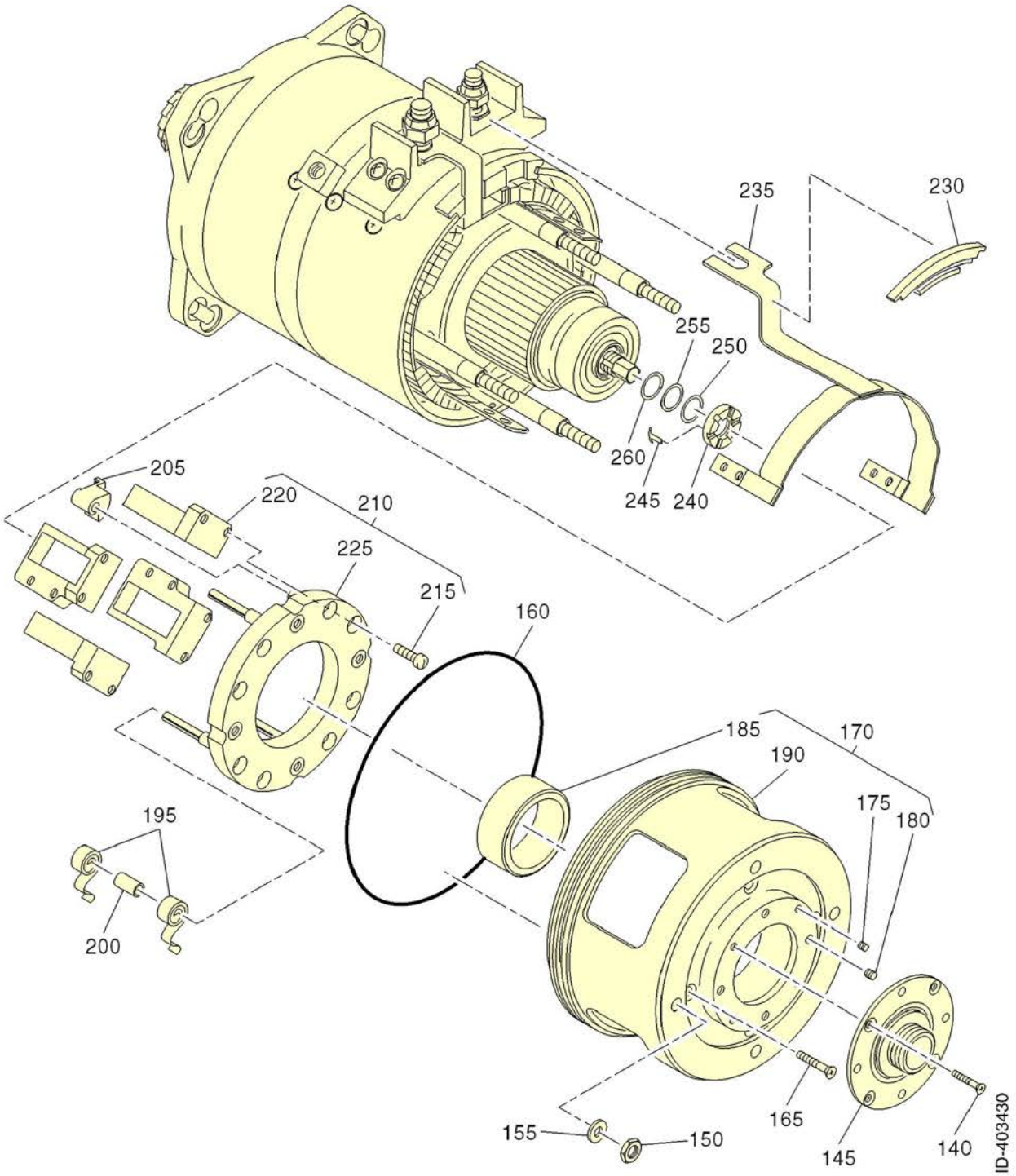
PART NUMBER	AIRLINE STOCK NO.	FIG. ITEM	TTL REQ
S3215-1038-080		1 300	1
S8154-200C002		1 355	AR
S8154-200C005		1 360	AR
S8154-200C010		1 365	AR
S8154-200C025		1 370	AR
S8154-231C002		1 250	AR
S8154-231C005		1 255	AR
S8154-231C007		1 260	AR
S8154-368C002		1 335	AR
S8154-368C005		1 340	AR
S8154-368C010		1 345	AR
S8192-442AAB065		1 465	8
S8302M2		1 15	1
S8454R89		1 25	1
S8454R90		1 30	1
S8491C125		1 427	AR
S8491C126		1 427A	AR
S9046-2-1-008		1 380	4
S9046-2-1-515		1 390	4
S9479-12		1 350	2
Z99504LR1MV		1 420	1
137-108-0113	SEE GAREF1026		
137-124-0113	SEE Z99504LR1MV		
2011633-3		1 395	4
235-007-9003	SEE G62055-2-7G		
2356586-1		1 10	1
2704442-3		1 1	RF
2704442-4		1 1A	RF
2704442-5		1 1B	RF
2704443-3		1 5	1
2704443-4		1 5A	1
2704443-5		1 5B	1
2704443-6		1 5C	1
2709560-1		1 55	1
2709951-1		1 425	1
2709960-1		1 430	1
2709961-1		1 490	1
2709962-1		1 470	4
2709968-1		1 20	1
2709969-1		1 400	1
2709969-3		1 410	1
2709970-1		1 405	1
2709971-1		1 230	1
2709971-2		1 480	1
2709972-15		1 190	1
2709972-3		1 170	1
2709973-1		1 185	1
2709974-1		1 225	1
2709975-1		1 210	1

Numerical Index

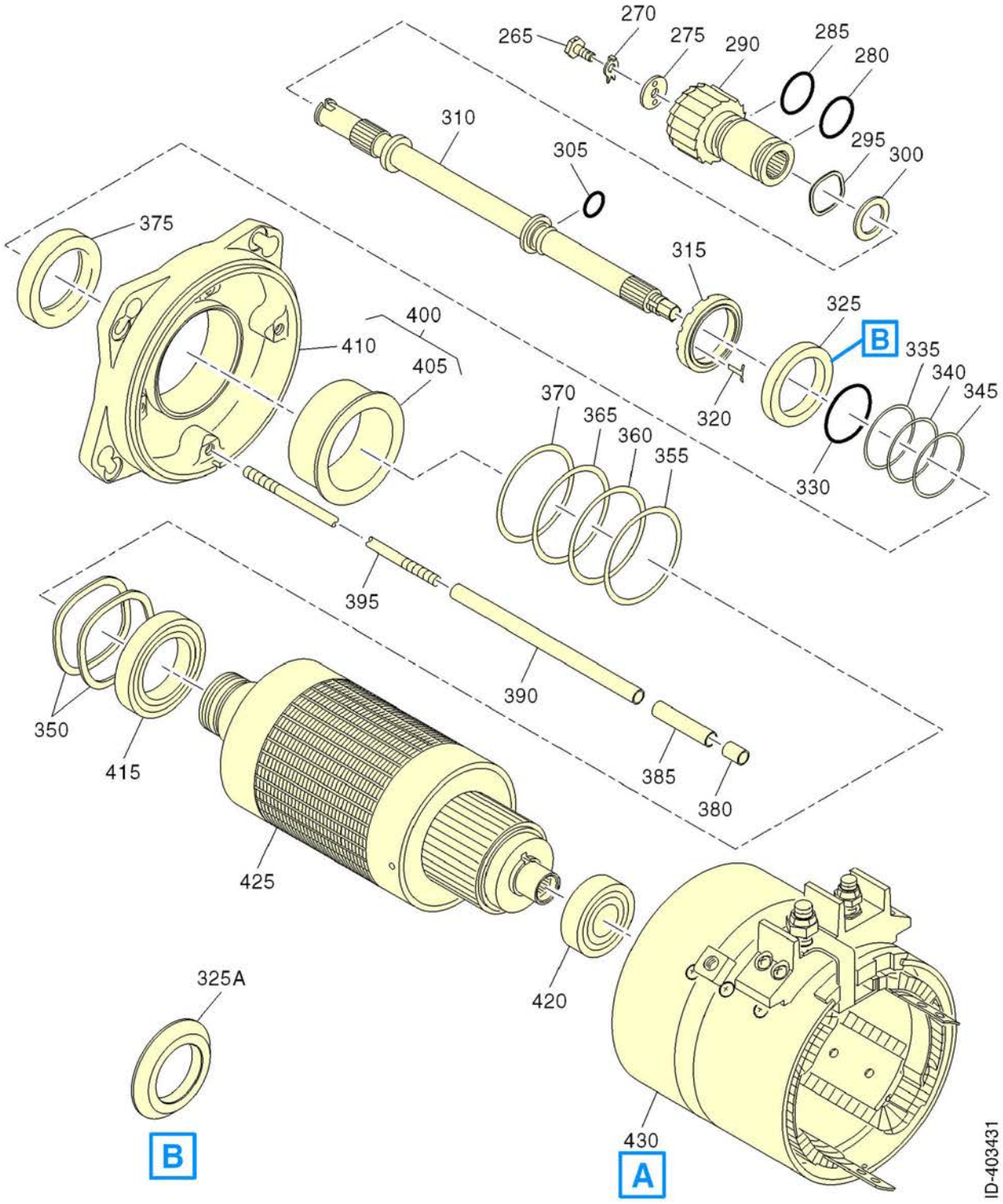
PART NUMBER	AIRLINE STOCK NO.	FIG. ITEM	TTL REQ
2709977-1		1 220	4
2709978-4		1 195	8
2709981-1		1 455	1
2709986-3		1 310	1
2709987-1		1 240	1
2709990-1		1 325	1
2709991-1		1 315	1
2709992-4		1 120	1
2709993-1		1 145	1
2709994-1		1 235	1
2709996-1		1 245	1
		320	1
2710442-1		1 205	1
2710451-19		1 475	1
2710493-7		1 135	8
2711018-1		1 100	1
2711020-1		1 40	1
2711021-1		1 90	1
2711025-1		1 70	1
2711026-1		1 95	1
2711026-2		1 95A	1
2711027-1		1 45	1
2712931-1		1 10A	1
2714942-1		1 205A	1
2714943-1		1 325A	1
2714946-1		1 10B	1
2714946-2		1 10C	1
2714947-1		1 71	AR
2714947-2		1 72	AR
2714947-3		1 73	AR
28182-225		1 385	4
3503904-1		1 290	1
3503992-1		1 295	0
3503992-2		1 295A	1
3504008-1		1 270	0
3504008-2		1 270A	1
3504009-1		1 275	1
367180-1		1 375A	1
62042R5J/C3UD		1 420	1
651-103-9201	SEE SK10423		
67620174-1		1 420B	1
67620231-1		1 95B	1



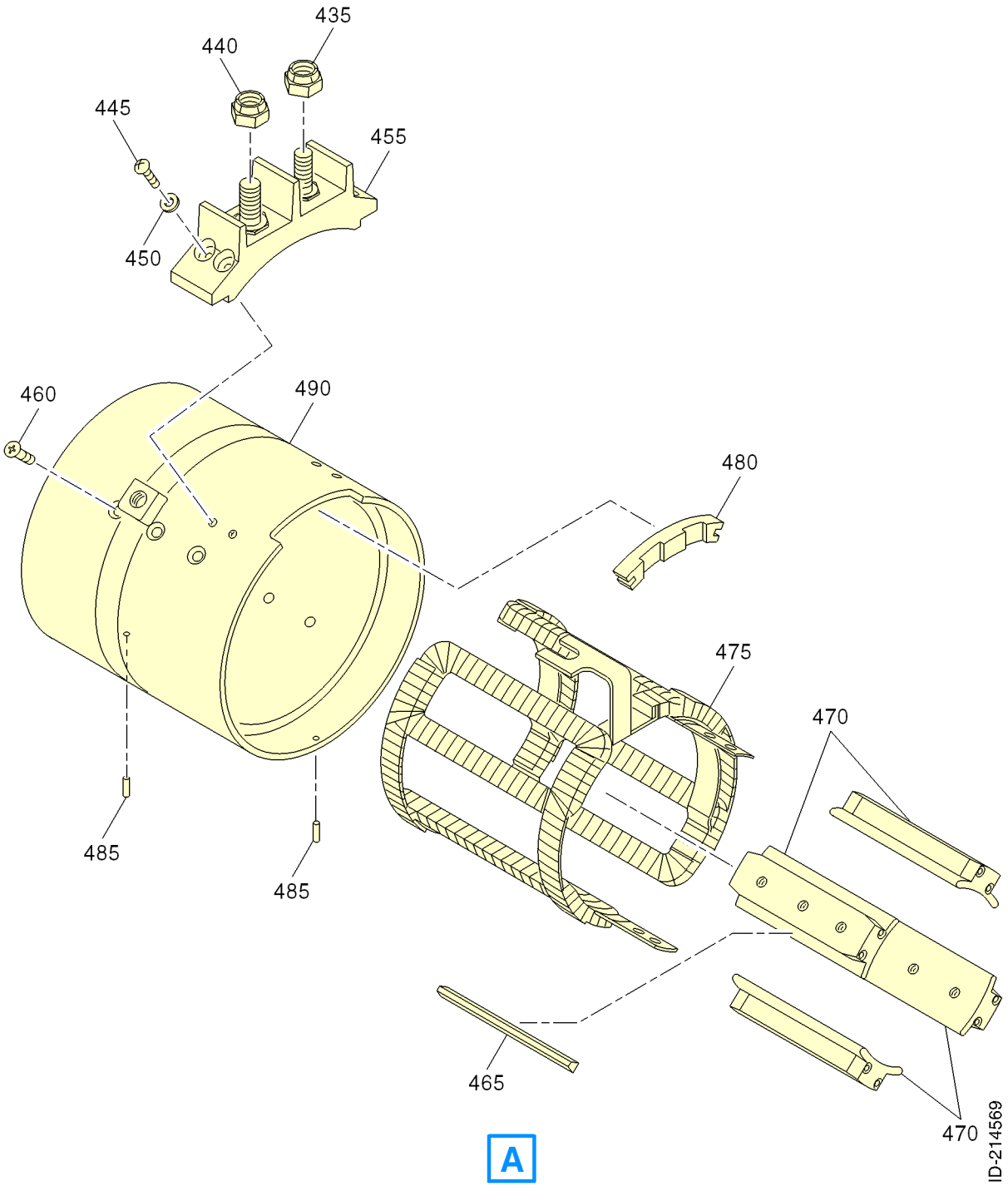
IPL Figure 1. (Sheet 1 of 4) Direct Current Motor



IPL Figure 1. (Sheet 2 of 4) Direct Current Motor



IPL Figure 1. (Sheet 3 of 4) Direct Current Motor



IPL Figure 1. (Sheet 4 of 4) Direct Current Motor

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FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
- 1	2704442-3			MOTOR DIRECT CURRENT (INSTL OUTLINE) (SERIES 1) (PRE SB 49-2358)	A	RF
- 1A	2704442-4			MOTOR DIRECT CURRENT (INSTL OUTLINE) (SERIES 1) (POST SB 49-2358) (PRE SB 49-2380)	B	RF
- 1B	2704442-5			MOTOR DIRECT CURRENT (INSTL OUTLINE) (SERIES 1) (POST SB 49-2380) (PRE SB 49-2389)	C	RF
- 1C	REF2704442-5-2			MOTOR DIRECT CURRENT (ORDER PN 2704442-5) (INSTL OUTLINE) (SERIES 2) (POST SB 49-2389)	D	RF
- 5	2704443-3			.MOTOR ASSY (NONPROCURABLE)	A	1
- 5A	2704443-4			.MOTOR ASSY (NONPROCURABLE)	B	1
- 5B	2704443-5			.MOTOR ASSY (NONPROCURABLE)	C	1
- 5C	2704443-6			.MOTOR ASSY (NONPROCURABLE)	D	1
10	2356586-1			..PLATE IDENT	A	1
- 10A	2712931-1			..PLATE IDENT	B	1
- 10B	2714946-1			..PLATE IDENT	C	1
- 10C	2714946-2			..PLATE-IDENT	D	1
15	S8302M2			..LABEL		1
20	2709968-1			..BOOT TERMINAL		1

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
25	S8454R89			..LABEL (POS)		1
30	S8454R90			..LABEL (NEG)		1
35	MS24693C3			..SCREW (0.112-40 X 0.313 LG) (V96906)		4
40	2711020-1			..COVER		1
45	2711027-1			..GASKET BRUSH WEAR IND COVER		1
50	MS35275-213			..SCREW (V96906)		4
55	2709560-1			..CONNECTOR		1
60	MS21097-004			..DELETED		0
- 60A	MS21097-04004			..SCREW SLF LKG (V96906)		2
65	NAS620-4L			..WASHER (0.115 ID X 0.209 OD) (V80205)		2
70	2711025-1			..SWITCH ASSY MICRO		1
71	2714947-1			..SHIM SWITCH	C,D	AR
72	2714947-2			..SHIM SWITCH	C,D	AR
73	2714947-3			..SHIM SWITCH	C,D	AR
75	NAS1352C06LL6			..DELETED		0
- 75A	NAS1352-06LL4P			..SCREW SLF LKG (V80205)	A	3
- 75B	NAS1191E06P5LKH			..SCREW SLF LKG (V80205)	B,C,D	3
80	NAS620-6L			..WASHER (V80205)	A	3

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
- 80A	NAS620-6			..WASHER *(V80205)*	B,C,D	2
85	MS25036-101			..TERMINAL LUG *(V96906)*		1
90	2711021-1			..GASKET BRUSH WEAR IND HOUSING		1
95	2711026-1			..INDICATOR ASSY BRUSH WEAR	A,B	1
- 95A	2711026-2			..INDICATOR ASSY BRUSH WEAR	C	1
- 95B	67620231-1			..INDICATOR ASSY BRUSH WEAR	D	1
100	2711018-1			..HOUSING ASSY BRUSH WEAR		1
105	MS35207-264			..SCREW *(V96906)*		4
110	NAS620-10L			..WASHER *(V80205)*		4
115	G62055-2-7G			..COVER DUST *(V06324)* *(CSD:* 235-007-9003 V70210*)*		1
120	2709992-4			..COVER BRUSH ASSY		1
125	M83248-1-030			..PACKING *(V81349)*		1
130	NAS720-8-8			..SCREW ASSY *(V80205)*		8
135	2710493-7			..BRUSH ASSY MTR		8
140	MS24693S249			..SCREW *(V96906)*		4
145	2709993-1			..SUPPORT COVER		1
150	MS21083N4			..NUT *(V96906)*		4
155	NAS620-416L			..WASHER *(V80205)*		4

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567 NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1					
160	M83248-1-160		..PACKING *(V81349)*		1
165	MS24693S273		..SCREW *(V96906)*		4
170	2709972-3		..END BELL ASSY REAR		1
175	MS212209F1-20L		...DELETED		0
- 175A	MS21209F1-20L		...INSERT *(V96906)*		4
180	MS21209F0820L		...INSERT *(V96906)*		4
185	2709973-1		...INSERT BEARING		1
190	2709972-15		...HOUSING END BELL		1
195	2709978-4		..SPRING SPIRAL TORSION		8
200	GAREF1027		..SLEEVE *(*ORDER PN S8128E10-049-16A*)*		3
205	2710442-1		..CAM INDICATOR	A,B	1
- 205A	2714942-1		..CAM INDICATOR	C,D	1
210	2709975-1		..BASE ASSY BRUSH HOLDER		1
215	MS35276-264		...SCREW *(V96906)*		8
220	2709977-1		...HOLDER BRUSH		4
225	2709974-1		...BASE ASSY MOLDED		1
230	2709971-1		..GROMMET BUS BAR (REAR)		1
235	2709994-1		..BUS BAR ASSY NEG		1
240	2709987-1		..NUT SPECIAL		1

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
245	2709996-1			..KEY LOCKING NUT		1
250	S8154-231C002			..WASHER SHIM (0.002 IN. (0.05 MM) THK)		AR
255	S8154-231C005			..WASHER SHIM (0.005 IN. (0.13 MM) THK)		AR
260	S8154-231C007			..WASHER SHIM (0.007 IN. (0.18 MM) THK)		AR
265	AN3C3A			..BOLT (V88044) (REPL BY ITEM: -265A)		1
- 265A	AN3-3A			..BOLT HEX (V88044) (REPL ITEM: 265)		1
270	3504008-1			..DELETED		0
- 270A	3504008-2			..WASHER KEY (V59364)		1
275	3504009-1			..WASHER SPECIAL (V59364)		1
280	M83248-1-212			..PACKING (V81349)		1
285	M83248-1-213			..PACKING (V81349)		1
290	3503904-1			..RATCHET SPLINED SHAFT (V59364)		1
295	3503992-1			..DELETED		0
- 295A	3503992-2			..WASHER SPRING (V59364)		1
300	S3215-1038-080			..WASHER (V59364)		1

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
305	M83248-1-014			..PACKING (V81349)		1
310	2709986-3			..SHAFT MOTOR GEAR		1
315	2709991-1			..NUT SLOTTED		1
320	2709996-1			..KEY LOCKING NUT		1
325	2709990-1			..RING MATING SEAL	A,B	1
325A	2714943-1			..RING	C,D	1
330	M83248-1-027			..PACKING (V81349)		1
335	S8154-368C002			..WASHER SHIM (0.002 IN. (0.05 MM) THK)		AR
340	S8154-368C005			..WASHER SHIM (0.005 IN. (0.13 MM) THK)		AR
345	S8154-368C010			..WASHER SHIM (0.010 IN. (0.25 MM) THK)		AR
350	S9479-12			..WASHER WAVE		2
355	S8154-200C002			..WASHER SHIM (0.002 IN. (0.05 MM) THK)		AR
360	S8154-200C005			..WASHER SHIM (0.005 IN. (0.13 MM) THK)		AR
365	S8154-200C010			..WASHER SHIM (0.010 IN. (0.25 MM) THK)		AR
370	S8154-200C025			..WASHER SHIM (0.025 IN. (0.64 MM) THK)		AR

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
375	SK10423			..SEAL REV PRESS FACE *(V*91587*)* *(CSD:* 651-103-9201 V70210*)*	A	1
- 375A	367180-1			..SEAL FACE	B,C,D	1
380	S9046-2-1-008			..SLEEVE INSULATION		4
385	28182-225			..BUSHING PLAIN		4
390	S9046-2-1-515			..SLEEVING INSULATION		4
395	2011633-3			..STUD		4
400	2709969-1			..END BELL ASSY FRONT		1
405	2709970-1			...INSERT BEARING		1
410	2709969-3			...END BELL MACHINED		1
415	GAREF1026			..BEARING *(CSD:* 137-108-0113 V70210*)* *(*ORDER PN R1908QQ4R6A1P712LY48*)* *(OPT MFR:* P9308PPFS371A V21335*)* *(OPT MFR:* R1908QQ4R6A1P712LY48 V83086*)* *(OPT MFR:* C008RRPP1P613LY231 V40920*)*		1
- 415A	P9308PPFS371A			..DELETED		0
420	Z99504LR1MV			..BEARING *(V*43334*)* *(CSD:* 137-124-0113 V70210*)* *(REPL BY ITEM:* 420B*)* *(OPT MFR:* P204PPZ3FS50000 V21335*)* *(OPT MFR:* 62042R5J/C3UD V52676*)*		1
- 420A	P204PPFS381A			..DELETED		0
- 420B	67620174-1			..BEARING *(REPL ITEM:* 420*)*		1
425	2709951-1			..ARMATURE ASSY		1
- 427	S8491C125			...PLUG BALANCE *(*REPAIR PART*)*		AR

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	AIRLINE STOCK NO.	1234567	NOMENCLATURE	EFFECT (USE) CODE	UNITS PER ASSY
1						
- 427A	S8491C126			...PLUG BALANCE (REPAIR PART)		AR
430	2709960-1			..FIELD ASSY		1
435	MS21046C5S			...NUT (V96906)		1
440	MS21046C6S			...NUT (V96906)		1
445	MS35206-231			...SCREW (V96906)		4
450	AN960-6L			...WASHER (V88044)		4
455	2709981-1			...TERMINAL ASSY		1
460	MS24693S274			...SCREW (V96906)		12
465	S8192-442AAB065			...INSULATOR		8
470	2709962-1			...STACK ASSY		4
475	2710451-19			...WINDING ASSY		1
480	2709971-2			...GROMMET		1
485	MS16562-209			...PIN SPRING (V96906)		2
490	2709961-1			...HOUSING		1

- ITEM NOT ILLUSTRATED