TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

ENGINE, GAS TURBINE MODEL T55-L-712 NSN 2840-01-030-4890

This copy is a reprint which Includes current pages from Changes 1 through 3.

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26 APRIL 1983

CHANGE

NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C.. 30 September 1996

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE, GAS TURBINE
MODEL T55-L-712
NSN 2840-01-030-4890

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**AVIATION UNIT AND
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**ENGINE, GAS TURBINE
MODEL T55-L-712
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AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

ENGINE, GAS TURBINE MODEL T55-L-712 NSN 2840-01-030-4890

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Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE, GAS TURBINE
MODEL T55-L-712
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Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE, GAS TURBINE, MODEL T55-L-712 (NSN 2840-01-030-4890)

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WARNING AND FIRST AID DATA

Warnings, cautions and notes emphasize important and critical instructions. They are defined as follows:

WARNING

An operating procedure or practice which, if not correctly followed, will result in personnel injury or loss of life.

CAUTION

An operating procedure or practice which, if not strictly observed, will result in damage or destruction of equipment.

NOTE

An operating procedure or condition which it is essential to highlight.

Personnel performing instructions involving operations, procedures, materials, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury or death. Refer to FM 21-11 for first aid data to treat injuries resulting from working on the engine.

WARNING

Fuels

- Turbine fuels are very flammable. They may cause drying and irritation of skin or eyes.
- Handle only in well-ventilated areas away from heat and open flame.
- Drain and store in approved metal safety containers.
- Avoid prolonged or repeated contact with skin and do not take internally.
- Wash contacted area of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eves.

WARNING

Lubricating Oils

- Lubricating oils cause paralysis if swallowed. Prolonged contact with them may irritate the skin,
- Handle only in well-ventilated areas away from heat and flame.
- Drain and store in approved metal safety containers.
- Avoid prolonged or repeated contact with skin and do not take internally.
- Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes

WARNING

Dangerous Voltages

- The ignition exciter stores very high and possibly fatal voltage, Use extreme care when working around spark and ignition exciters,
- Serious injury could result if exciter or igniters are Improperly discharged or accidentally grounded.
- Do not probe inside of output receptacles, ignition leads, or spark Igniters with finger or metal objects.
- Discharge exciter only with insulated screwdriver.
- In case of shock or injury, get medical attention.

WARNING

Discharging Ignition Exciter

- When discharging ignition exciter, remove one lead at a time and discharge receptacle that lead was removed from. Failure to do so may result in serious shock when you are removing second lead.
- In case of serious shock, get medical attention.

WARNING

Compressed Air

- When using compressed air for cleaning, use approved protective equipment for eyes and face.
- Do not use more than 30 psig air pressure.
- Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin.
- In case of injury, get medical attention.

WARNING

Corrosion Preventive Compounds

- These materials are flammable and toxic.
- Use only in well-ventilated area away from heat, sparks and open flames.
- If swallowed, do not induce vomiting. Get medical attention.
- In case of contact immediately flush skin and eyes with water for 15 minutes, Get medical attention for eyes.

WARNING

Cleaning Solvents

- These materials are flammable and toxic. They can irritate skin and cause burns.
- Use only in well-ventilated area, away from heat, sparks and open flame.
- In case of contact, immediately flush skin and eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Handling of Heated Parts

- Wear asbestos gloves when handling heated parts for assembly and disassembly. Failure to comply may cause severe burns.
- Get medical attention for burns.

WARNING

Handling of Parts Treated with Dry Ice

- Dry ice is very cold. It can cause severe burns.
- Wear approved protective equipment and handle only in well ventilated areas. Get medical attention for burns.

WARNING

Handling of Spring Loaded Parts

- Be careful when removing and installing retaining ring to spring loaded parts.
- Spring tension could cause parts to spring up and cause injury
- If injury occurs, get medical attention.

WARNING

Nitric Acid

- Both nitric acid and its vapors are a personnel hazard.
- Avoid contact with skin, eyes or clothing. Avoid inhalation of vapors.
- In case of contact, immediately flush skin and eyes with water for at least 15 minutes. Get medical attention

WARNING

Handling Engine Shipping Container

- Be careful when working with engine shipping container. Make sure both sections of container are grounded.
- Make sure container is opened in well-ventilated area. Failure to do so could result in explosion.
- Shipping container is pressurized. Make certain that all air pressure has been released before removing valve stem or loosening nuts. If nuts are removed before pressure is released, internal pressure could blow cover off and cause serious injury.
- If injury occurs, get medical attention.

WARNING

Handling of Skimming Maintenance Kit

- Contact with skimming maintenance kit rotating parts could cause injury. Exposure to maintenance kit noise may cause ringing in ears, and temporary or permanent hearing loss.
- Keep hands and clothing away from rotating parts and wear approved hearing protection.
- If injury occurs, or ringing in ears or loss of hearing persists, get medical attention.

WARNING

Sodium Dichromate

- Sodium dichromate is highly toxic, do not take internally.
- Use only with adequate ventilation. Avoid prolonged or repeated contact with skin.
- Wear approved gloves and goggles, or face shield and apron, and wash hands thoroughly after handling.
- Wear respirator if sodium dichromate is in powdered form.
- In case of contact, immediately flush skin and eyes with water for at least 15 minutes. Get medical attention.

WARNING

Welding Operations

- Welding operations are hazardous. Harmful light rays may injure eyes and burn skin. Poisonous fumes may cause illness. Burns and fires may result from hot sparks.
- Wear approved protective clothing and equipment.
- Perform welding operations in well-ventilated areas away from flammable liquids and gases.
- If fire occurs, call for assistance and use proper extinguishing procedures.
- If injury or illness occurs, get medical attention.

WARNING

Use of Engine Maintenance Sling

- Inspect sling prior to use for signs of abuse or wear. Failure to comply may cause injury to personnel and/or damage to engine.
- When using sling, make sure hoist lifting capacity is 1200 pounds.
- In case of injury get medical attention.

WARNING

Power Grinding

- Power grinding is hazardous to personnel. Sparks and metal chips may injure eyes.
- Wear approved goggles.
- If injury occurs, get medical attention.

WARNING

Handling Torque Multiplier

- Make sure handle is fully seated and ratchet selector on torque pack is properly set before applying torque. Rotating ratchet selector with load on torque pack may damage unit and injure personnel.
- Do not change ratchet selector when torque load is on torque pack.
- If injury occurs, get medical attention.

WARNING

Flight Safety Critical Aircraft Parts (FSCAP)

The T-55 flight safety critical aircraft parts inclusion in this manual will be restricted to the flight safety critical aircraft parts section, including Table 1. Warnings will not be included throughout the manual. Flight safety critical aircraft parts require special handling during maintenance and compliance to all maintenance procedures are mandatory.

TECHNICAL MANUAL

NO. 55-2840-254-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 26 April 1983

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE, GAS TURBINE, MODEL T55-L-712
(NSN 2840-01-030-4890)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

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NOTE:

This manual is printed in four volumes as follows:

TM 55-2840-254-23-1, consisting of Warning Pages, Table of Contents, Chapter 1, and Alphabetical Index.

TM 55-2840-254-23-2, consisting of Warning Pages, Table of Contents, Chapter 2, and Alphabetical Index.

TM 55-2840-254-23-3, consisting of Warning Pages, Table of Contents, Chapter 3 through 5 and Alphabetical Index.

TM 55-2840-254-23-4, consisting of Warning Pages, Table of Contents, Chapter 6 through 9, Appendixes A through F, Glossary, and Alphabetical Index.

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HOW TO USE THIS MANUAL

OVERVIEW

This information gives a general description of the entire manual and how to use it along with the repair parts and special tools list (TM 55-2840-254-23P). If you cannot find information, you cannot do the job Learning how to use this manual can help. Check how the manual IS put together and how its system works.

1. DESCRIPTION OF MANUAL

This manual has nine chapters and six appendixes. Each chapter is divided into sections. Each section in Chapter 1 is divided into paragraphs or tasks. Each section in Chapters 2 thru 9 is divided into tasks. The tasks tell you what you need and how to do any job. The paragraphs have specific Information you will need to know. The appendixes have general information you will need to know. They list references, expendable supplies and materials etc.

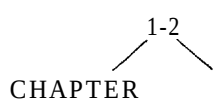
A. Chapters. Chapters divide the manual into usable engine maintenance groups. They align with standard groupings shown in the MAC chart. Refer to Appendix B.

B. Sections Sections divide the chapters into smaller groups. They have information about the components of parts for which the chapter is titled. They align with components shown in the MAC chart. Refer to Appendix B.

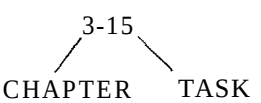
C. Paragraphs/Tasks. Paragraphs make up some of the sections in Chapter 1 They contain specific information about the engine. Tasks make up some of the sections in Chapter 1 and the sections in Chapters 2 thru 9. It is the tasks that have the information you need to do any job. The upper heading after the task number is the task name. It tells the job to be done in the task. The task heading at the top of each page specifies the task to be performed and the lowest maintenance level authorized to perform that task. Tasks to be accomplished by the Aviation lntermediate Maintenance level only will be reflected by the term (AVIM) at the end of the task heading. If the term (AVIM) is not at the end of the task heading, then either the Aviation Unit or Aviation Intermediate Maintenance (AVUM) or (AVIM) level can accomplish that task. All paragraphs and tasks are numbered This helps your find what you need when you need it. USE THE INDEX TO FIND THE PARAGRAPH OR TASK YOU NEED. DO NOT USE PAGE NUMBERS. Paragraphs and tasks are numbered as follows

(1) Two-element numbers are used as shown in the examples

CHAPTER 1



CHAPTERS 2 THRU 9

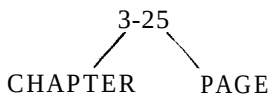


(2) The first number is the number of the chapter. The second number is the paragraph or task in that chapter. The two elements arc separated by a dash.

HOW TO USE THIS MANUAL (Continued)

D. Page Numbers. Pages are numbered by order of chapters, from front to back of manual. They are used as follows.

(1) Two-element numbers are used as shown in the example.



(2) The first number is the number of the chapter. The second number is the page in that chapter.

E. Initial Setup Tables. An initial setup table is the first part of every task in the manual. It lists information you will need to know before you can do the job. How to prepare the work area, what tools will be needed, and other critical information are listed when they apply, The following headings are used when they apply.

(1) Applicable Configuration. If the task does not apply to all engine configurations, different configurations covered by the same procedure will be brought to your attention.

(2) Tools. Tools, tool kits, or shop sets needed to do the task are listed here. if tools from your repairman's tool kit are needed, the kit is listed. individual tools from your shop set are listed, as needed, by name, type, and size. Tools you need that are not in the kit or set, are listed by name, type, and size. Special tools and test and support equipment are listed by a T-number. Find these items in Table 1-1.

(3) Materials. This heading lists all expendable items and support materials (things you normally use up doing a job). These are things like solvent, rags, grease, safety wire, etc. They are listed by an E-number; example. Grease (E23). Find these items in Appendix C.

(4) Parts. This heading lists all mandatory replacement parts (parts you must replace if you expose or remove them during the task). These are things like gaskets, packings, cotter pins, lockwashers, etc. They are listed by RPSTL nomenclature.

(5) Personnel Required. This heading lists the people needed to do the job, They are identified by their MOS. The heading identifies the MOS and the recommended skill level to accomplish the subject task. The assigned skill level should not be construed as the only skill level authorized to accomplish that task. The Maintenance Allocation Chart (MAC) (Ref. Appendix B) assigns maintenance functions to the authorized maintenance level without regard to the MOS skill level. When more than one of any MOS IS needed, the number needed IS shown in parentheses. The text will tell you when the additional MOS is needed.

(6) References. This heading lists related tasks and TM's you will need to do the job. The task steps tell you when these tasks and TM's are needed,

(7) Equipment Condition. This heading lists all the things to be done before you start the job To help, the number of the task that tells you how to do them is given when applicable

HOW TO USE THIS MANUAL (Continued)

NOTE

All tasks covered in this manual are off helicopter tasks. If a task is an off engine task, it will be brought to your attention under "Equipment Condition." Example: "Off Engine Task."

(8) General Safety Instructions. Safety precautions that must be observed when you are doing the job are described under this heading. Warnings also include basic first aid instructions.

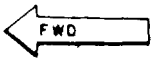
F. Locator Illustrations When needed (for removal, installation and other procedures) a locator illustration is included on or facing initial setup pages. They show you the area of the engine to be worked on. Parts Involved in the task are called out.

G. Illustration Arrows. You will find five types of arrows used. They are as shown below:



Locator arrow used to show parts that cannot be easily seen or to indicate area of engine being worked on.

Index arrow used to identify parts on artwork.



Direction arrow used to indicate position, i.e., fwd, aft



Movement arrow used to indicate direction of movement.



Movement arrow used to indicate direction of rotation

H. Procedures. Step by step procedures tell you how to do the job. They are arranged in logical sequence to help you get the job done efficiently.

HOW TO USE THIS MANUAL (Continued)

1. Use of Clock Positions. Many procedures contain references to or views of clock positions. Comparing engine to face of clock is an easy way to locate specific engine areas. To help find clock positions on the engine, remember the following:

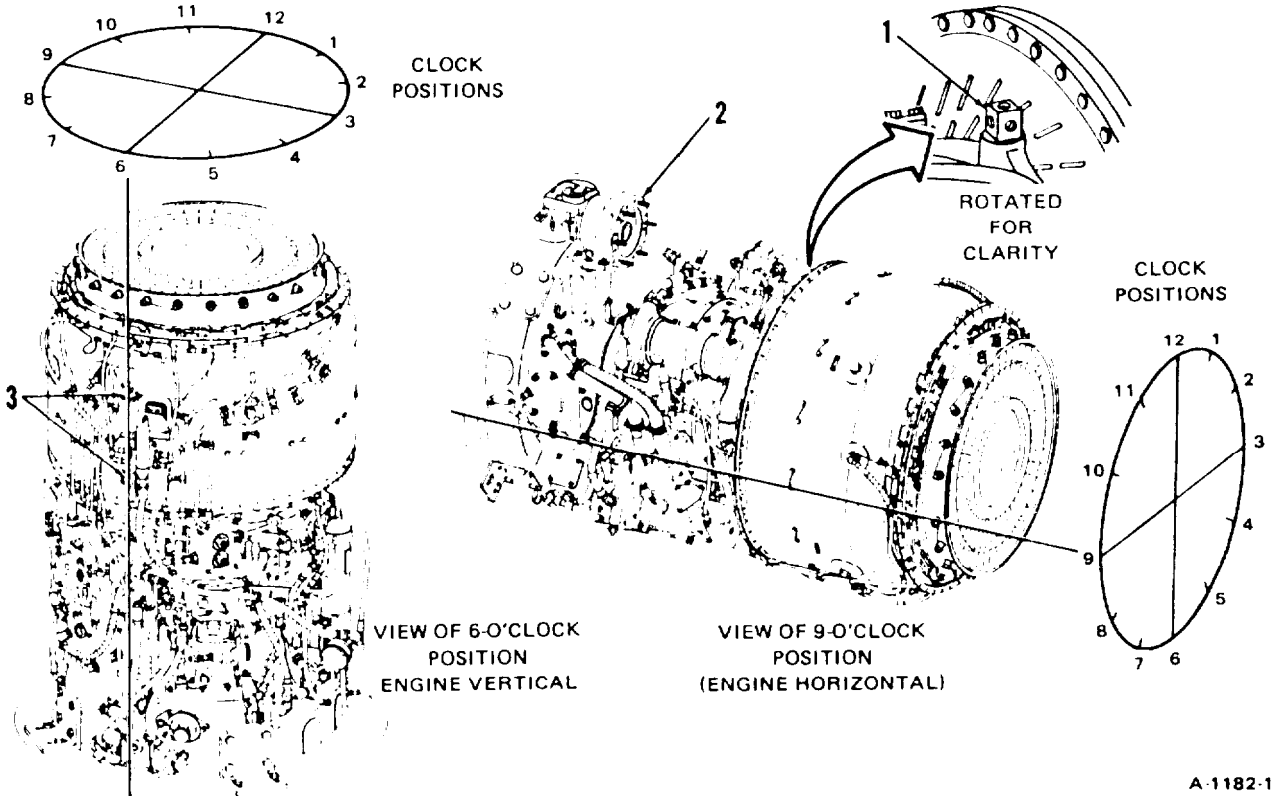
(1) Clock position is always determined from rear of engine.

(2) Once a clock position is determined from rear of engine, visualize that clock position along entire length of engine.

(3) Hoist adapter (1) and starter drive assembly (2) are mounted at the 12-o'clock position.

(4) Two fuel drain valves (3) are mounted at the 6-o'clock position.

(5) Some procedures show engine mounted vertical in maintenance stand. This does not change the method for finding clock positions on the engine.



HOW TO USE THIS MANUAL (Continued)

J. Appendix A - References. This appendix lists all referenced publications needed to perform the maintenance procedures in this manual.

K. Appendix B - Maintenance Allocation Chart (MAC). This appendix consists of four sections as follows:

Section I - Introduction. This section is a summary of what is in the MAC

Section II, This section is the MAC. The MAC assigns maintenance functions in accordance with the Three Levels of Maintenance concept for Army Aviation. The MAC has six columns, containing the following information:

Columns 1 and 2 - Functional Groups. These columns identify maintenance significant components, assemblies, subassemblies, and modules.

Column 3 - Maintenance Function. This column lists the maintenance functions to be performed on the items listed in column 2.

Column 4 - Maintenance Categories. The maintenance categories (levels) AVUM, AVIM, and DEPOT are listed with individual columns. These columns identify the maintenance level at which each maintenance function is to be performed.

Column 5 - Tools and Equipment. This column lists the reference code identifying the tool or test equipment required, as listed in Section III.

Column 6 - Remarks. Remarks identified by an alphabetical code, where applicable, are listed in Section IV anti identified in column 6.

Section III - Tool and Test Equipment Requirements. This section consists of five columns, containing the foIlowing information:

Tool or Test Equipment Reference: Code. This column lists the reference code listed in Column 5 - Tools and Equipment in the MAC.

Maintenance Category. This column lists the maintenance category (level) authorized to use the tool or test equipment.

Nomenclature. This column lists the nomenclature of the tools and test equipment.

National/NATO Stock Number. This column lists the stock number applicable to each tool or test equipment.

Tool NUMBER. The tool number is listed to aid in identifying the tool or test equipment.

Section IV-Remarks. This section has two columns, containing the following information:

References Code. This column contains alphabetical codes or numbers in parentheses corresponding to the codes appearing in the applicable columns in the MAC.

Remarks/Notes. This column contains the actual notes cross-reference by the reference codes to the MAC.

HOW TO USE THIS MANUAL (Continued)

L. Appendix C - Expendable Supplies and Materials List. This appendix lists all expendable supplies and materials called out in the manual. The following columns are provided.

(1) Item Number. This is the E-number assigned to the expendable item. It is referred to in the detail procedures. Example: "Use cleaning solution (E11)."

(2) National Stock Number. This is the national stock number assigned to the item. Use it to request or requisition the item.

(3) Description. This column lists the Federal name and, if required, a description to identify the item. The last line for each item shows the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable,

M. Appendix D - Wiring Diagrams. This appendix contains the engine wiring diagram. Use this appendix to help you understand the description of the engine electrical system.

N. Appendix E - Illustrated List of Manufactured Items. This appendix lists and illustrates any parts or tools you may have to make to do a job.

O. Appendix F - Abbreviations. This appendix lists abbreviations you will find in the manual.

P. Glossary. Definitions of terms you find in the manual are listed here to help you.

Q. Index. This appears at the end of the manual. It lists all subjects in the manual by alphabetical order. Items are listed as follows.

(1) Each paragraph/task number is listed with the subject it applies to:

Example

	Para. Task	Page
Fuel Boost Pump Assembly		
Clean	6-10	6-42
Inspect	6-11	6-43
Install	6-13	6-48
Package	6-15	6-56
Preserve	6-14	6-55
Remove	6-9	6-39
Repair	6-12	6-44

(2) Some tasks are listed by the job to be done. The subjects or components are listed under them.

Example:

	Para./ Task	Page
Remove		
Accessory Gear Assembly (AVIM)	5-8	5-45
Accessory Gearbox Assembly	5-1	5-3
Air Diffuser Assembly (AVIM)	2-36	2-351
Anti-Icing Air Gallery Cover	2-14	2-51

Check over the index and see how it can work for you. It can make finding information easy.

R Part Numbers. Part numbers are not listed in this manual except where absolutely needed for clarity. You can find the part number you need in the Repair Parts and Special Tools List (RPSTL) (TM 55-2840-254-23P)

2. HOW TO FIND WHAT YOU NEED

A. General Information (Troubleshooting)

(1) Look at the "INDEX." Find "Symptom Index." The "INDEX" gives the paragraph number for the symptom index. Go to the Symptom Index.

(2) Find your symptom in the "Symptom Index." Next to the symptom is the page number of the troubleshooting procedure that will help you solve your problem. Turn to the troubleshooting procedure page.

(3) Follow the troubleshooting procedure until you find the problem. The troubleshooting procedure gives you the task number of the maintenance procedure needed to fix the engine. Turn to that task.

(4) Follow the maintenance procedure and complete all work. Check again and make sure you are right. When the job IS done, recheck that the trouble has been corrected.

B. Part Numbers. To find a part number go to the RPSTL (TM 55-2840-254-23P). Find the "How To Locate Repair Parts" paragraph in the introduction. It will tell you how to find your part number.

C. Tasks. To find any task, use the "INDEX." Find the subject you want. The "INDEX" gives you the task number you want.

3. HOW TO PREPARE FOR A TASK

Read the initial setup page carefully before starting. It tells you what you will need and what you have to know to start the job. DO NOT START A JOB UNTIL:

- You know what IS needed
- You have the things you need
- You understand what to do

A. If a tool has a T-number in front of it, go to the Special Tools and Test and Support Equipment List in Table 1-1, Read down the far left-hand column to your T-number. This is the tool you need for your task.

B. If an expendable material has an E-number in front of it, go to the Expendable Supplies and Materials List in Appendix C. Read down the Item Number column to your E-number. This is the expendable you need for your task.

C. If parts are listed, they can be drawn from supply. Before you start the job, check and make sure you can get the needed parts. Part numbers are listed in TM 55-2840-254-23P.

D. Check for personnel required.

E. If preliminary procedures are listed under "Equipment Conditions," BE SURE THE LISTED JOBS ARE DONE; then do this job.

4. HOW TO DO THE JOB

Before starting, read the entire task. Familiarize yourself with the entire procedure before you begin the task. As you read, remember the following:

A. PAY ATTENTION TO WARNINGS, CAUTIONS AND NOTES.

B. Always follow standard maintenance practices (Chapter 1, Section XIII).

C. When values are underlined or followed by the word INSPECT, an inspector must OK the completed step.

D. Major steps and key words are printed in bold type for experienced repairers.

E. A GLOSSARY IS provided. It lists the special words and terms used in this manual and gives their meaning. Use it. It may help you understand the instructions.

CHAPTER 3

COMBUSTION SECTION - MAINTENANCE INSTRUCTIONS

CHAPTER OVERVIEW

This chapter contains maintenance procedures for the combustion section. It is divided into the following sections and tasks:

SECTION	TASK NO.	TITLE	PAGE
I		FUEL DRAIN VALVE -MAINTENANCE PROCEDURES	
	3-1	Remove Fuel Drain Valve	3-3
	3-2	Clean Fuel Drain Valve	3-6
	3-3	Inspect Fuel Drain Valve	3-7
	3-4	Install Fuel Drain Valve	3-8
II		COMBUSTION SECTION AND POWER TURBINE - MAINTENANCE PROCEDURES	
	3-5	Remove Combustion Section and Power Turbine (AVIM)	3-11
	3-6	Disassemble Combustion Section and Power Turbine (AVIM)	3-40
	3-7	Assemble Combustion Section and Power Turbine (AVIM)	3-77
	3-8	Install Combustion Section and Power Turbine (AVIM)	3-116
III		COMBUSTION SECTION - MAINTENANCE PROCEDURES	
	3-9	Disassemble Combustion Section (AVIM)	3-151
	3-10	Assemble Combustion Section (AVIM)	3-157
	3-11	Disassemble Combustion Section	3-168
	3-12	Assemble Combustion Section	3-169
IV		COMBUSTION CHAMBER VANE ASSEMBLY - MAINTENANCE PROCEDURES	
	3-13	Clean Combustion Chamber Vane Assembly (AVIM)	3-171
	3-14	Inspect Combustion Chamber Vane Assembly (AVIM)	3-173
	3-15	Repair Combustion Chamber Vane Assembly (AVIM)	3-180
V		COMBUSTION CHAMBER LINER -MAINTENANCE PROCEDURES	
	3-16	Clean Combustion Chamber Liner (AVIM)	3-183
	3-17	Inspect Combustion Chamber Liner (AVIM)	3-185
	3-18	Repair Combustion Chamber Liner (AVIM)	3-197

SECTION	TASK NO.	TITLE	PAGE
VI		COMBUSTION CHAMBER HOUSING - MAINTENANCE PROCEDURES	
	3-19	Clean Combustion Chamber Housing (AVIM)	3-213
	3-20	Inspect Combustion Chamber Housing (AVIM)	3-215
	3-21	Repair Combustion Chamber Housing (AVIM)	3-217

3-1 REMOVE FUEL DRAIN VALVE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Container, 1 Quart

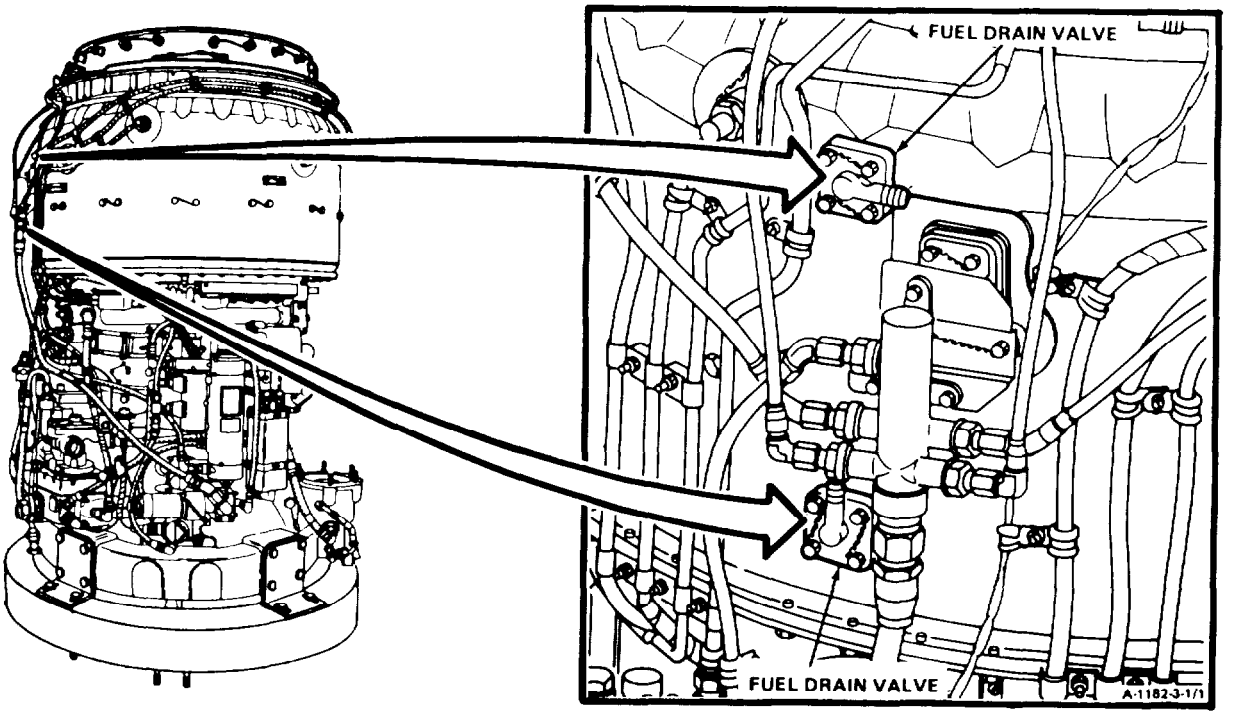
Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

General Safety Instructions:

WARNING

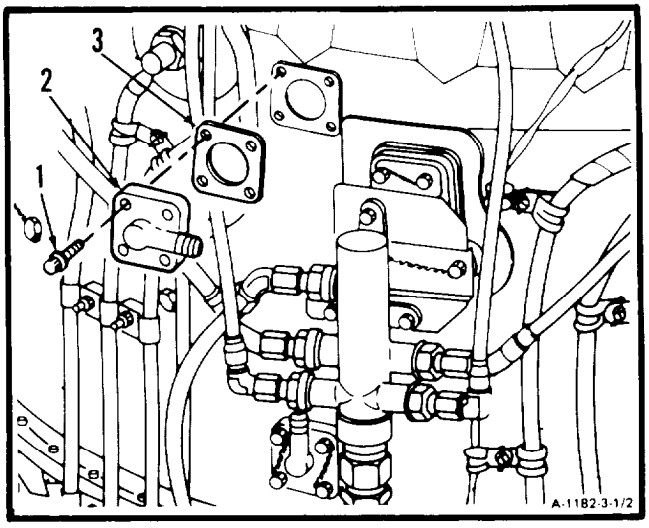
Turbine fuels are very flammable. They cause drying and irritation of skin or eyes. Handle only in well-ventilated areas away from heat and open flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.



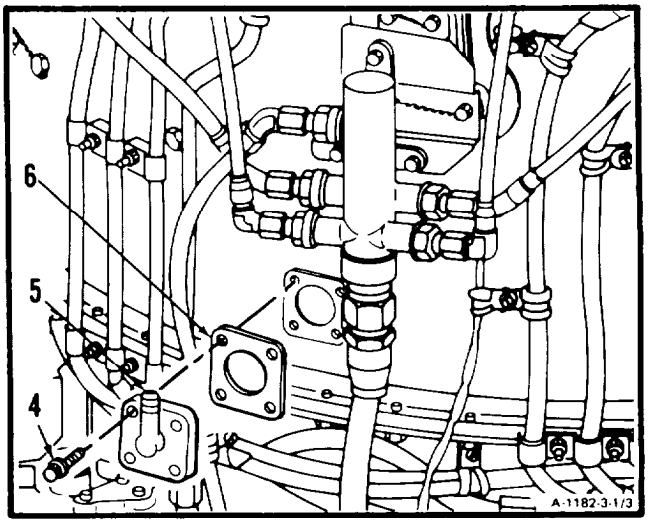
GO TO NEXT PAGE

3-1 REMOVE FUEL DRAIN VALVE (Continued)

1. **Remove** lockwire, four bolts (1), **fuel drain valve (2),** and gasket (3).



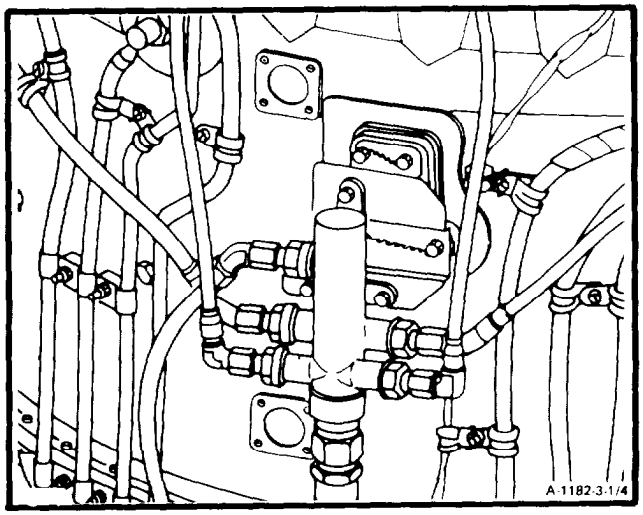
2. **Remove** lockwire, four bolts (4), **fuel drain valve (5),** and gasket (6).



GO TO NEXT PAGE

FOLLOW-ON MAINTENANCE:

None



END OF TASK

3-2 CLEAN FUEL DRAIN VALVE 3-2

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)

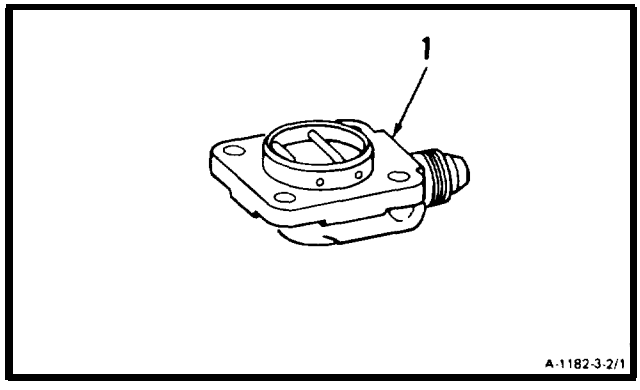
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Fuel Drain Valve Removed (Task 3-1)

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20) and **clean fuel drain valve (1).** Use dry cleaning solvent (E17) and brush.



FOLLOW-ON MAINTENANCE.

Inspect Fuel Drain Valve (Task 3-3).

END OF TASK

3-3 INSPECT FUEL DRAIN VALVE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. Inspect fuel drain valve (1). There shall be no cracks.

2. Inspect plate (2).

a. Depress plate (2) and release.

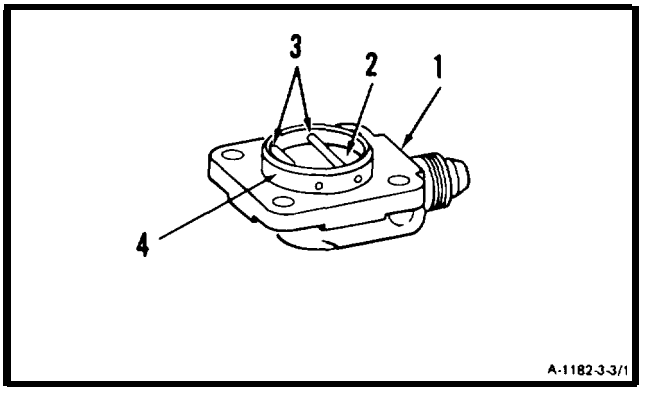
b. Plate (2) shall not stick or bind.

c. Plate (2) shall reseat against pins (3).

3. Inspect pins (3).

a. Pins (3) shall not be loose.

b. Pins (3) shall not extend past valve body outside diameter (4).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-4 INSTALL FUEL DRAIN VALVE

INITIAL SETUP

Applicable Configurations:
All

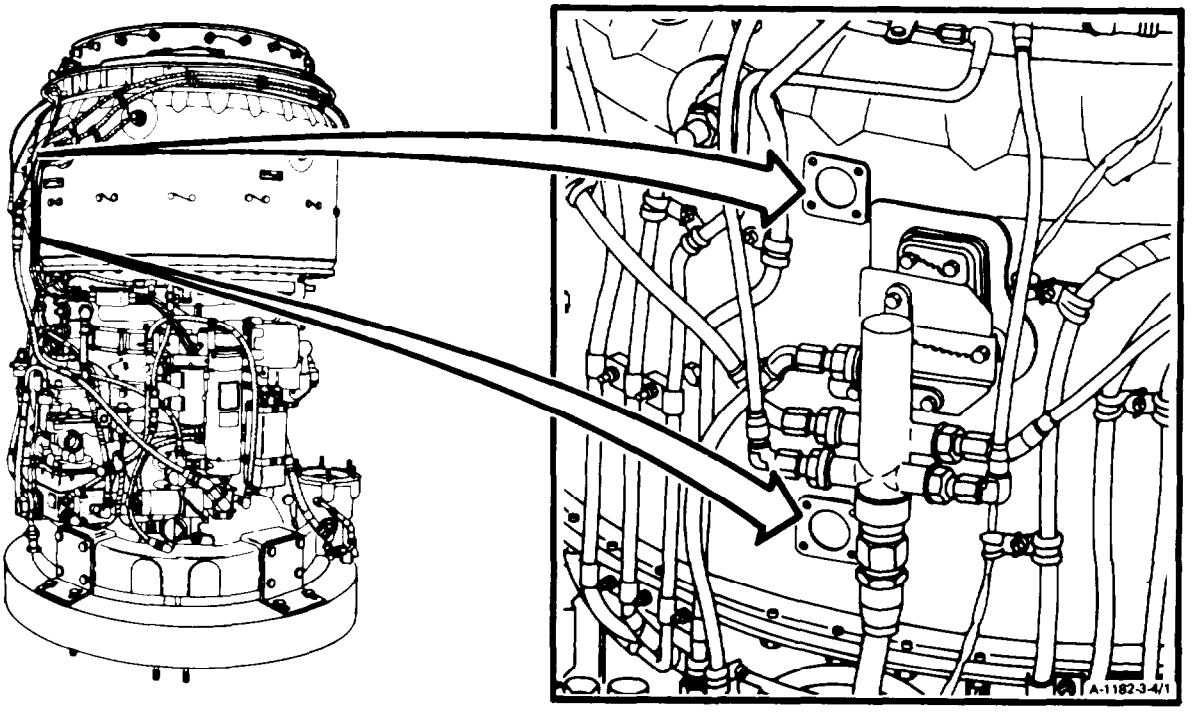
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Lockwire (E29)

Parts:
Gaskets

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

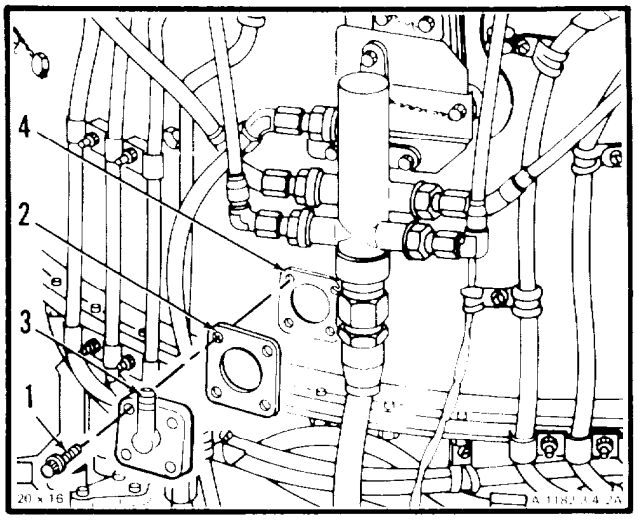
References:
TM 55-2840-254-23P



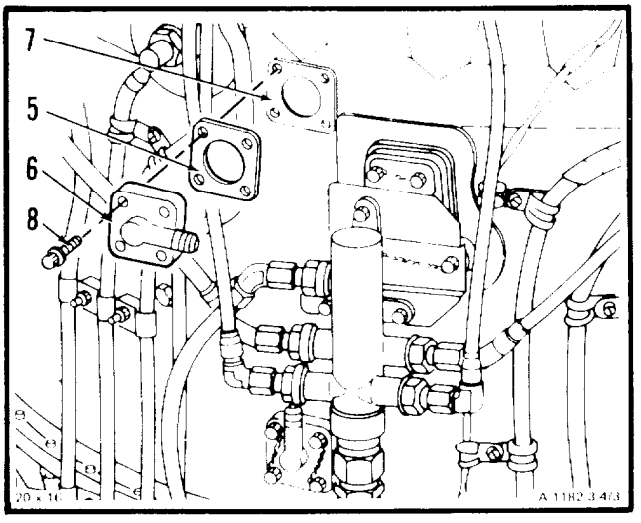
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3-4 INSTALL FUEL DRAIN VALVE (Continued)

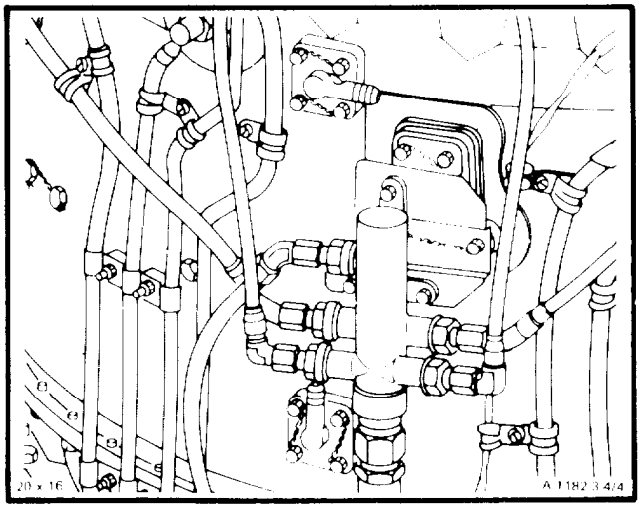
1. Coat four bolts (1) with antiseize compound (E5). Install gasket (2) and fuel drain valve (3) on boss (4). Install four bolts (1). Torque bolts (1) to 40 to 45 inch-pounds. Lockwire bolts (1). Use lockwire (E29).



2. **Install** gasket (5) and **fuel drain valve (6)** on boss (7). Install four bolts (8). Torque bolts (8) to 40 to 45 inch-pounds. Lockwire bolts (8). Use lockwire (E29).



INSPECT

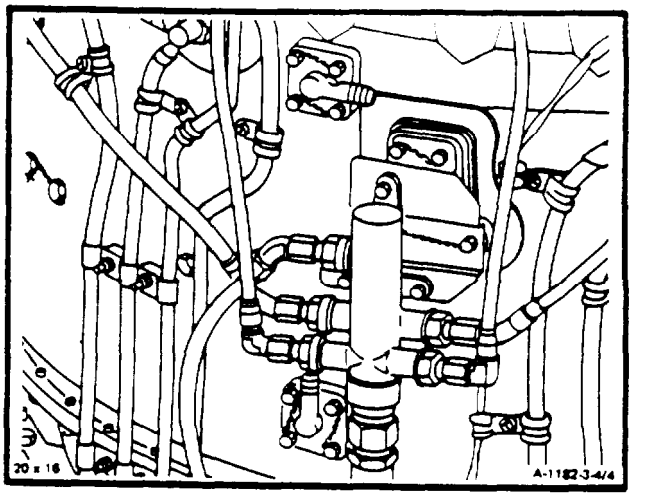


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3-4 INSTALL FUEL DRAIN VALVE (Continued) 3-4

FOLLOW-ON MAINTENANCE:

None



END OF TASK

3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM)

3-5

INITIAL SETUP

Applicable Configurations.
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Group Aircraft Cover (T24)
Clamp Coupling Half (T37)
Open-End Wrench (T53)
Power Turbine Fixture (T54)
Hoist

Materials:
Marking Pencil (E34)
Vexar Nylon Webbing (E56)

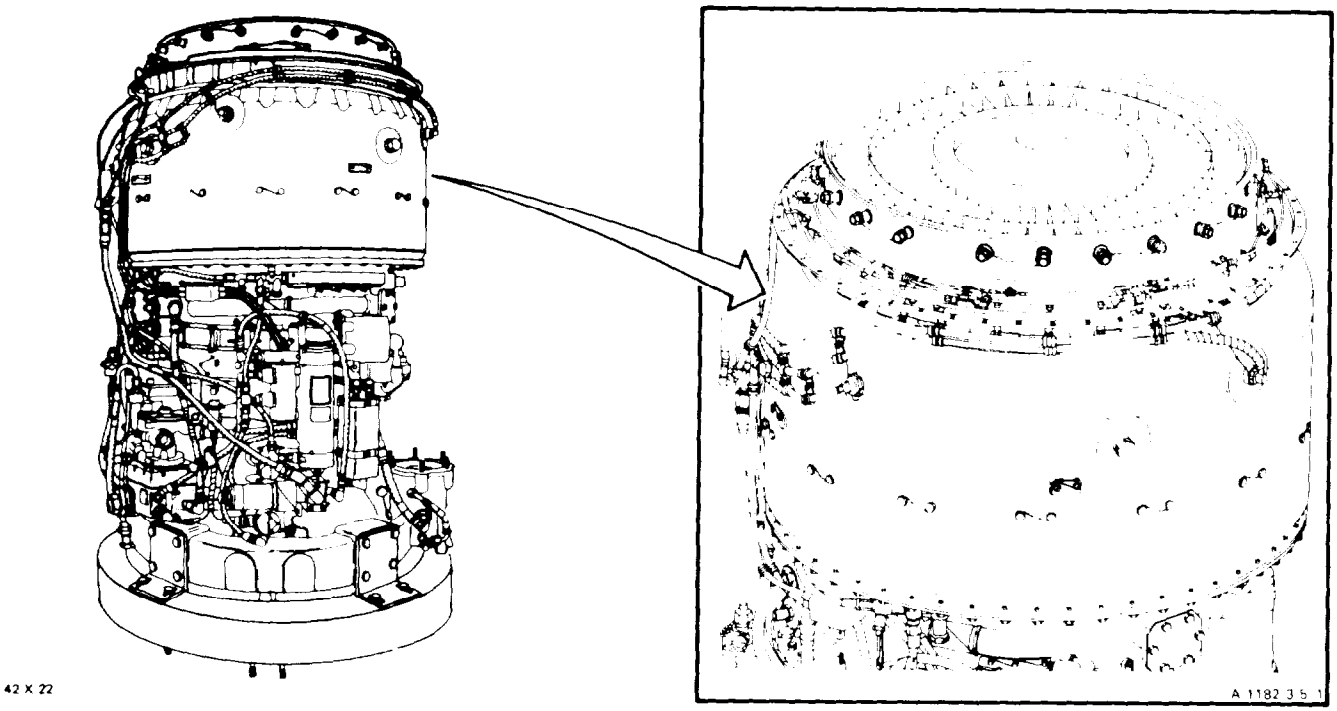
Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

References:
Task 3-8

Equipment Condition:
Engine Oil System Drained (Task 1-75)

WARNING

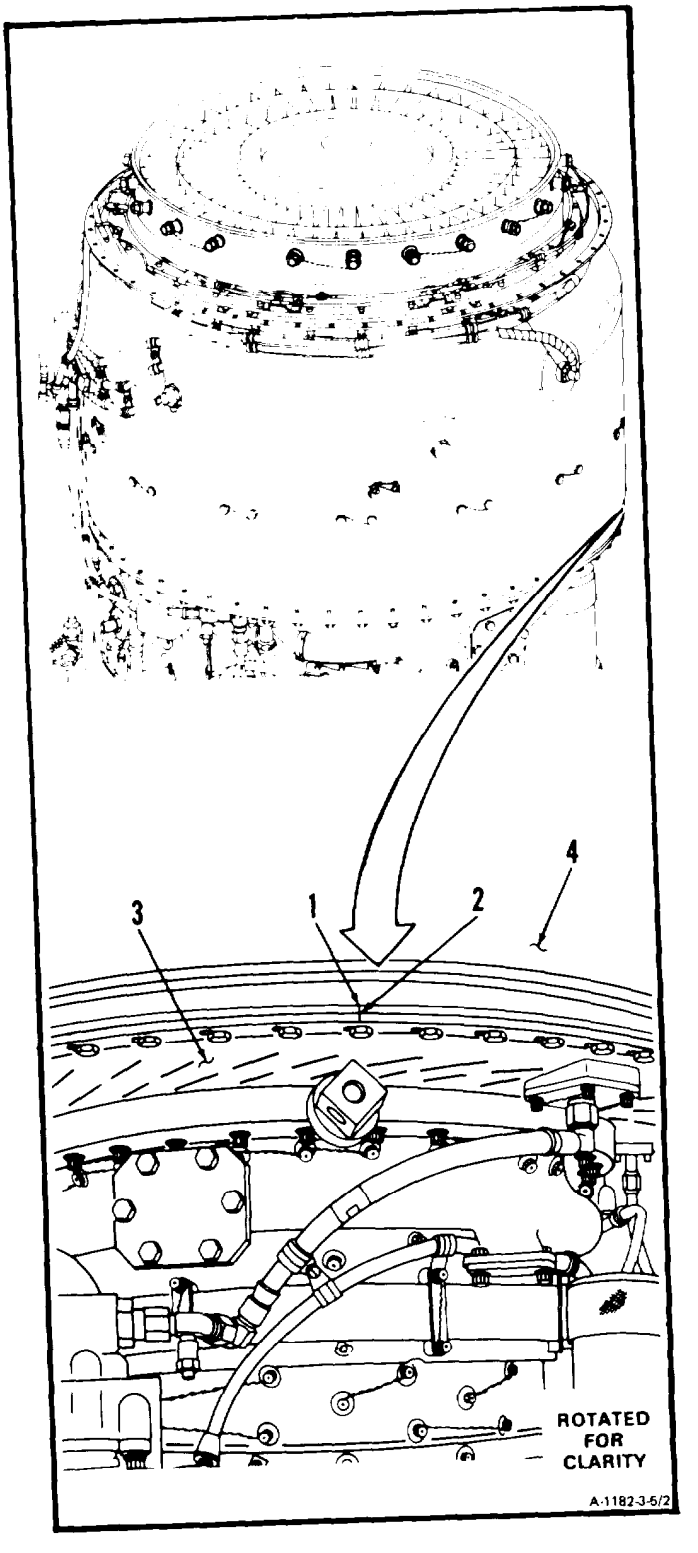
The ignition exciter stores very high and possibly fatal voltage. Use extreme care when working around ignition exciter. Serious injury could result if exciter is accidentally grounded. Do not probe inside of output receptacles with fingers or metal objects. Discharge exciter only with insulated screwdriver. In case of shock or injury, get medical attention.



GO TO NEXT PAGE

3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

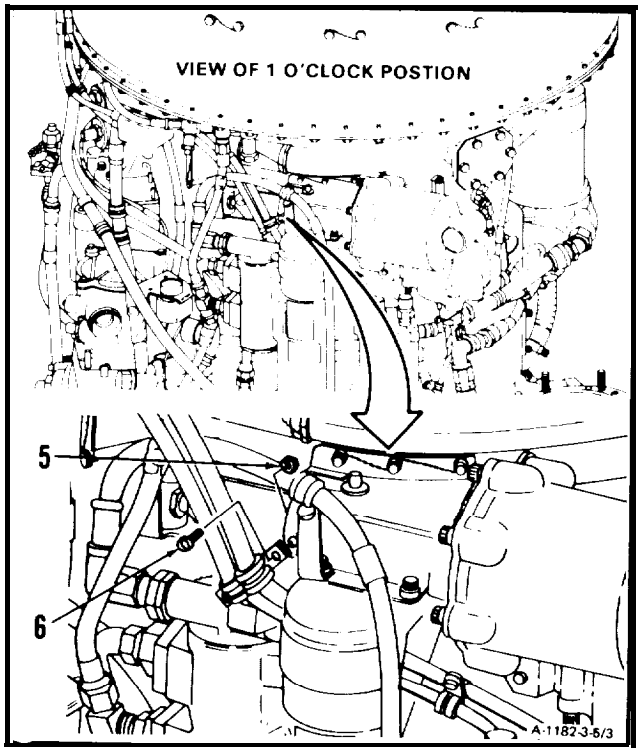
1. **Make matchmark (1) across mating edge (2) of air diffuser assembly (3) and combustion section and power turbine (4).** Use marking pencil (E34). Matchmark (1) will be at top dead center hole.



GO TO NEXT PAGE

3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

2. Remove nut (5) and screw (6).



GO TO NEXT PAGE

3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

WARNING

When discharging ignition exciter, only one lead shall be removed at a time and receptacle that lead was removed from shall be discharged. Failure to comply may result in serious shock when you are removing second lead. In case of serious shock get medical attention.

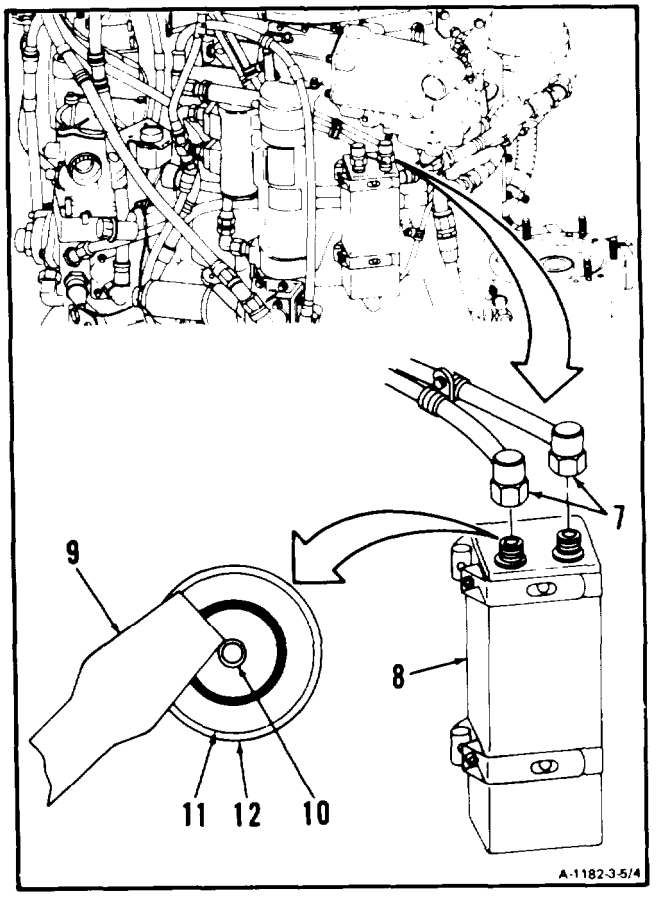
NOTE

Steps 3. and 4. apply to both output receptacles.

3. Remove lockwire and **disconnect ignition coil and cable assembly leads (7).**

4. **Discharge ignition exciter (8)** by placing tip of insulated screwdriver (9) against pin (10) and edge (11) of receptacle (12).

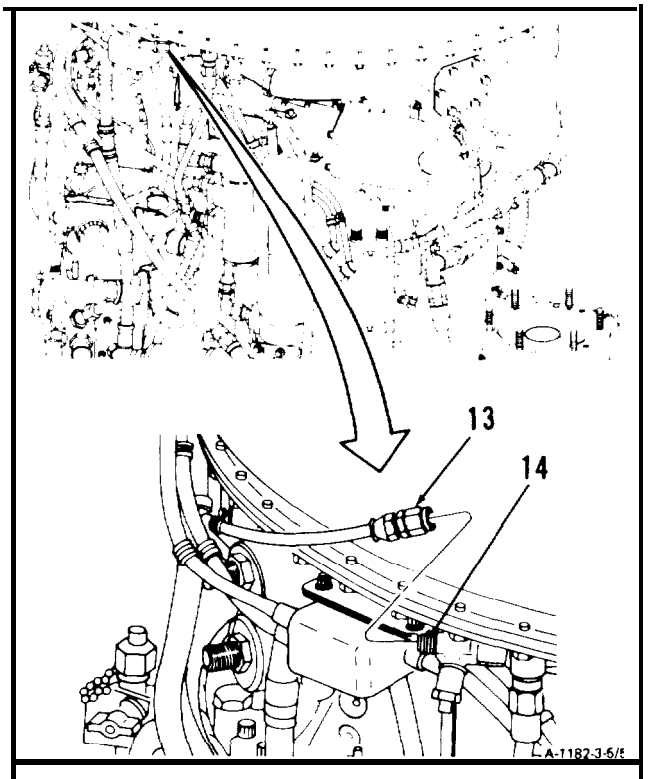
5. Place ignition coil and cable assembly leads (7) to one side.



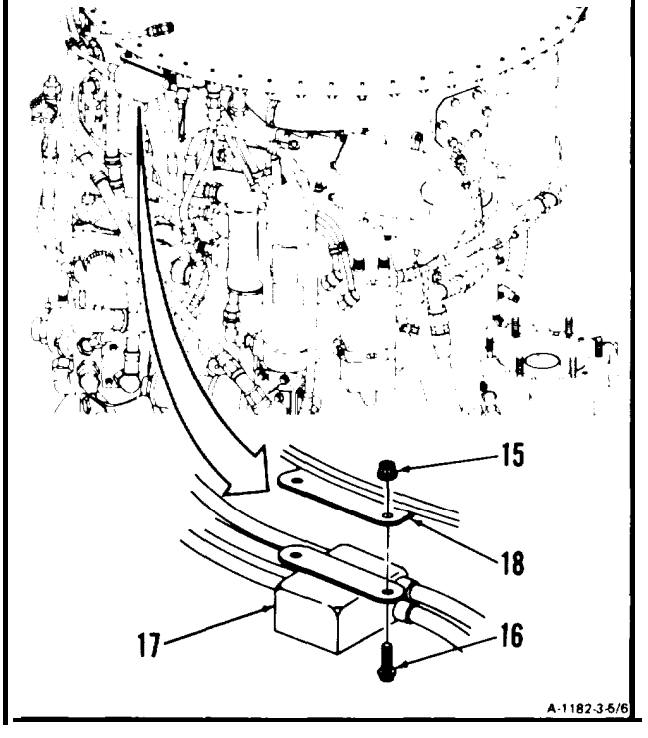
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

6. **Disconnect hose assembly (13)** from pressure connector (14).



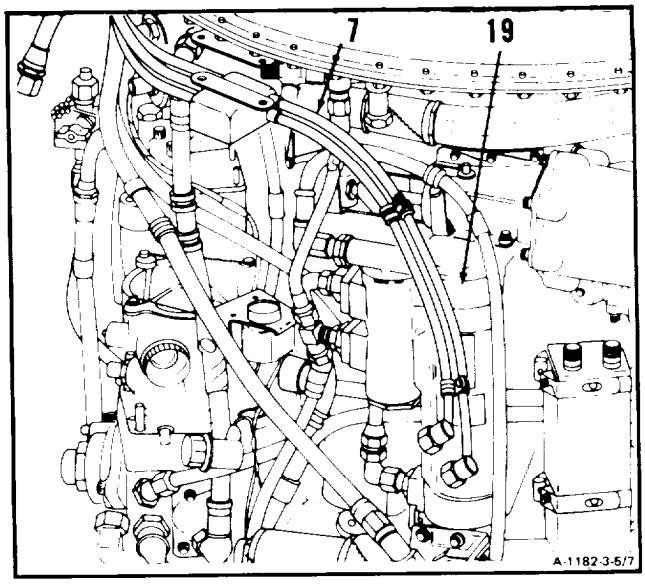
7. **Remove** two nuts (15), two bolts (16), and **ignition coil (17)** from bracket (18).



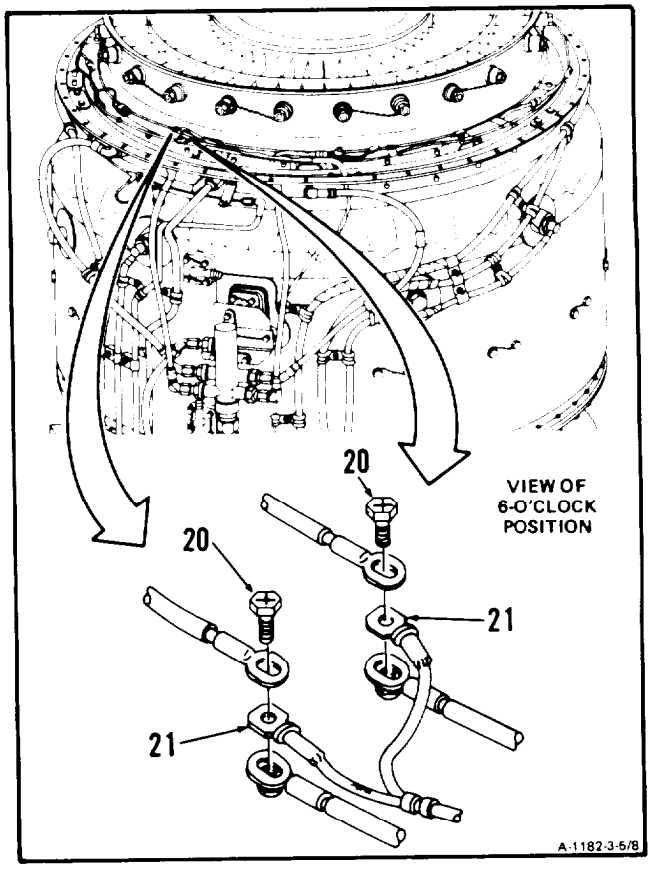
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

8. Pull ignition coil and cable assembly leads (7) from behind oil cooler assembly (19) and let them hang free.

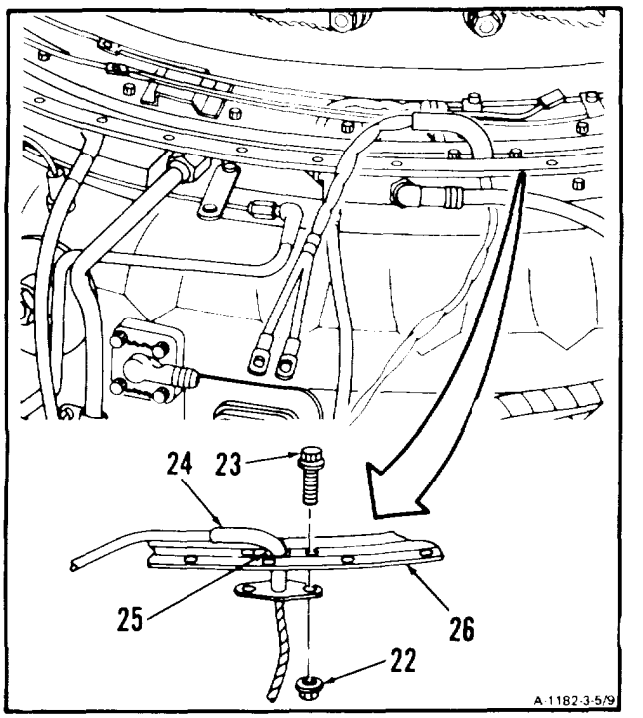


9. **Remove** two screws (20) and **two thermocouple jumper lead ends (21).**

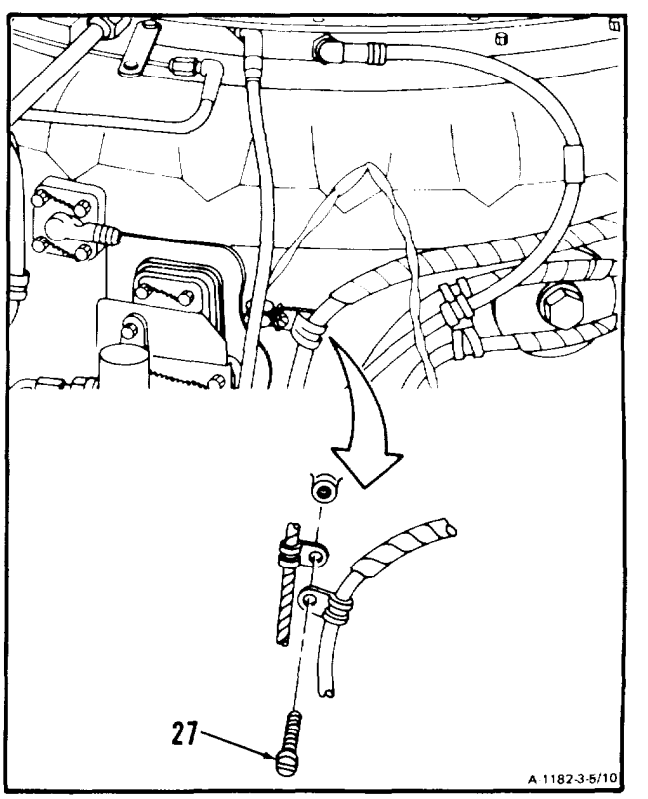


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10. Remove two nuts (22) and two bolts (23). Withdraw thermocouple jumper lead (24). through hole (25) in fire shield assembly (26).



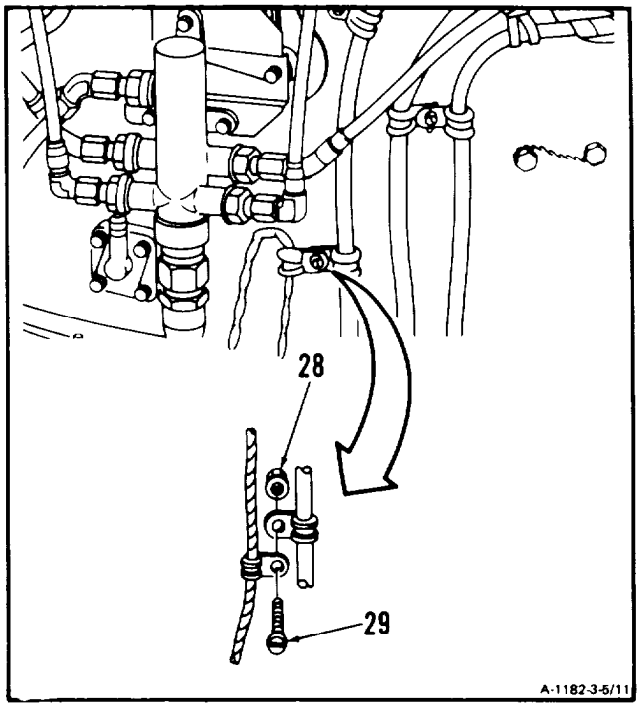
11. Remove lockwire and screw (27).



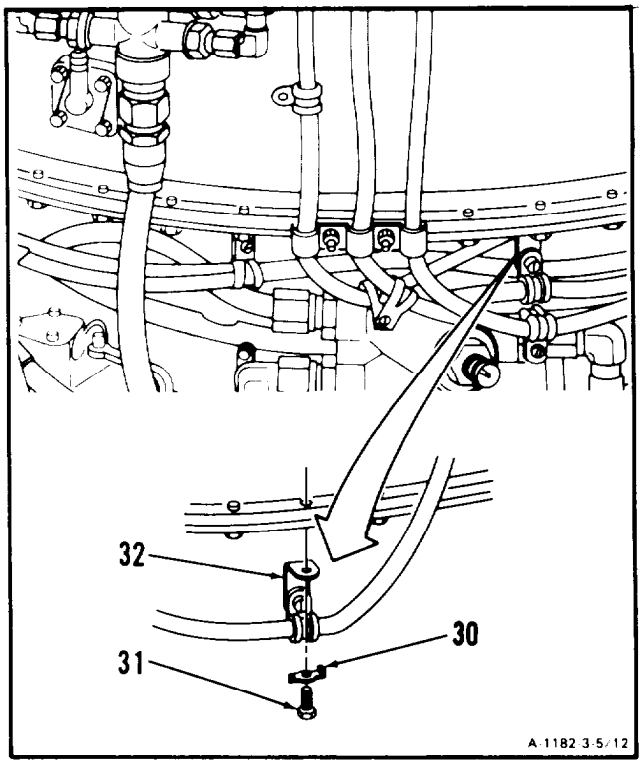
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

12. Remove nut (28) and screw (29).

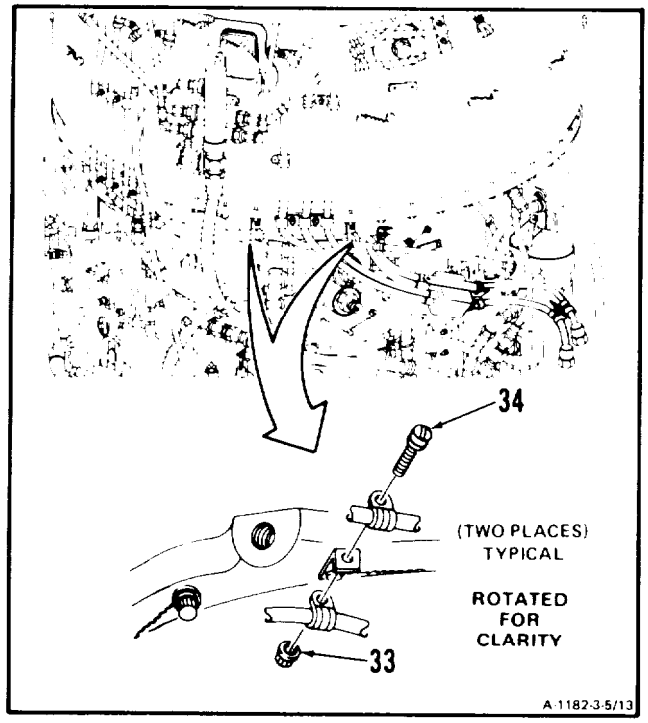


13. Straighten tabs of key washer (30) and remove bolt (31), key washer (30), and bracket (32).

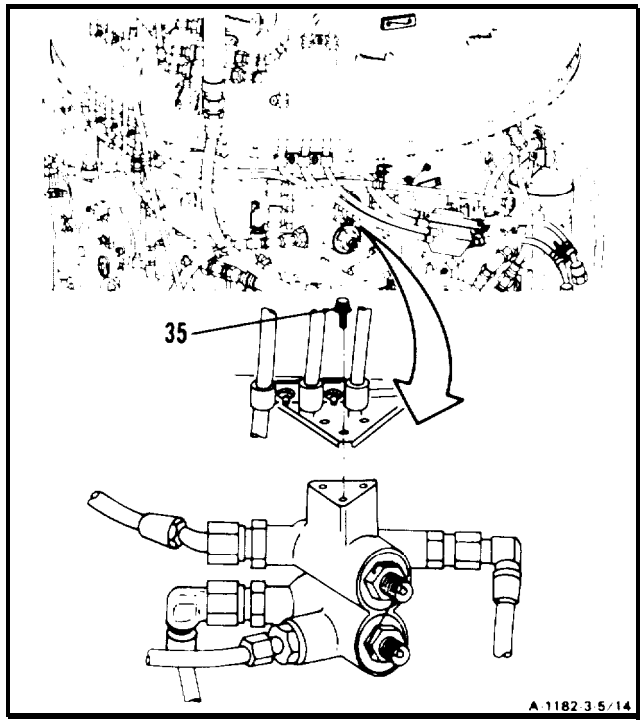


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14. Remove two nuts (33) and two screws (34).



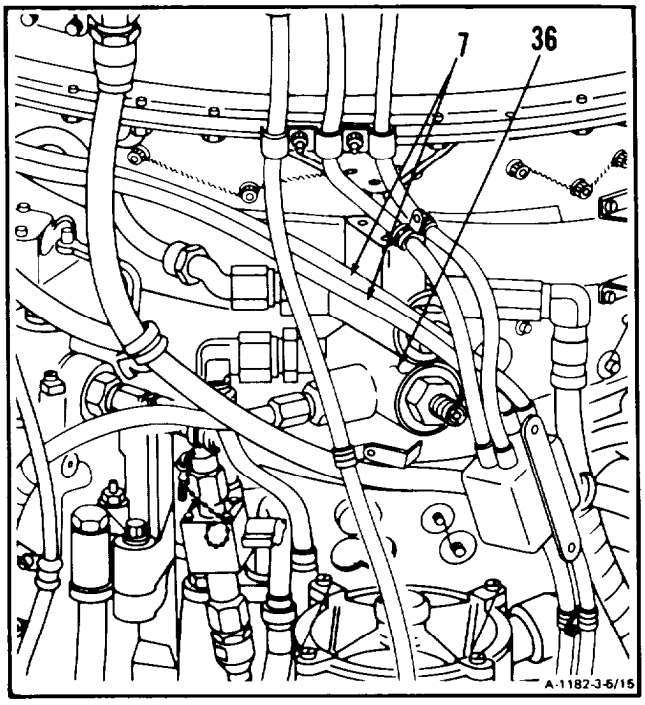
15. **Remove** lockwire and **three bolts (35).**



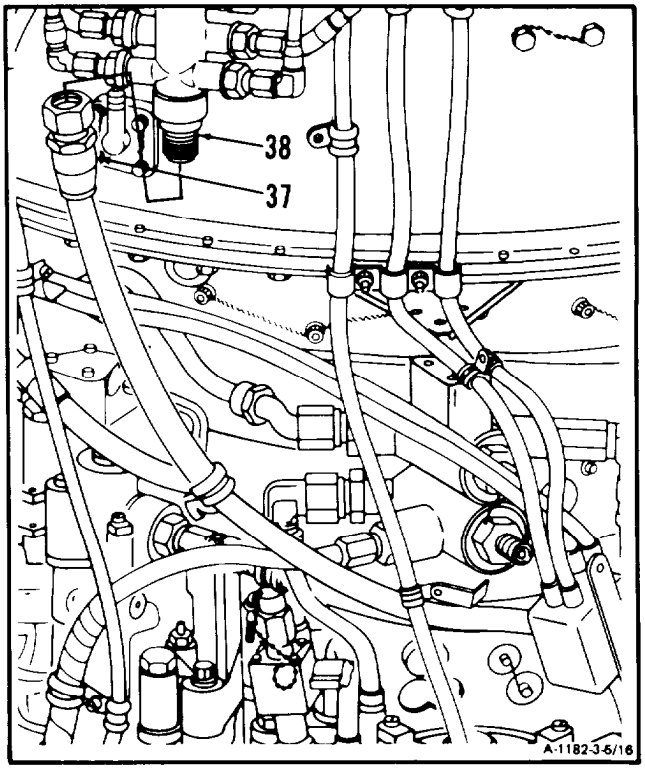
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

16. Pull ignition coil and cable assembly leads (7) from behind dual chip detector (36) and let them hang free.



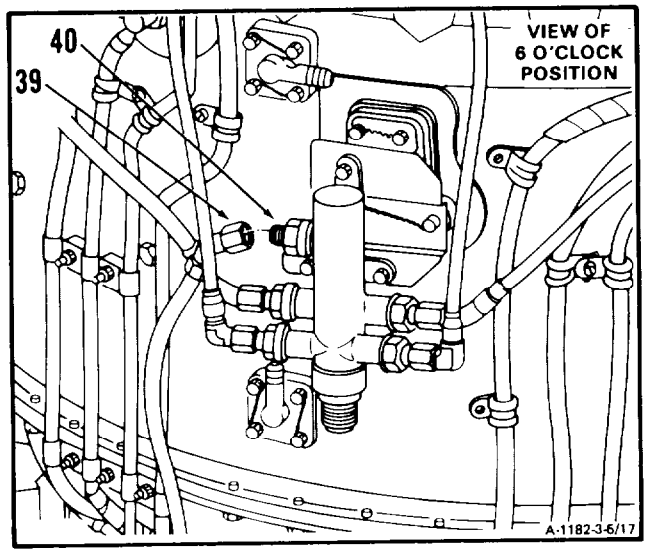
17. **Disconnect hose assembly (37)** from flow divider (38).



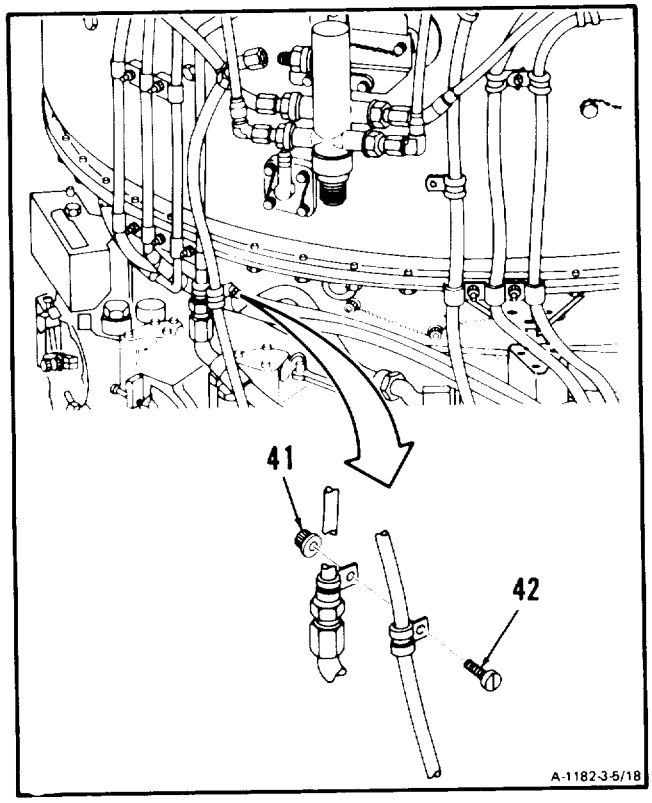
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

18. **Disconnect hose assembly (39)** from fuel check valve (40).

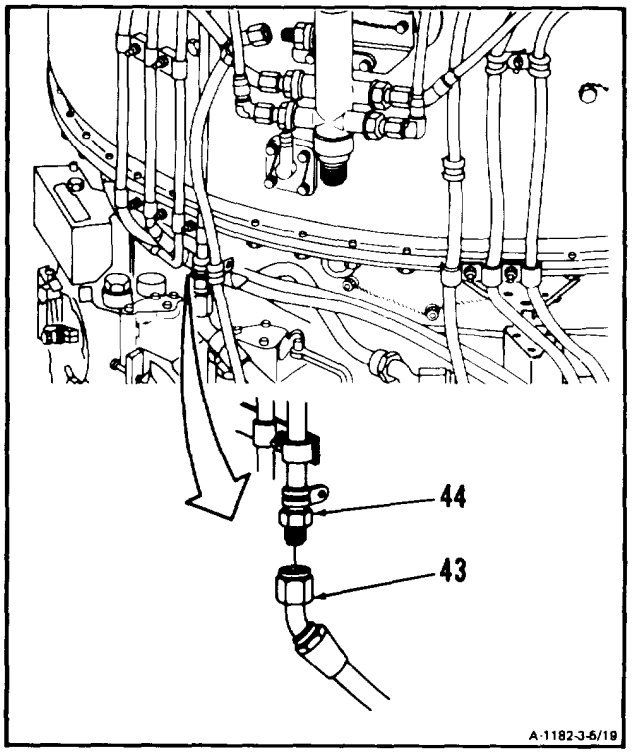


19. Remove nut (41) and screw (42).

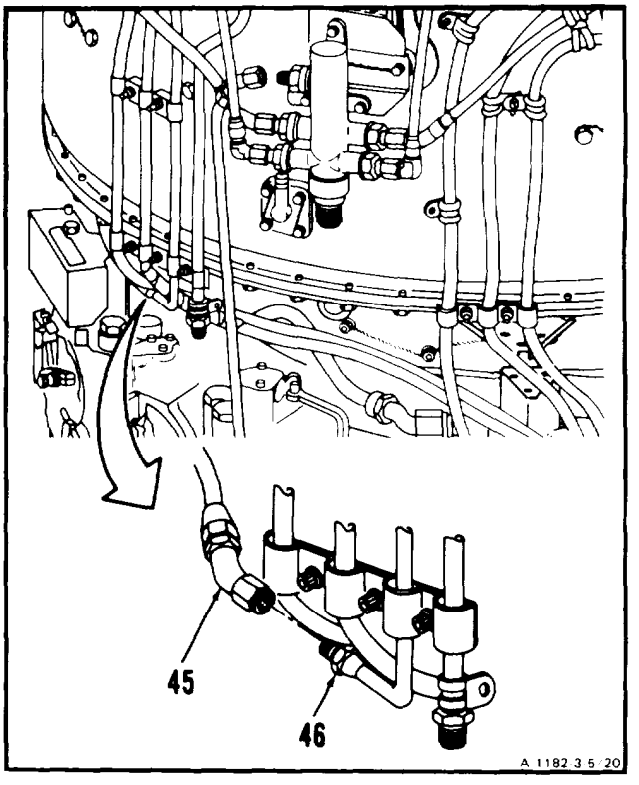


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20. **Disconnect hose assembly (43)** from tube assembly (44).



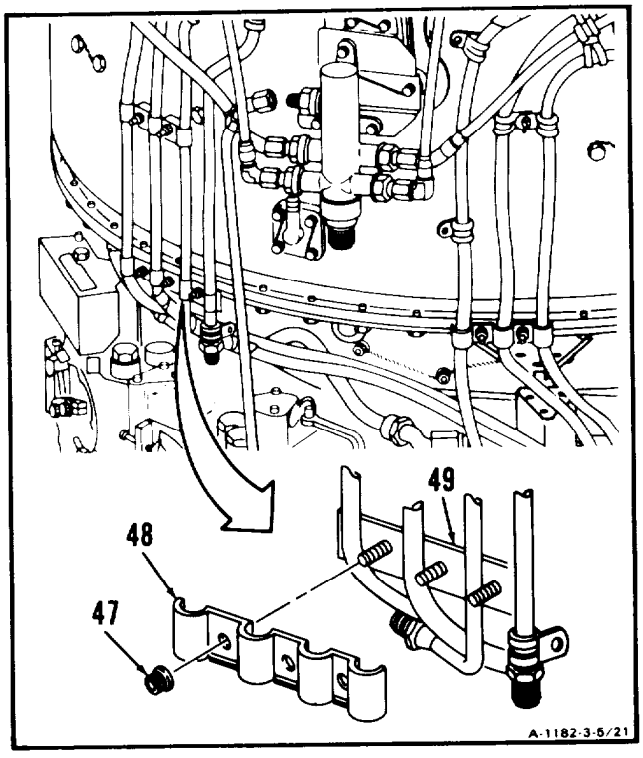
21. **Disconnect hose assembly (45)** from tube assembly (46).



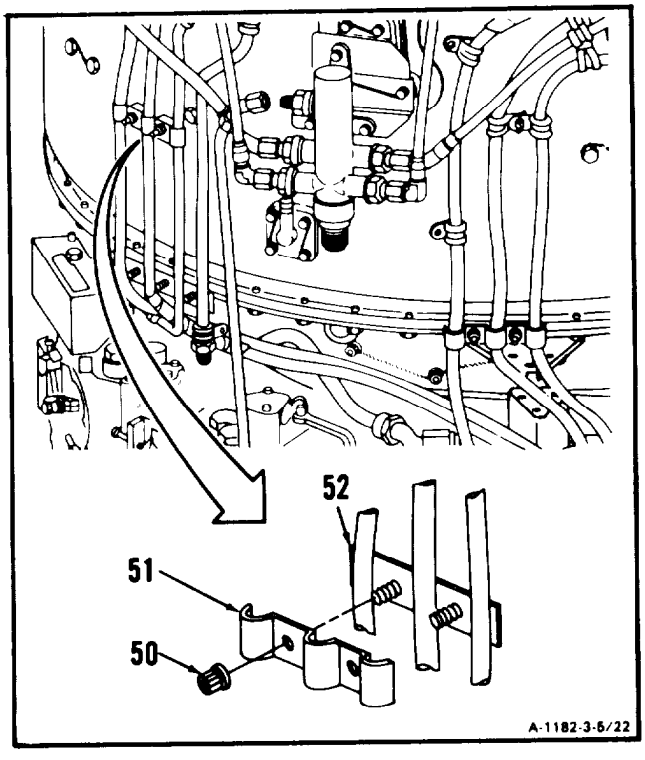
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

22. Remove three nuts (47) and clamp (48) from bracket (49).



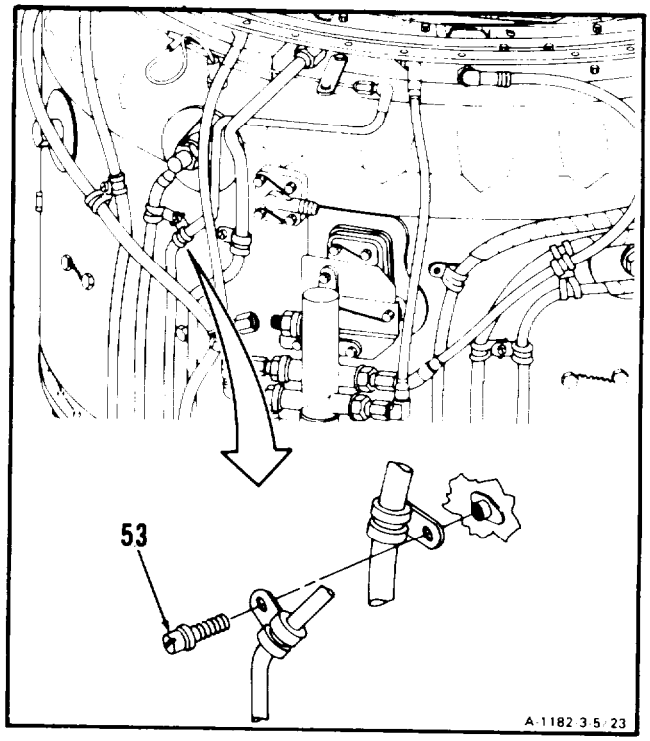
23. Remove two nuts (50) and two clamps (51) and (52).



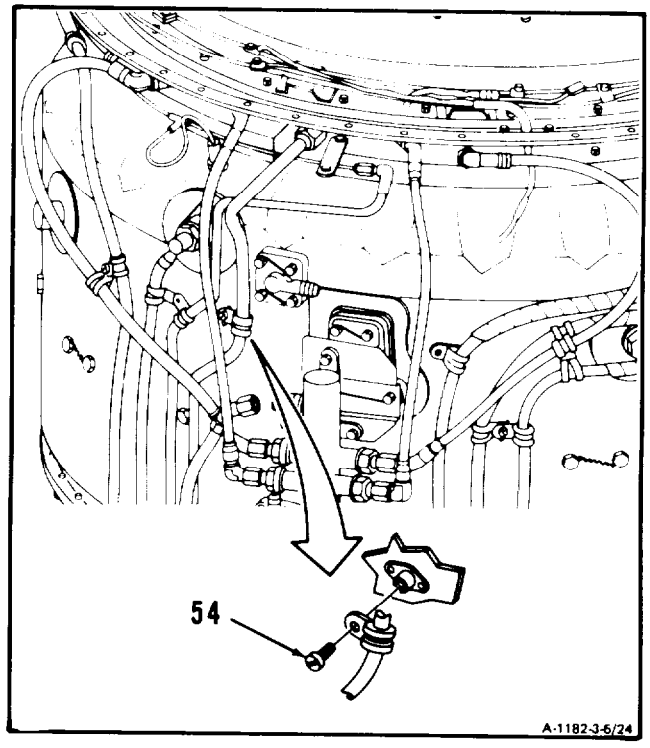
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

24. Remove lockwire and screw (53).



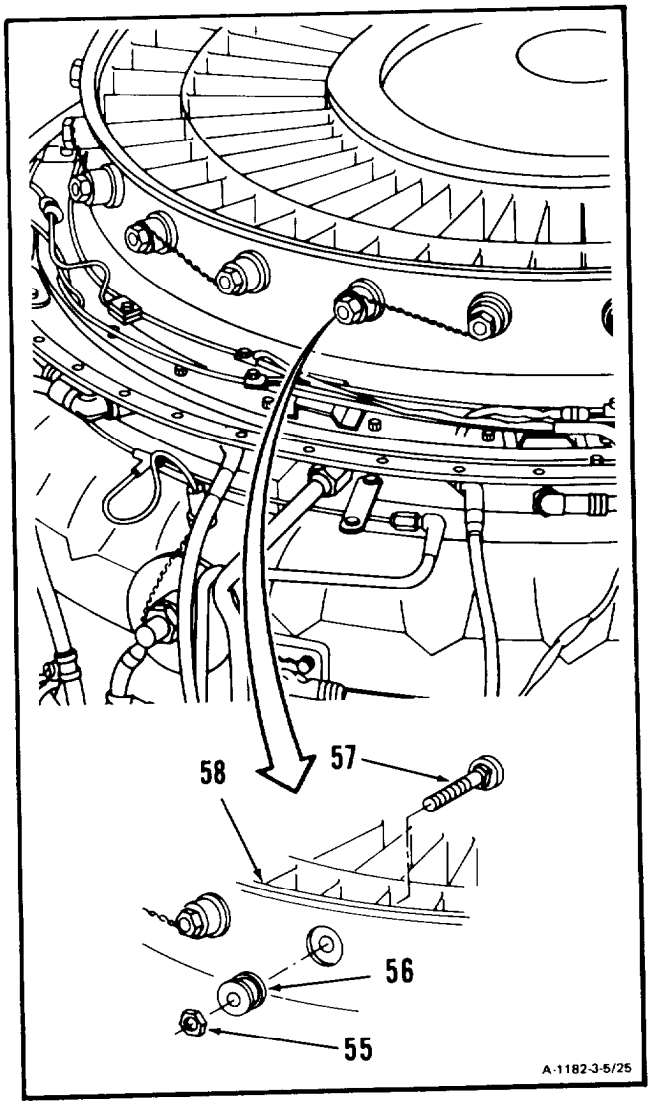
25. Remove lockwire and screw (54).



GO TO NEXT PAGE

3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

26. **Remove** lockwire, nut (55), spacer (56) and **bolt (57)** from exit vane assembly (58).



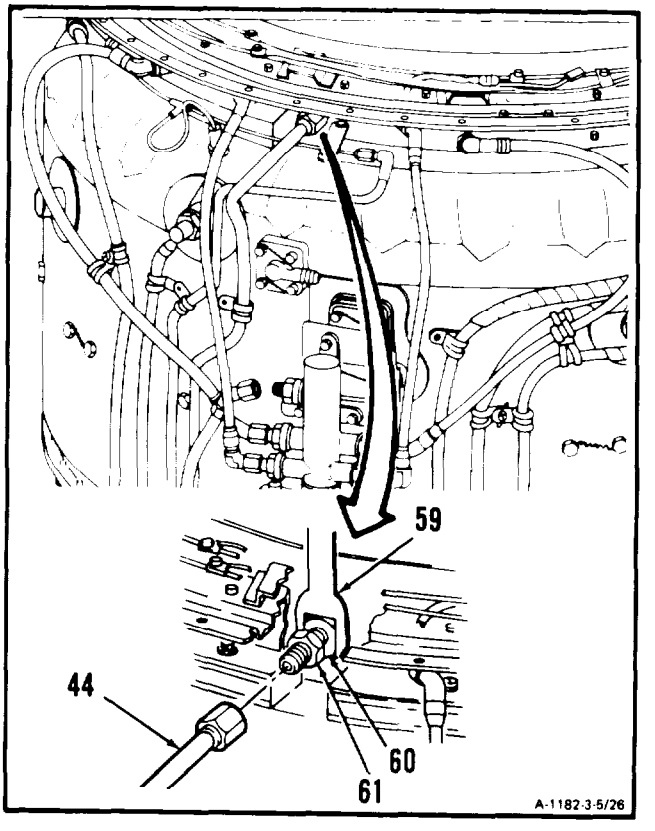
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CAUTION

In following step, hold No. 4 and 5 bearing scavenge adapter using open-end wrench (T53). Failure to use wrench may result in damage and mislocation of oil transfer tube resulting in oil leaks.

27. Place open-end wrench (T53) (59) on No. 4 and 5 bearing scavenge adapter (60).

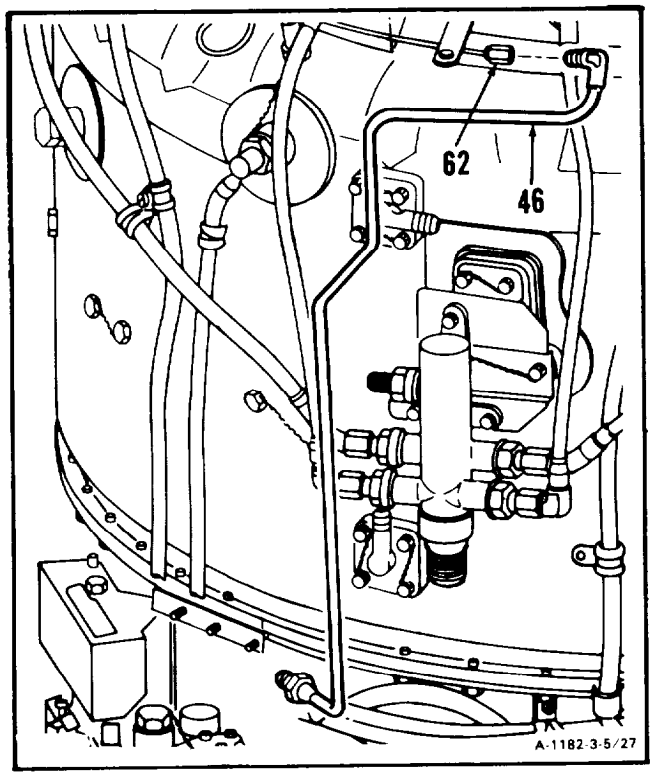
28. Disconnect and remove tube assembly (44) from reducer (61).



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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

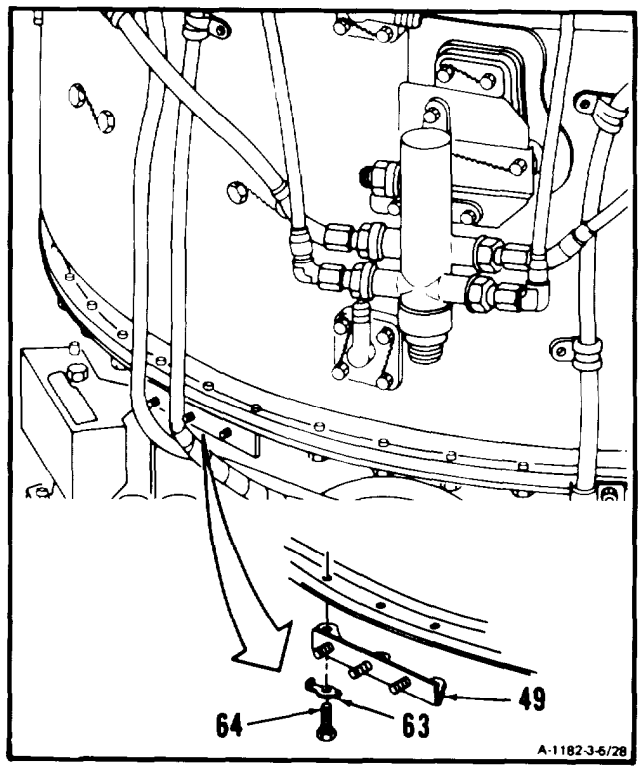
29. **Disconnect tube assembly (46)** from primer tube assembly (62), and **remove tube assembly (46).**



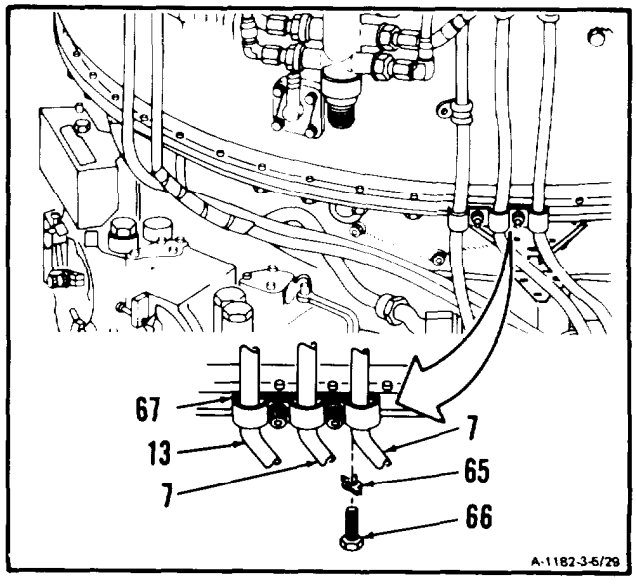
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

30. Straighten tabs of key washers (63) and remove three bolts (64), three key washers (63), and bracket (49).



31. Straighten tabs of key washers (65) and **remove two bolts (66)** and two key washers (65). Let strap and bracket (67) remain attached to ignition coil and cable assembly leads (7) and hose assembly (13).



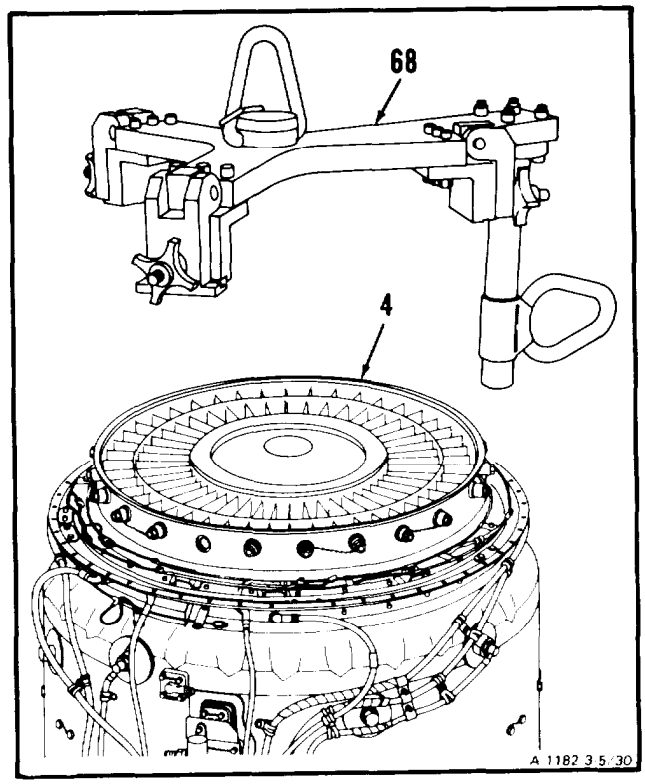
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

CAUTION

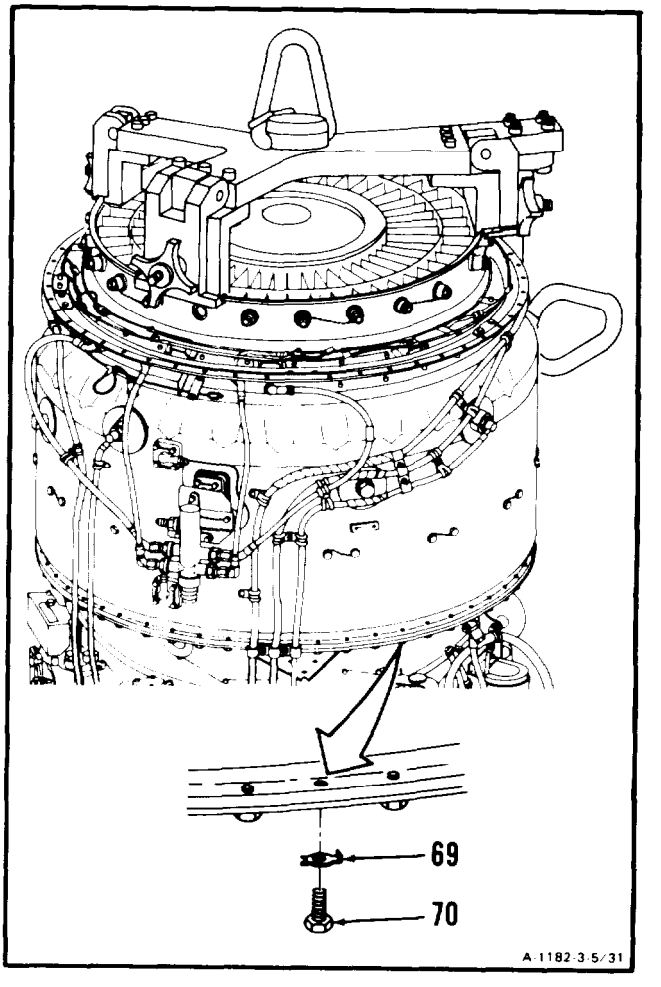
In following step, make certain that three clamping devices are securely attached to combustion section and power turbine. Failure to comply may result in damage to engine.

32. **Install power turbine fixture (T54) (68)** on combustion section and power turbine (4).



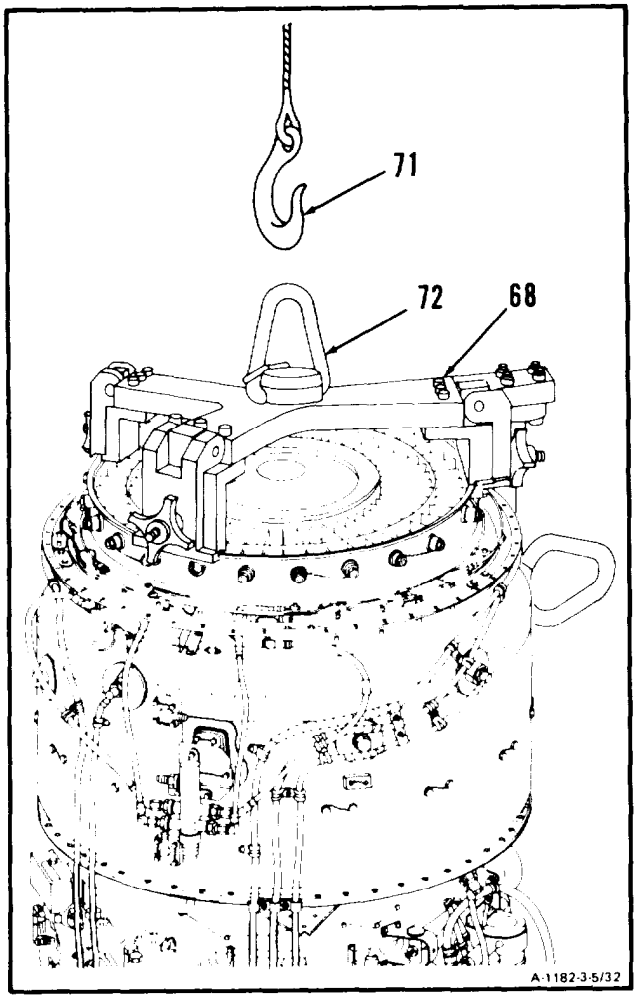
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33. Straighten tabs of key washers (69), and **remove 46 bolts (70)** and 46 key washers (69).



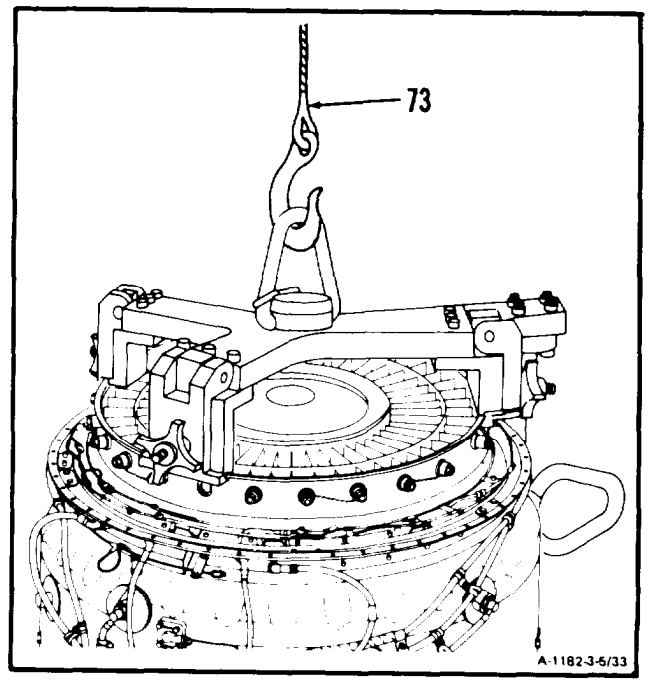
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34. **Attach hoist hook (71)** to lifting eye (72) of power turbine fixture (T54) (68).



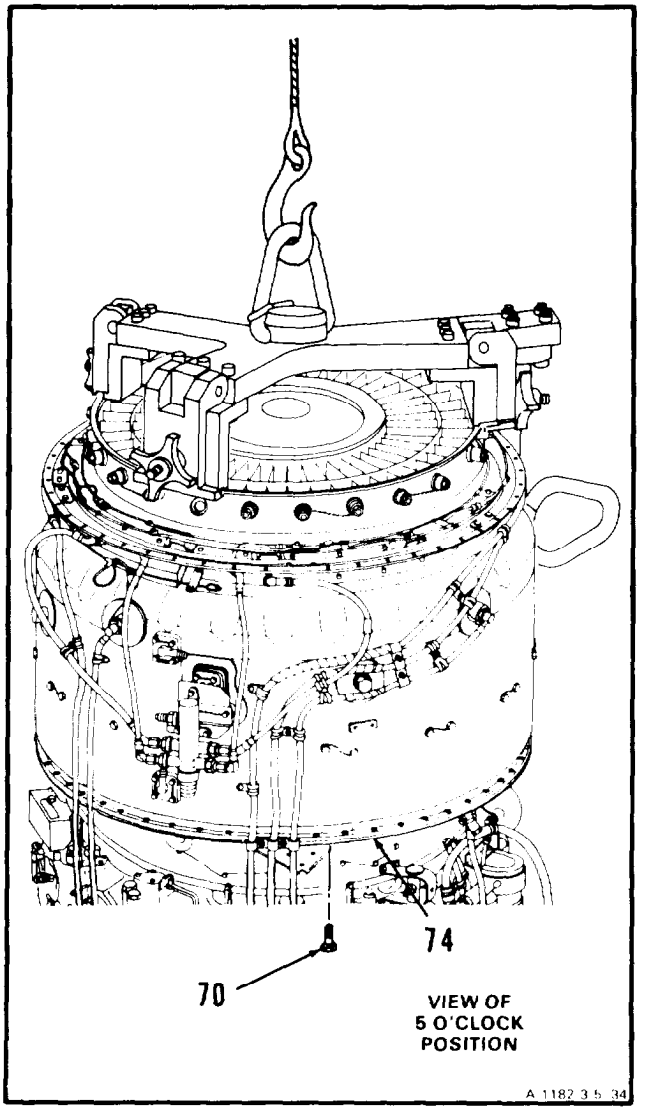
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35. Take up slack on hoist cable (73)



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36. Install three bolts (70) in three jacking holes at approximately 1-, 5-, and 9-o'clock positions in air diffuser flange (74).



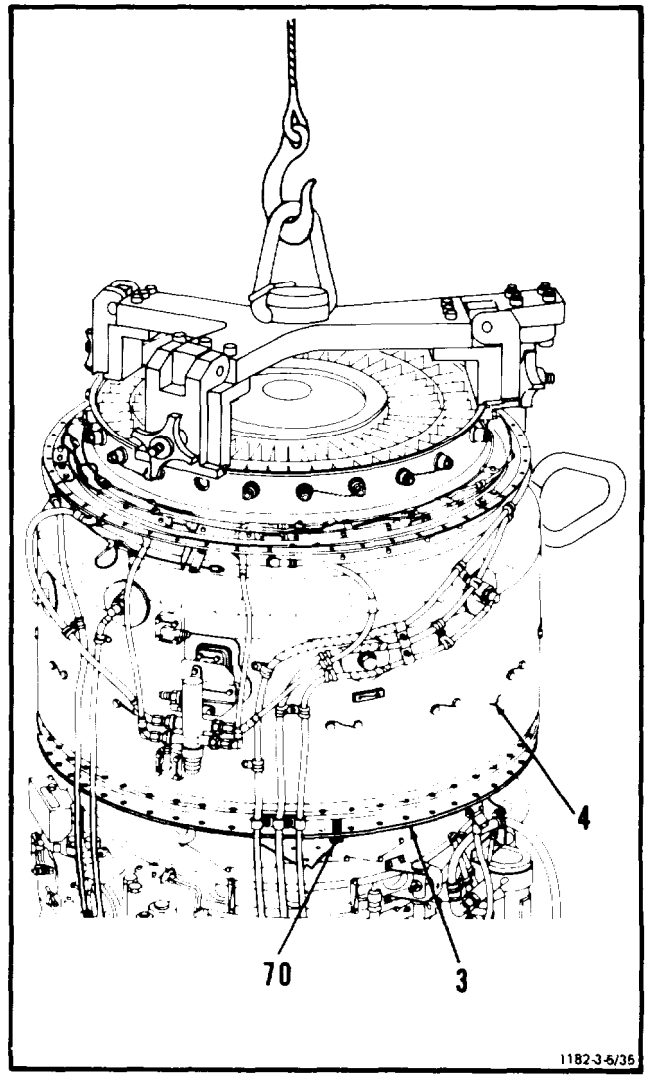
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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-5

CAUTION

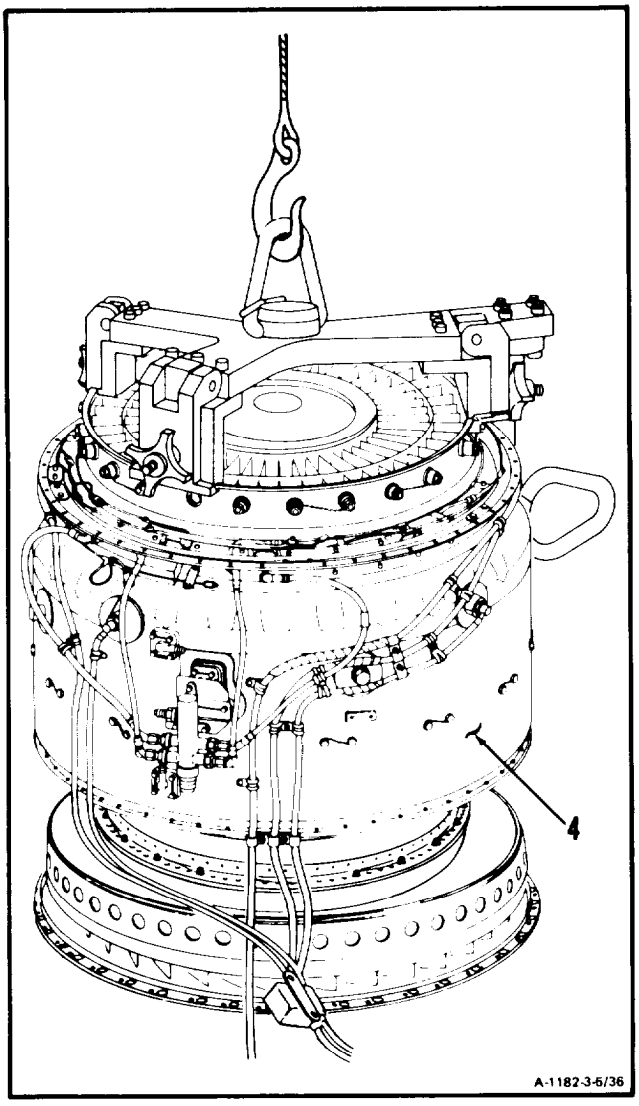
In following step, bolts shall be turned evenly and power turbine rotor shall be turned to detect tilting of power turbine shaft. Failure to comply will cause damage to No. 3 bearing.

37. Turn three bolts (70) evenly to separate combustion section and power turbine (4) from air diffuser assembly (3). Remove three bolts (70).



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38. **Remove combustion section and power turbine (4).** Have helper guide combustion section and power turbine (4).



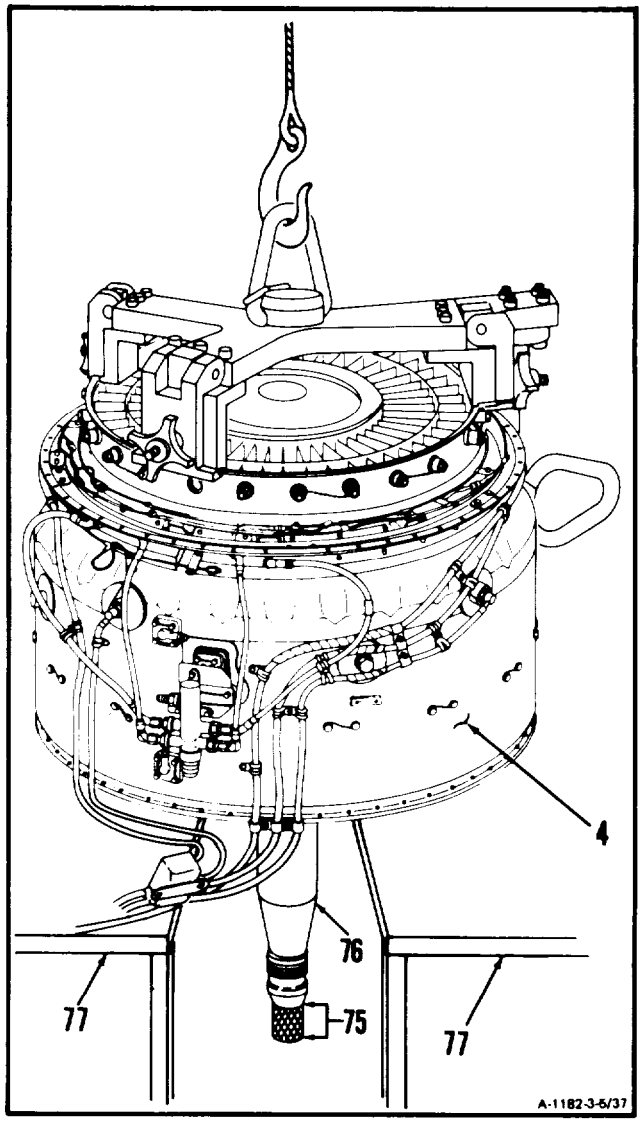
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CAUTION

A protective cover must be installed over No. 3 bearing inner race location on power turbine shaft. If this is not done, damage to power turbine shaft surface may result.

39. Install vexar nylon webbing (E56) over No. 3 bearing inner race location (75) on shaft (76).

40. **Lower combustion section and power turbine (4) onto two tables (77)** placed nearly together. Shaft (76) will pass between two tables (77).

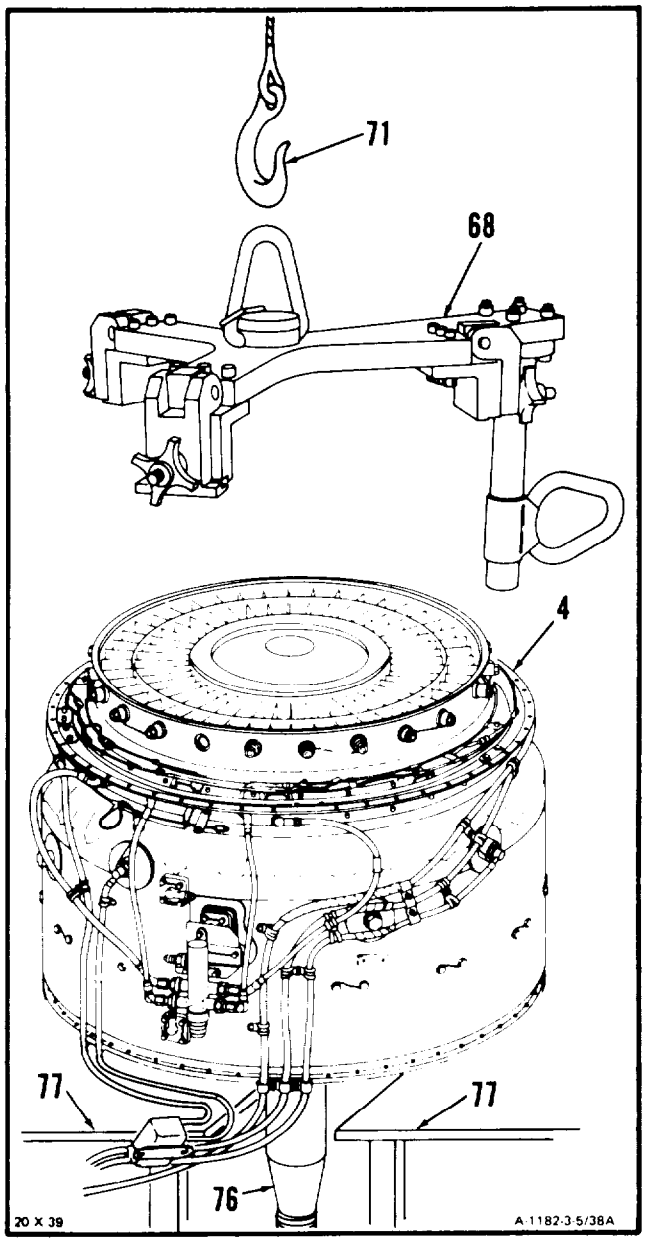


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41. Remove hoist hook (71) and power turbine fixture (T55) (68).

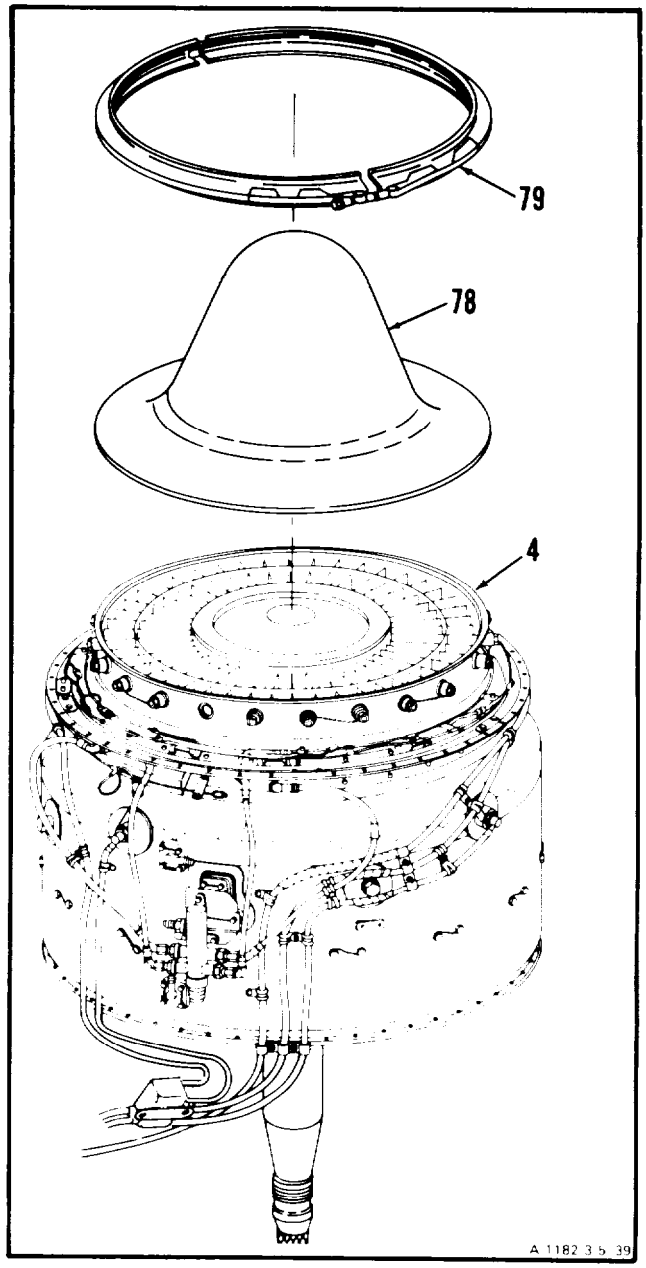
41.1. Turn combustion turbine and power turbine section (4) over on table. Measure axial clearance between second turbine disc assembly and third turbine nozzle (Ref. Task 3-8, paragraph 2). Record measurement on DA Form 2404 for future reference.

41.2. Turn combustion turbine and power turbine section (4) over on two tables (77). Shaft (76) will pass between two tables (77).



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42. **Install group aircraft cover (T24) (78)** and secure to combustion section and power turbine (4) with clamp coupling half (T37) (79).

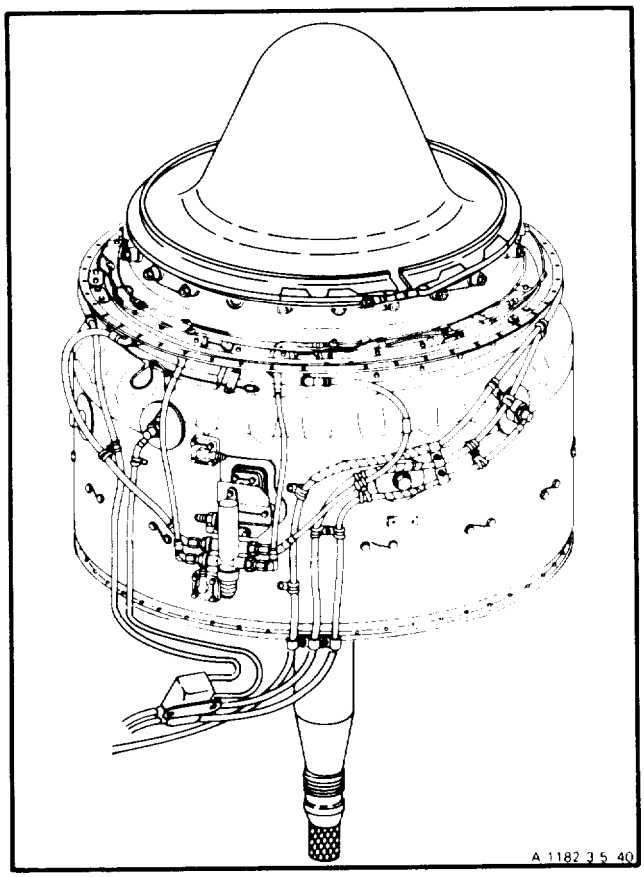


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3-5 REMOVE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

FOLLOW-ON MAINTENANCE:

None



END OF TASK

3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) 3-6

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Mechanical Puller (T47)
Open-End Wrench (T53)
Power Turbine Fixture (T54)
Hoist
Outside Micrometer Caliper Set

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

References:
Task 4-7
Task 4-12
Task 4-16
Task 6-16

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)

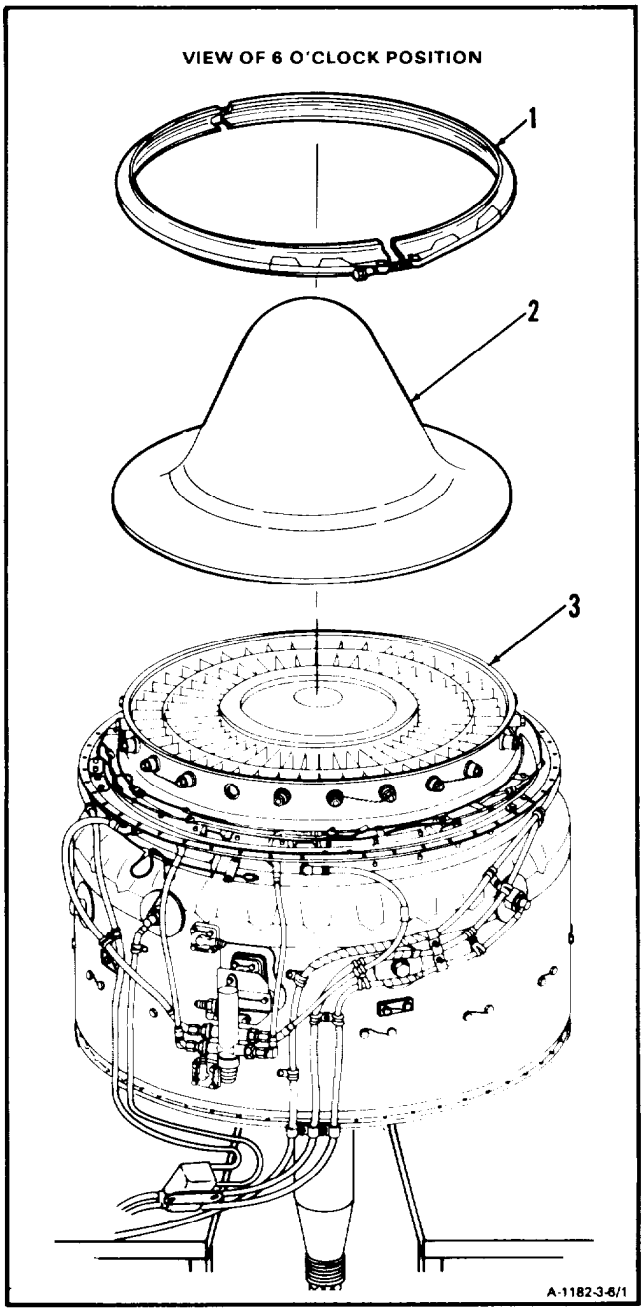
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

NOTE

During the following steps, it may be necessary to rotate combustion section and power turbine. This may require a helper.

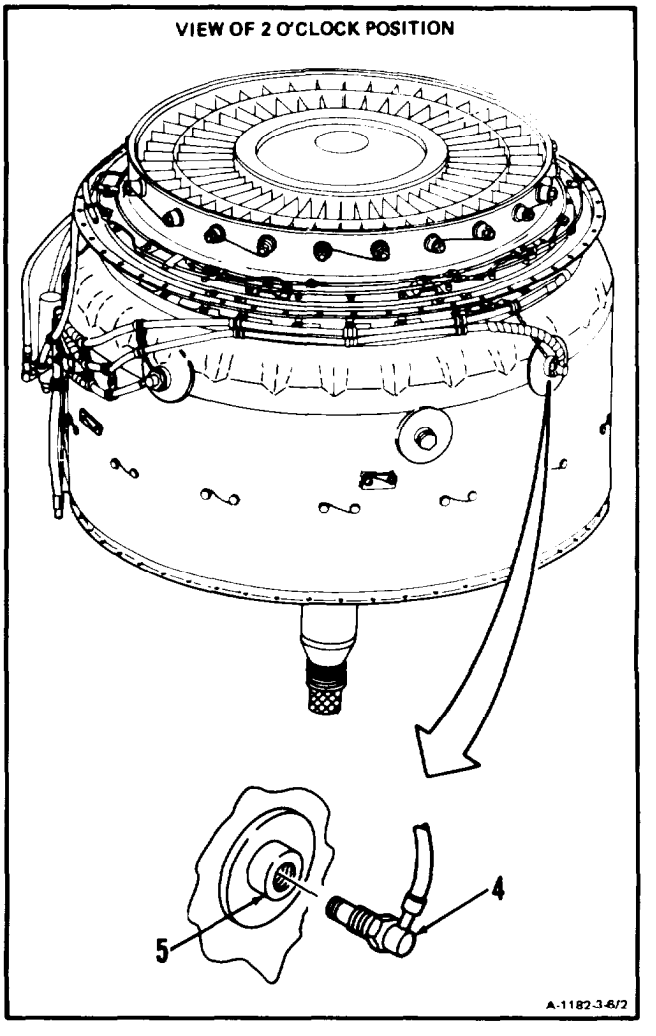
1. Remove clamp coupling half (T37) (1) and group aircraft cover (T24) (2) from combustion section and power turbine (3).



GO TO NEXT PAGE

3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

2. Remove lockwire and **disconnect ignition coil and cable assembly lead (4)** from receptacle (5).



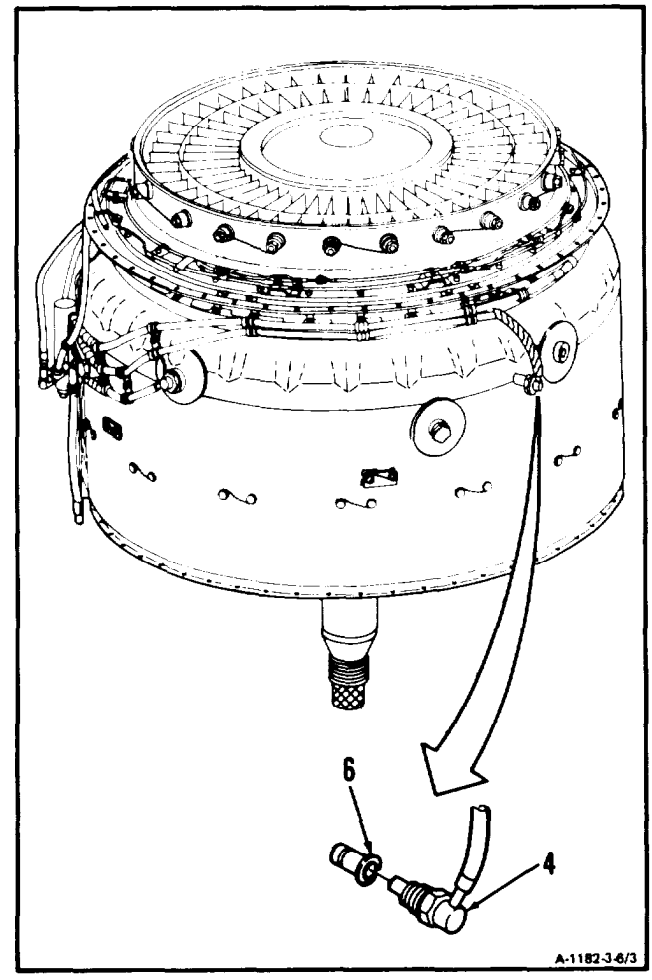
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

NOTE

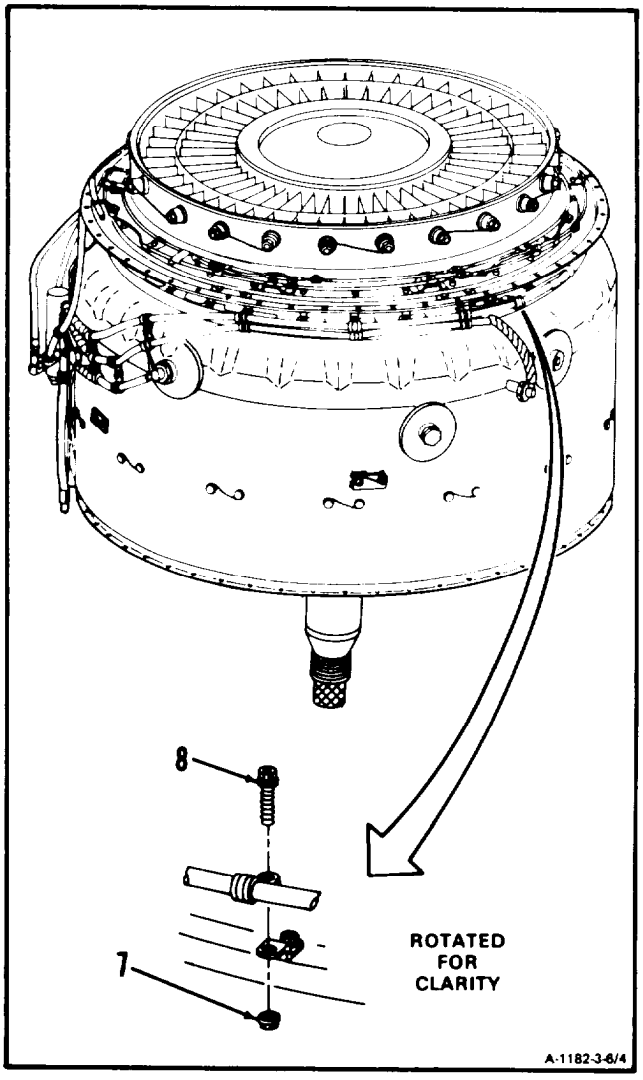
In the following step, the spark igniter may have remained in combustor housing and will have to be removed.

3. **Remove spark igniter (6)** from ignition coil and cable assembly lead (4).



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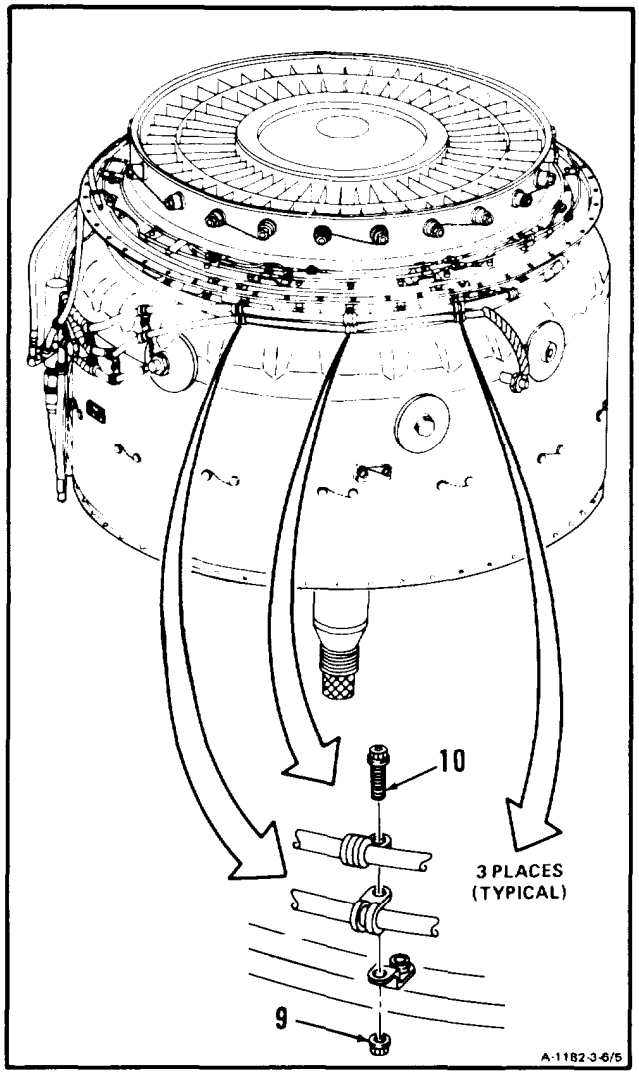
4. Remove nut (7) and bolt (8).



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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

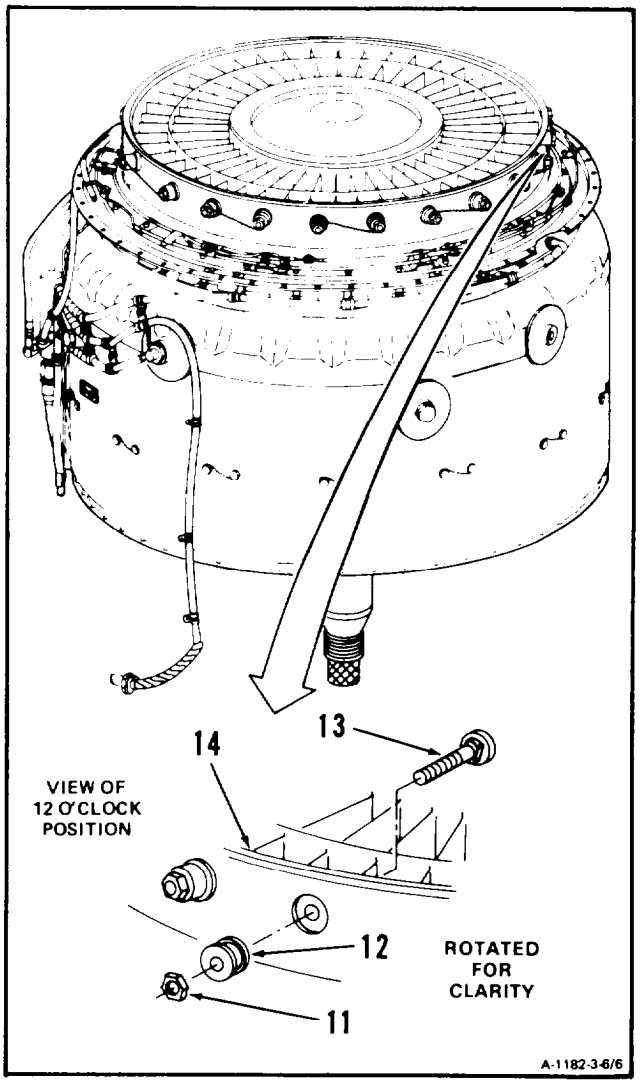
5. Remove three nuts (9) and three bolts (10).



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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

6. Remove lockwire, nut (11), spacer (12), and bolt (13) from exit vane assembly (14).



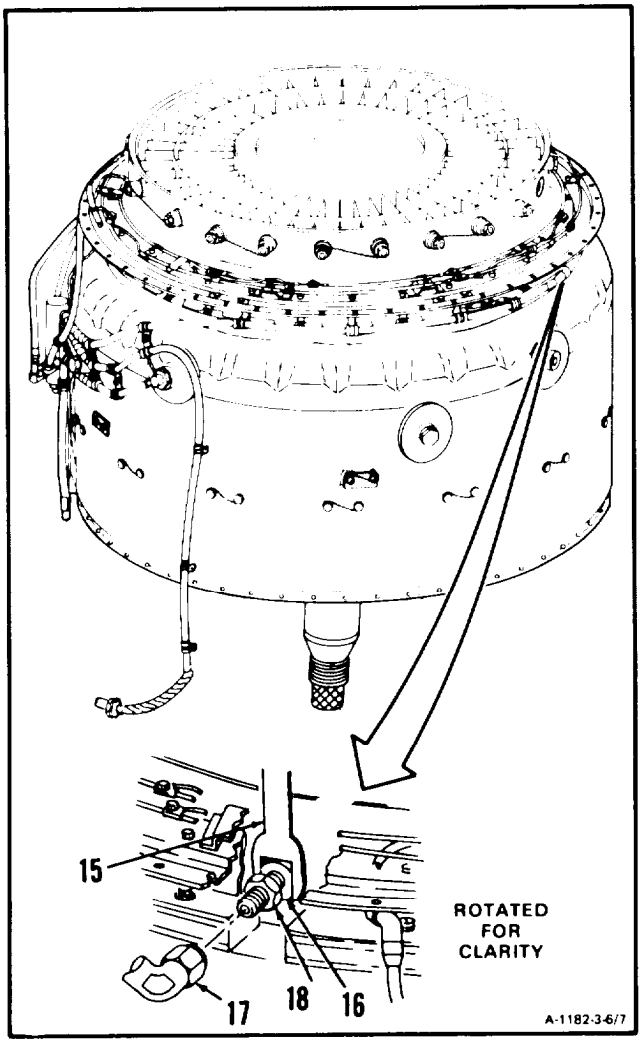
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CAUTION

In following step, hold No. 4 and 5 bearing lube adapter using open-end wrench (T53). Failure to use wrench may result in damage and mislocation of oil transfer tube resulting in oil leaks.

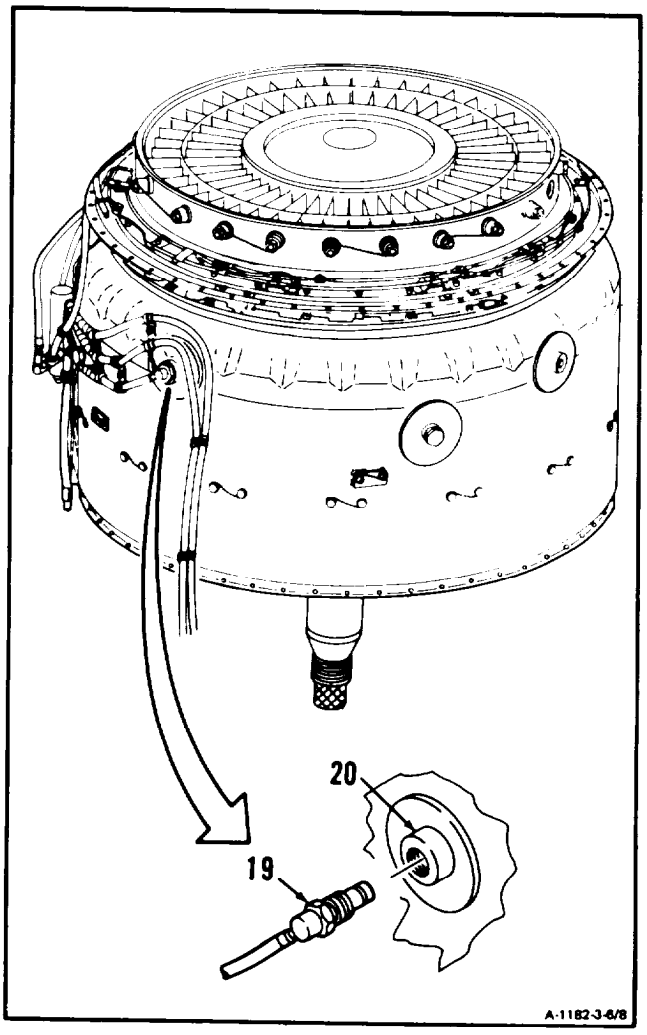
7. Place open-end wrench (T53) (15) on No. 4 and 5 bearing lube adapter (16).

8. Disconnect and **remove hose assembly (17)** from reducer (18).



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9. Remove lockwire and **disconnect ignition coil and cable assembly lead (19)** from receptacle (20).



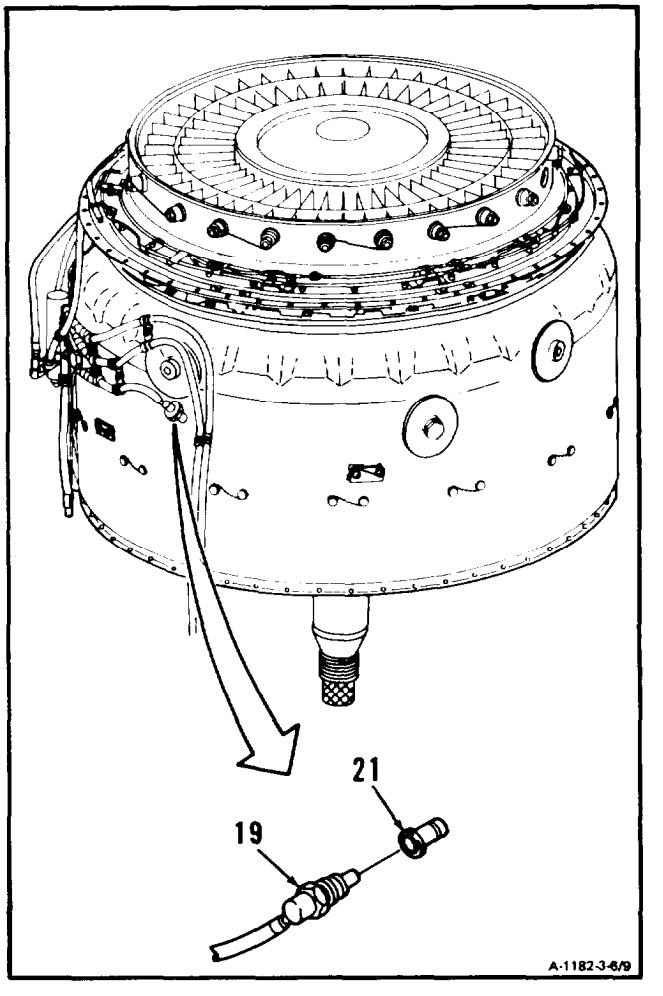
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

NOTE

In the following step, the spark igniter may have remained in combustor housing and will have to be removed.

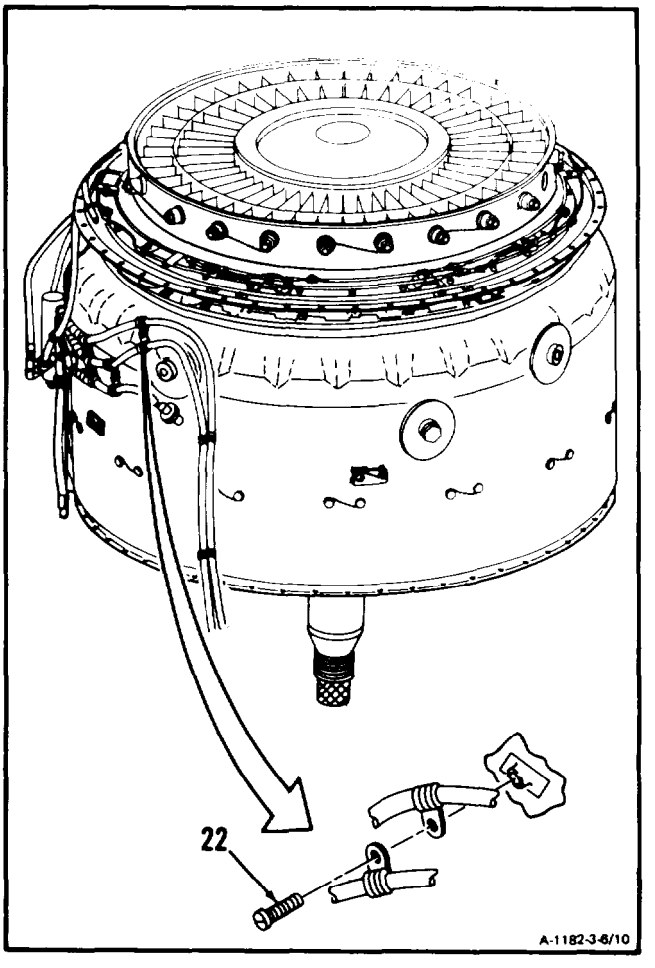
10. **Remove spark igniter (21)** from ignition coil and cable assembly lead (19).



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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

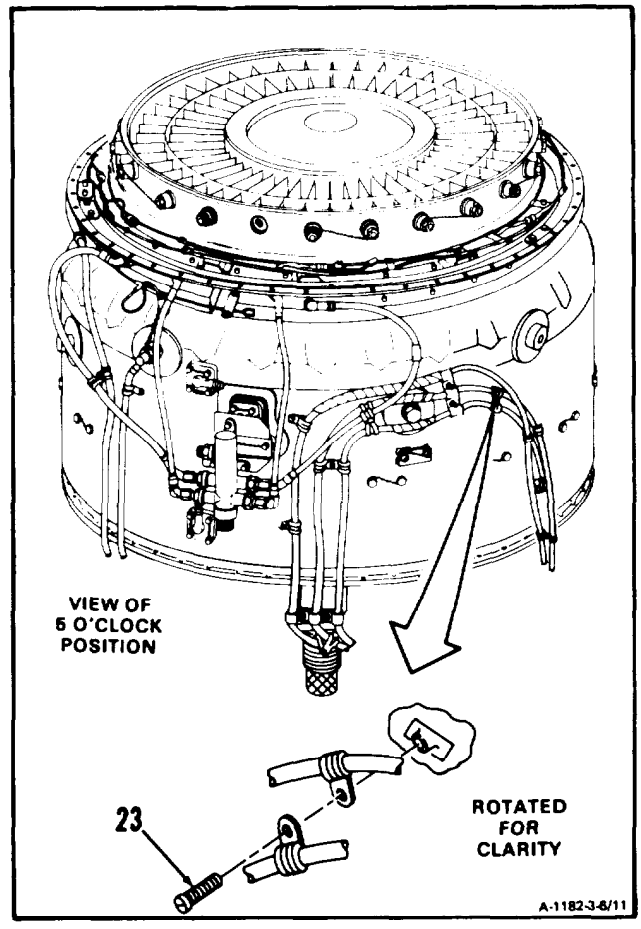
11. Remove lockwire and screw (22).



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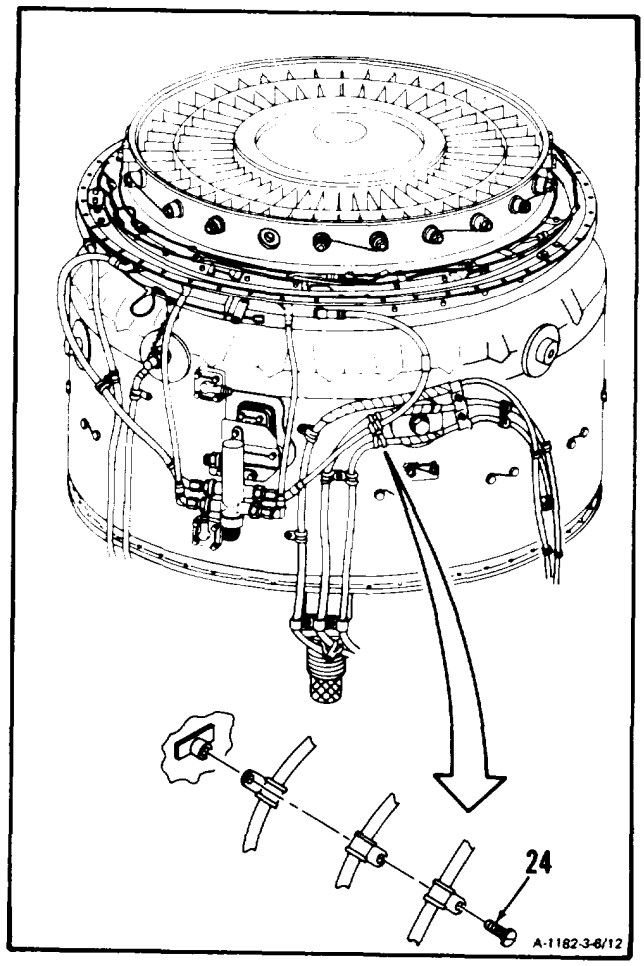
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

12. Remove lockwire and screw (23).



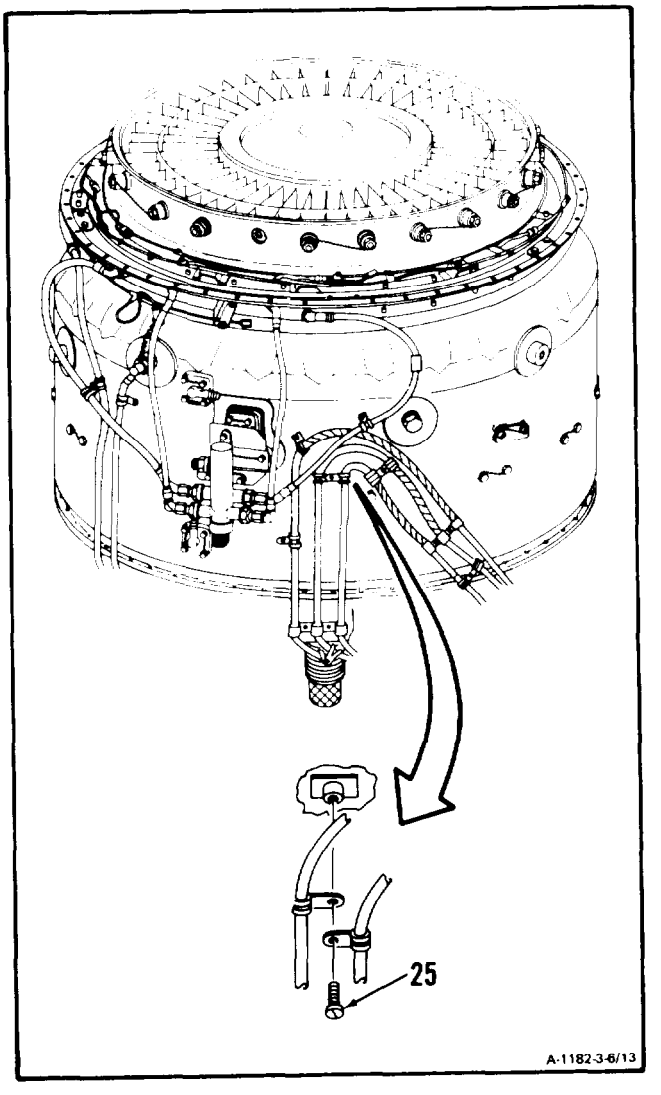
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13. Remove lockwire and screw (24).



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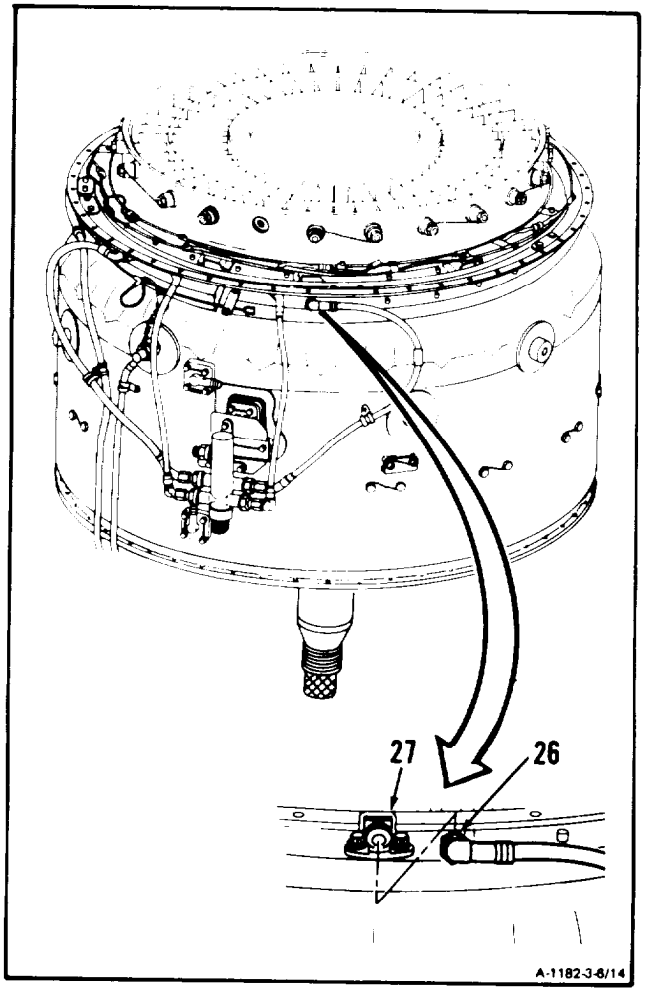
14. Remove lockwire and screw (25).



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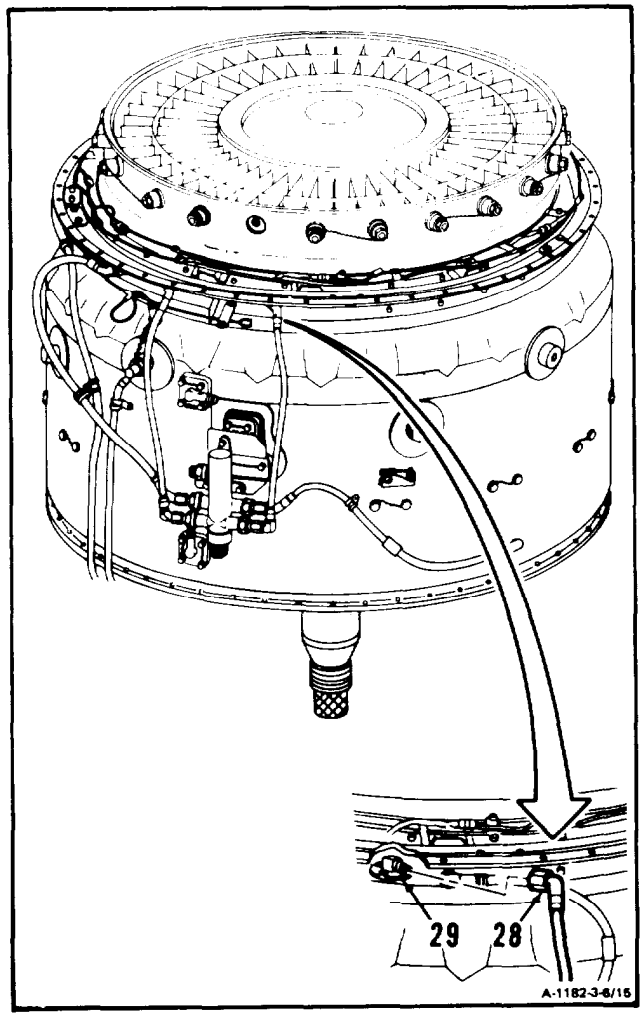
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

15. **Disconnect hose assembly (26)** from elbow (27).



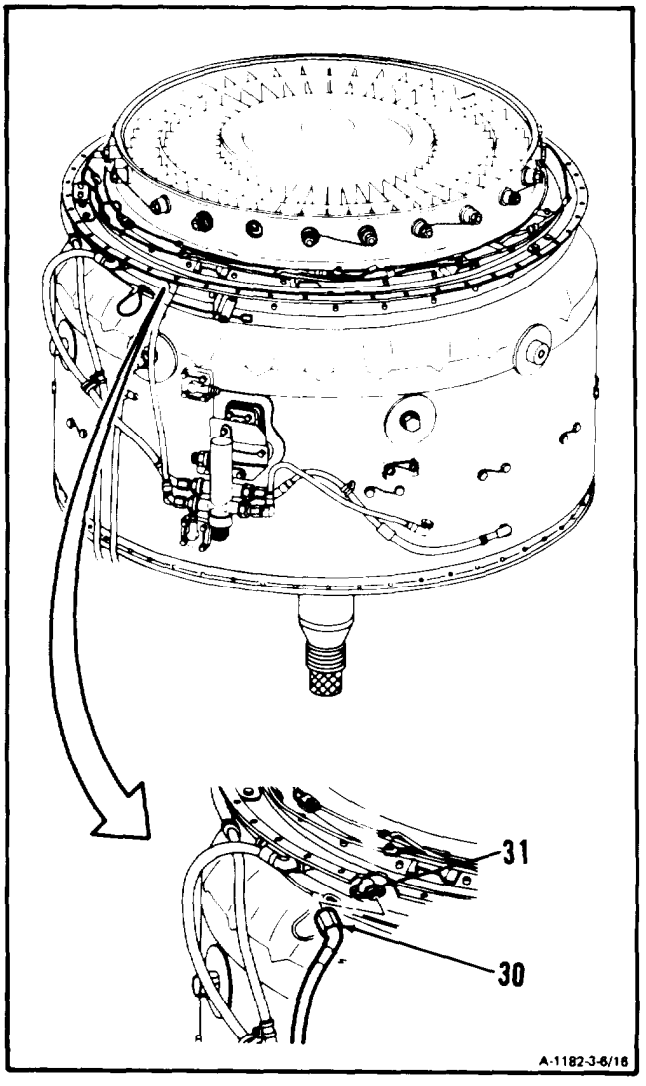
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16. **Disconnect hose assembly (28)** from elbow (29).



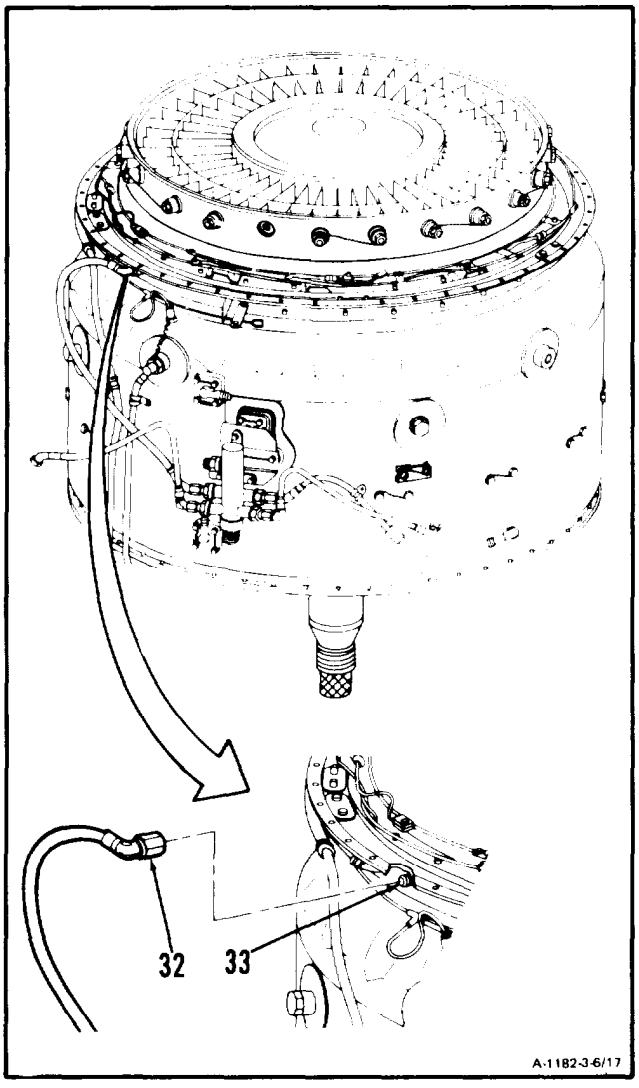
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17. **Disconnect hose assembly (30)** from elbow (31).



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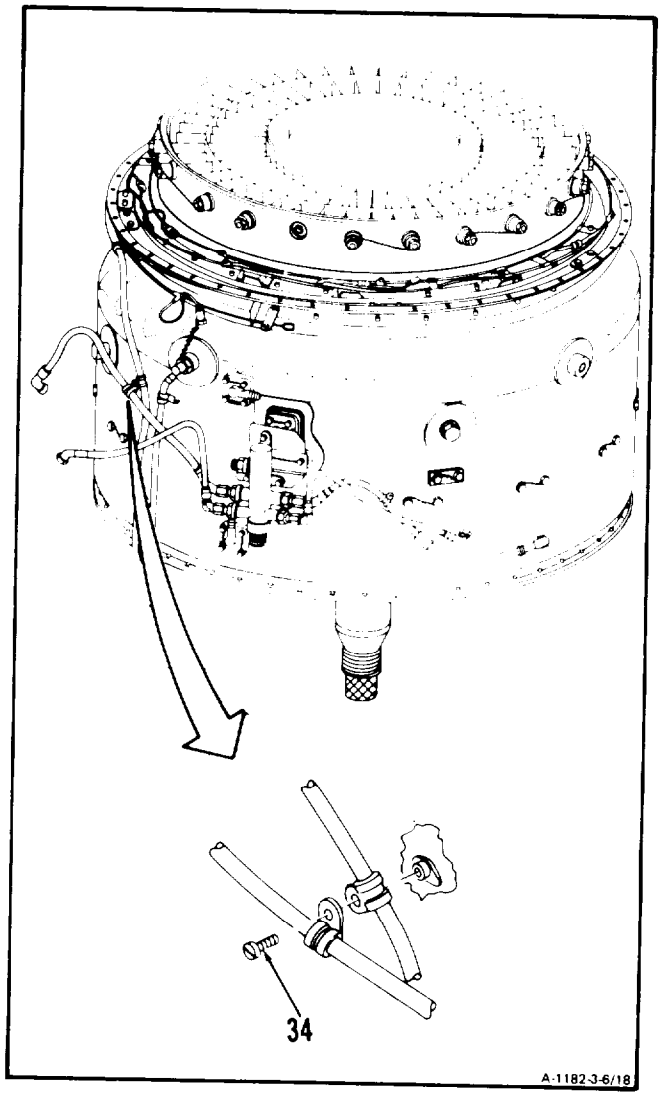
18. **Disconnect hose assembly (32)** from elbow (33).



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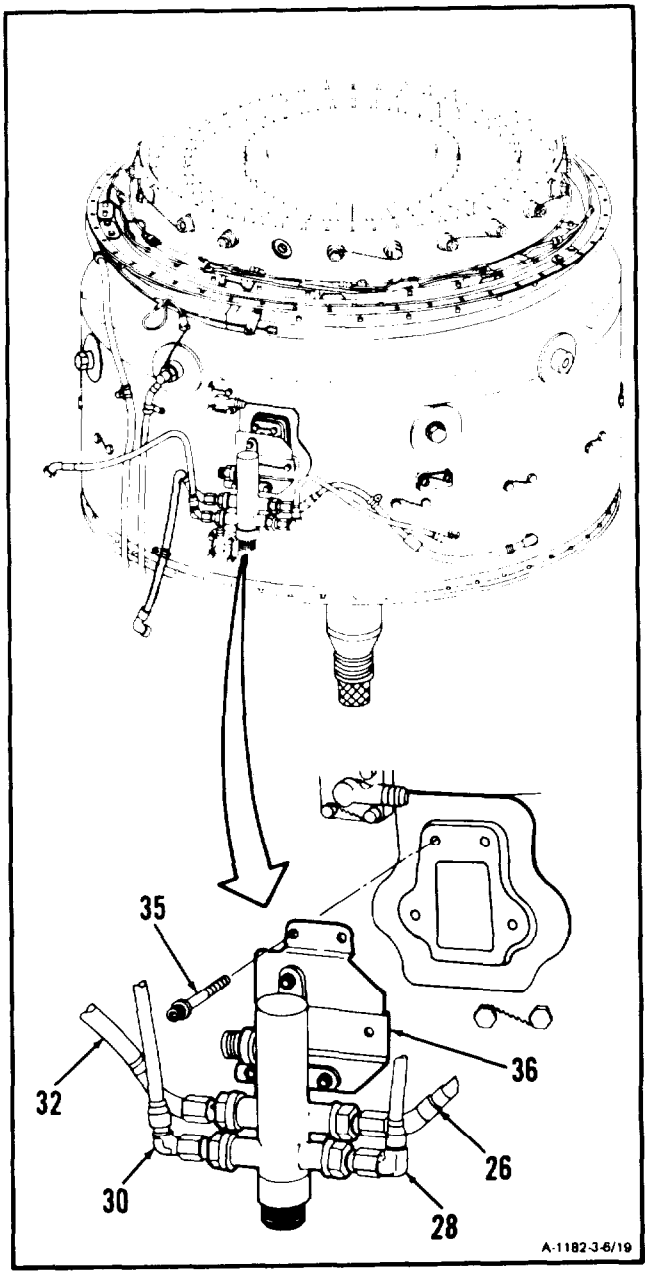
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

19. Remove lockwire and screw (34).



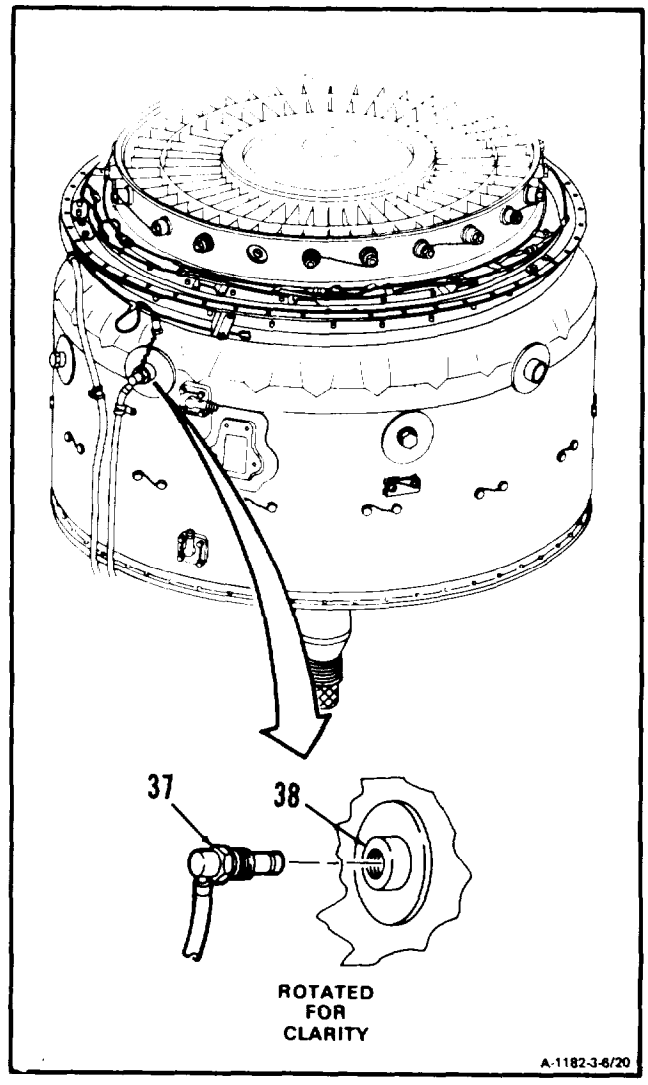
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20. **Remove** lockwire, four bolts (35), and **flow divider and bracket (36),** with hose assemblies (26, 28, 30, and 32) attached.



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21. Remove lockwire and **disconnect ignition coil and cable assembly lead (37)** from receptacle (38).



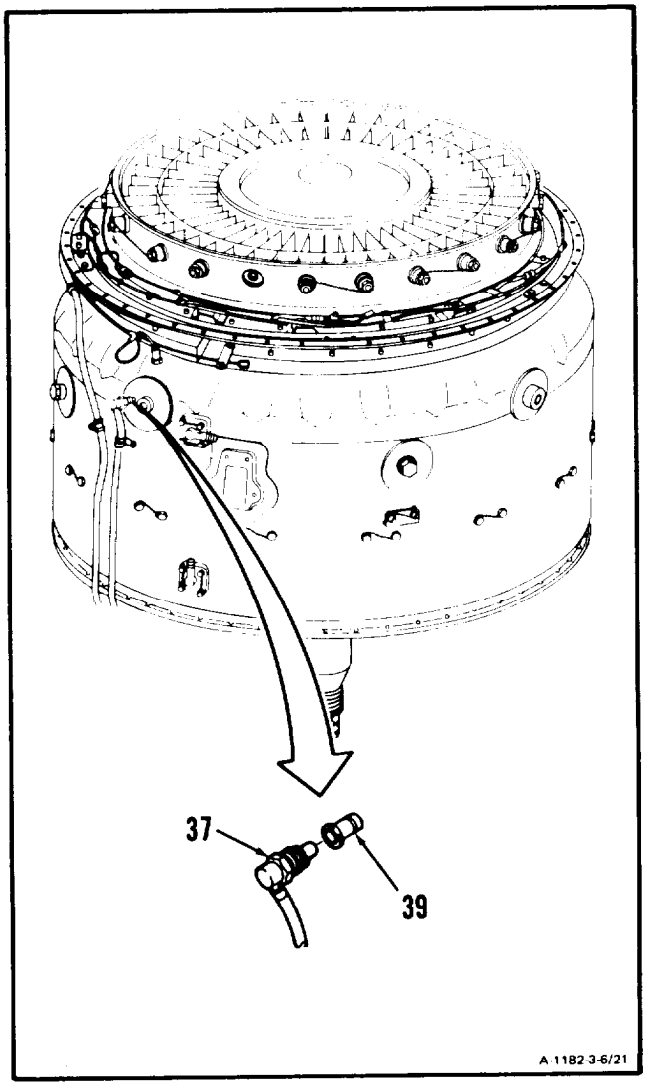
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

NOTE

In the following step, the spark igniter may have remained in combustor housing and will have to be removed.

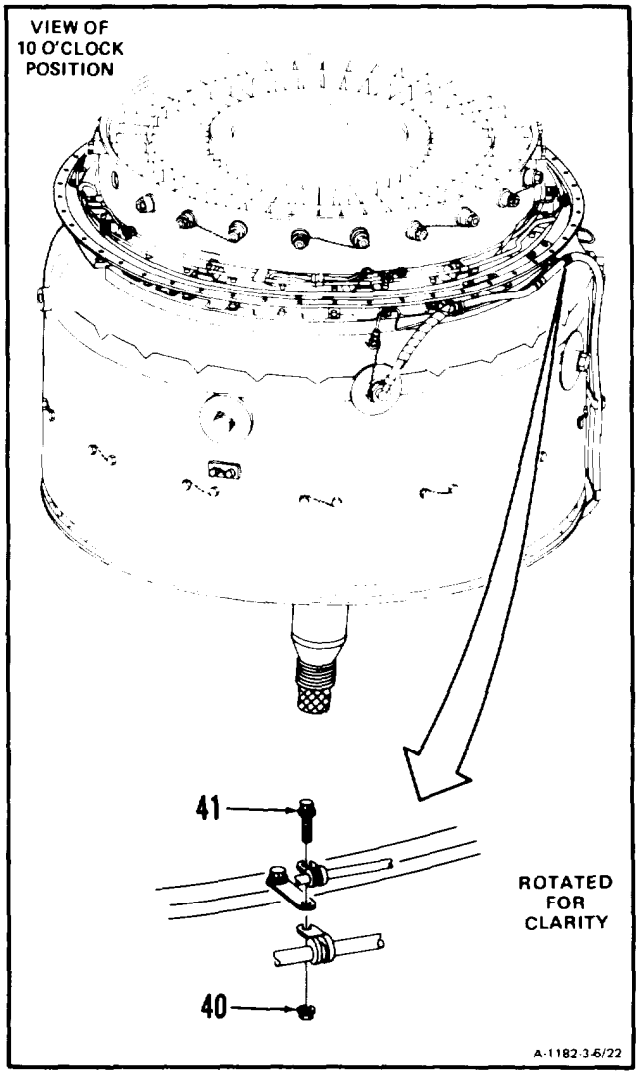
22. **Remove spark igniter (39)** from ignition coil and cable assembly lead (37).



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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

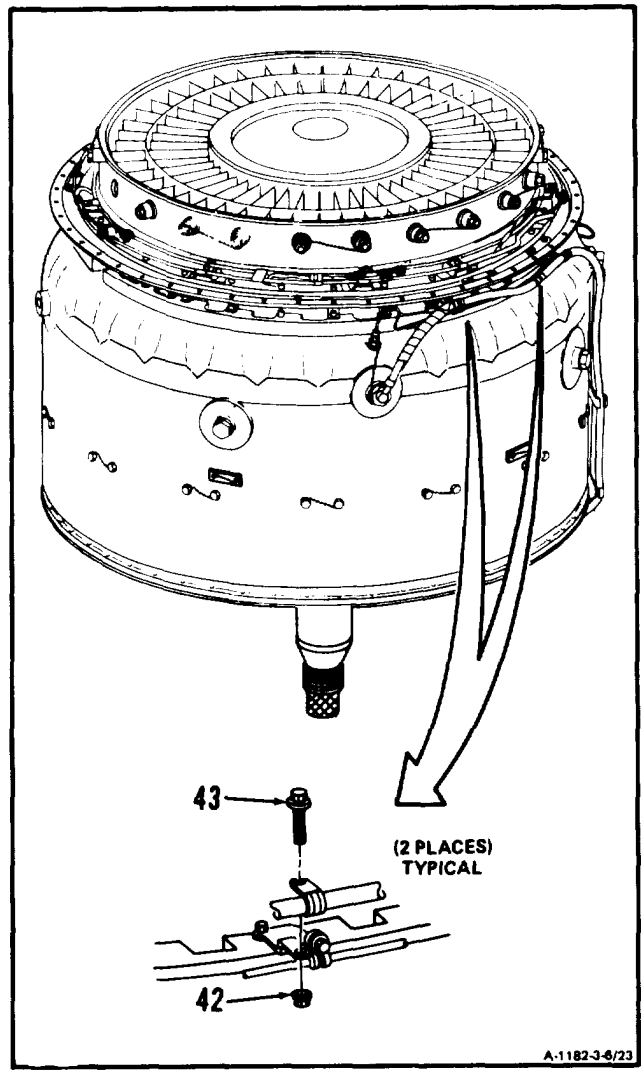
23. Remove nut (40) and bolt (41).



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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

24. Remove two nuts (42) and two bolts (43).



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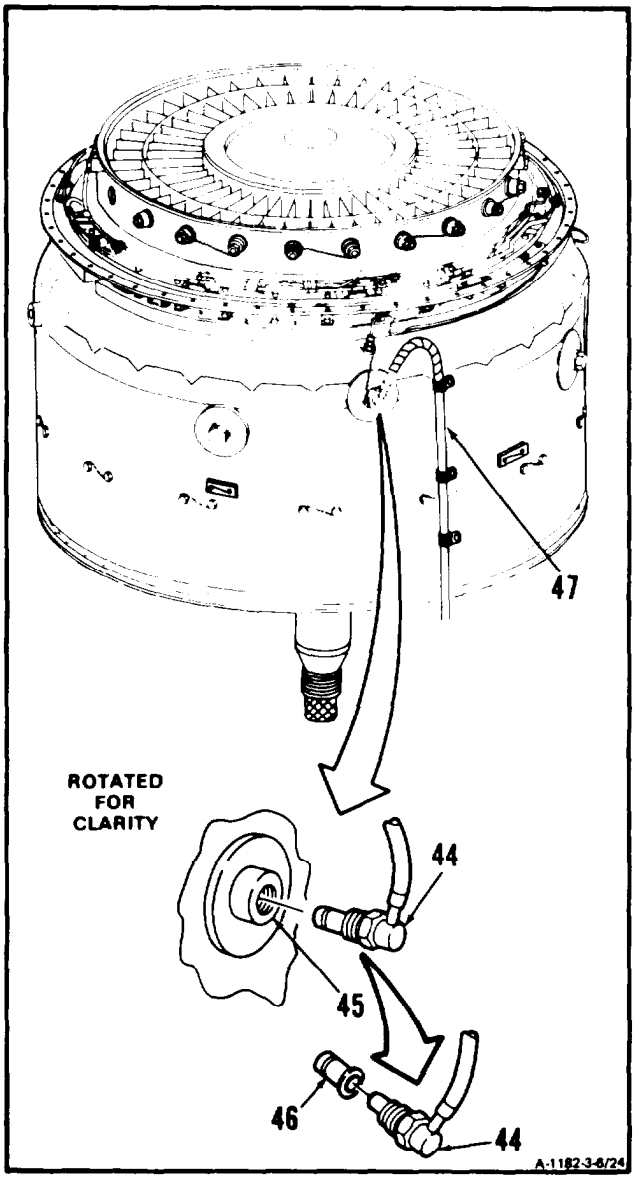
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

25. Remove lockwire and **disconnect ignition coil and cable assembly lead (44)** from receptacle (45).

NOTE

In the following step, the spark igniter may have remained in combustor housing and will have to be removed.

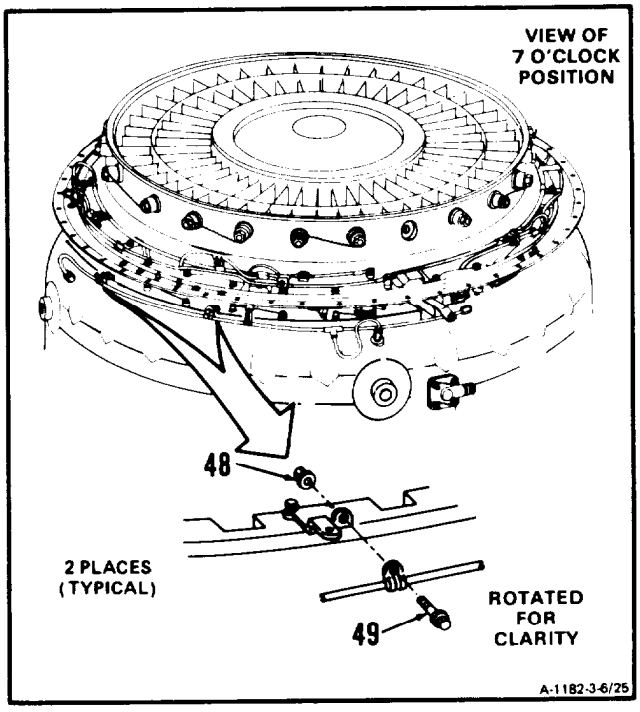
26. **Remove spark igniter (46)** from ignition coil and cable assembly lead (44), and **remove ignition coil and cable assembly (47).**



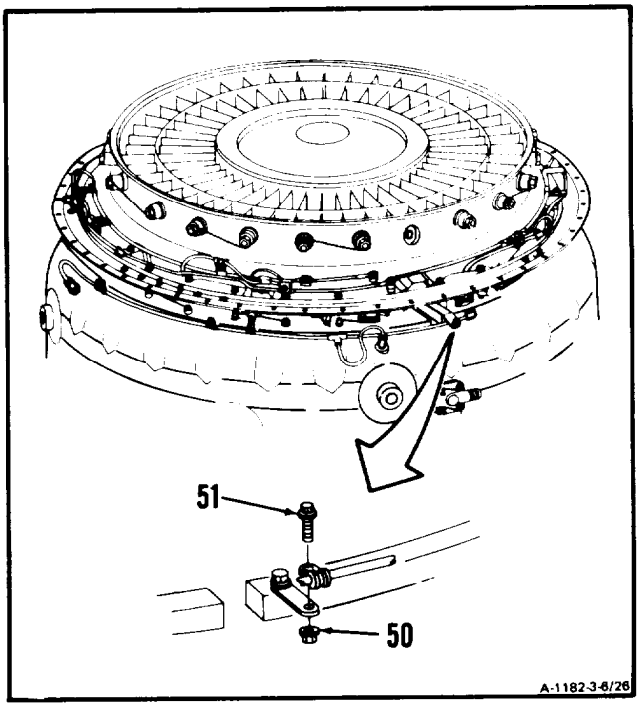
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

27. Remove two nuts (48) and two bolts (49).



28. Remove nut (50) and bolt (51)



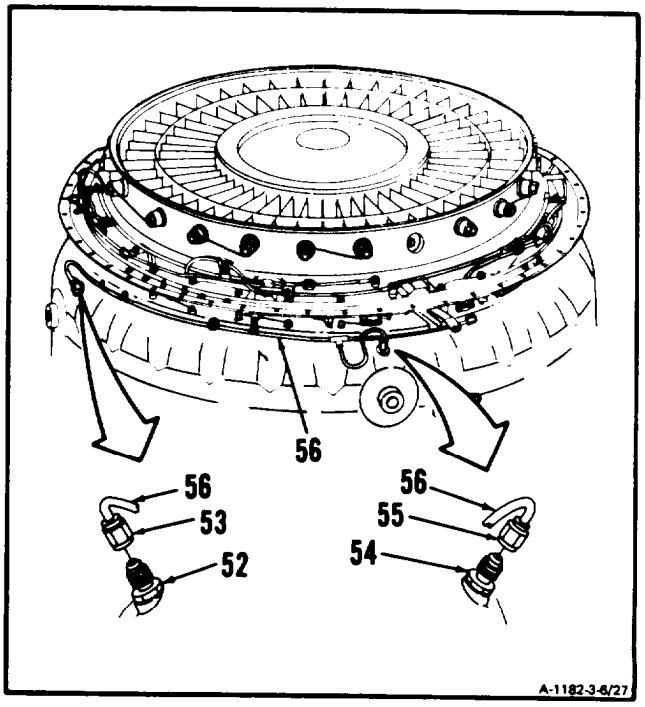
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3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

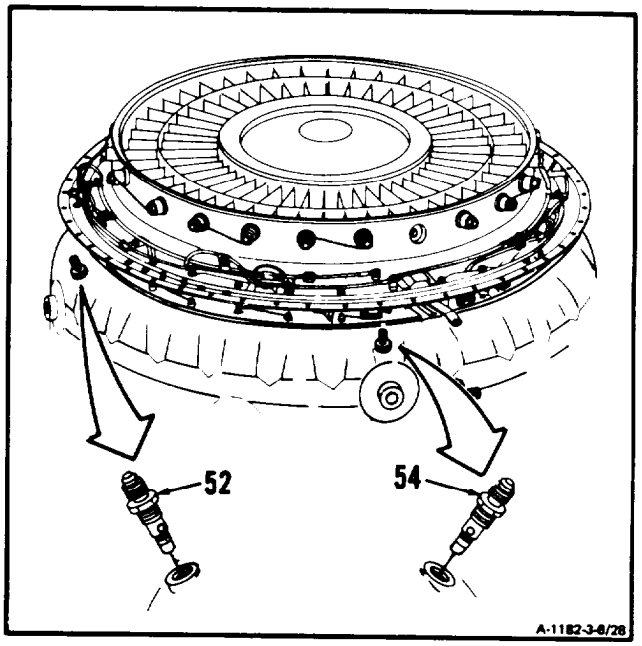
29. Using two wrenches, hold start fuel nozzle (52) and loosen swivel nut (53).

30. Using two wrenches, hold start fuel nozzle (54) and loosen swivel nut (55).

31. **Disconnect and remove primer tube assembly (56)** from start fuel nozzles (52 and 54).



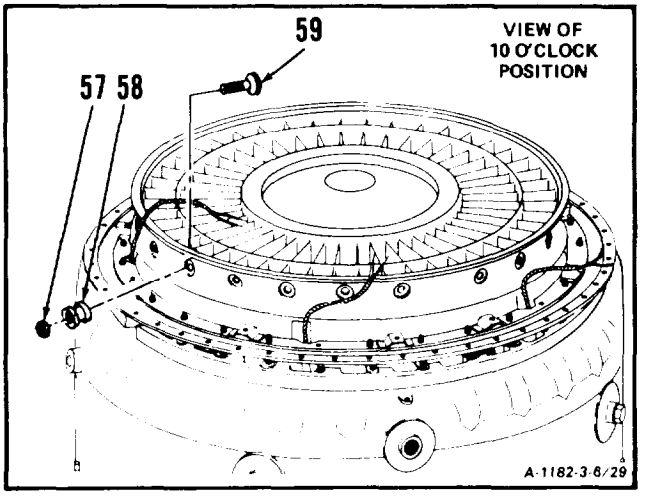
32. **Remove start fuel nozzles (52 and 54).**



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33. Remove lockwire, 20 nuts (57), spacers (58), and bolts (59).

34. **Remove left- and right-hand bus bar assemblies** (Ref. Task 4-7).



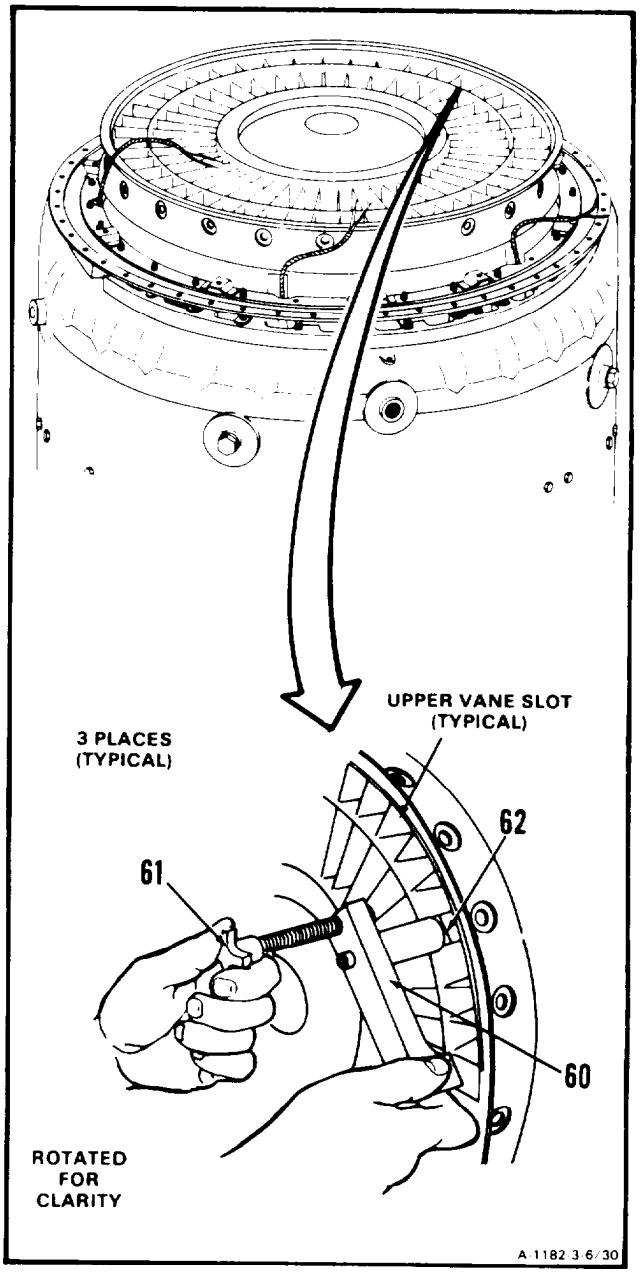
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35. **Install three mechanical pullers (T47) (60)** as follows:

NOTE

The following procedures apply to three pullers installed at the 2-o'clock, 6-o'clock, and 10-o'clock positions.

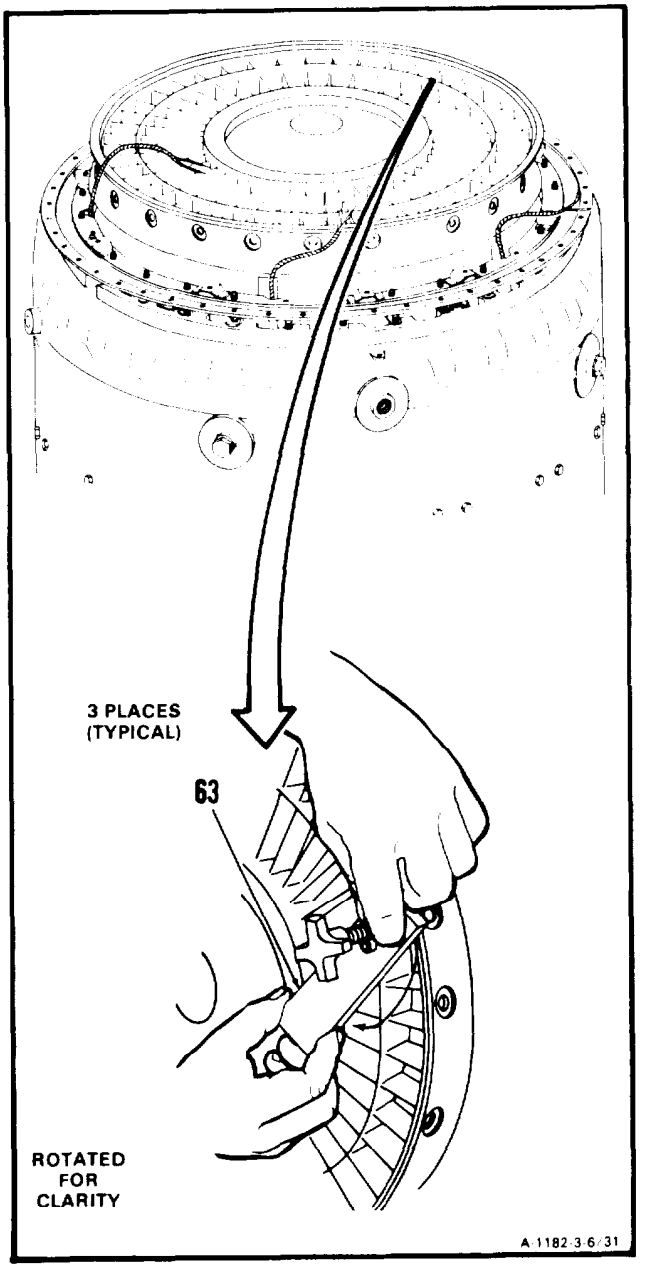
a. Back knob (61) all the way out, and guide plate (62) through upper vane slot.



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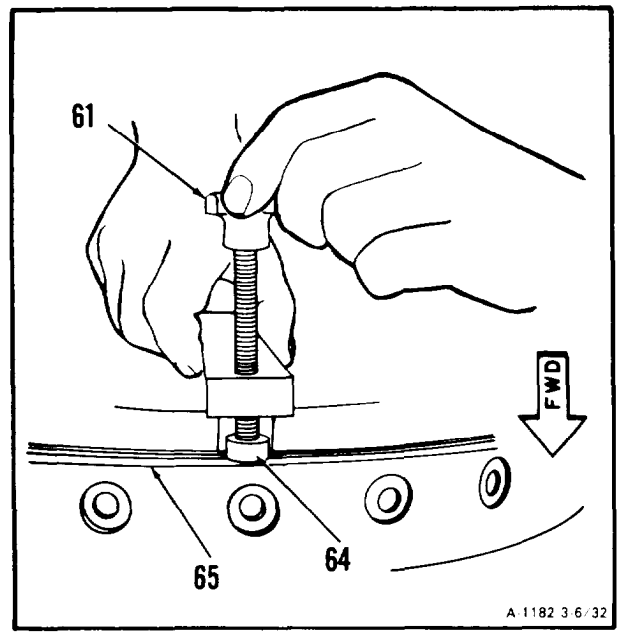
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

b. Rotate arm (63) 90 degrees clockwise.



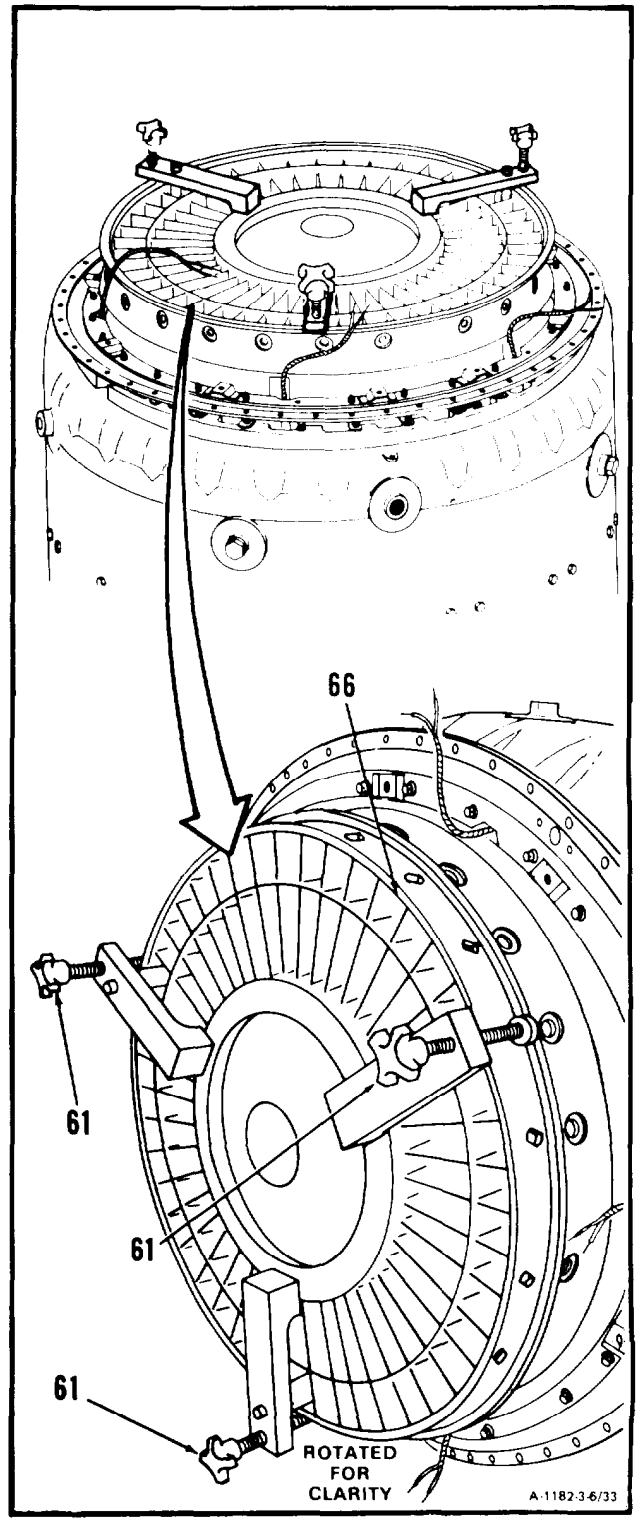
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c. Turn knob (61) clockwise until bumper (64) fits snugly against fourth turbine nozzle flange (65).



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36. Turn knobs (61) evenly clockwise and **remove exit vane assembly (66).**



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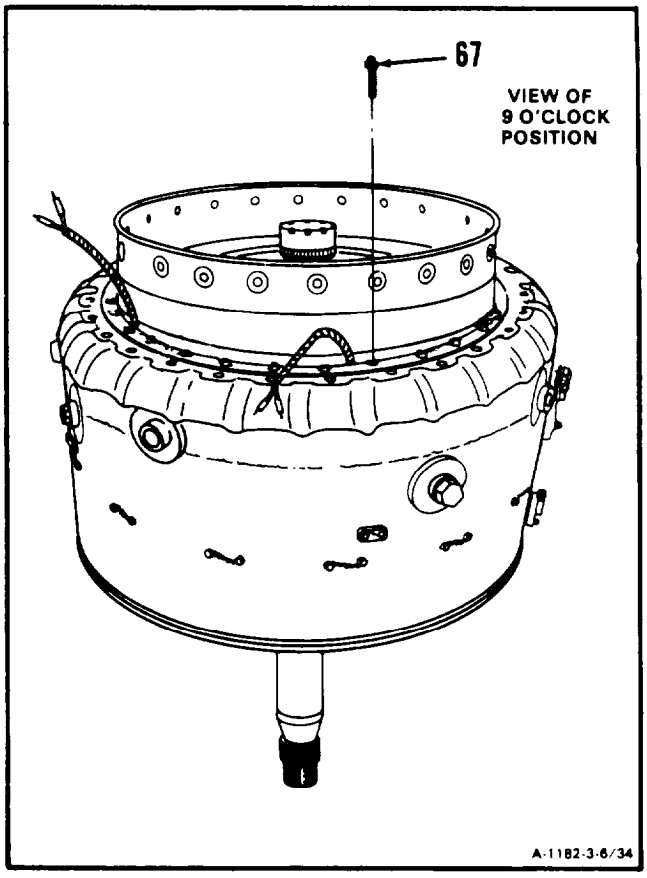
3-6 DISASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-6

37. **Remove fireshield assembly** (Ref. Task 4-12).

38. **Remove left- and right-hand fuel manifold assemblies** (Ref. Task 6-16).

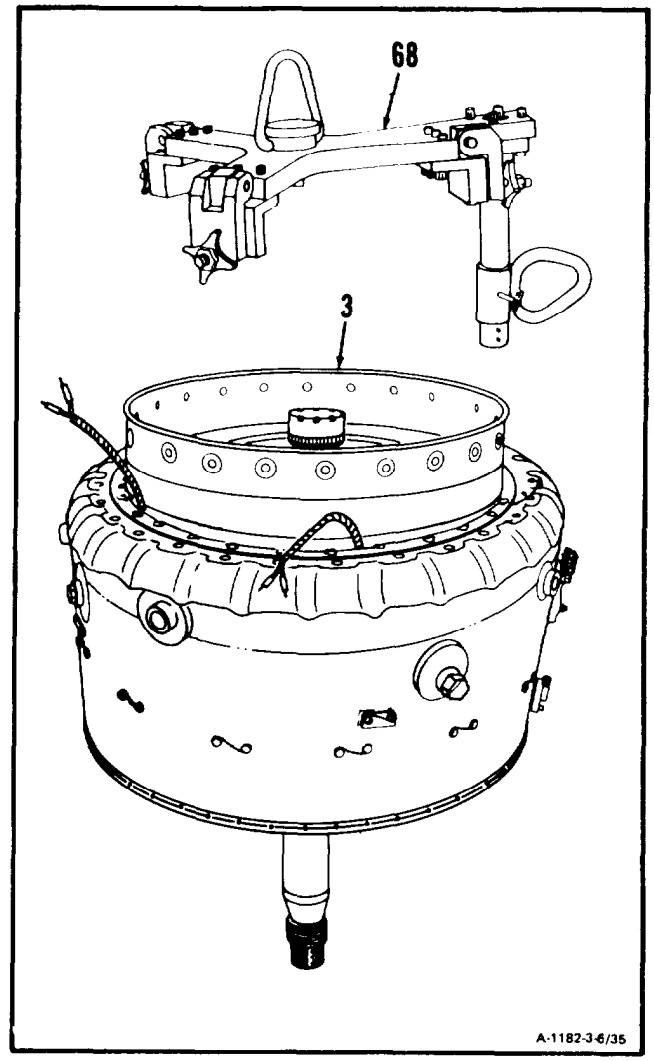
39. **Remove fireshield section** (Ref. Task 4-16).

40. Remove lockwire and 42 bolts (67).



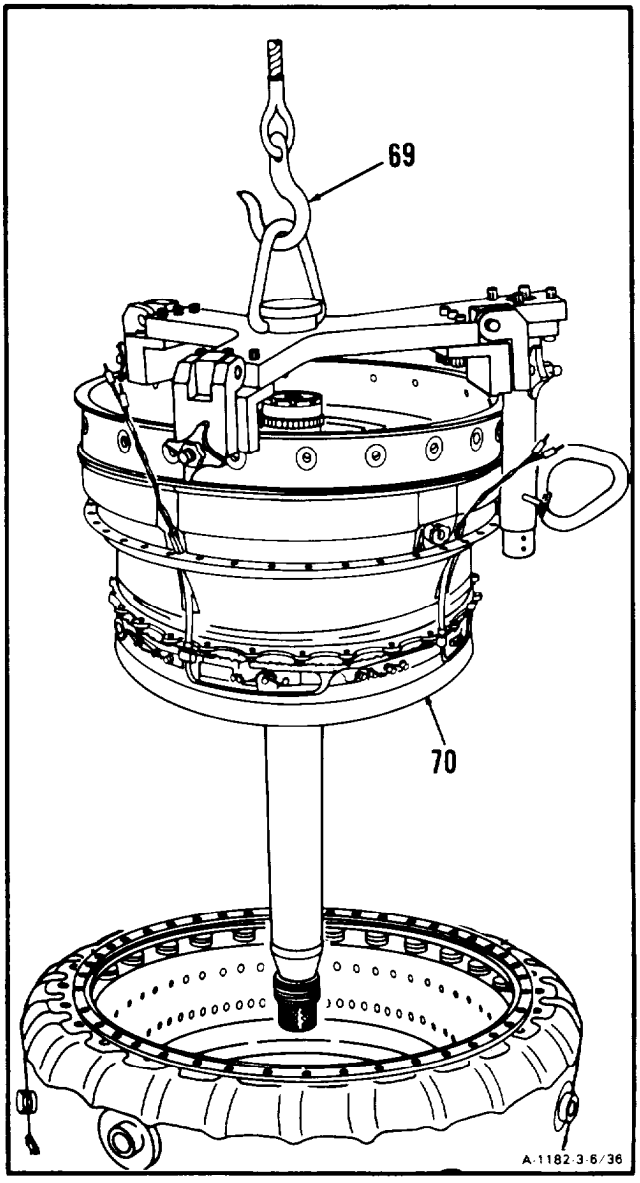
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41. **Install power turbine fixture (T54) (68)** on combustion section and power turbine (3).



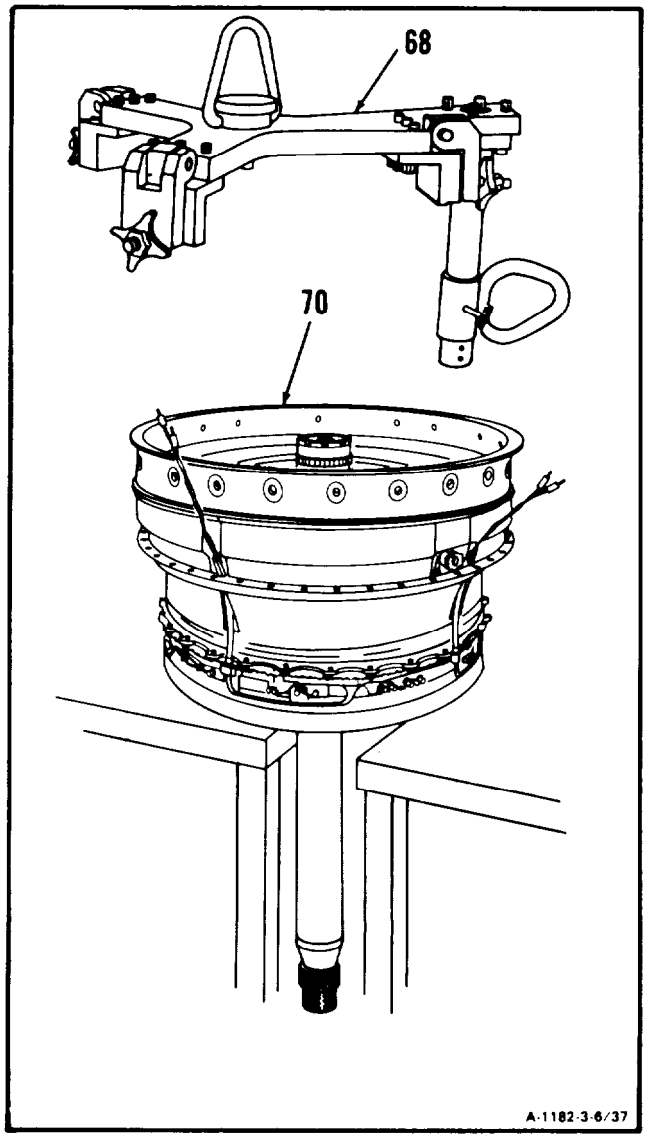
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42. Using hoist (69), lift power turbine assembly (70) and position between two tables.



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43. Remove power turbine fixture (T54) (68) from power turbine assembly (70).



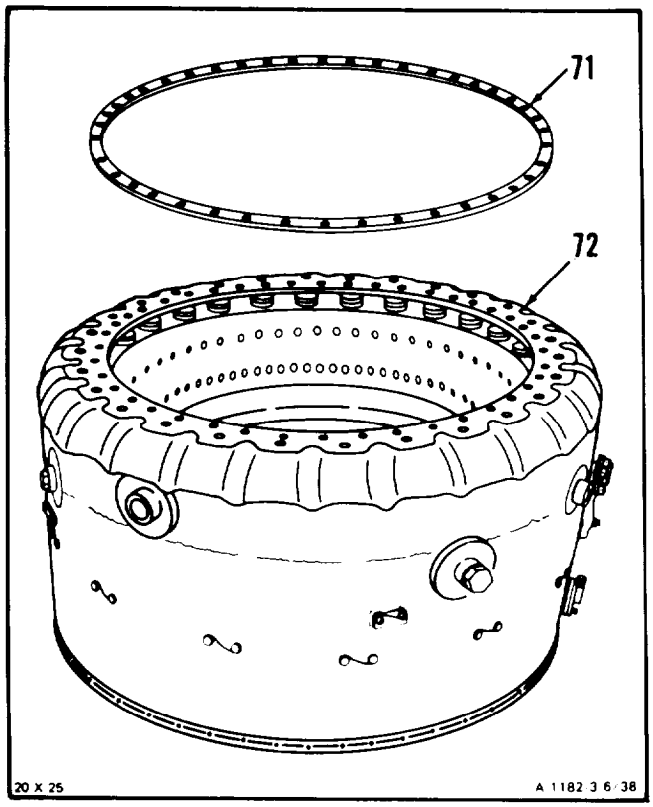
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44. **Remove shim (71)** from combustor assembly (72).

45. Using outside micrometer, measure thickness of shim (71). Record dimension. If clearance between second turbine disc assembly and third turbine nozzle (Ref. Task 3-5, step 41.1) was not within limits, adjust thickness of shim (71).

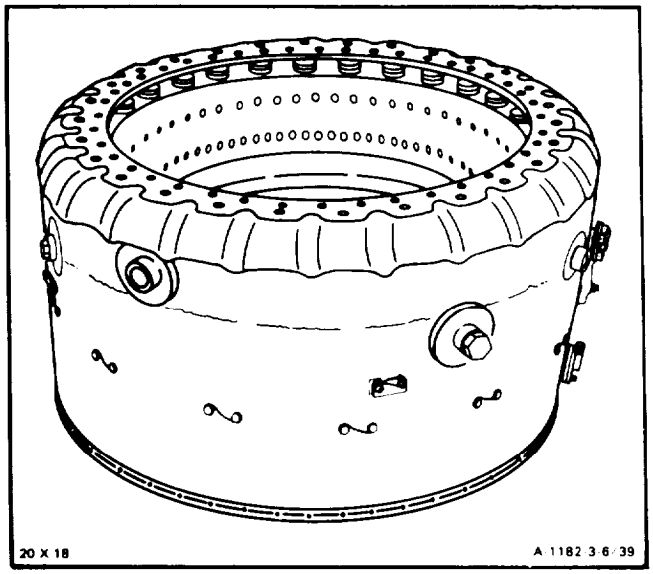
NOTE

Maximum total shim thickness is 0.045 inch.



FOLLOW-ON MAINTENANCE:

None



END OF TASK

3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) 3-7

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Group Aircraft Cover (T24)
Clamp Coupling Half (T37)
Open-End Wrench (T53)
Power Turbine Fixture (T54)
Torque Wrench, 30-150 Inch-Pounds
Crowfoot Attachment, 7/8-Inch
Hoist

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)

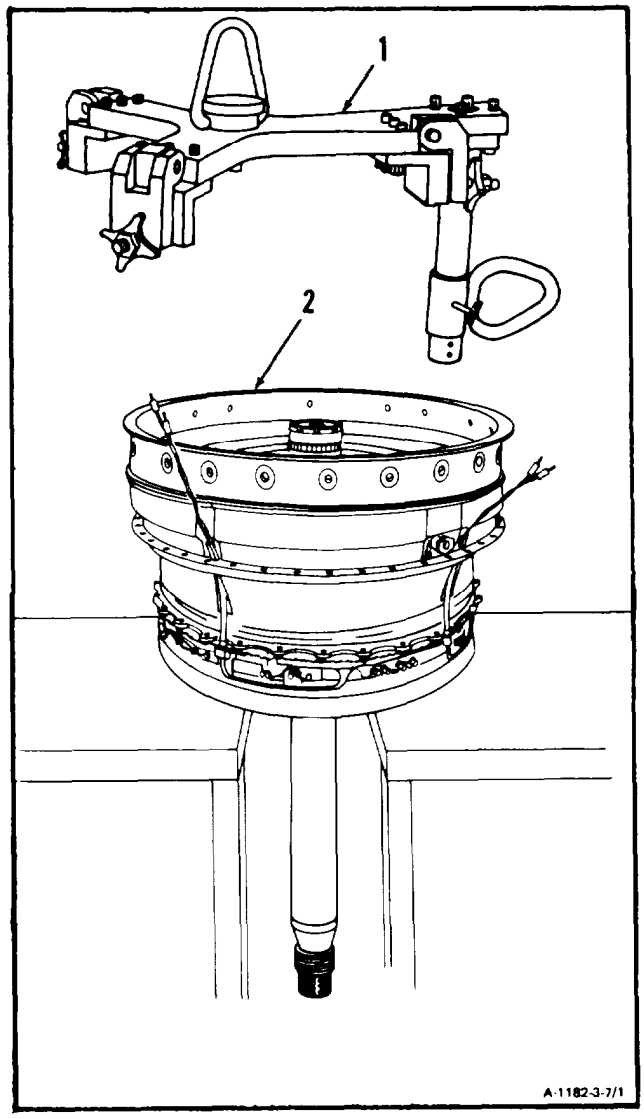
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
Task 4-11
Task 4-15
Task 4-19
Task 6-20

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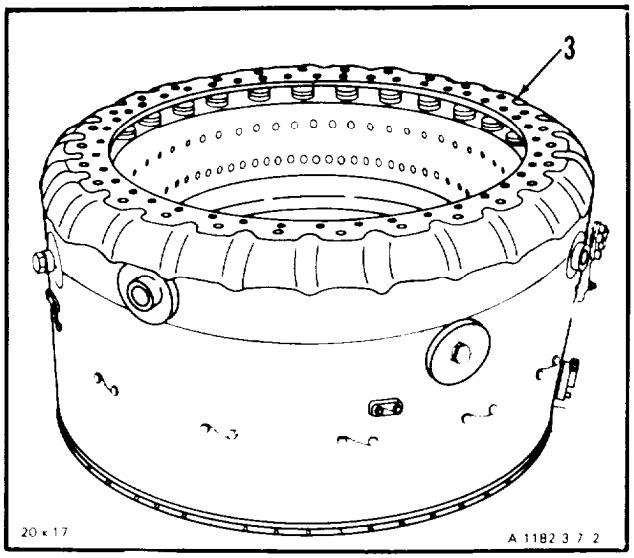
3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

1. **Install power turbine fixture (T54) (1)** on power turbine assembly (2).



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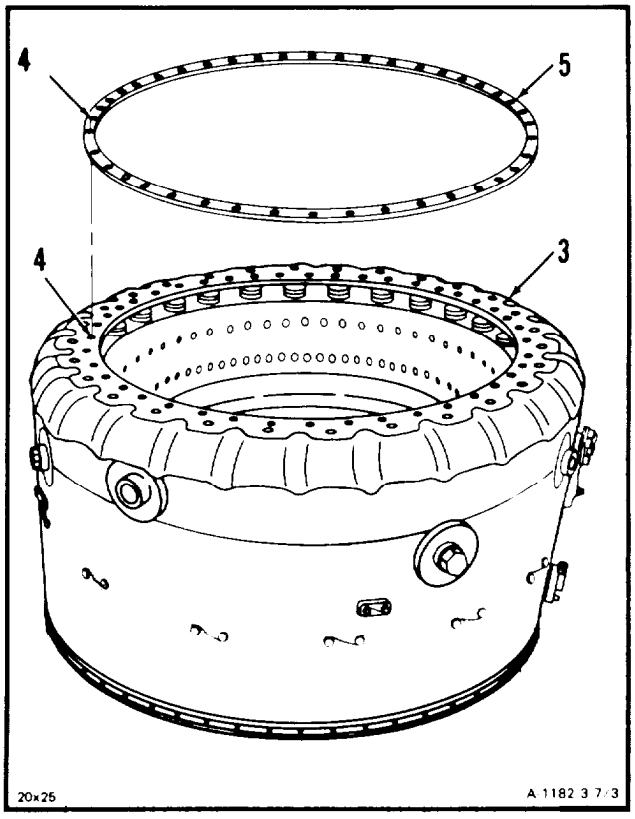
2. Place combustor assembly (3) on two tables placed approximately 6 inches apart.



CAUTION

Ensure axial clearance between second turbine disc assembly and third turbine nozzle is 0.045 inch minimum. (Ref. Task 3-8). Maximum shim thickness shall not exceed 0.045 inch. Failure to comply may allow rubbing between second turbine disc assembly on third turbine nozzle. Damage to engine will result.

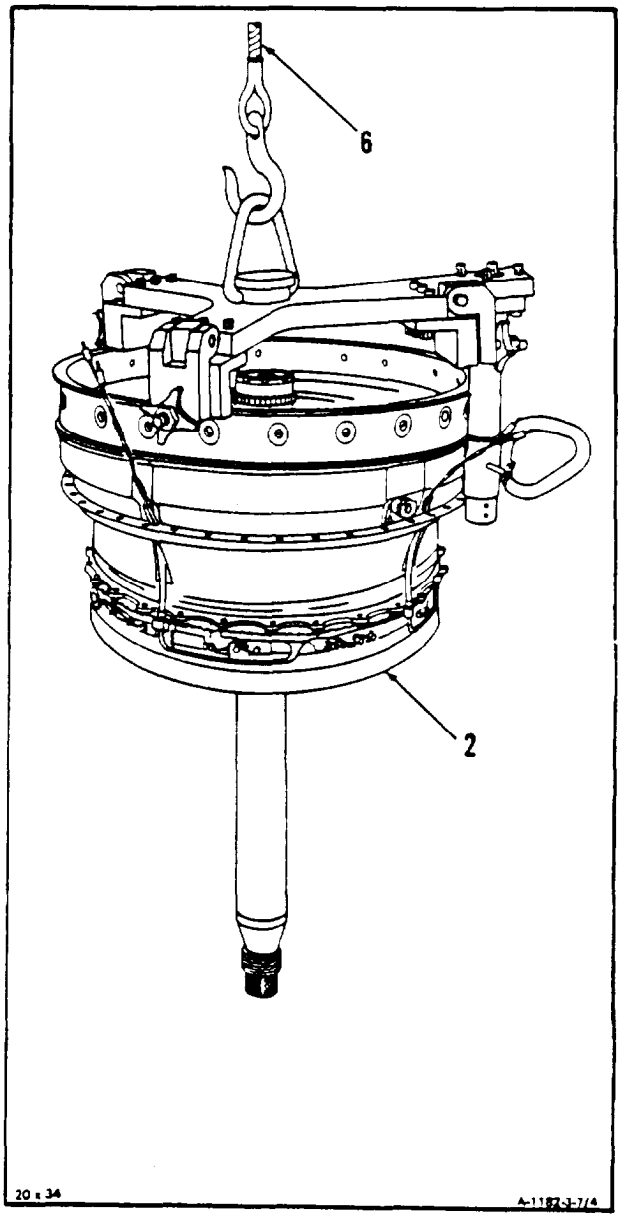
3. Align bolt holes (4) and **install shim (5)** on combustor assembly (3).



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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

4. Using hoist (6), lift power turbine assembly (2).



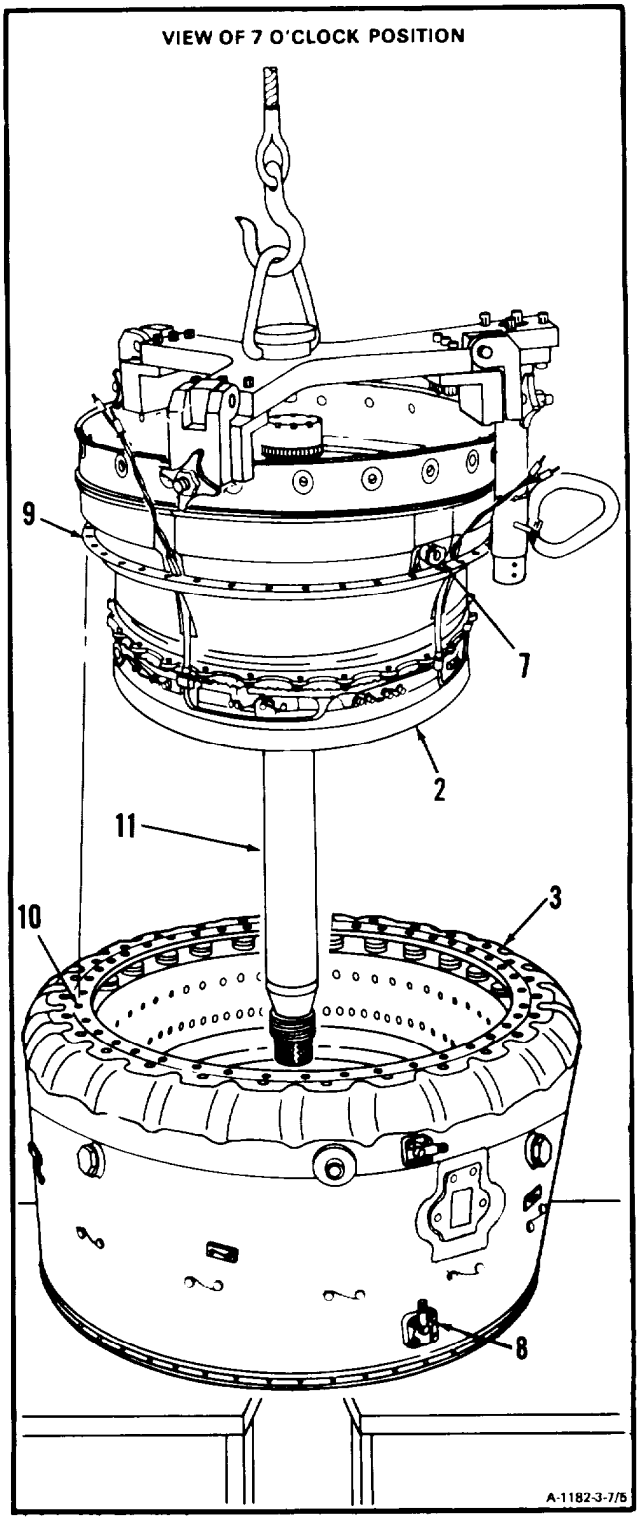
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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

5. Position power turbine assembly (2) over combustor assembly (3).

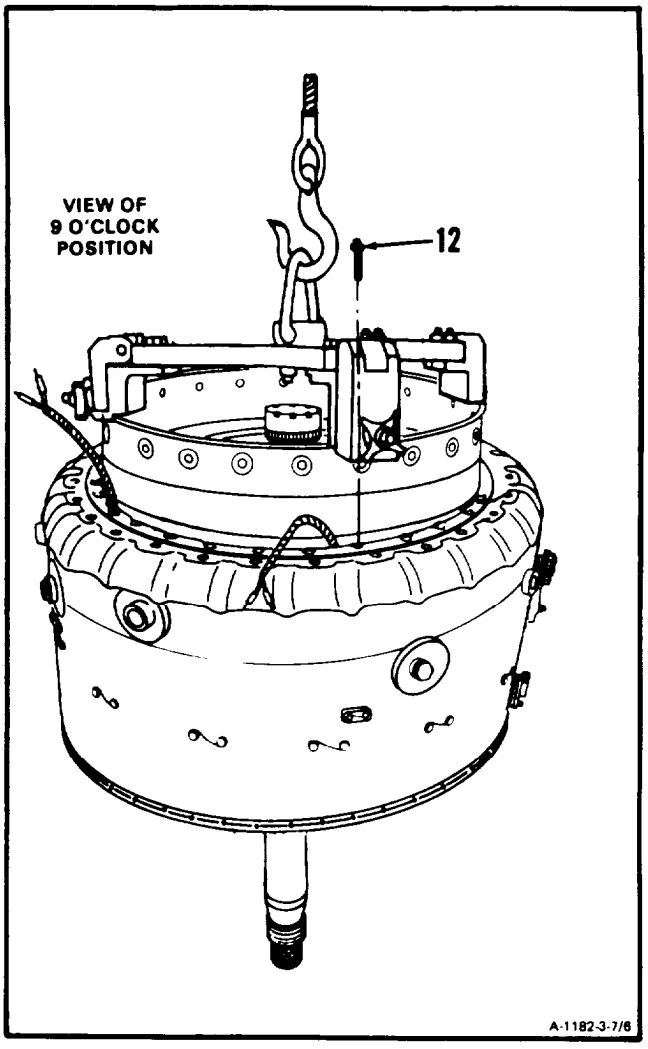
6. Align lube scavenge adapter (7) with fuel drain valve (8) and bolt holes (9) with bolt holes (10).

7. Using helper, **install power turbine assembly (2) onto combustor assembly (3)** with shaft (11) going between two tables.



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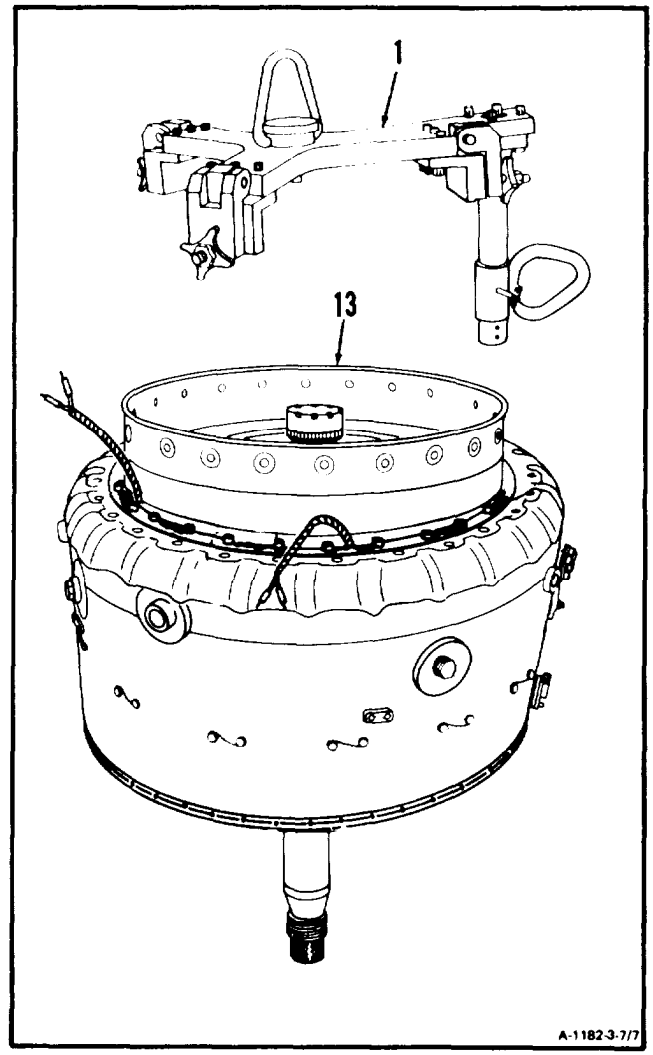
8. Apply anti-seize compound (E5) to 42 bolts (12). **Install 42 bolts (12). Torque 42 bolts (12) to 80 inch-pounds.** Lockwire bolts (12). Use lockwire (E29).



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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

9. Remove power turbine fixture (T54) (1) from combustion section and power turbine (13).



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10. **Install fireshield section** (Ref. Task 4-19).

11. **Install left- and right-hand fuel manifold assemblies** (Ref. Task 6-20).

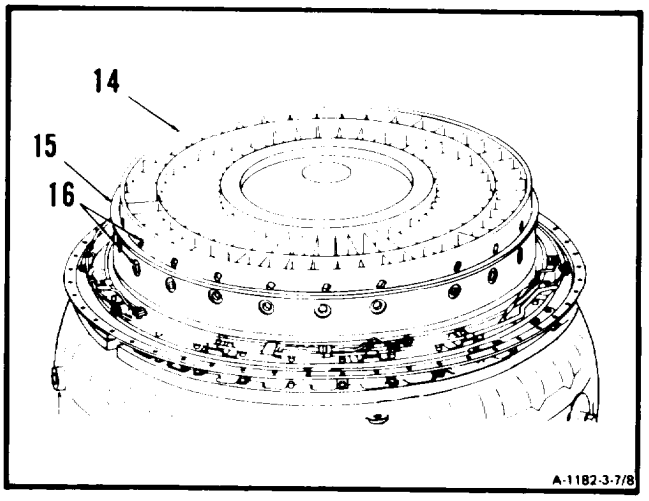
12. **Install fireshield assembly** (Ref. Task 4-15).

13. **Install left- and right-hand bus bar assemblies** (Ref. Task 4-11).

NOTE

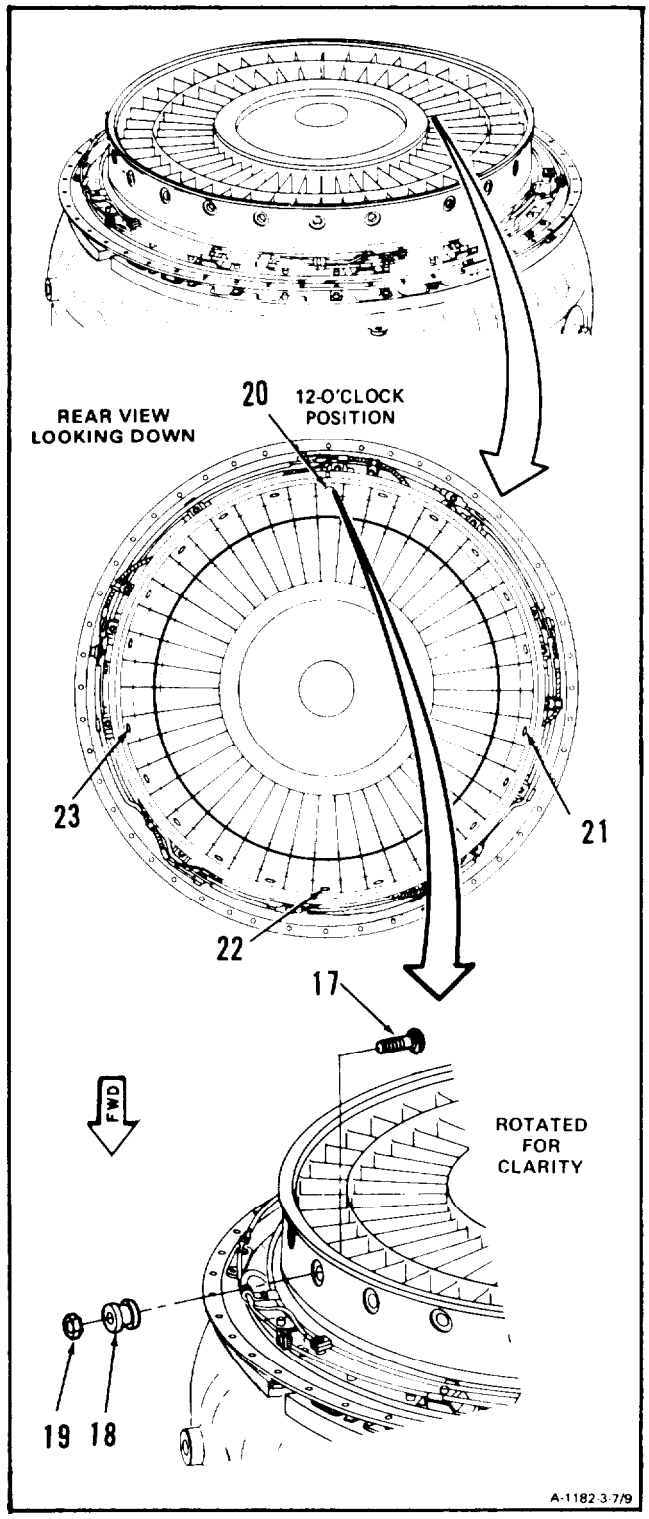
If necessary, use a soft-faced mallet to align bolt holes.

14. Position exit vane assembly (14) in fourth turbine nozzle (15). **Align bolt holes (16).**



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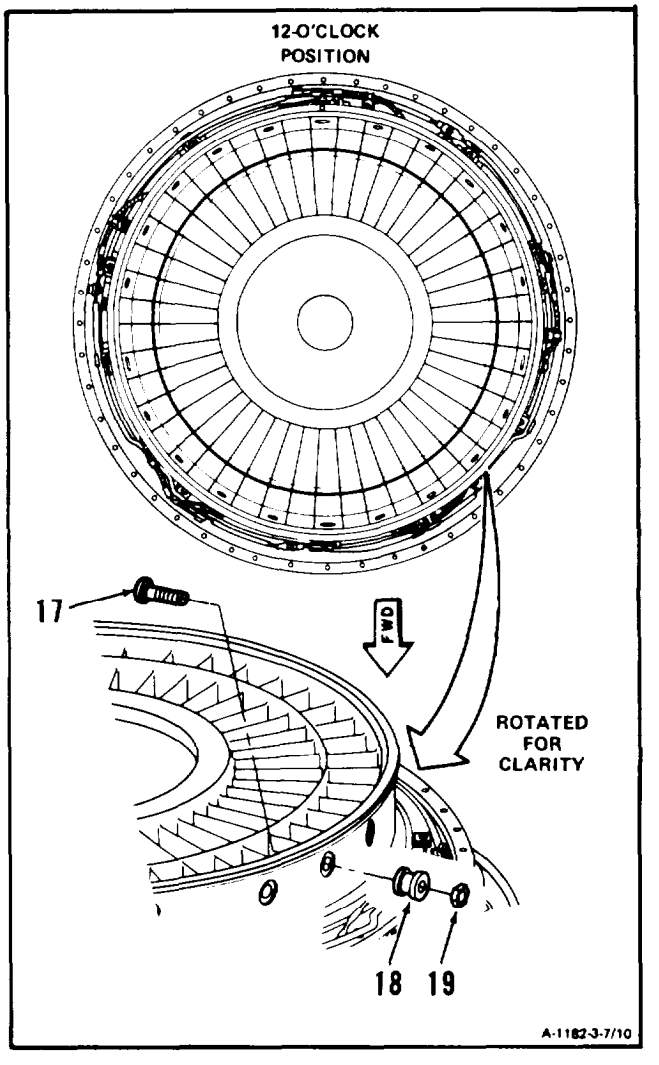
15. **Install four bolts (17), spacers (18), and nuts (19)** in bolt hole positions (20, 21, 22, and 23). **Torque nuts (19) to 125 inch-pounds.**



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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

16. **Install remaining 18 bolts (17), spacers (18) and nuts (19). Torque nuts (19) to 125 inch-pounds.** Lockwire nuts (19). Use lockwire (E29).



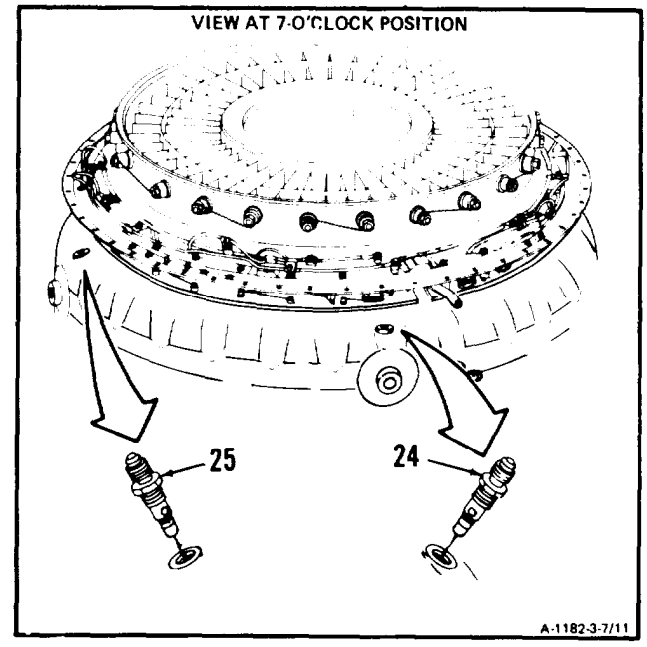
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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

CAUTION

Hand-tighten start fuel nozzles before torquing. Failure to comply may cause damage to fuel nozzles or combustor chamber liner.

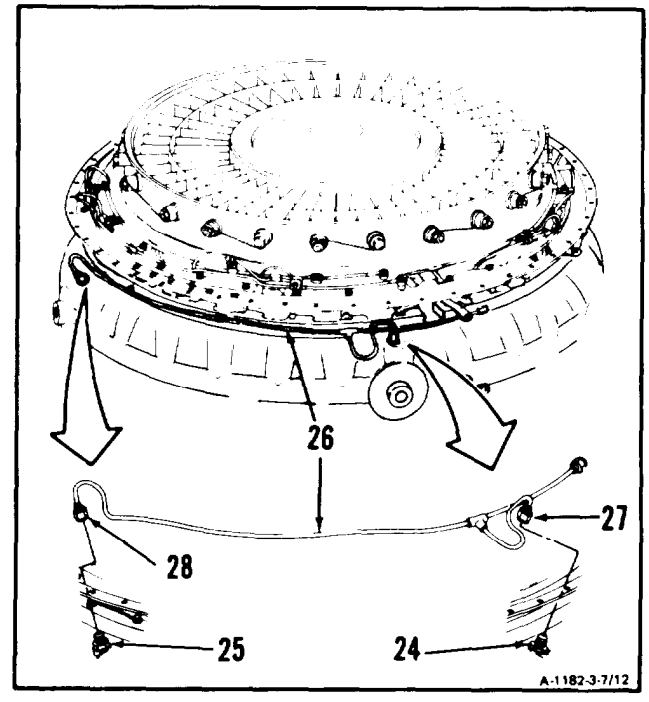
17. Apply anti-seize compound (E5) to threads of start fuel nozzles (24 and 25). Install start fuel nozzles (24 and 25).



18. **Connect primer tube assembly (26)** to start fuel nozzles (24 and 25).

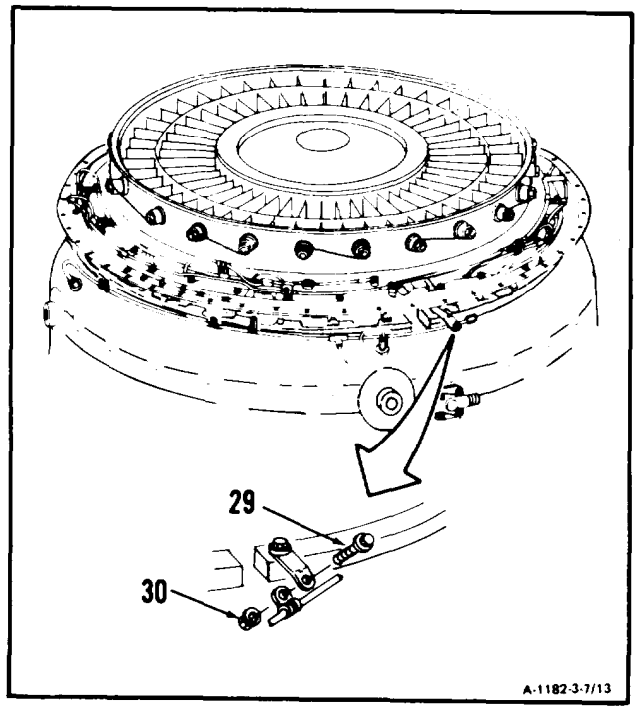
19. Using two wrenches, hold start fuel nozzle (24) and tighten swivel nut (27).

20. Using two wrenches, hold start fuel nozzle (25) and tighten swivel nut (28).

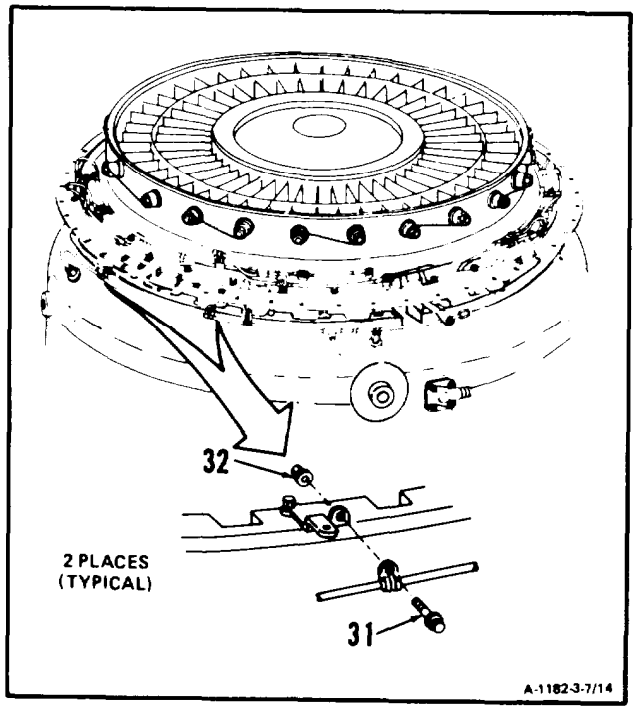


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21. Install bolt (29) and nut (30)

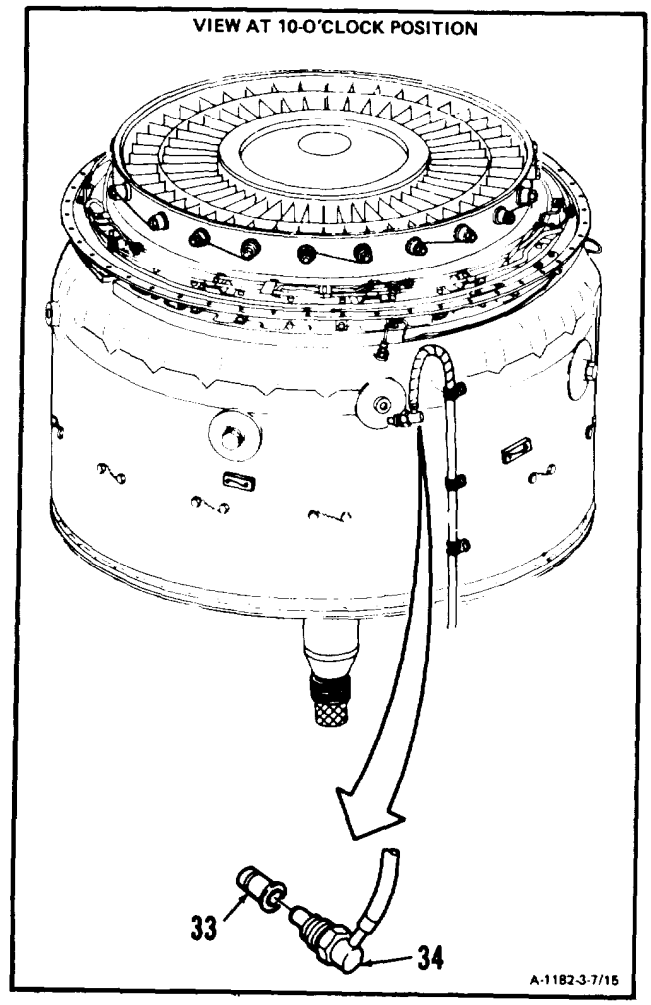


22. Install two bolts (31) and two nuts (32).



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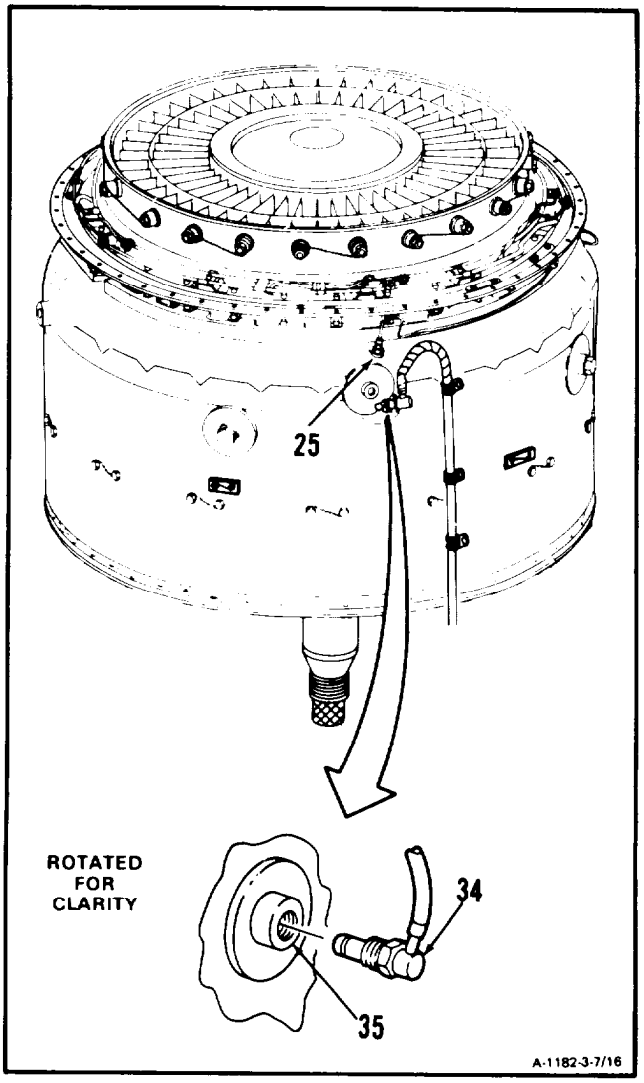
23. **Install spark igniter (33)** on ignition coil and cable assembly lead (34).



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24. Apply anti-seize compound (E5) to threads of ignition coil and cable assembly lead (34). **Connect ignition coil and cable assembly lead (34)** to receptacle (35). **Torque ignition coil and cable assembly lead (34) to 135 inch-pounds.** Use crowfoot attachment.

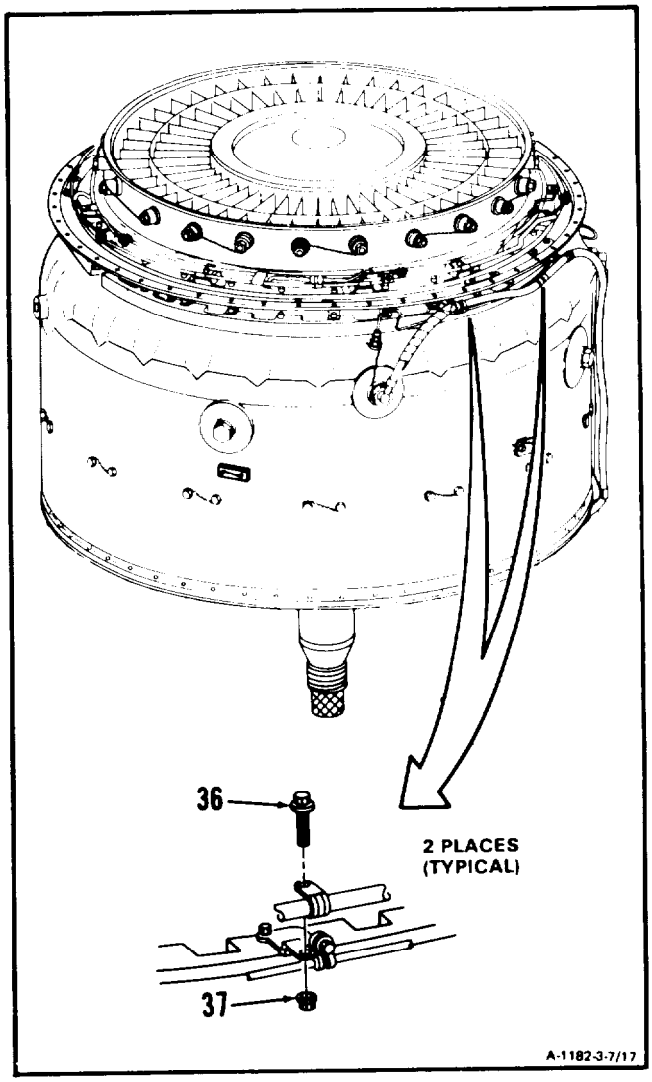
25. Lockwire ignition coil and cable assembly lead (34) to start fuel nozzle (25). Use lockwire (E29).



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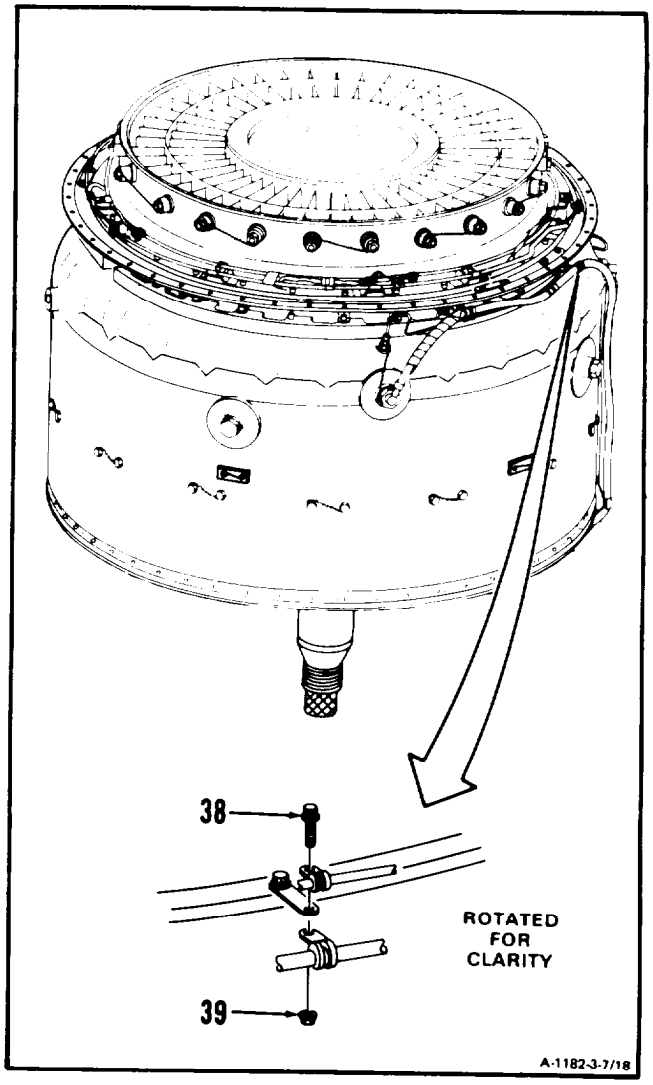
3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

26. Install two bolts (36) and two nuts (37).



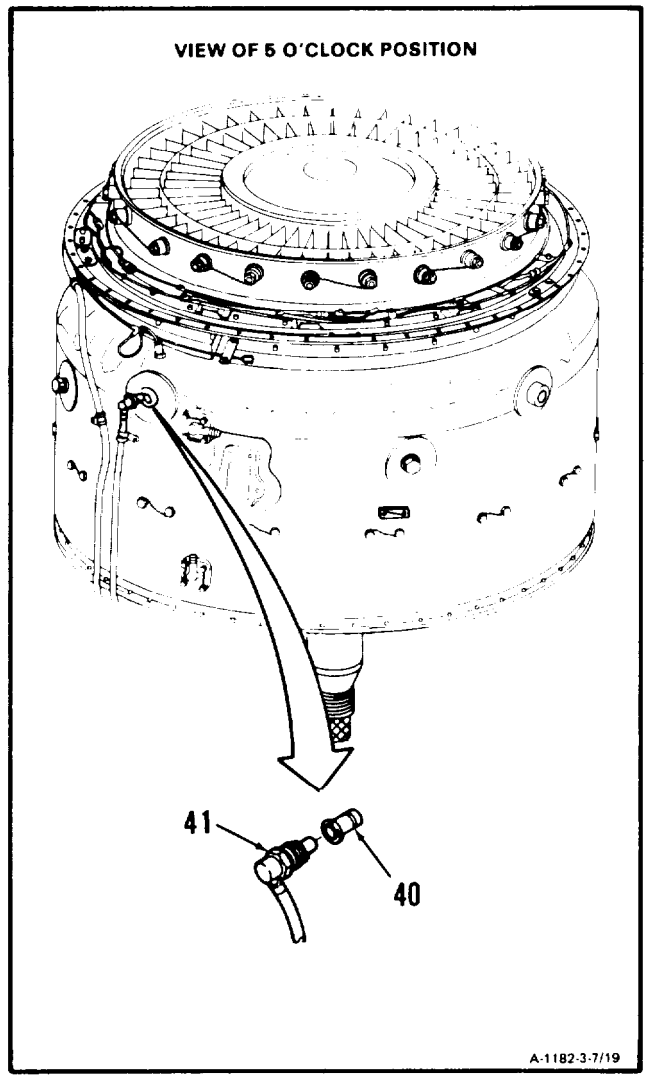
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27. Install bolt (38) and nut (39).



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28. **Install spark igniter (40)** on ignition coil and cable assembly lead (41).

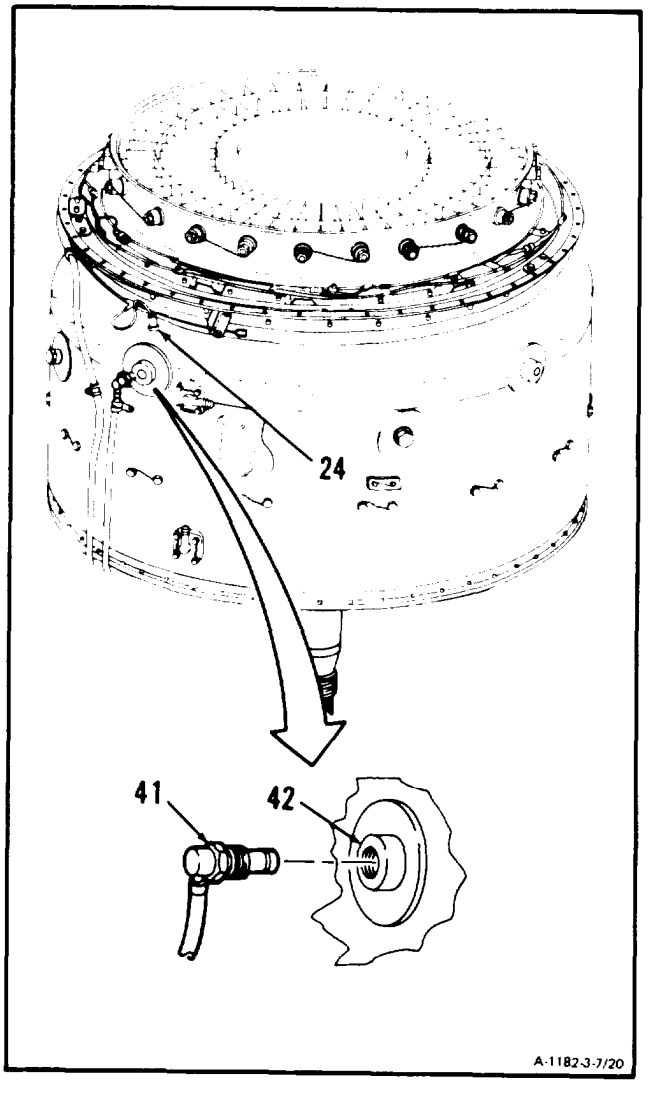


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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

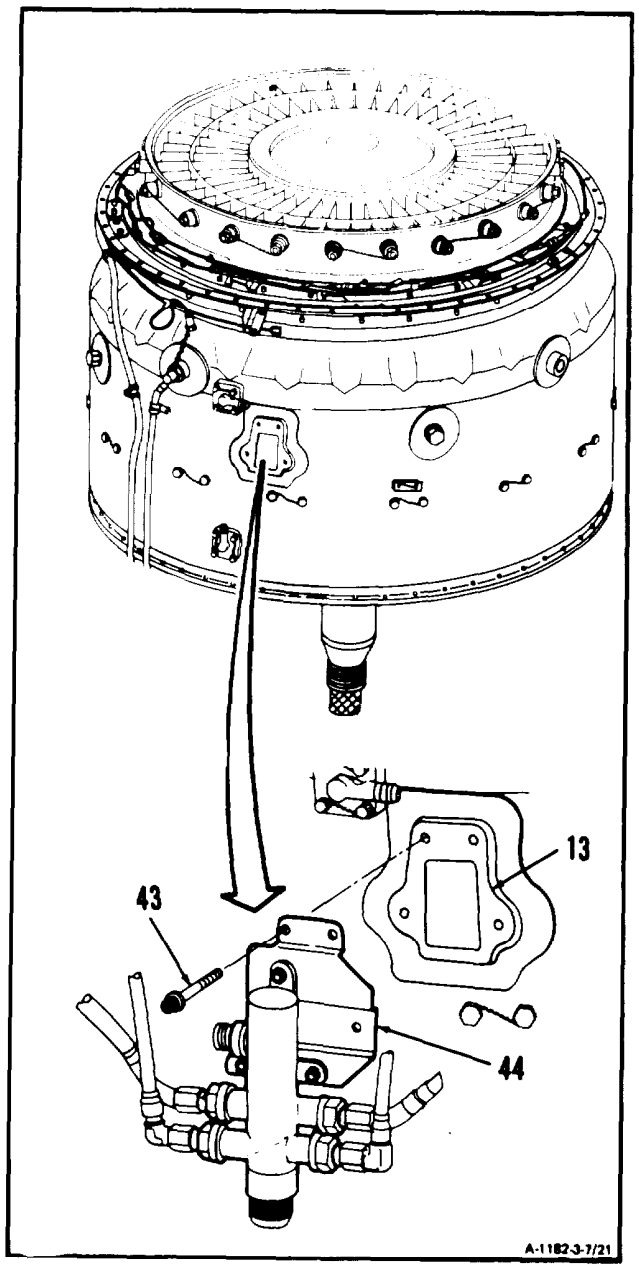
29. Apply anti-seize compound (E5) to threads of ignition coil and cable assembly lead (41). **Connect ignition coil and cable assembly lead (41)** to receptacle (42). **Torque ignition coil and cable assembly lead (41) to 135 inch-pounds.** Use crowfoot attachment.

30. Lockwire ignition coil and cable assembly lead (41) to start fuel nozzle (24). Use lockwire (E29).



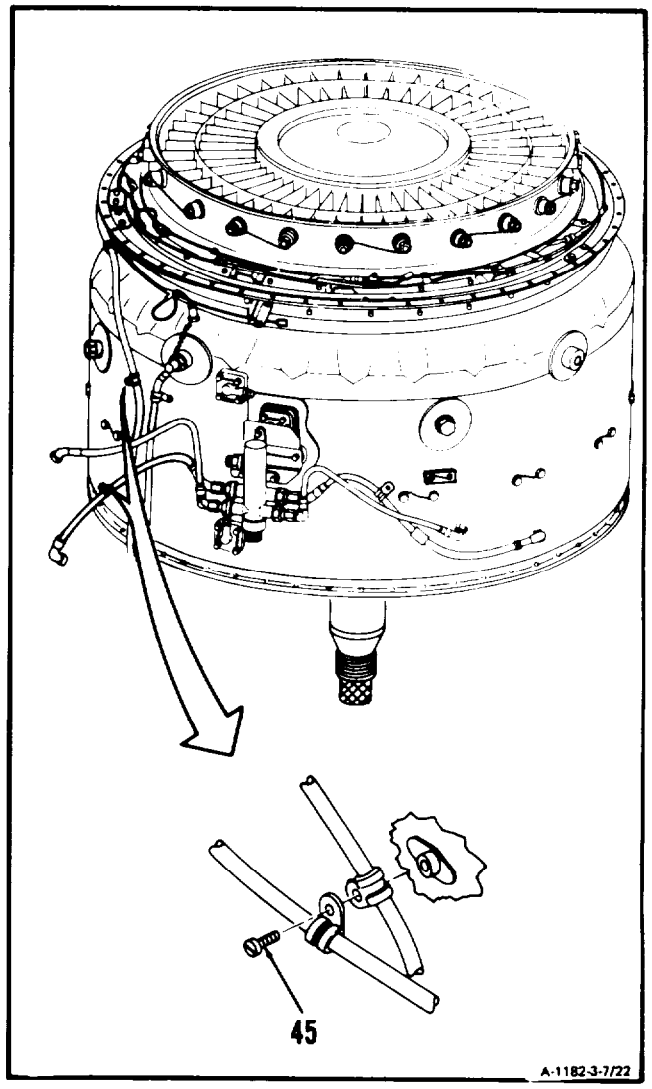
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31. Apply anti-seize compound (E5) to threads of four bolts (43). **Install flow divider and bracket (44)** and four bolts (43) on combustion section and power turbine (13). Lockwire bolts (43). Use lockwire (E29).



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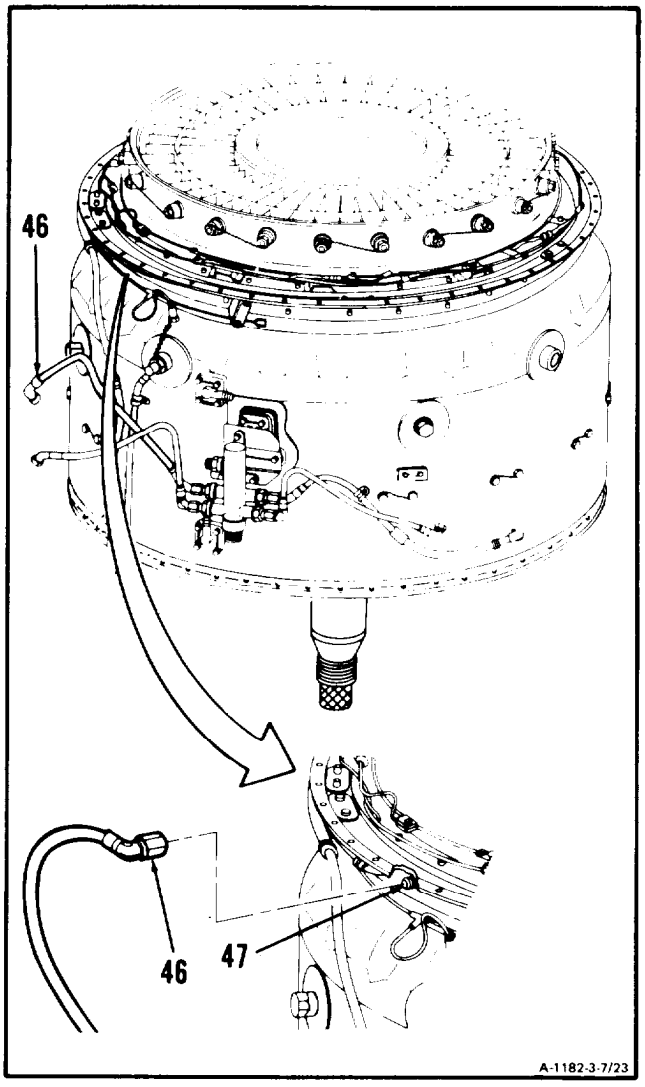
32. Install screw (45). Lockwire screw (45). Use lockwire (E29).



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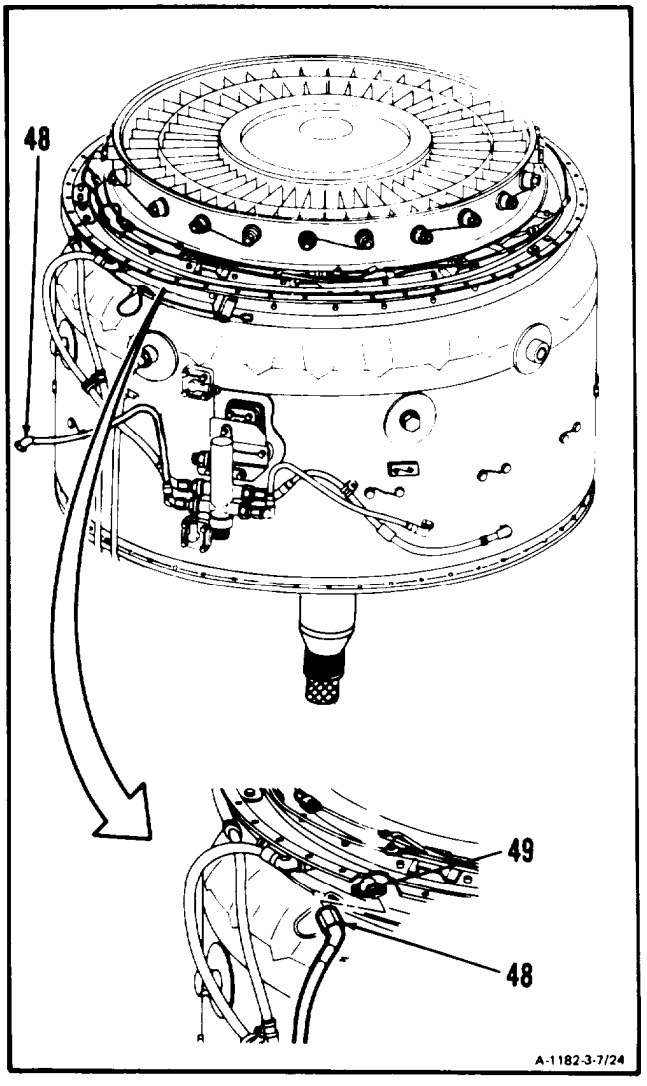
3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

33. **Connect hose assembly (46)** to elbow (47).



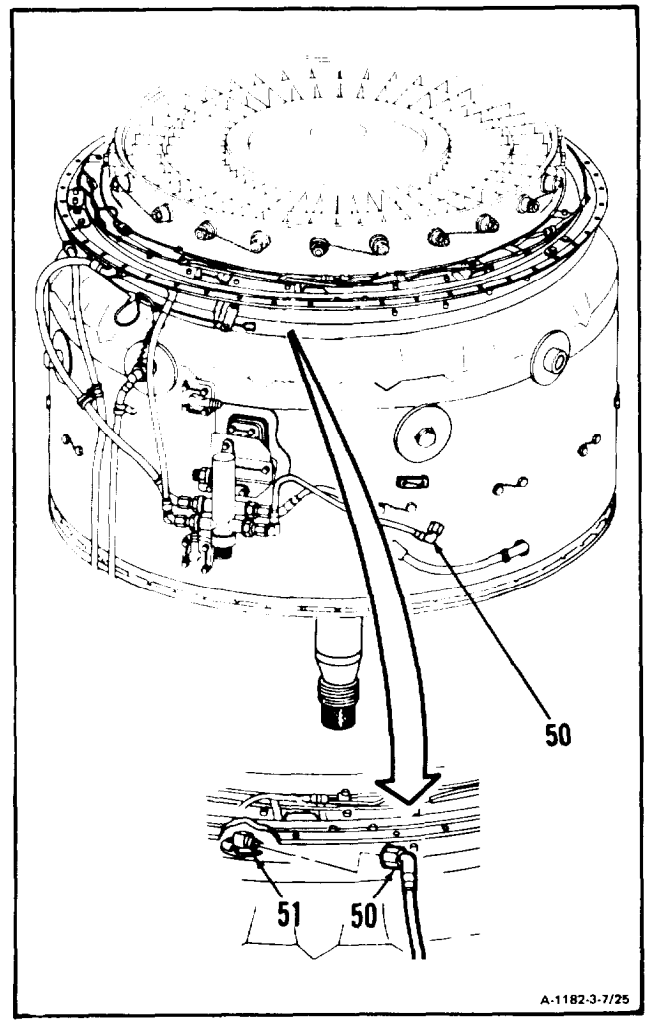
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34. **Connect hose assembly (48)** to elbow (49).



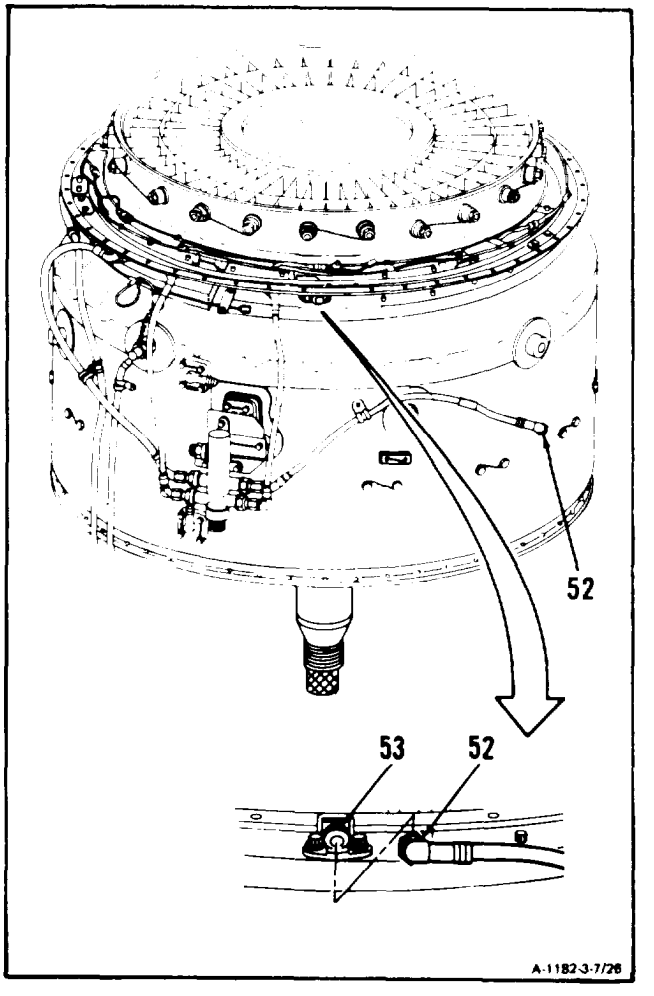
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35. **Connect hose assembly (50)** to elbow (57).



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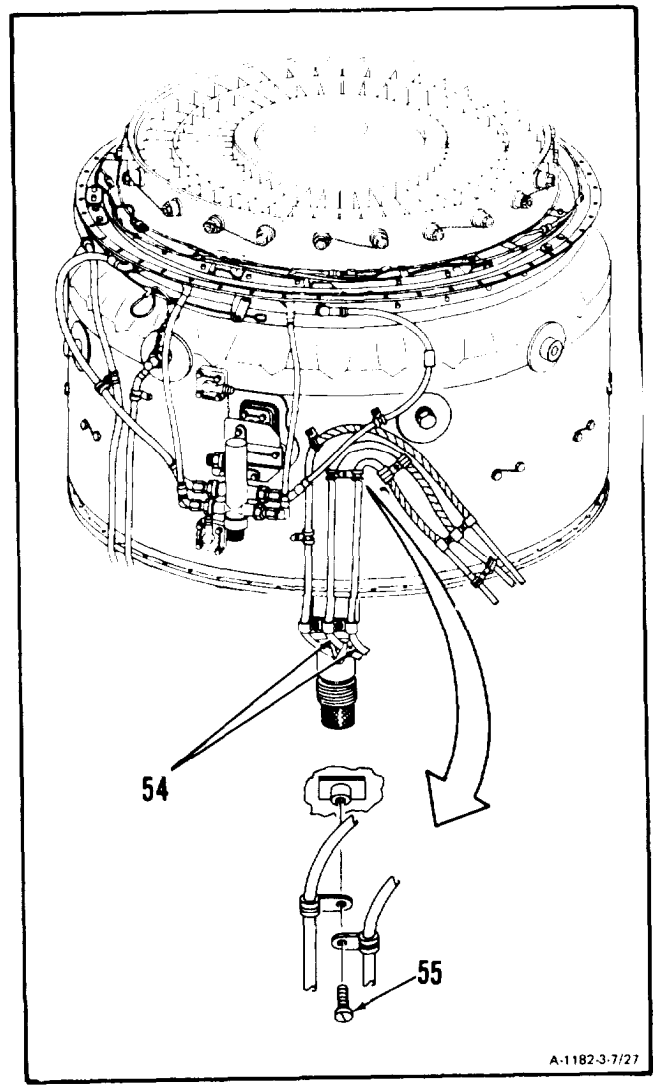
36. **Connect hose assembly (52)** to elbow (53).



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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

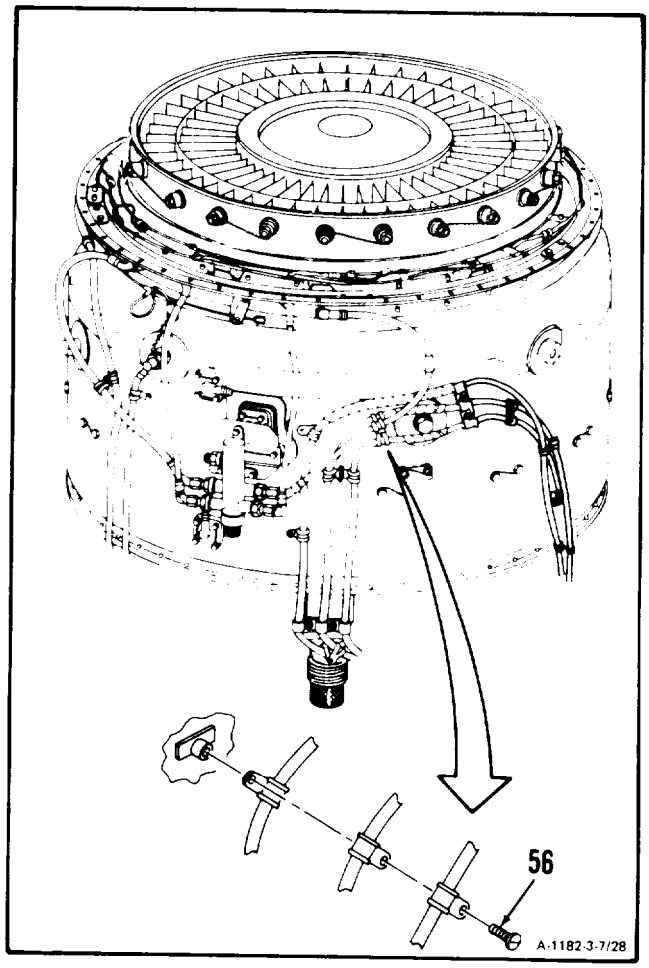
37. Route ignition coil and cable assembly (54) as shown, and install screw (55). Lockwire screw (55). Use lockwire (E29).



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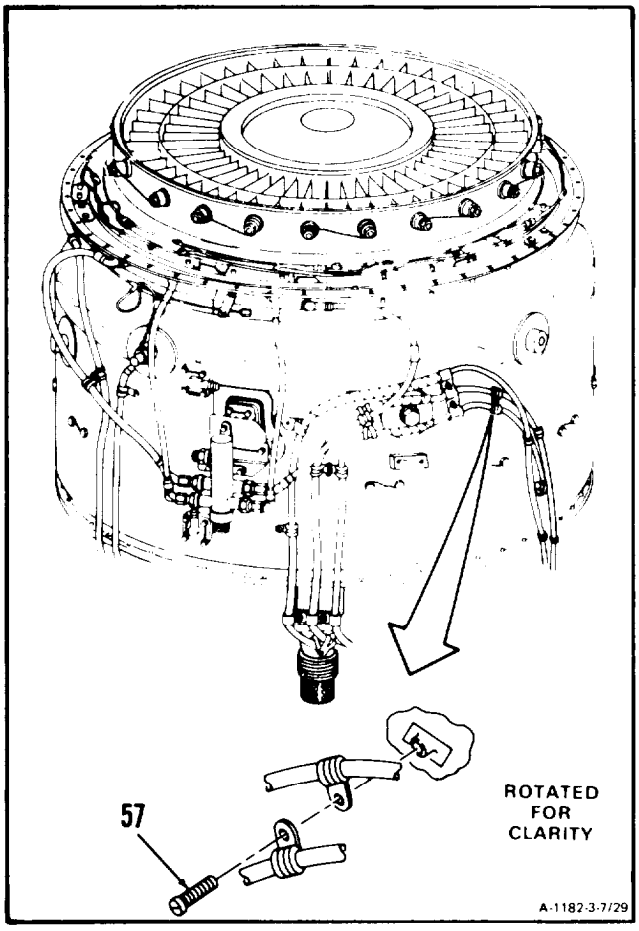
3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

38. Install screw (56). Lockwire screw (56). Use lockwire (E29).



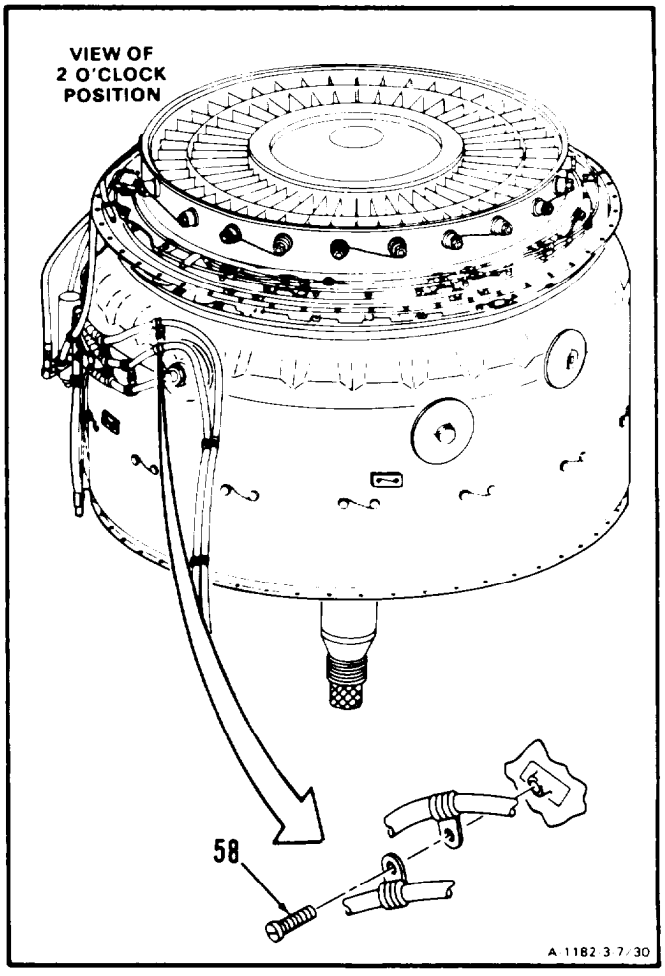
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39. Install screw (57). Lockwire screw (57). Use lockwire (E29).



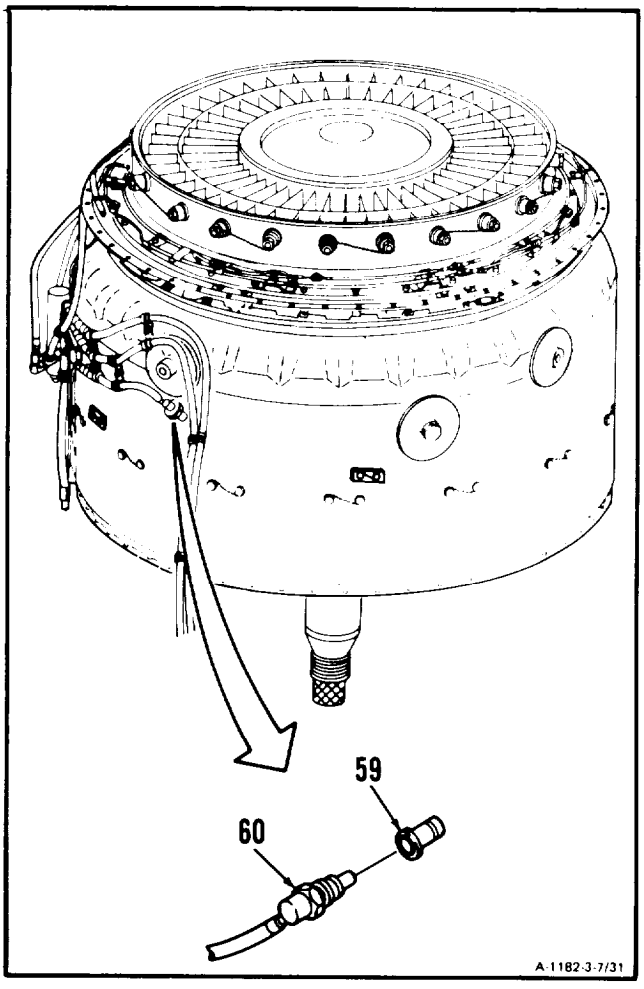
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40. Install screw (58). Lockwire screw (58). Use lockwire (E29).



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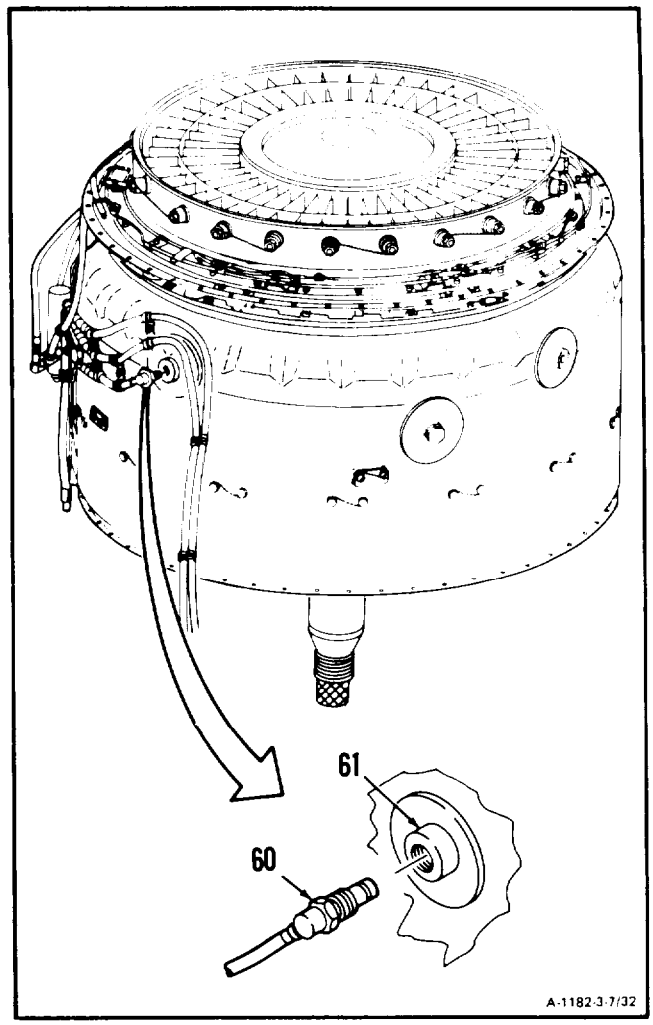
41. **Install spark igniter (59)** on ignition coil and cable assembly lead (60).



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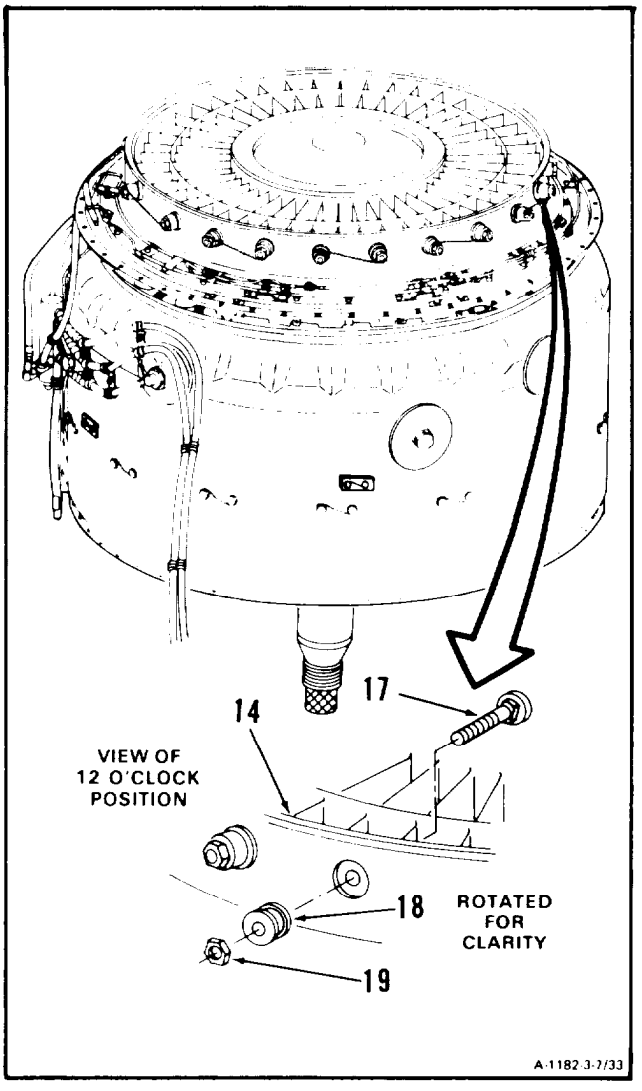
42. Apply anti-seize compound (E5) to threads of ignition coil and cable assembly lead (60). **Connect ignition coil and cable assembly lead (60)** to receptacle (61). **Torque ignition coil and cable assembly lead (60) to 135 inch-pounds.** Use crowfoot attachment.

43. Lockwire ignition coil and cable assembly lead (60). Use lockwire (E29).



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44. Remove lockwire, nut (19), spacer (18), and bolt (17) from exit vaneassembly (14).



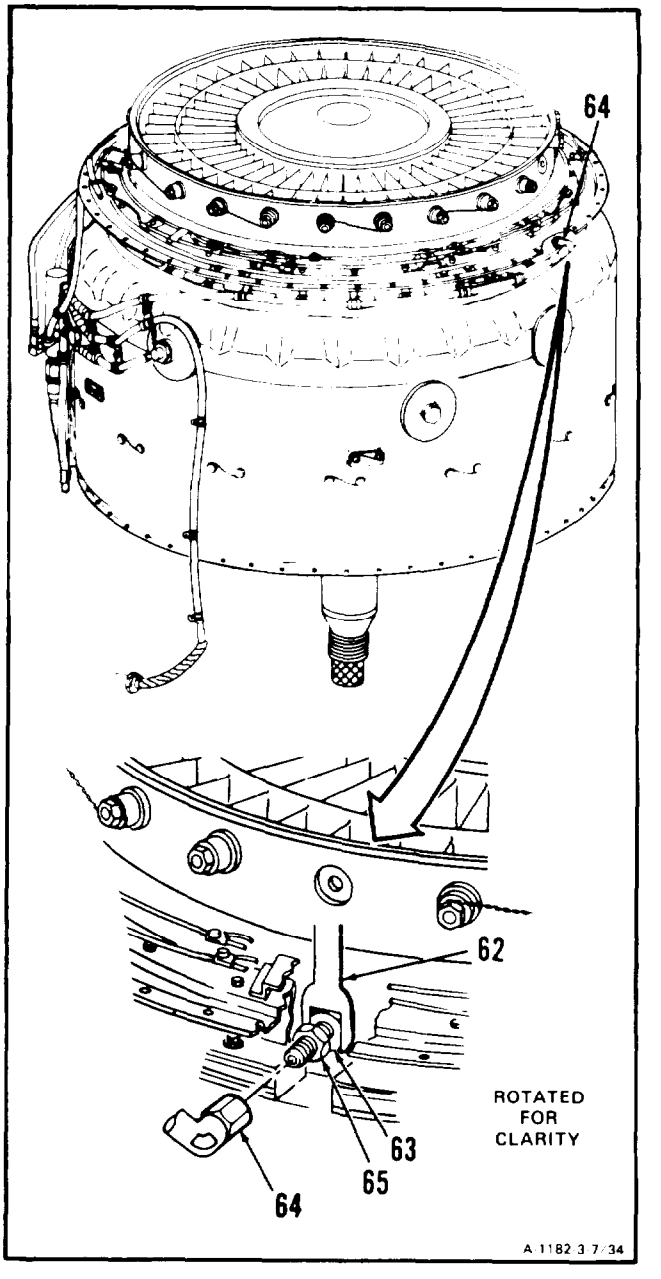
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CAUTION

In following step, hold No. 4 and 5 bearing lube adapter using open-end wrench (T53). Failure to use wrench may result in damage and mislocation of oil transfer tube resulting in oil leaks.

45. Place open-end wrench (T53) (62) on No. 4 and 5 bearing lube adapter (63).

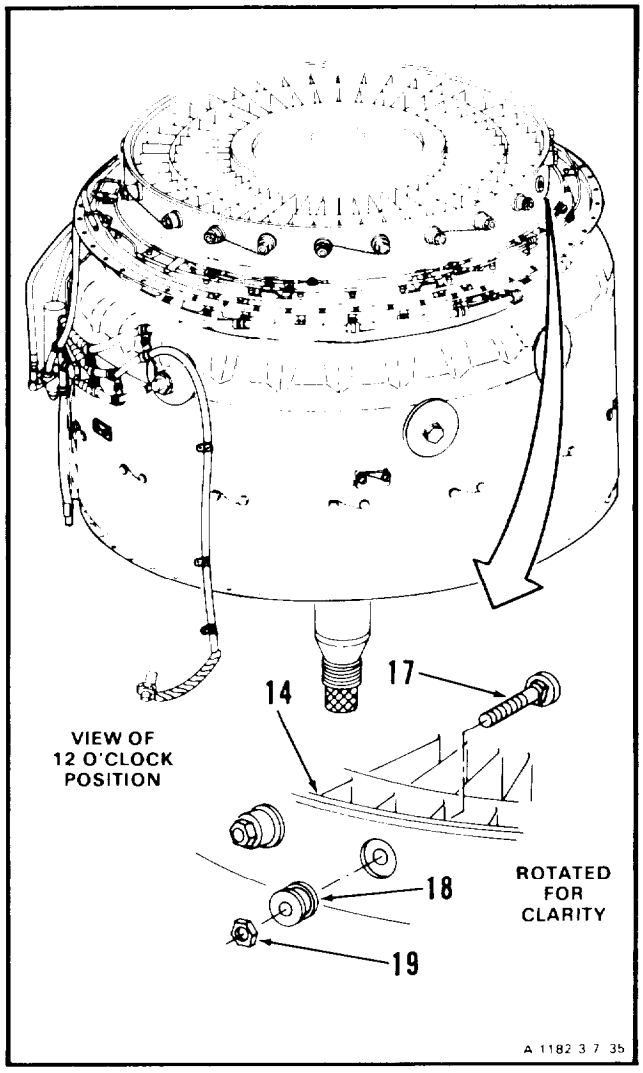
46. **Connect hose assembly (64)** to reducer (65).



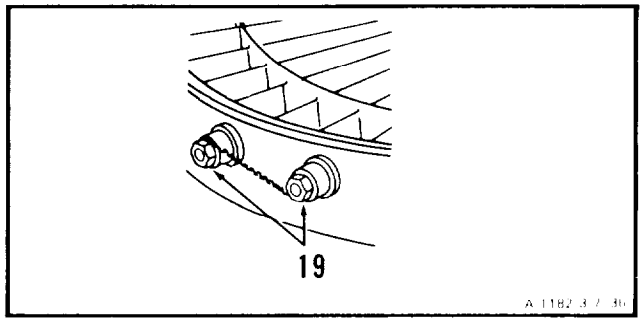
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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

47. **Install bolt (17),** spacer (18), and nut (19) in exit vane assembly (14). **Torque nut (19) to 125 inch-pounds.**

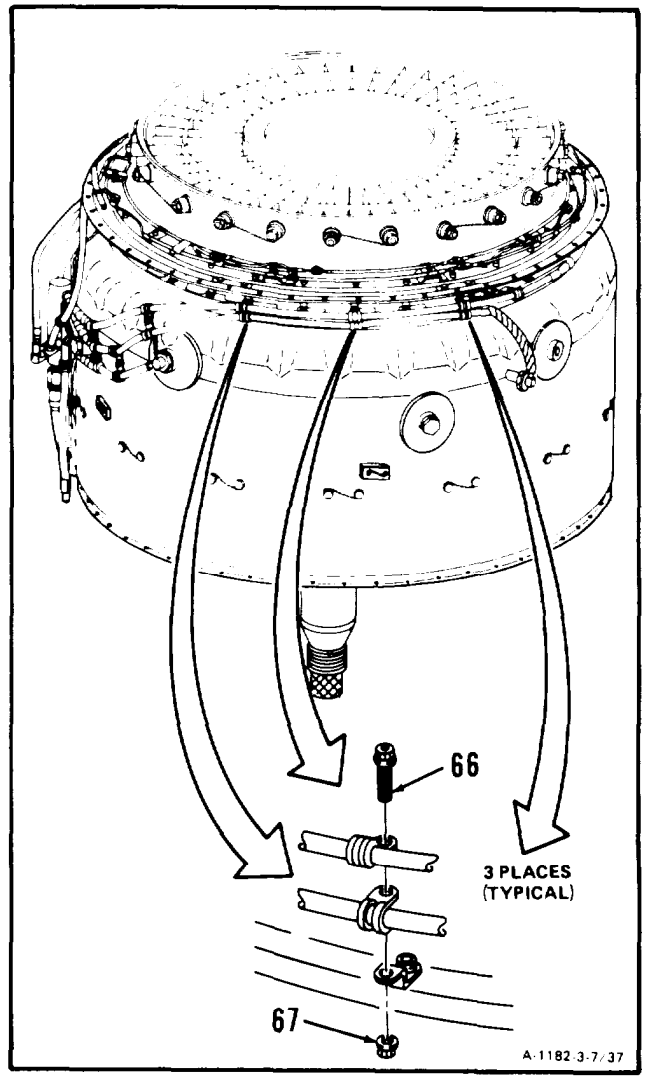


48. Lockwire nuts (19) together. Use lockwire (E29).



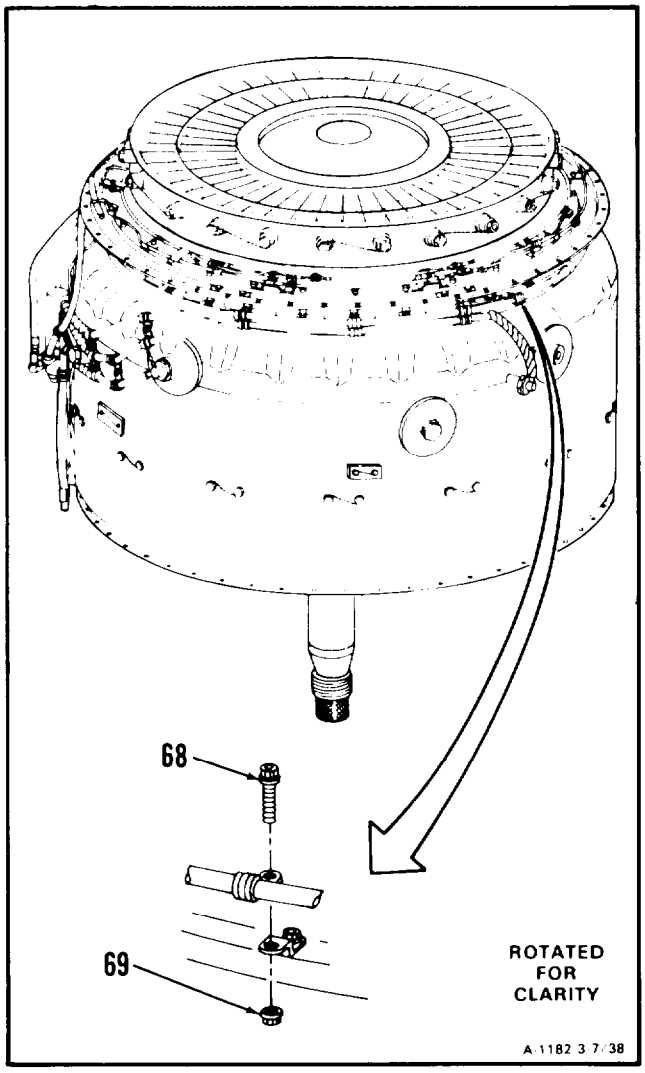
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49. Install three bolts (66) and three nuts (67).



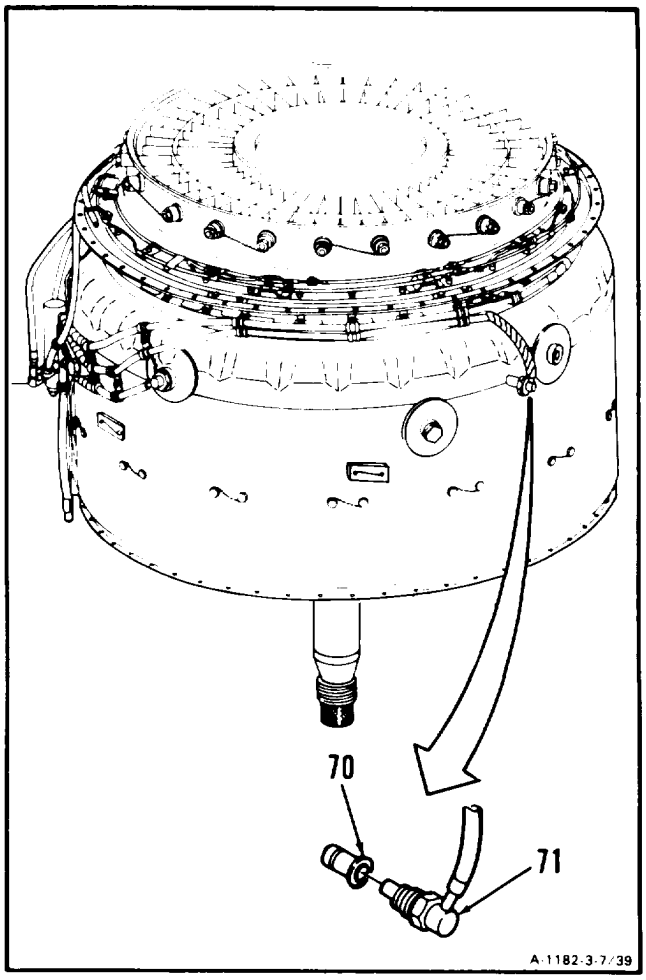
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50. Install bolt (68) and nut (69).



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51. **Install spark igniter (70)** on ignition coil and cable assembly lead (71).

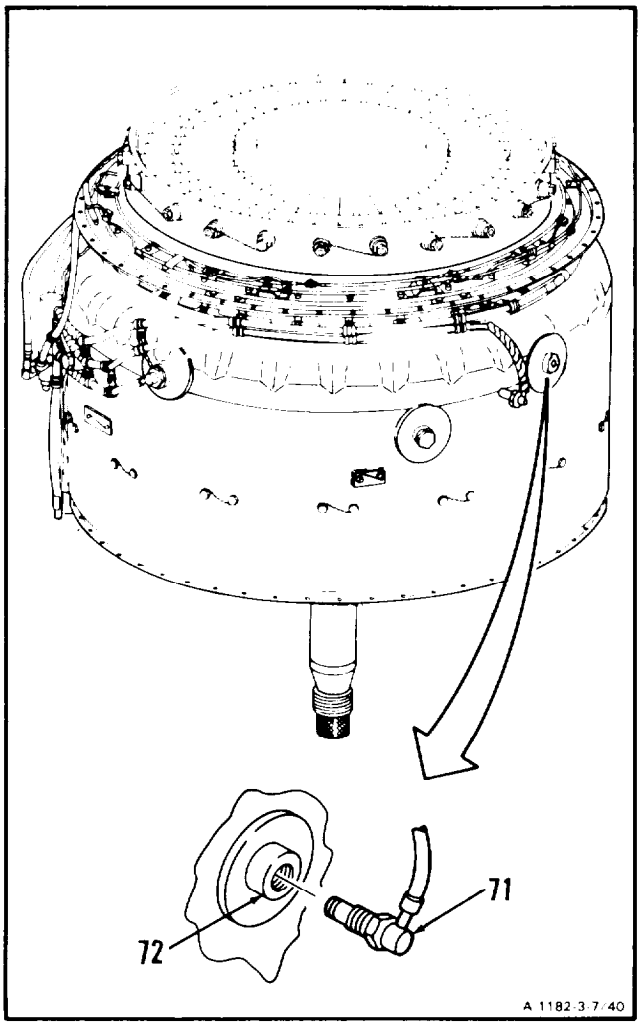


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3-7 ASSEMBLE COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-7

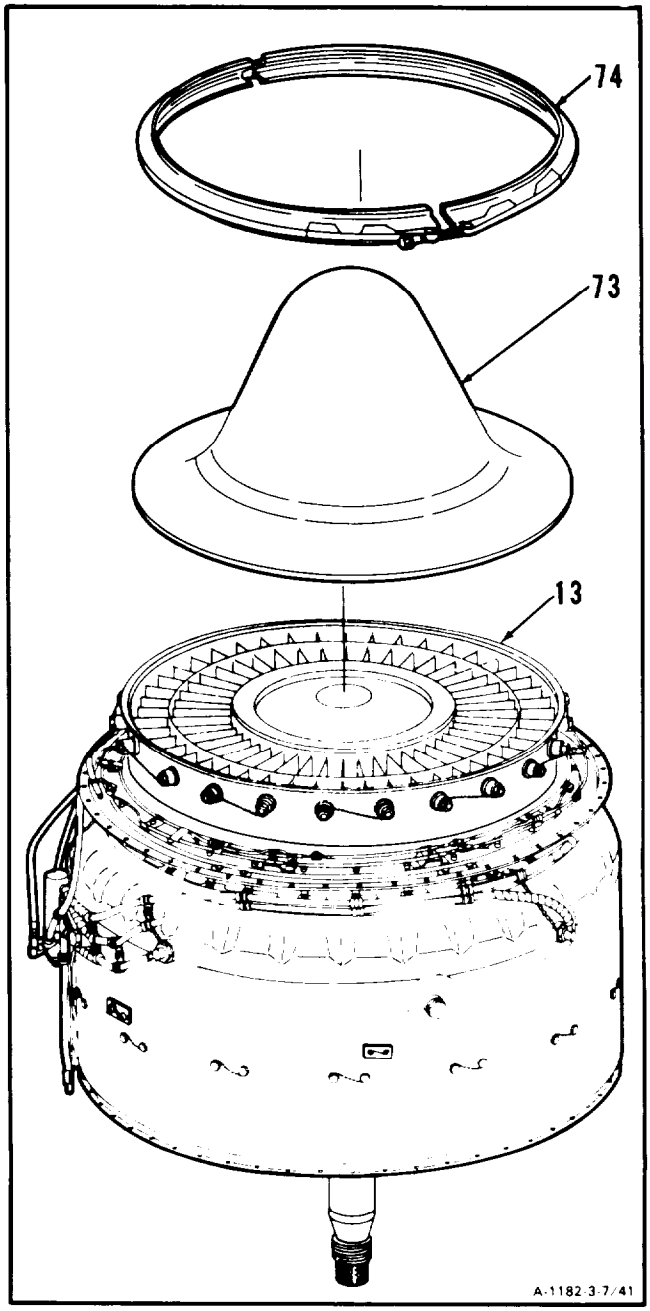
52. Apply anti-seize compound (E5) to threads of ignition coil and cable assembly lead (71). **Connect ignition coil and cable assembly lead (71)** to receptacle (72). **Torque ignition coil and cable assembly lead (71) to 135 inch-pounds.**

53. Lockwire ignition coil and cable assembly (71). Use lockwire (E29).



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54. Install group aircraft cover (T24) (73) and secure to combustion section and power turbine (13) with clamp coupling half (T37) (74).

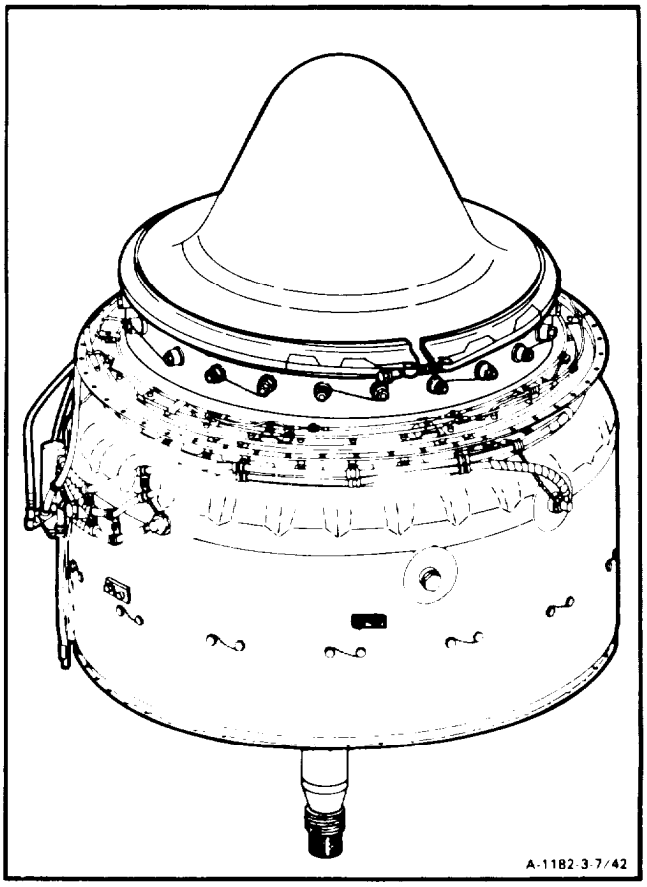


INSPECT

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FOLLOW-ON MAINTENANCE.

None



END OF TASK

3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) 3-8

INITIAL SETUP

Applicable Configurations:
All

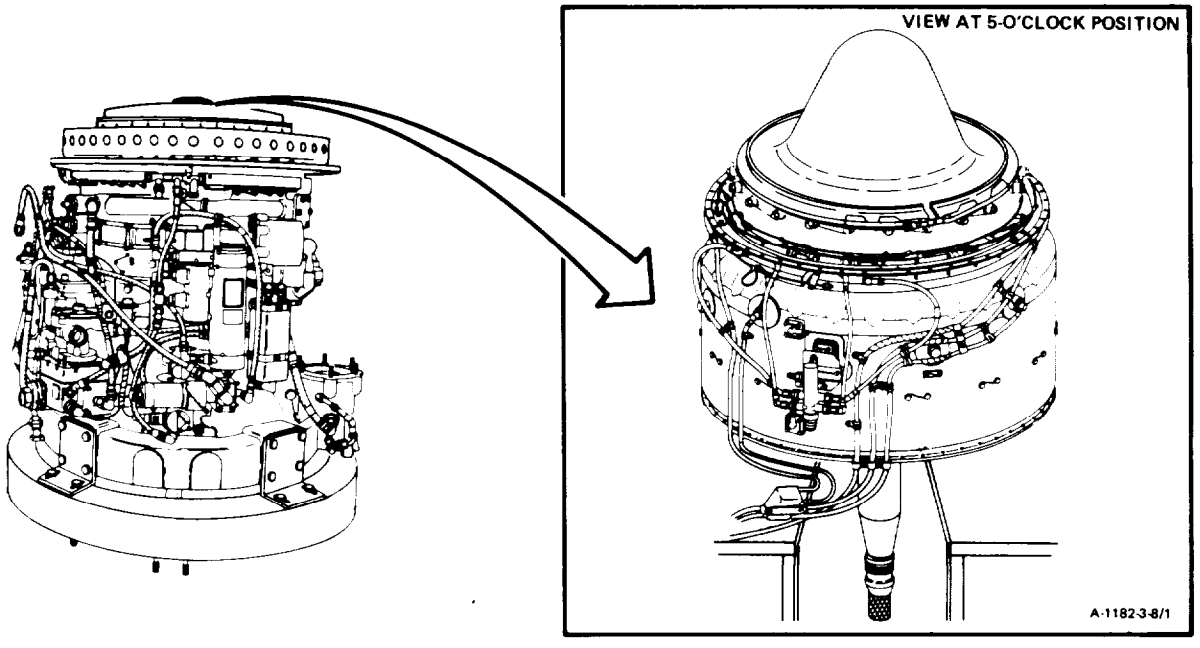
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Locating Bar (T1)
Group Aircraft Cover (T24)
Clamp Coupling Half (T37)
Open-End Wrench (T53)
Power Turbine Fixture (T54)
Torque Wrench, 30-150 Inch-Pounds
Hoist

Materials:
Lockwire (E29)

Parts:
Key Washers

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)
68B30 Aircraft Powerplant Inspector

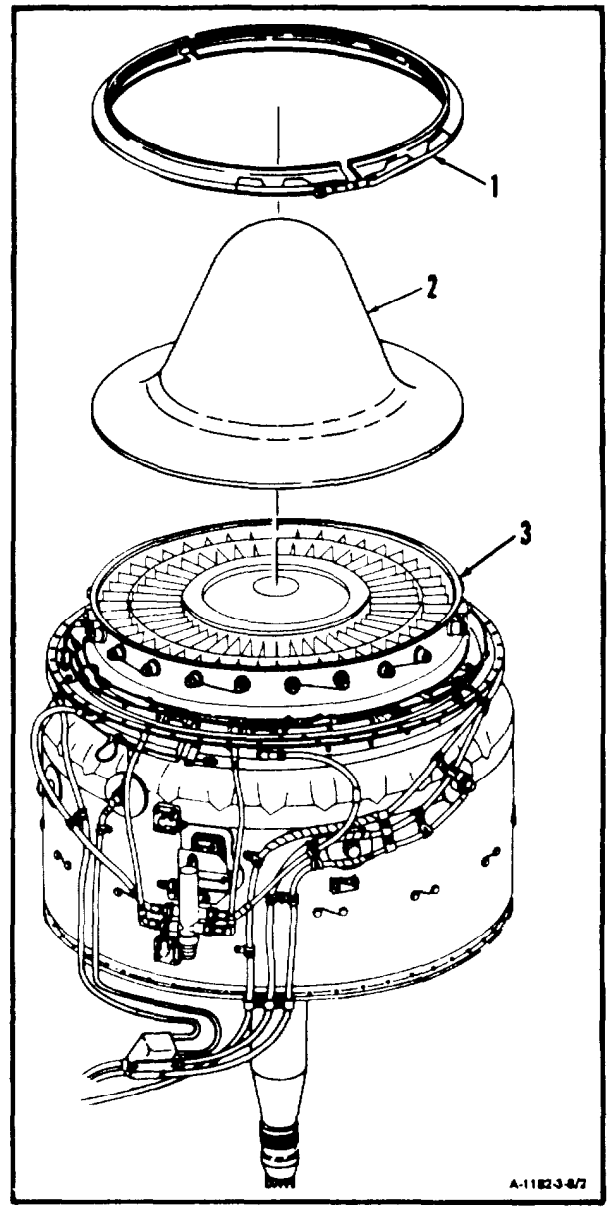
References:
TM 55-2840-254-23P
Task 2-48
Task 2-52
Task 4-53
Task 4-56
Task 9-6
Task 9-10



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

1. Remove clamp coupling half (T37) (1) and group aircraft cover (T24) (2) from combustion section and power turbine (3). Turn combustion section and power turbine over on table.



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

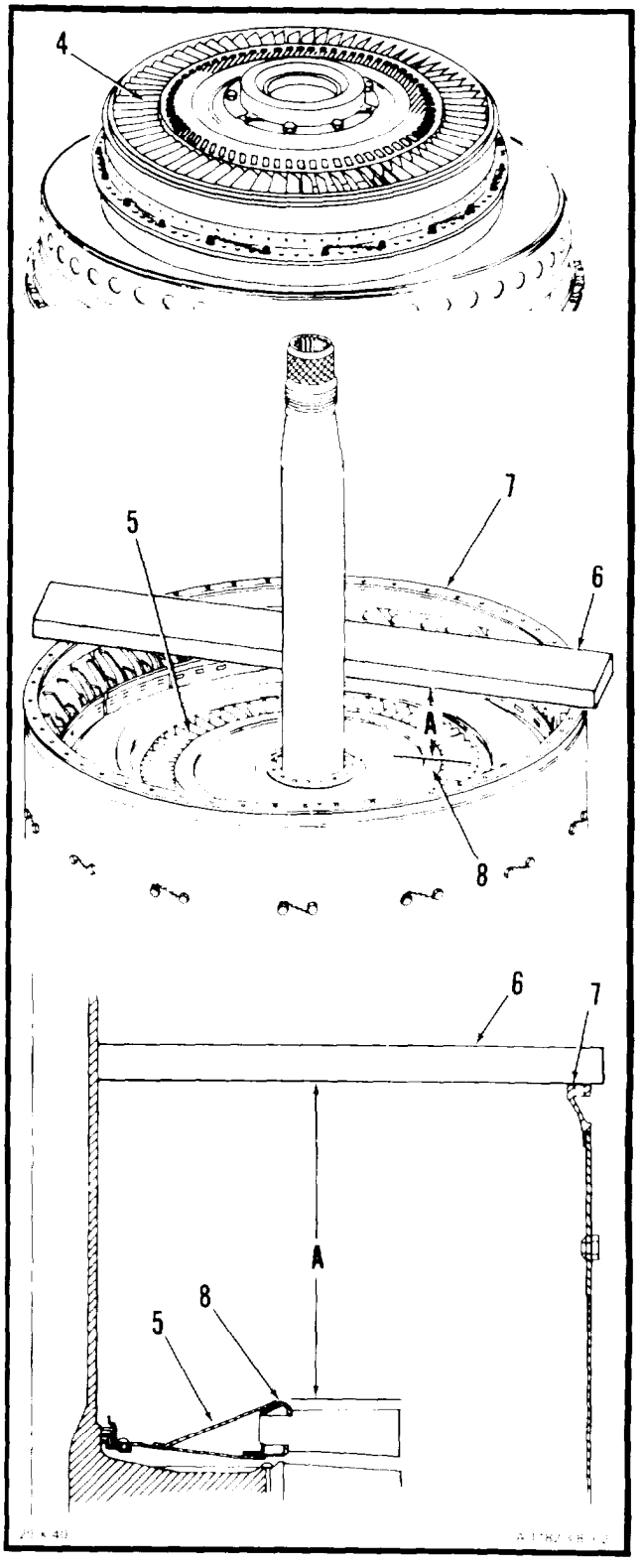
CAUTION

Maximum shim thickness shall not exceed 0.045 inch.

2. **Check axial clearance between second turbine disc assembly (4) and third turbine nozzle (5)** as follows: Use locating bar (T1) (6).

   a. Calculate outer axial clearance as follows:

      (1) Measure from mounting flange (7) to inner shroud (8). Subtract thickness of locating bar (T1) (6). Record as dimension A.



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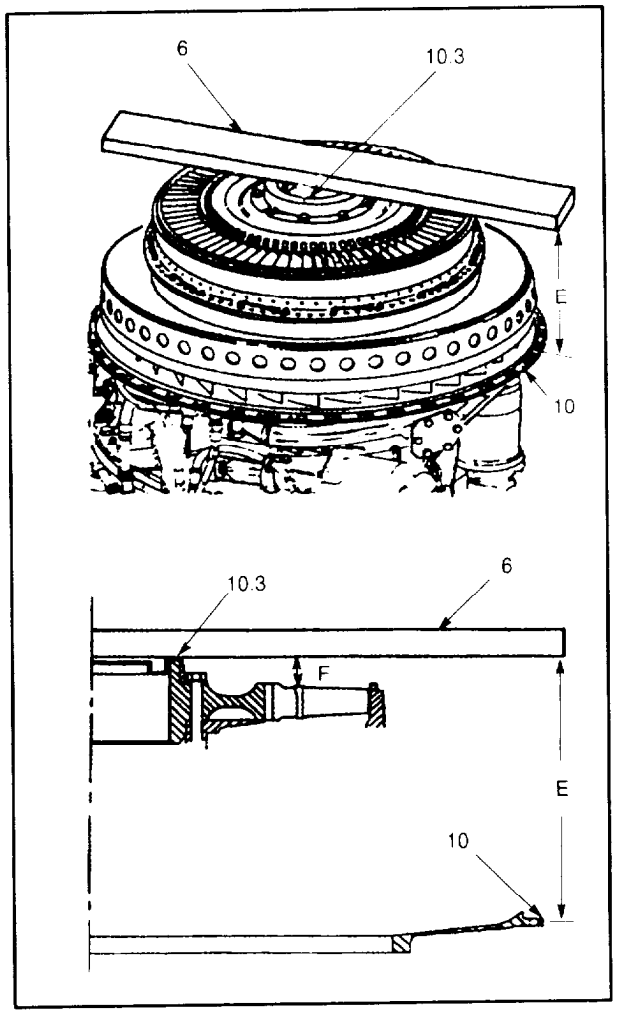
3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

(2) Measure from aft face of disc assembly seal hub (10.3) to outer flange (10). Record as dimension E.

(3) Measure from aft face of disc assembly seal hub (10.3) to aft face (blade platform). Record as dimension F.

(4) Subtract dimension F from dimension E and record as dimension B.

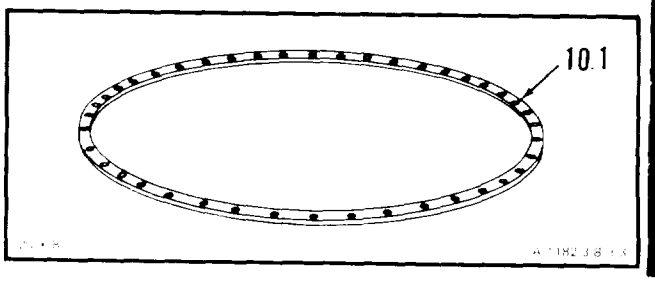
(5) Subtract dimension B from dimension A. Result is axial clearance. Axial clearance shall be 0.045 inch minimum. Record as dimension C.



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

(4) If clearance cannot be met, select shim (10.1) from shim selection table to obtain 0.045 inch minimum. Use outside micrometer caliper.



Example: If Dimension C is 0.035 inch, select shim Part No. 2-141-199-01. If Dimension C is 0.025 inch select shim Part No. 2-141-199-02. If Dimension C is 0.015 inch select Part No. 2-141-199-03.

SHIM SELECTION TABLE

PART NUMBER	SHIM THICKNESS
2-141-199-01	0.010 inch
2-141-199-02	0.020 inch
2-141-199-03	0.040 inch

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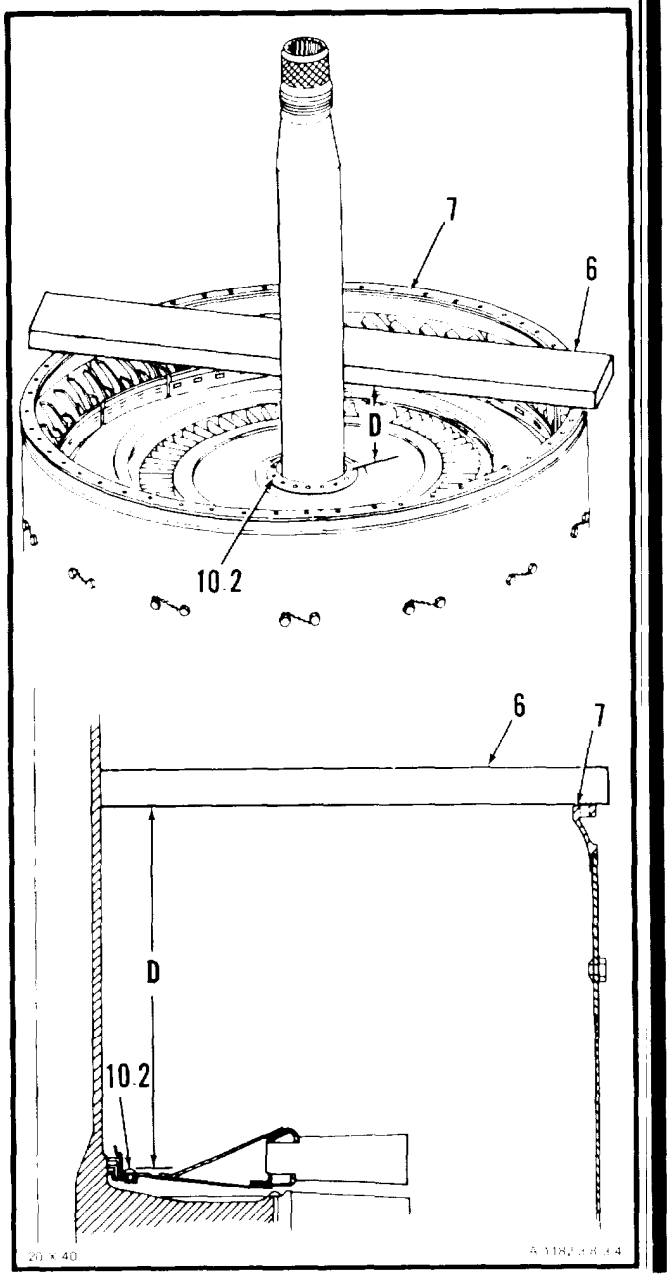
3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

CAUTION

Maximum shin thickness shall not exceed 0.045 inch.

b. Calculate inner axial clearance as follows:

(1) Measure from mounting flange (7) to nozzle rivet heads (10.2). Subtract thickness of locating bar (T1) (6). Record as dimension D.

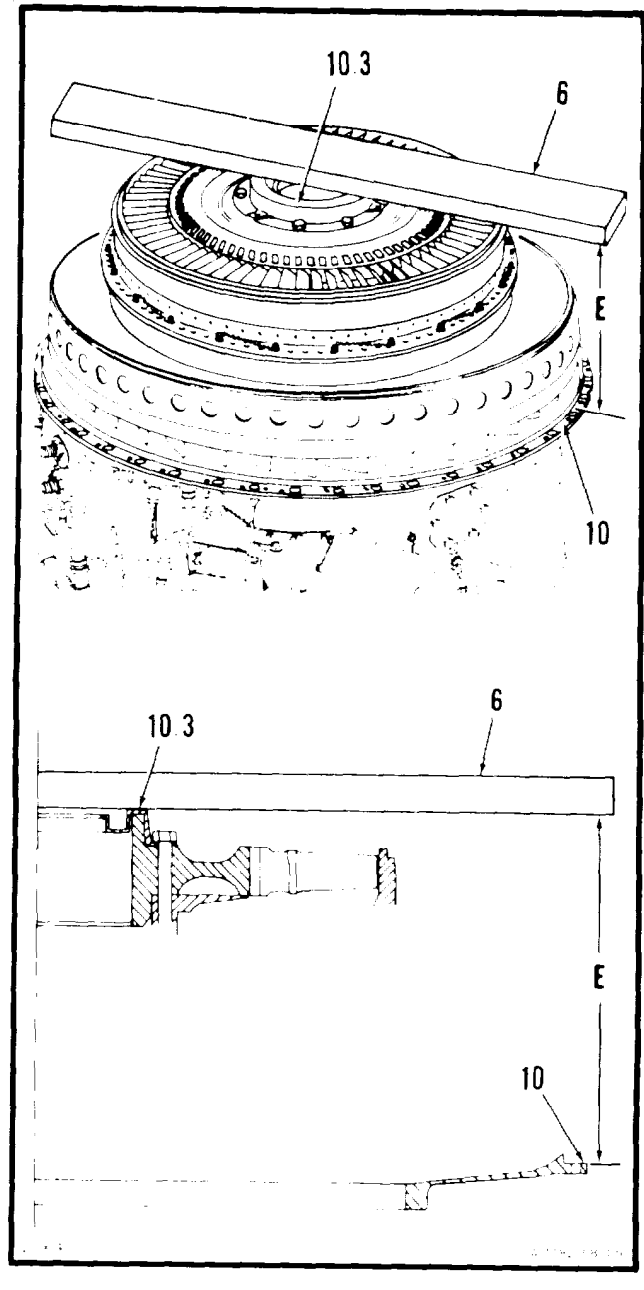


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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

(2) Measure from aft face of disc assembly seal hub (10.3) to outer flange (10). Subtract thickness of locating bar (T1) (6). Record as dimension E.

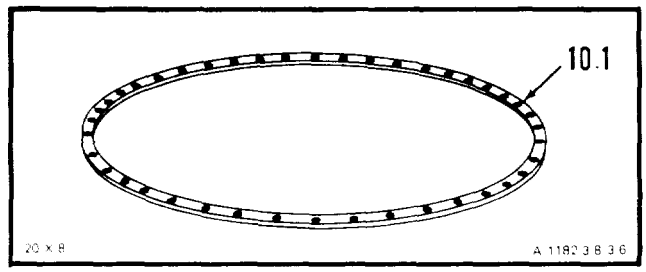
(3) Subtract dimension E from dimension D. Result is inner axial clearance. Axial clearance shall be 0.045 inch minimum. Record as dimension F.



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

(4) If clearance cannot be met, select shim (10.1) from shim selection table to obtain 0.045 inch minimum. Use outside micrometer caliper.



Example: If Dimension F is 0.035 inch, select shim Part No. 2-141-199-01. If Dimension F is 0.025 inch select shim Part No. 2-141-199-02. If Dimension F is 0.015 inch select Part No. 2-141-199-03.

SHIM SELECTION TABLE

PART NUMBER	SHIM THICKNESS
2-141-199-01	0.010 inch
2-141-199-02	0.020 inch
2-141-199-03	0.040 inch

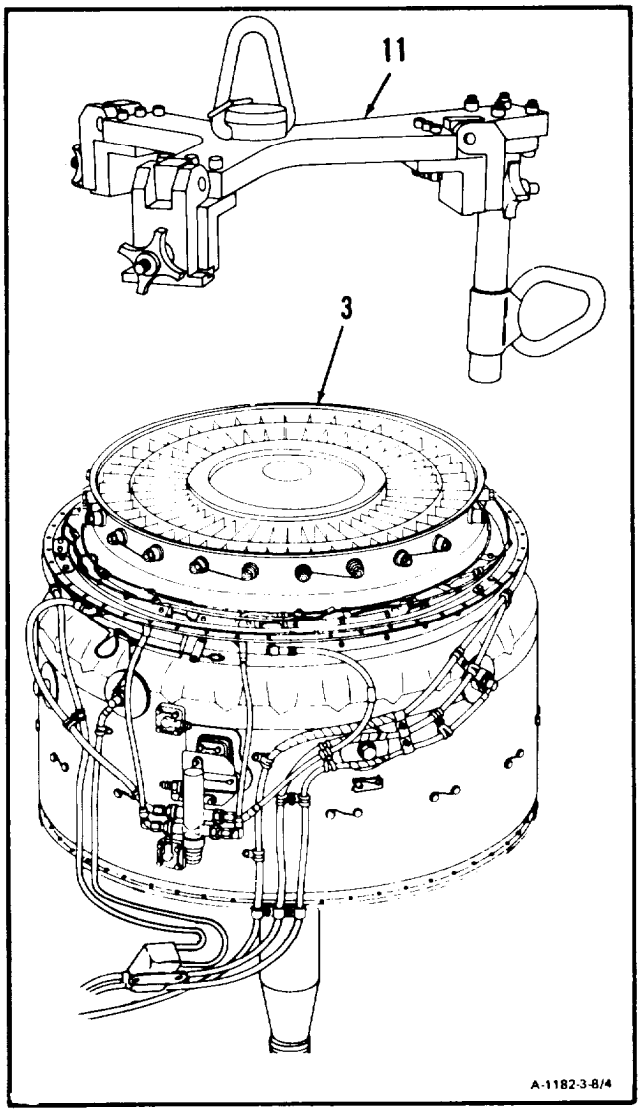
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

CAUTION

In following step, make certain that three clamping devices are securely attached to combustion section and power turbine. Failure to comply may result in damage to engine.

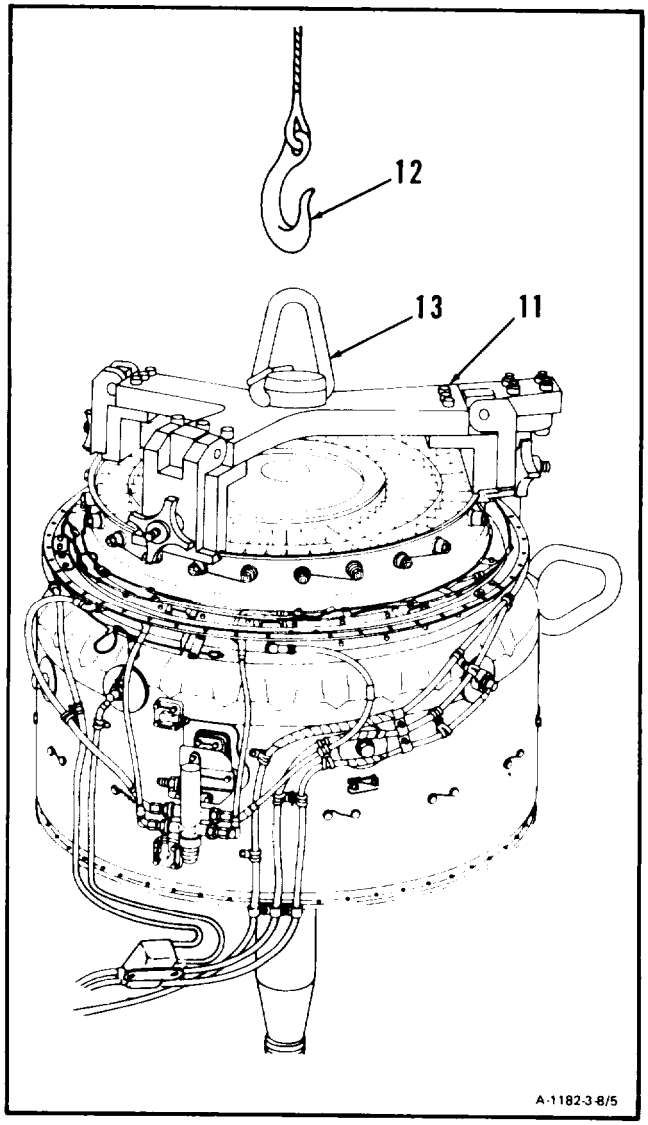
3. **Install power turbine fixture (T54) (11)** on combustion section and power turbine (3).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

4. **Attach hoist hook (12)** to lifting eye (13) of power turbine fixture (T54) (11).

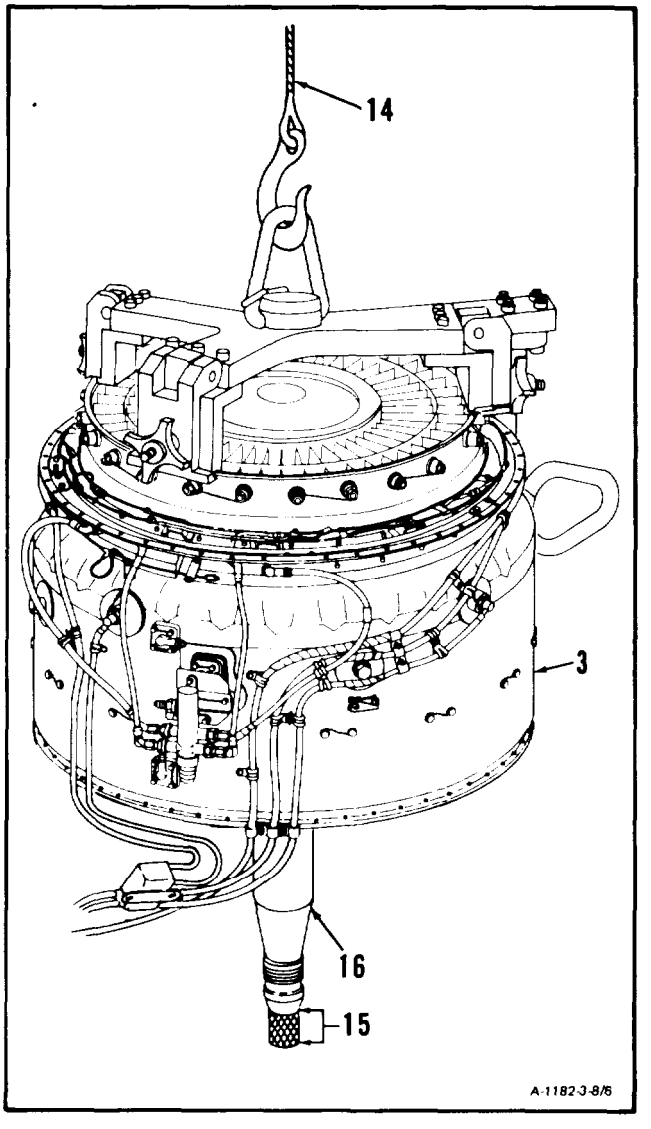


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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

5. Using hoist (14), **lift combustion section and power turbine (3).**

6. **Remove vexar nylon webbing** from No. 3 bearing inner race location (15) on shaft (16).



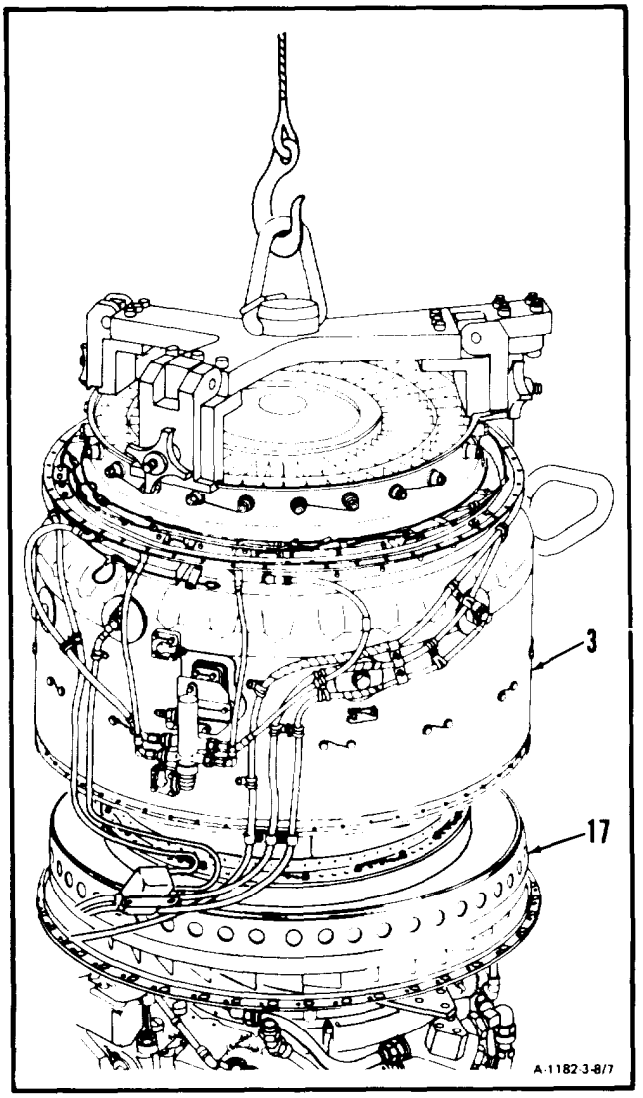
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

CAUTION

Use extreme care to guide power turbine shaft through No. 3 bearing seal and No. 3 bearing. During installation, rotate power turbine rotor to ensure freedom of rotation and engagement of output shaft.

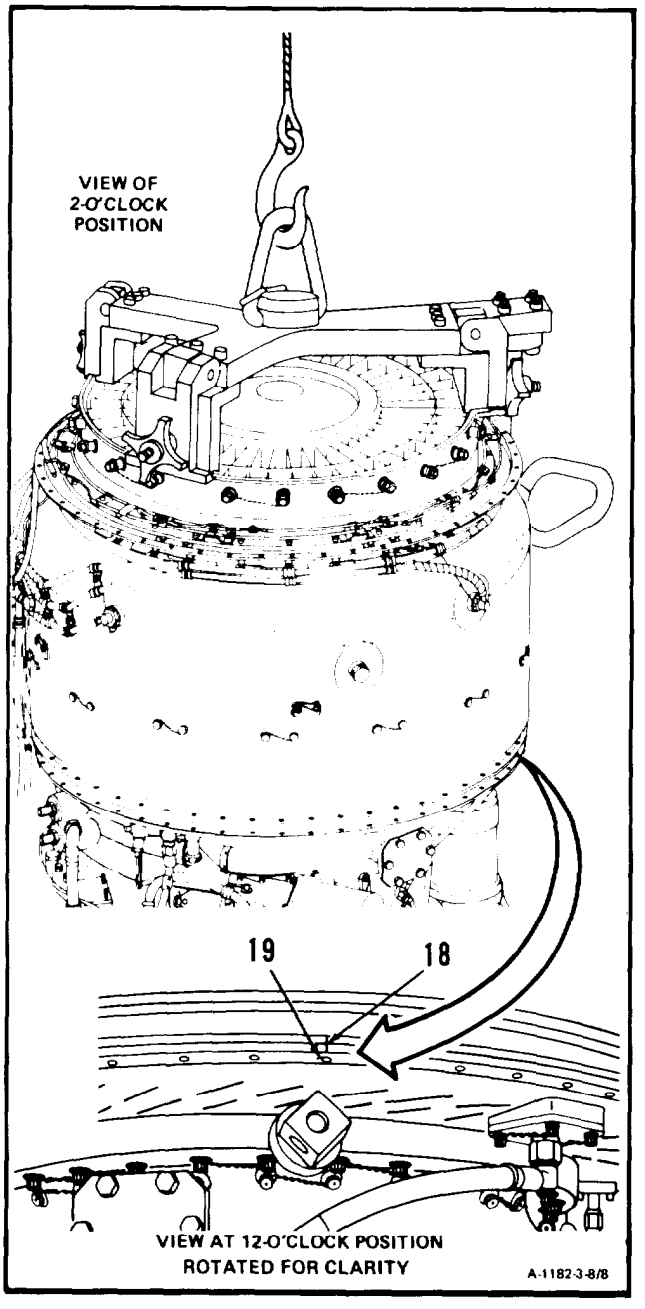
7.. Using helper, **lower combustion section and power turbine (3)** onto air diffuser assembly (17).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

8. Align matchmark (18) at top center hole (19).



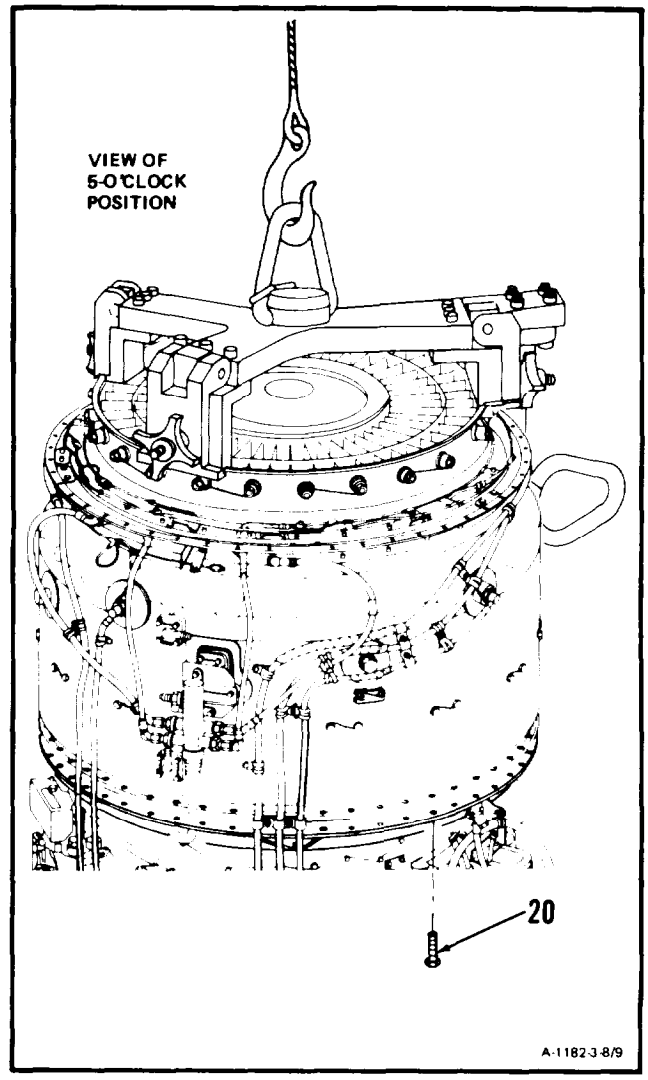
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

NOTE

Bolts are inserted through air diffuser assembly holes into threaded holes of combustor flange.

9. **Install three bolts (20)** in three holes at approximately the 4-, 8-, and 12-o'clock positions.



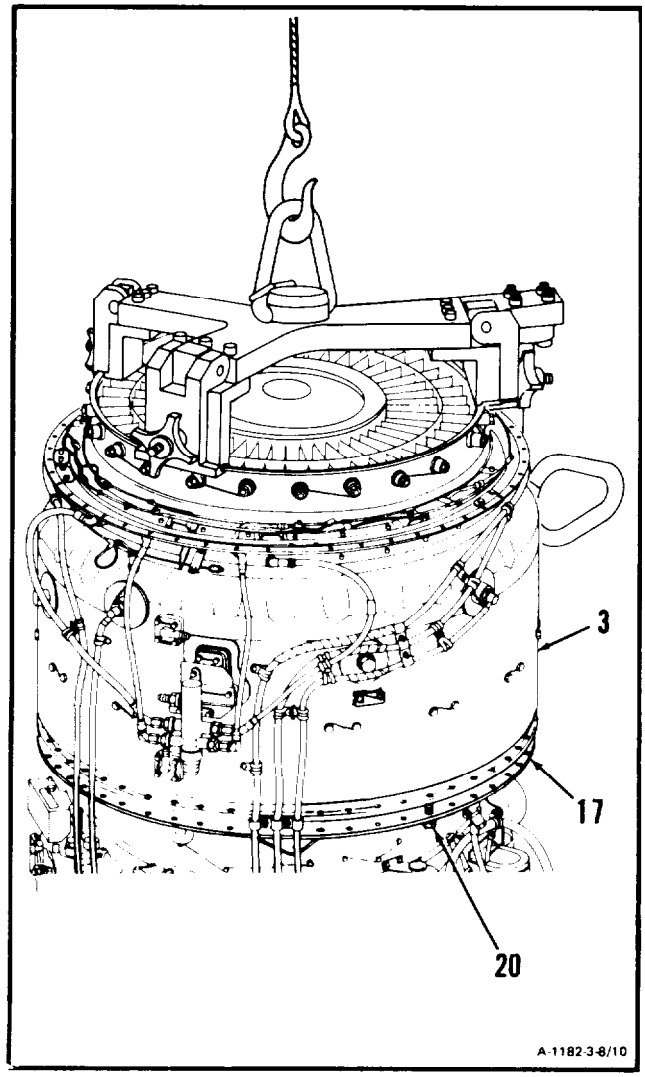
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

CAUTION

Do not force combustion section and power turbine onto air diffuser assembly. Damage to No. 3 bearing or other components may result.

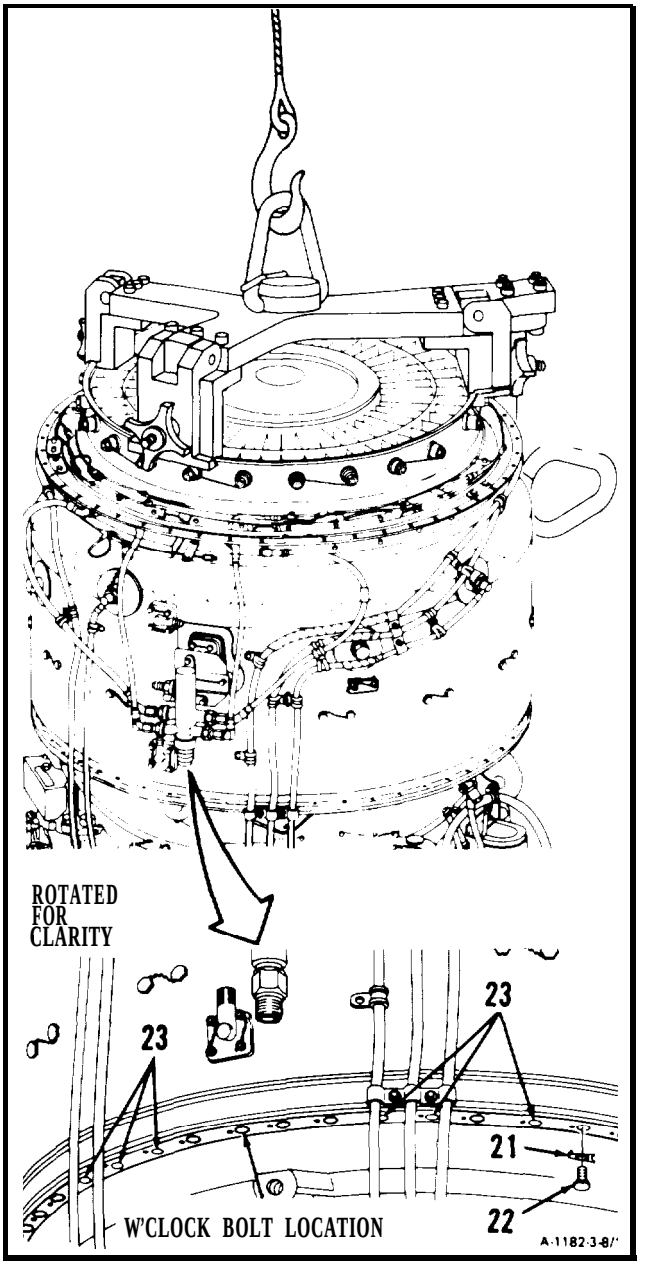
10. Turn three bolts (20) evenly to **draw combustion section and power turbine (3) and air diffuser assembly (17) together.** Remove three bolts (20).



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11. **Install 46** key washers (21) and **bolts (22)** in all bolt holes except six bolt holes (23).

12. **Lock bolts (22)** by bending tabs of key washers (21).



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13. Remove hoist hook (12) and power turbine fixture (T54) (11).

14. Inspect output shaft end play as follows:

a. **Remove output shaft seal and housing assembly** (Ref. Task 2-48).

b. **Install output shaft seal and housing assembly** (Ref. Task 2-52).

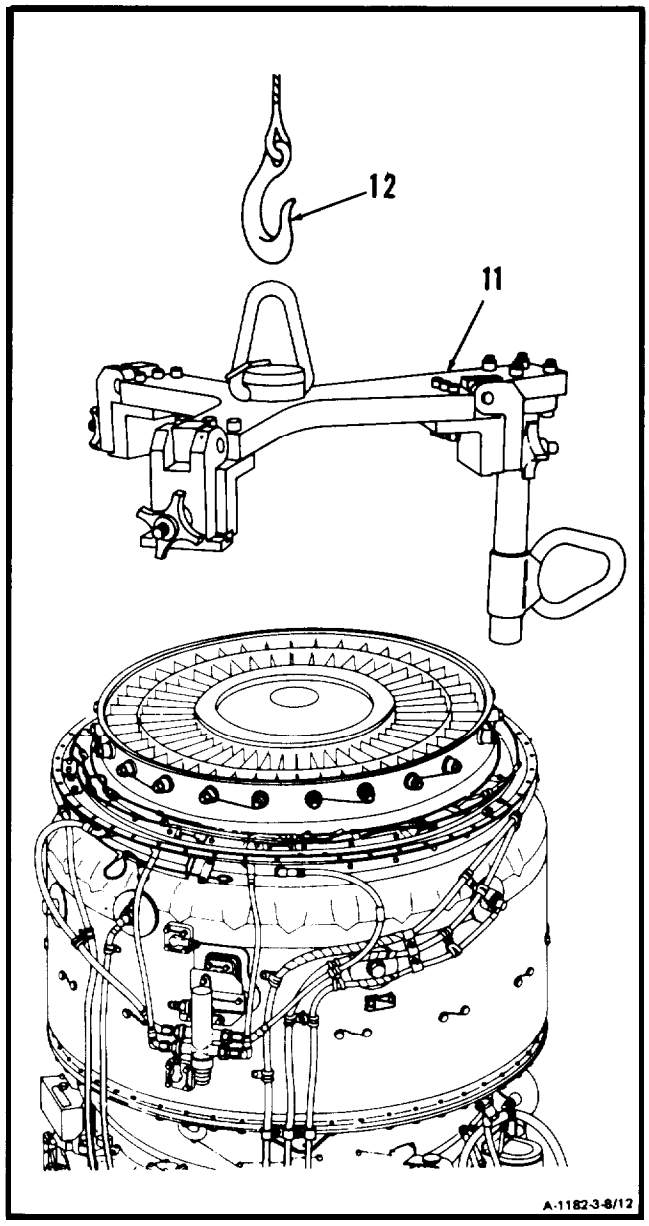
c. If output shaft end play is within limits, omit following steps d. thru g. **If output shaft end play is not within limits,** do following steps d. thru g.

d. **Remove output shaft seal and housing assembly** (Ref. Task 2-48).

e. **Remove output shaft** (Ref. Task 9-6).

f. **Install output shaft** (Ref. Task 9-10).

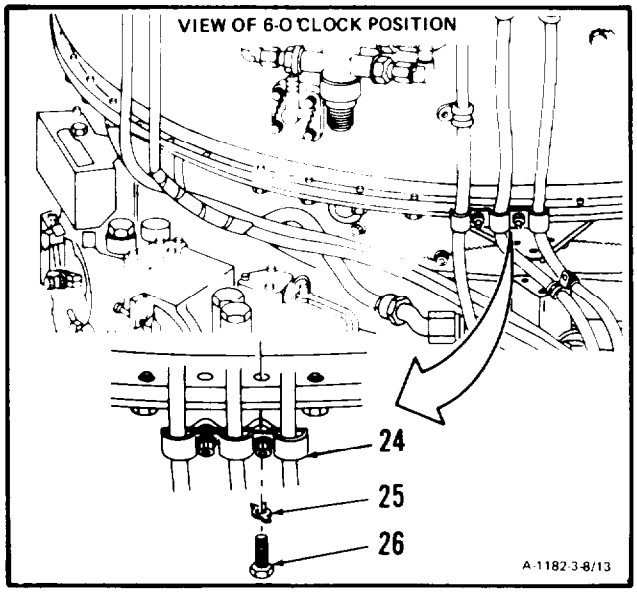
g. **Install output shaft seal and housing assembly** (Ref. Task 2-52).



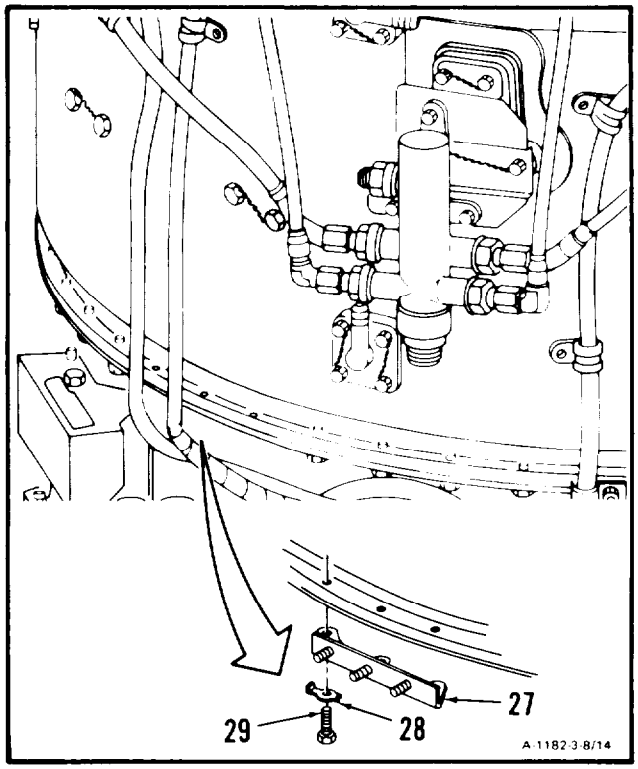
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

15. **Install strap and bracket (24),** two key washers (25), and two bolts (26). **Lock bolts (26)** by bending tabs of key washers (25).



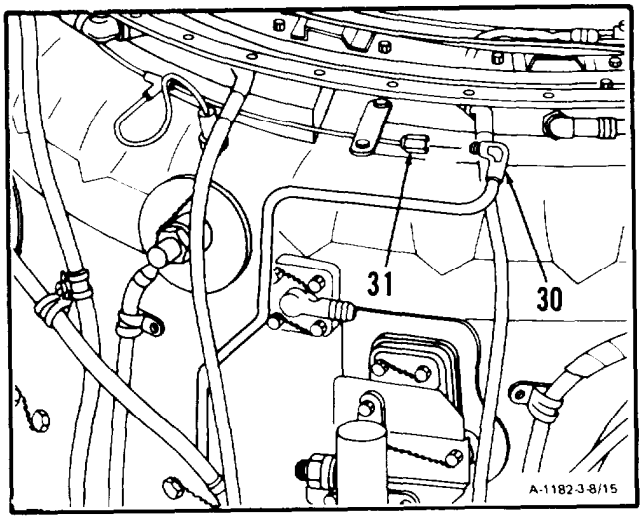
16. **Install bracket (27),** three key washers (28), and three bolts (29). **Lock bolts (29)** by bending tabs of key washers (28).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

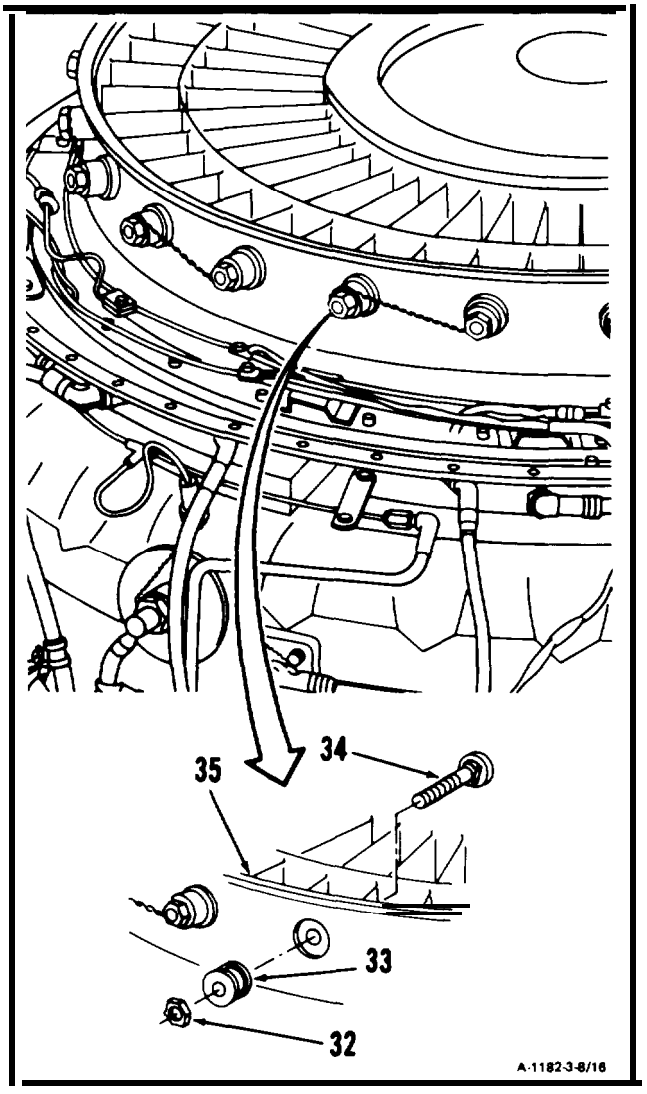
17. **Connect tube assembly (30)** to primer tube assembly (31).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

18. If installed, **remove** lockwire, **nut (32), spacer (33) and bolt** (34) from exit vane assembly (35).



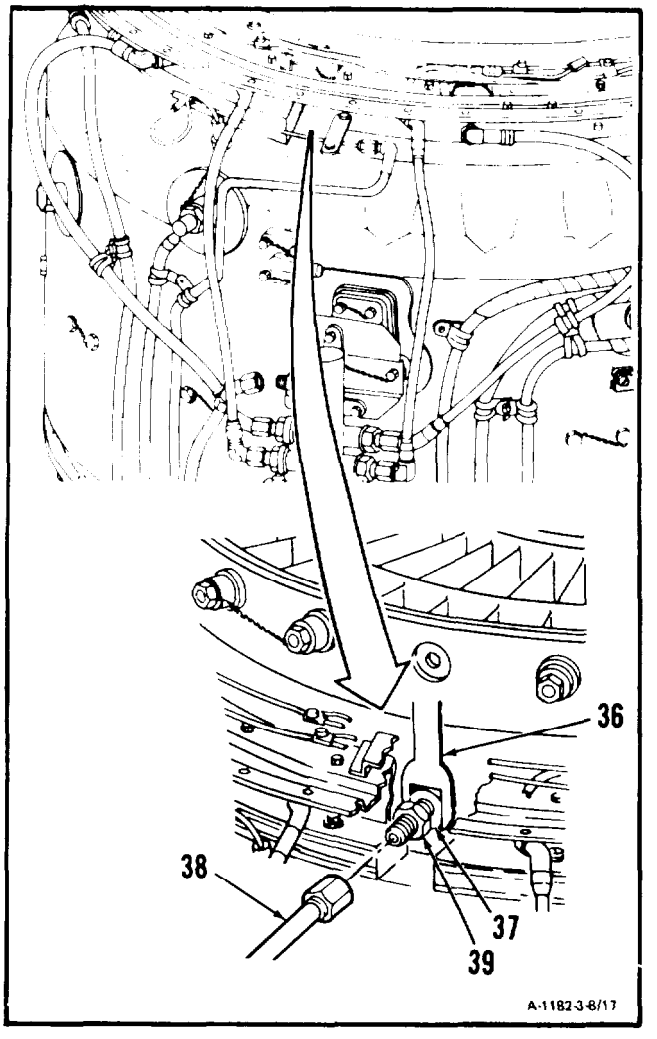
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CAUTION

In following step, hold No. 4 and 5 bearing and scavenge adapter using open-end wrench (T53). Failure to use wrench may result in damage and mislocation of oil transfer tube resulting in oil leaks.

19. Place open-end wrench (T53) (36) on No. 4 and 5 bearing scavenge adapter (37).

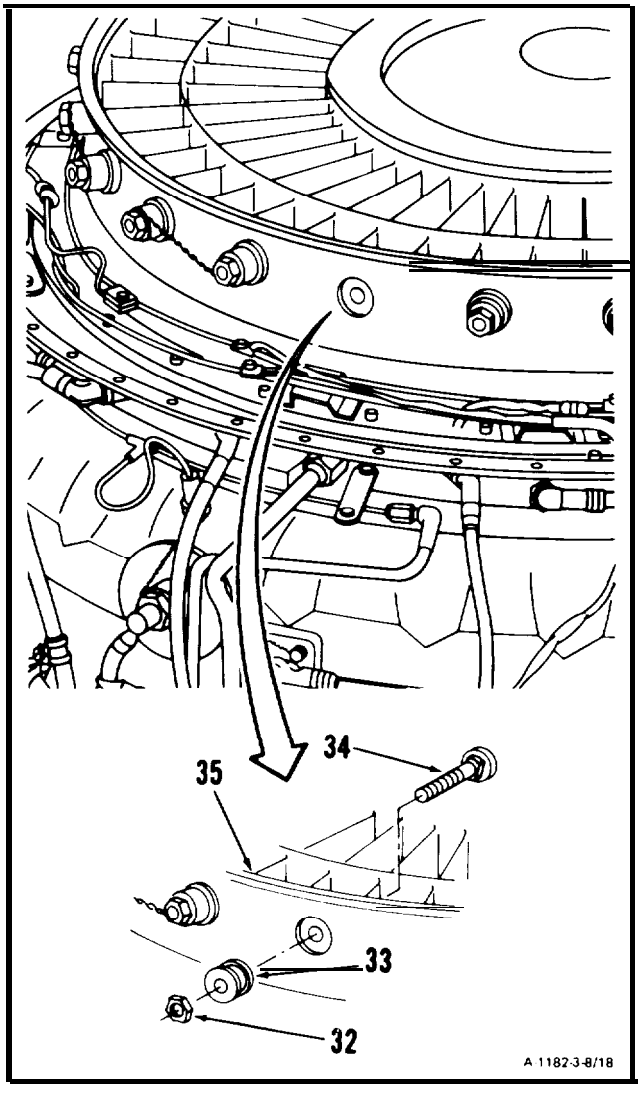
20. **Connect tube assembly (38)** to reducer (39).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

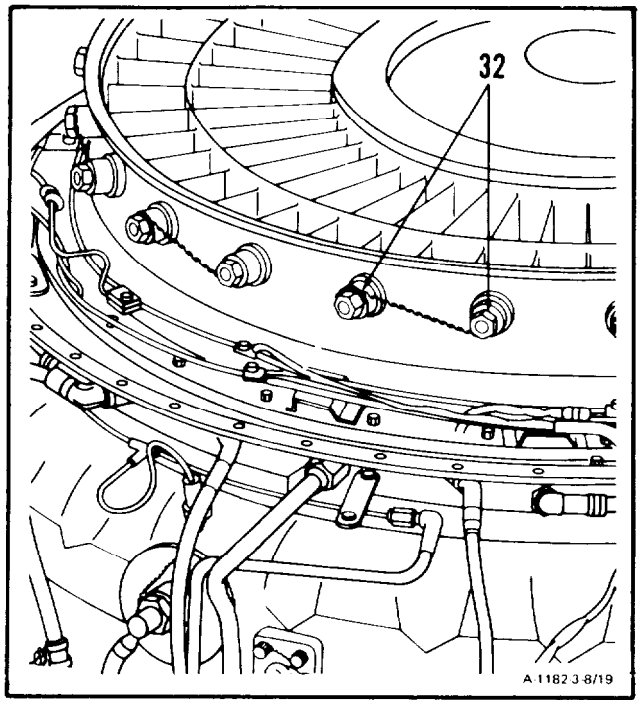
21. install bolt (34), spacer (33), and nut (32) in exit vane assembly (35). **Torque nut (32) to 125 inch-pounds.**



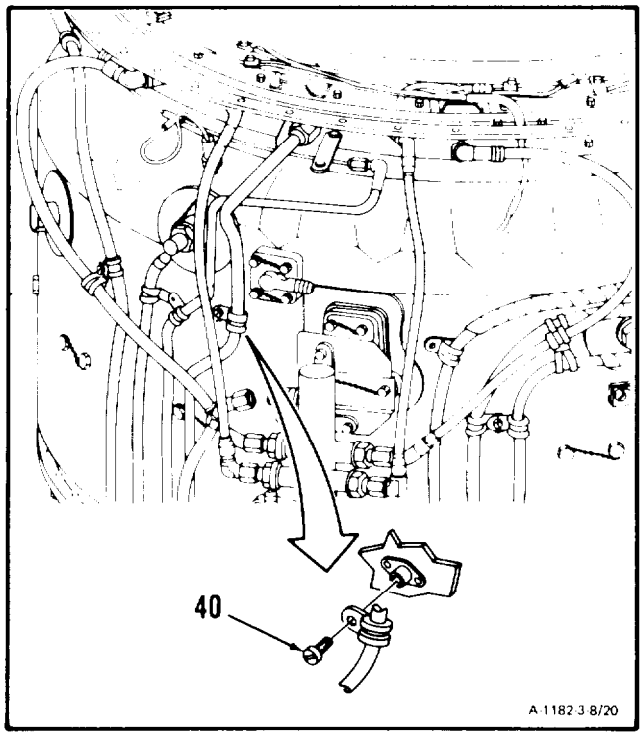
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

22. Lockwire nuts (32) together. Use lockwire (E29).



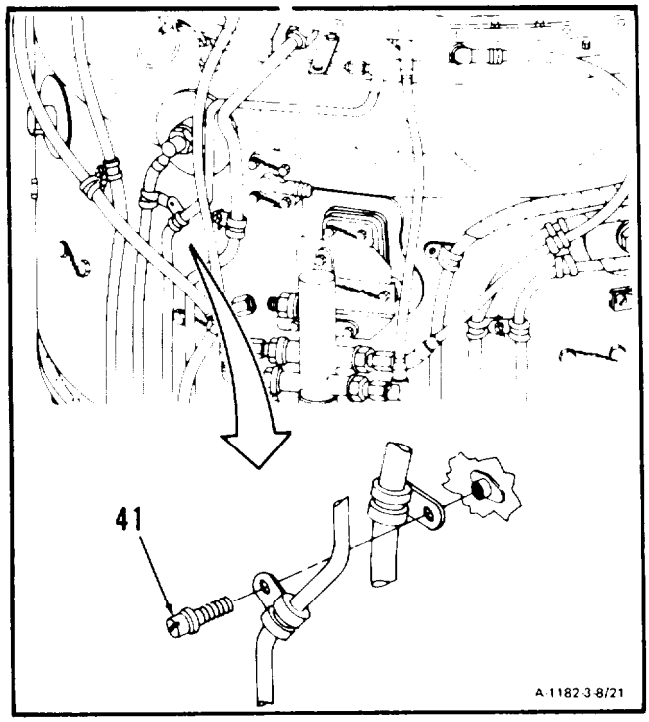
23. Install screw (40). Lockwire screw (40). Use lockwire (E29).



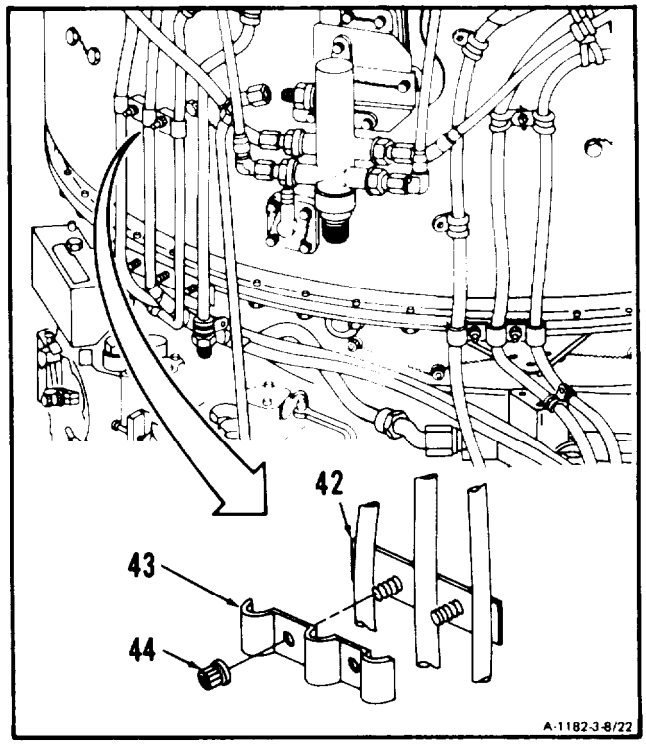
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued)

24. Install screw (41). Lockwire screw (41). Use lockwire (E29).



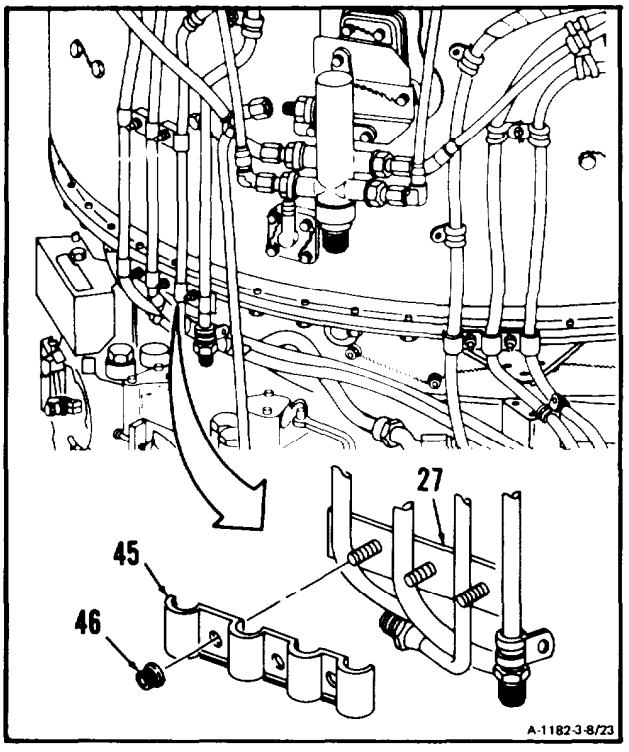
25. **Install two clamps (42 and 43)** and two nuts (44).



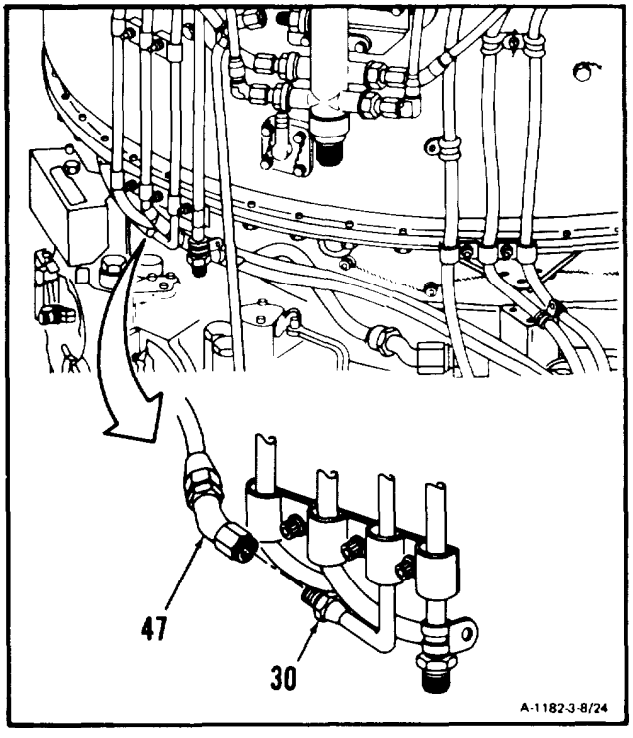
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

26. **Install clamp (45)** and three nuts (46) on bracket (27).

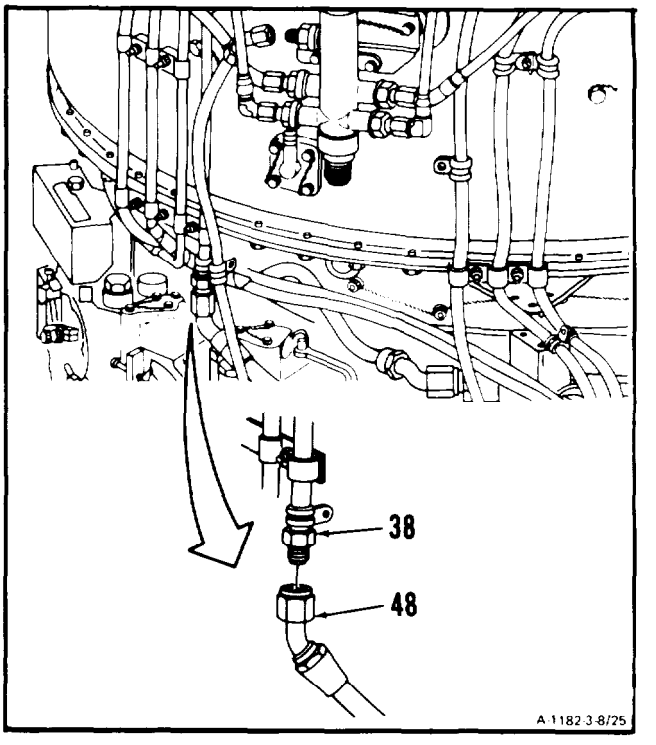


27. **Connect hose assembly (47)** to tube assembly (30).

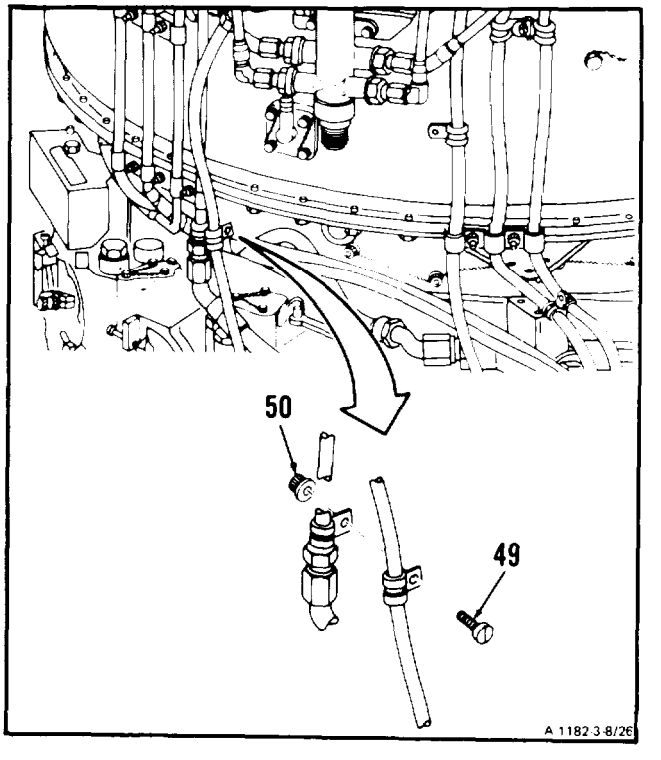


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28. **Connect hose assembly (48)** to tube assembly (38).

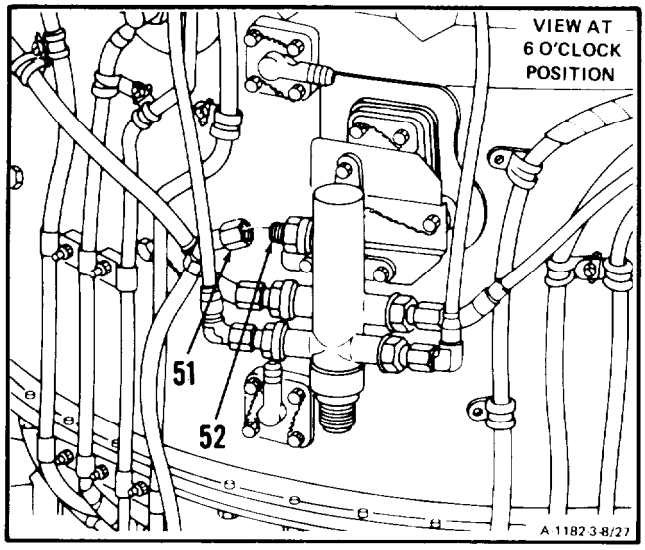


29. Install screw (49) and nut (50).

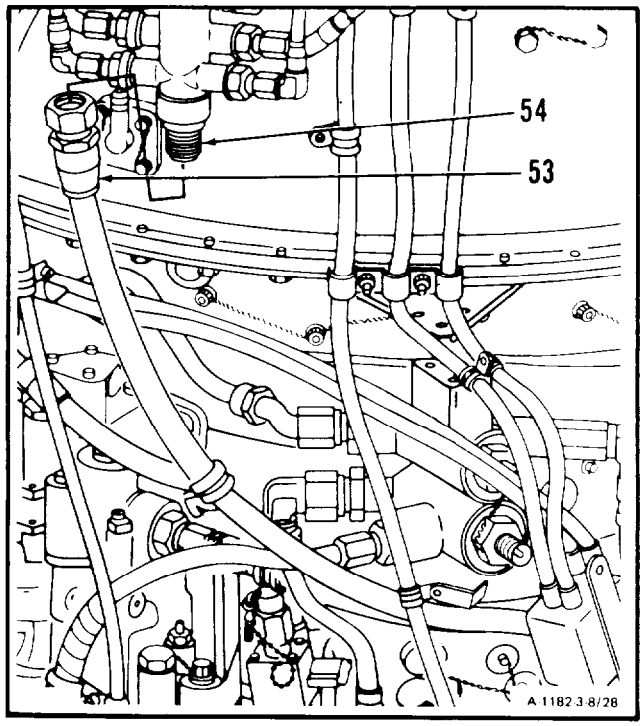


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30. **Connect hose assembly (51)** to fuel check valve (52).



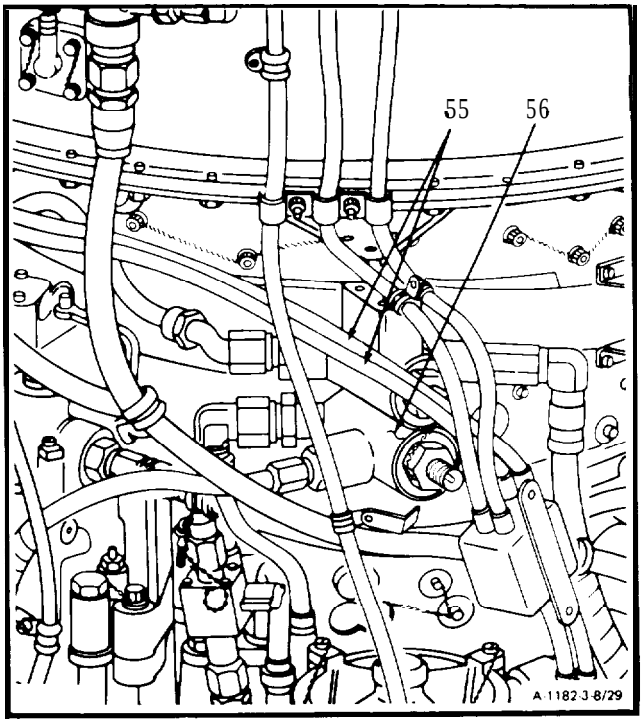
31. **Connect hose assembly (53)** to flow divider (54).



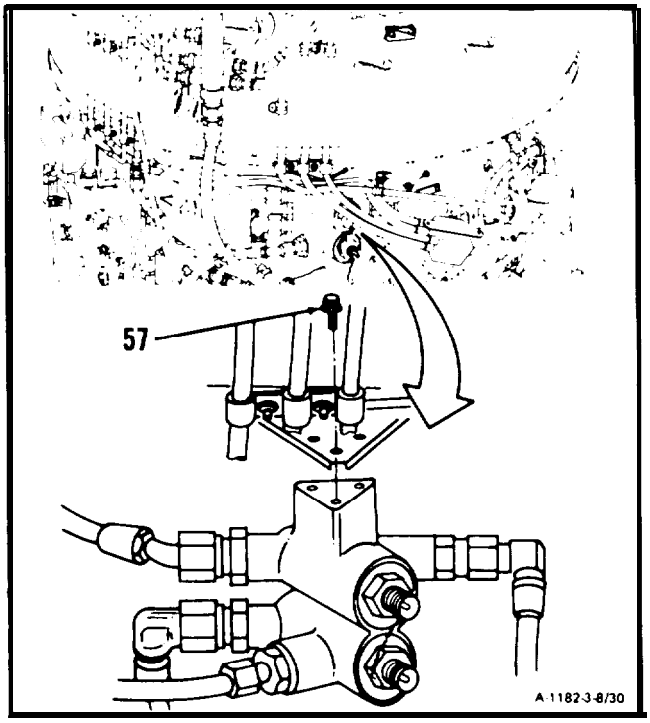
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

32. Put ignition coil and cable assembly leads (55) behind dual chip detector (56).



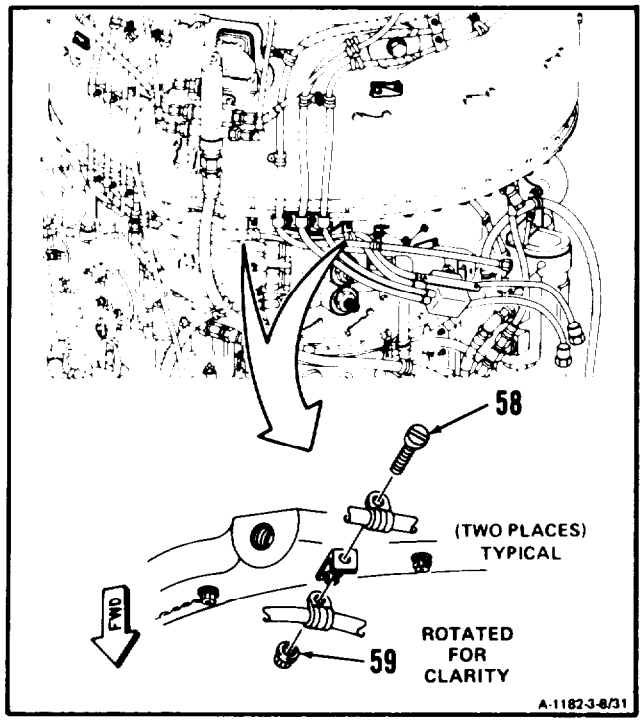
33. Install three bolts (57). Lockwire bolts (57). Use lockwire (E29).



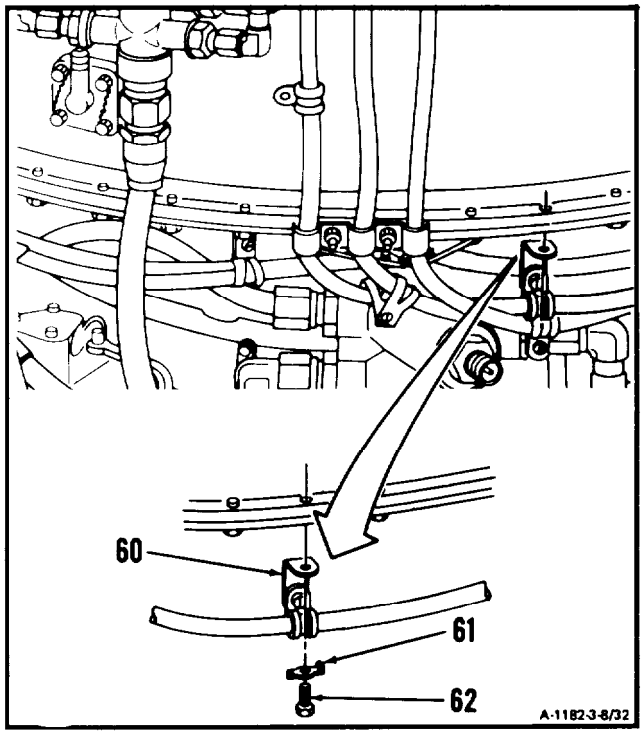
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

34. Install two screws (58) and two nuts (59).



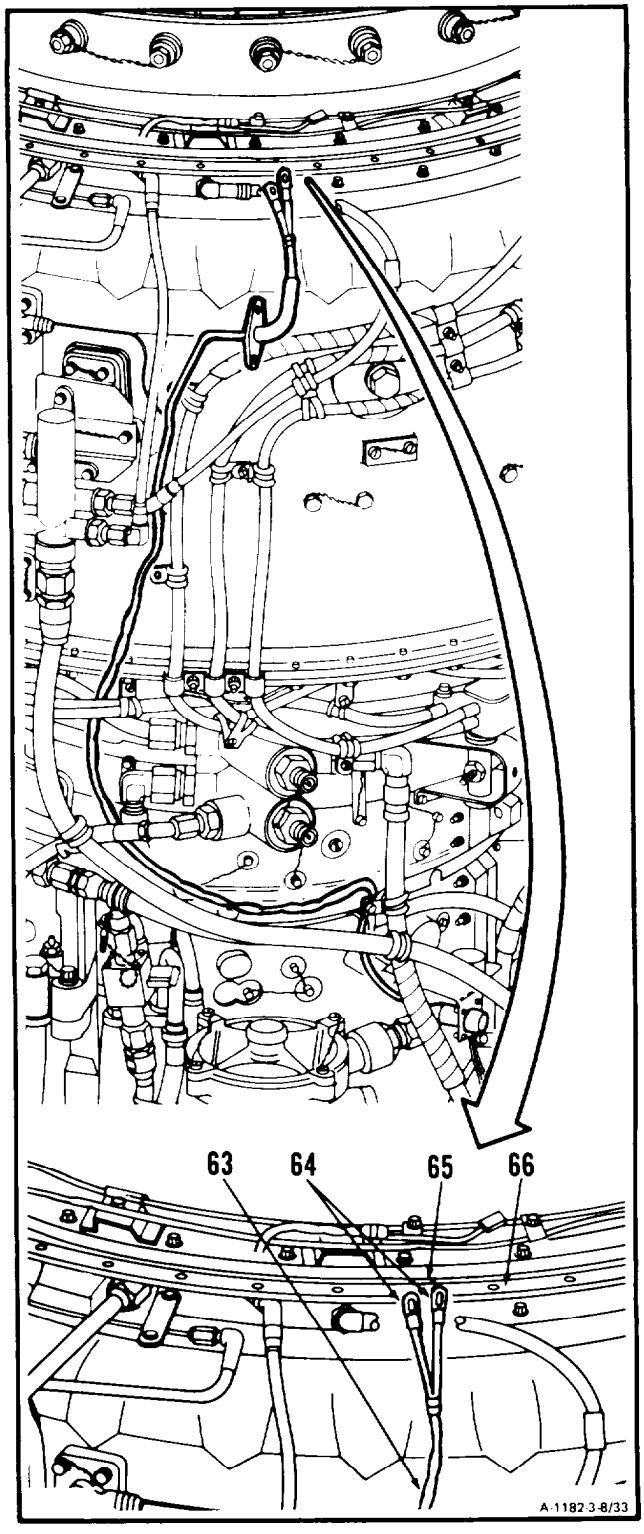
35. Install bracket (60), key washer (61), and bolt (62). Lock bolt (62) by bending tab of key washer (61).



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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

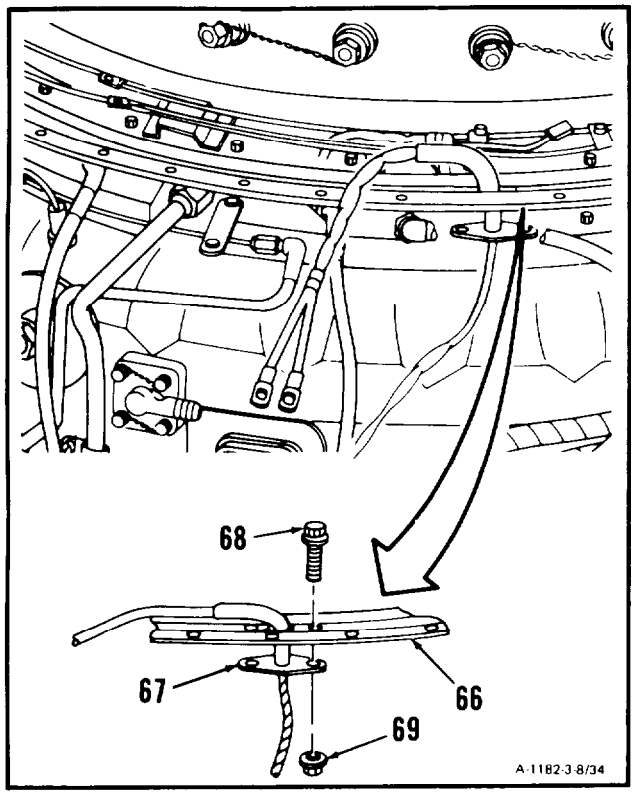
36. Route thermocouple jumper lead (63) as shown. Insert thermocouple jumper lead ends (64) through hole (65) in fireshield assembly (66).



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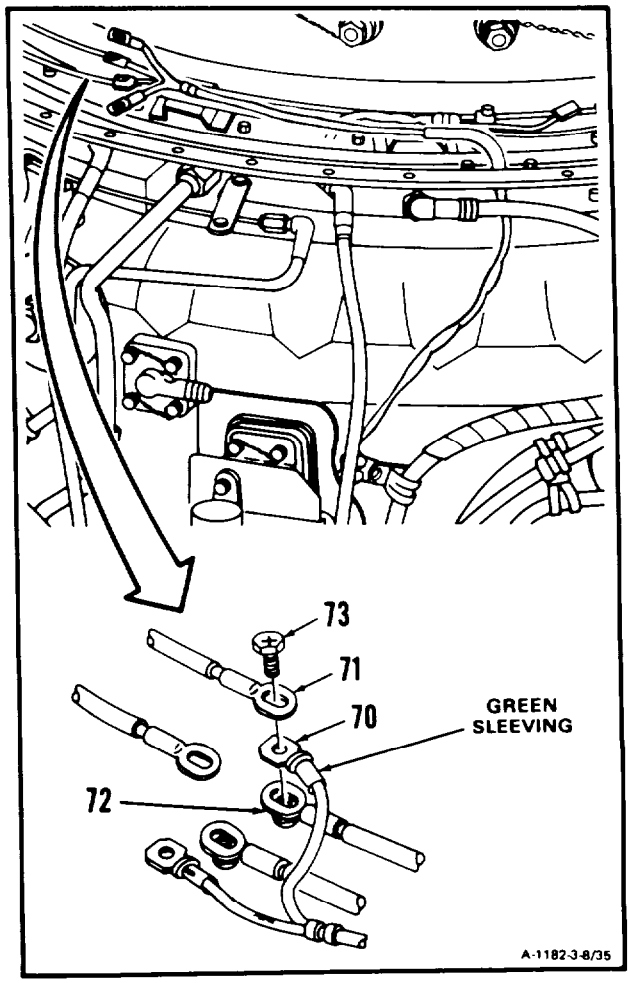
3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

37. Install plate (67) against fireshield assembly (66). Install two bolts (68) and two nuts (69).



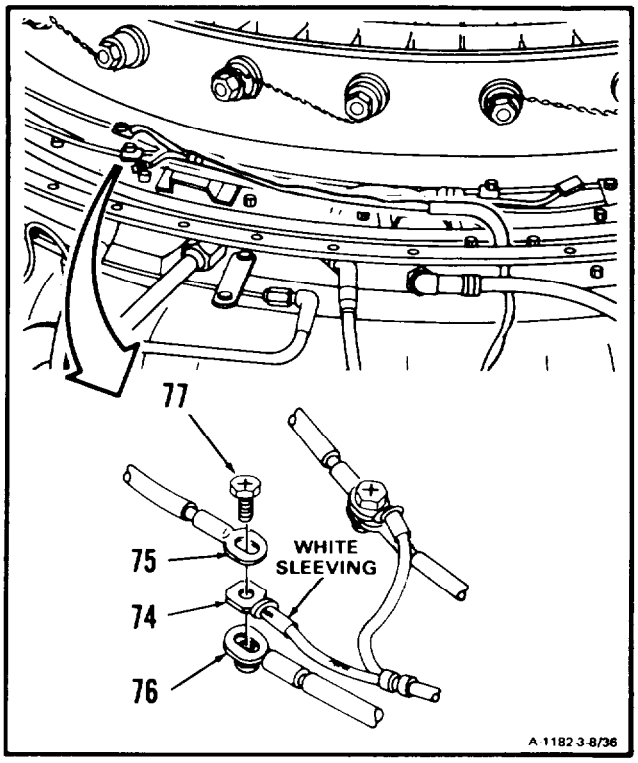
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38. **Install terminal lug (70)** between terminal lugs (71 and 72), and install screw (73).



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39. **Install terminal lug (74)** between terminal lugs (75 and 76), and install screw (77).

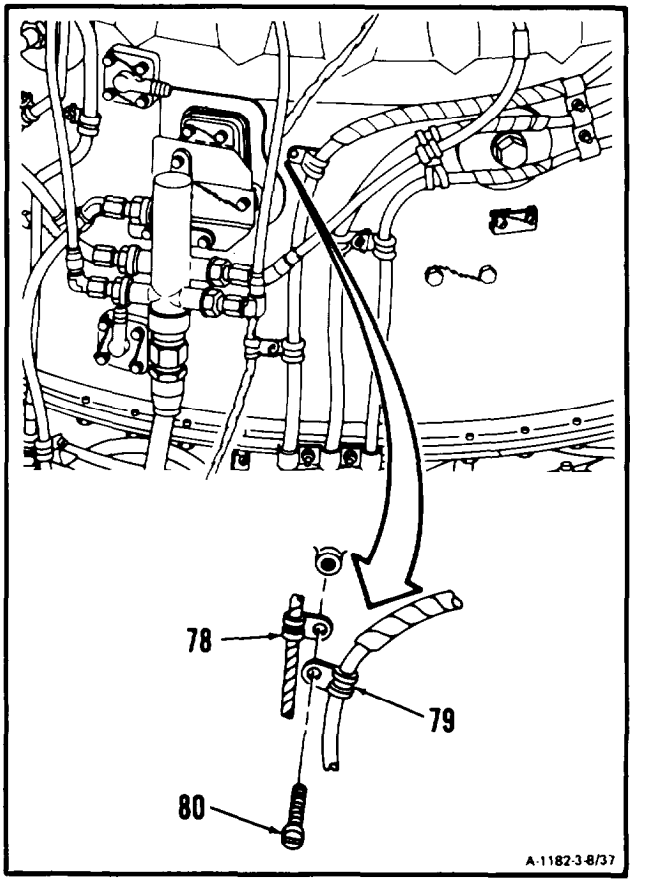


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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

40. Align clamp (78) with clamp (79), and install screw (80).

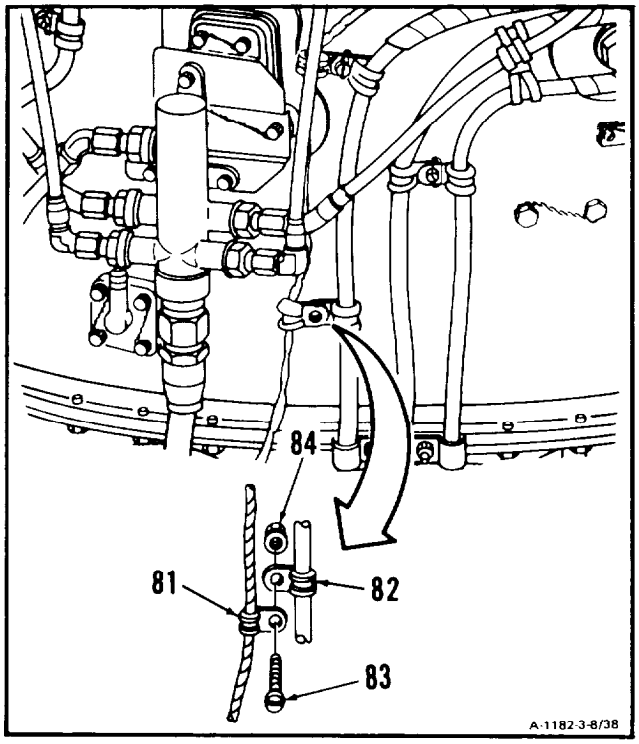
41. Lockwire screw (80). Use lockwire (E29).



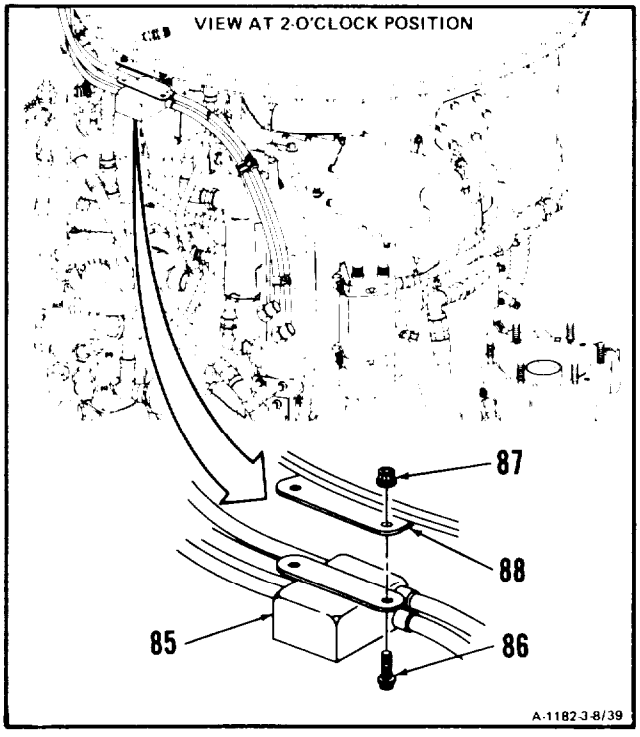
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3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

42. Align clamp (81) with clamp (82), and install screw (83) and nut (84).

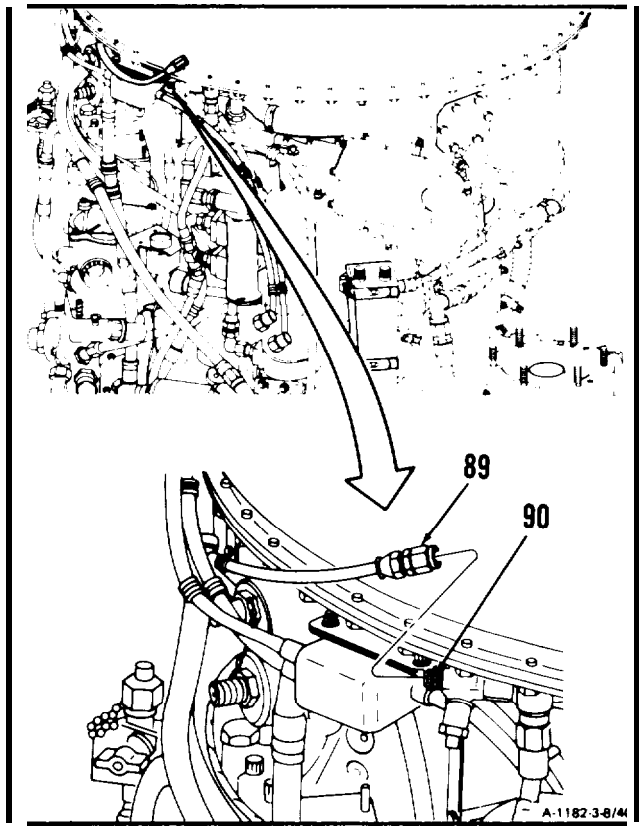


43. **Install ignition coil (85),** two bolts (86), and two nuts (87) on bracket (88).

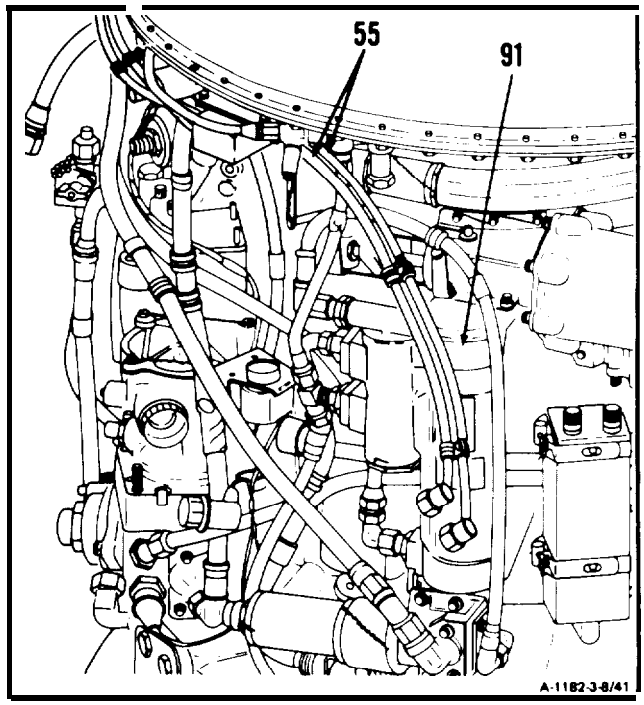


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44. **Connect hose assembly (89)** to pressure connector (90).



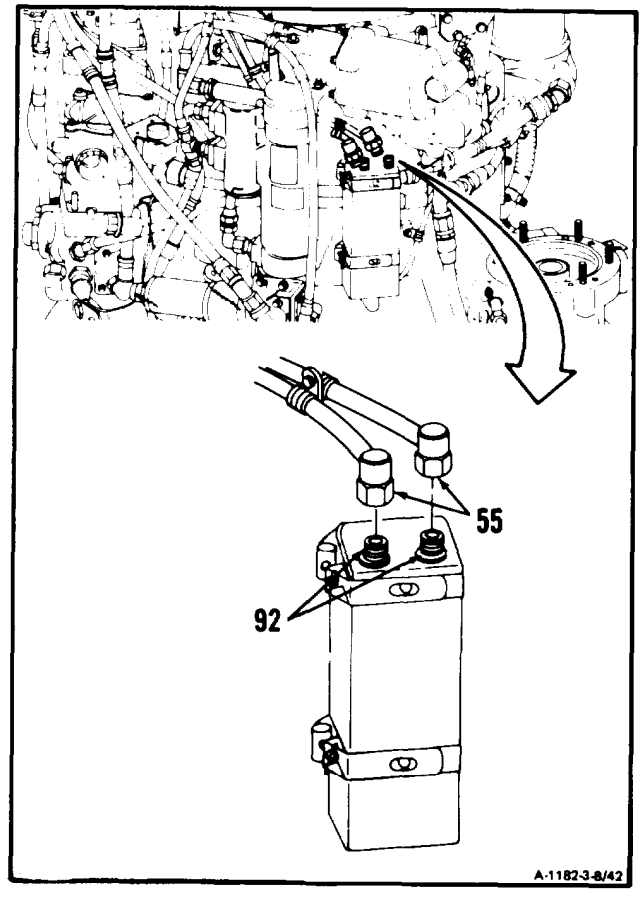
45. Put ignition coil and cable assembly leads (55) behind oil cooler assembly (91).



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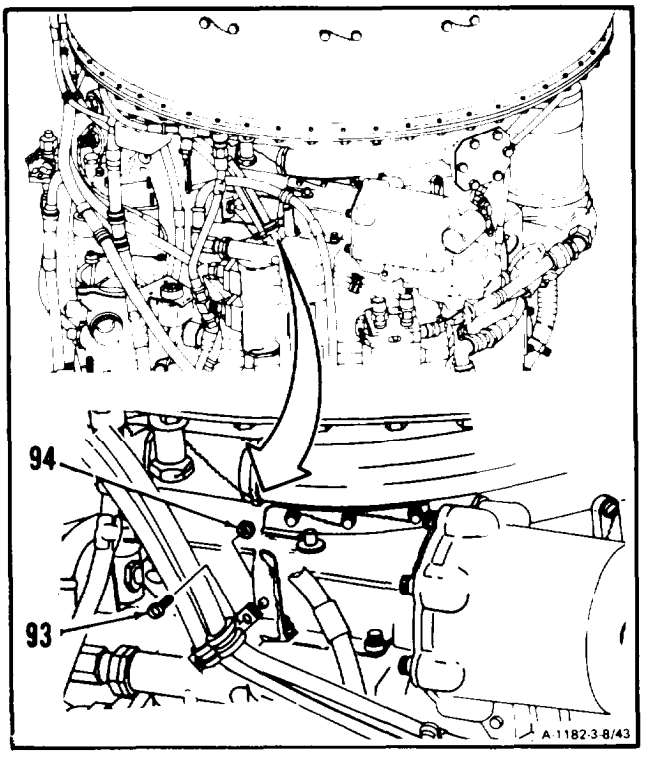
3-8 INSTALL COMBUSTION SECTION AND POWER TURBINE (AVIM) (Continued) 3-8

46. **Connect two ignition coil and cable assembly leads (55)** to receptacles (92). Lockwire ignition coil and cable assembly leads (55). Use lockwire (E29).



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47. install screw (93) and nut (94).

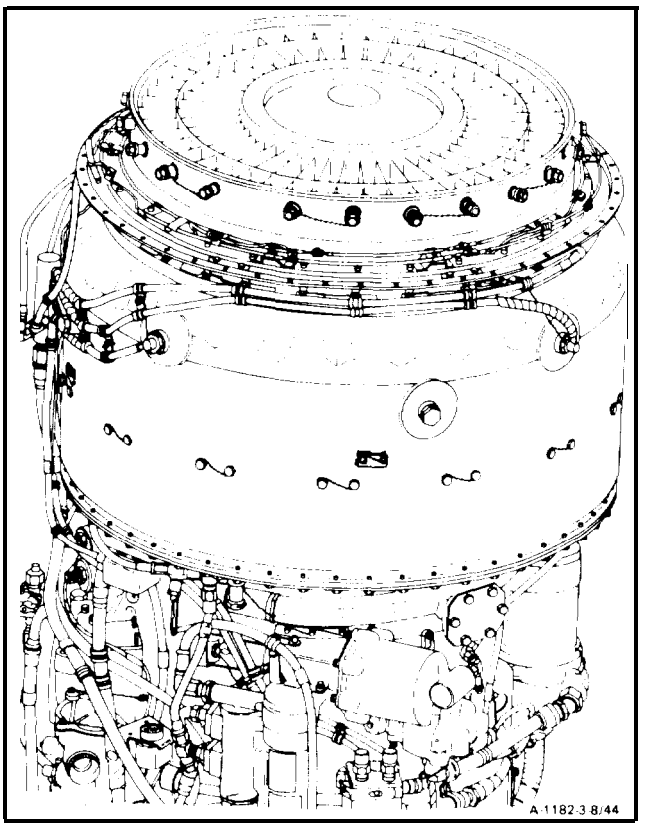


INSPECT

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FOLLOW-ON MAINTENANCE:

Service Engine Oil System (Task l-74).



END OF TASK

3-9 DISASSEMBLE COMBUSTION SECTION (AVIM) 3-9

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Phenolic Drift (Appendix E)

Materials:
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer

References:
Task 3-1

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)

GO TO NEXT PAGE

3-9 DISASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

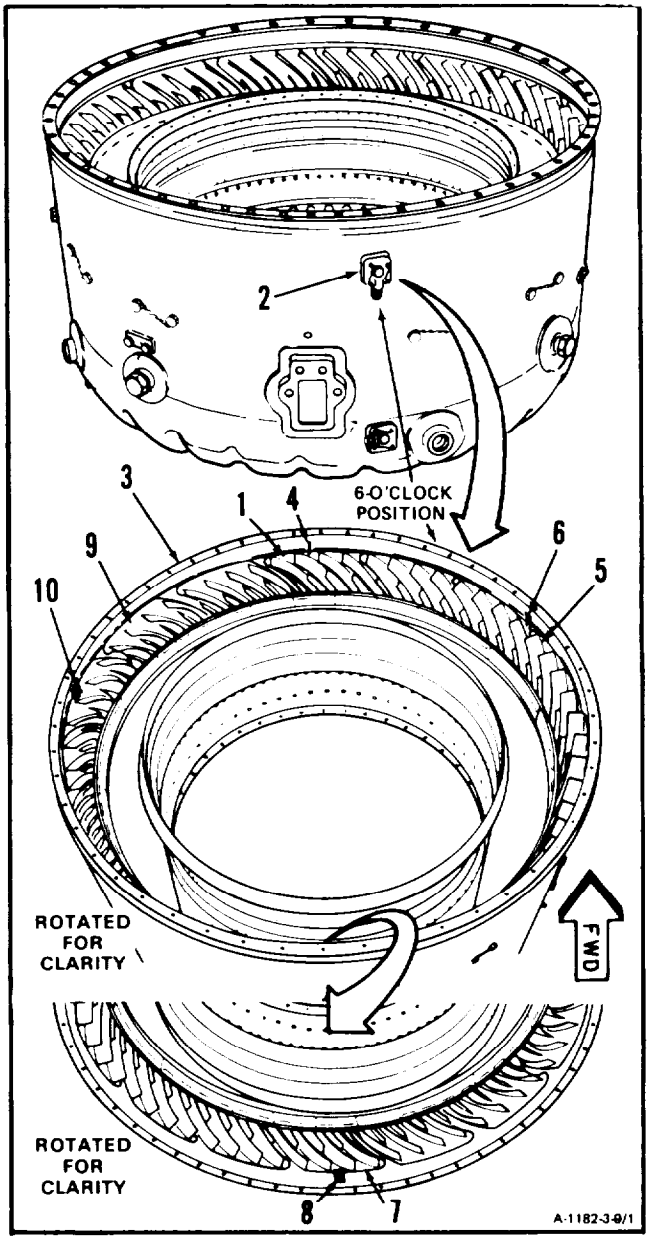
1. Locate smallest vane segment (1) at 8-o'clock position. Use fuel drain valve (2), located at 6-o'clock position, for reference.

2. **Matchmark vane segment (1)** to combustion chamber housing (3) with one mark (4). Use marking pencil (E34).

3. **Matchmark vane segment (5),** located at 5-o'clock position to combustion chamber housing (3) with two marks (6). Use marking pencil (E34).

4. **Matchmark vane segment (7),** located at 2-o'clock position, to combustion chamber housing (3) with three marks (8). Use marking pencil (E34).

5. **Matchmark vane segment** (9), located at 10-o'clock position, to combustion chamber housing (3) with four marks (10). Use marking pencil (E34).

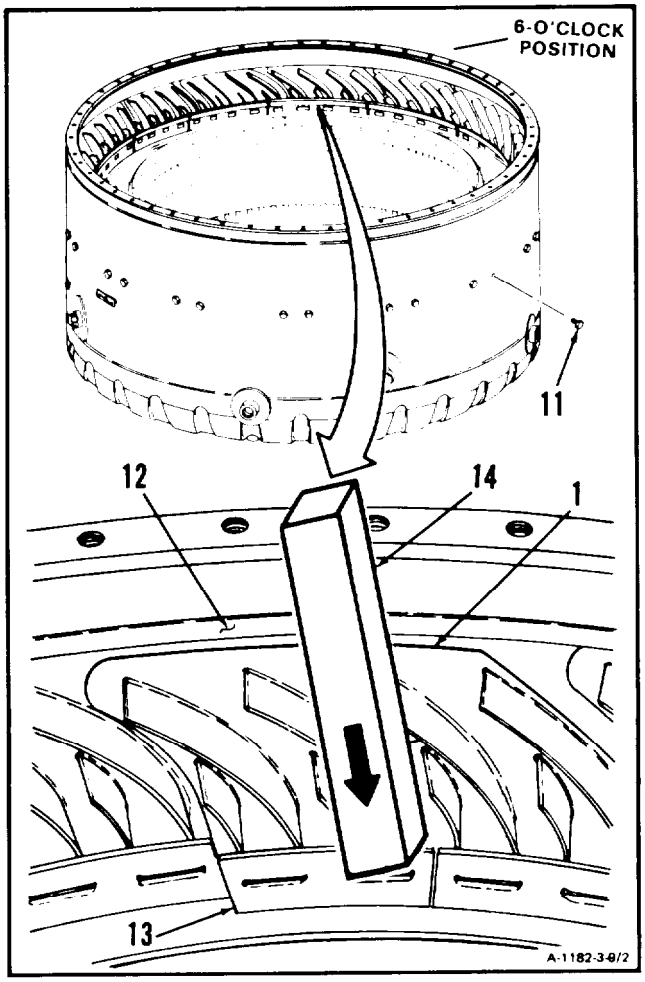


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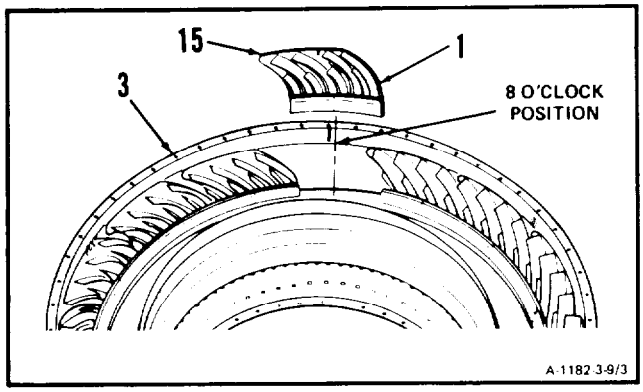
3-9 DISASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

6. Remove lockwire and 28 bolts (11).

7. Loosen vane segment (1) from lip (12). Hammer lightly in aft direction on inner shroud (13). Use soft-faced hammer and phenolic drift (Appendix E) (14).



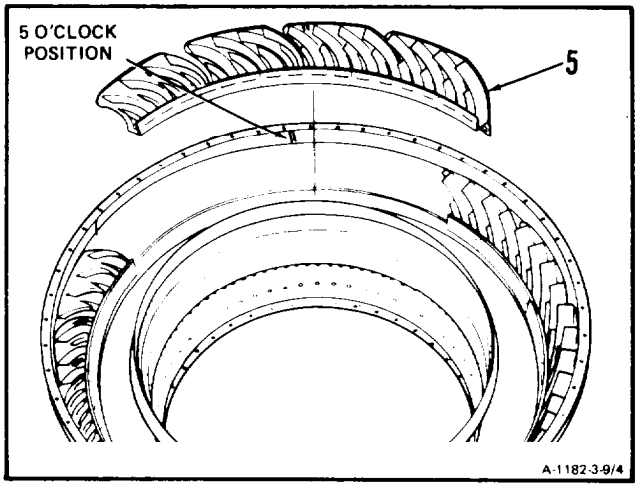
8. **Remove vane segment (1).** Tip leading edge (15) inward and pull from combustion chamber housing (3).



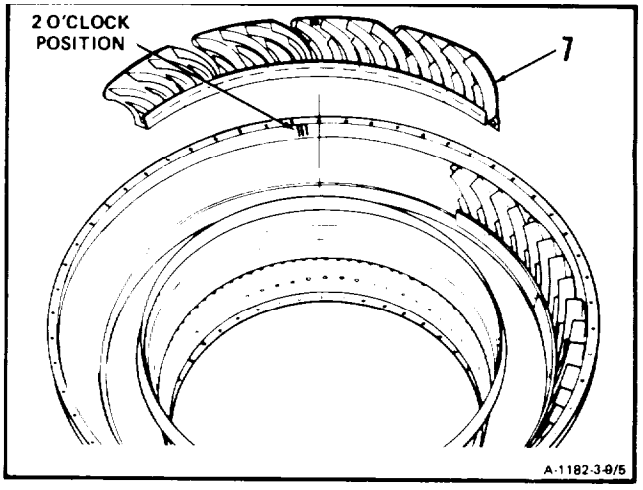
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3-9 DISASSEMBLE COMBUSTION SECTION (AVIM) (Continued) 3-9

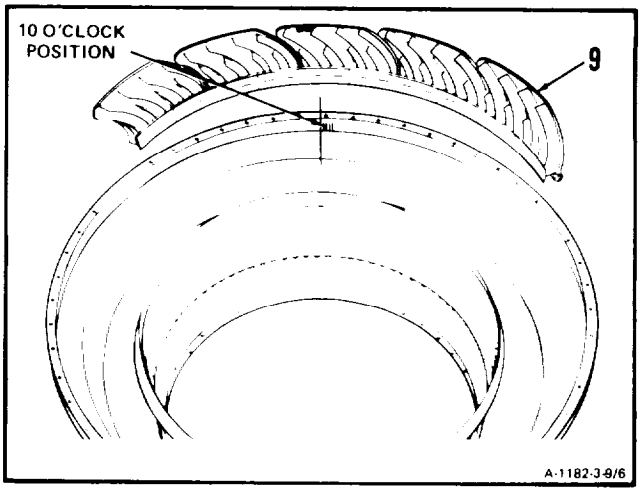
9. **Remove vane segment (5).** Use procedure in previous steps 7. and 8.



10. **Remove vane segment (7).** Use procedure in previous steps 7. and 8.

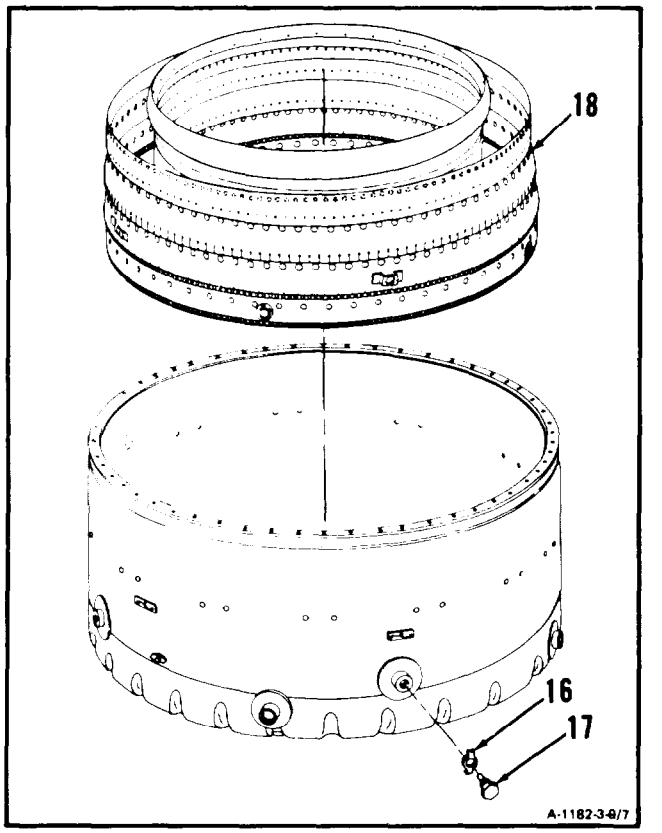


11. **Remove vane segment (9).** Use procedure in previous steps 7. and 8.

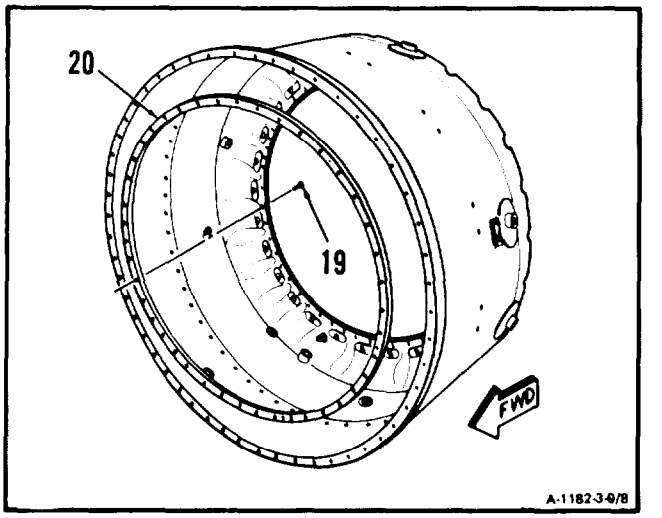


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12. Straighten tabs of key washers (16) and **remove** four bolts (17), four key washers (16) and **combustion chamber liner (18).**



13. **Remove** six screws (19) and **ring (20).**

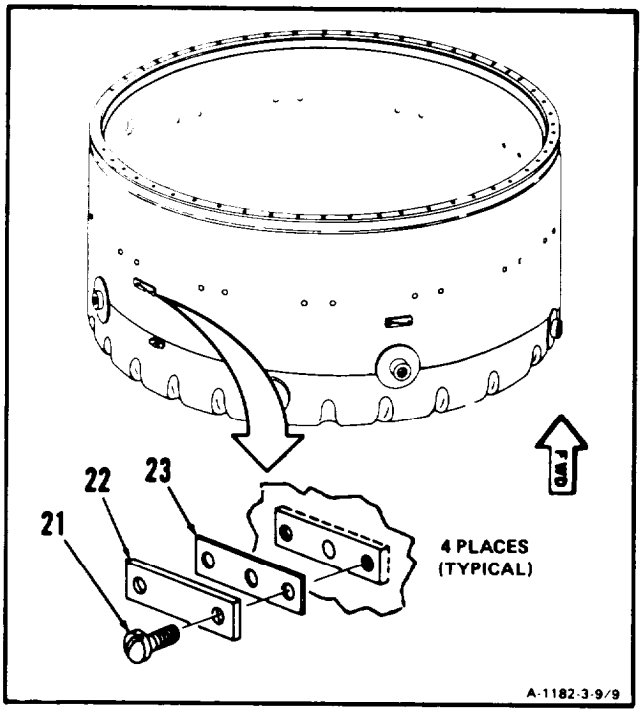


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3-9 DISASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

14. **Remove fuel drain valves (Ref. Task 3-1).**

15. **Remove** lockwire, eight screws (21), **four plates (22),** and four gaskets (23).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-10 ASSEMBLE COMBUSTION SECTION (AVIM) 3-10

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 30-150 Inch-Pounds
Torque Wrench, 100-750 Inch-Pounds

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)
Marking Pencil (E34)

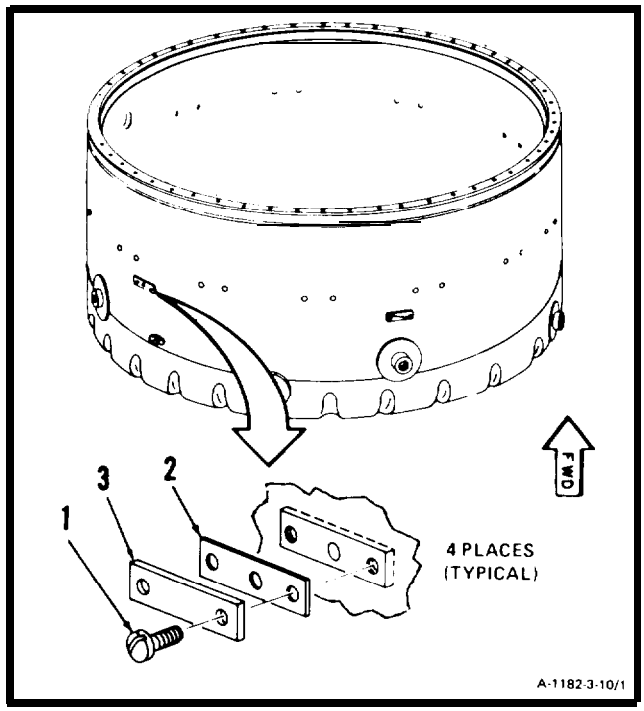
Parts:
Gaskets
Washers

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P
Task 3-4

1. Apply anti-seize compound (E5) to threads of eight screws (1). **Install** four gaskets (2), **four plates (3),and** eight screws (1). Lockwire screws (1). Use lockwire (E29).

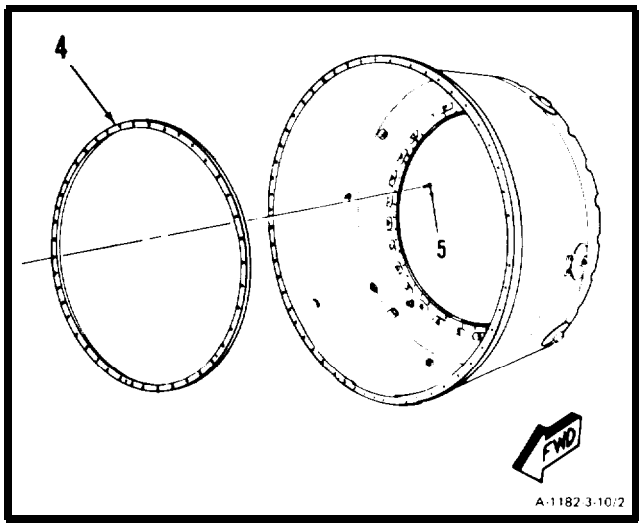
2. **Install fuel drain valves** (Ref. Task 3-4).



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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued) 3-10

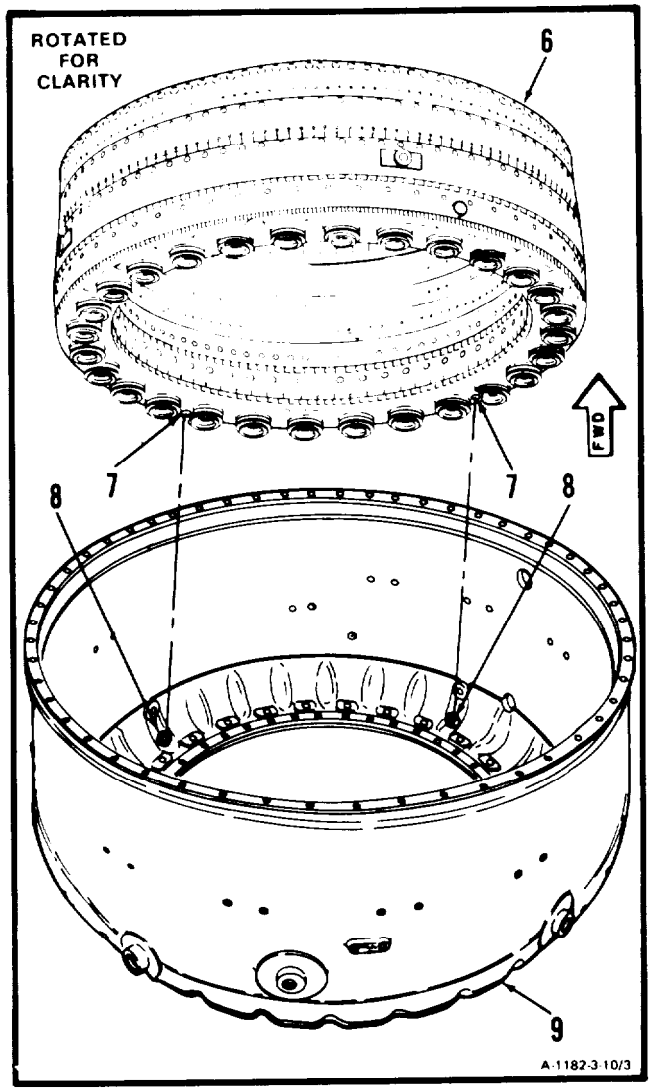
3. **Install ring (4)** and six screws (5).



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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

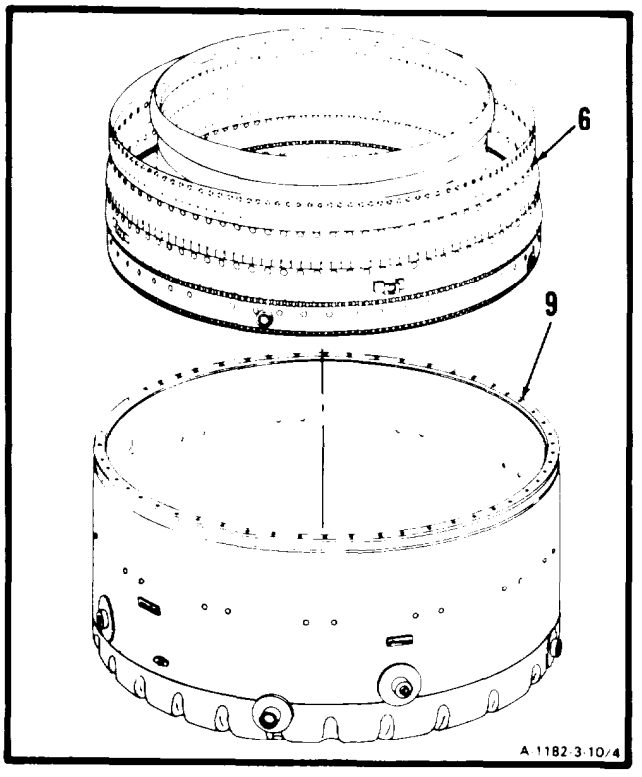
4. Position combustion chamber liner (6) with start fuel nozzle holes (7) aligned with holes (8) in combustion chamber housing (9).



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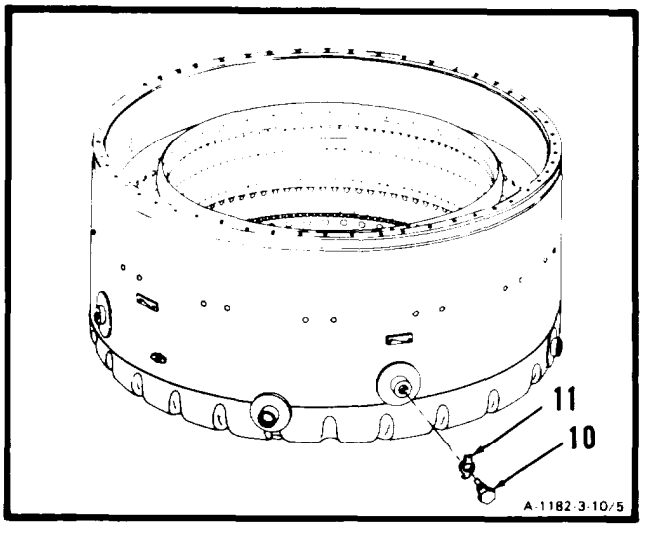
3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

5. **Install combustion chamber liner (6)** in combustion chamber housing (9).



6. Coat four bolts (10) with anti-seize compound (E5).

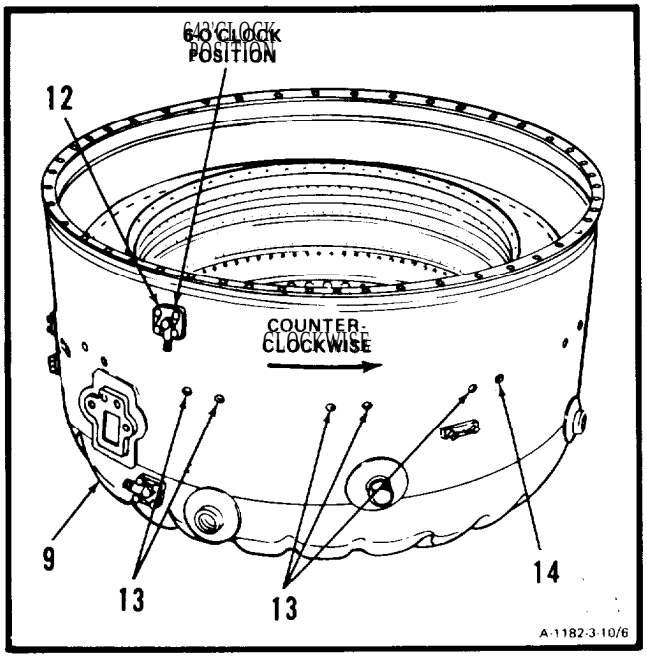
7. Install four washers (11) and four bolts (10). **Torque to 150 inch-pounds.** Bend tabs up on washers (11).



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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

8. Locate forward drain valve (12) at 6-o'clock position on combustion chamber housing (9). Count five bolt holes (13) counterclockwise and mark next hole (14). Use marking pencil (E34).



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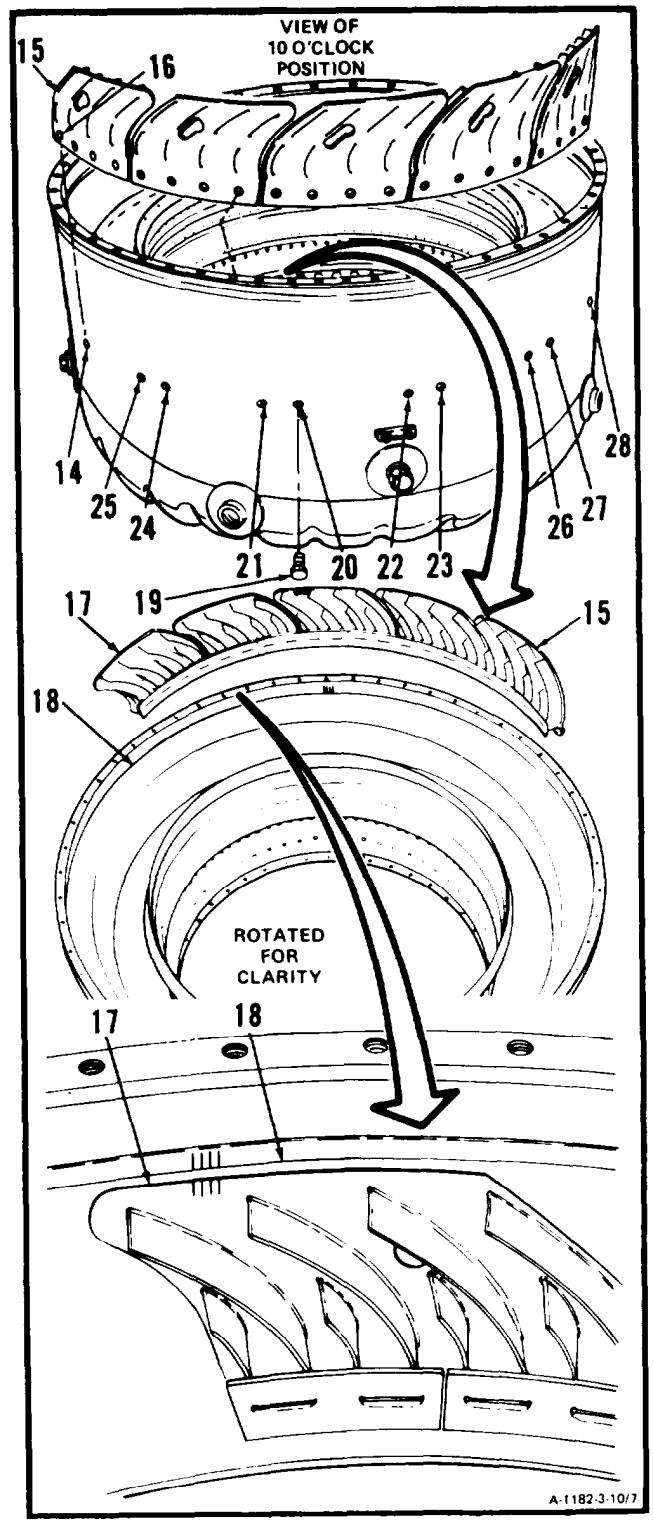
3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

9. Position longest vane segment (15) with hole (16) aligned with marked hole (14).

10. **Install vane segment (15)** with forward edge (17) under lip (18).

11. Coat 28 bolts (19) with anti-seize compound (E5).

12. Install 10 bolts (19) in following sequence in holes (20, 21, 22, 23, 24, 25,26, 27, 14,and 28). **Do not tighten.**

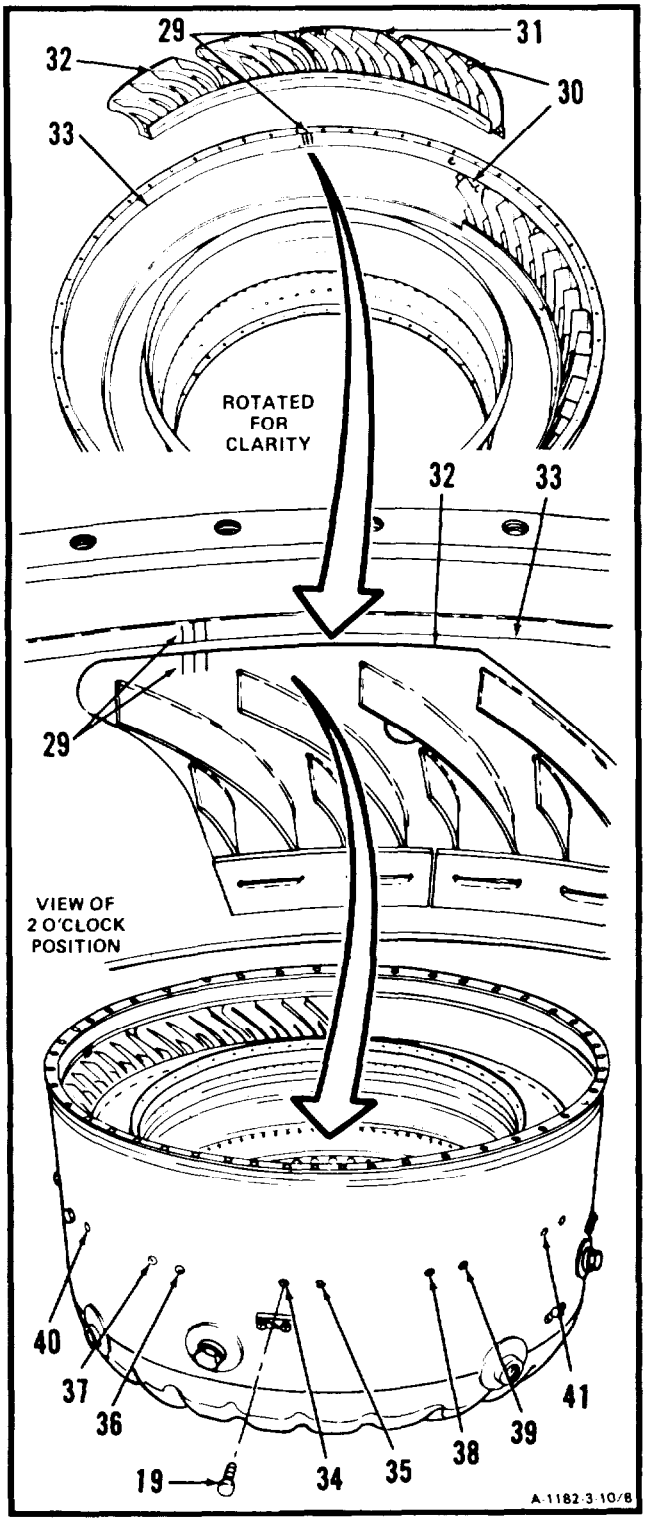


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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued) 3-10

13. Align matchmarks (29) or matching letters C-C (30) and **install vane segment (31)** with forward edge (32) under lip (33).

14. Install eight bolts (19) in sequence in holes (34 thru 41). **Do not tighten.**

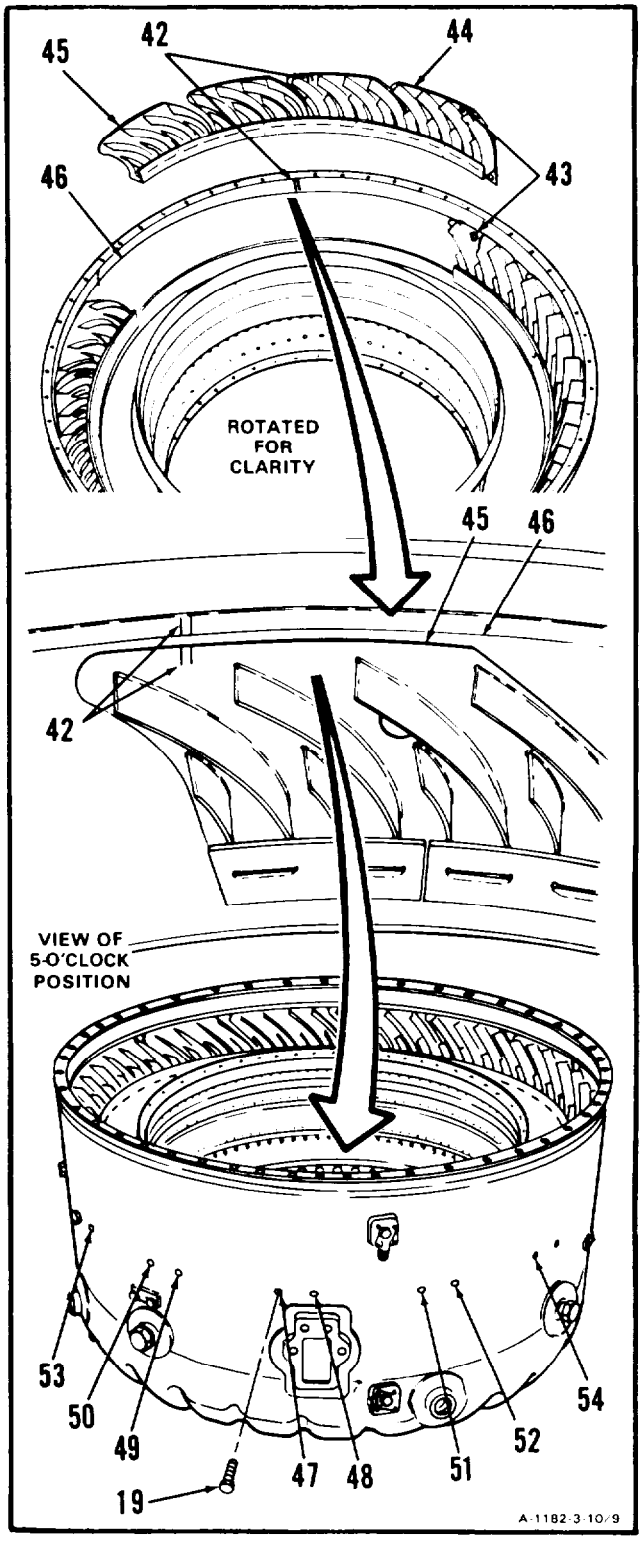


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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued) 3-10

15. Align matchmarks (42) or matching letters D-D (43) and **install vane segment (44)** with forward edge (45) under lip (46).

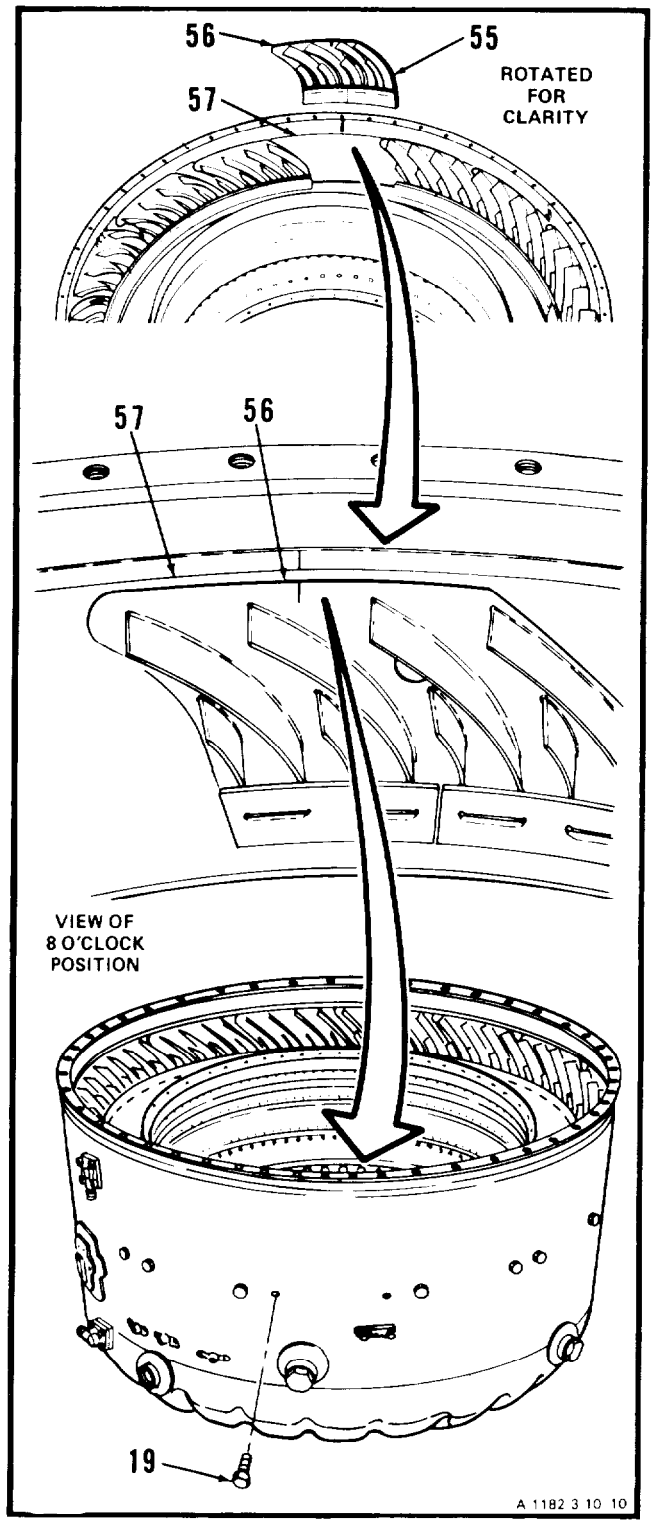
16. Install eight bolts (19) in sequence in holes (47 thru 54). **Do not tighten.**



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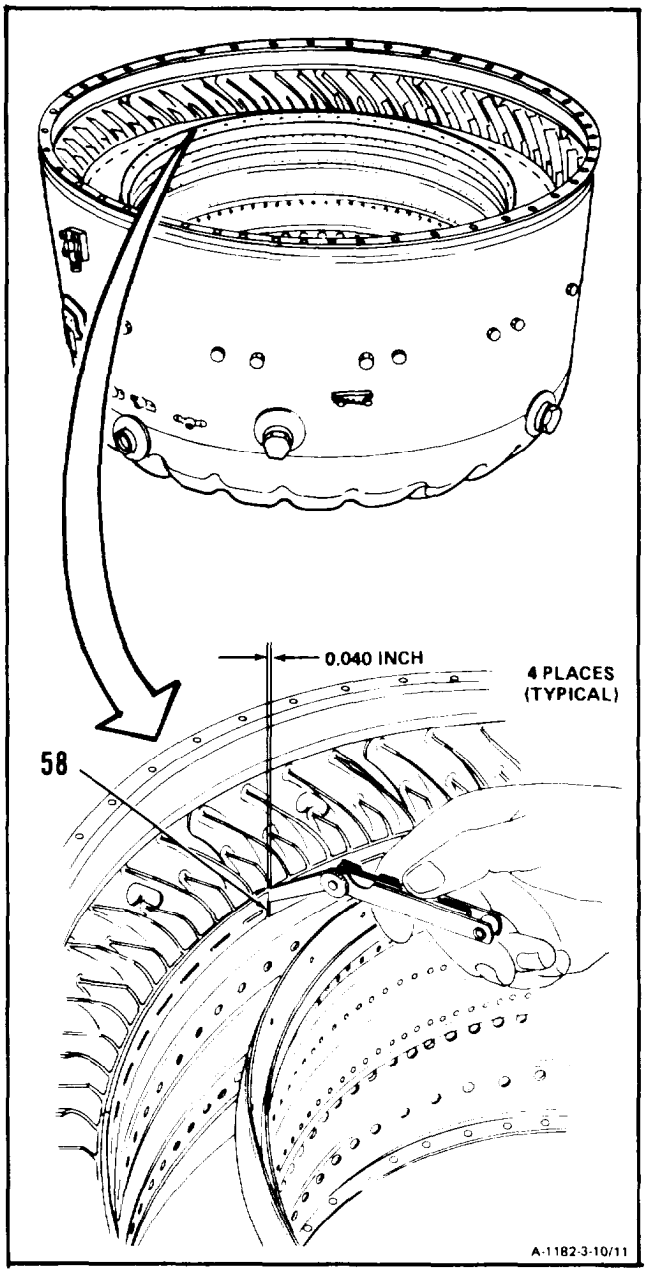
3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

17. **Install shortest vane segment (55)** with forward edge (56) under lip (57). Install two bolts (19). **Do not tighten.**



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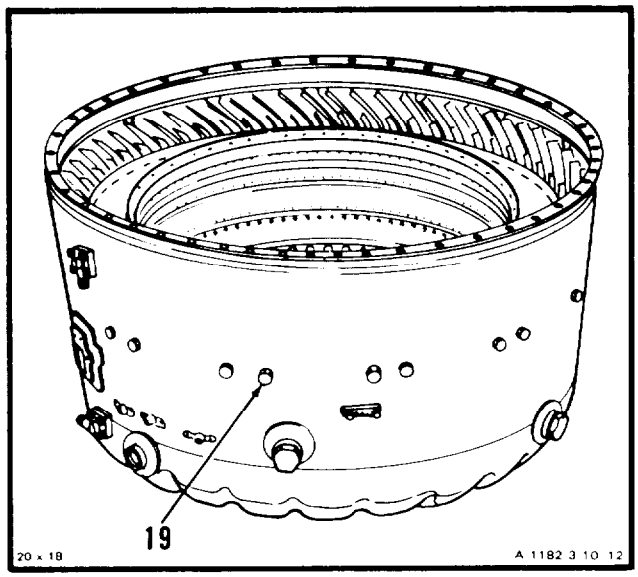
18. **Measure gaps (58) between four vane segments. Gap shall be 0.040 inch.** If gap is not 0.040 inch, move vane segments sideways and repeat measurement,



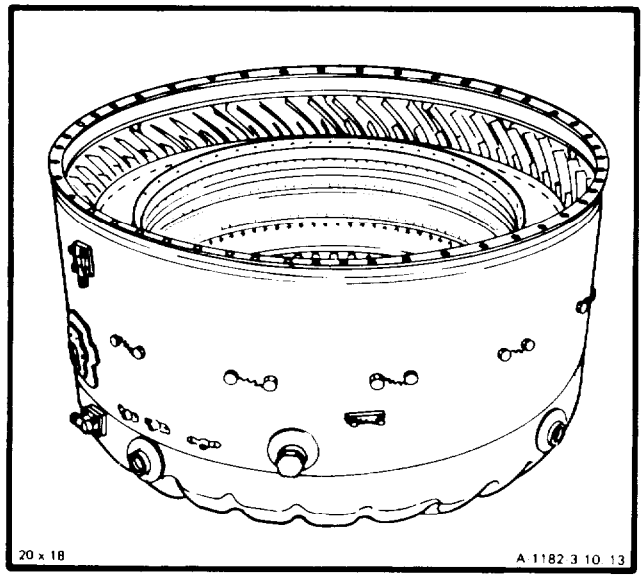
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3-10 ASSEMBLE COMBUSTION SECTION (AVIM) (Continued)

19. **Tighten 28 bolts (19). Torque to 50 to 55 inch-pounds.** Lockwire bolts (19). Use lockwire (E29).



INSPECT



FOLLOW-ON MAINTENANCE:

Assemble Combustion Section and Power Turbine Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).

END OF TASK

3-11 DISASSEMBLE COMBUSTION SECTION

INITIAL SETUP

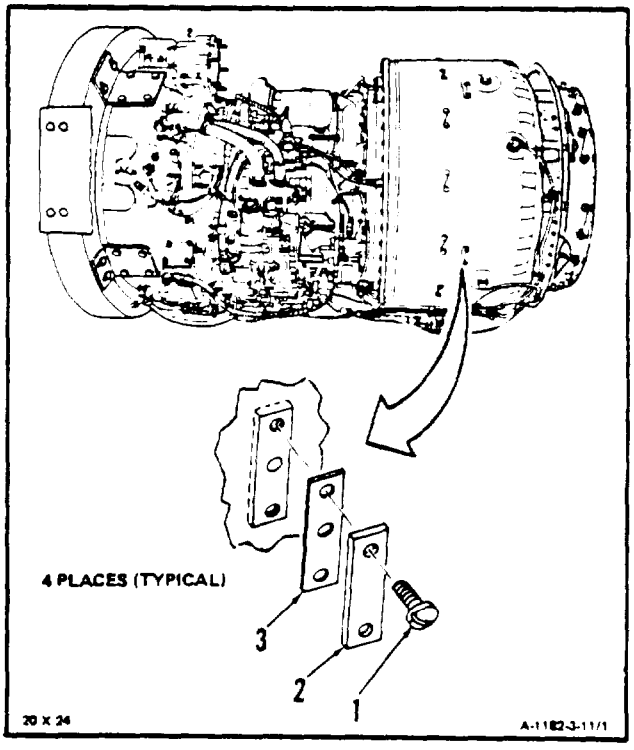
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

1. **Remove** lockwire, eight screws (1), **four plates (2),** and four gaskets (3).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-12 ASSEMBLE COMBUSTION SECTION

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5 180-00-323-4944
Technical Inspection Tool Kit
NSN 5180-00-323-5114

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)

Parts:
Gaskets

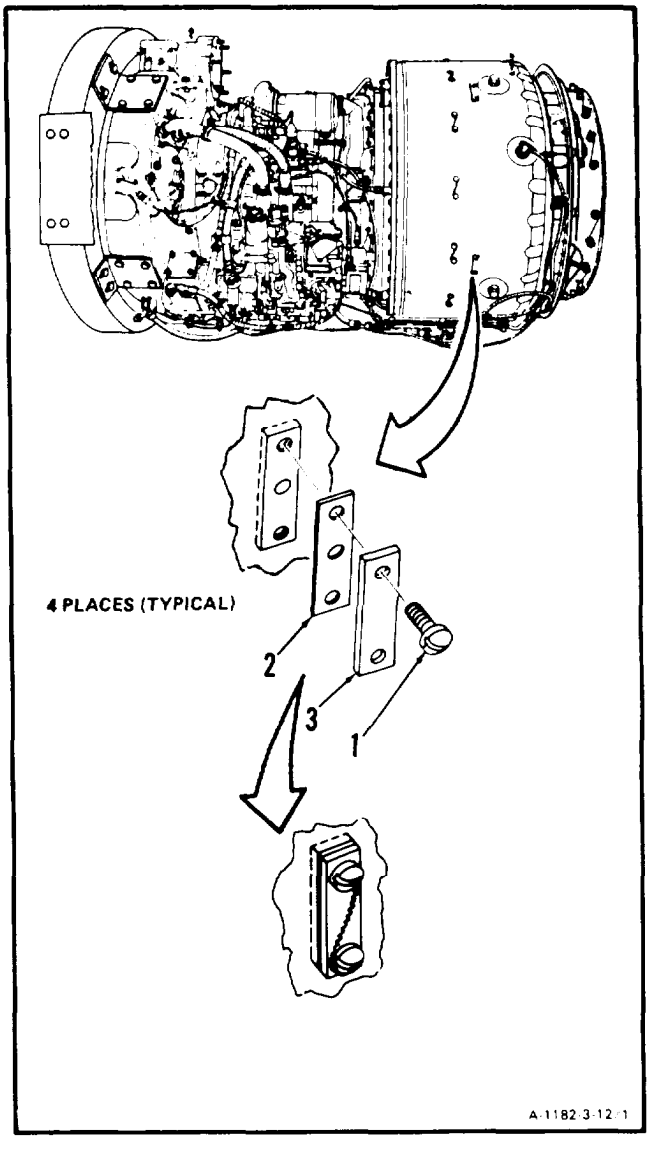
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P

GO TO NEXT PAGE

3-12 ASSEMBLE COMBUSTION SECTION (Continued) 3-12

1. Apply anti-seize compound (E5) to threads of eight screws (1). **Install** four gaskets (2), **plates** (3),and eight screws (1). Lockwire screws (1). Use lockwire (E29).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-13 CLEAN COMBUSTION CHAMBER VANE ASSEMBLY (AVIM) 3-13

INITIAL SETUP

Applicable Configurations.
All

Tools.
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Combustion Section Disassembled (Task 3-9)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

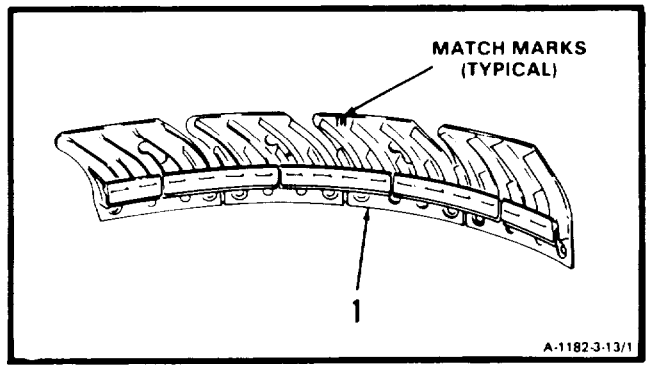
Procedure to clean four combustion chamber vane assembly segments is the same. Only one is shown.

NOTE

When cleaning combustion chamber vane assembly, do not remove match marks.

1. **Clean combustion chamber vane assembly (1)** as follows

   a. Wear gloves (E20) and goggles. Use methyl ethyl ketone (E36) and brush.

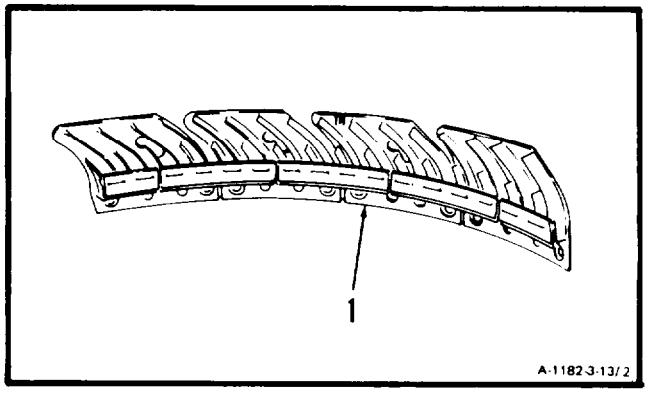


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WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

b. **Blow dry vane assembly (1).** Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Combustion Chamber Vane Assembly (Task 3-14).

END OF TASK

3-14 INSPECT COMBUSTION CHAMBER VANE ASSEMBLY (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

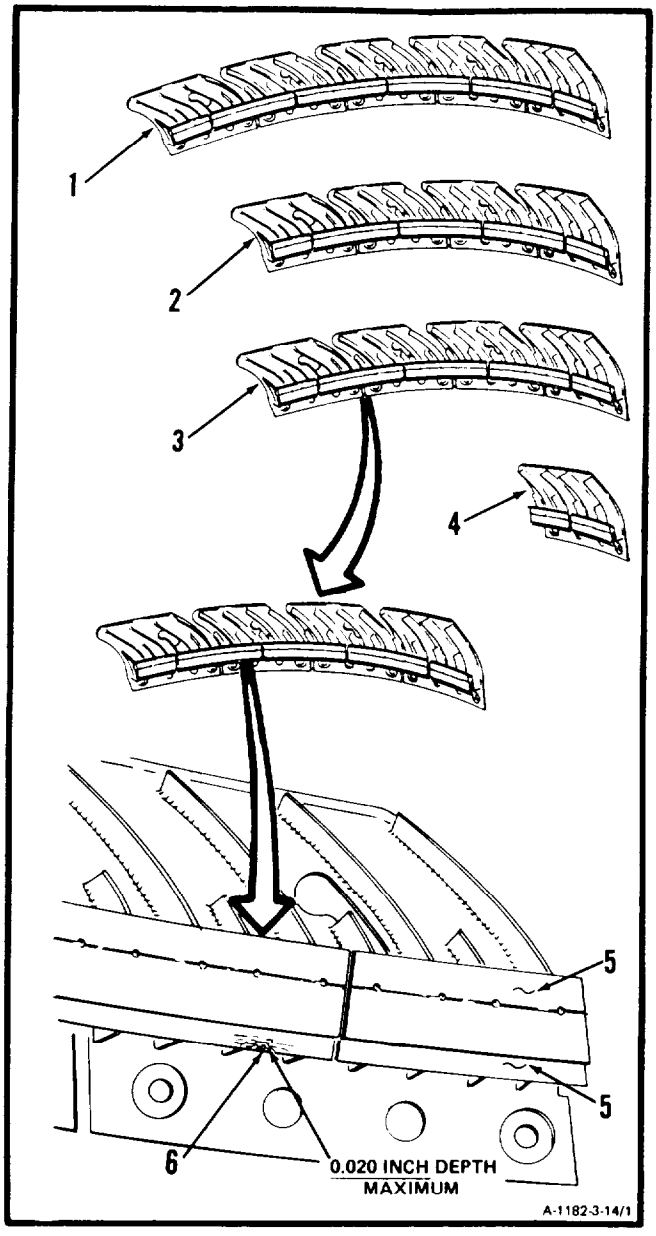
1. **Inspect four vane segments (1, 2, 3 and 4)** as follows:

NOTE

The following inspection applies to four vane segments. Only one vane segment is shown.

a. **Inspect inner shroud (5)** as follows:

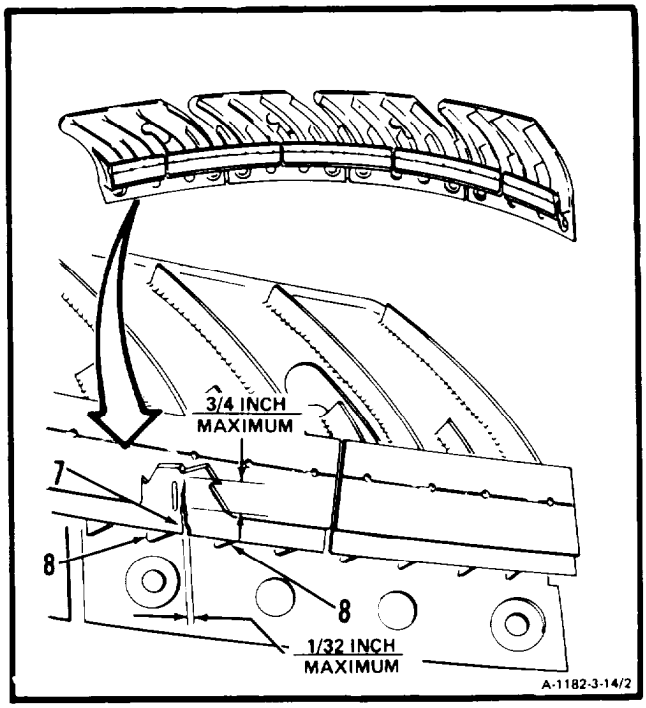
(1) There shall be no chafing wear (6) deeper than 0.020 inch. There shall be no cracks in chafed area.



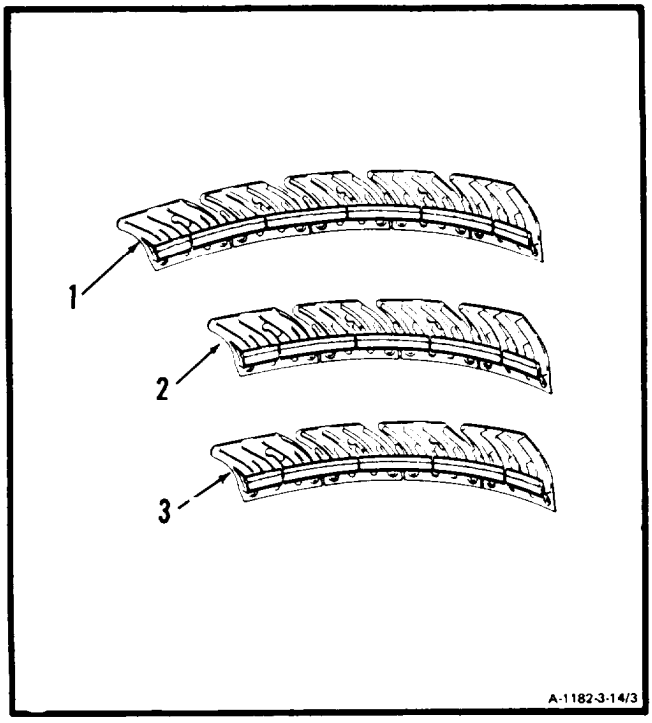
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3-14 INSPECT COMBUSTION CHAMBER VANE ASSEMBLY (AVIM) (Continued)

(2) There shall be no more than one crack (7) between vanes (8). There shall be no cracks (7) longer than 3/4 inch or wider than 1/32 inch.



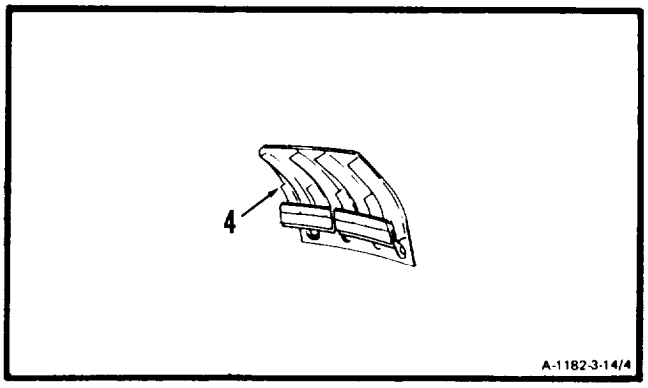
(a) The total length of all cracks in the three longer vane assemblies (1, 2 and 3) shall not be greater than 6 inches.



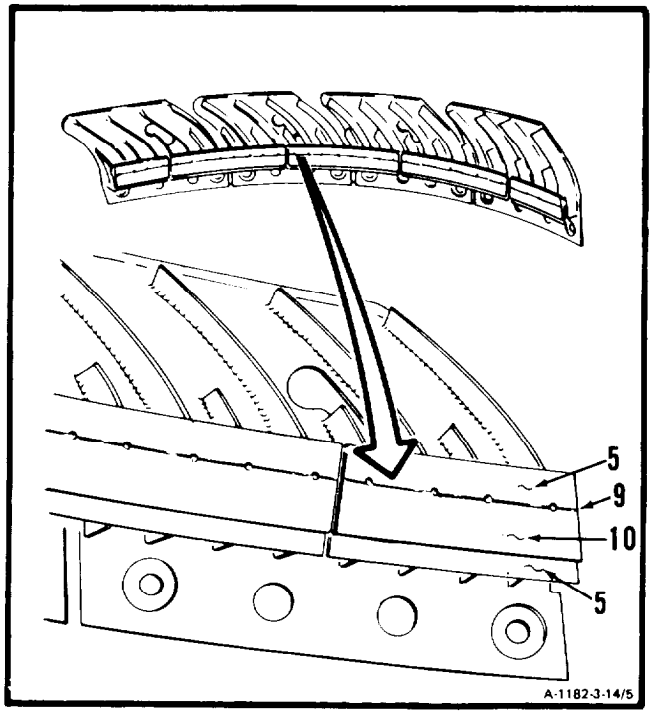
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3-14 INSPECT COMBUSTION CHAMBER VANE ASSEMBLY (AVIM) (Continued) 3-14

(b) The total length of all cracks in the shorter vane assembly (4) shall not be greater than 2 inches.

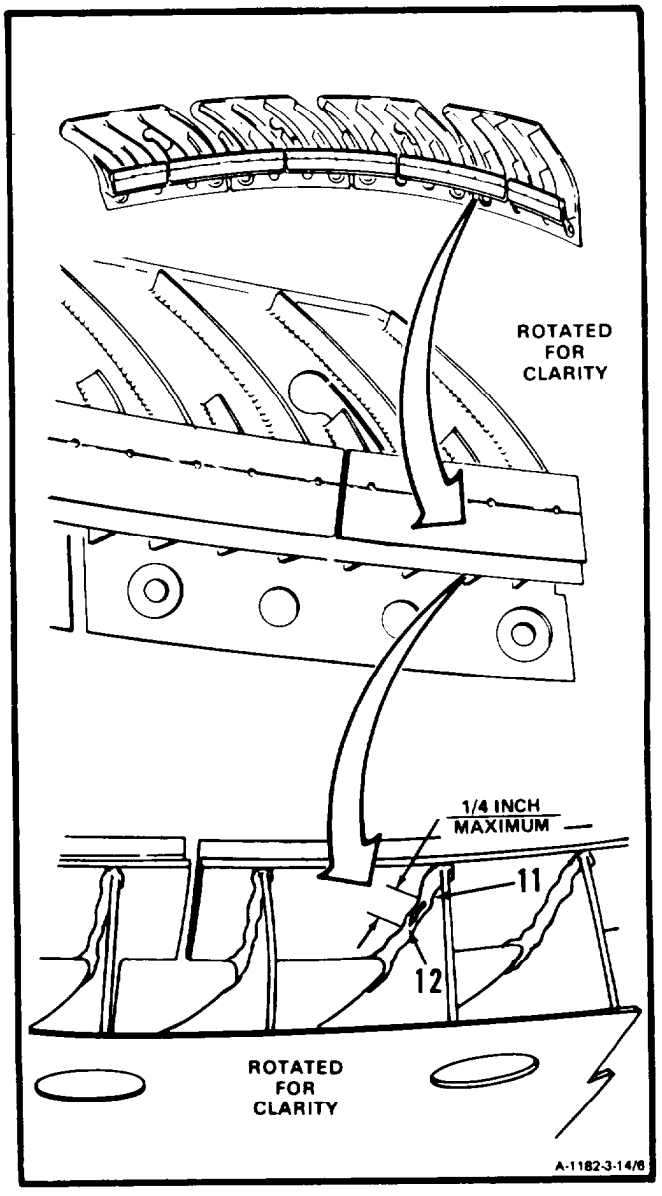


(3) lnspect weld join t (9) between inner shroud (5) and ring (10). There shall be no cracks.



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(4) Inspect vane brazement (11). There shall be no cracks (12) longer than 1/4 inch.



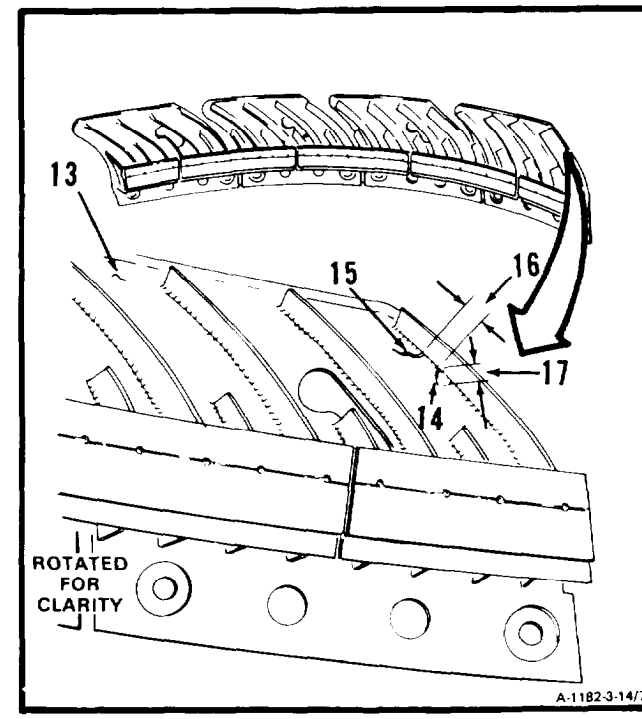
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3-14 INSPECT COMBUSTION CHAMBER VANE ASSEMBLY (AVIM) (Continued) 3-14

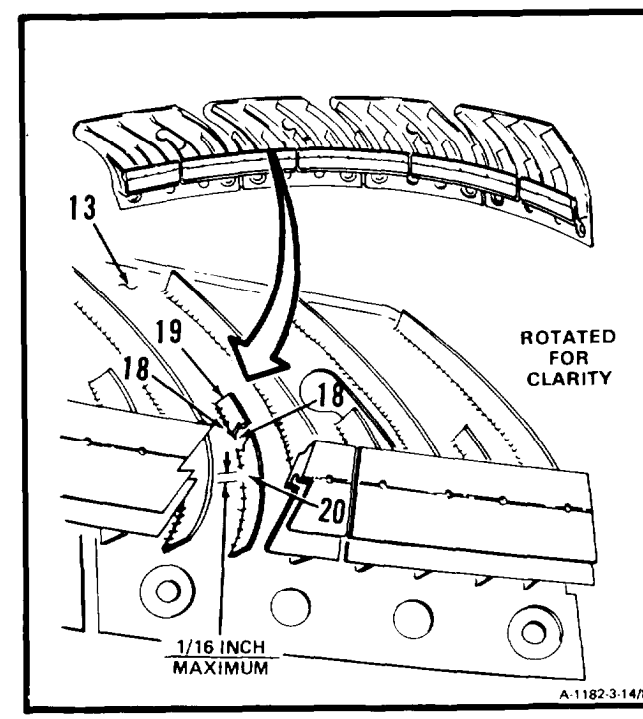
b. Inspect outer shroud (13) as follows:

(1) Thereshall be no cracks (14 and 15) which do not have minimum separation (16).

(a) Minimum separation (16) shall be equal to the length (17) of shorter crack (14).



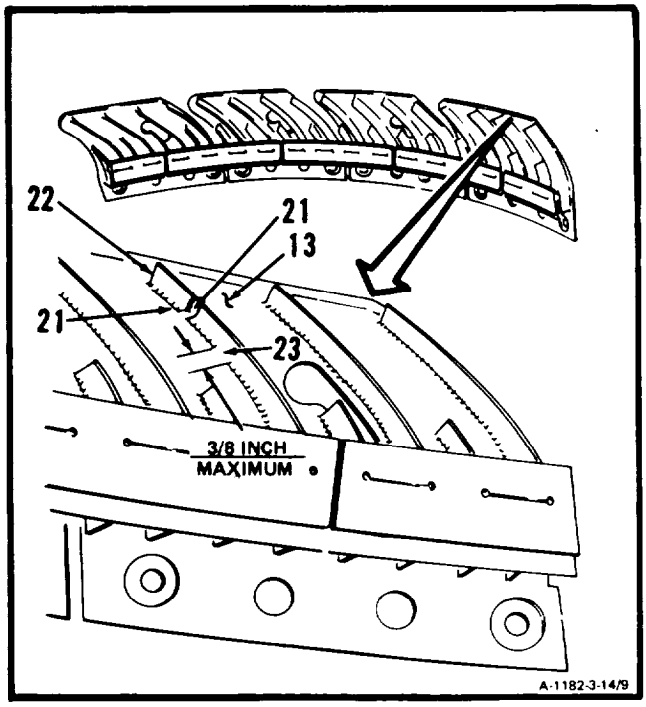
(2) Inspect brazement (18) between short vane (19) and outer shroud (13). There shall be no cracks or lack of braze (20) longer than 1/16 inch.



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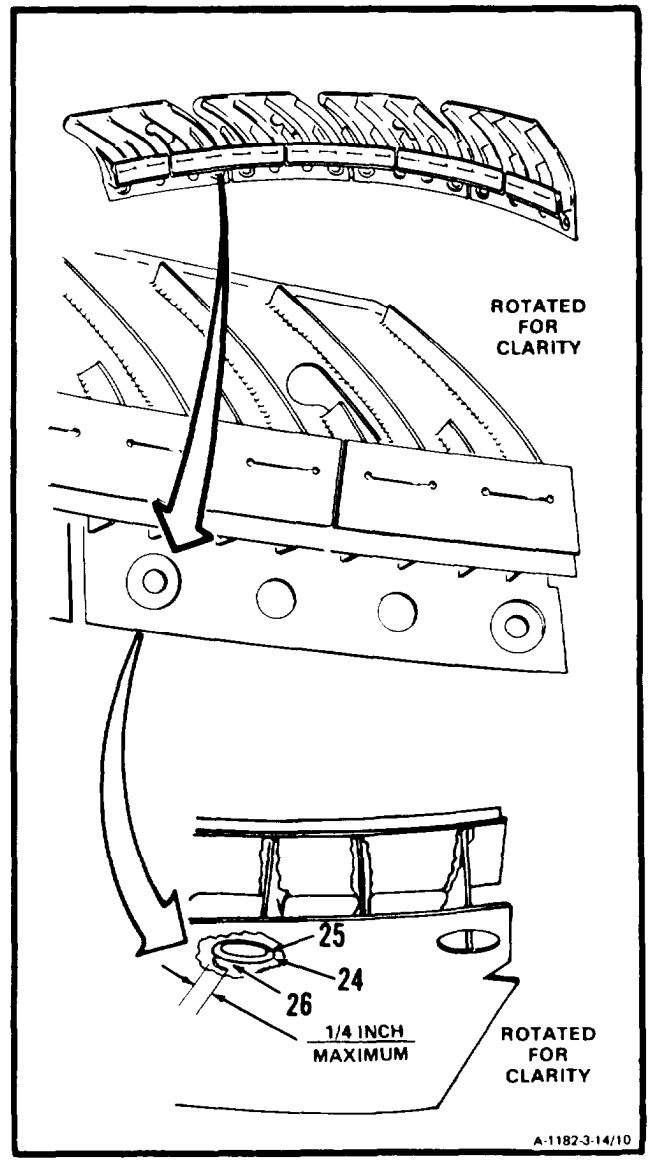
3-14 INSPECT COMBUSTION CHAMBER VANE ASSEMBLY (AVIM) (Continued)

(3) Inspect brazement (21) between long vane (22) and outer shroud (13). There shall be no cracks or lack of braze (23) longer than 3/8 inch..



GO TO NEXT PAGE

(4) Inspect braze joint (24) around boss (25). There shall be no circular cracks (26) longer than 1/4 inch.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-15 REPAIR COMBUSTION CHAMBER VANE ASSEMBLY (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Soft Face Mallet
Wooden Block (Appendix E)

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

GO TO NEXT PAGE

1. Repair distortion in four vane segments (1, 2, 3 and 4) as follows:

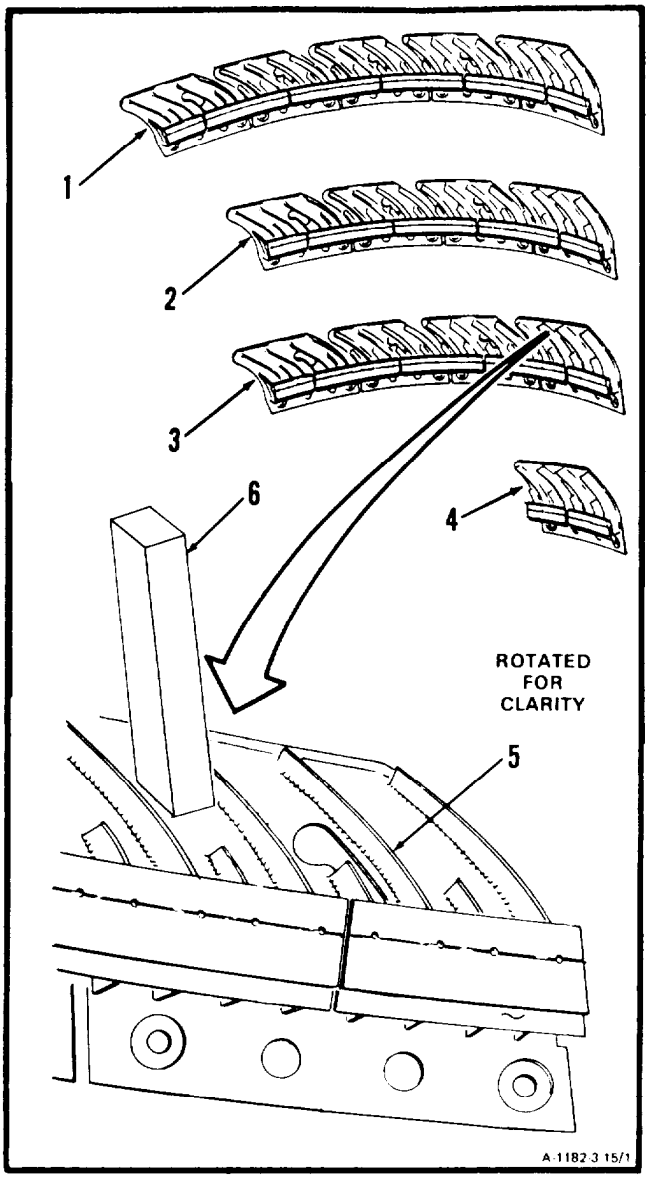
NOTE

The following steps apply to four vane segments. Only one vane segment is shown.

a. Position vane segment concave side (5) up on workbench.

b. Place wooden block (Appendix E) (6) in vane segment.

c. Using soft face mallet, rework distorted vane segment to original shape.



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-16 CLEAN COMBUSTION CHAMBER LINER (AVIM) 3-16

INITIAL SETUP

Applicable Configurations.
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Combustion Section Disassembled (Task 3-9)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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3-16 CLEAN COMBUSTION CHAMBER LINER (AVIM) (Continued)

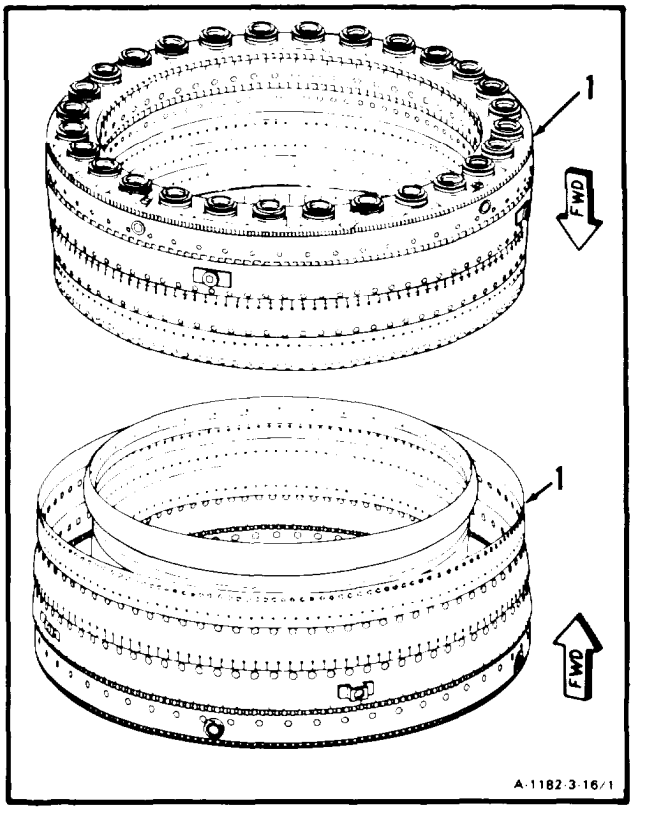
1. Clean combustion chamber liner (1) as follows

   a. Wear gloves (E20) and goggles. Use methyl ethyl ketone (E36) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure, Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

   b. **Blow dry combustion chamber liner** (1). Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE

Inspect Combustion Chamber Liner (Task 3-17).

END OF TASK

3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) 3-17

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

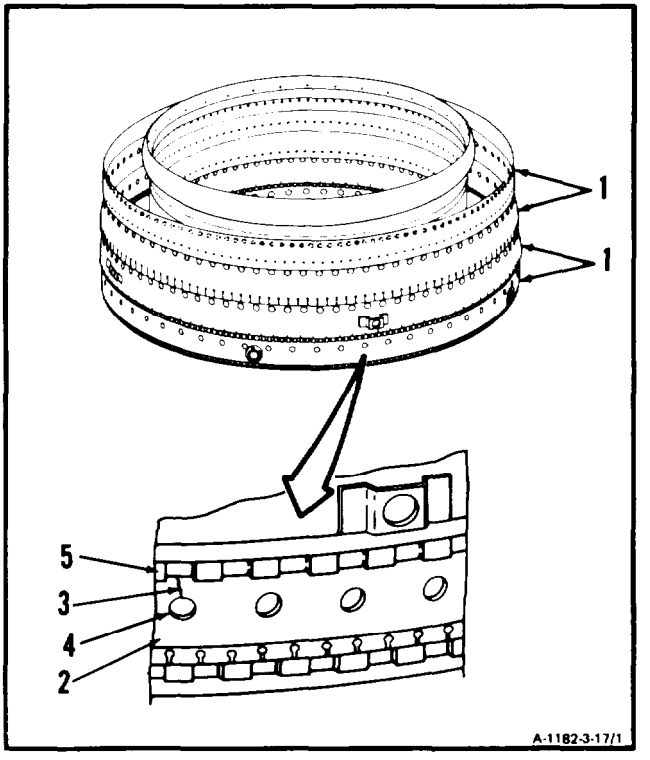
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect four outer liners (1)** as follows:

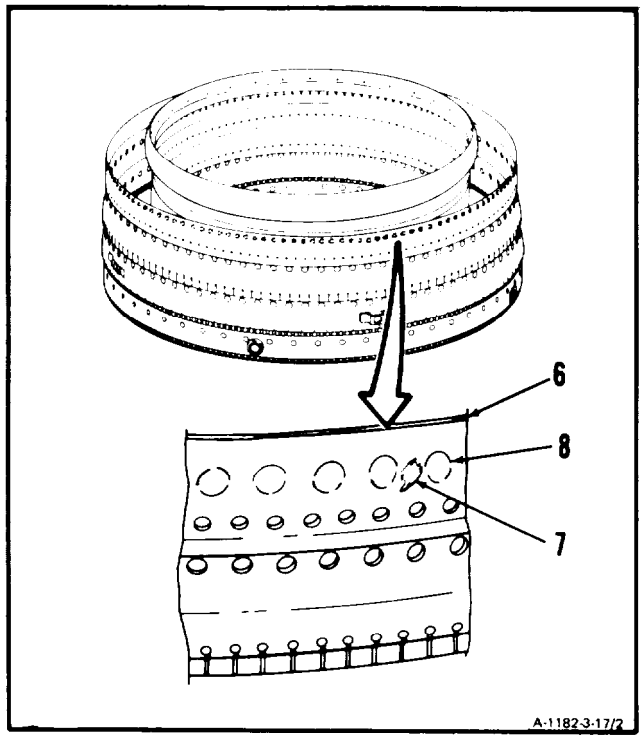
   a. **Inspect aft outer liner (2).** There shall be no more than one crack (3) per hole (4) reaching to forward edge (5)



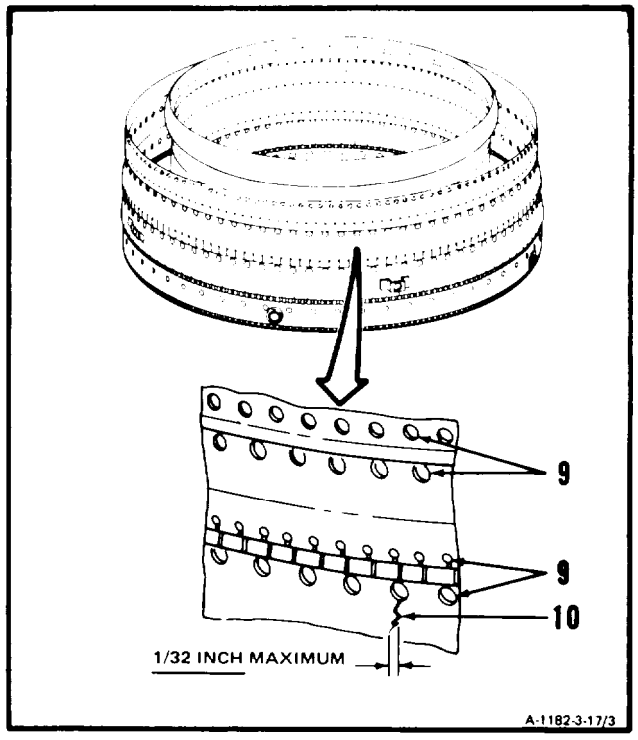
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3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-17

b. **Inspect forward outer liner (6).** There shall be no holes (7) worn through in dimpled area (8).



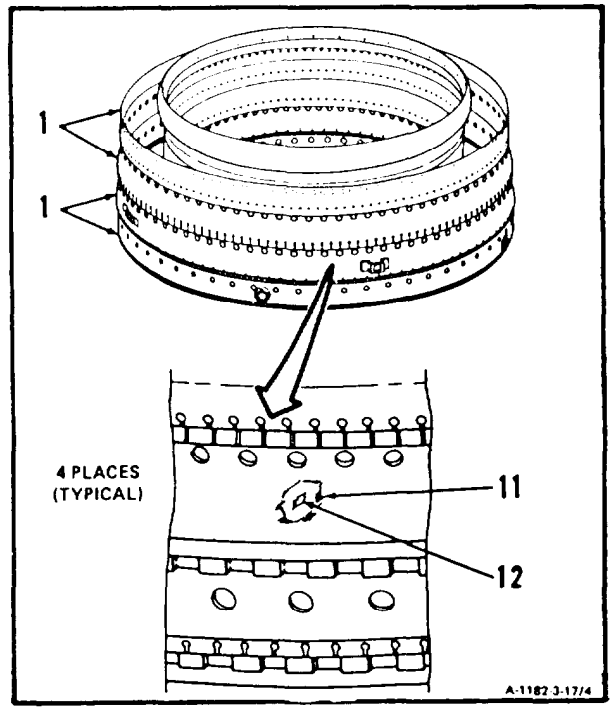
c. **Inspect air holes (9).** There shall be no more than one crack (10) per hole. These cracks shall not be more than 1/32 inch wide. There is no limit on length of these cracks.



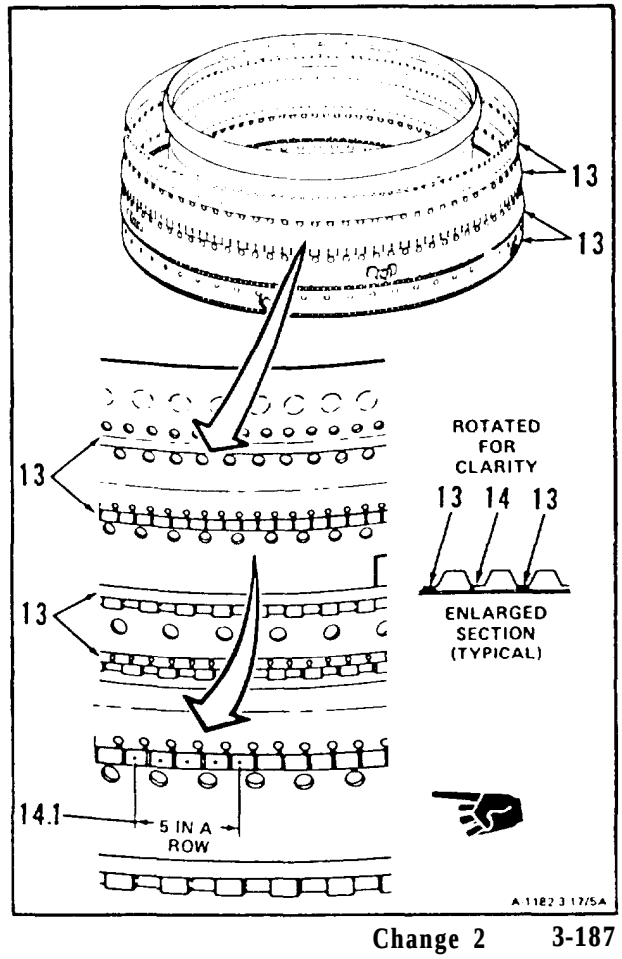
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3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

d. **Inspect for burned areas (11)** on four outer liners (1). There shall be no holes (12).



e. **Inspect joints (13).** There shall be no more than five broken or cracked spotwelds (14) in a row (14.1).

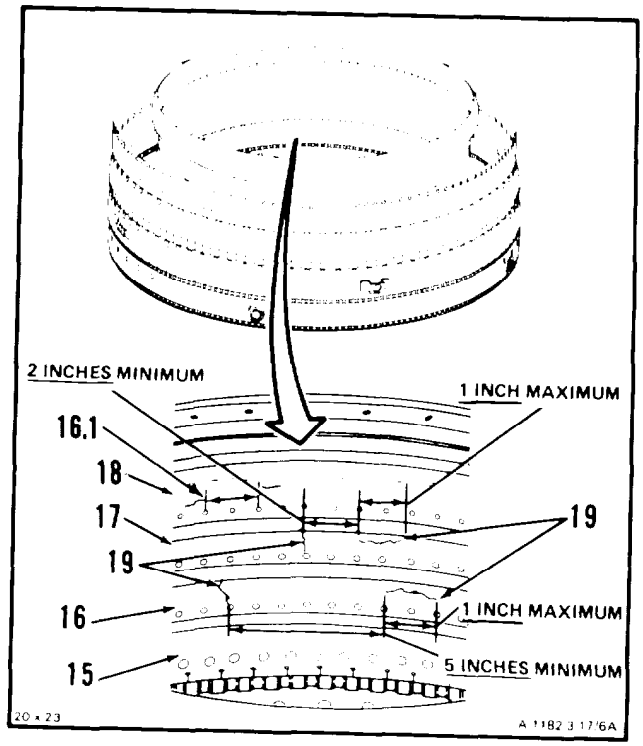


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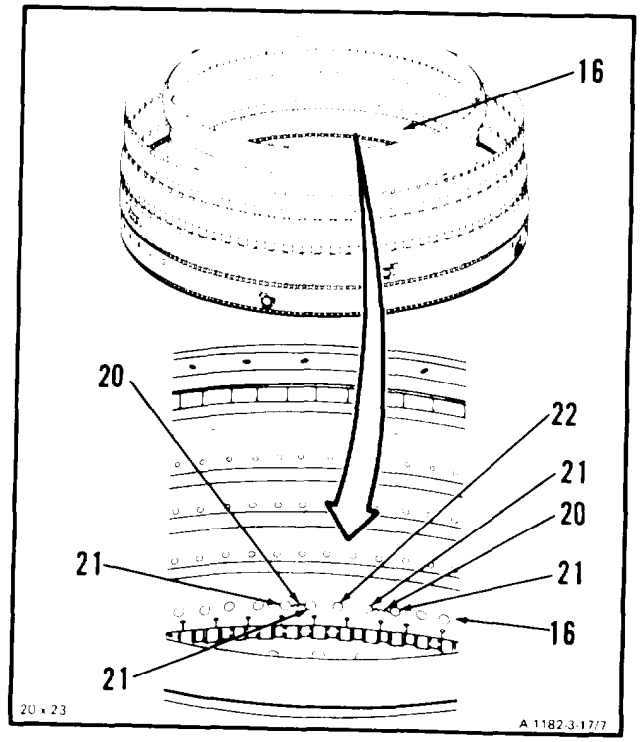
3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-17

2. **Inspect four inner liners (15, 16, 17, and 18)** as follows:

   a. There shall be no cracks (19) longer than 1 inch. There shall be no cracks less than 5 inches apart on liners (15, 16 and 17) or less than 2 inches apart on liner (18). All inner liners (15, 16, 17, 18) are allowed to have two adjacent cracks (16.1). These cracks must be separated by 1 inch.



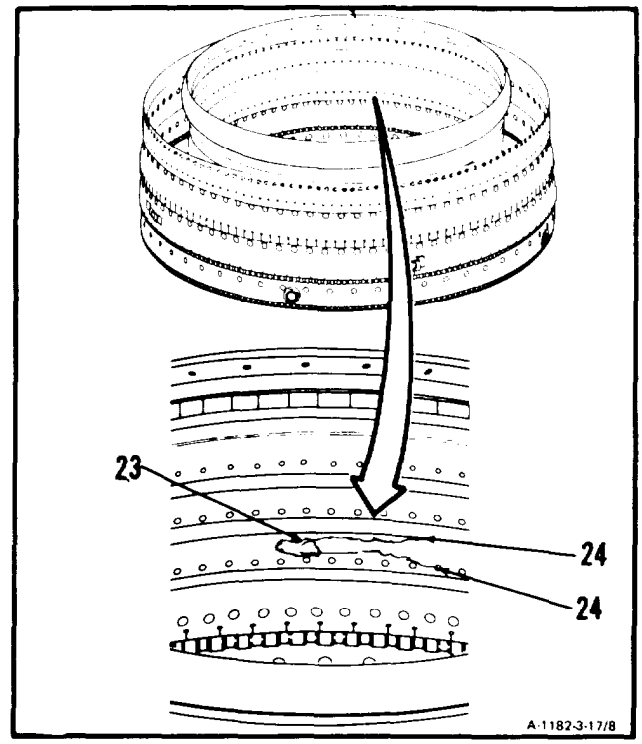
   b. **Inspect aft inner liner (16).** There shall be no more than five hole to hole cracks (20) between holes (21). These cracks must be separated by at least one hole without cracks (22).



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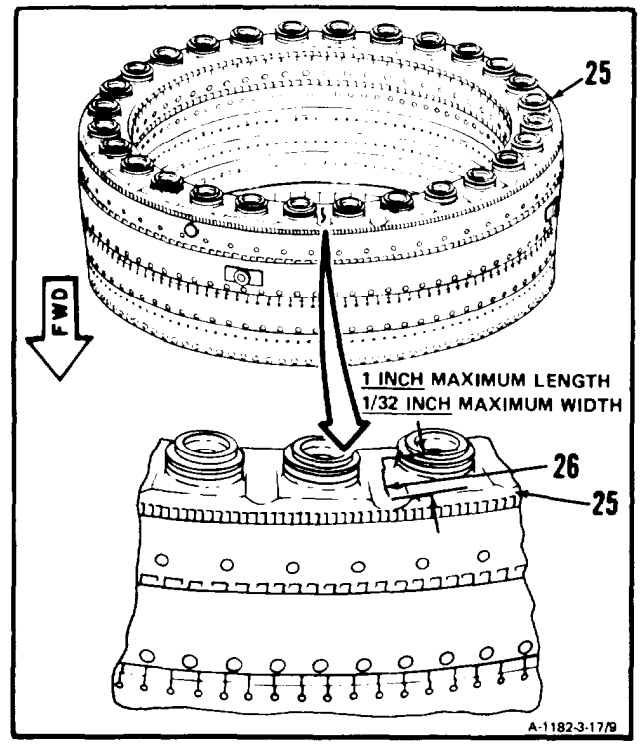
3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-17

c. **Inspect for burned areas (23).** There shall be no converging cracks (24) in burned areas which could result in loss of material.



3. **Inspect liner end (25)** as follows:

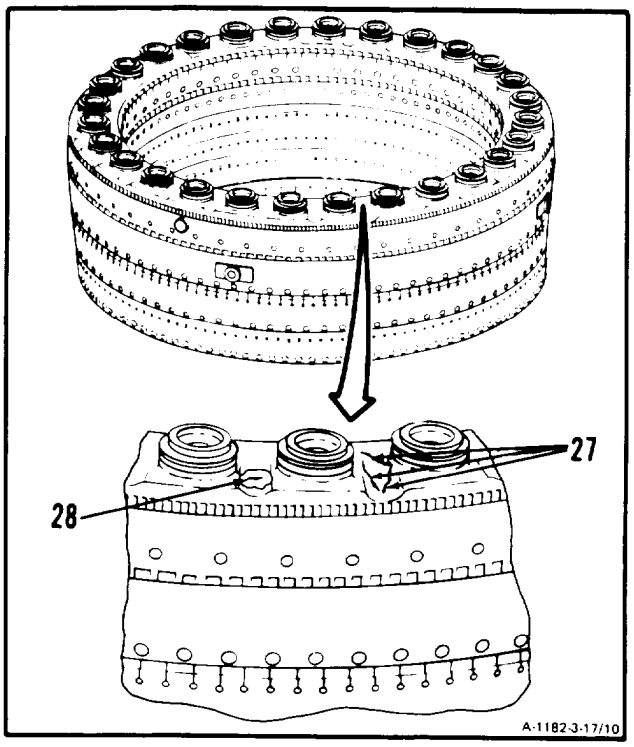
a. There shall be no cracks (26) longer than 1 inch or wider than 1/32 inch. The total length of all cracks shall not exceed 10 inches.



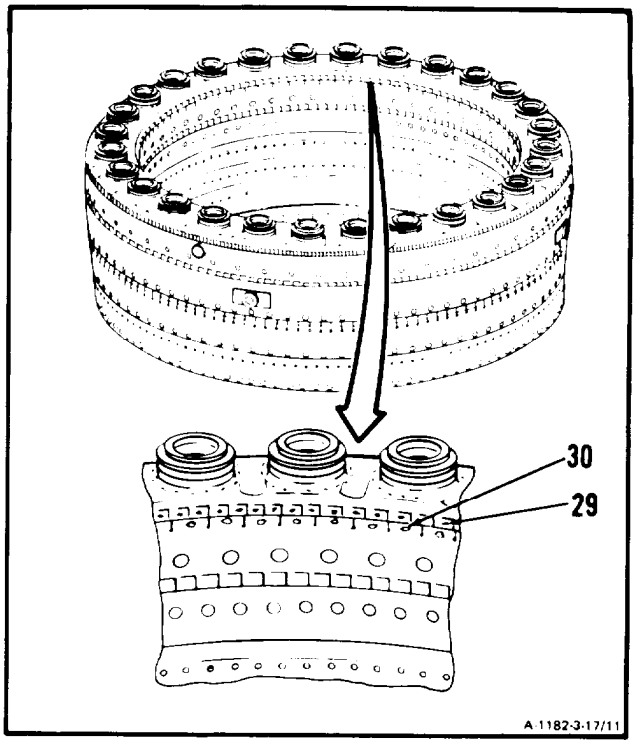
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b. There shall be no converging cracks (27) which could result in loss of material.

c. There shall be no holes (28) burned through.



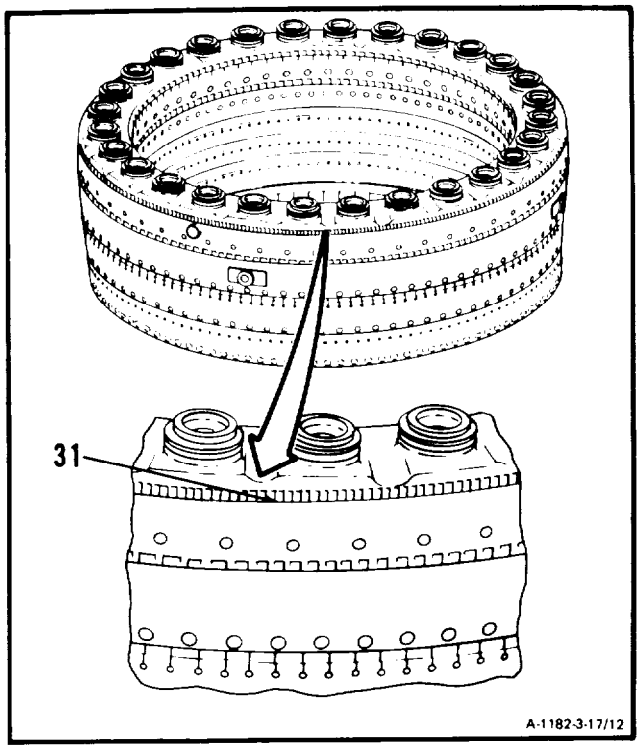
d. **Inspect joint (29).** There shall be no separation in area of spot welds (30).



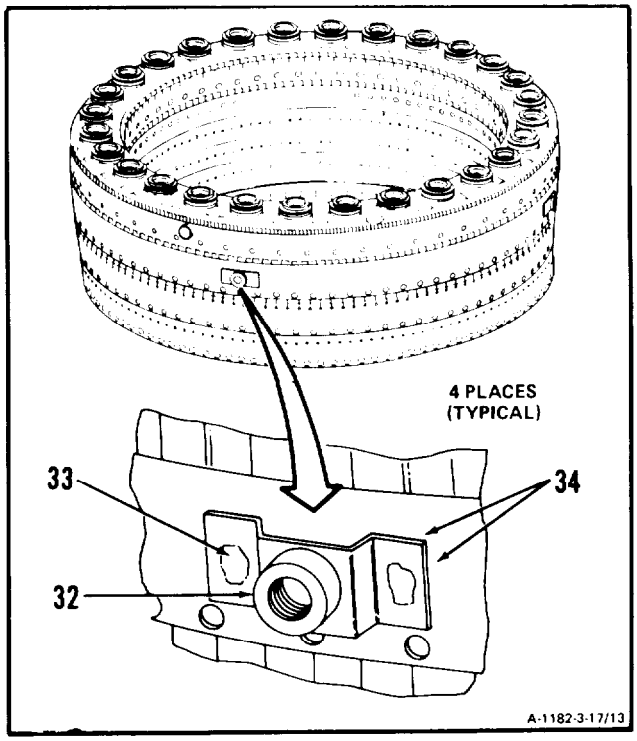
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3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

e. **Inspect joint (31).** There shall be no separation.



4. **Inspect four locating bushings (32).** There shall be no cracks in bushing (32), welded area (33), or mounting area (34).

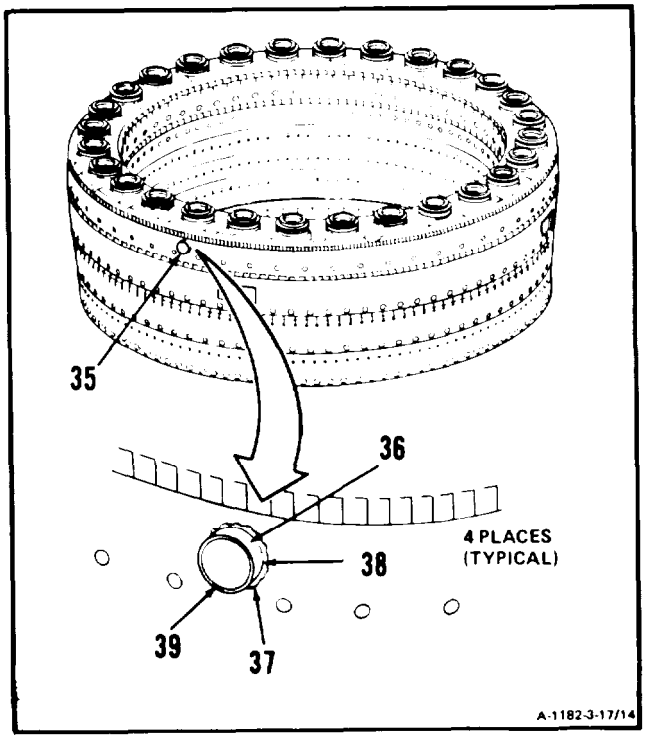


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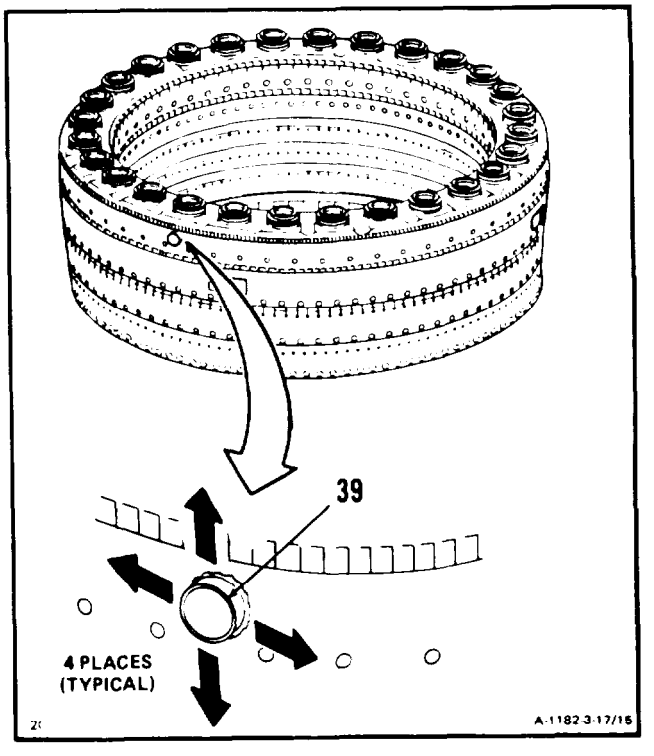
3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

5. **Inspect four seal assemblies (35)** as follows:

   a. There shall be no cracks in cup (36), welded area (37), mounting area (38), or igniter plug seal (39).



   b. Push igniter plug seal (39) sideways in all directions. Seal shall move freely in any direction. Use light finger force effort.

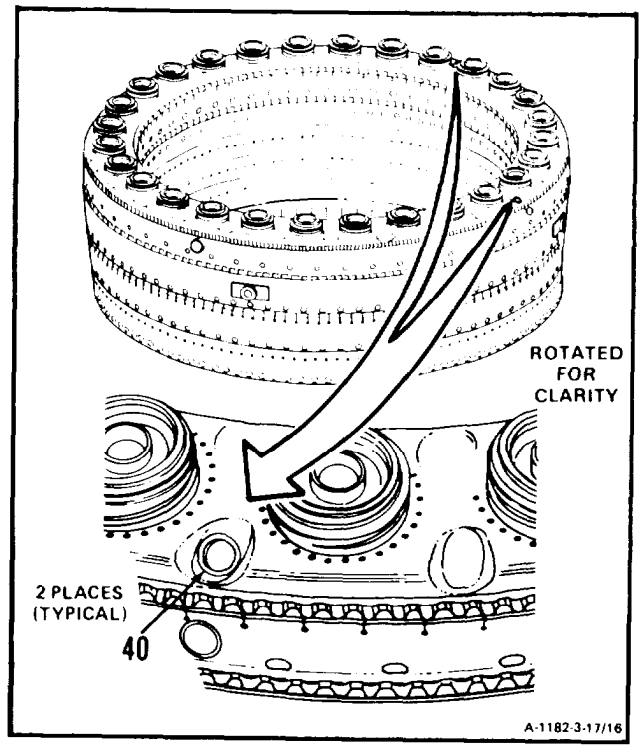


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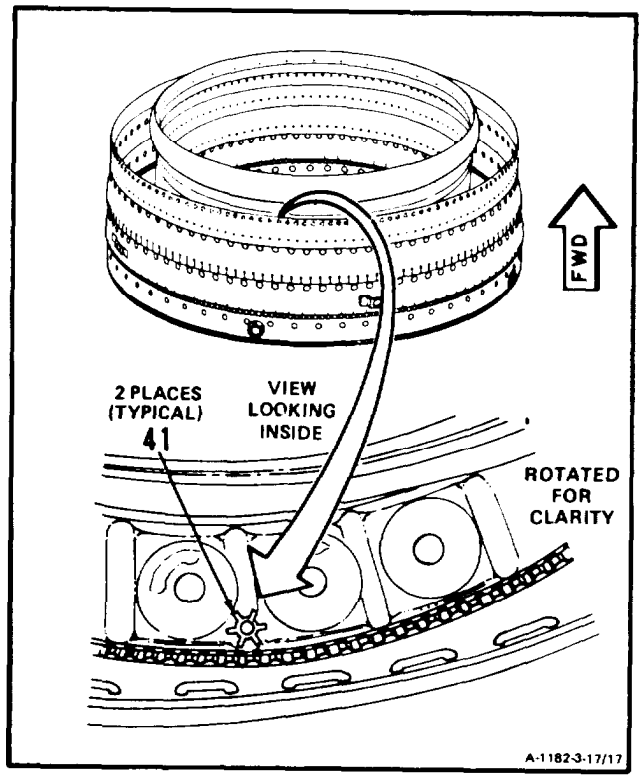
3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

6. **Inspect two guides (40)** as follows:

a. There shall be no cracks.

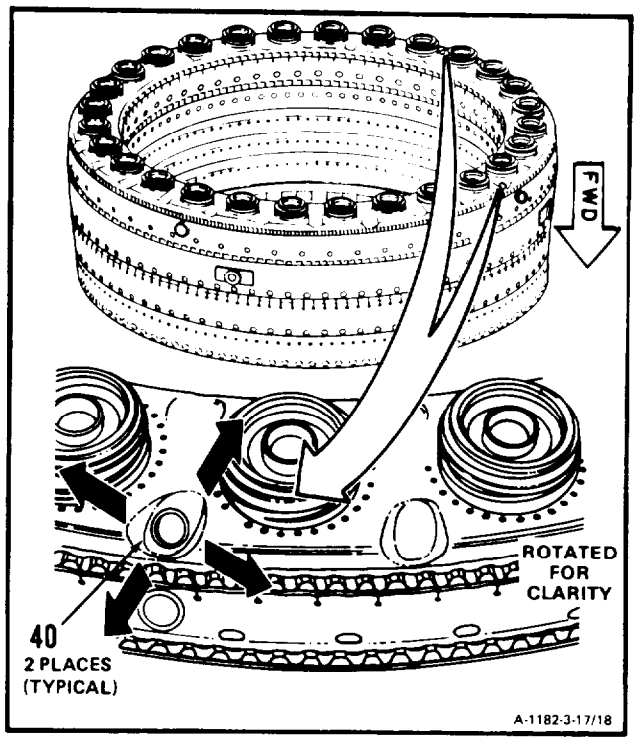


b. There shall be no broken, cracked or missing tabs (41).



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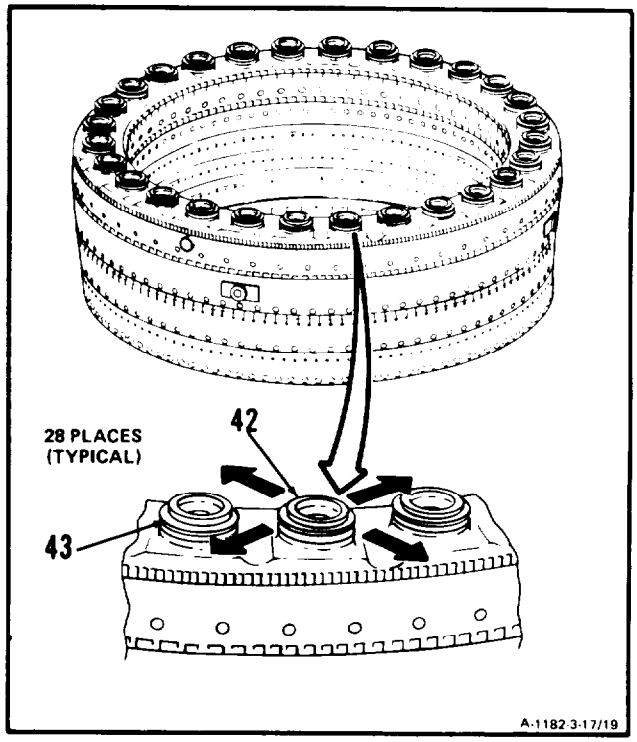
c. Push guide (40) sideways in all directions. Guide shall move freely in any direction. Use light finger force effort.



7. **Inspect 28 swirlers (42)** as follows:

a. Push swirler (42) sideways in all directions with hand. Firm hand pressure shall move swirler slightly. Swirlers shall be considered excessively loose if they can be moved radially with a light finger force effort.

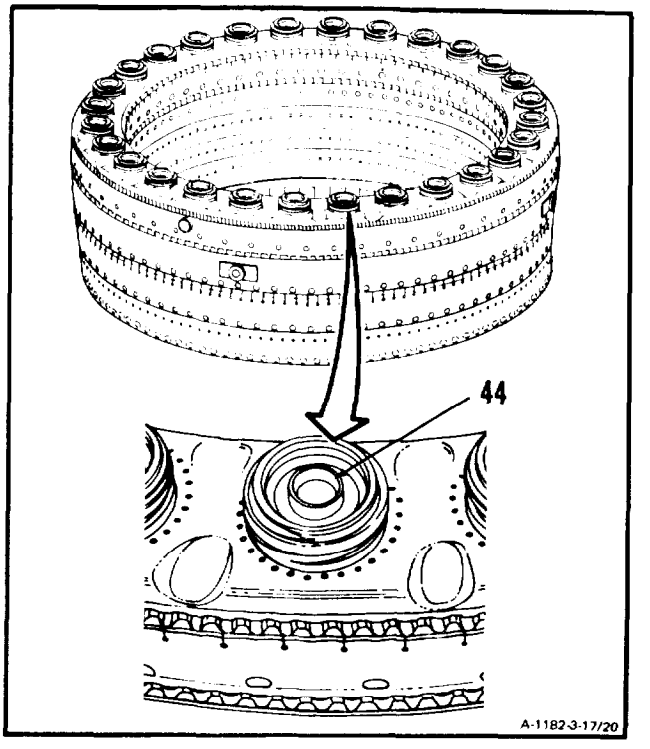
b. Inspect spring (43). There shall be no broken coils.



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3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

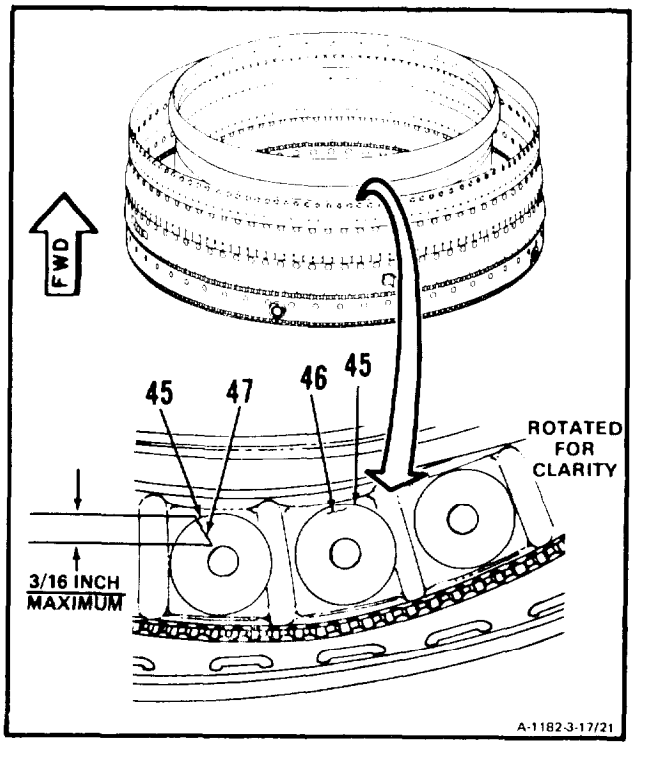
c. **Inspect fuel nozzle contact area (44).** There shall be no wear that breaks through nozzle contact area (44).



d. **Inspect swirler cup outer edges (45)** as follows:

(1) There shall be no circular cracks (46).

(2) There shall be no radial cracks (47) longer than 3/16 inch.

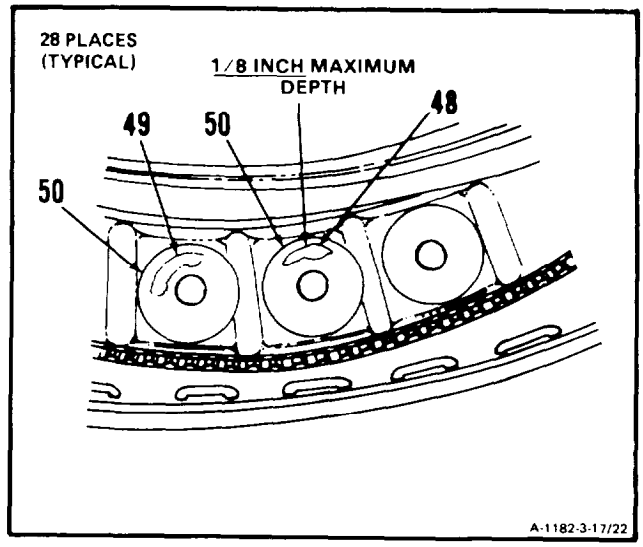


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3-17 INSPECT COMBUSTION CHAMBER LINER (AVIM) (Continued)

(31 There shall be no burns (48) deeper than 1/8 Inch.

(4) Burned area (49) shall not extend more than one-quarter of the way around swirler cup (50).



FOLLOW-ON MAINTENANCE

None

END OF TASK

3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5 180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Clinching Tool (T41)
Swirler Installation Tool (Appendix E)
Torque Wrench, 30-150 Inch-Pounds
Goggles (2)

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

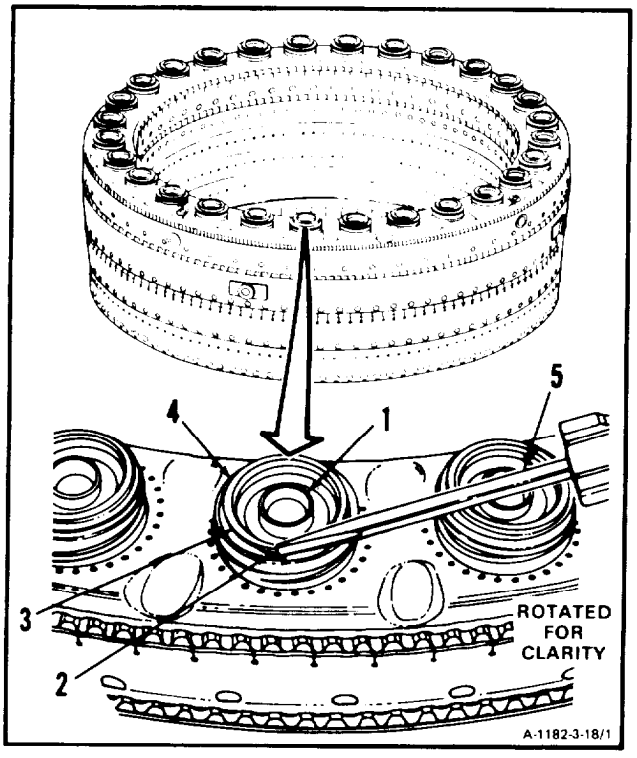
References:
TM 55-2840-254-23P

1. Remove swirler (1) as follows:

WARNING

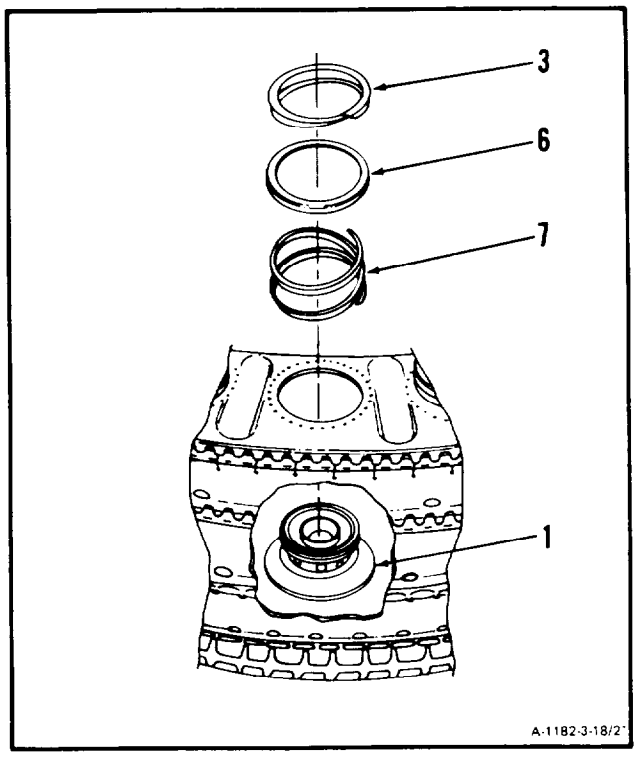
Be careful when removing retaining ring. Spring tension could cause parts to spring up and cause injury. If injury occurs, get medical attention.

a. Wear goggles, Pry tab (2) of ring (3) out from under lip (4) of swirler (1). Usescrewdriver (5).



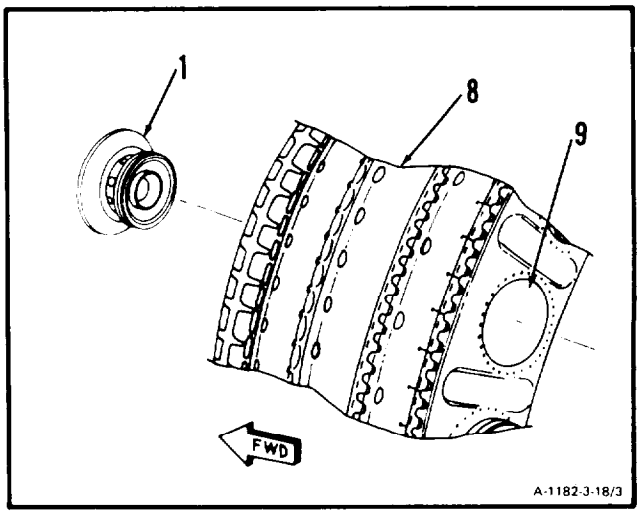
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b. Remove ring (3), seat (6), and spring (7). Swirler (1) will drop to bench.



2. **Install swirler (1)** as follows:

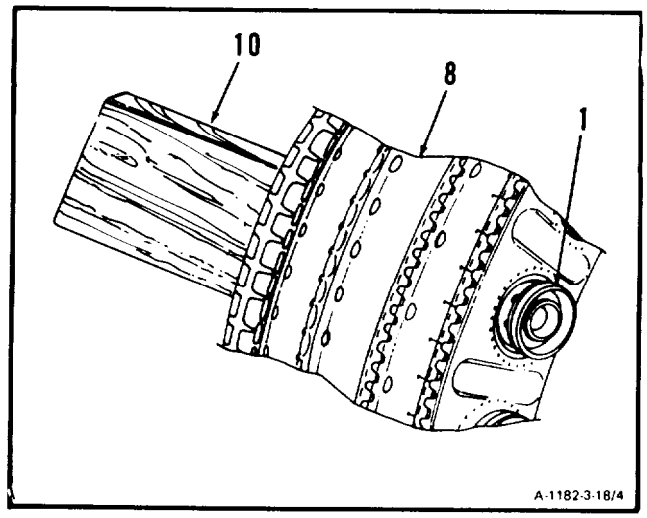
a. Install serviceable swirler (1) through forward end of liner (8) and into hole (9).



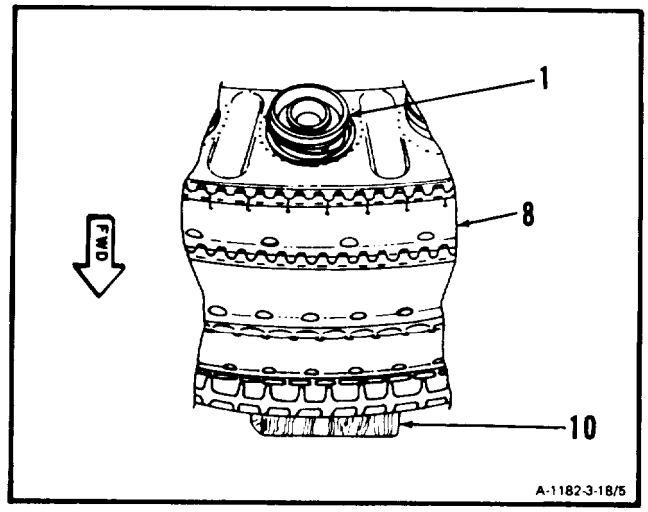
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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-18

b. Using swirler installation tool (Appendix E) (10), hold swirler (1) in place in liner (8).



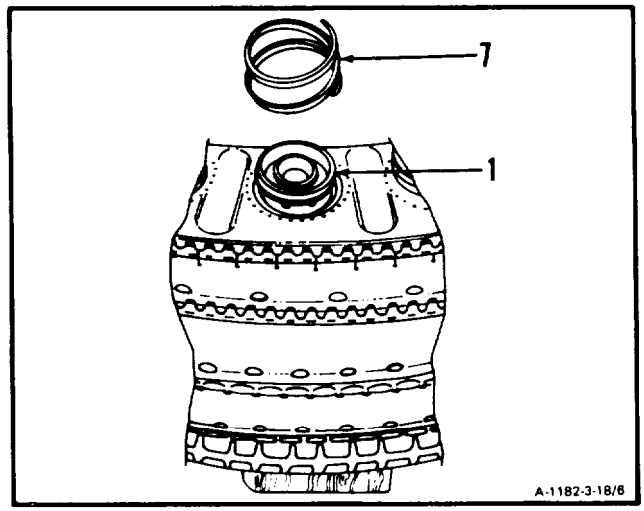
c. Set swirler (1), liner (8), forward end down, and swirler installation tool (10) on bench so swirler (1) is held in place by swirler installation tool (10).



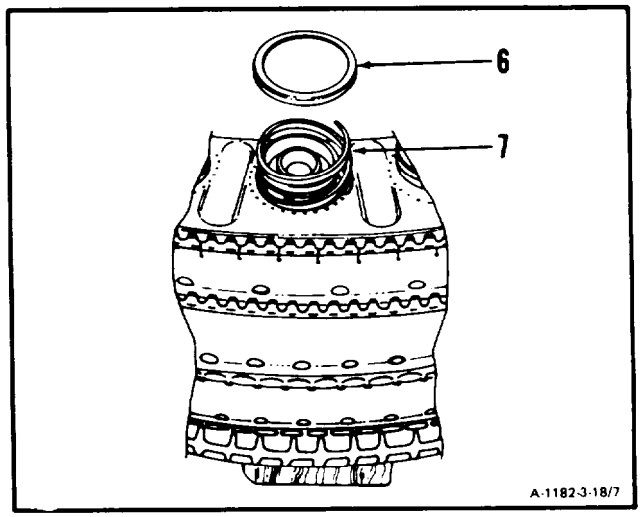
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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued)

d. Install spring (7) over swirler (1).



e. Install seat (6) on spring (7).



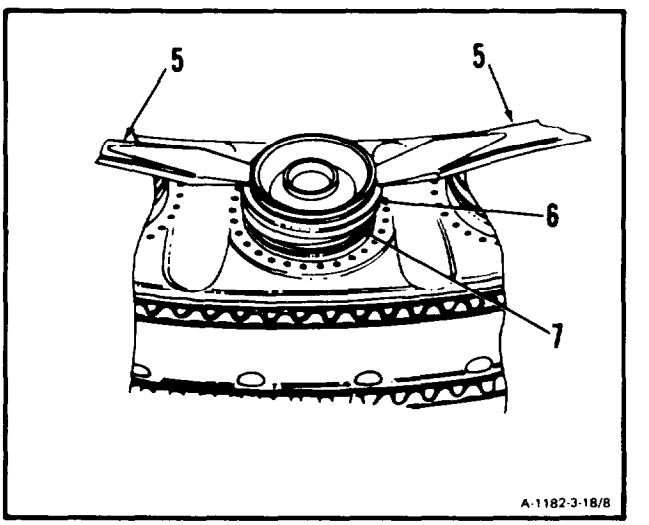
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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued)

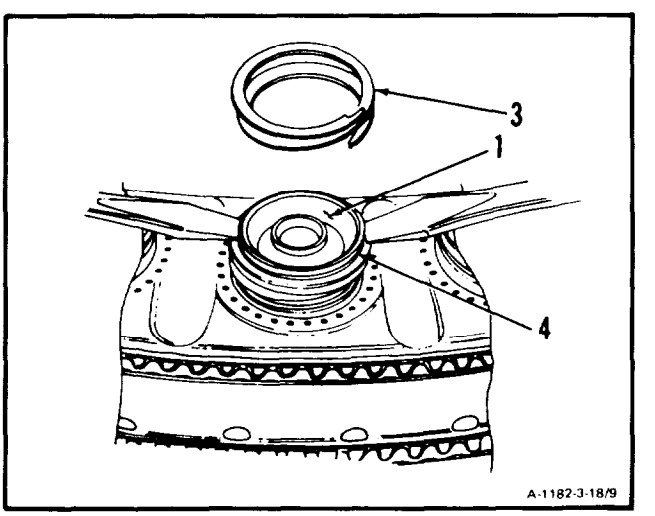
WARNING

Be careful when installing retaining ring. Spring tension could cause parts to spring up and cause injury. If injury occurs, get medical attention.

f. Wear goggles. Using two screw drivers (5) press down seat (6) to compress spring (7).



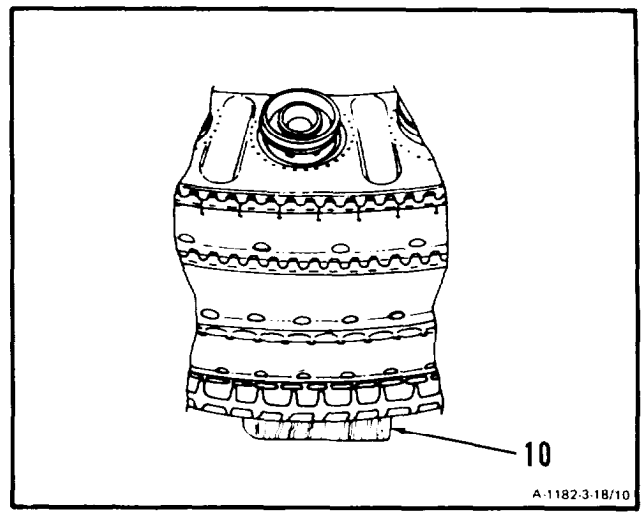
g. Have helper wear goggles and install ring (3) under lip (4) of swirler (1).



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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued)

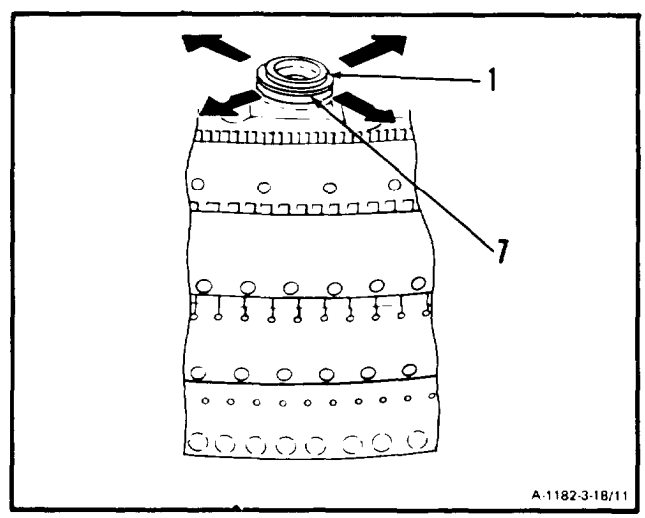
h. Remove swirler installation tool (10).



i. **Check swirler for proper fit and spring tension** as follows:

(1) Push swiler (1) sideways in all directions with hand, Firm hand pressure shall move swirler slightly, Swirlers shall be considered excessively loose if they can be moved radially with a light finger force effort.

(2) If swirler is excessively loose, replace spring (7).



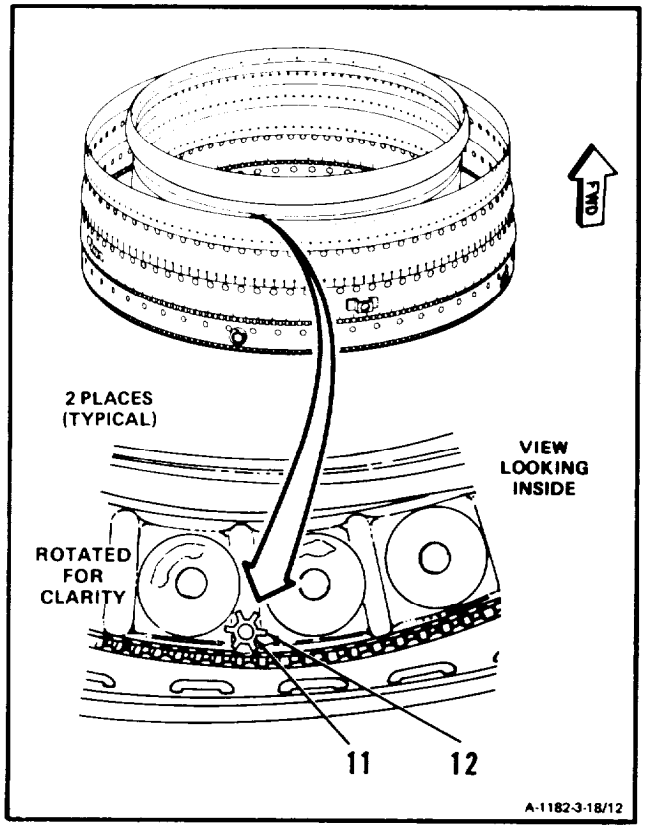
INSPECT

GO TO NEXT PAGE

3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-18

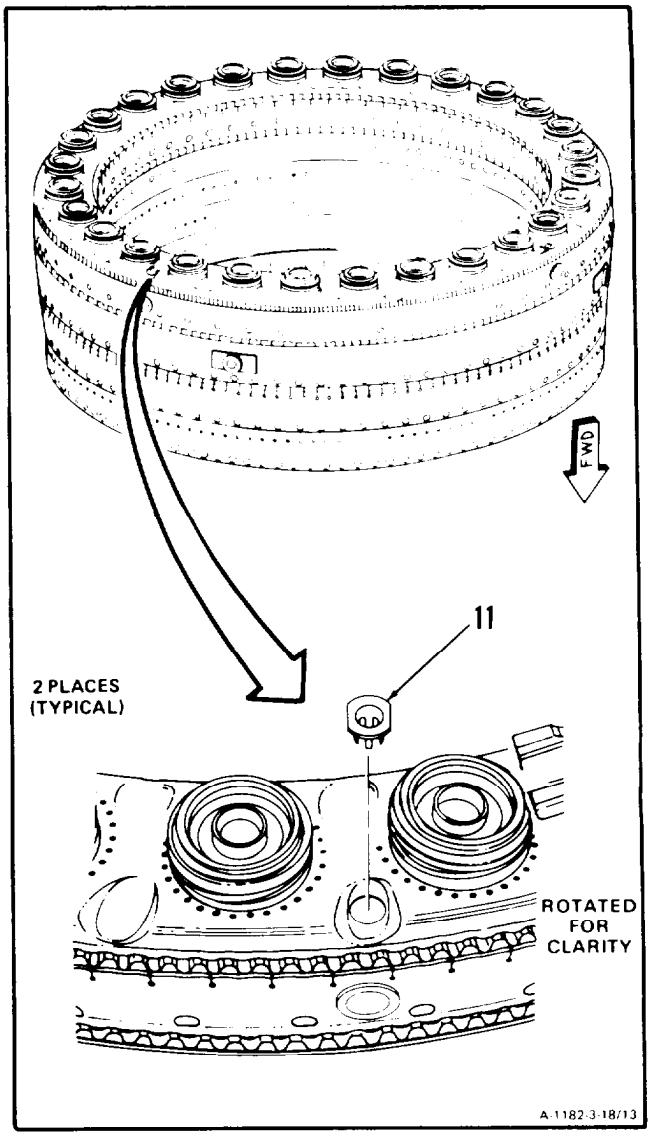
3. **Remove nozzle guide (11)** as follows:

   a. Straighten six bent tabs (12). Use 6 inch long, round nose pliers.



GO TO NEXT PAGE

b. Remove nozzle guide (11).

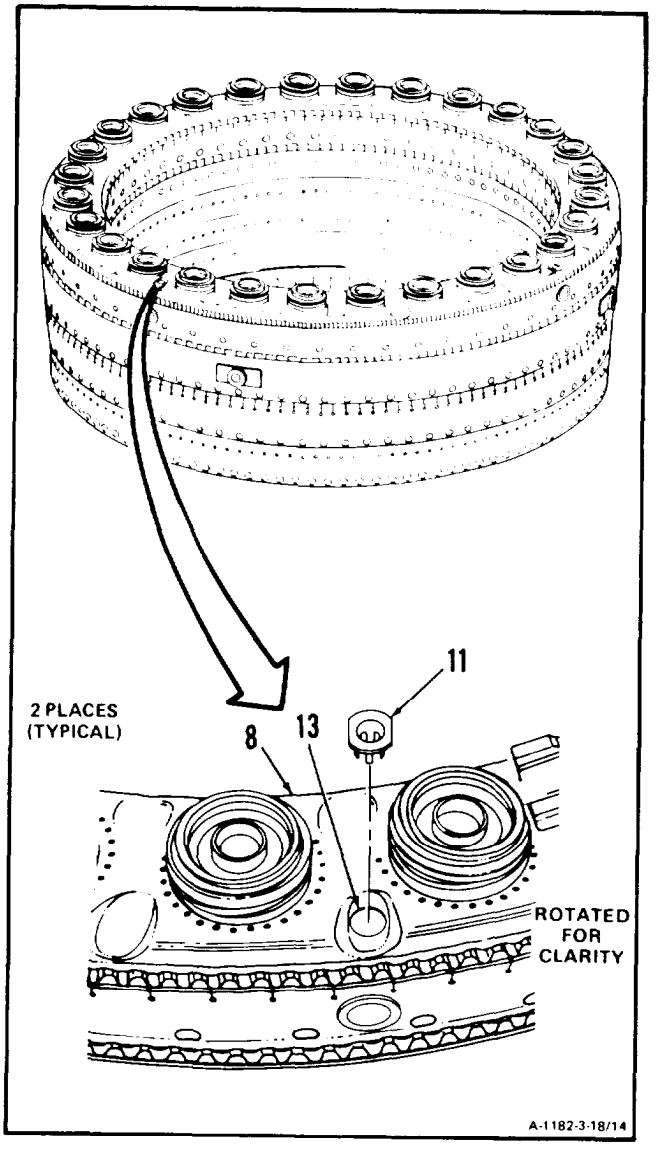


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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued) 3-18

4. **Install nozzle guide (11)** as follows:

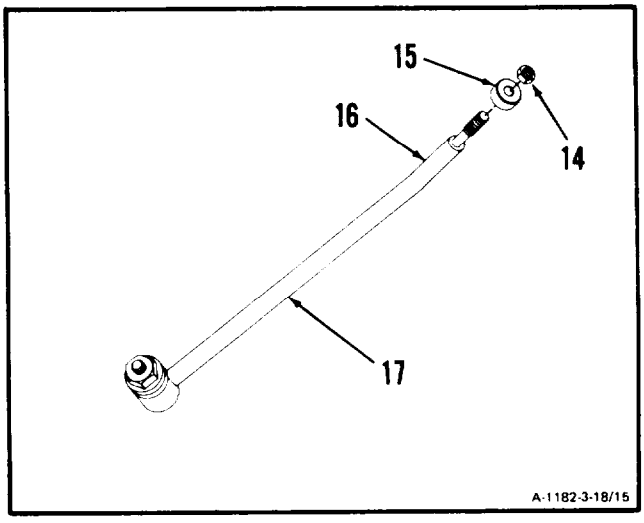
   a. Install nozzle guide (11) in hole (13) in combustion chamber liner (8).



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3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued)

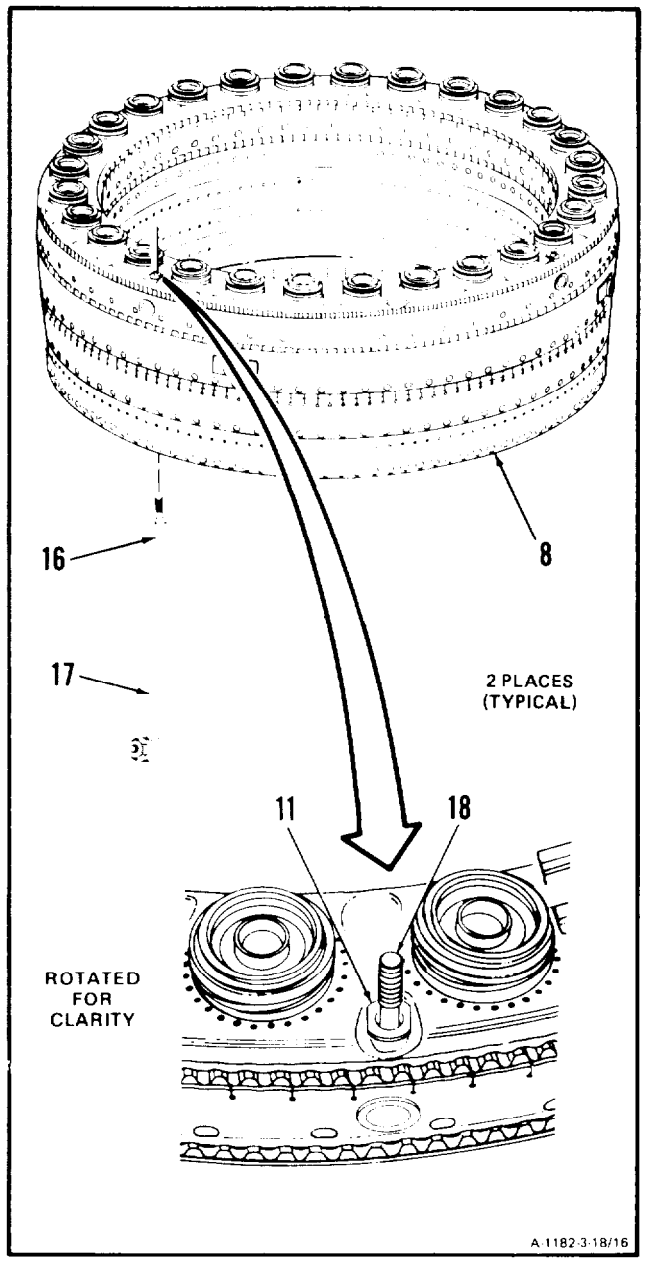
b. Remove nut (14) and ring (15) from bent end (16) of clinching tool (T41) handle (17).



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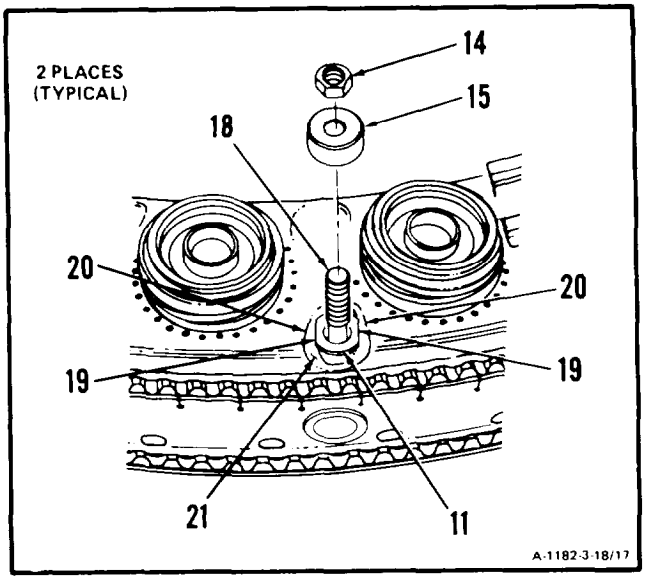
3-18 REPAIR COMBUSTION CHAMBER LINER (AVIM) (Continued)

c Insert bent end (161 of clinching tool (T41) handle (17) into combustion chamber liner (81 until threaded end (18) projects through nozzle guide (11).

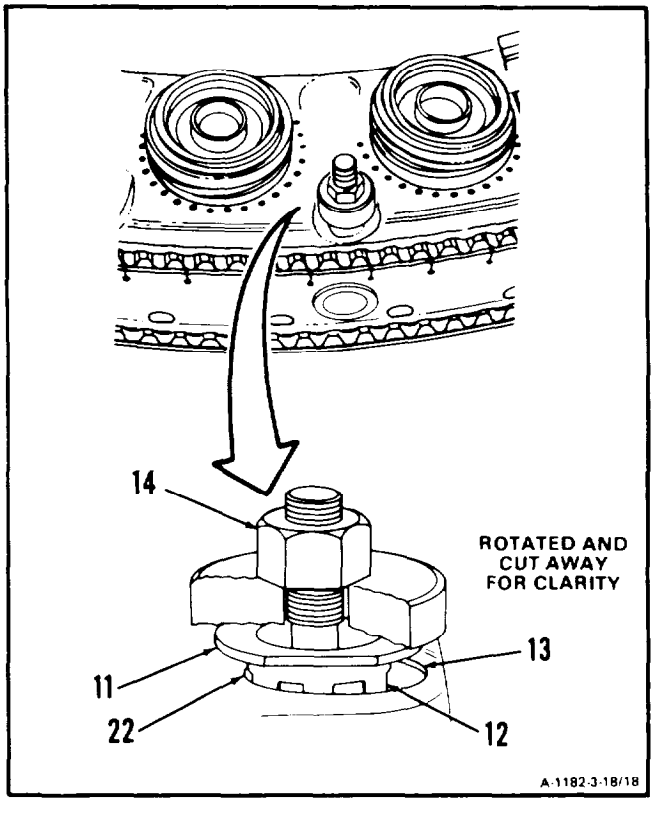


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d. Align flats (19) on nozzle guide (1 1) with edges (20) of indentation (21). Install ring (15) and nut (14) on threaded end (18).

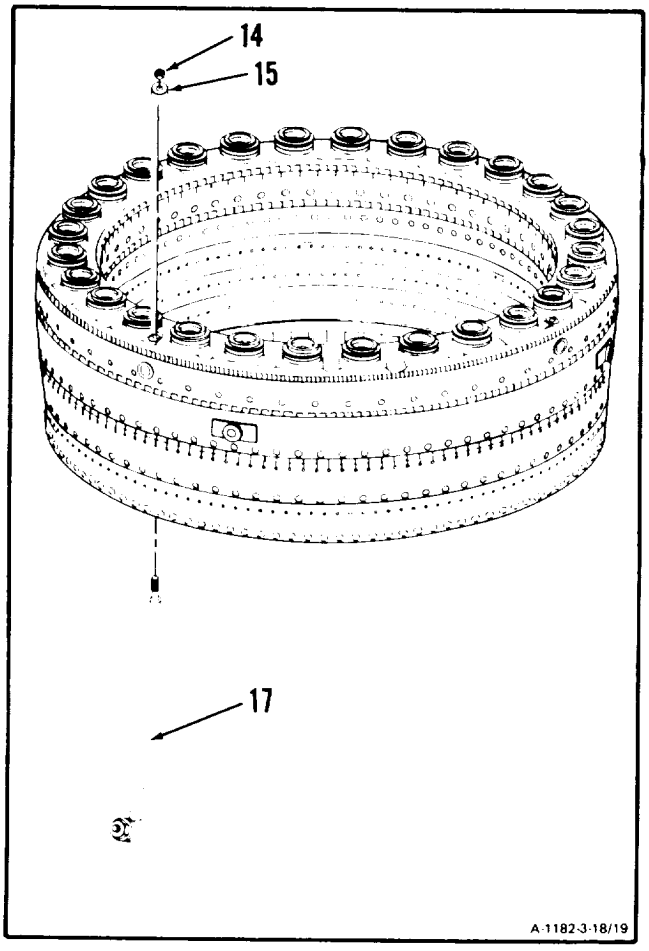


e. Hold nozzle guide (11) against inner edge (22) of hole (13) and tighten nut (14) to bend six tabs (12). **Torque nut to 45 inch-pounds.**



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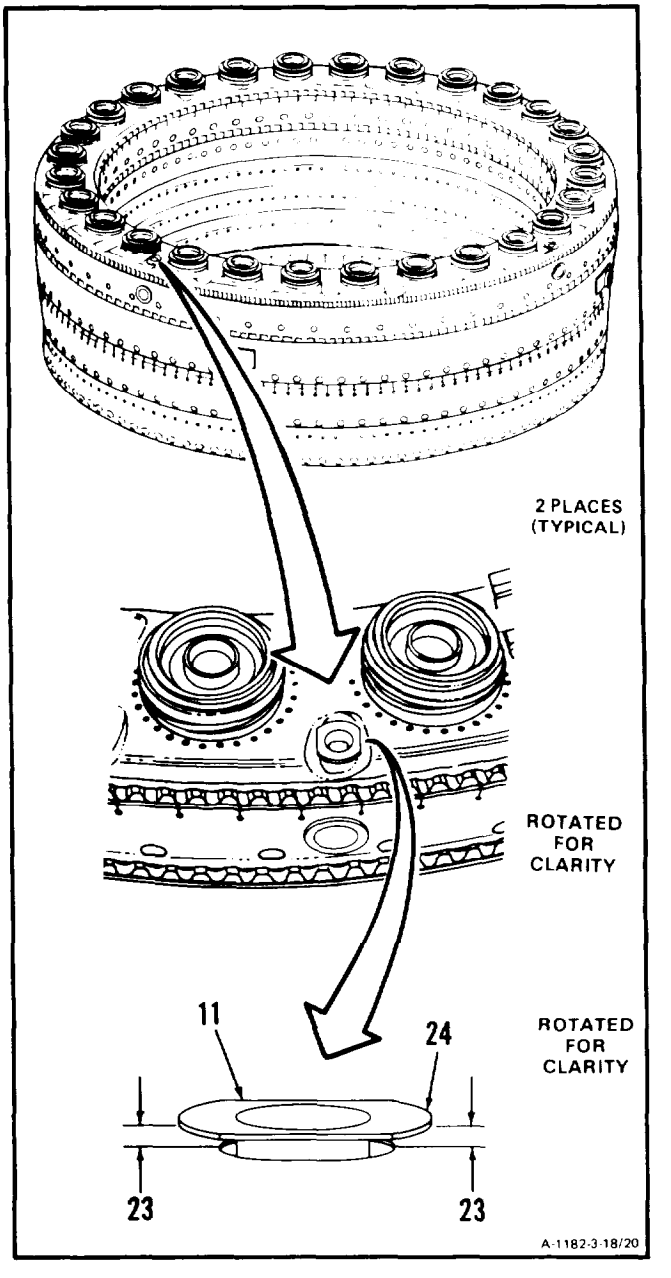
f. Remove nut (14), ring (15) and clinching tool (T41) handle (17).



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g. **Check nozzle guide (11) for proper clearance and freedom of movement as follows:**

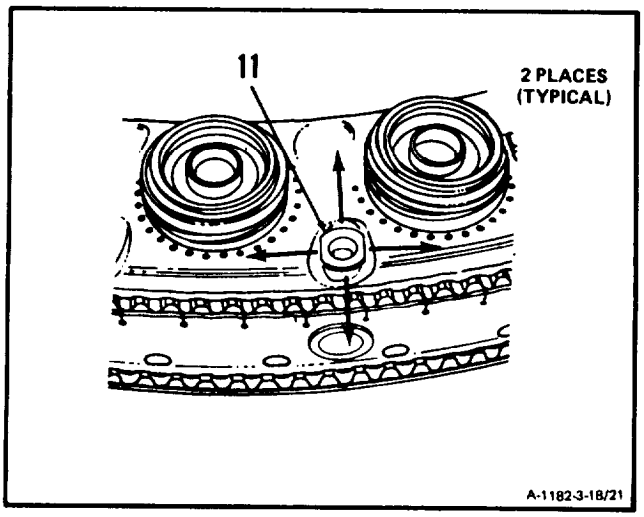
(1) Push nozzle guide (11) in aft direction and measure clearance (23) under lip (24) at two places. Clearance (23) shall not be less than 0.015 inch or more than 0.025 inch.



GO TO NEXT PAGE

(2) Push nozzle guide (11) sideways in all directions. Use light finger force effort. Nozzle guide (1 1) shall move freely in any direction.

(3) If proper clearance or freedom of movement can not be obtained, replace nozzle guide (1 1).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-19 CLEAN COMBUSTION CHAMBER HOUSING (AVIM) 3-19

INITIAL SETUP

Applicable Configurations:
All

Tools:
Compressed Air Source
Fiber Brush
Goggles

Materials.
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

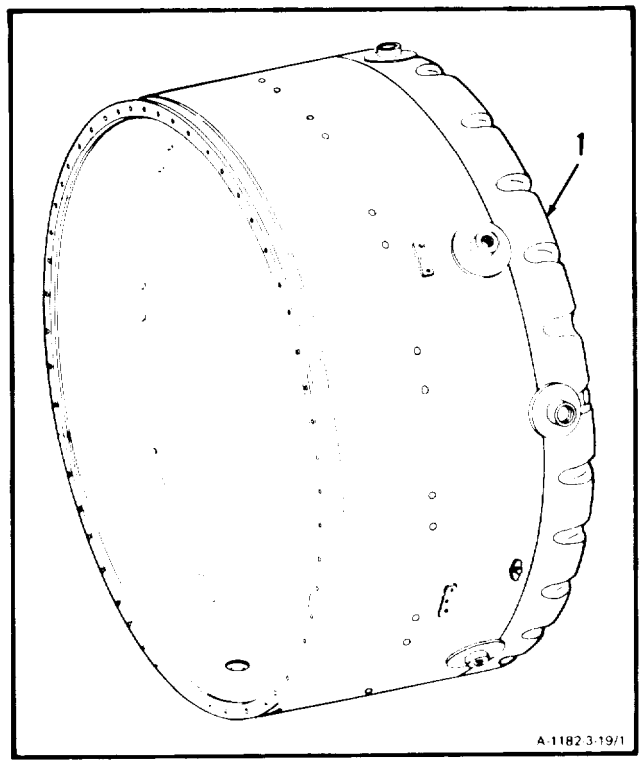
Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Combustion Section Disassembled (Task 3-9)

WARNING

Methyl ethyl ketone (E36) is flammable and toxic, It can irritate skin and cause burns. Use only in well-ventilated areas, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1, **Clean combustion chamber housing (1)** as follows.

a. Wear gloves (E20) and goggles. Use methyl ethyl ketone (E36) and fiber brush.



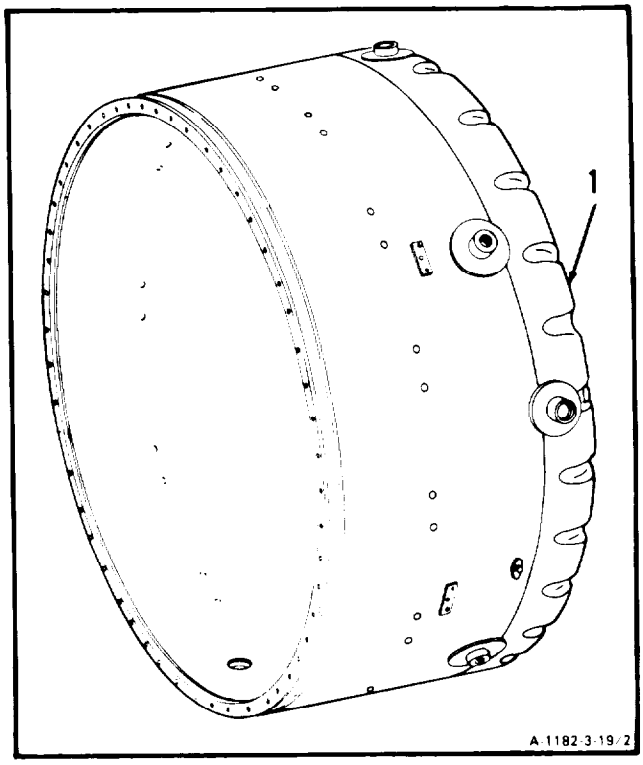
GO TO NEXT PAGE

3-19 CLEAN COMBUSTION CHAMBER HOUSING (AVIM) (Continued) 3-19

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

b. **Blow dry combustion chamber housing (1).** Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Combustion Chamber Housing (Task 3-20).

END OF TASK

3-20 INSPECT COMBUSTION CHAMBER HOUSING (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

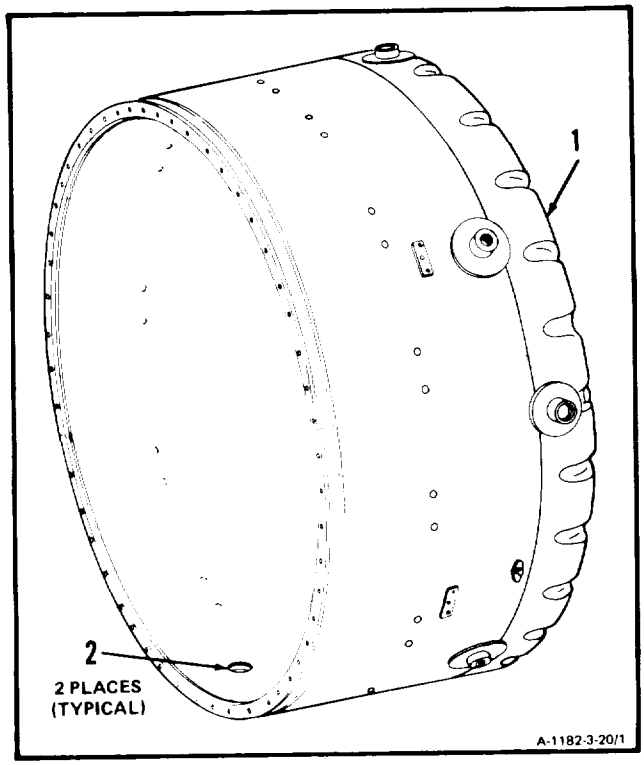
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect combustion chamber housing (1).**
There shall be no cracks.

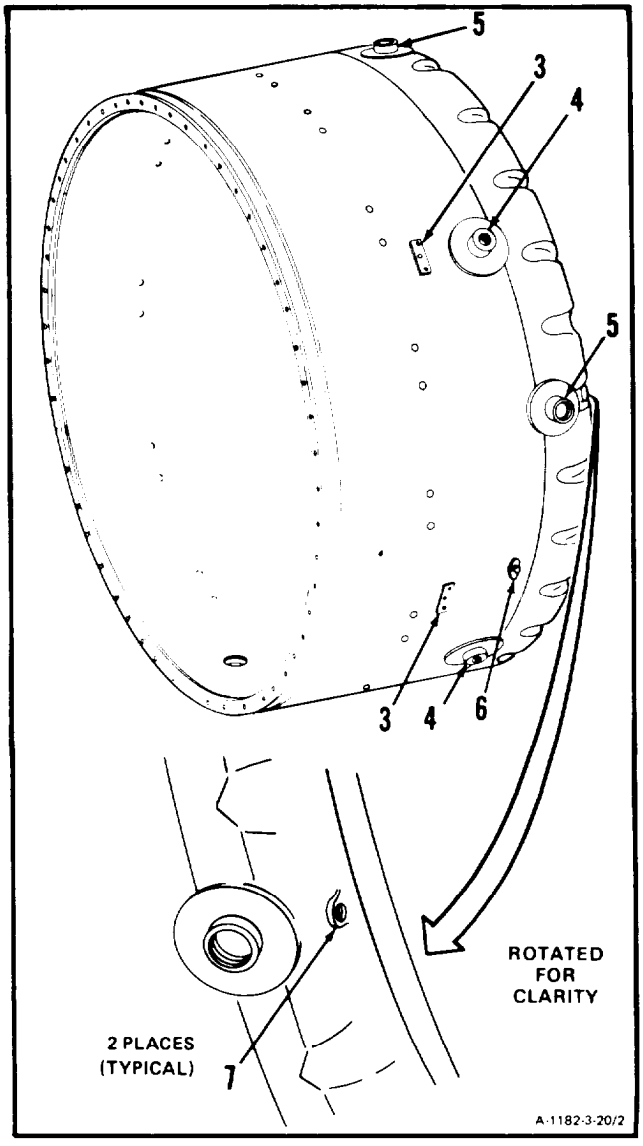
   a. Inspect two fuel drain valve mounting boss welcome is (2). There shall be no cracks.



GO TO NEXT PAGE

2. **Inspect four plate bosses (3), four mounting bosses (4), four igniter bosses (5) and eight nut plates (6).** There shall be none missing or broken. They shall be securely mounted.

3. **Inspect two start fuel nozzle bosses (7).** They shall not be missing or broken. They shall be securely mounted.



FOLLOW-ON MAINTENANCE

None

END OF TASK

3-21 REPAIR COMBUSTION CHAMBER HOUSING (AVIM) 3-21

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
General Support Welding Aircraft
Maintenance Shop Set,
NSN 4920-00-621-2043,
Portable Electric Grinder,
NSN 5130-00-857-8526
Goggles

Materials.
Fluorescent-Penetrant Materials (E19)
Welding Wire (E60)

Parts.
Nut Plates

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-1500-204-25/1
TM 55-2840-254-23P
TM 43-0103
Task 3-19

Equipment Condition.
Off Engine Task

GO TO NEXT PAGE

3-21 REPAIR COMBUSTION CHAMBER HOUSING (AVIM) (Continued) 3-21

WARNING

Welding operations are hazardous. Harmful light rays may injure eyes and burn skin. Poisonous fumes may cause illness. Burns and fires may result from hot sparks. Wear protective clothing and equipment. Perform welding operations in well ventilated areas away from flammable liquids and gases. If fire occurs, call for assistance and use proper extinguishing procedures. If injury or illness occurs, get medical attention.

1. **Repair combustion chamber housing** nut plates (1) if damaged or missing as follows:

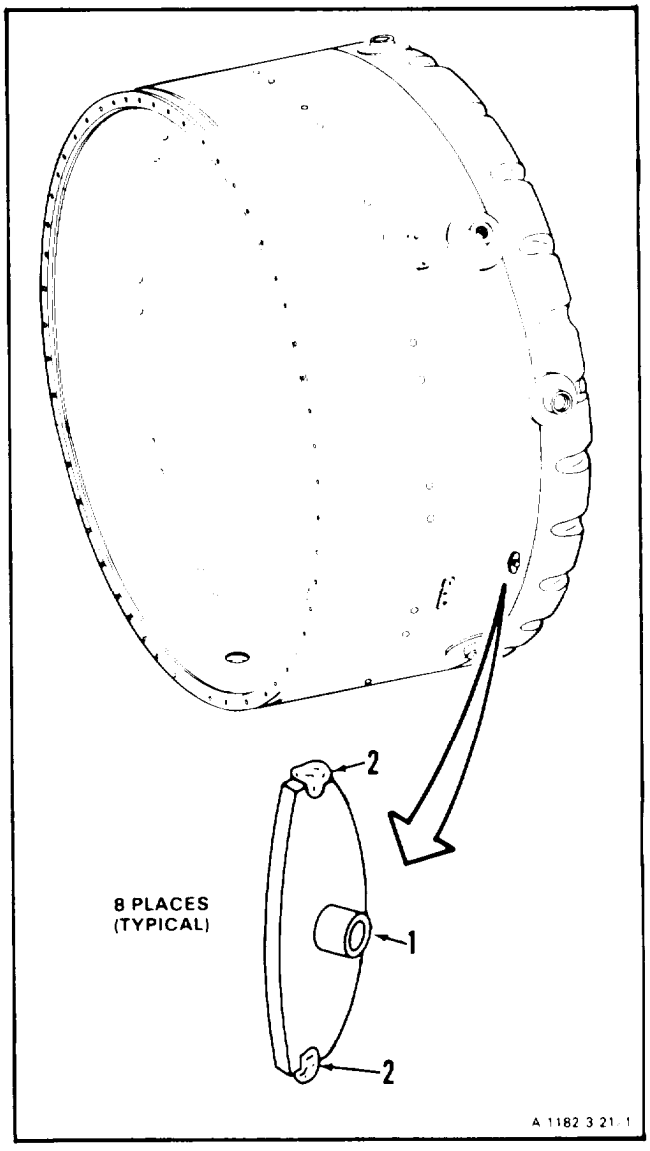
WARNING

Power grinding is hazardsous to personnel. Sparks and metal chips may injure eyes. If injury occurs, get medical attention.

CAUTION

Be careful not to grind into parent metal. Damage will result to the combustion chamber housing.

a. Wear goggles. Remove damaged nut plate (1) by grinding tack welds (2). Use portable electric grinder.



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3-21 REPAIR COMBUSTION CHAMBER HOUSING (AVIM) (Continued)

b. Clean chips, dirt, and oil from area to be repaired (Ref. Task 3-19).

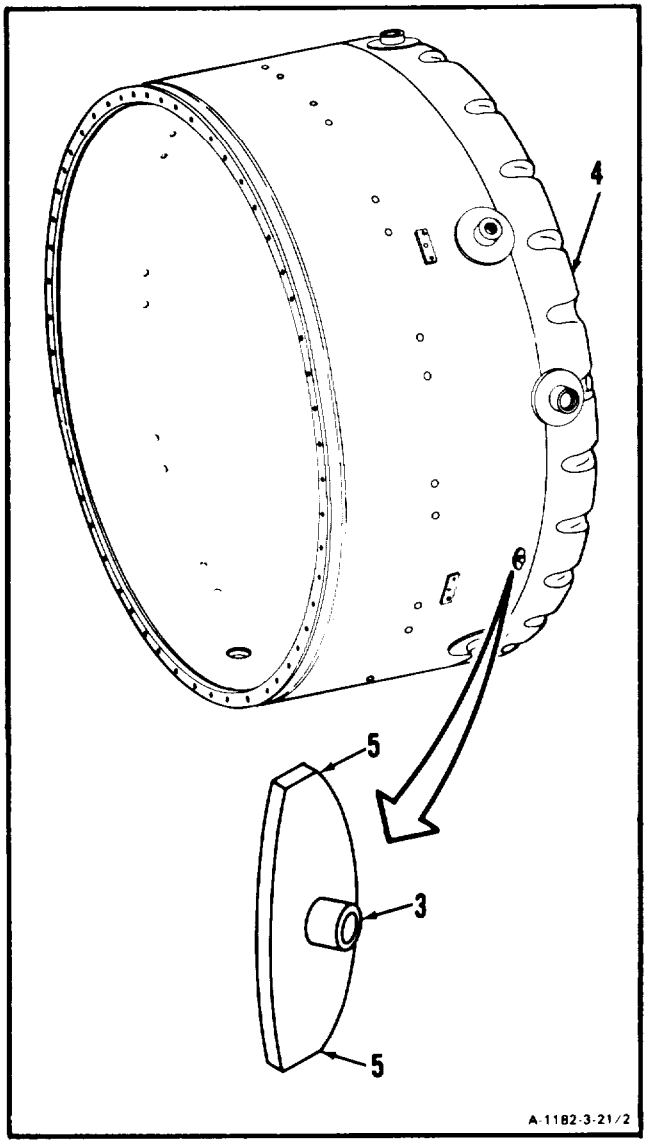
c. Position replacement nut plate (3) on combustion chamber housing (4).

NOTE

In following step d., use proper welding procedure at all times (Ref. TM 55-1500-204-25/1.

d. Tack-weld both ends (5) of nut plate (3) using tungsten inert gas method. Use welding wire (E60).

e. Fluorescent-penetrant inspect tack welds for cracks. (Ref. TM 43-0103). There shall be no cracks. If cracks are found, repeat steps a. through d.



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

CHAPTER 4

TURBINE SECTION - MAINTENANCE INSTRUCTIONS

CHAPTER OVERVIEW

This chapter contains maintenance procedures for the turbine section. It is divided into the following sections and tasks.

SECTION	TASK NO.	TITLE	PAGE
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	4-2	Clean Thermocouple Jumper Lead	4-11
	4-3	Inspect Thermocouple Jumper Lead	4-12
	4-4	Repair Thermocouple Jumper Lead	4-14
	4-5	Test Thermocouple Jumper Lead	4-16
	4-6	Install Thermocouple Jumper Lead	4-21
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SECTION	TASK NO.	TITLE	PAGE
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SECTION	TASK NO.	TITLE	PAGE
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4-1 REMOVE THERMOCOUPLE JUMPER LEAD 4-1

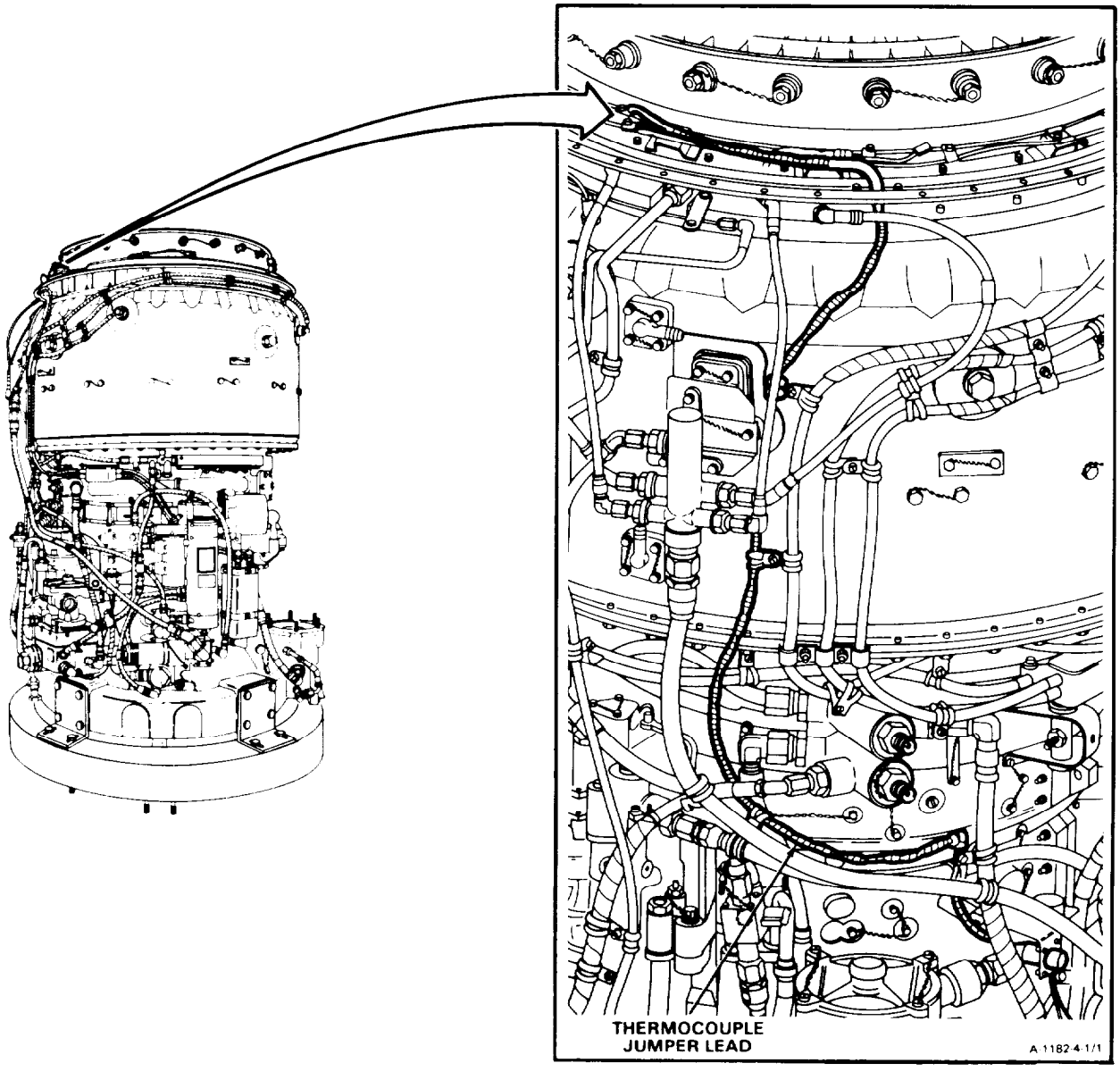
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

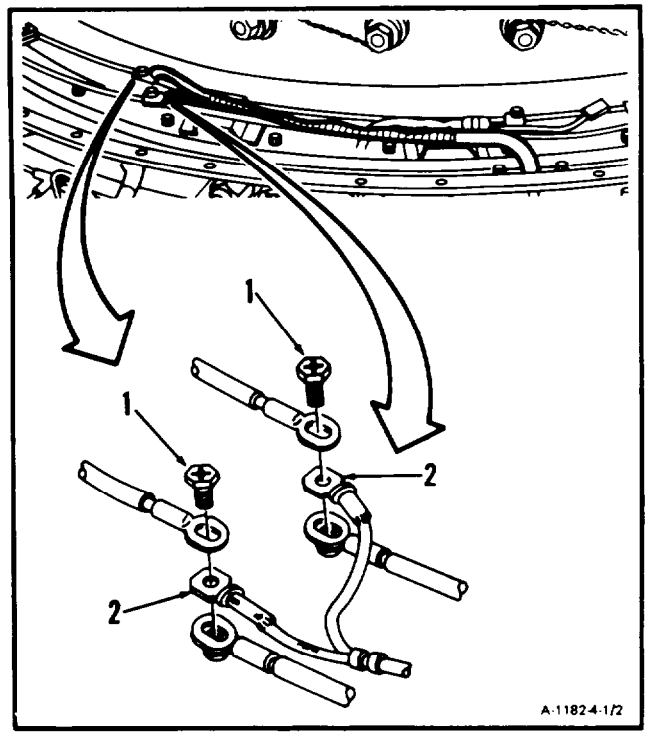
Personnel Required:
68B10 Aircraft Powerplant Repairer



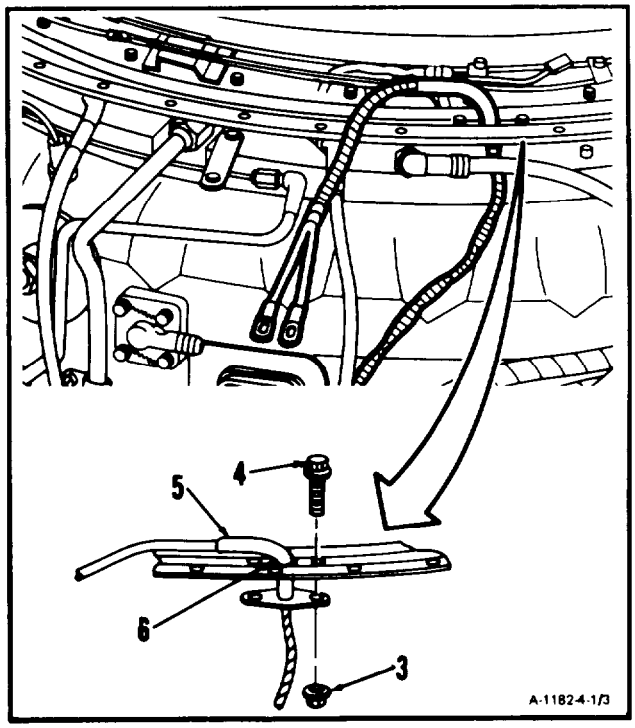
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4-1 REMOVE THERMOCOUPLE JUMPER LEAD (Continued) 4-1

1. **Remove** two screws (1) and two **thermocouple jumper lead ends (2).**



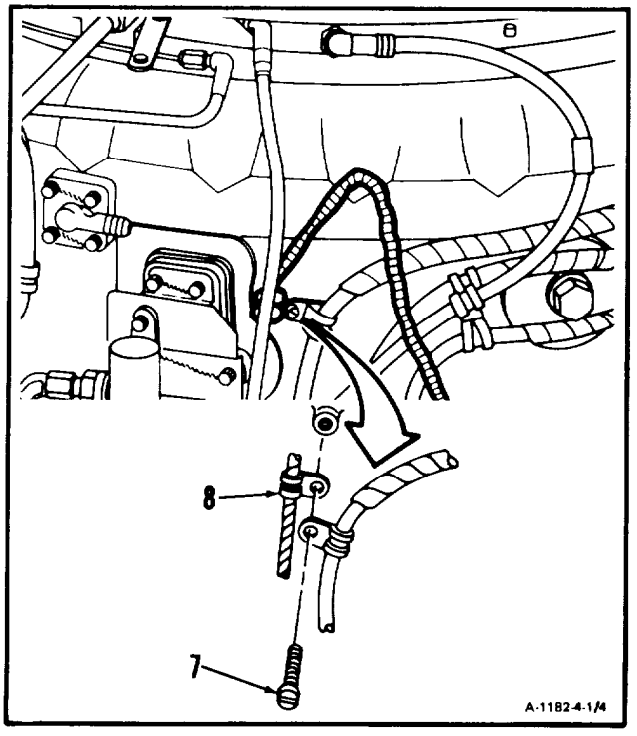
2. Remove two nuts (3) and two bolts (4). **Withdraw thermocouple jumper lead (5) through hole (6)** in fireshield assembly.



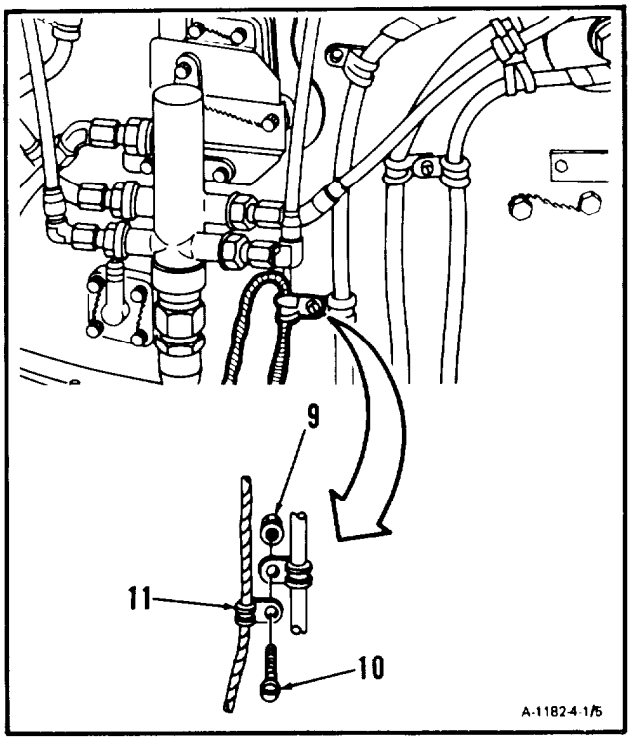
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4-1 REMOVE THERMOCOUPLE JUMPER LEAD (Continued) 4-1

3. **Remove** lockwire, screw (7), and **clamp (8).**

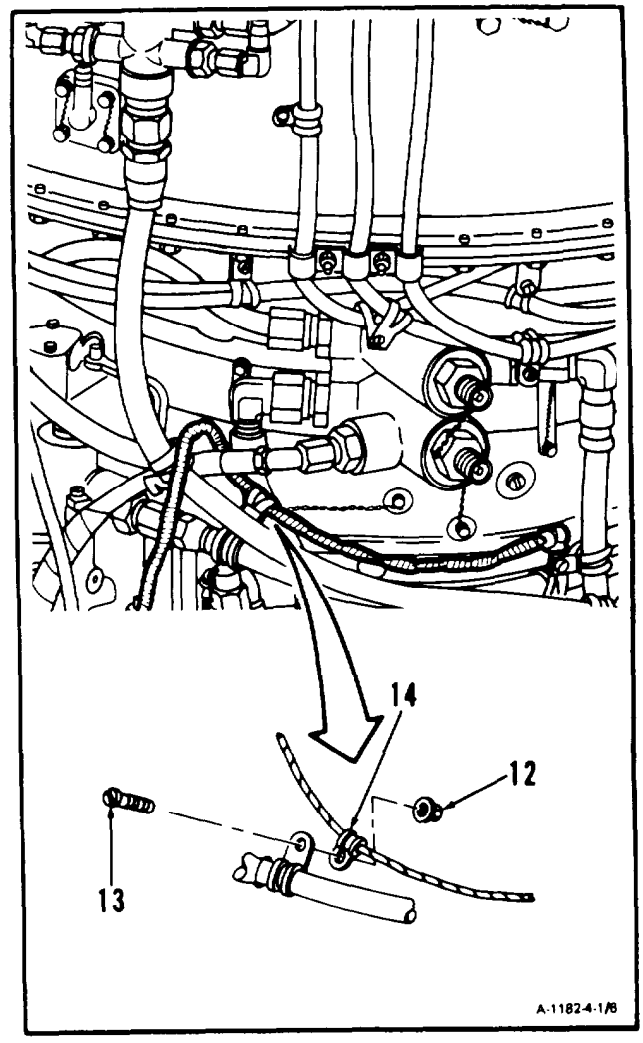


4. **Remove** nut (9), screw (10), and **clamp (11).**



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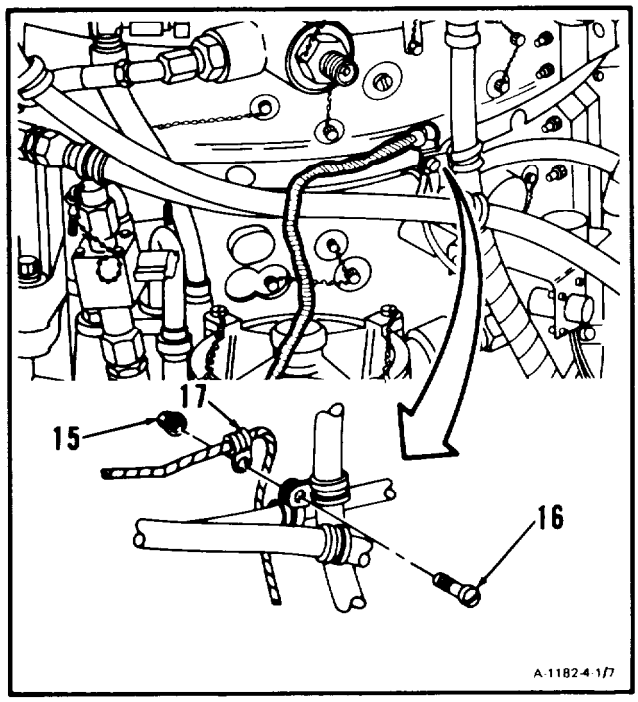
5. **Remove** nut (12), screw (13), and **clamp (14).**



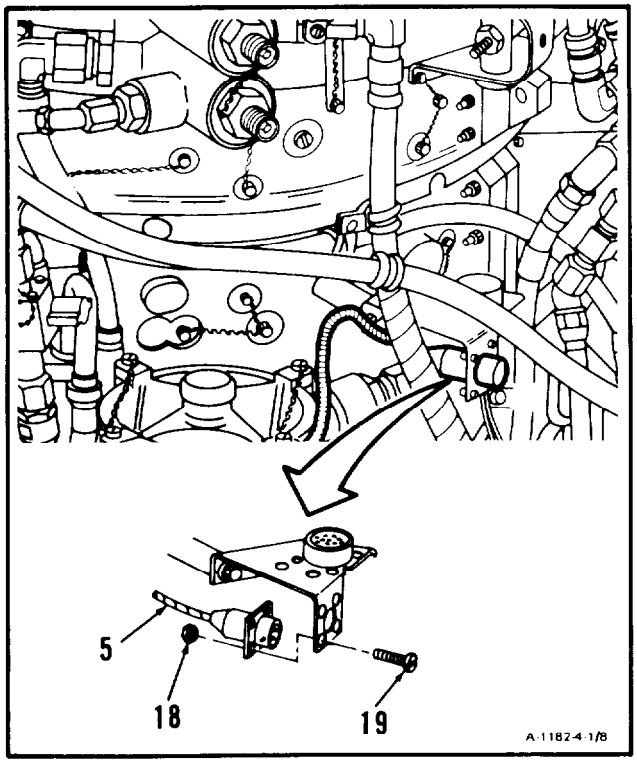
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4-1 REMOVE THERMOCOUPLE JUMPER LEAD (Continued)

6. **Remove** nut (15), screw (16), and **clamp (17).**



7. **Remove** four nuts (18), four screws (19), and **thermocouple jumper lead (5).**

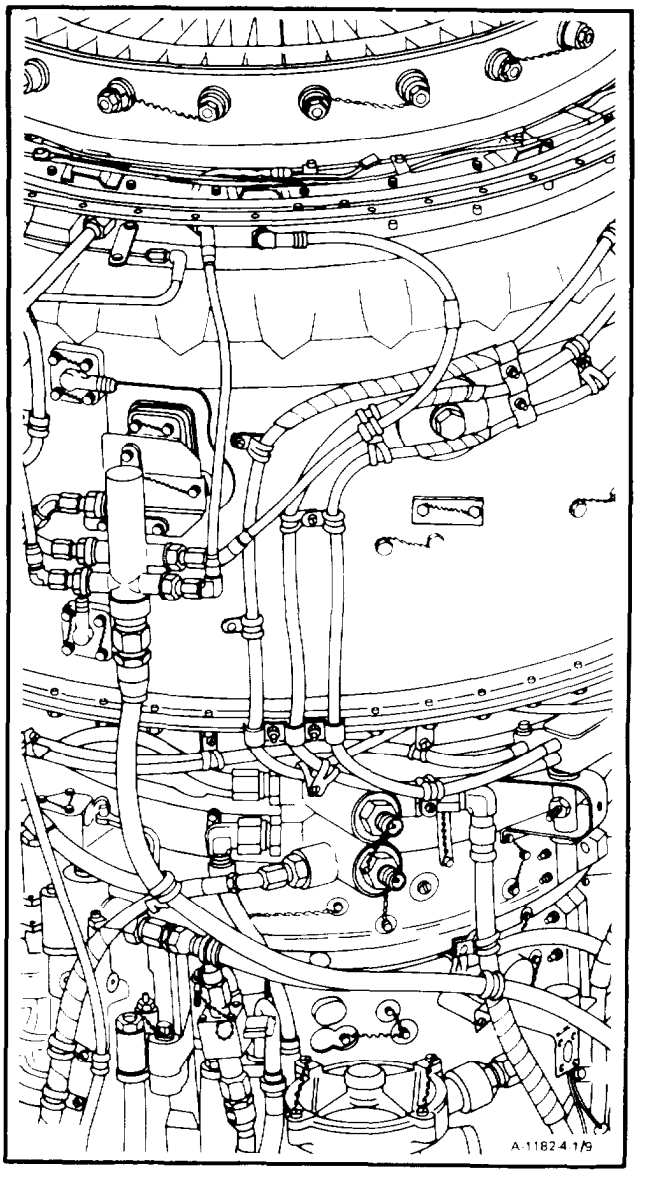


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4-1 REMOVE THERMOCOUPLE JUMPER LEAD (Continued) **4-1**

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-2 CLEAN THERMOCOUPLE JUMPER LEAD

INITIAL SETUP

Applicable Con figurations:
All

Tools:
None

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Free Cloth (E26)

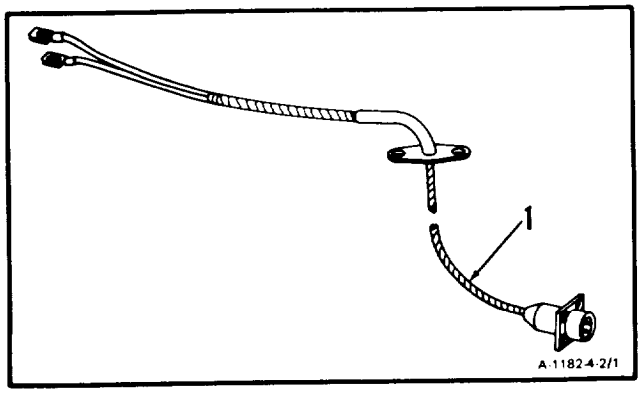
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Thermocouple Jumper Lead Removed (Task 4-1)

WARNING

Dry cleaning solvent (E 17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20) and **clean thermocouple jumper lead (1).** Use lint-free cloth (E26) dampened in dry cleaning solvent (E17).



FOLLOW-ON MAINTENANCE:

Inspect Thermocouple Jumper Lead (Task 4-3).

END OF TASK

4-3 INSPECT THERMOCOUPLE JUMPER LEAD

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

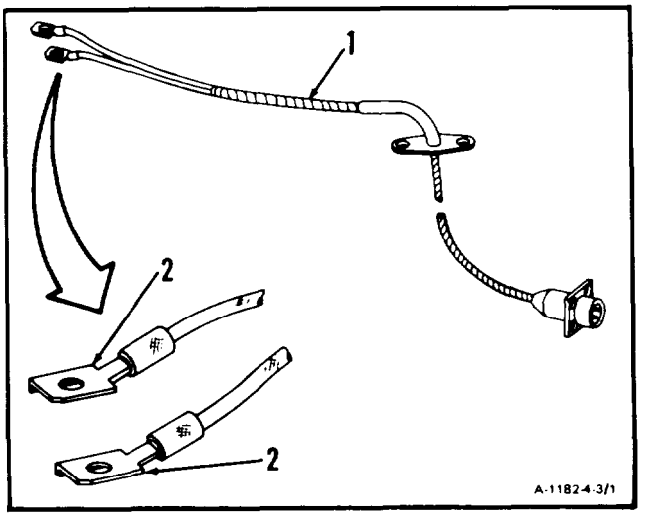
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

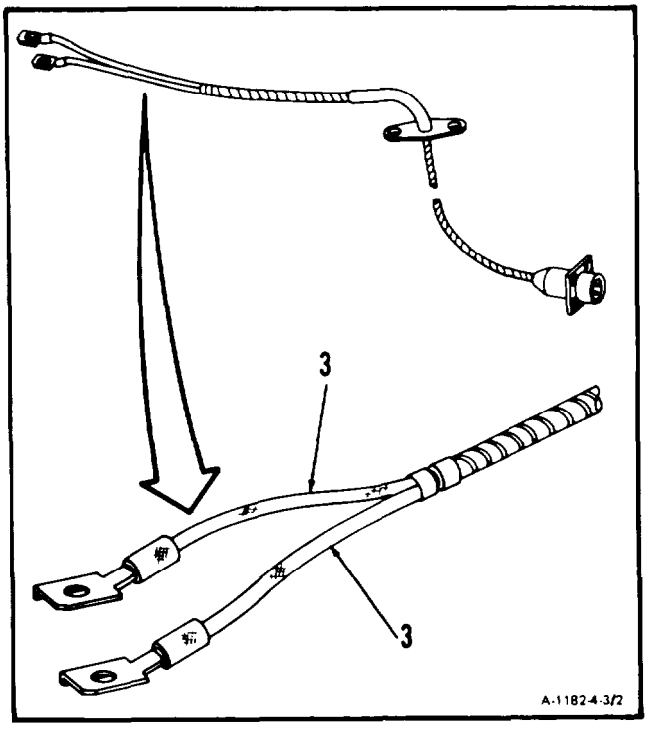
Equipment Condition:
Off Engine Task

1. Inspect thermocouple jumper lead (1) as follows:

   a. **Inspect terminal lugs (2).** There shall be no loose or cracked terminal lugs.

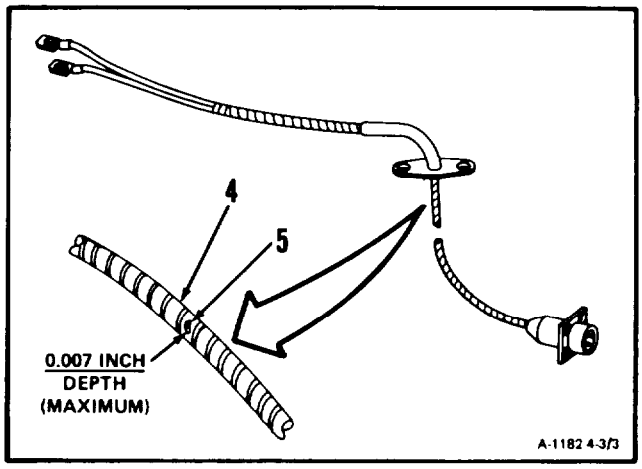


   b. **Inspect lead ends (3).** There shall be no broken wires or fraying.



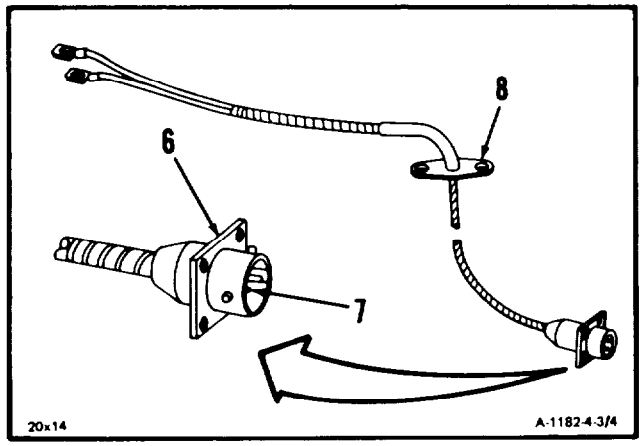
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c. **Inspect outer shield (4).** There shall be no cracks or gouges. There shall be no chafes, (5) deeper than 0.007 inch.



d. **Inspect electrical connector (6).** There shall be no corrosion, cracks, bent or broken pins (7). The electrical connector (6) shall not be loose.

e. **Inspect elbow mounting bracket (8);** The elbow mounting bracket (8) shall not be loose.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-4 REPAIR THERMOCOUPLE JUMPER LEAD

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Goggles
Compressed Air Source

Materials:
Crocus Cloth (El 5)

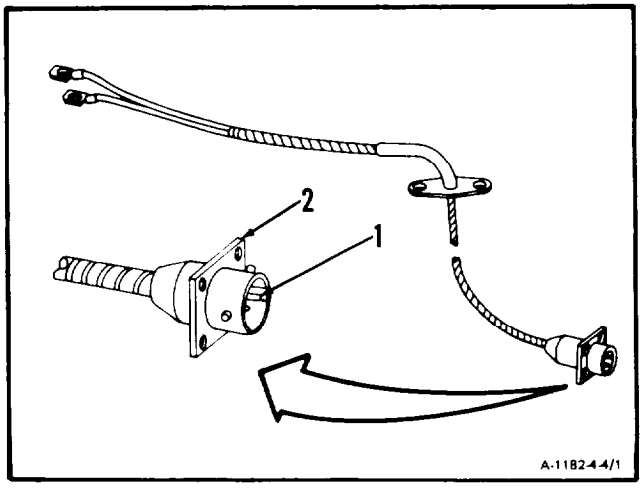
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

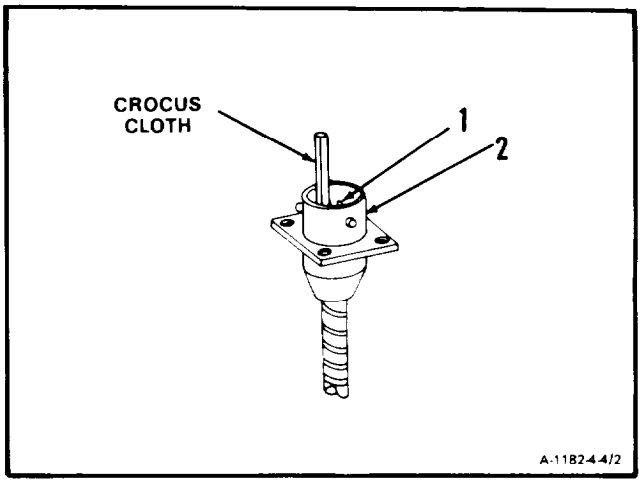
NOTE

This repair is allowed provided it does not cause pins to break or crack.

1. **Straighten bent pins (1)** of electrical connector (2). Using long-nose pliers, gently move pins (1) until they are straight.



2. **Remove corrosion from pins (1)** of electrical connector (2). Polish pins, using in and out motion over entire length of pin until corrosion is removed. Use crocus cloth (El 5).

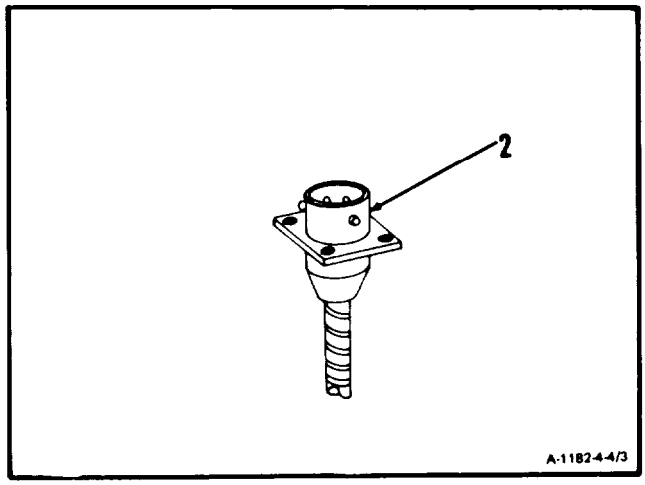


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WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

3. Wear goggles. **Remove loosened particles** from connector (2) using clean, dry compressed air.



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-5 TEST THERMOCOUPLE JUMPER LEAD 4-5

INITIAL SETUP

Applicable Configurations:
All

Tools:
Multimeter

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task

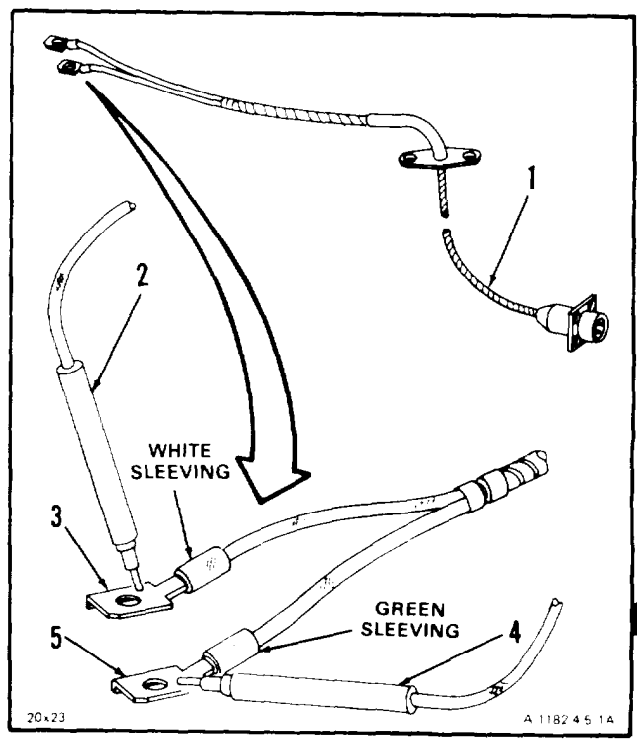
1. Using multimeter, **measure insulation resistance of thermocouple jumper lead (1)** as follows:

   a. Set multimeter range switch to R x 1000.

   b. Touch red probe (2) to terminal lug (3).

   c. Touch black probe (4) to terminal lug (5).

   d. Meter shall indicate 1000 ohms minimum.



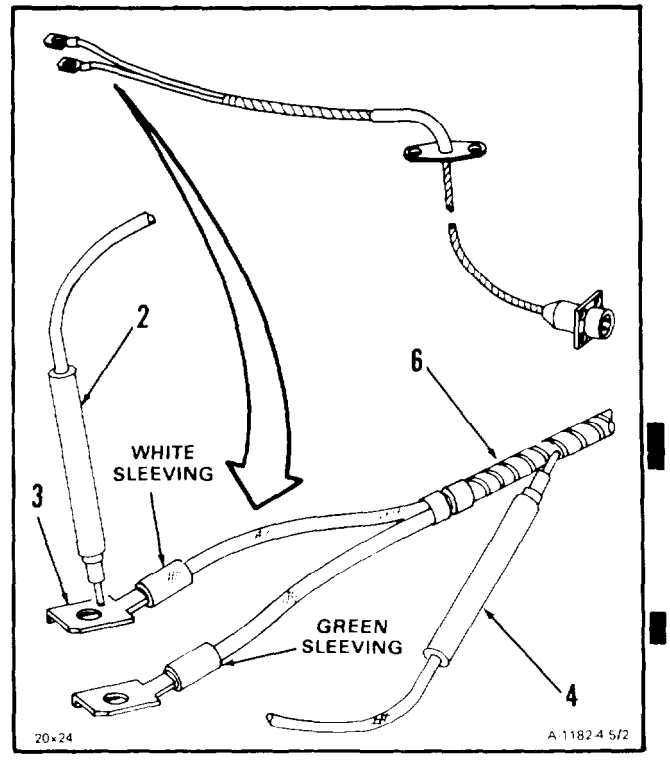
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4-5 TEST THERMOCOUPLE JUMPER LEAD (Continued) 4-5

e. Touch red probe (2) to terminal lug (3).

f. Touch black probe (4) to thermocouple jumper lead shield (6).

g. Meter shall indicate 1000 ohms minimum.



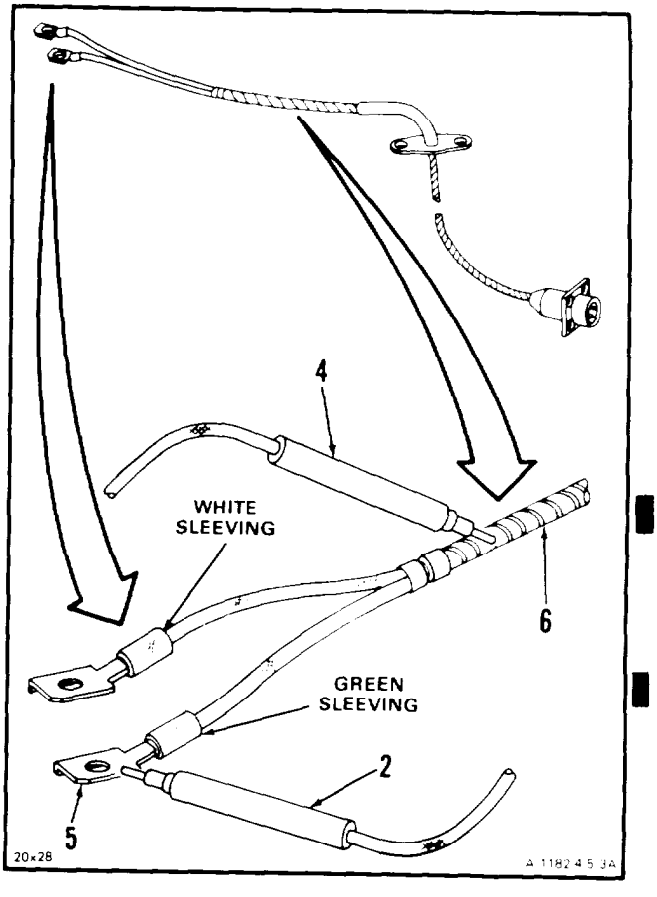
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4-5 TEST THERMOCOUPLE JUMPER LEAD Continued) 4-5

h. Touch red probe (2) to terminal lug (5).

i. Touch black probe (4) to thermocouple jumper lead shield (6).

j. Meter shall indicate 1000 ohms minimum.



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4-5 TEST THERMOCOUPLE JUMPER LEAD (Continued)

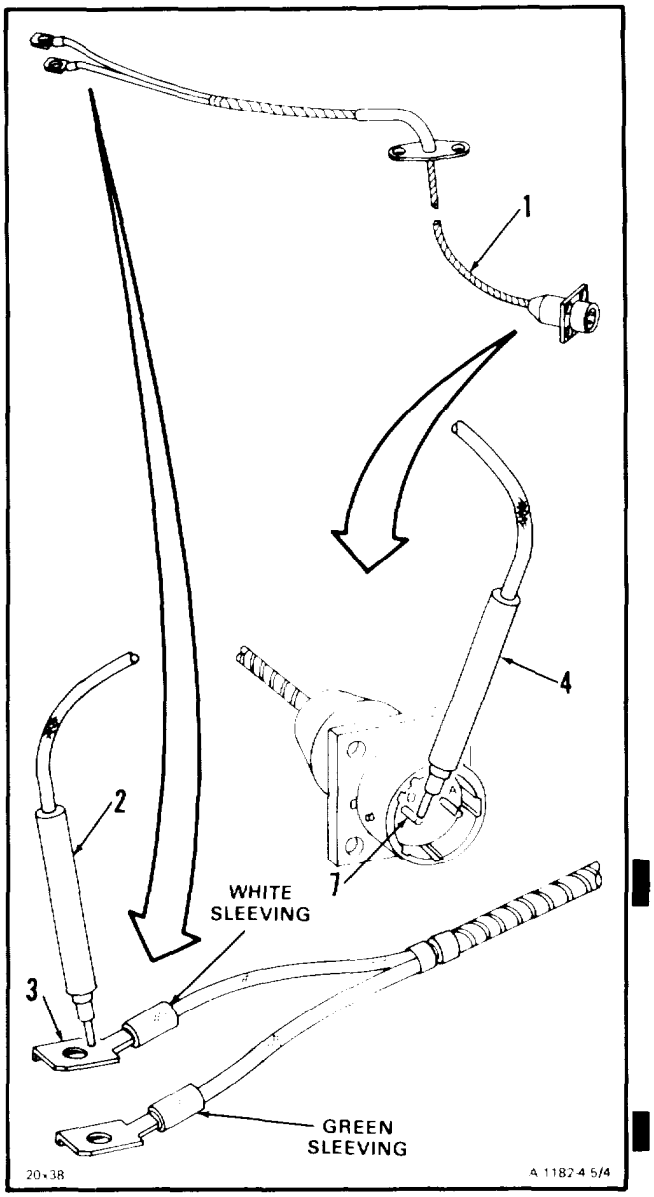
2. Using multimeter, **measure continuity of thermocouple jumper lead (1)** as follows:

   a. Set multimeter range switch to R x 1.

   b. Touch red probe (2) to terminal lug (3).

   c. Touch black probe (4) to electrical connector pin D (7).

   d. Meter shall indicate 1.8 to 2.8 ohms.



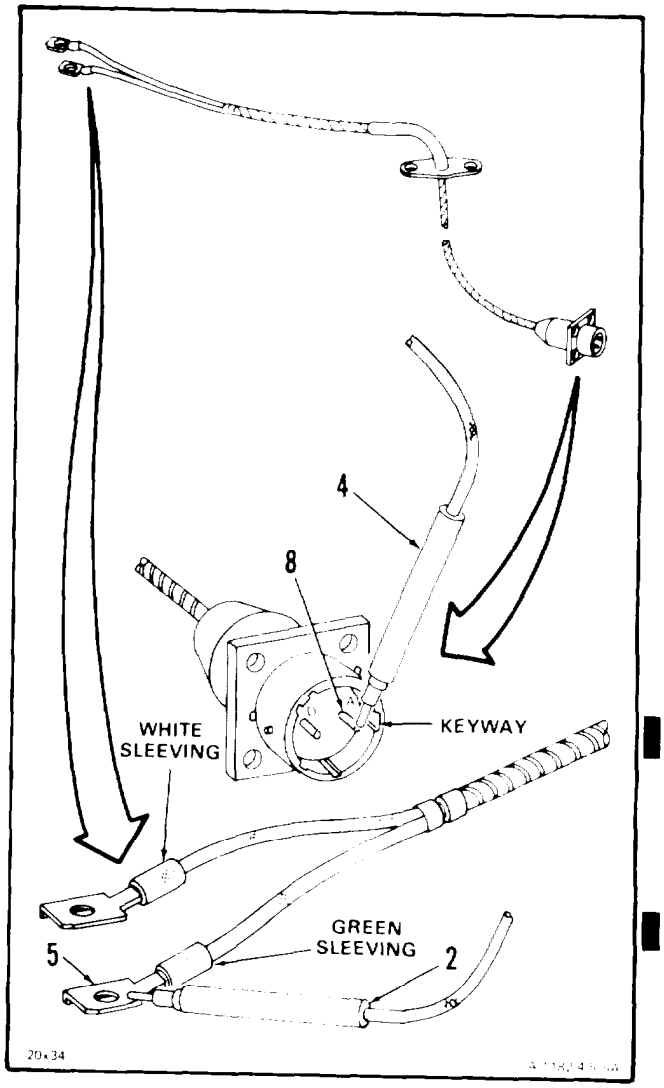
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4-5 TEST THERMOCOUPLE JUMPER LEAD (Continued) 4-5

e. Touch red probe (2) to terminal lug (5).

f. Touch black probe (4) to electrical connector pin A (8).

g. Meter shall indicate 0.7 to 1.5 ohms.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-6 INSTALL THERMOCOUPLE JUMPER LEAD

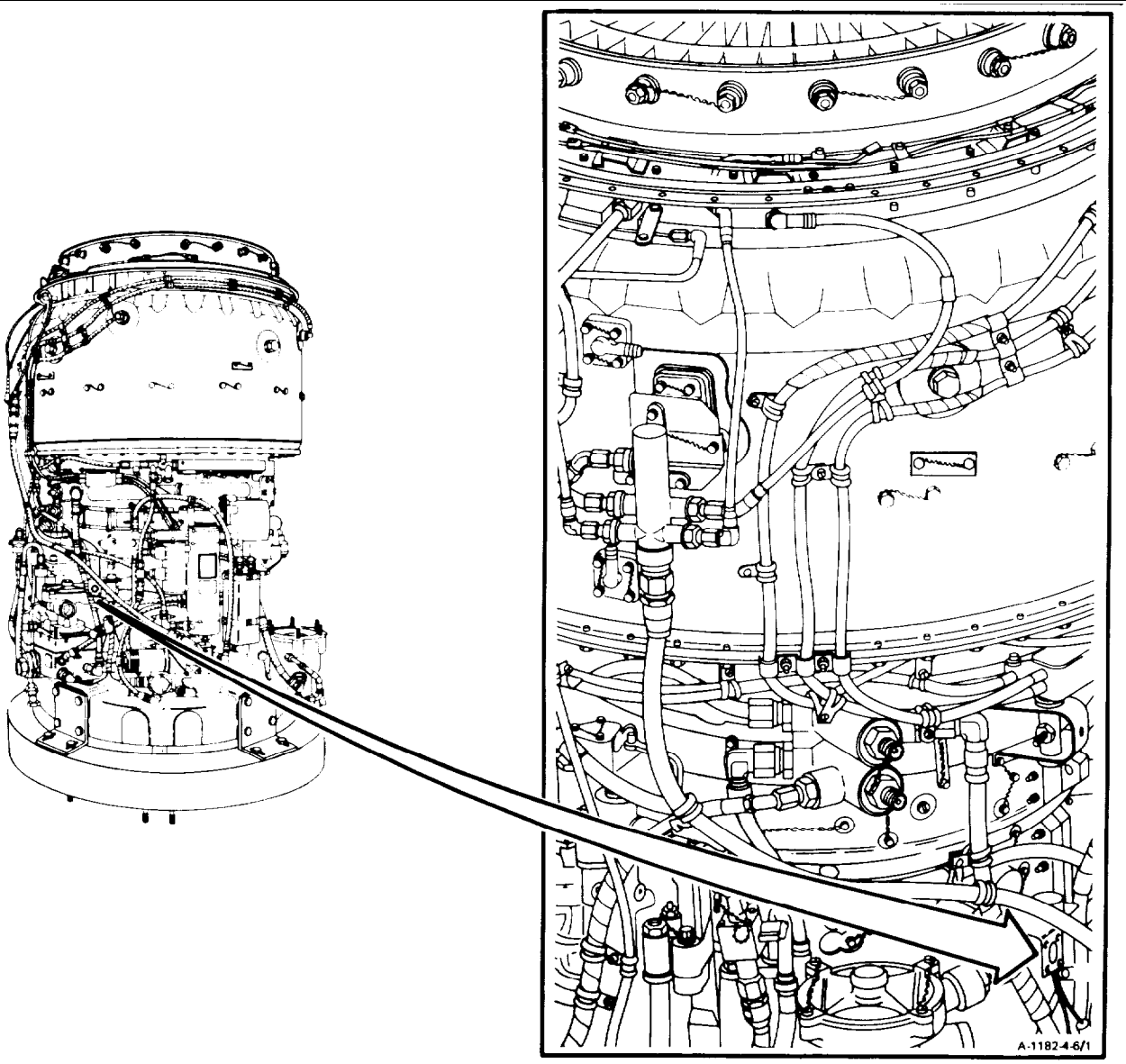
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Multimeter

Materials:
Lockwire (E29)

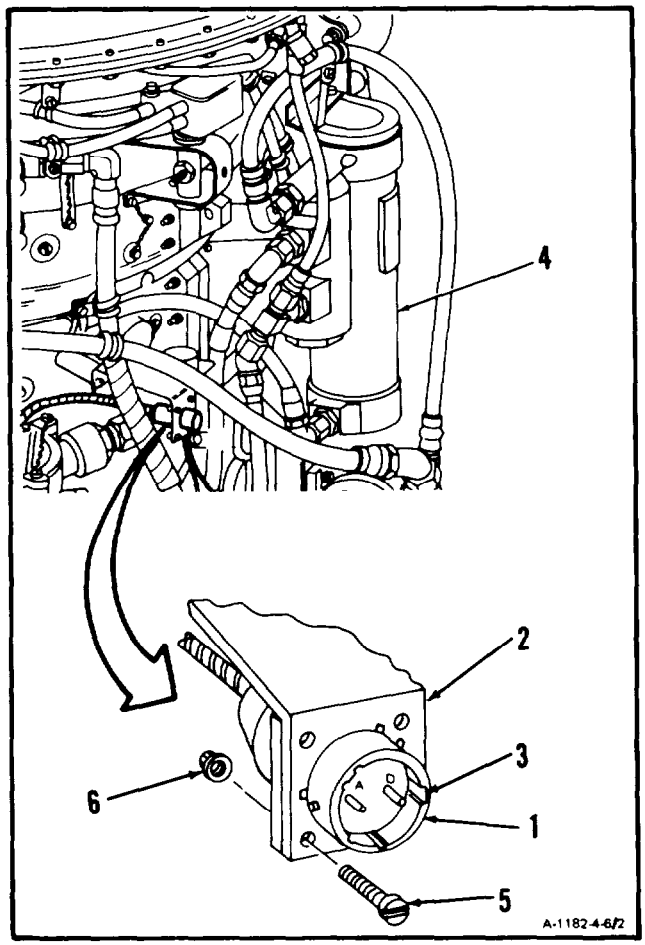
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued) 4-6

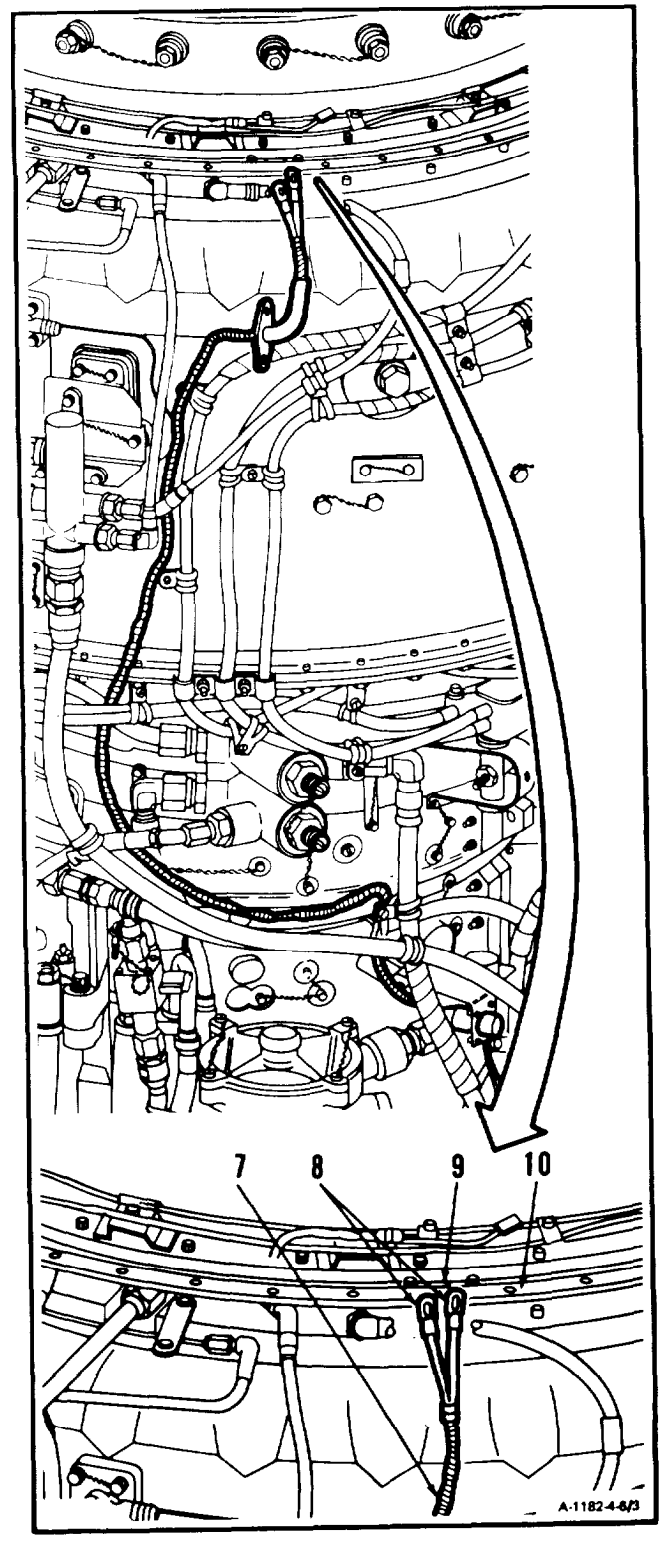
1. **Install electrical connector (1) in mounting bracket (2)** with wide keyway (3) toward oil cooler (4). Install four screws (5) and four nuts (6).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

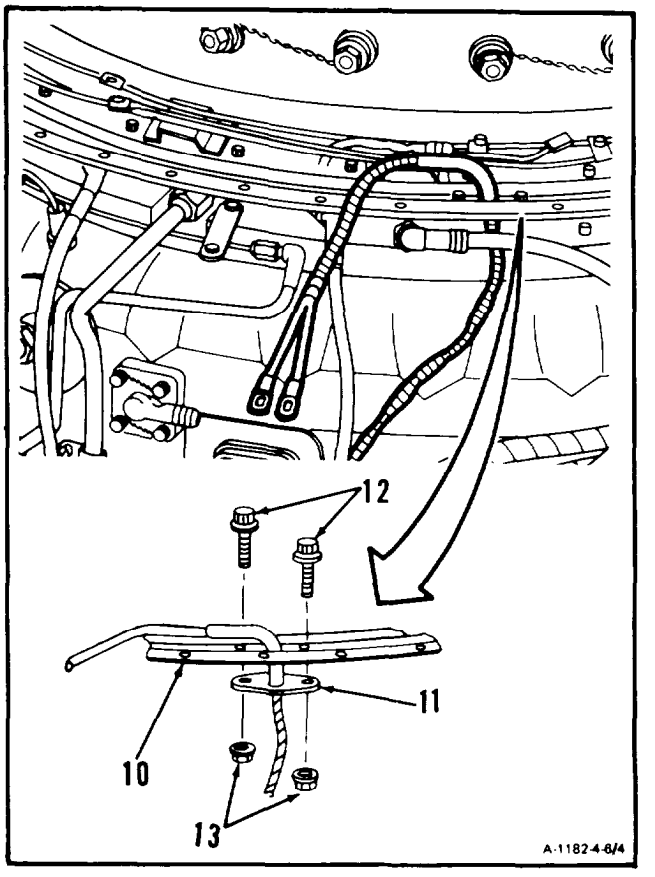
2. **Route thermocouple jumper lead (7)** as shown. Insert lead ends (8) through hole (9) in fire-shield assembly (10).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued) 4-6

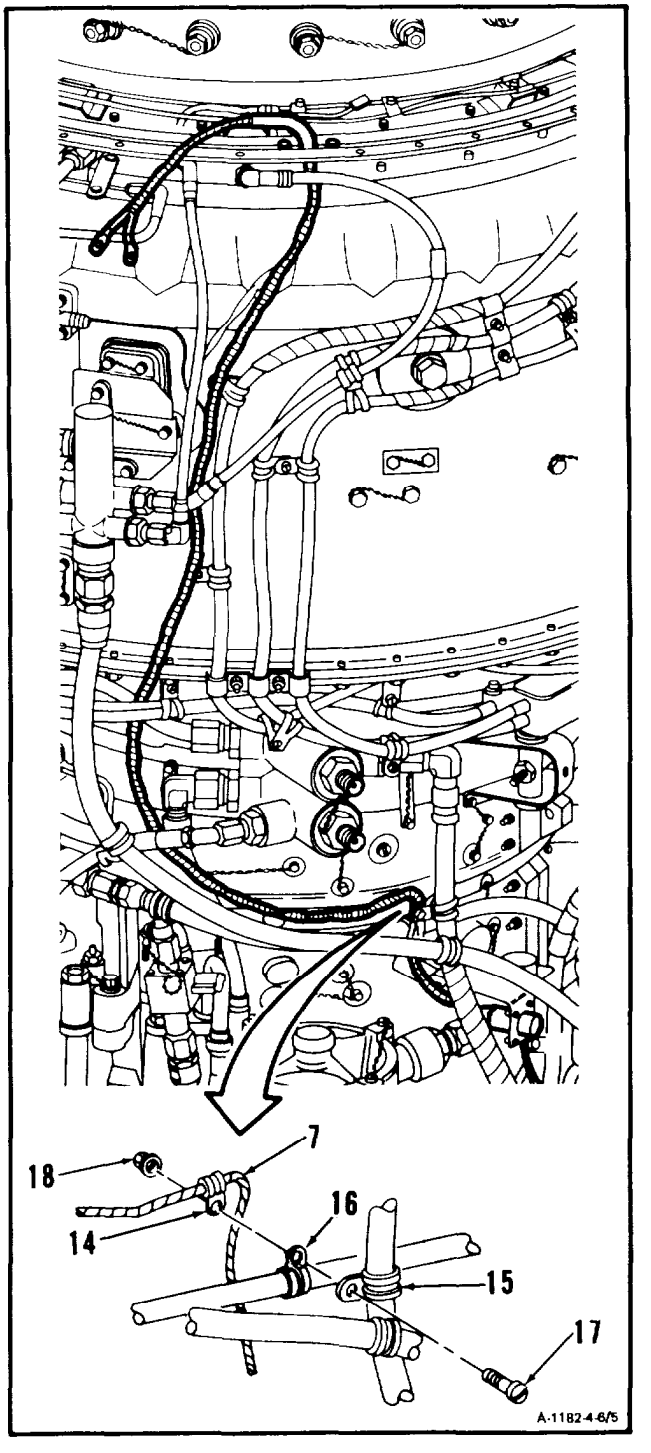
3. **Install plate (11)** against fireshield assembly (10). Install two bolts (12) and two nuts (13).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued) 4-6

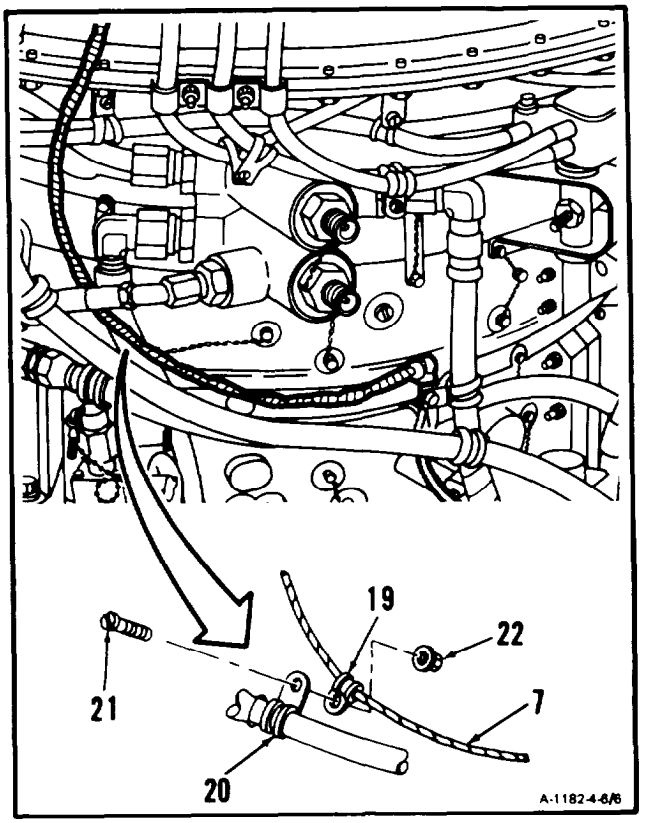
4. **Install clamp (14)** on thermocouple jumper lead (7). Align clamp (14) with clamp (15) and clamp (16), and install screw (17) and nut (18).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued) 4-6

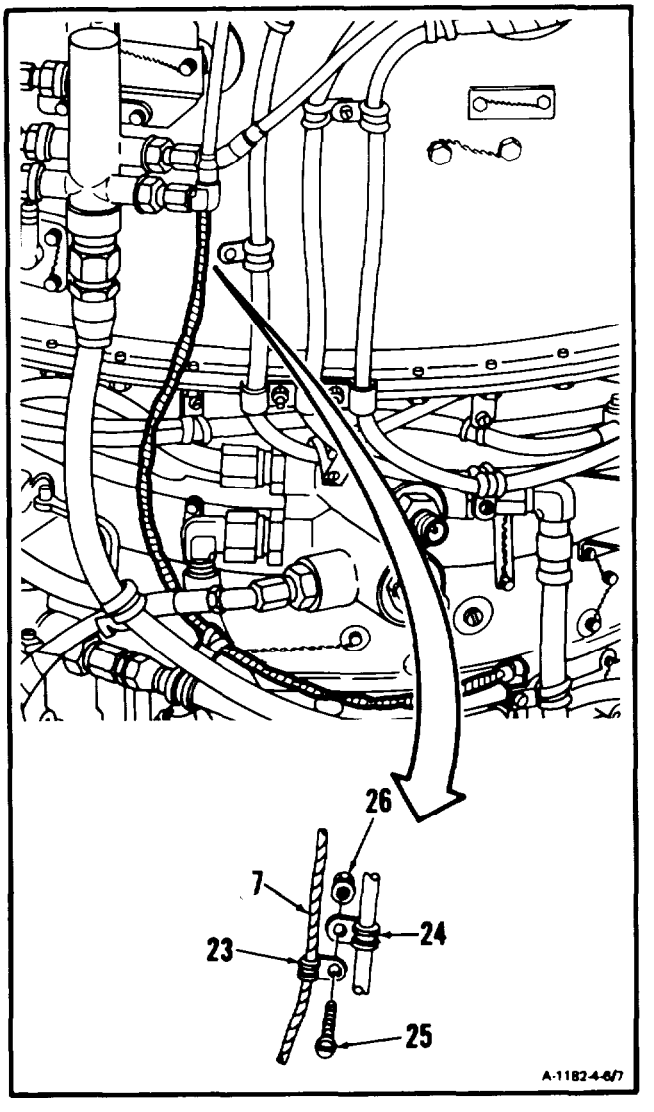
5. **Install clamp (19)** on thermocouple jumper lead (7). Align clamp (19) with clamp (20) and install screw (21) and nut (22).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

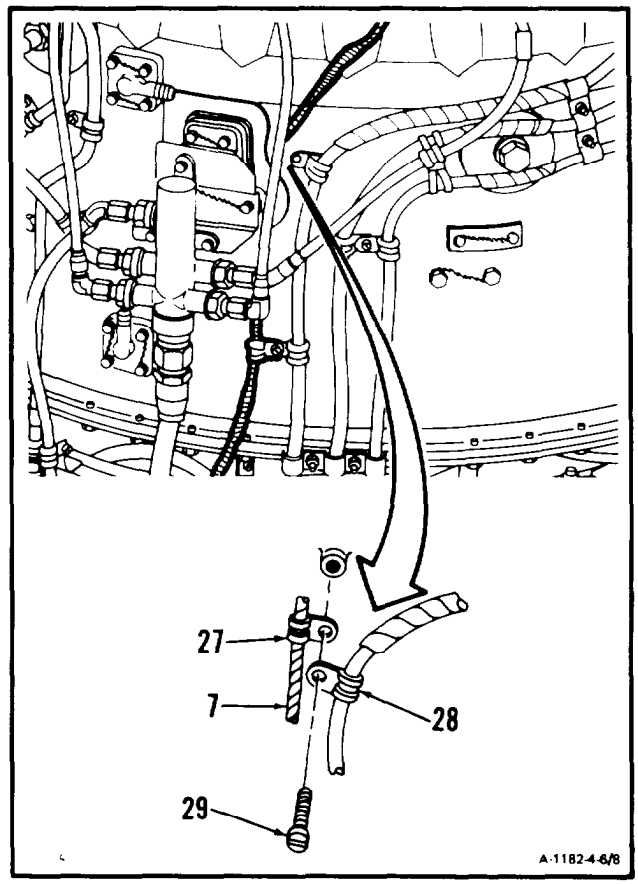
6. **Install clamp (23)** on thermocouple jumper lead (7). Align clamp (23) with clamp (24), and install screw (25) and nut (26).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

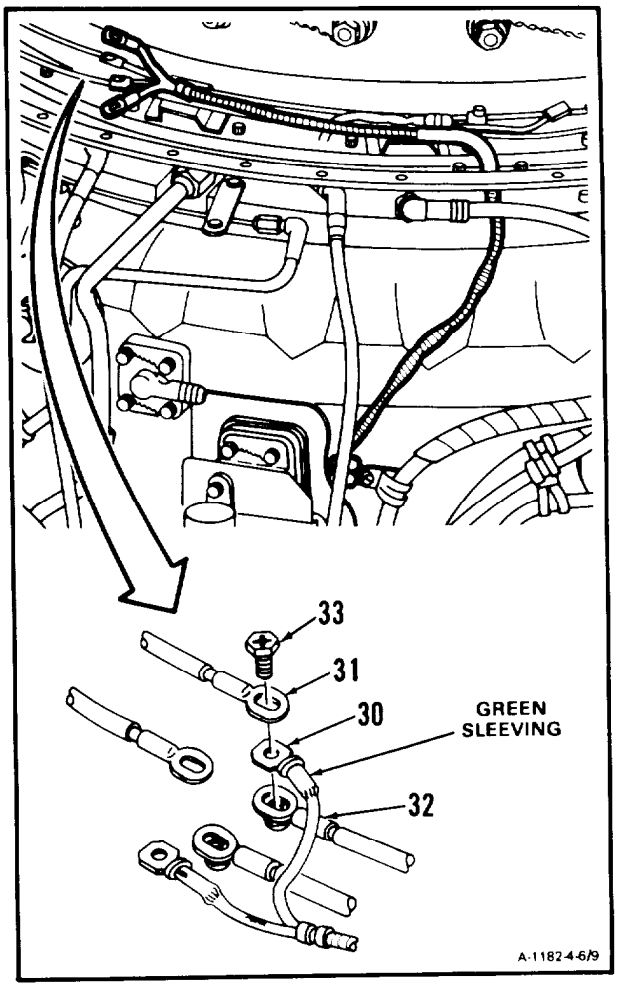
7. **Install clamp (27)** on thermocouple jumper lead (7). Align clamp (27) with clamp (28), and install screw (29). Lockwire screw (29). Use lockwire (E29).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

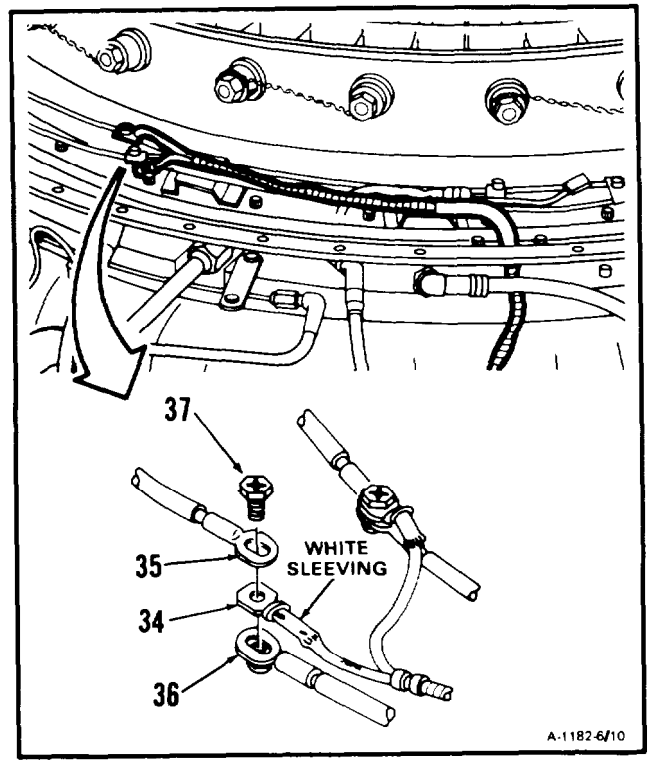
8. **Install terminal lug (30)** between terminal lugs (31) and (32), and install screw (33).



GO TO NEXT PAGE

4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

9. **Install terminal lug (34)** between terminal lugs (35) and (36), and install screw (37).



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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

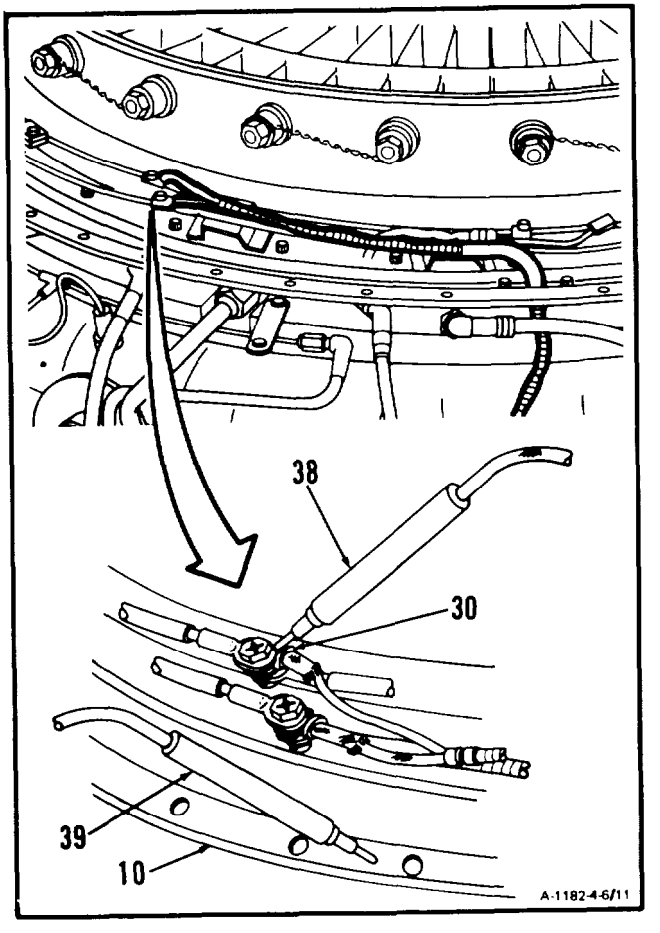
10. Using multimeter, measure insulation resistance as follows:

    a. Set multimeter range to R x 1000.

    b. Touch red probe (38) to terminal lug (30).

    c. Touch black probe (39) to fireshield assembly (10).

    d. Meter shall indicate 1000 ohms minimum.



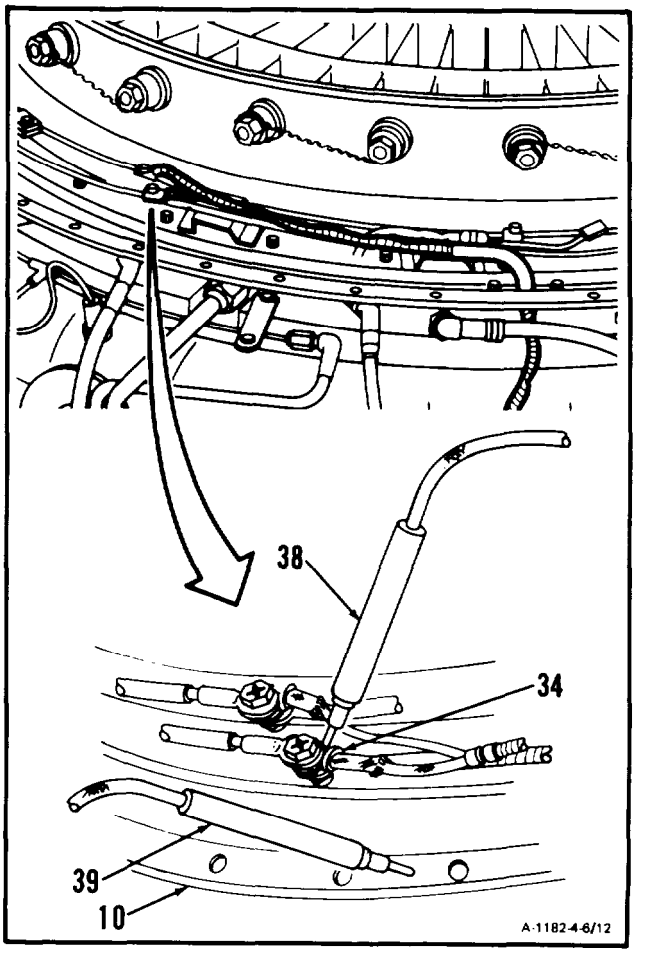
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4-6 INSTALL THERMOCOUPLE JUMPER LEAD (Continued)

e. Touch red probe (38) to terminal lug (34).

f. Touch black probe (39) to fireshield assembly (10).

g. Meter shall indicate 1000 ohms minimum.

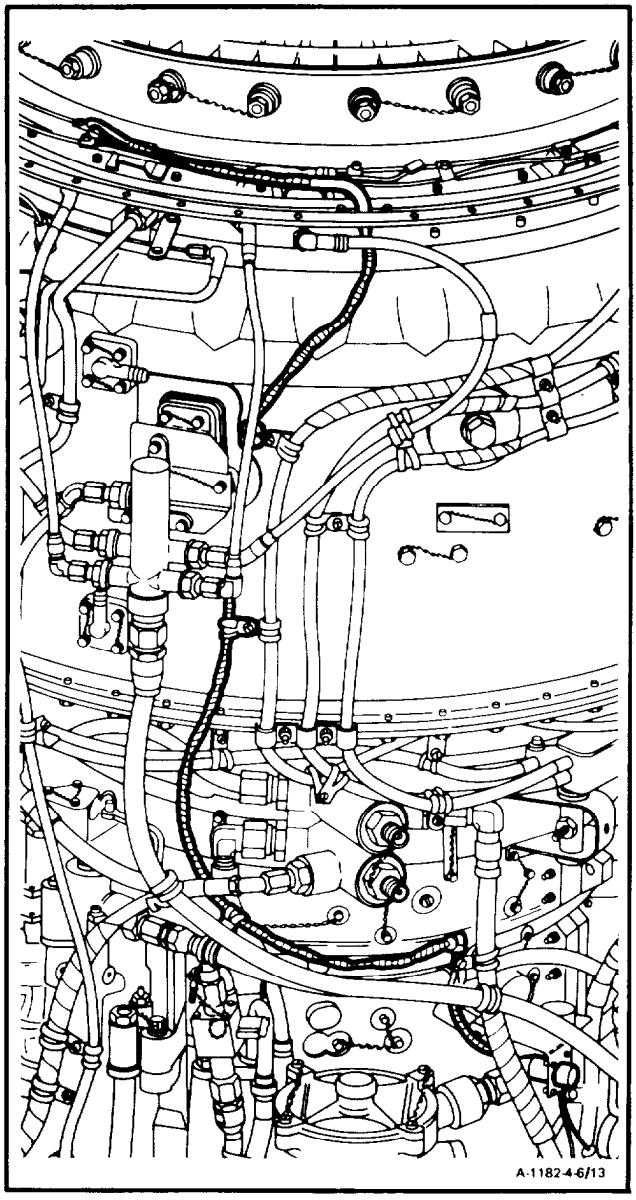


INSPECT

GO TO NEXT PAGE

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES 4-7

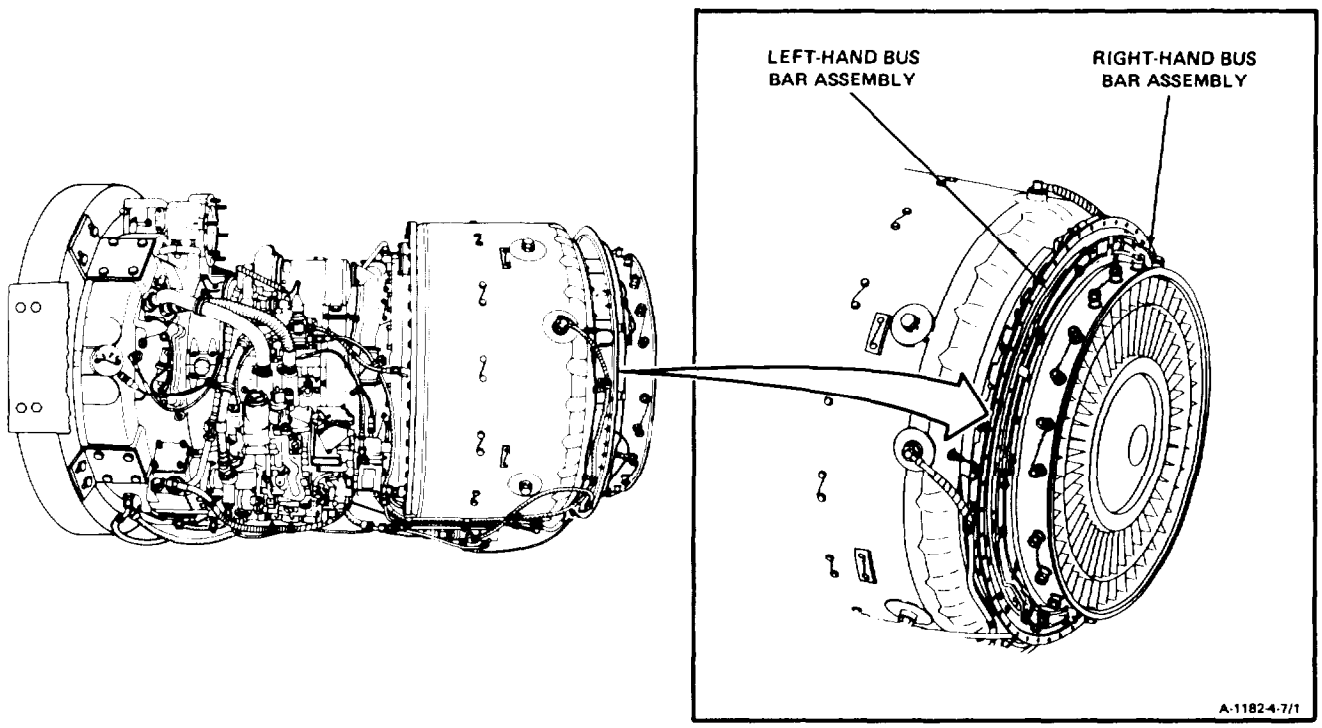
INITIAL SETUP

Applicable Configurations.
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

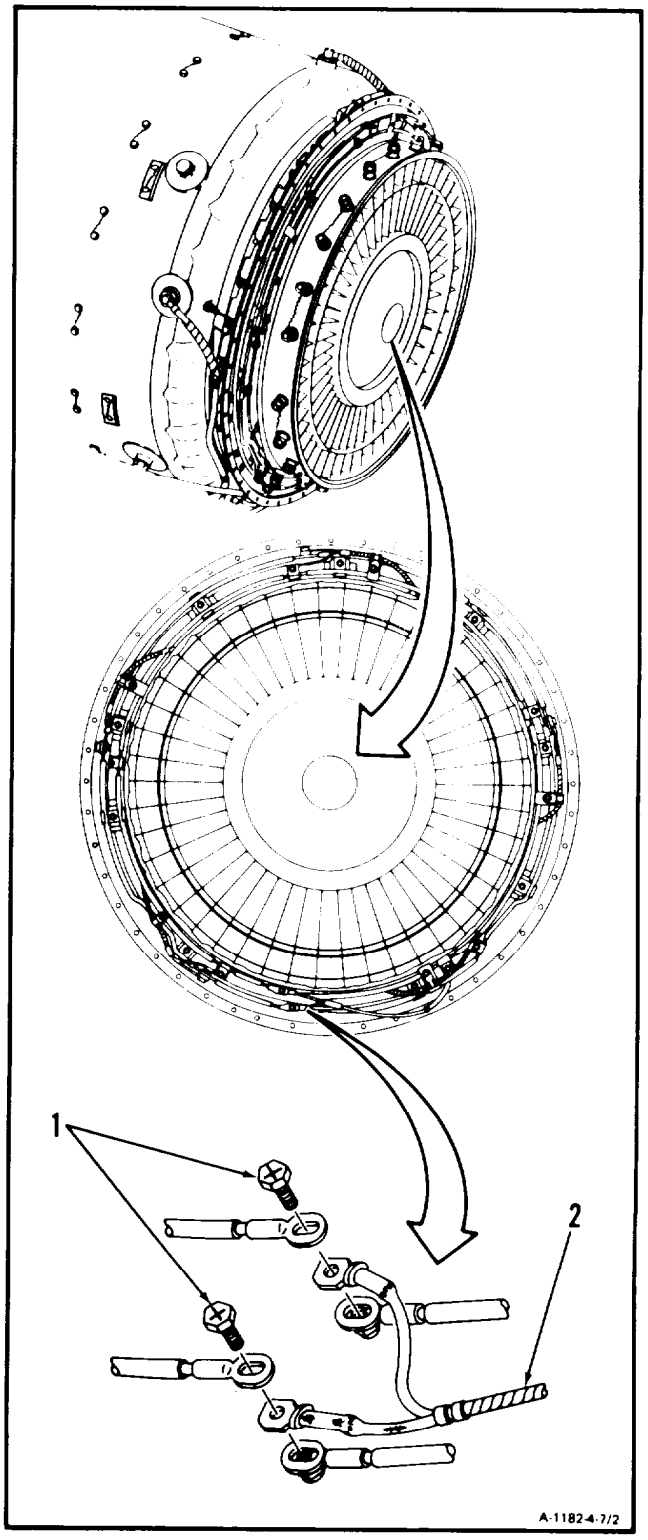
Personnel Required:
68B10 Aircraft Powerplant Repairer



GO TO NEXT PAGE

4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-7

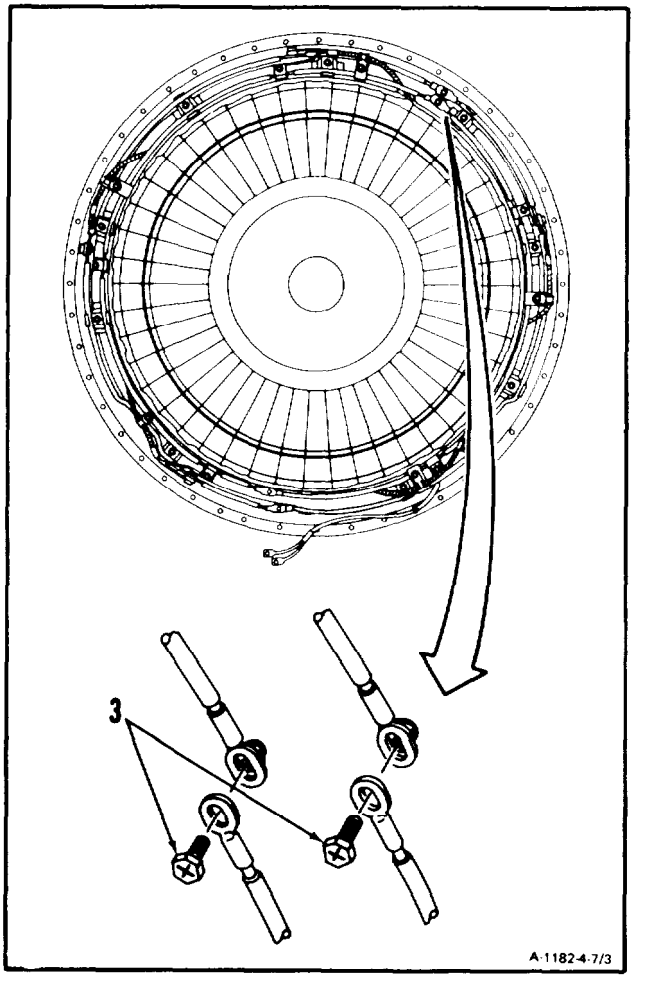
1. **Remove** two screws (1) and **thermocouple jumper lead (2).**



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4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued)

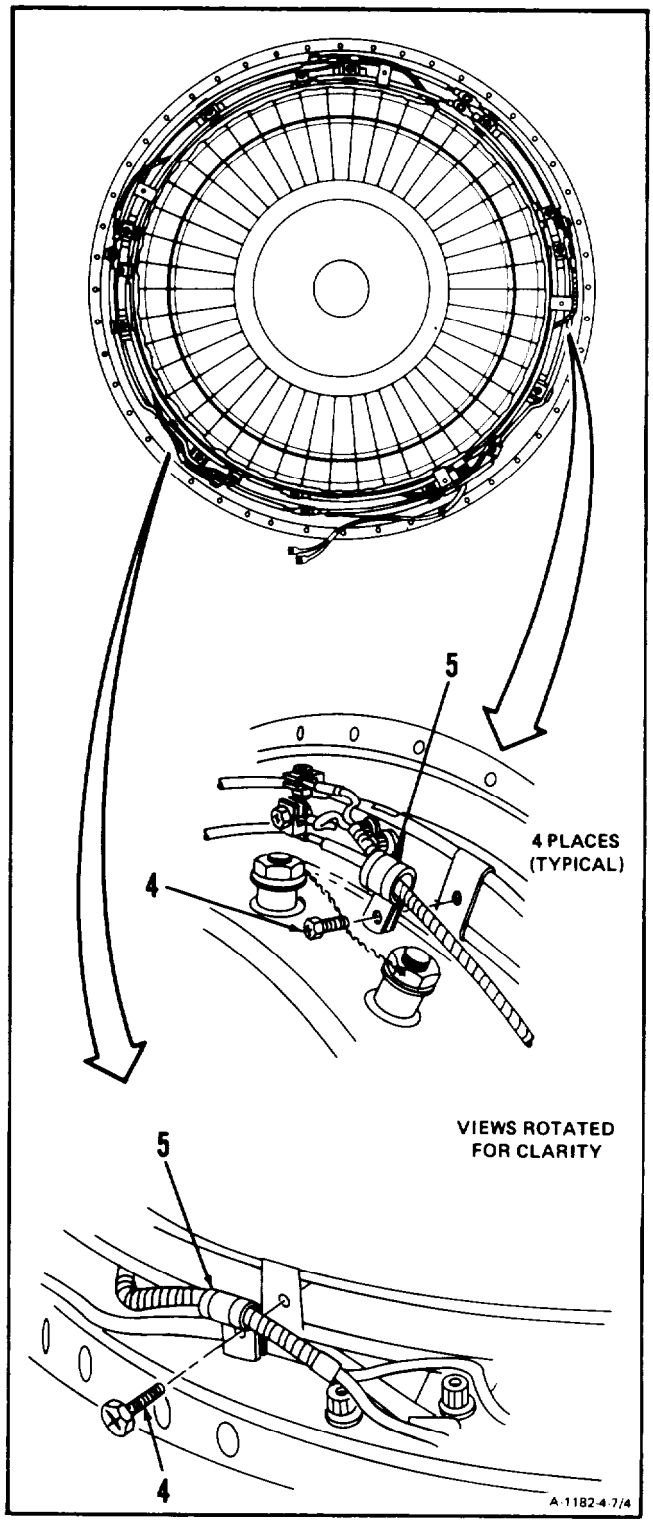
2. Remove two screws (3).



GO TO NEXT PAGE

4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-7

3. **Remove** five screws (4) and **five clamps (5).**

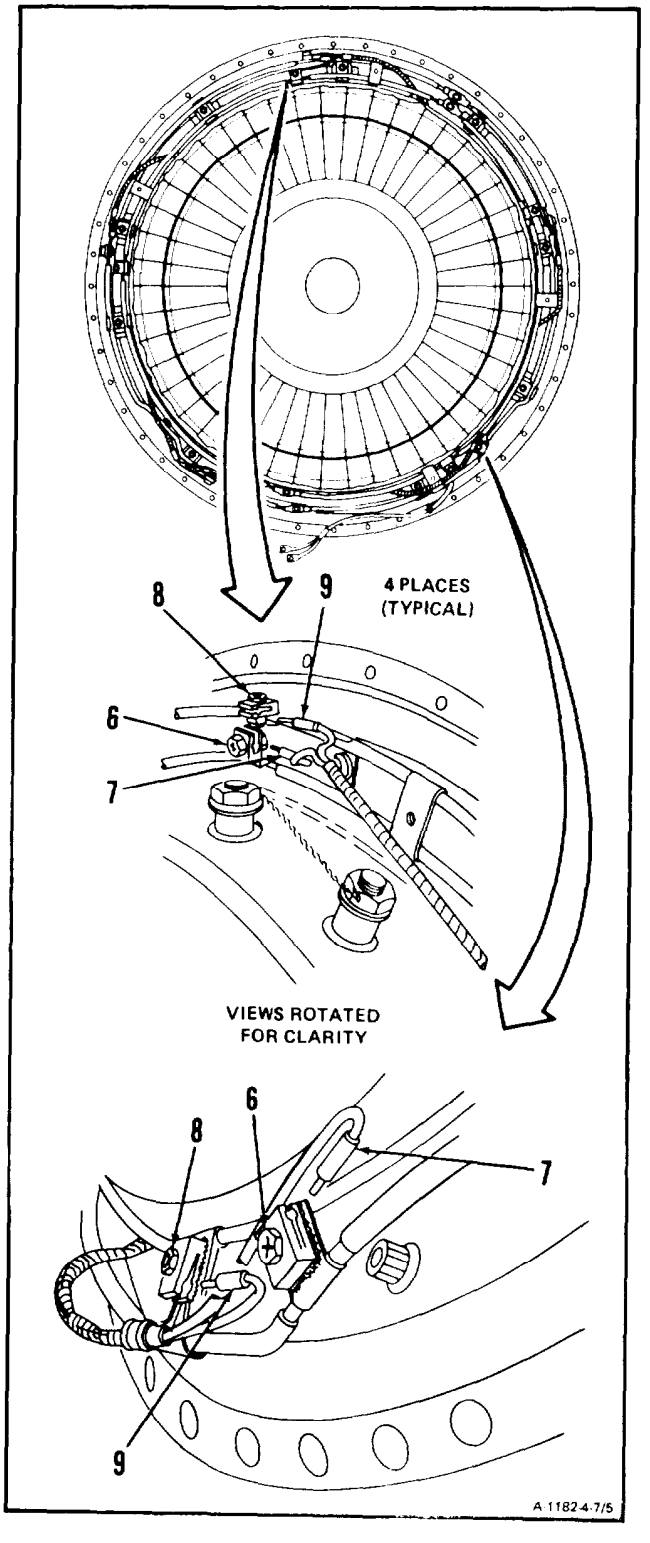


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4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued)

4. Loosen five screws (6) and **remove five thermocouple harness pins (7).**

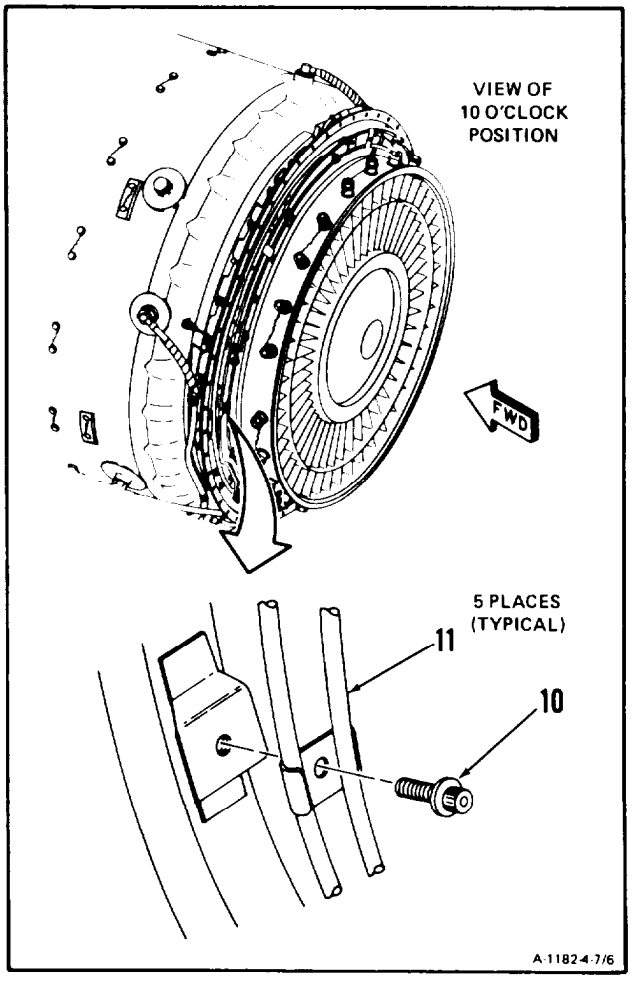
5. Loosen five screws (8) and **remove five thermocouple harness pins (9).**



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4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-7

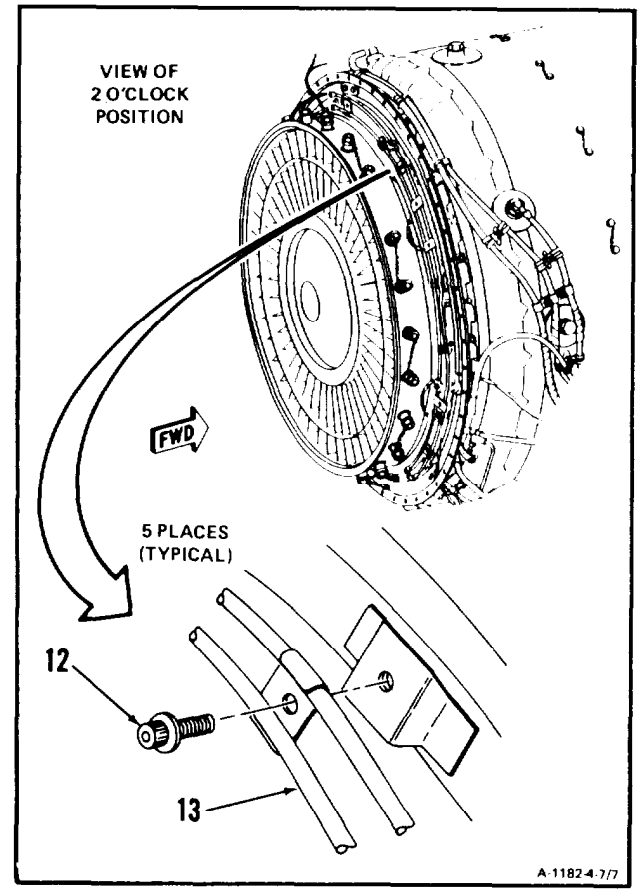
6. **Remove** five bolts (10) and **Left-hand bus assembly (11).**



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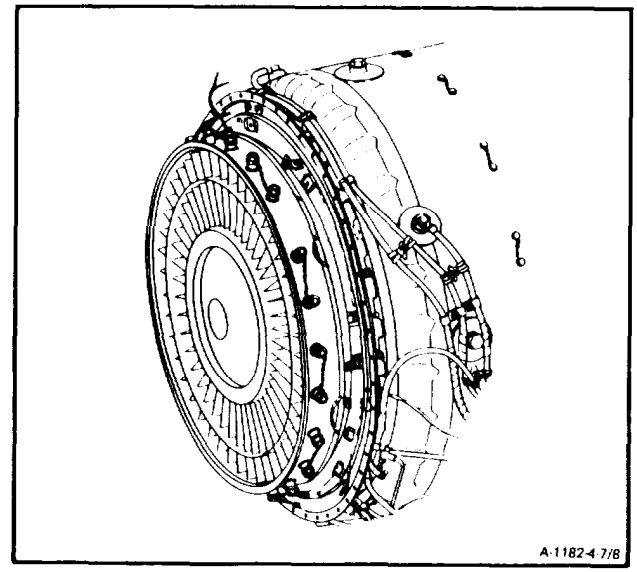
4-7 REMOVE LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-7

7. **Remove** five bolts (12) and **right-hand bus bar assembly (13).**



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-8 CLEAN LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES 4-8

INITIAL SETUP

Applicable Configurations:
All

Tools:
None

Materials:
Dry Cleaning Solvent (El 7)
Gloves (E20)
Lint-Free Cloth (E26)

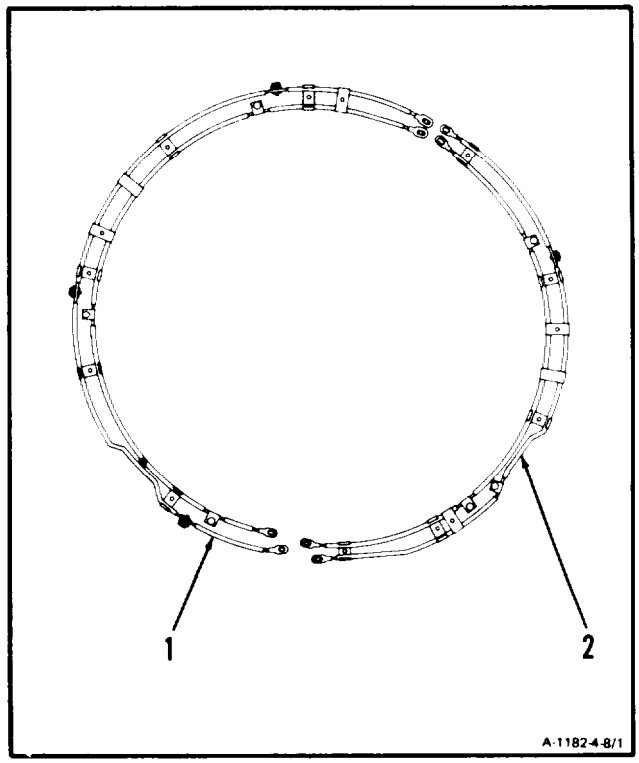
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Left- and Right-Hand Bus Bar Assemblies Removed (Task 4-7)

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean left- and right-hand bus bar assemblies (1 and 2).** Use lint-free cloth (E26) dampened in dry cleaning solvent (E17).



FOLLOW-ON MAINTENANCE:

Inspect Left- and Right-Hand Bus Bar Assemblies (Task 4-9).

END OF TASK

4-9 INSPECT LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES 4-9

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

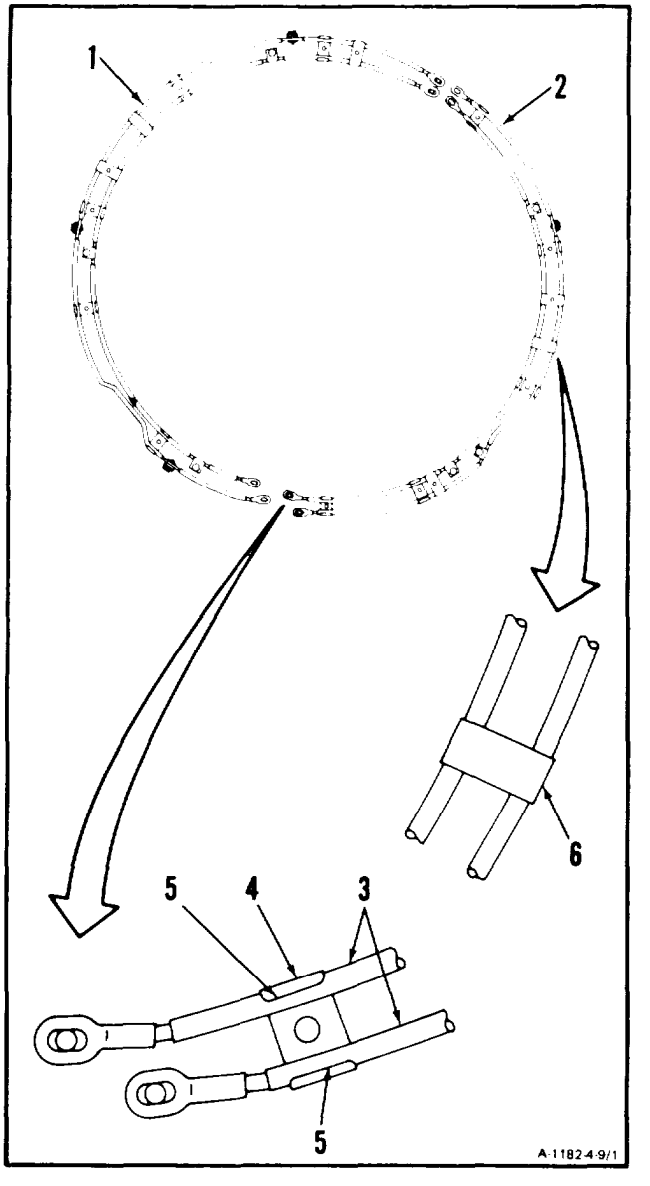
Equipment Condition.
Off Engine Task

1. Inspect left- and right-hand bus bar assemblies (1 and 2) as follows:

   a. Inspect conductors (3). There shall be no cracks.

   b. Inspect mounting brackets (4). There shall be no cracks. Any size void in brazement (5) is acceptable.

   c. Inspect spacers (6). There shall be no cracks.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES 4-10

INITIAL SETUP

Applicable Configurations:
All

Tools:
Multimeter

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task

1. Using multimeter, **measure continuity of left- and right-hand bus bar assemblies (1 and 2)** as follows:

NOTE

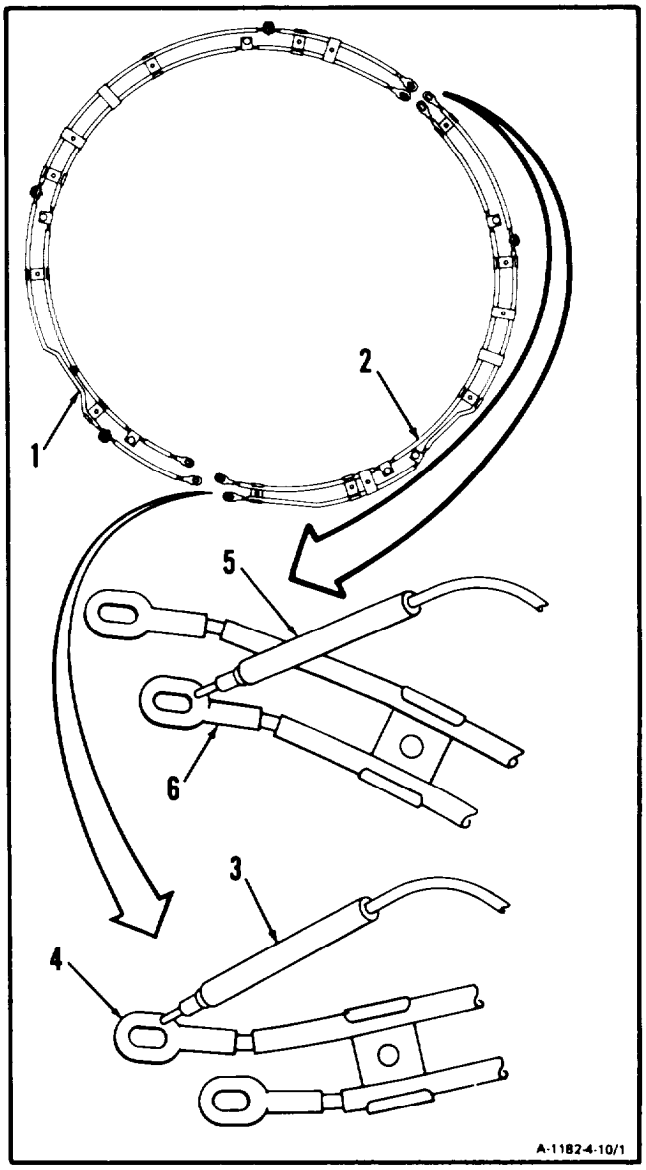
Following steps a. through g. apply to both left- and right-hand bus bar assemblies. Right-hand bus bar assembly is shown.

a. Set multimeter range switch to R x 1.

b. Touch red probe (3) to terminal lug (4).

c. Touch black probe (5) to terminal lug (6).

d. Multimeter shall indicate **zero ohms.** If multimeter indicates more than **zero ohms,** replace bus bar.



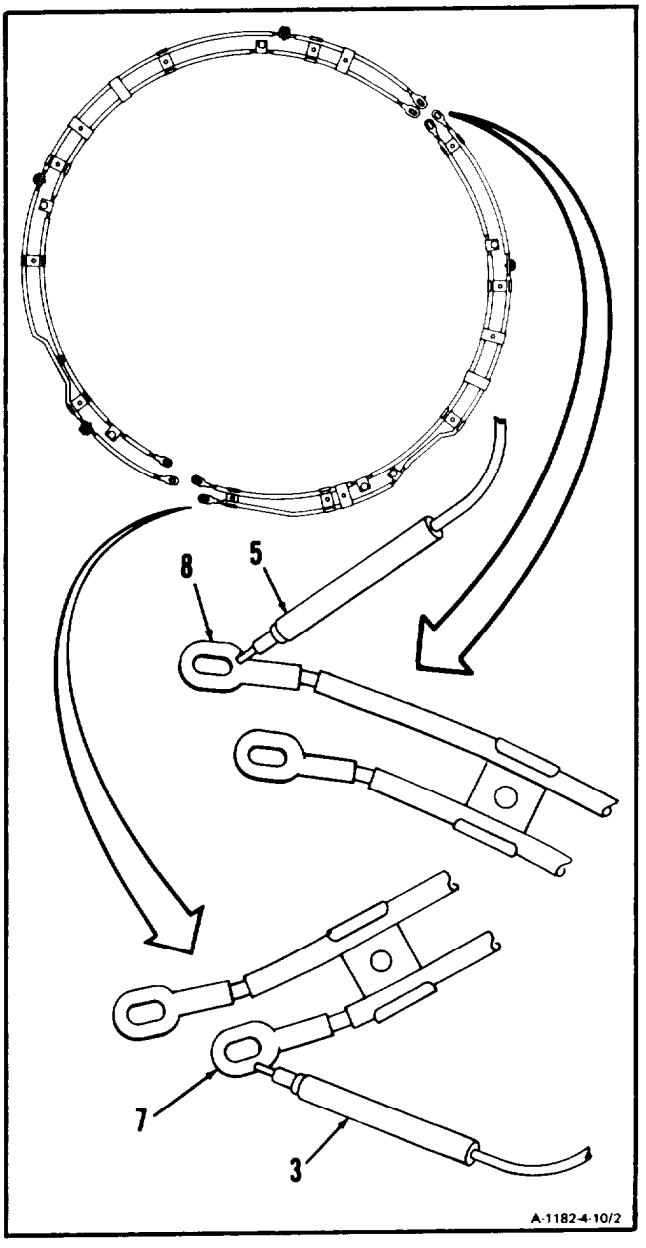
GO TO NEXT PAGE

4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

e. Touch red probe (3) to terminal lug (7).

f. Touch black probe (5) to terminal lug (8).

g. Multimeter shall indicate **zero ohms.** If multimeter indicates more than **zero ohms,** replace bus bar.



GO TO NEXT PAGE

4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

2. Using multimeter, **measure insulation resistance of left- and right-hand bus bar assemblies (1 and 2)** as follows:

NOTE

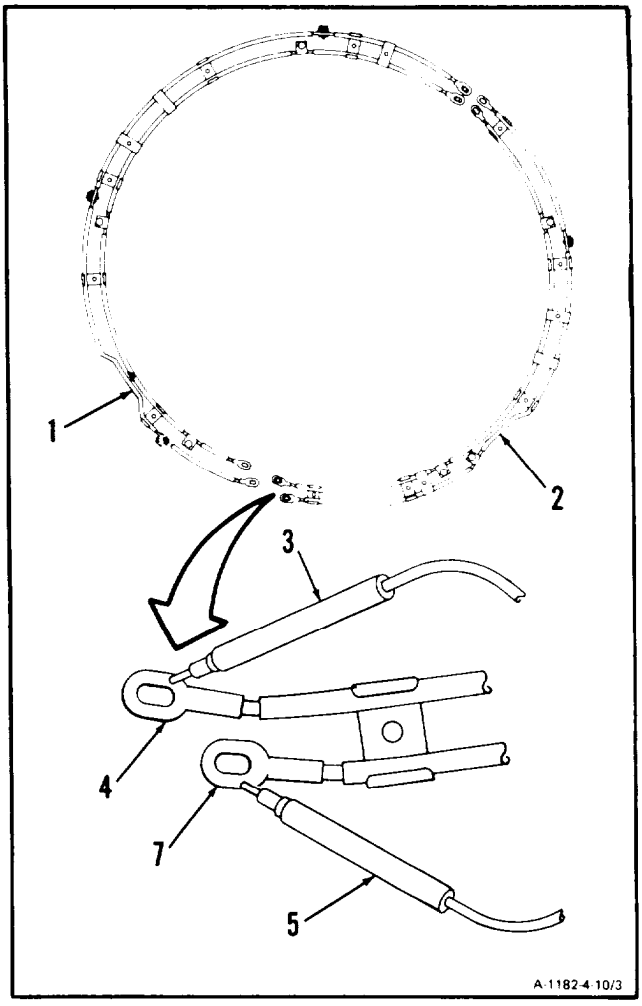
Following steps a. through m. apply to both left- and right-hand bus bar assemblies. Right-hand bus bar assembly is shown.

a. Set multimeter range switch to R x 1000.

b. Touch red probe (3) to terminal lug (4).

c. Touch black probe (5) to terminal lug (7).

d. Multimeter shall indicate **1000 ohms** minimum. If multimeter indicates less than **1000 ohms,** replace bus bar.

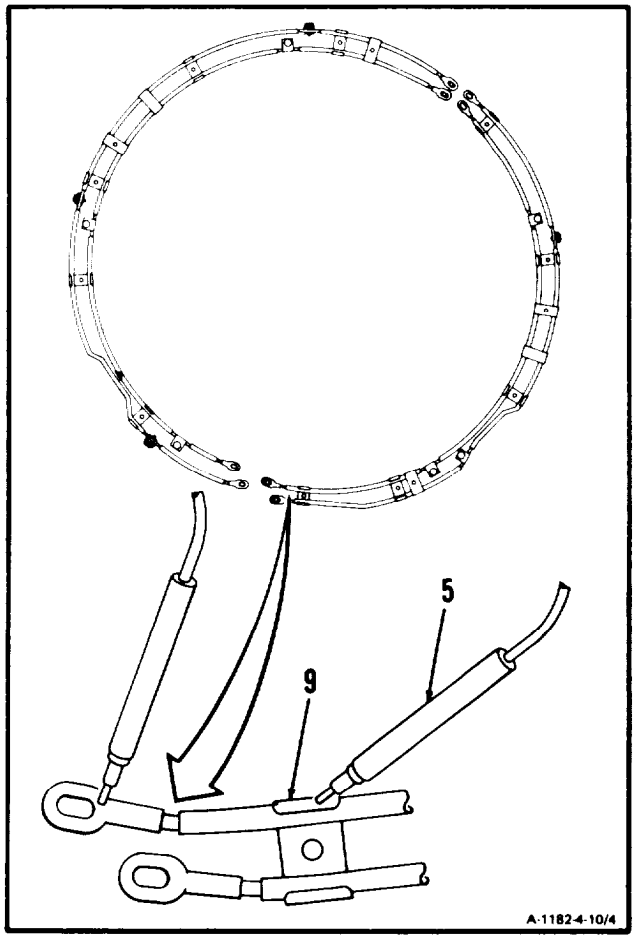


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4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

e. Touch black probe (5) to mounting bracket (9).

f. Multimeter shall indicate **1000 ohms** minimum. If multimeter indicates less than **1000 ohms,** replace bus bar.

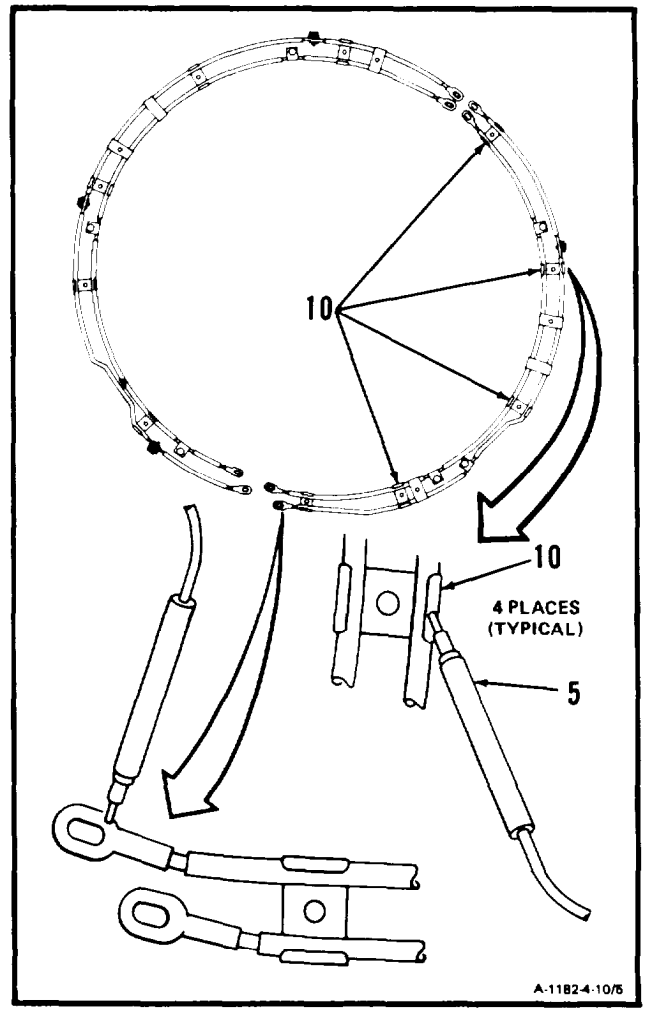


GO TO NEXT PAGE

4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

g. Touch black probe (5) to all other mounting brackets (10).

h. Multimeter shall indicate **1000 ohms** minimum, If multimeter indicates less than **1000 ohms,** replace bus bar.



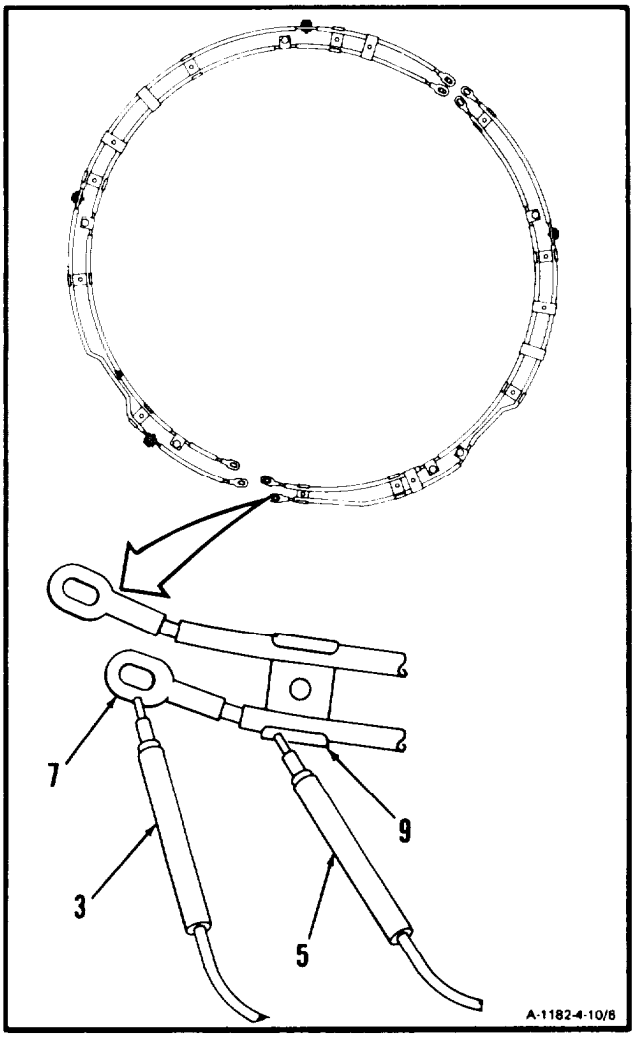
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4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

i. Touch red probe (3) to terminal lug (7).

j. Touch black probe (5) to mounting bracket (9).

k. Multimeter shall indicate **1000 ohms** minimum. If multimeter indicates less than **1000 ohms,** replace bus bar.

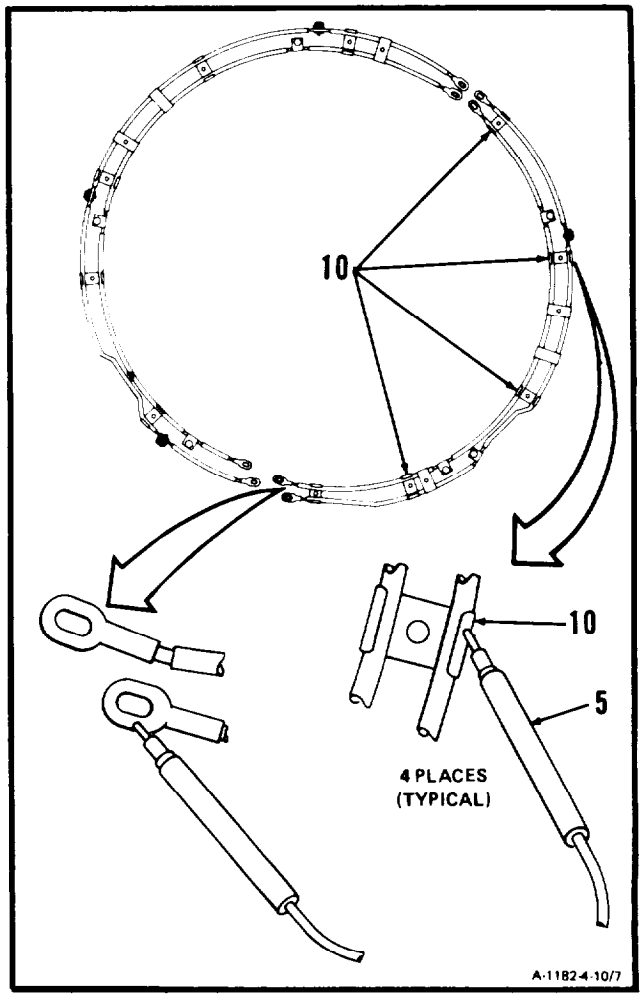


GO TO NEXT PAGE

4-10 TEST LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-10

l. Touch black probe (5) to all other mounting brackets (10).

m. Multimeter shall indicate **1000 ohms** minimum. If multimeter indicates less than **1000 ohms,** replace bus bar.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES 4-11

INITIAL SETUP

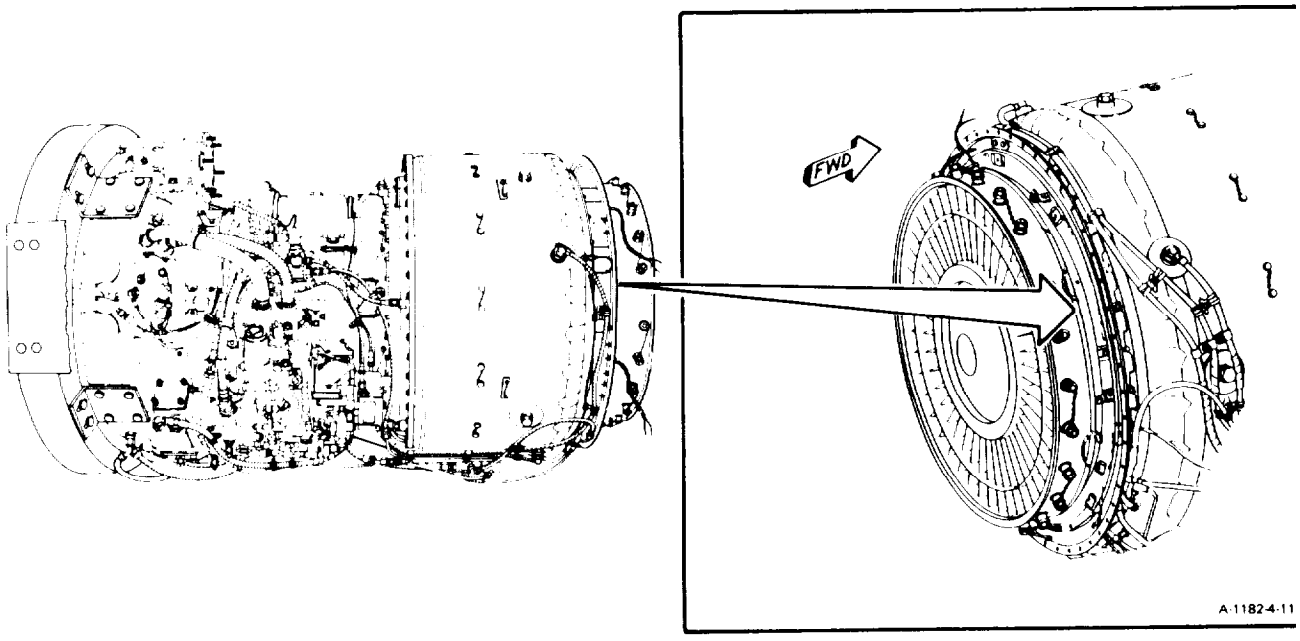
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Multimeter

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
Task 4-24



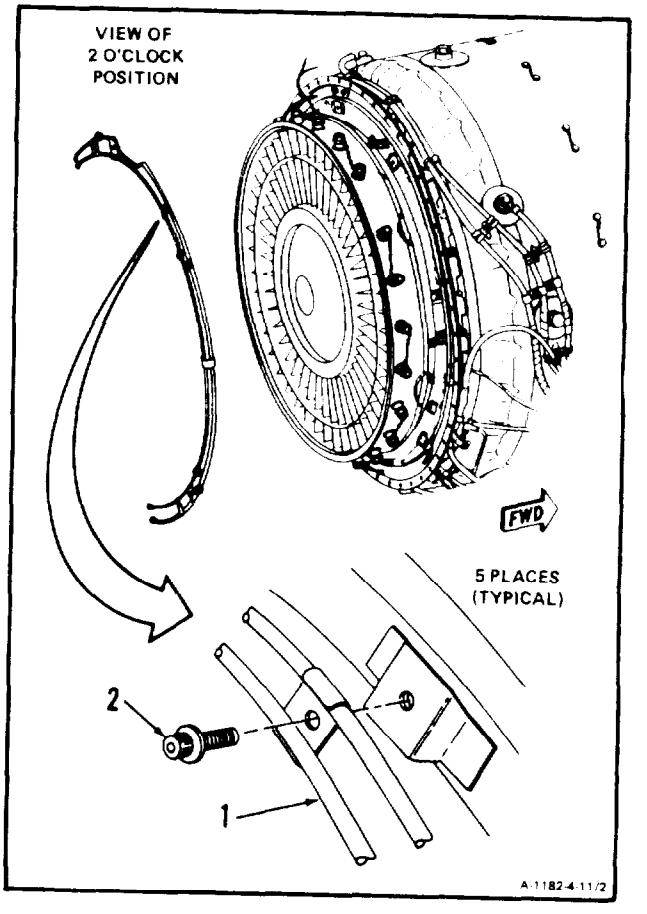
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4-11 INSTALL LEFT-AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

NOTE

In following step, bolt at 6-o'clock position is longer.

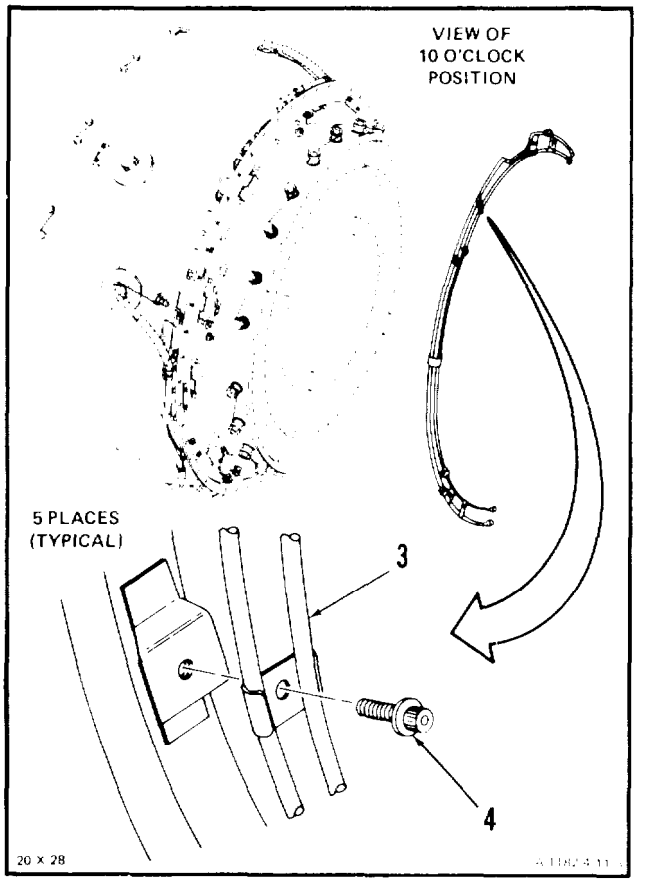
1. **Install right-hand bus bar assembly (1)** and five bolts (2)



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4-11 INSTALL LEFT-AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

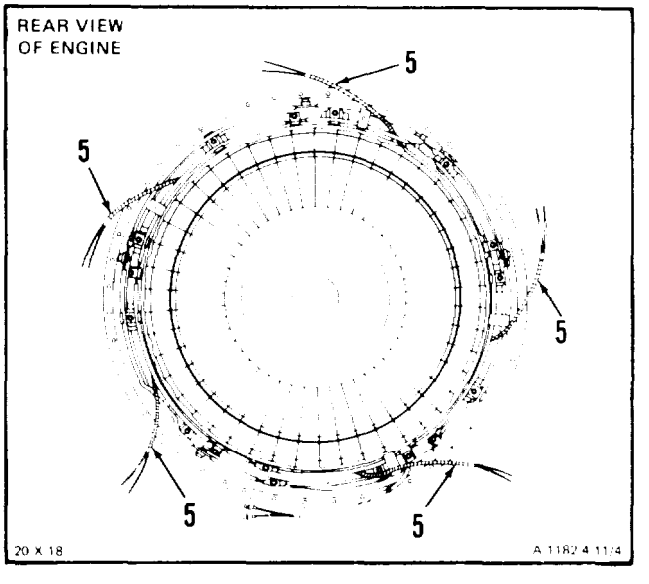
2. **Install left-hand bus bar assembly (3)** and five bolts (4).



3. **Test five thermocouple harness assemblies (5)** (Ref. Task 4-24).

NOTE

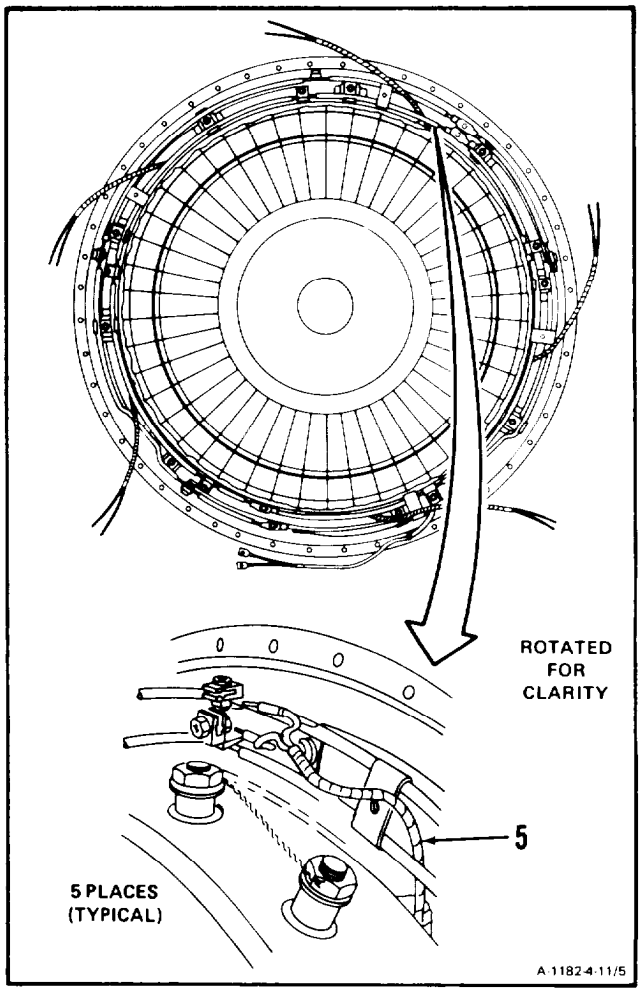
A thermocouple harness assembly that has been found defective shall be disconnected from the bus bar assembly and have its leads taped with fiberglass tape separately and then to the bus bar assembly in order to remove its signal input and prevent damage during operation. **An engine may remain in service with (one only) defective harness provided that harness is replaced within 100 hours.** Harnesses found defective during hot end inspection/schedule maintenance shall be replaced.



GO TO NEXT PAGE

4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

4. Route five thermocouple harness assemblies (5) counterclockwise.

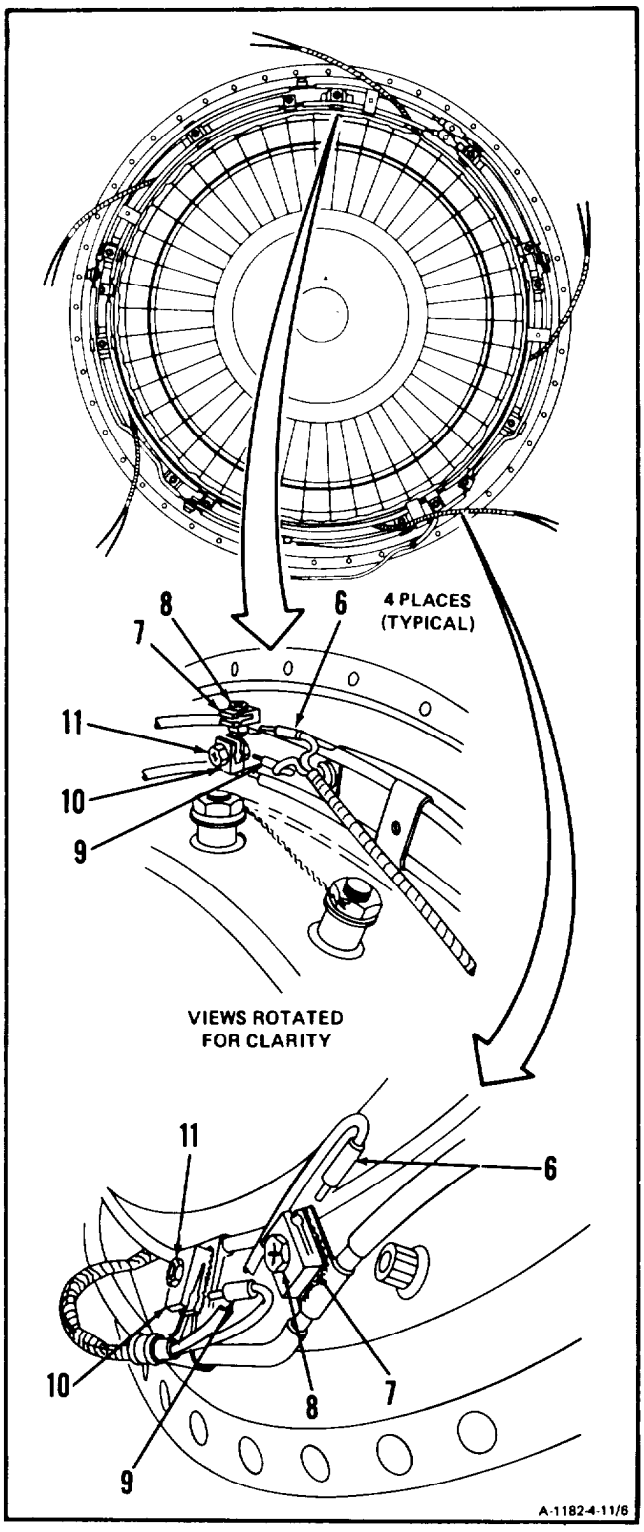


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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

5. **Install five large pins (6)** in pin clamps (7). Tighten five screws (8).

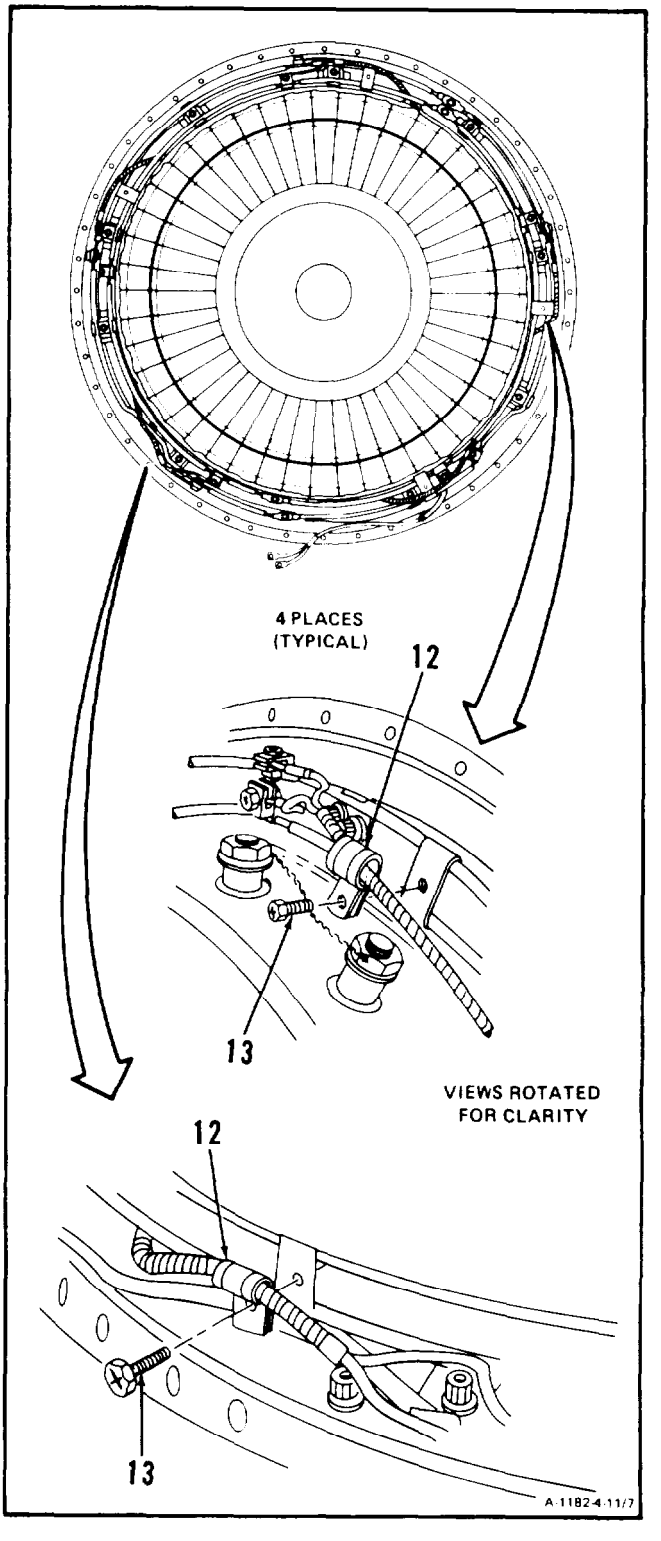
6. **Install five small pins (9)** in five pin clamps (10). Tighten five screws (11).



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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

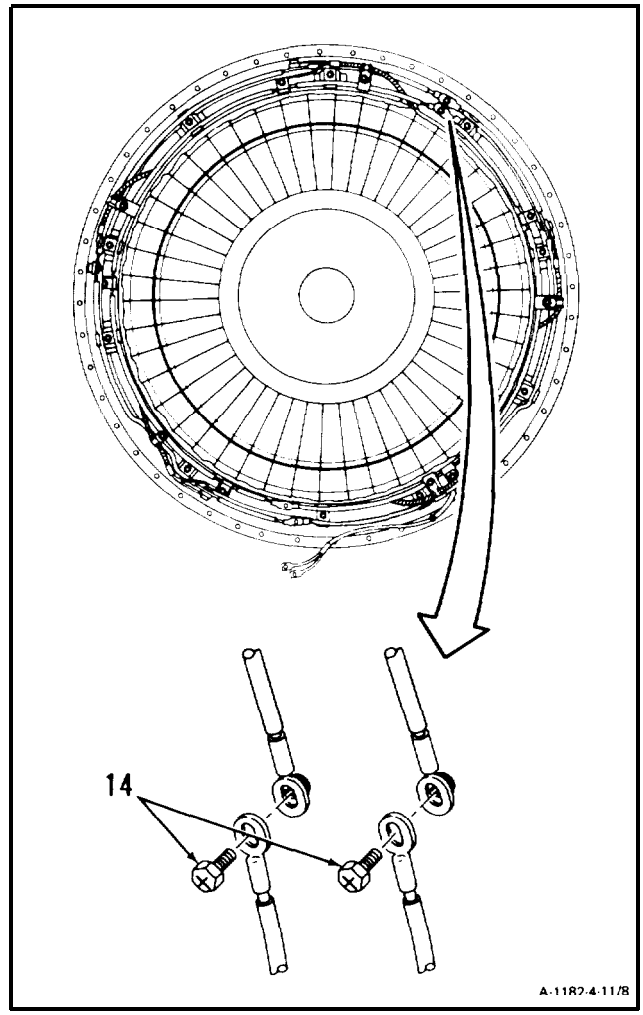
7. **Install five clamps (12)** and screws (13). Tighten five screws (13).



GO TO NEXT PAGE

4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

8. **Install two screws (14).**



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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

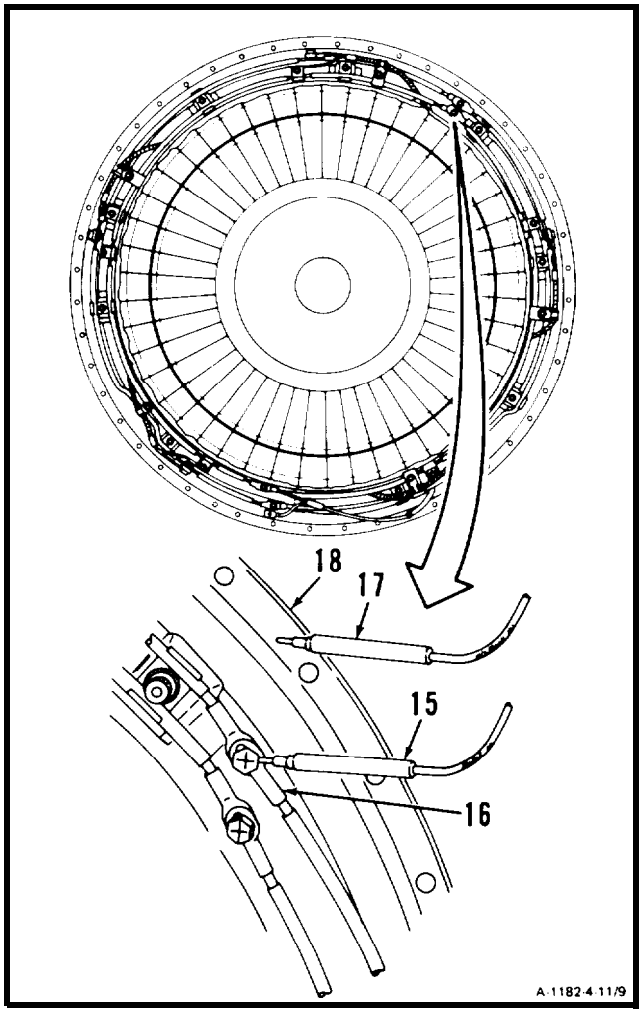
9. Using multimeter, **measure insulation resistance** as follows:

   a. Set multimeter range switch to R x 1000.

   b. Touch red probe (15) to terminal lug (16).

   c. Touch black probe (17) to fireshield (18).

   d. Multimeter shall indicate **1000 ohms** minimum.

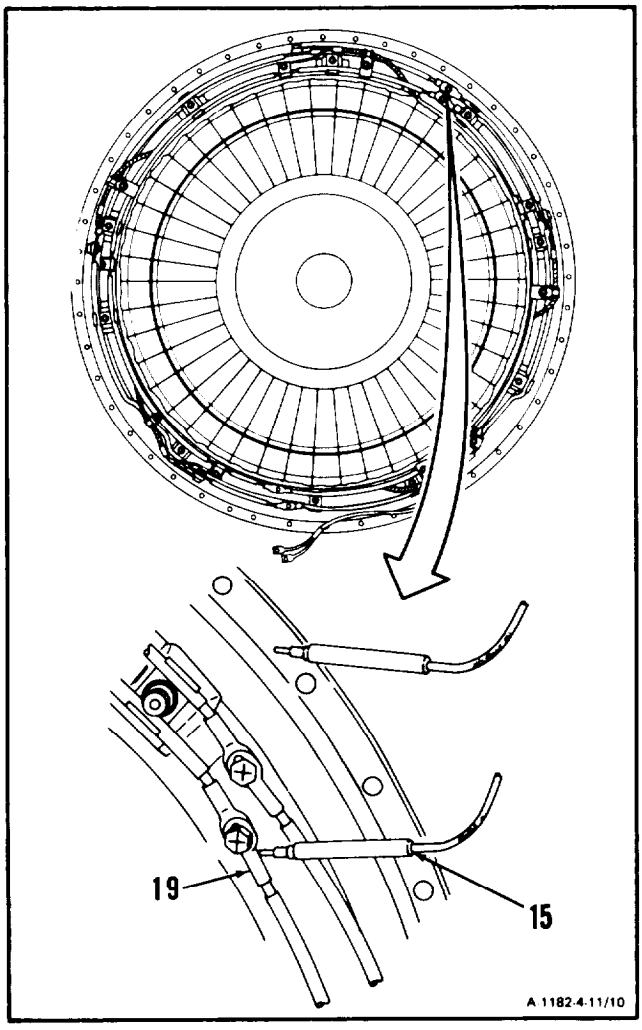


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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued)

e. Touch red probe (15) to terminal lug (19).

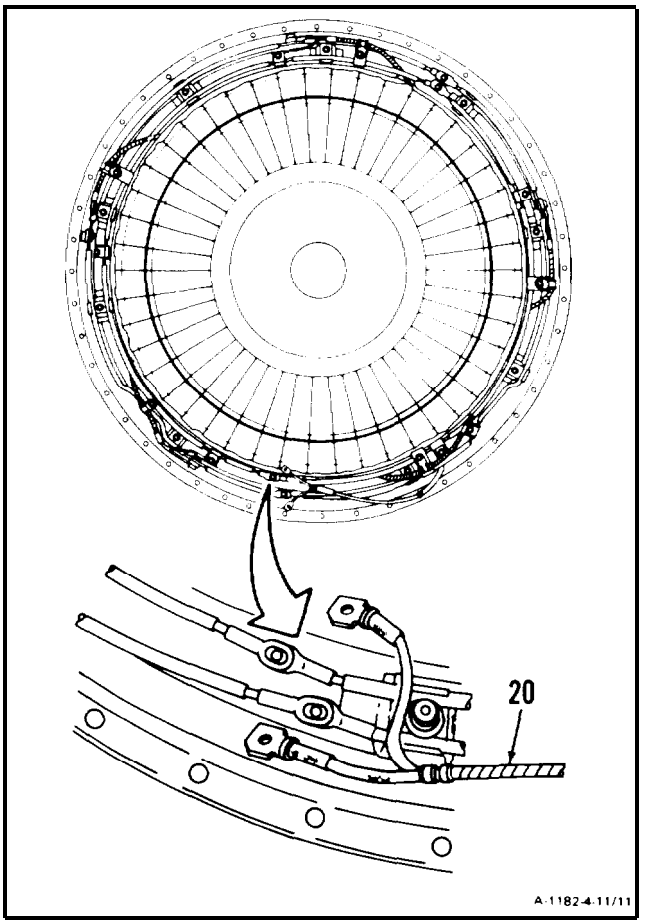
f. Multimeter shall indicate **1000 ohms** minimum.



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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

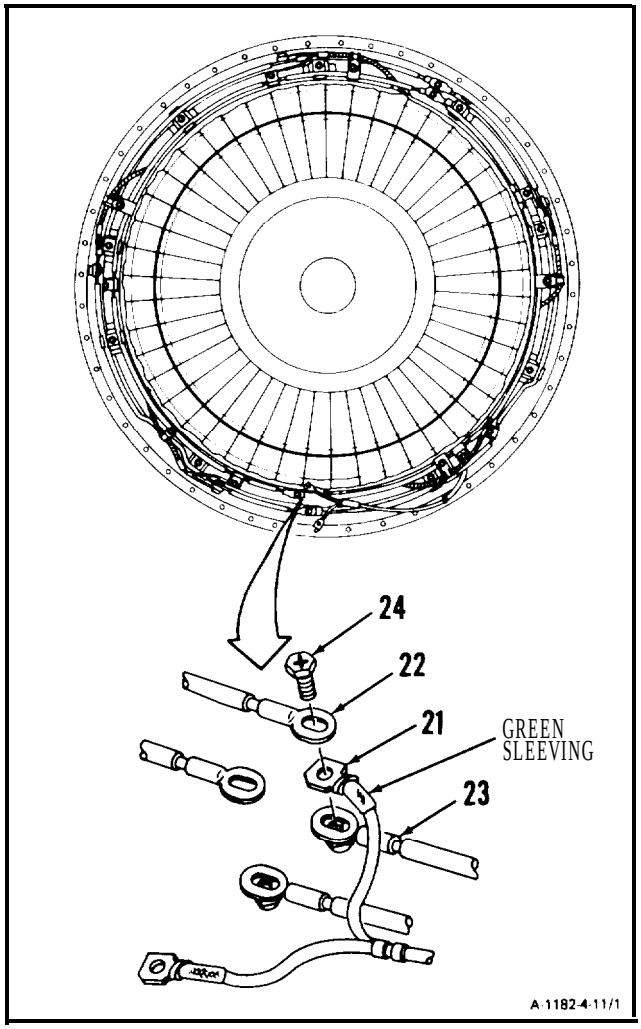
10. Route thermocouple jumper lead (20) clockwise.



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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

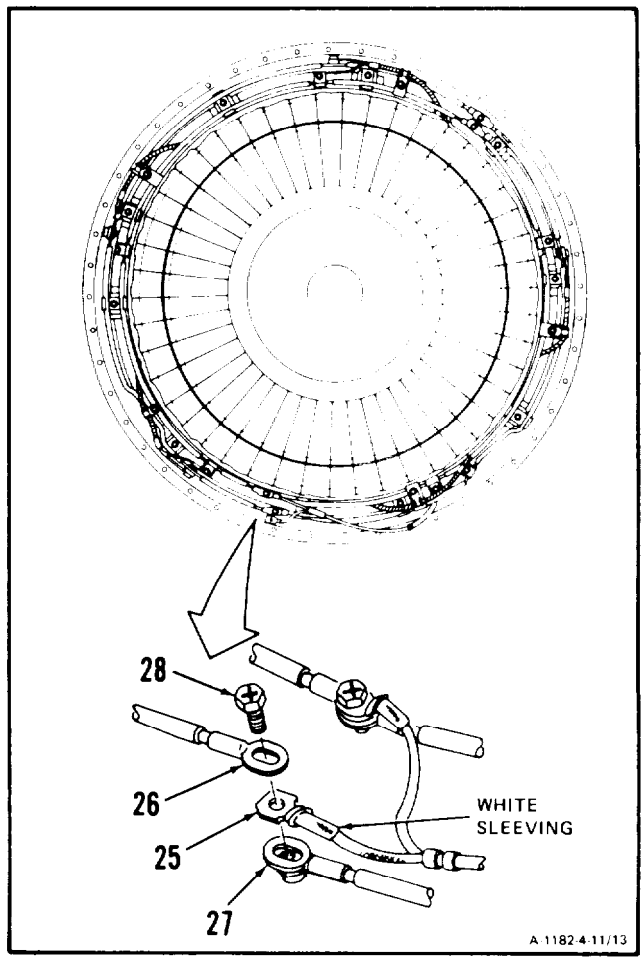
11. **Install terminal lug (21)** between terminal lugs (22 and 23) and install screw (24).



GO TO NEXT PAGE

4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

12. **Install terminal lug** (25) between terminal lugs (26 and 27) and install screw (28).



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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued)

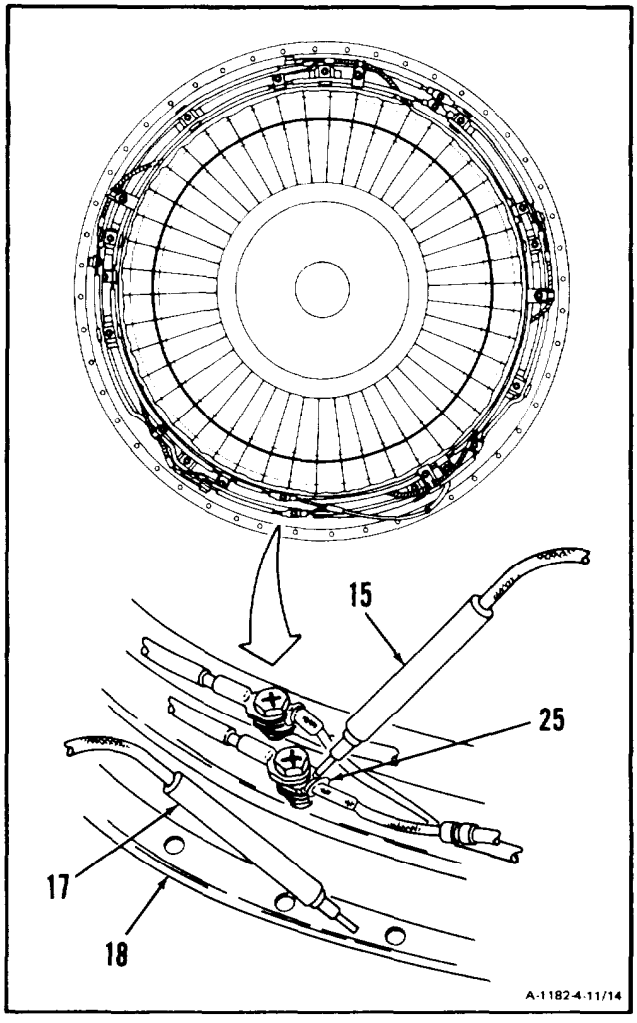
13. Using multimeter, **measure insulation resistance as follows:**

    a. Set multimeter range switch to R x 1000.

    b. Touch red probe (15) to terminal lug (25).

    c. Touch black probe (17) to fireshield (18).

    d. Multimeter shall indicate **1000 ohms** minimum.

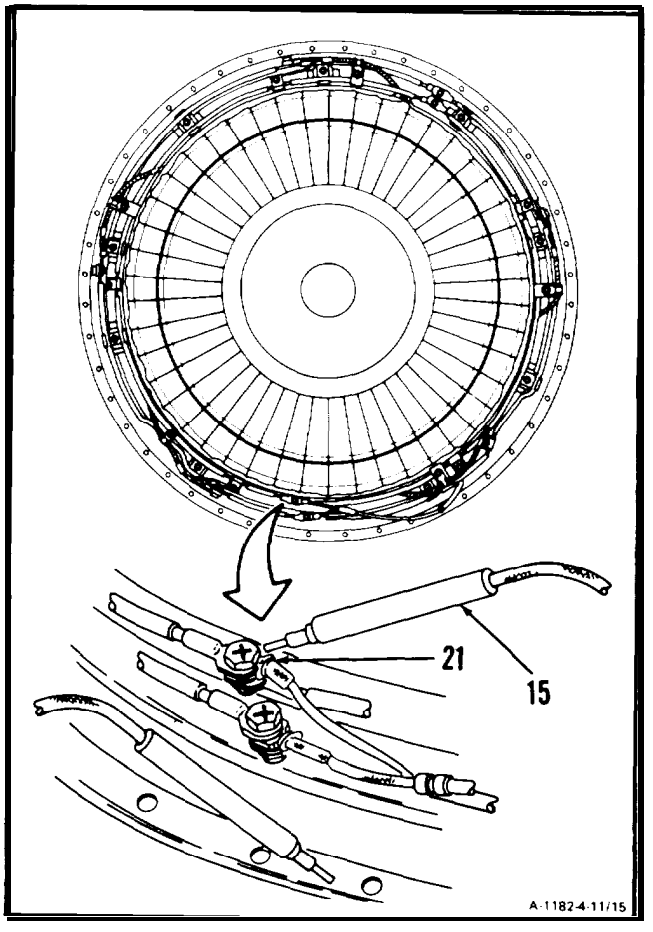


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4-11 INSTALL LEFT- AND RIGHT-HAND BUS BAR ASSEMBLIES (Continued) 4-11

e. Touch red probe (15) to terminal lug (21).

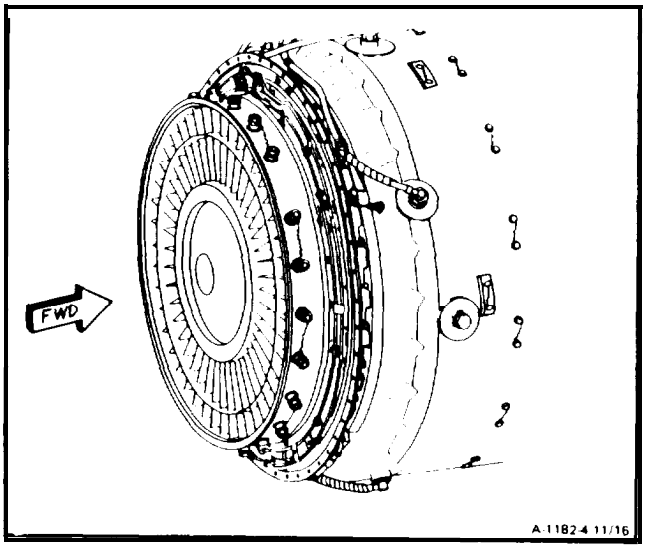
f. Multimeter shall indicate **1000 ohms** minimum.



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-12 REMOVE FIRESHIELD ASSEMBLY

4-12

INITIAL SETUP

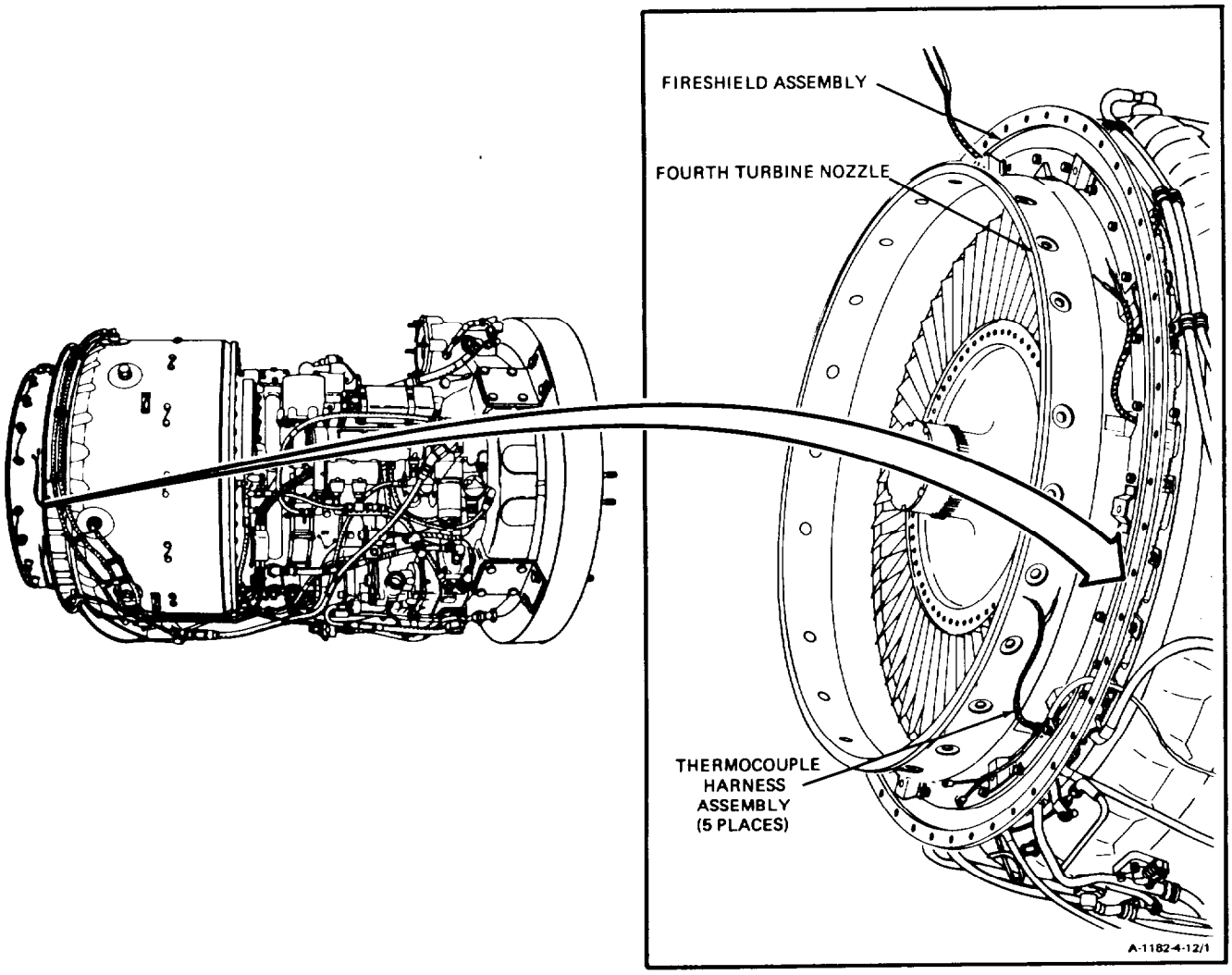
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

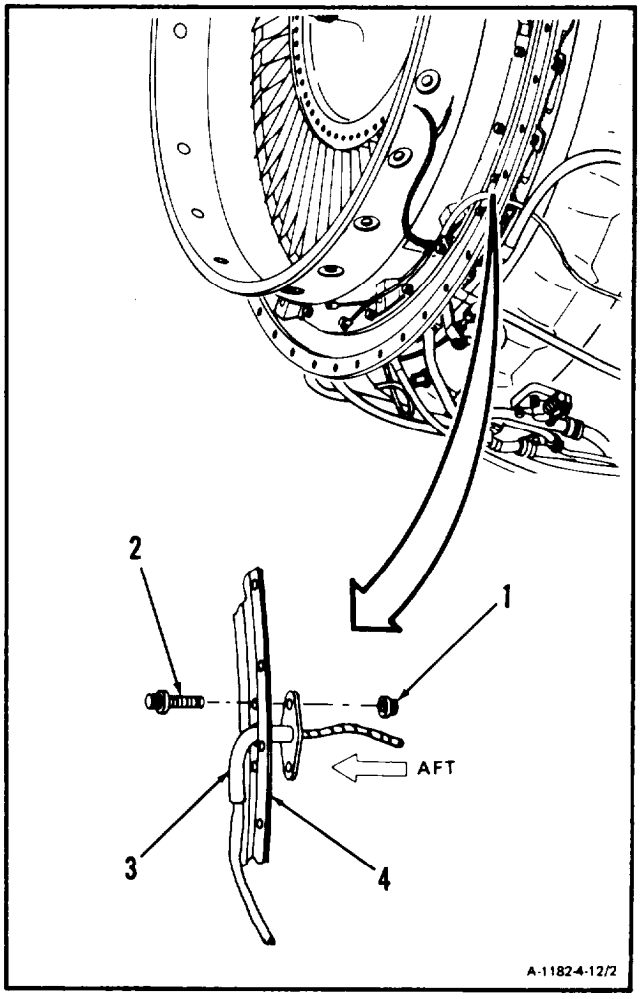
Equipment Condition:
Left- and Right-Hand Bus Bar Assemblies Removed (Task 4-7)
Exit Vane Assembly Removed (Task 4-78)



GO TO NEXT PAGE

4-12 REMOVE FIRESHIELD ASSEMBLY (Continued) 4-12

1. Remove two nuts (1) and bolts (2). **Withdraw thermocouple jumper lead (3)** from fireshield assembly (4).



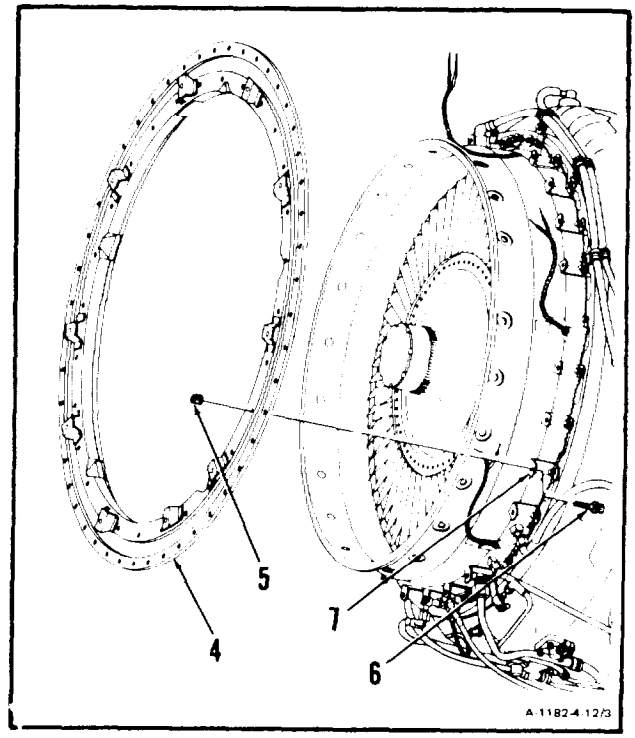
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4-12 REMOVE FIRESHIELD ASSEMBLY (Continued) 4-12

CAUTION

When removing fireshield assembly, be careful not to get five thermocouple harness assembly leads caught between fireshield and fourth turbine nozzle. Failure to comply may cause damage to harness assembly leads.

2. Remove 28 nuts (5) and bolts (6) from 28 supports (7). **Remove fireshield assembly.**

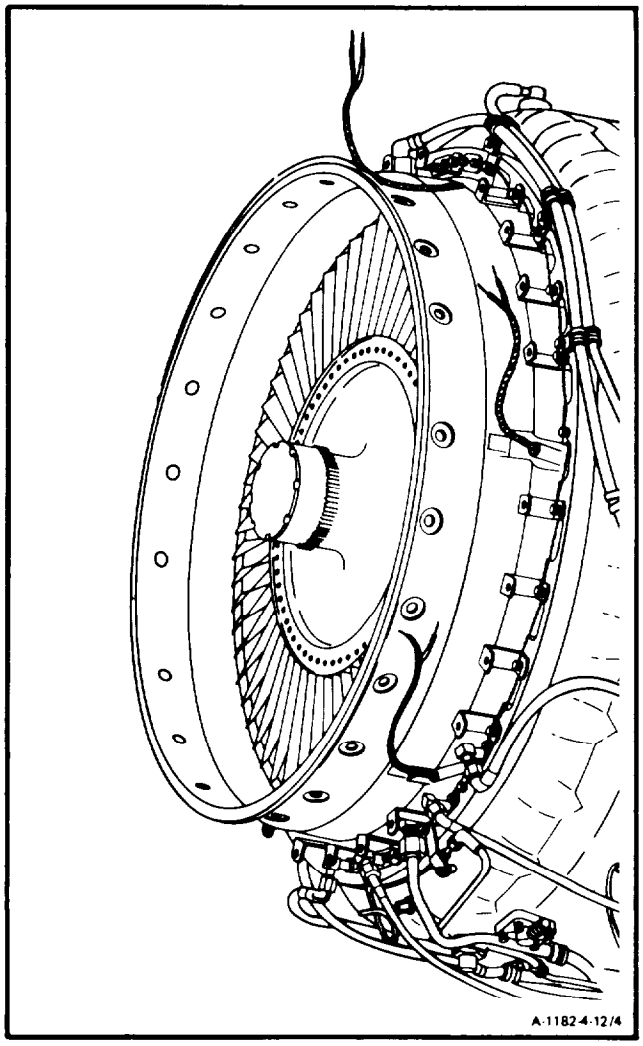


GO TO NEXT PAGE

4-12 REMOVE FIRESHIELD ASSEMBLY (Continued)

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-13 CLEAN FIRESHIELD ASSEMBLY 4-13

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Left- and Right-Hand Bus Bar Assemblies Removed (Task 4-7)
Exit Vane Assembly Removed (Task 4-78)
Fireshield Assembly Removed (Task 4-12)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause bums. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

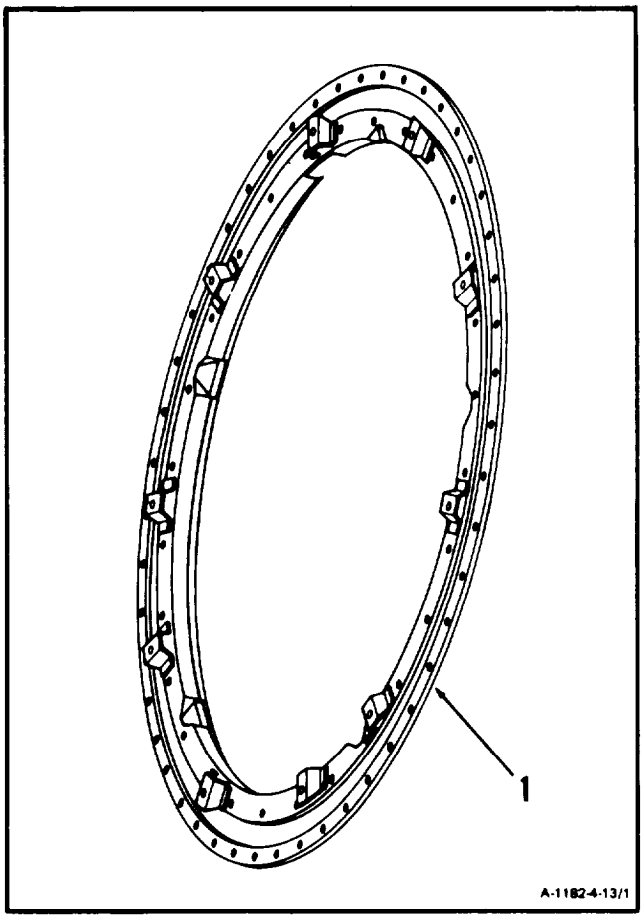
4-13 CLEAN FIRESHIELD ASSEMBLY (Continued)

1. Wear gloves (E20). **Clean fireshield assembly (1)** using methyl ethyl ketone (E36) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. Blow dry fireshield assembly (1) using clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Fireshield Assembly (Task 4-14)..

END OF TASK

4-14 INSPECT FIRESHIELD ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspectron Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

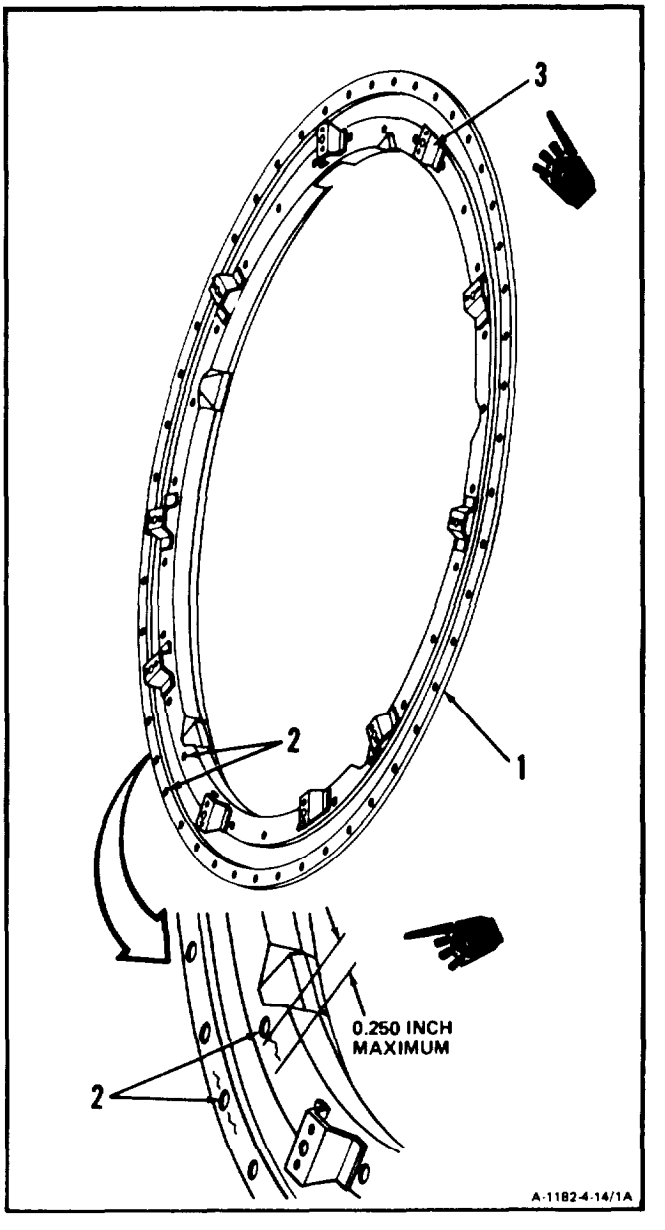
Equipment Condition:
Off Engine Task

1. **Inspect fireshield assembly (1)** as follows:

   a. Non-converging cracks not to exceed 1/4 inch length, in bolt hole areas (2) are acceptable. No other cracks are allowed.

   b. There shall be no loose mounting brackets (3).

   c. There shall be no bends or war page which cause deformation after installation.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-15 INSTALL FIRESHIELD ASSEMBLY

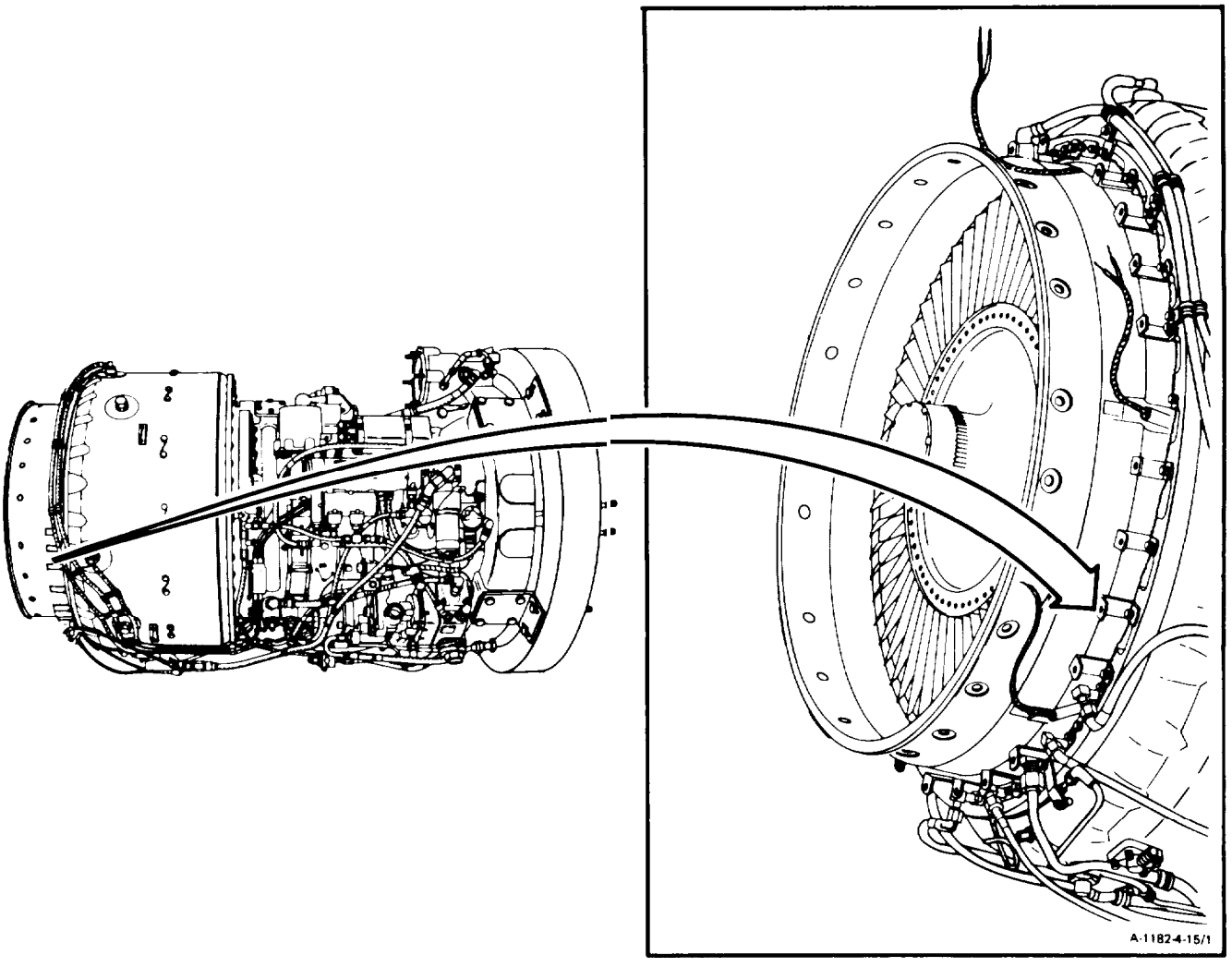
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 30-150 Inch-Pounds

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector



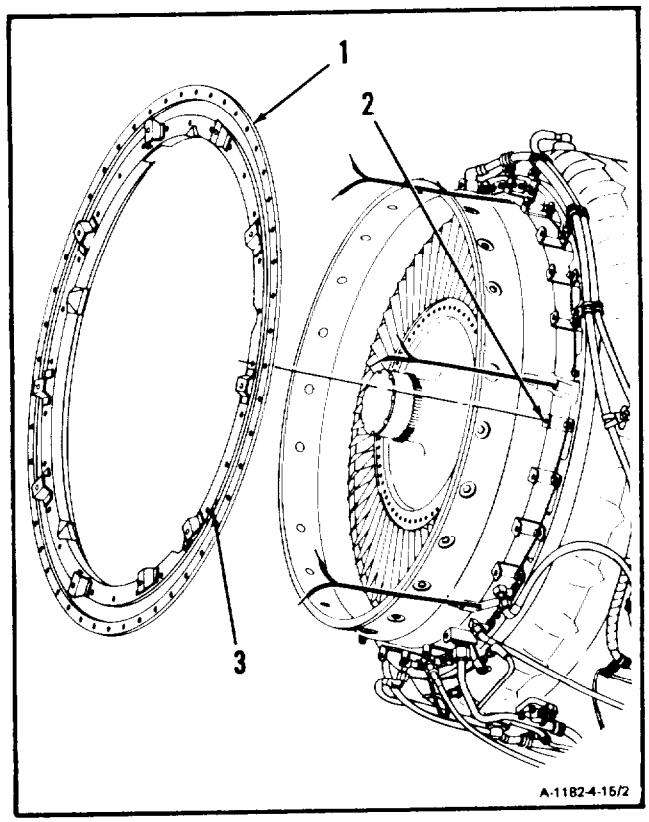
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4-15 INSTALL FIRESHIELD ASSEMBLY (Continued)

CAUTION

When installing fireshield assembly, be careful not to get five thermocouple harness assembly leads caught between fireshield and fourth turbine nozzle. Failure to comply may cause damage to harness assembly leads.

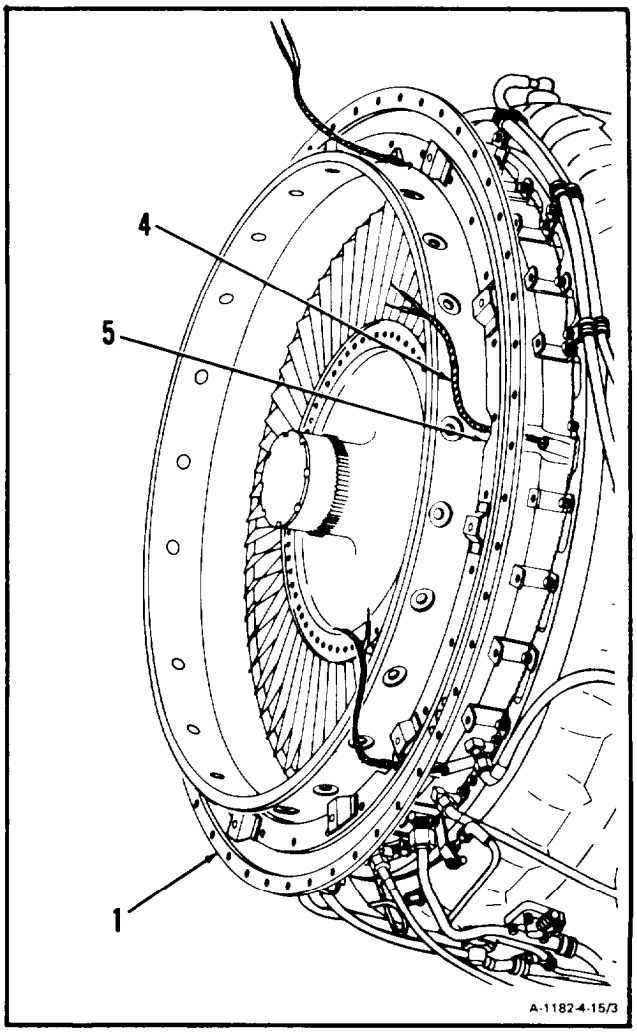
1. Align fireshield assembly (1) near 23 supports (2) with thermocouple jumper lead mounting hole (3) at 5-o'clock position.



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4-15 INSTALL FIRESHIELD ASSEMBLY (Continued) 4-15

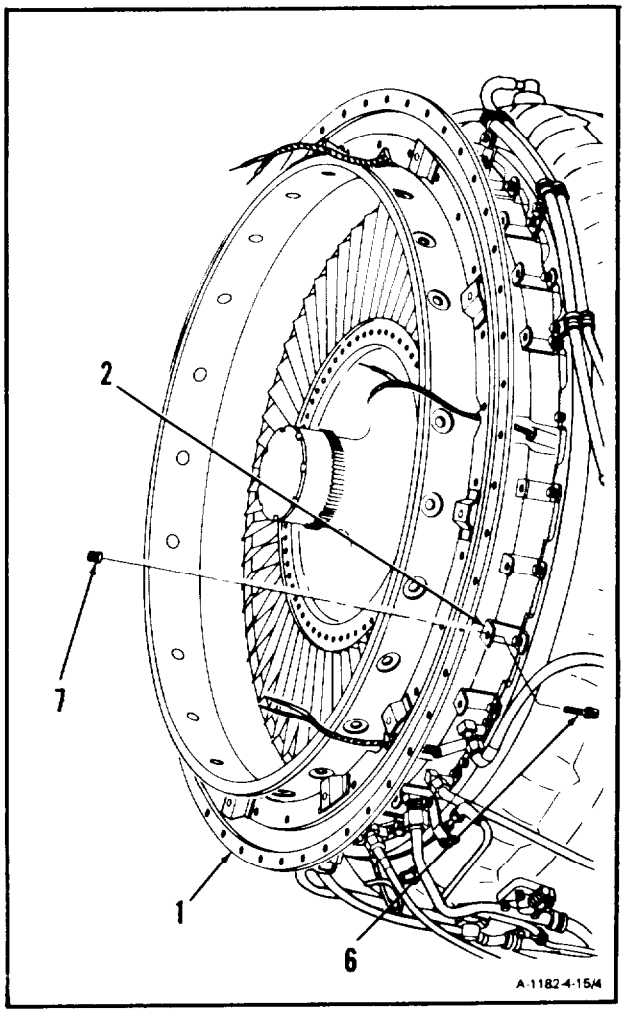
2. Route five thermocouple harness assembly leads (4) through five cutouts (5) in fireshield assembly (1).



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4-15 INSTALL FIRESHIELD ASSEMBLY (Continued) 4-15

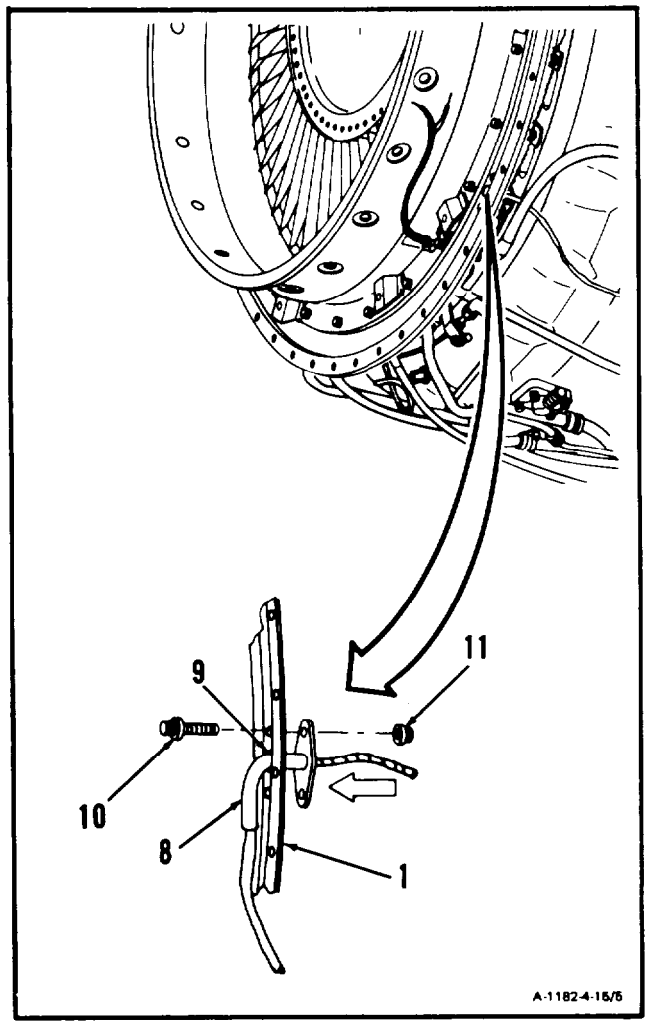
3. **Install fireshield assembly (1),** 28 bolts (6), and nuts (7) on supports (2). **Torque nuts (7) to 30 inch-pounds.**



GO TO NEXT PAGE

4-15 INSTALL FIRESHIELD ASSEMBLY (Continued)

4. **Insert thermocouple jumper lead (8)** through hole (9) in fireshield assembly (1), and install two bolts (10) and nuts (11).

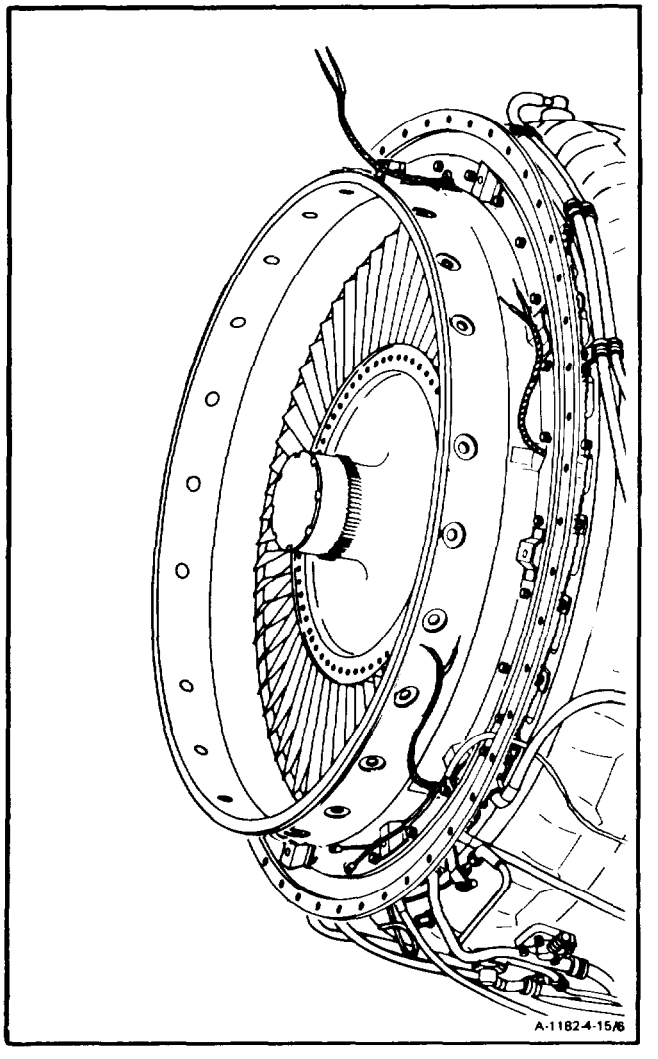


INSPECT

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FOLLOW-ON MAINTENANCE:

Install Left- and Right-Hand Bus Bar Assemblies (Task 4-11).
Install Exit Vane Assembly (Task 4-82).



END OF TASK

4-16 REMOVE FIRESHIELD SECTION 4-16

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Open-End Wrench (T53)

Materials:
Wiping Rag (E58)

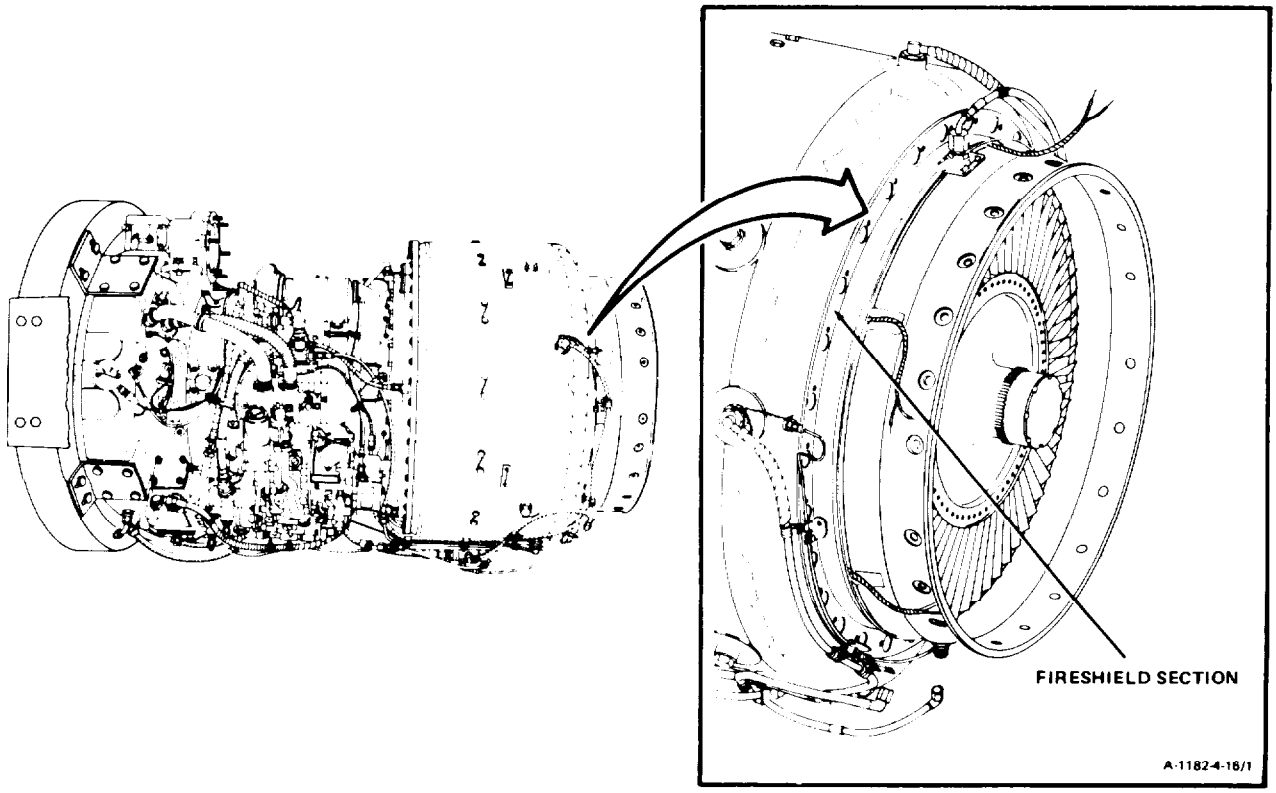
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Exit Vane Assembly Removed (Task 4-78)
Tube Assembly (No. 4 and 5 Bearing Scavenge Connector to Hose Assembly) Removed (Task 8-56)
Left- and Right-Hand Bus Bar Assemblies Removed (Task 4-7)
Fireshield Assembly Removed (Task 4-12)
Left- and Right-Hand Fuel Manifold Assemblies Removed (Task 6-16)

General Safety Instructions:

WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.



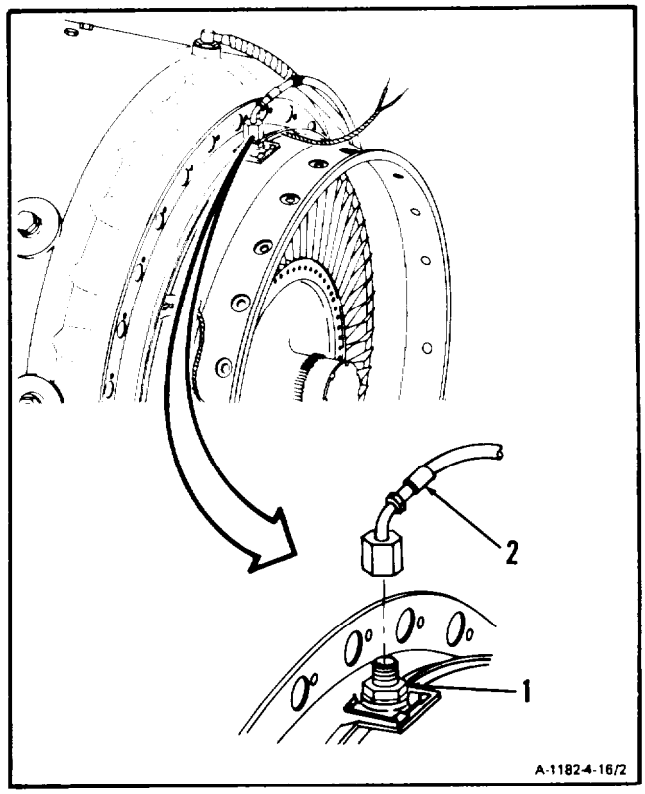
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4-16 REMOVE FIRESHIELD SECTION (Continued)

CAUTION

Reducer must be held with wrench when disconnecting hose assembly. Failure to comply will cause damage to internal tube assembly.

1. **Hold reducer (1)** with wrench and **disconnect hose assembly (2).**



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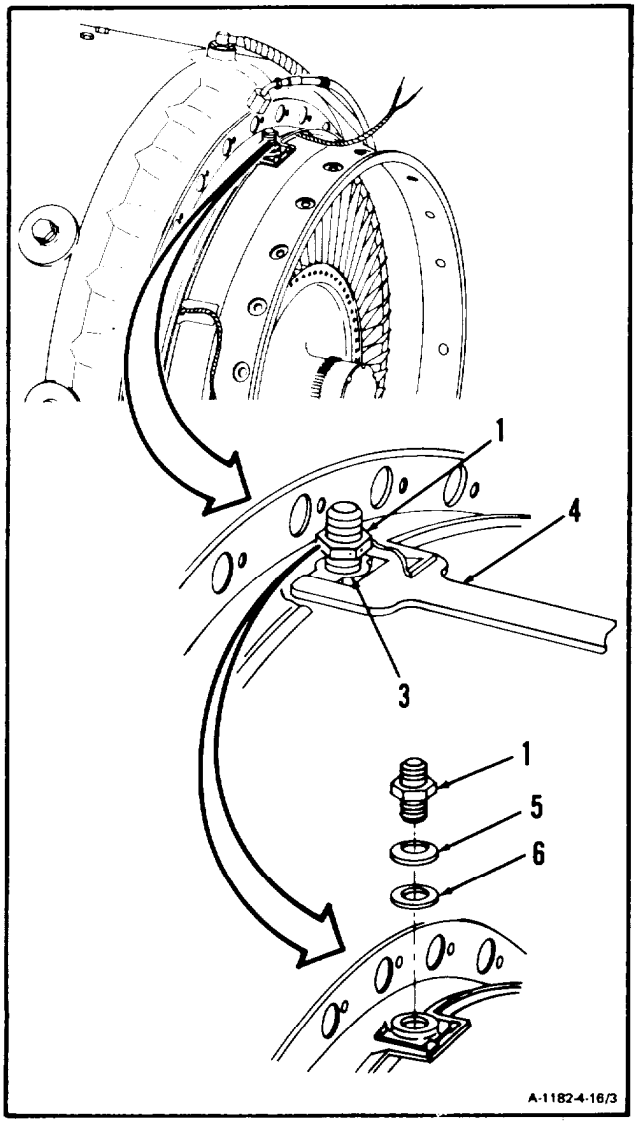
4-16 REMOVE FIRESHIELD SECTION (Continued) 4-16

CAUTION

Adapter must be held firmly when loosening reducer. Failure to comply will cause damage to internal tube assembly.

2. **Hold adapter (3)** with open-end wrench (T53) (4) and **loosen reducer (1).**

3. **Remove reducer (1),** spring washer (5), and, if installed, shim (6).



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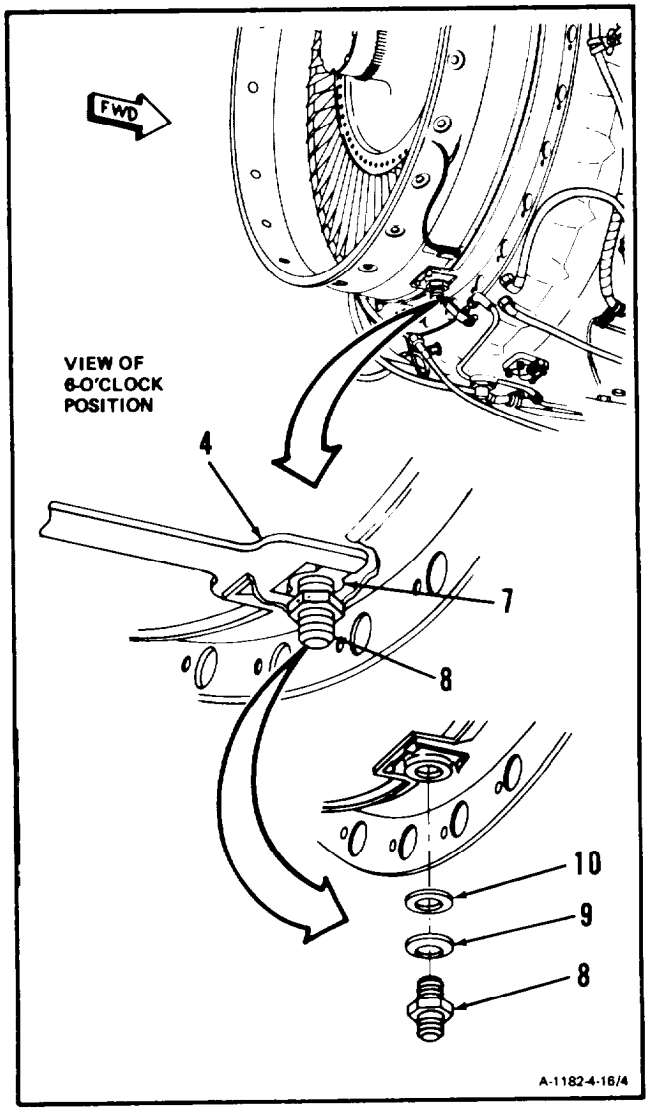
4-16 REMOVE FIRESHIELD SECTION (Continued)

CAUTION

Adapter must be held firmly when loosening reducer. Failure to comply will cause damage to internal tube assembly.

4. **Hold adapter (7)** with open-end wrench (T53) (4) and **loosen reducer (8).**

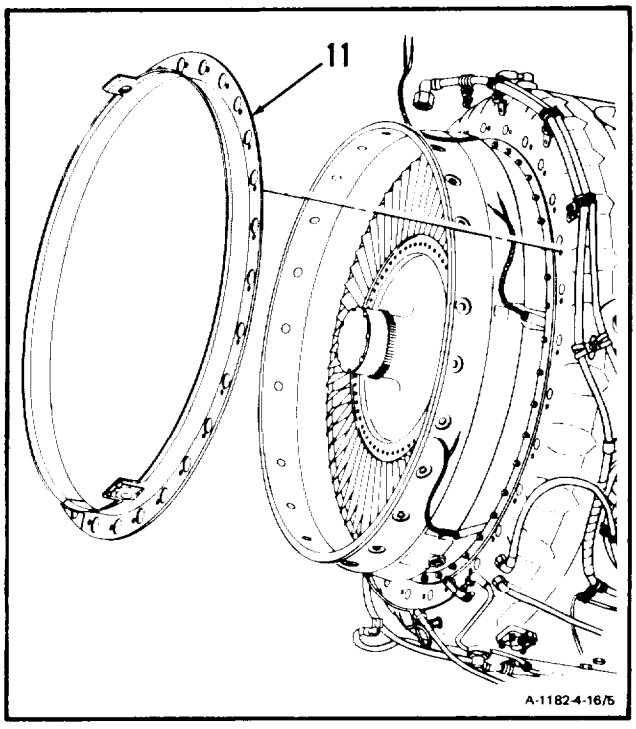
5. **Remove reducer (8),** spring washer (9), and,if installed, shim (10).



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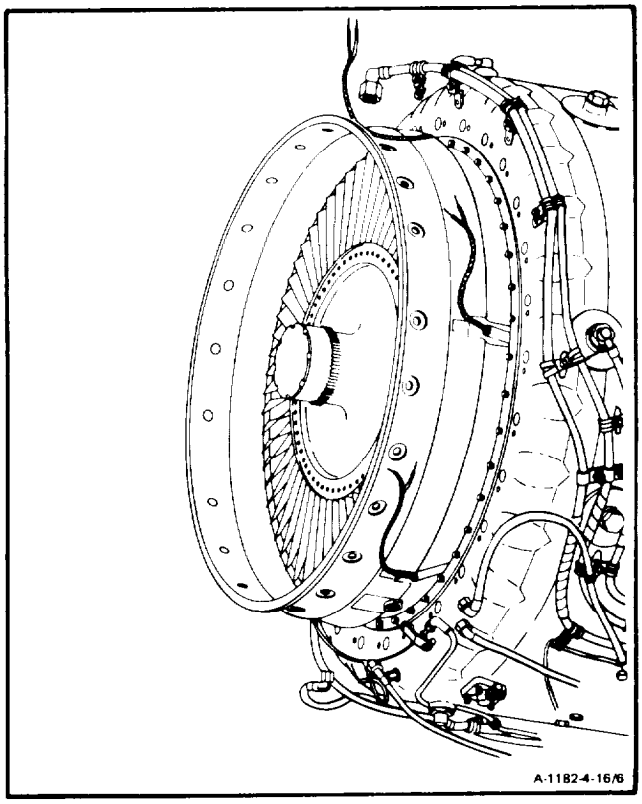
4-16 REMOVE FIRESHIELD SECTION (Continued)

6. **Remove fireshield section (11).**



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-17 CLEAN FIRESHIELD SECTION 4-17

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (El 7)
Gloves (E20)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Exit Vane Assembly Removed (Task 4-78)
Tube Assembly (No. 4 and 5 Bearing Scavenge Connector to Hose Assembly) Removed (Task B-56)
Left- and Right-Hand Bus Bar Assemblies Removed (Task 4-7)
Fireshield Assembly Removed (Task 4-12)
Left- and Right-Hand Fuel Manifold Assemblies Removed (Task 6-16)
Fireshield Section Removed (Task 4-16)

General Safety Instructions:

W A R N I N G

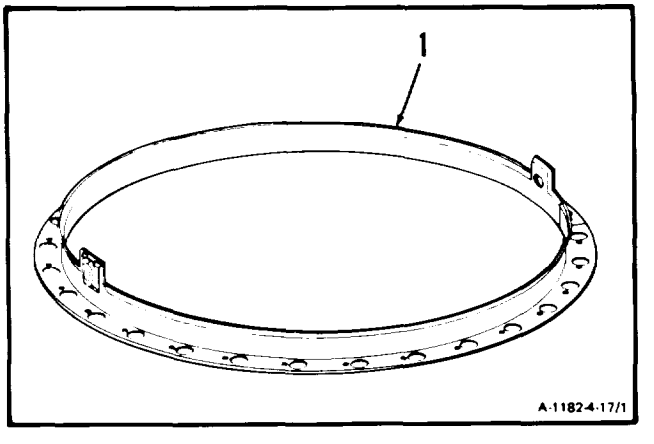
Dry cleaning solvent (E 17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated areas, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean fireshield section (1),** using dry cleaning solvent (E17) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry fireshield section (1),** using clean, dry compressed air.



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FOLLOW-ON MAINTENANCE:

Inspect Fireshield Section (Task 4-18).

END OF TASK

4-18 INSPECT FIRESHIELD SECTION 4-18

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect fireshield section (1).**

   a. There shall be no nicks or pits that result in holes.

   b. There shall be no dents.

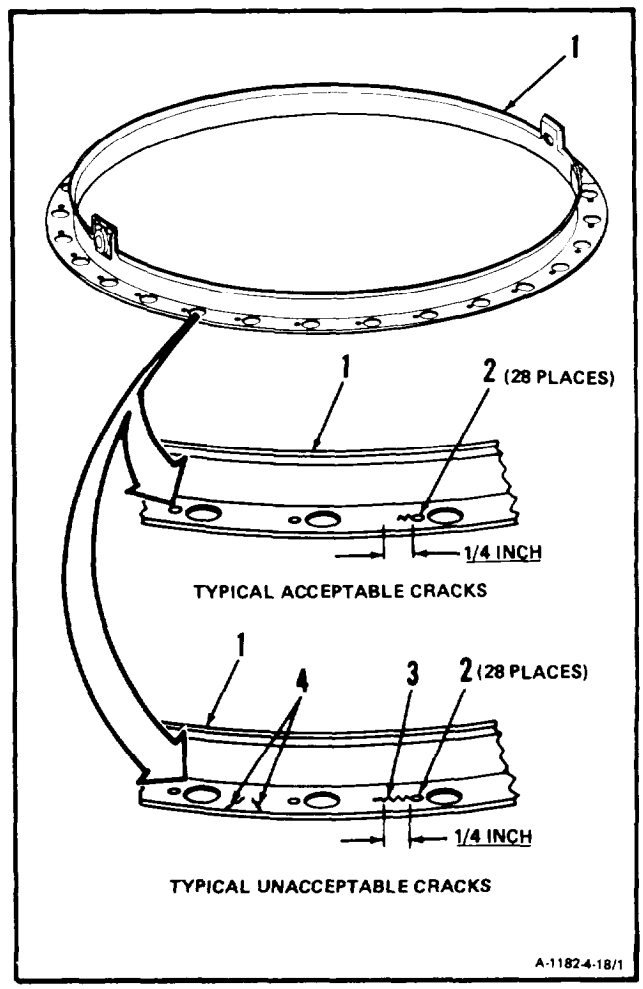
   c. There shall be no bends or warpage which cause deformation after installation.

   d. **Inspect bolt hole areas (2).**

      (1) There shall be no cracks (3) longer than l/4 inch.

      (2) There shall be no cracks wider than l/32 inch.

      (3) There shall be no converging cracks (4).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-19 INSTALL FIRESHIELD SECTION

INITIAL SETUP

Applicable Configurations:
All

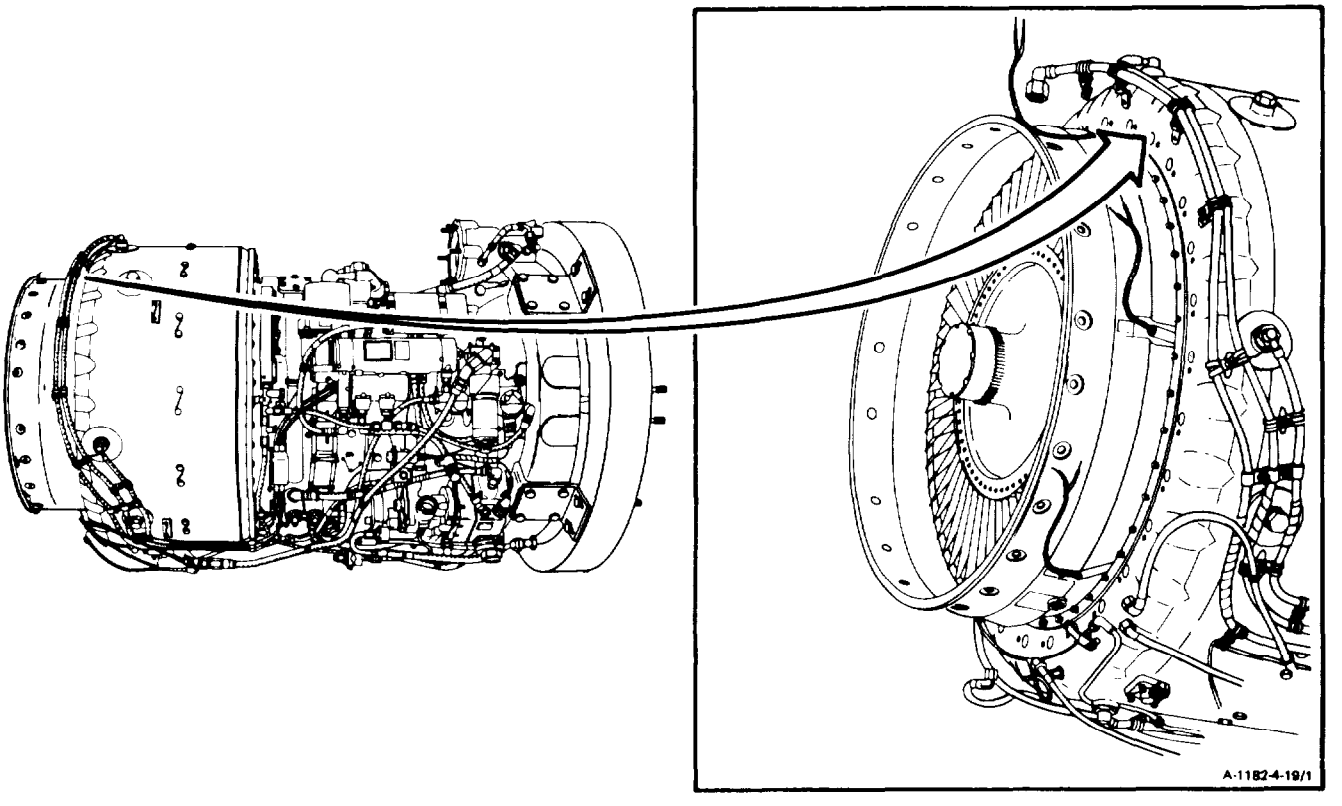
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Open-End Wrench (T53)
Torque Wrench, 30-150 Inch-Pounds
Outside Micrometer Caliper Set

Materials:
None

Parts:
Shims

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P



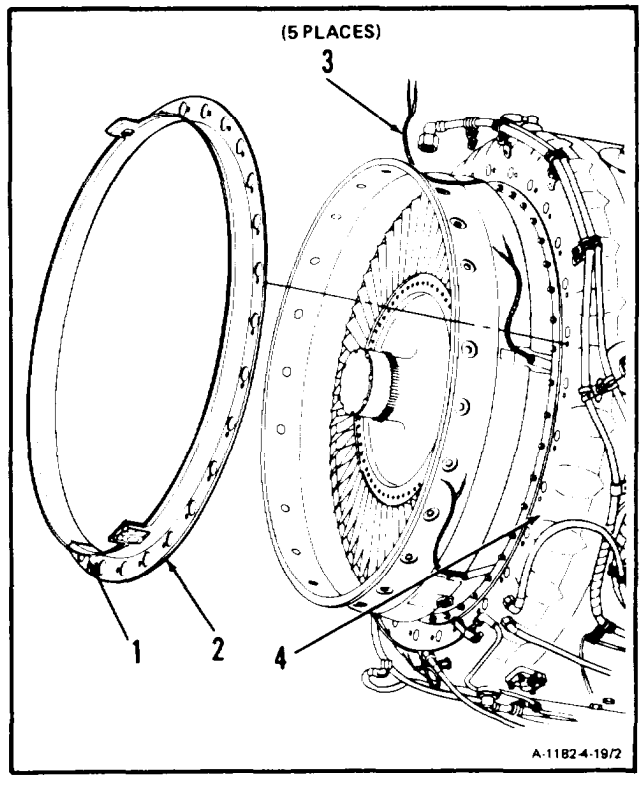
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4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

CAUTION

Be careful not to snag five thermocouple harness leads under fireshield section during installation. Failure to comply may cause damage to harness assemblies and wrong temperature readings.

1. Position slot (1) at -/-o'clock position. **Install fireshield section (2)** over five thermocouple harness leads (3) and on combustion chamber housing (4).



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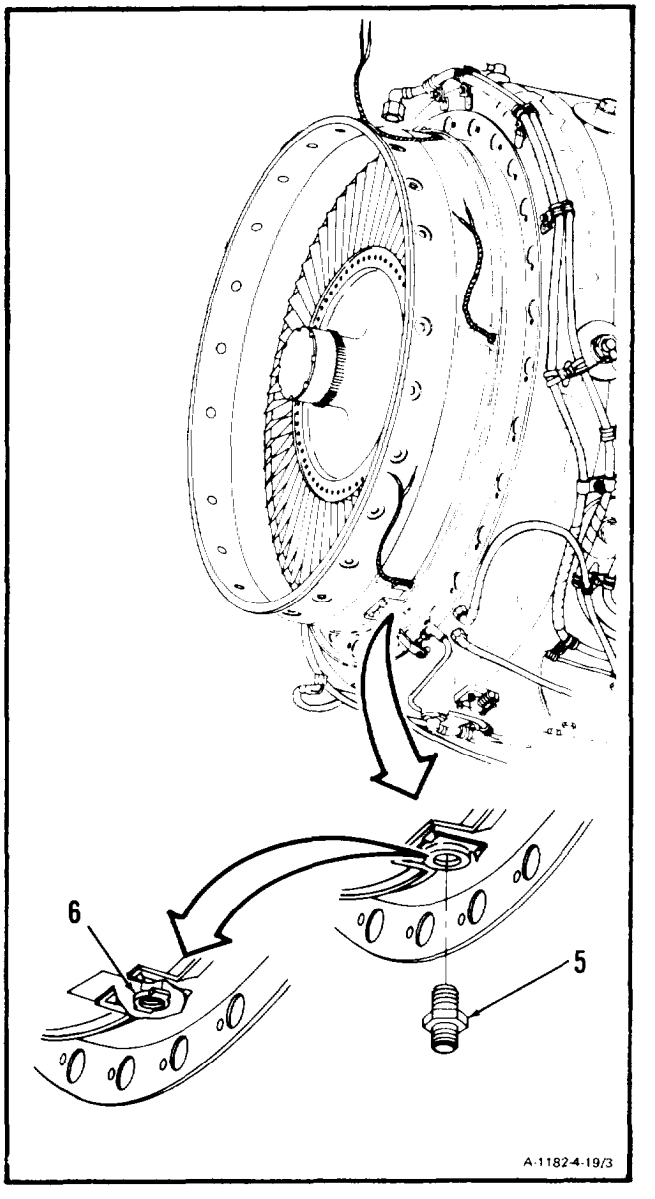
4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

2. Determine shims needed under reducer (5) as follows:

CAUTION

Do not tighten reducer in following step. Tightening of reducer may damage internal oil tube.

a. Thread reducer (5) in adapter (6) until it is seated.



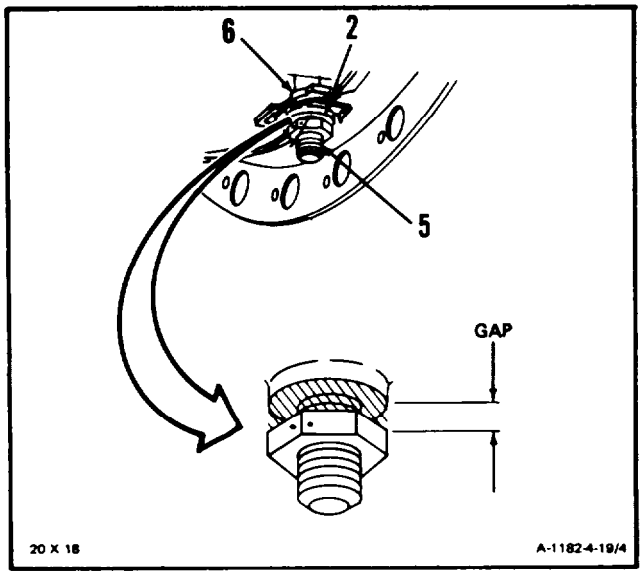
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4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

CAUTION

In following step, fireshield must be seated against adapter to obtain correct measurement. Failure to do so will result in incorrect gap.

b. Seat fireshield section (2) against adapter (6) and measure gap between fireshield section and reducer (5).



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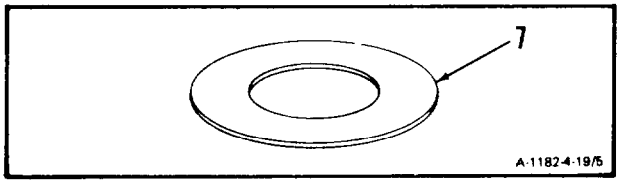
4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

c. Find gap measured in shim selection table. Read across table to find shim thickness needed.

CAUTION

The required shim thickness depends upon which part number disc spring is used. The P/N 2-300-368-01 is a nominal 0.072 inch thickness (free state) whereas the P/N 2-141-496-01 is a nominal 0.044 inch thickness (free state). Failure to use the correct shim may cause damage to oil tube or oil leakage.

d. Measure thickness of shims (7) and check against shim selection table. Use outside micrometer caliper.



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4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

SHIM SELECTION TABLE

IF GAP MEASURES	SHIM THICKNESS REQUIRED	
	P/N 2-300-368-01 SPRING, DISC	P/N 2-141-496-01 SPRING, DISC
INCH	INCH	INCH
0.060	NONE	0.019 - 0.029
0.061	NONE	0.020 - 0.030
0.062	NONE	0.021 - 0.031
0.063	NONE	0.022 - 0.032
0.064	NONE	0.023 - 0.033
0.065	NONE	0.024 - 0.034
0.066	NONE	0.025 - 0.035
0.067	NONE	0.026 - 0.036
0.068	NONE	0.027 - 0.037
0.069	NONE	0.028 - 0.038
0.070	NONE	0.029 - 0.039
0.071	0.003 - 0.005	0.030 - 0.040
0.072	0.003 - 0.006	0.031 - 0.041
0.073	0.003 - 0.006	0.032 - 0.042
0.074	0.004 - 0.008	0.033 - 0.043
0.075	0.005 - 0.009	0.034 - 0.044
0.076	0.006 - 0.010	0.035 - 0.045
0.077	0.007 - 0.011	0.036 - 0.046
0.078	0.008 - 0.012	0.037 - 0.047
0.079	0.009 - 0.013	0.038 - 0.048
0.080	0.010 - 0.014	0.039 - 0.049
0.081	0.011 - 0.015	0.040 - 0.050
0.082	0.012 - 0.016	0.041 - 0.051
0.083	0.013 - 0.017	0.042 - 0.052
0.084	0.014 - 0.018	0.043 - 0.053
0.085	0.015 - 0.019	0.044 - 0.054
0.086	0.016 - 0.020	0.045 - 0.055
0.087	0.017 - 0.021	0.046 - 0.056
0.088	0.018 - 0.022	0.047 - 0.057
0.089	0.019 - 0.023	0.048 - 0.058
0.090	0.020 - 0.024	0.049 - 0.059

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4-19 INSTALL FIRESHIELD SECTION (Continued)

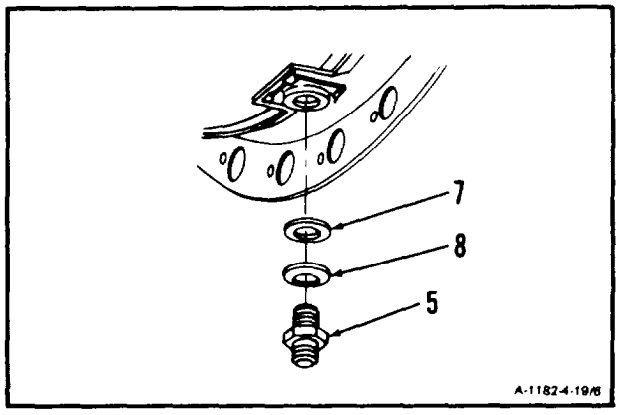
CAUTION

Concave side of washer must face fireshield section. Failure to comply will place wrong tension on internal oil tube. This may cause damage to oil tube.

CAUTION

Do not tighten reducer in following step. Tightening of reducer may damage internal oil tube.

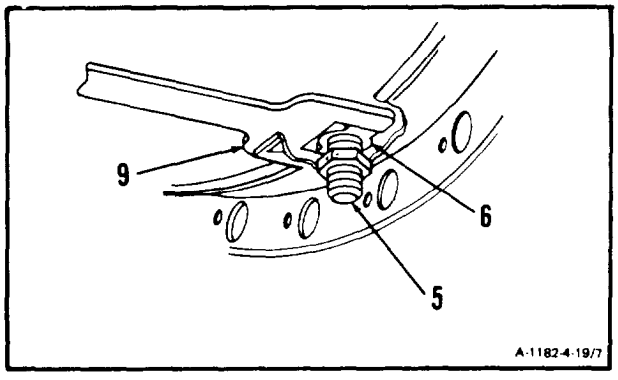
3. Remove reducer (5). **Loosely install shim (7), washer (8),** concave side up, **and reducer (5).**



CAUTION

Adapter must be held firmly when tightening reducer. Failure to comply will cause damage to internal tube assembly.

4. Hold adapter (6) with open-end wrench (T53) (9). **Torque reducer (5) to 115 inch-pounds.**



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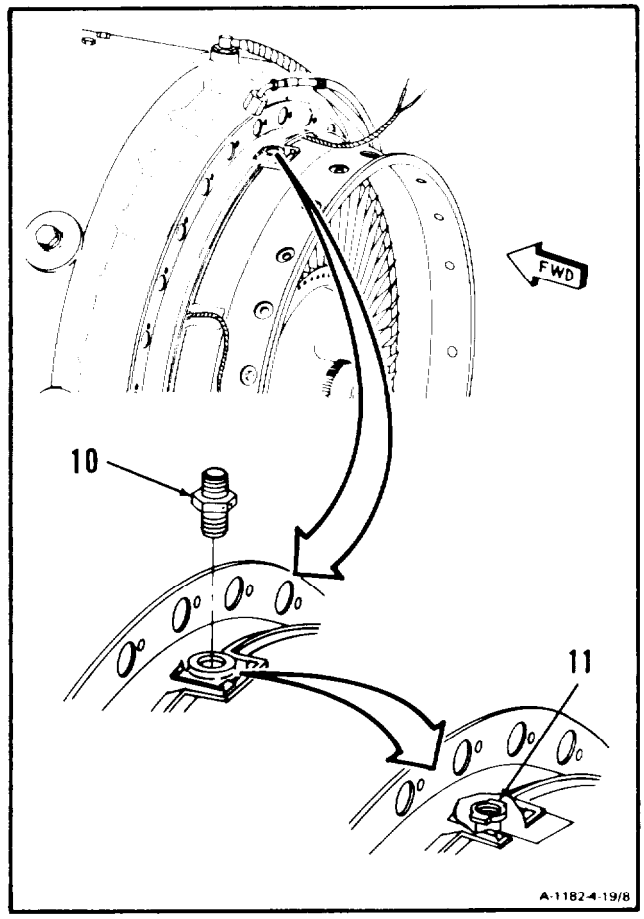
4-19 INSTALL FIRESHIELD SECTION (Continued)

5. **Determine shims needed under reducer (10)** as follows:

CAUTION

Do not tighten reducer in following step. Tightening of reducer may damage internal oil tube.

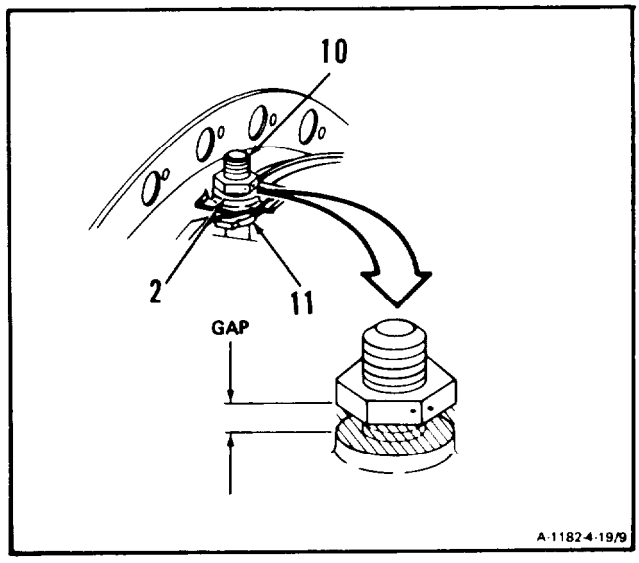
a. Thread reducer (10) in adapter (1 1) until it is seated.



CAUTION

In following step, fire shield must be seated against adapter to obtain correct measurement. Failure to do so will result in incorrect gap.

b. Seat fireshield section (2) against adapter (11) and measure gap between fireshield section and reducer (10).



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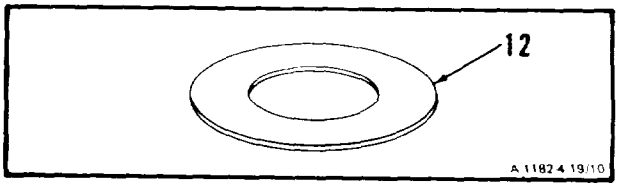
4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

c. Find gap measured in shim selection table. Read across table to find shim thickness needed.

CAUTION

The required shim thickness depends upon which part number disc spring is used. The P/N 2-300-368-01 is a nominal 0.072 inch thickness (free state) whereas the P/N 2-141-496-01 is a nominal 0.044 inch thickness (free state). Failure to use the correct shim may cause damage to oil tube or oil leakage.

d. Measure thickness of shims (12) and check against shim selection table. Use outside micrometer caliper.



GO TO NEXT PAGE

4-19 INSTALL FIRESHIELD SECTION (Continued) 4-19

SHIM SELECTION TABLE

IF GAP MEASURES	SHIM THICKNESS REQUIRED	
	P/N 2-300-368-01 SPRING, DISC	P/N 2-141-496-01 SPRING, DISC
INCH	INCH	INCH
0.060	NONE	0.019 - 0.029
0.061	NONE	0.020 - 0.030
0.062	NONE	0.021 - 0.031
0.063	NONE	0.022 - 0.032
0.064	NONE	0.023 - 0.033
0.065	NONE	0.024 - 0.034
0.066	NONE	0.025 - 0.035
0.067	NONE	0.026 - 0.036
0.068	NONE	0.027 - 0.037
0.069	NONE	0.028 - 0.038
0.070	NONE	0.029 - 0.039
0.071	0.003 - 0.005	0.030 - 0.040
0.072	0.003 - 0.006	0.031 - 0.041
0.073	0.003 - 0.006	0.032 - 0.042
0.074	0.004 - 0.008	0.033 - 0.043
0.075	0.005 - 0.009	0.034 - 0.044
0.076	0.006 - 0.010	0.035 - 0.045
0.077	0.007 - 0.011	0.036 - 0.046
0.078	0.008 - 0.012	0.037 - 0.047
0.079	0.009 - 0.013	0.038 - 0.048
0.080	0.010 - 0.014	0.039 - 0.049
0.081	0.011 - 0.015	0.040 - 0.050
0.082	0.012 - 0.016	0.041 - 0.051
0.083	0.013 - 0.017	0.042 - 0.052
0.084	0.014 - 0.018	0.043 - 0.053
0.085	0.015 - 0.019	0.044 - 0.054
0.086	0.016 - 0.020	0.045 - 0.055
0.087	0.017 - 0.021	0.046 - 0.056
0.088	0.018 - 0.022	0.047 - 0.057
0.089	0.019 - 0.023	0.048 - 0.058
0.090	0.020 - 0.024	0.049 - 0.059

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4-19 INSTALL FIRESHIELD SECTION (Continued)

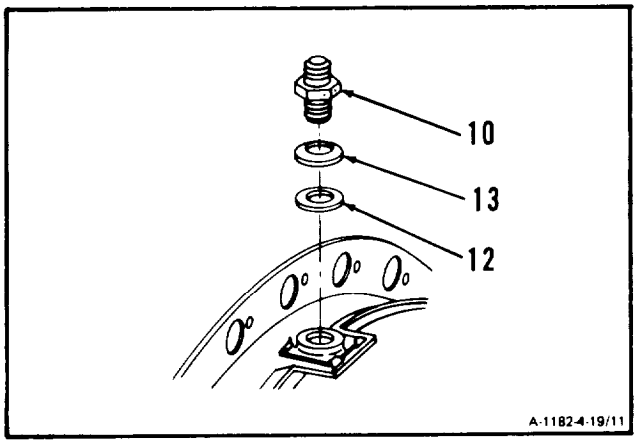
CAUTION

Concave side of washer must face fireshield section. Failure to comply will place wrong tension on internal oil tube.

CAUTION

Do not tighten reducer in following step. Tightening of reducer may damage internal oil tube.

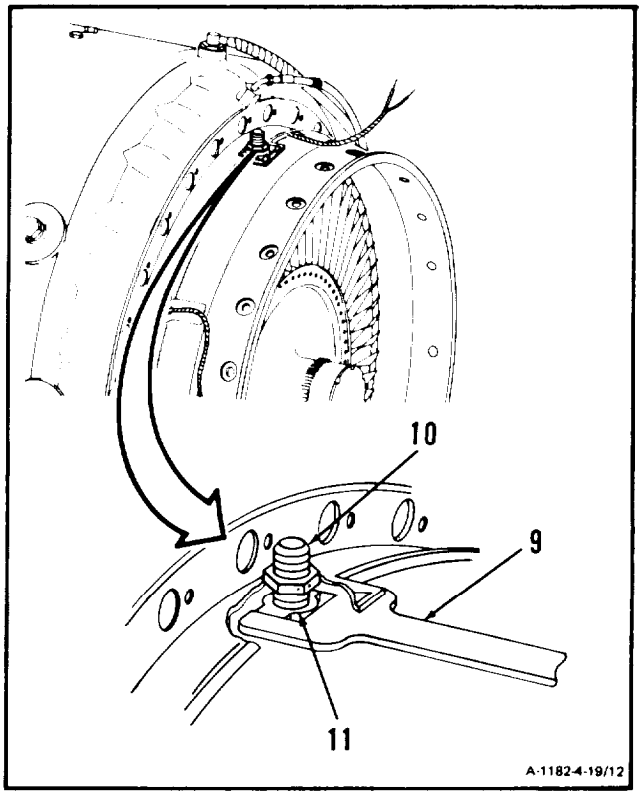
6. Remove reducer (10). **Loosely install shim (12), washer (13).** concave side down, **and reducer (10).**



CAUTION

Adapter must be held firmly when tightening reducer. Failure to comply will cause damage to internal tube assembly.

7. Hold adapter (11) with open-end wrench (T53) (9). **Torque reducer (10) to 115 inch-pounds.**

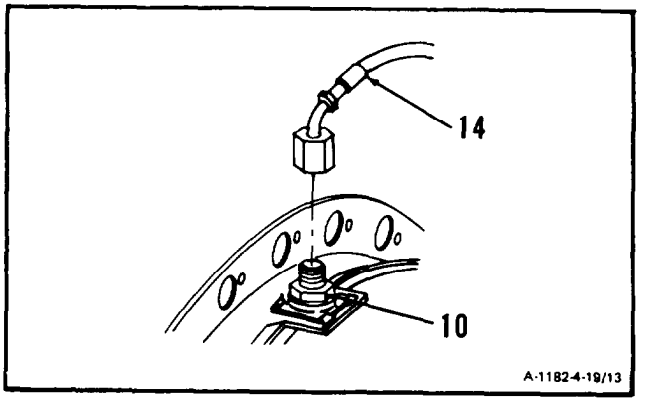


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CAUTION

Reducer must be held with wrench when connecting hose assembly. Failure to comply will cause damage to internal tube assembly.

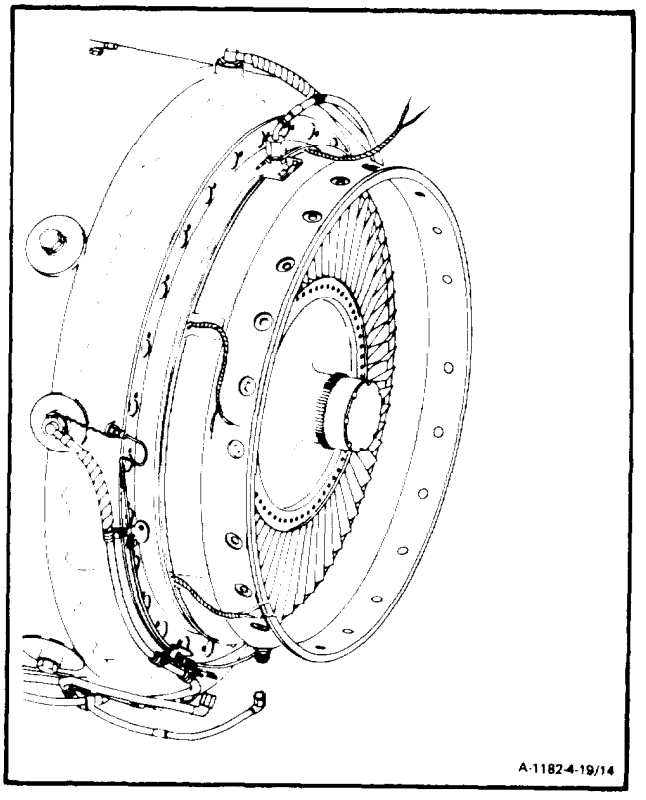
8. Hold reducer (10) with wrench. **Connect hose assembly (14) to reducer (10).**



INSPECT

FOLLOW-ON MAINTENANCE:

Install Left- and Right-Hand Fuel Manifold Assemblies (Task 6-20).
Install Fireshield Assembly (Task 4-15).
Install Left- and Right-Hand Bus Bar Assemblies (Task 4-11).
Install Tube Assembly (No. 4 and 5 Bearing Scavenge Connector to Hose Assembly) (Task 8-57),
Install Exit Vane Assembly (Task 4-82).



END OF TASK

4-20 REMOVE THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) 4-20

INITIAL SETUP

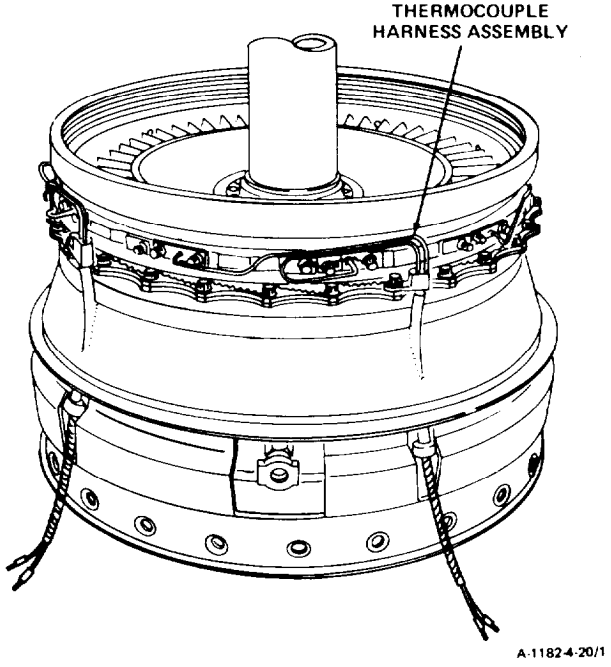
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

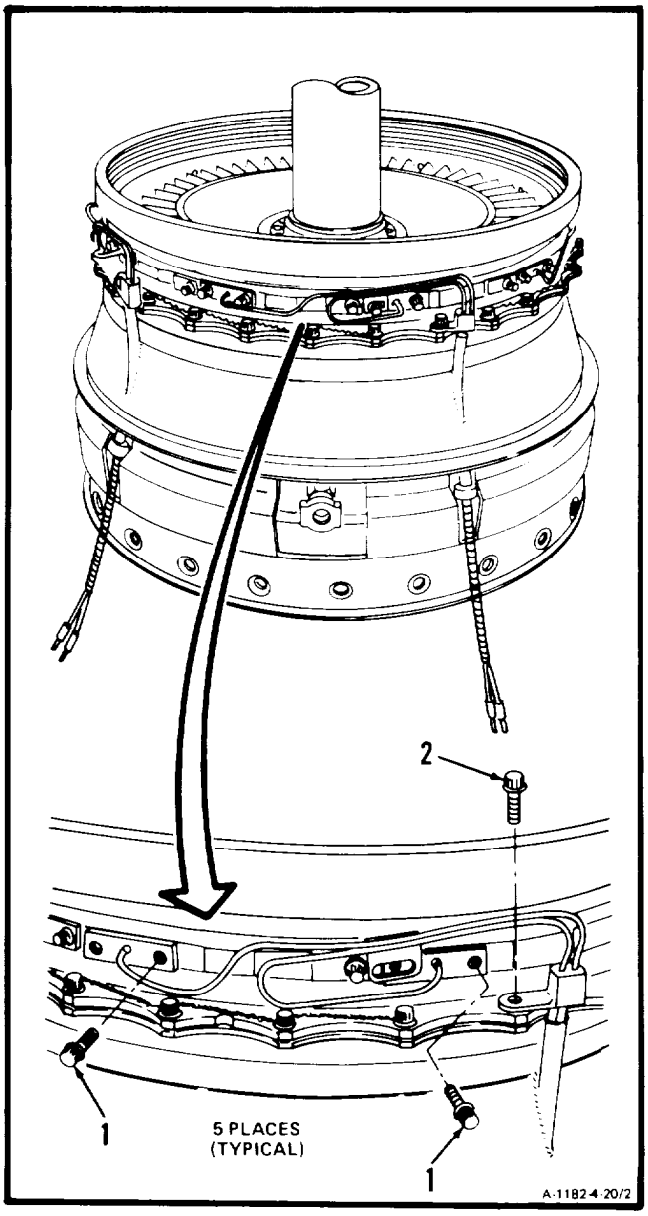
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)



GO TO NEXT PAGE

4-20 REMOVE THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-20

1. Remove lockwire, 20 bolts (1), and five bolts (2).



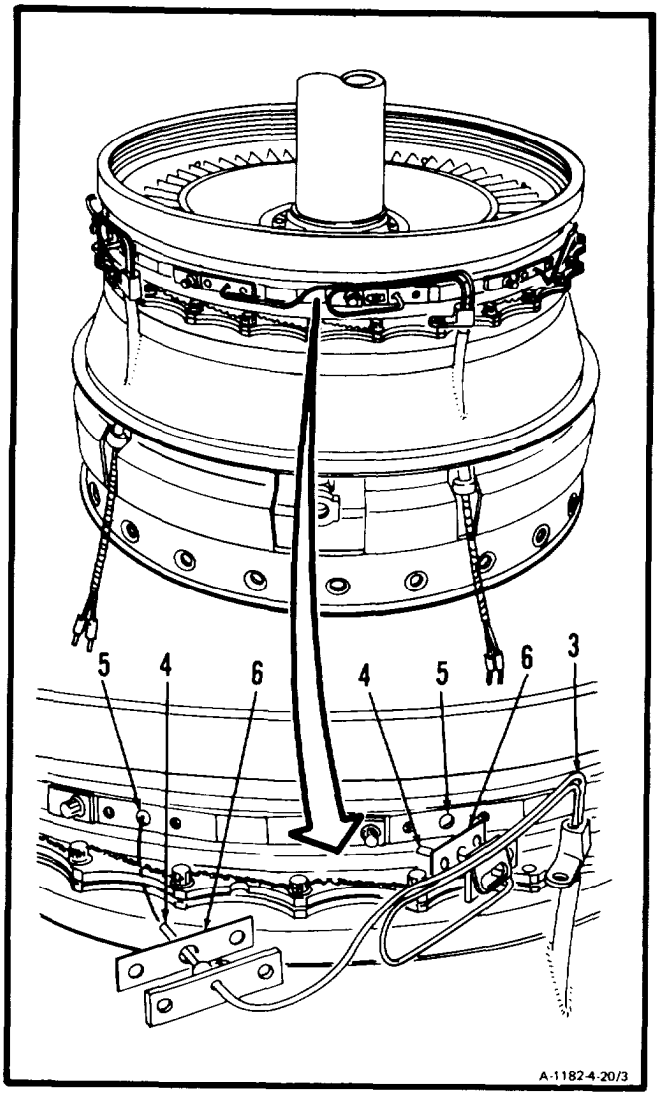
GO TO NEXT PAGE

4-20 REMOVE THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued)

CAUTION

Be careful not to bend and damage probes. Damaged probes may cause incorrect temperature indications and damage to engine.

2. Rotate five thermocouple harness assemblies (3) until probes (4) are removed from holes (5). Remove 10 gaskets (6).



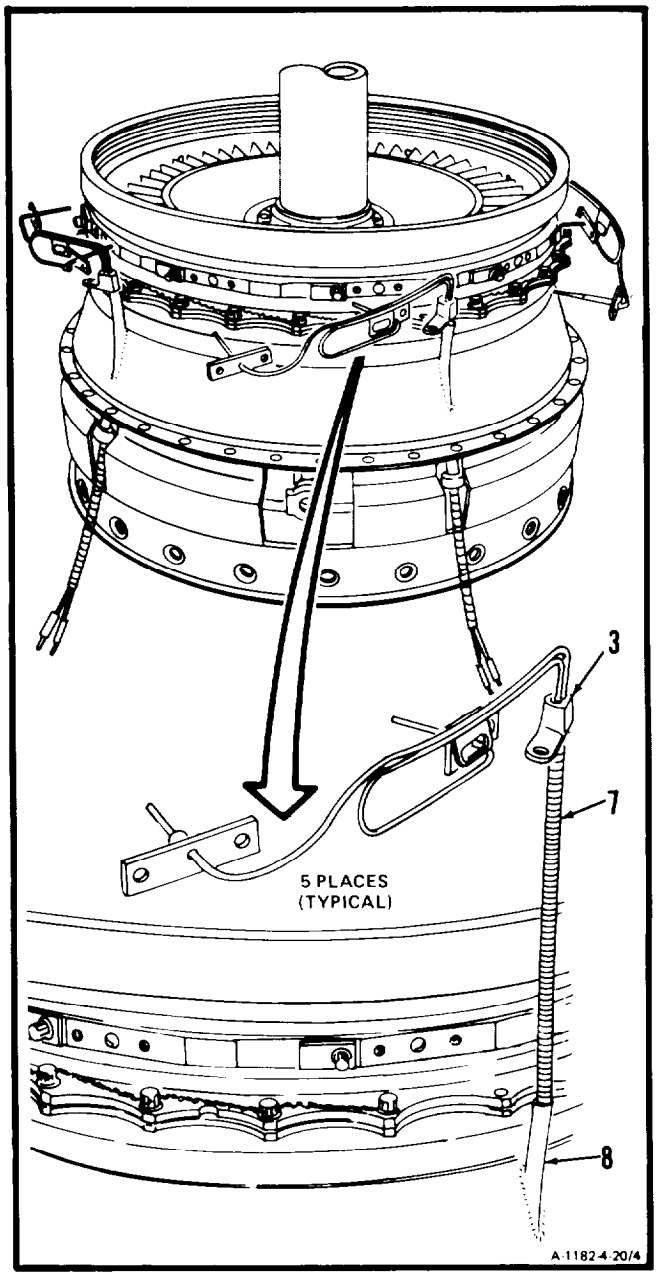
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4-20 REMOVE THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-20

CAUTION

In following step 3. be careful in pulling cables through guide tubes. Pins or insulation could be easily damaged. This would cause incorrect temperature indication and damage to engine.

3. Carefully pull five cables (7) through guide tubes (8), and remove five thermocouple harness assemblies (3).

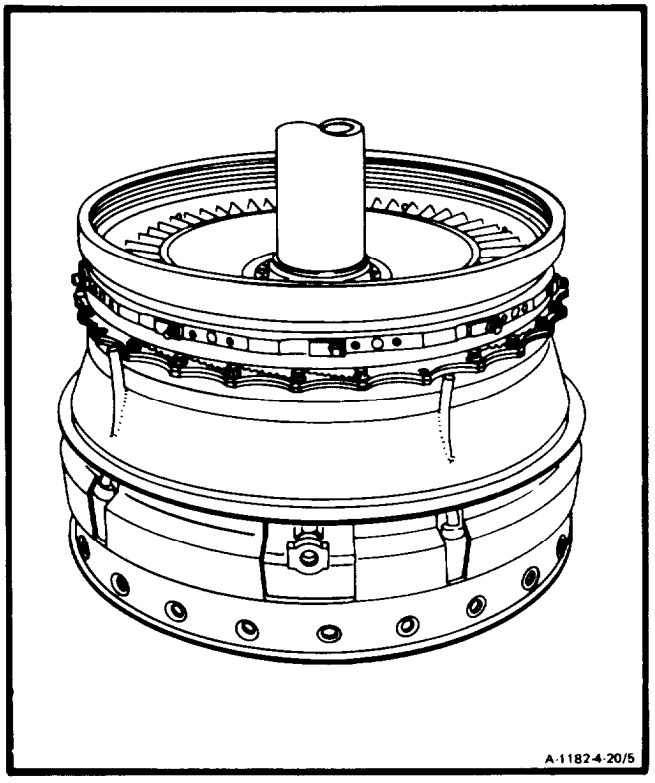


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4-20 REMOVE THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-20

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-21 CLEAN THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) 4-21

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Free Cloth (E26)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)

General Safety Instructions:

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated areas, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

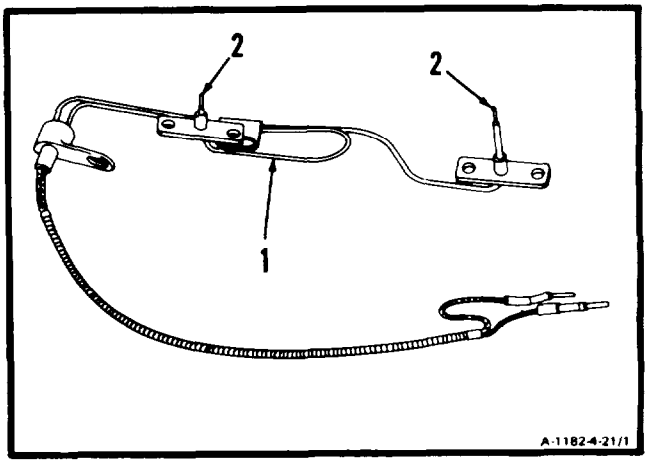
1. **Clean thermocouple harness assembly (1)** as follows:

CAUTION

Do not immerse in dry cleaning solvent. It may cause malfunction of probes or breakdown of internal wiring insulation.

a. **Wear gloves (E20). Wipe clean with lint-free cloth (E26) dampened in dry cleaning soivent (E17). Use brush to loosen carbon on probes (2).**

b. Wipe dry. Use clean, dry lint-free cloth (E26).



FOLLOW-ON MAINTENANCE:

Inspect Thermocouple Harness Assemblies (Task 4-22).

END OF TASK

4-22 INSPECT THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) 4-22

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

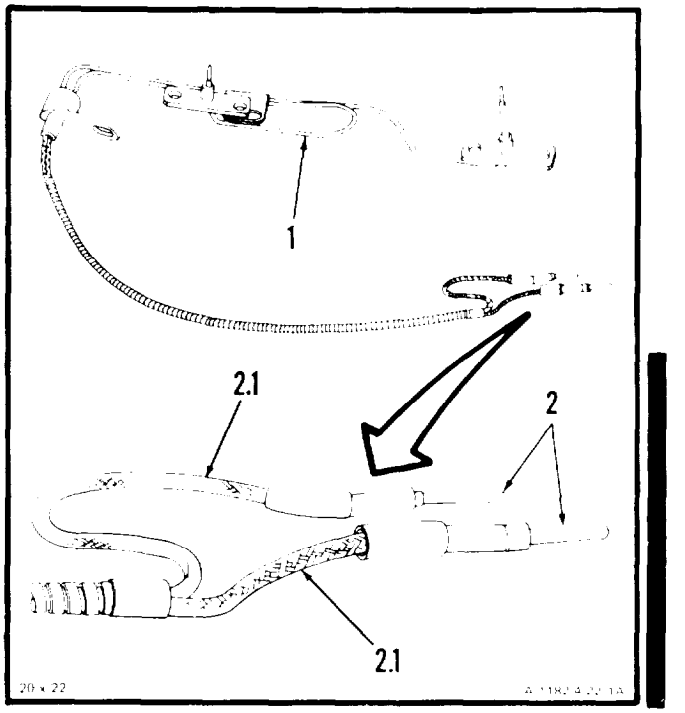
Equipment Condition:
Off Engine Task

1. **Inspect thermocouple harness assemblies (1)** as follows:

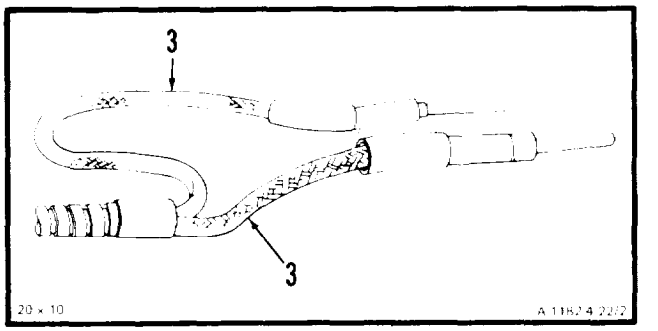
   a. **Inspect pins (2).** There shall be no cracks, corrosion, broken or missing pins.

   a1. Inspect insulation (2.1) for severe damage. Replace harness if there is severe damage.

   a2. Inspect pin leads (3) for chafing and fraying. Minor chafing is allowed provided that all other limits are met.



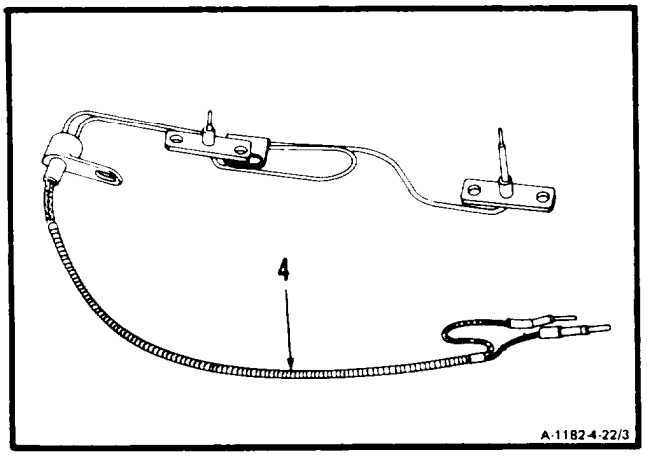
   b. **Inspect pin leads (3).** There shall be no frayed or broken wires.



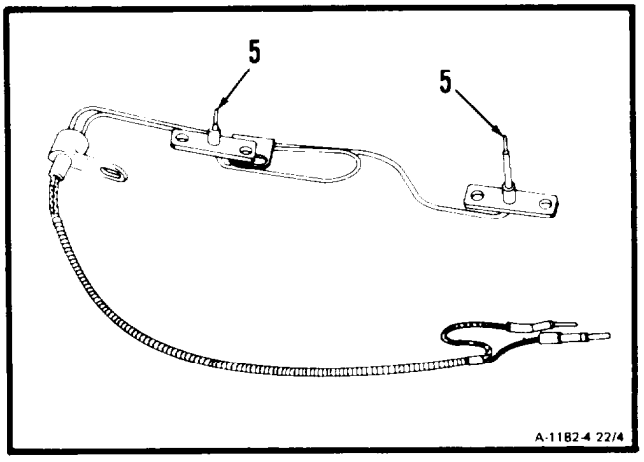
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4-22 INSPECT THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-22

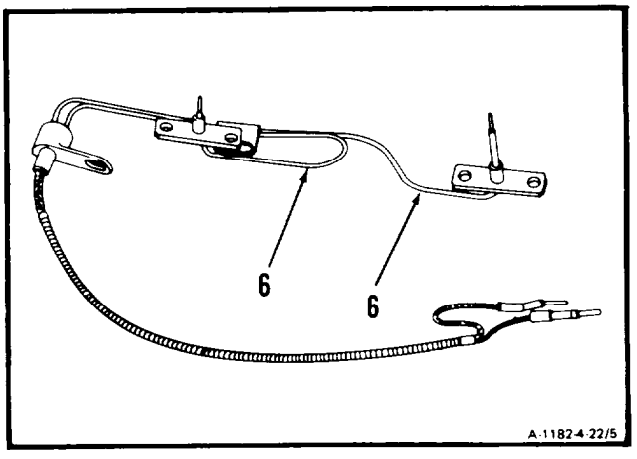
c. **Inspect outer shield (4).** There shall be no cracks or gouges.



d. **Inspect probes (5).** There shall be no cracks.



e. **Inspect tubes (6).** There shall be no cracks or kinks.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-23 REPAIR THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) 4-23

INITIAL SETUP

Applicable Configurations:
All

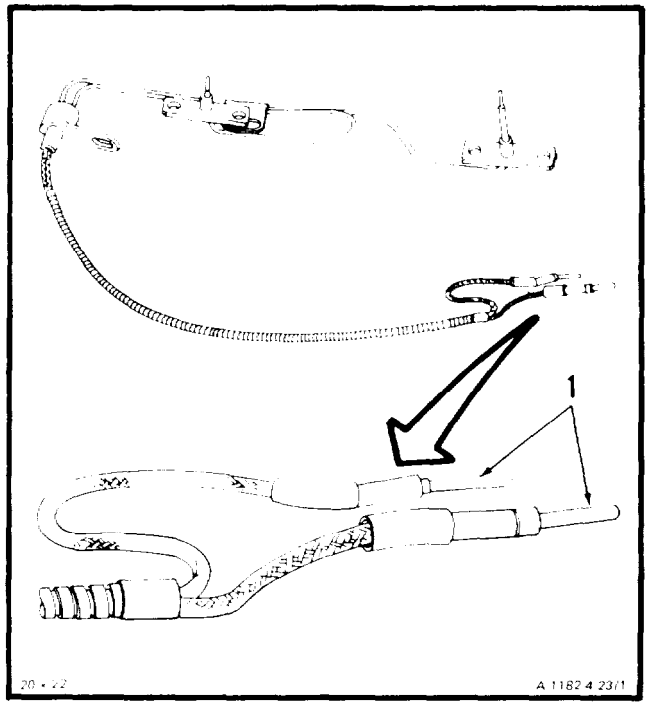
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspecton Tool Kit, NSN 5180-00-323-5114
Wire Brush

Materials:
Lockwire (E28)
Spiral Chafing Sleeve (E50)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B13 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

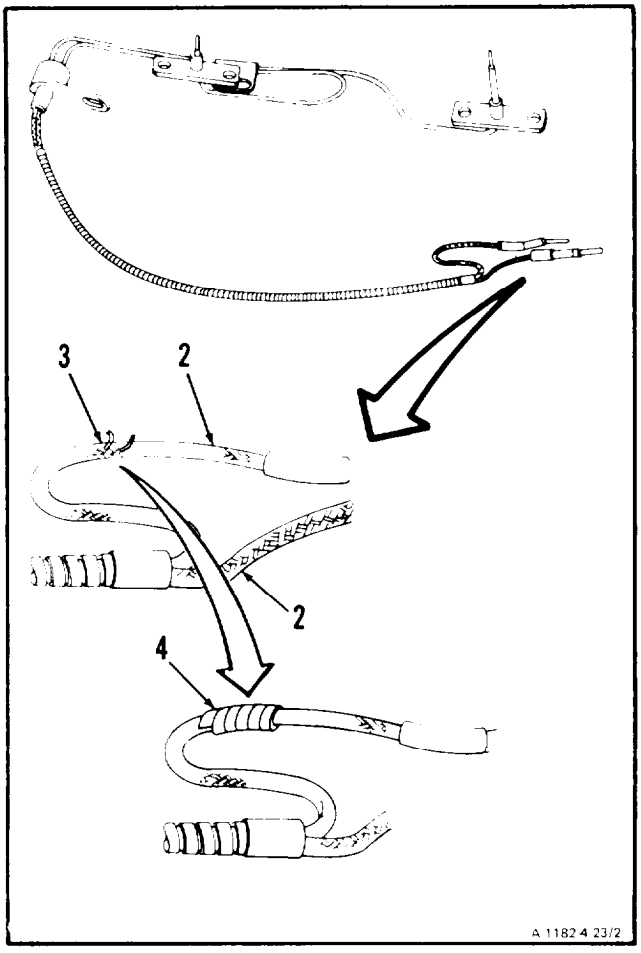
1. **Remove corrosion from pins (1).** Use wire brush or crocus cloth (E15) and dry cleaning solvent (E17).



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2. **Repair fraying (broken) leads (2)** as follows:

   a. If one or two wires (3) are broken, wrap in. dividual lead (2) with spiral chafing sleeve (E50) (4). Be sure that spiral chafing sleeve (E50) (4) extends beyond damaged area.



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NOTE

Only one repair allowed on each lead with more than two broken wires.

NOTE

If both leads require repair, the second lead will have to be repaired after insertion through thermocouple tube.

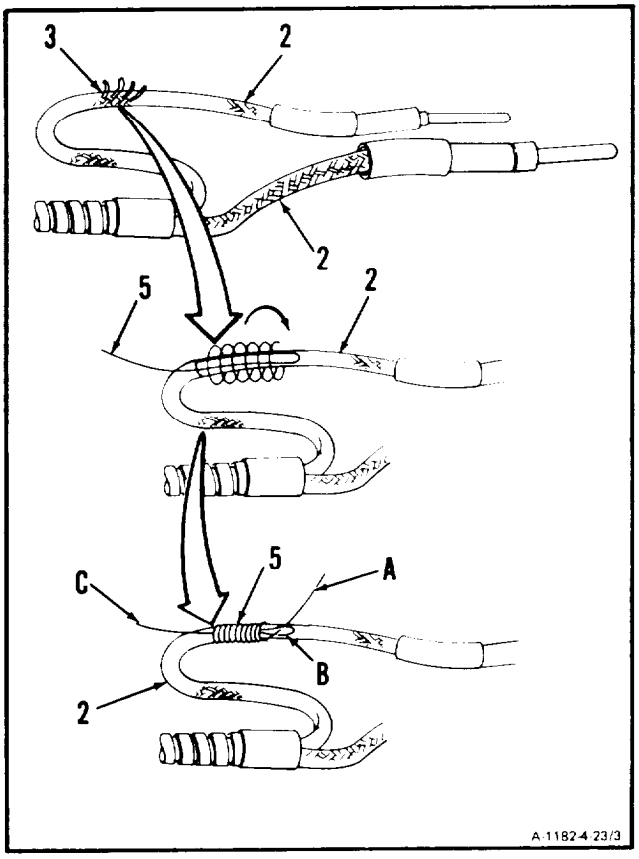
b. If three or four wires (3) on leads (2) are broken, flatten broken wires (3) of leads (2) at damaged area.

c. Use lockwire (E28) (5), wind around damaged leads (2) clockwise. Lockwire (5) should cover damaged area by 3/8 inch. Do not pass wrapping limits of 1-1/4 inch length.

NOTE

In following step use care when pulling end C. Pull only far enough to firmly anchor end A beneath several wraps of lockwire.

d. Finish wrap by inserting lockwire (5) end A through loop B. Hold A tight while pulling C to close loop. Release A and carefully pull C until end A is anchored beneath wrapping. Cut excess wire ends.



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-24 TEST THERMOCOUPLE HARNESS ASSEMBLIES 4-24

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Multimeter

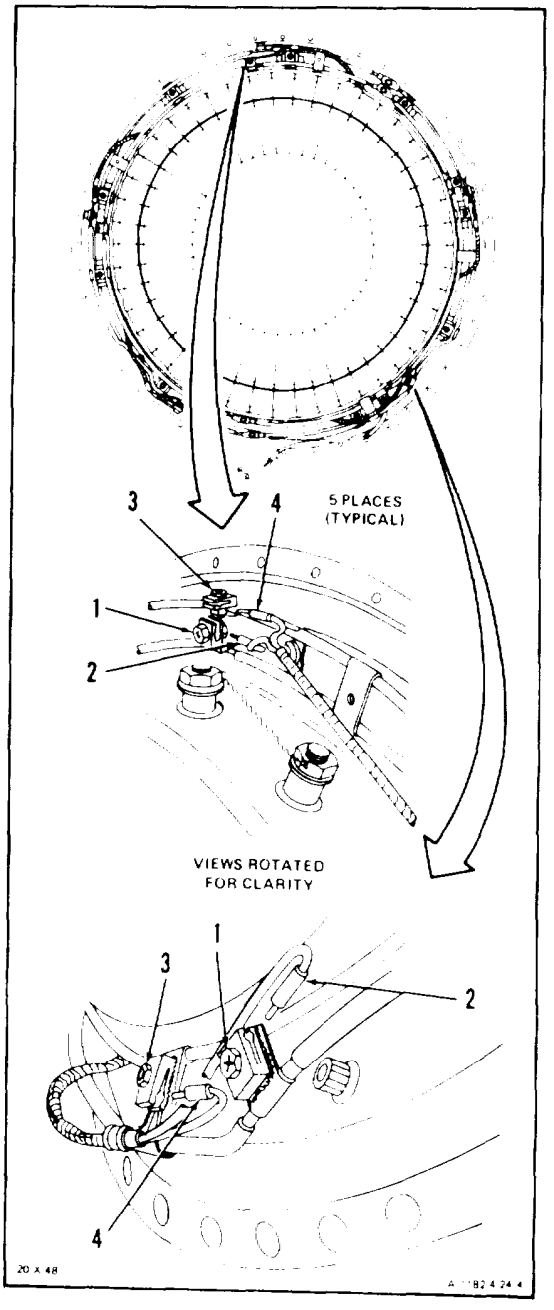
Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

NOTE

This task may be done with the five thermocouple harness assemblies on or off the engine. This task shows assemblies removed. If testing is to be done with assemblies on engine, do steps 1. and 2. first. If assemblies are off engine, omit steps 1. and 2.

1. Loosen five screws (1) and remove five thermocouple harness pins (2).
2. Loosen five screws (3) and remove five thermocouple harness pins (4).



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4-24 TEST THERMOCOUPLE HARNESS ASSEMBLIES (Continued) 4-24

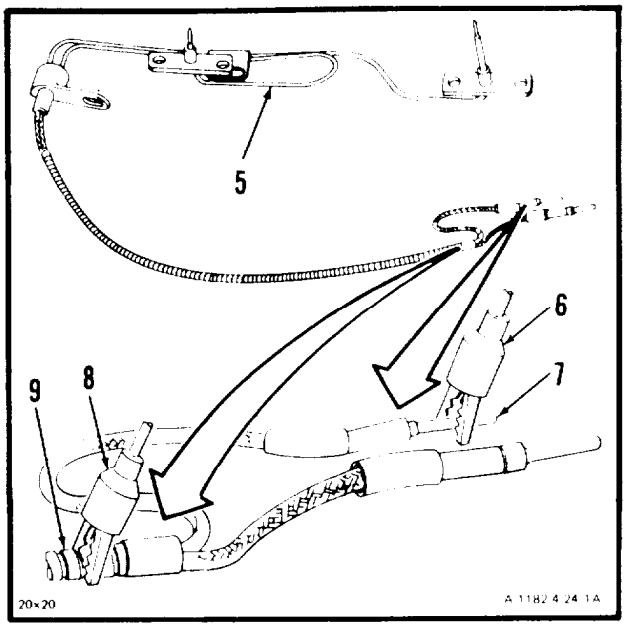
3. **Measure insulation resistance of five thermocouple harness assemblies (5)** as follows:

   a. Set multimeter range switch to R x 1000.

   b. Clip red lead (6) to pin (7).

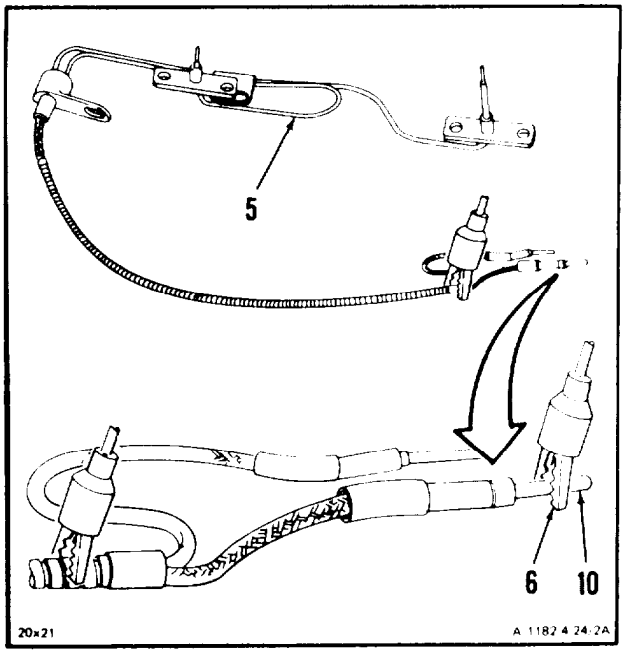
   c. Clip black lead (8) to outer shield (9).

   d. Meter shall indicate 10,000 ohms minimum.



   e. Clip red lead (6) to pin (10).

   f. Meter shall indicate 10,000 ohms minimum.



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4-24 TEST THERMOCOUPLE HARNESS ASSEMBLIES (Continued) 4-24

4. Measure continuity of five thermocouple harness assemblies (5) as follows:

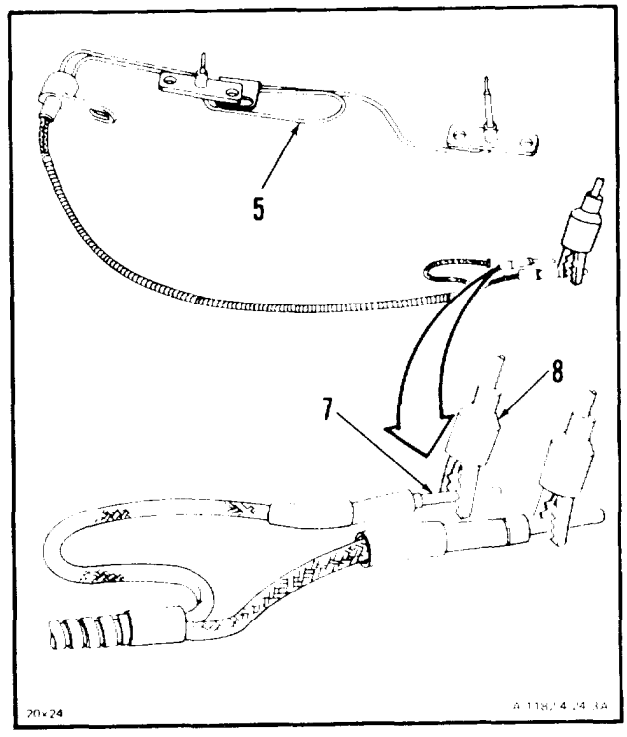
a. Set multimeter range switch to R x 1.

b. Clip black lead (8) to pin (7).

c. Meter shall indicate 3 ohms maximum.

NOTE

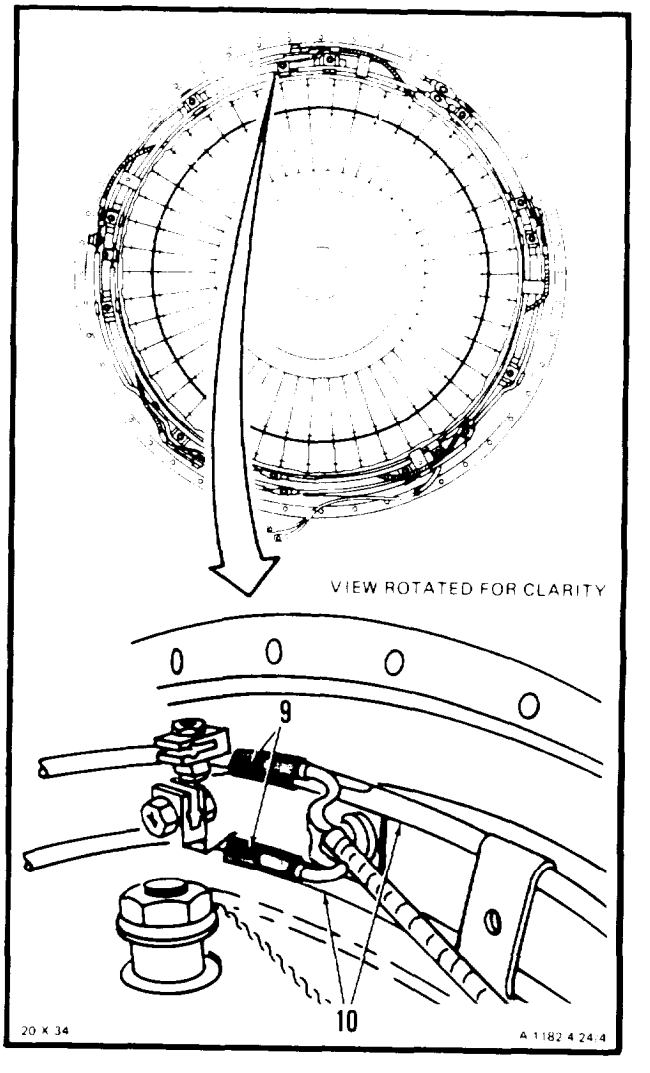
A thermocouple harness assembly that has been found defective shall be disconnected from the bus bar assembly and have it leads taped with fiberglass tape separately and then to the bus bar assembly in order to remove its signal input and prevent damage during operation. **An engine may remain in service with a defective harness (one only) provided that the defective harness is replaced at the next scheduled aircraft phase inspection.** Harnesses found defective during hot end inspection/schedule maintenance shall be replaced.



GO TO NEXT PAGE

4-24 TEST THERMOCOUPLE HARNESS ASSEMBLIES (Continued) 4-24

d. Tape leads (9) individually to bus bar assembly (10) using acetate fiber tape (E54.1).



FOLLOW-ON MAINTENANCE:
None

END OF TASK

4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) 4-25

INITIAL SETUP

Applicable Configurations:
All

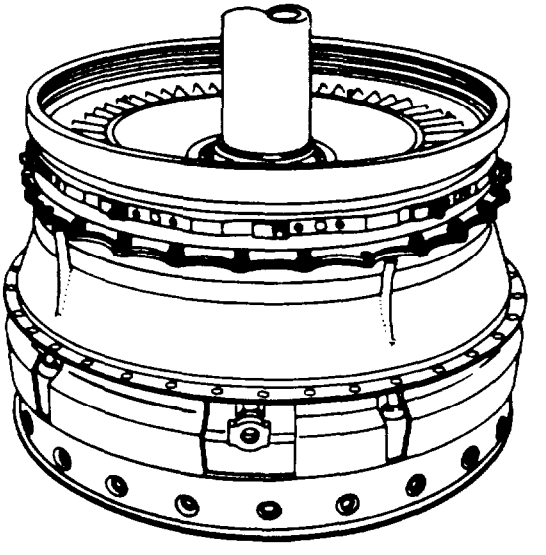
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Multimeter

Materials:
Anti-Seize Compound (E5)
Lockwire (E28)

Parts:
Gaskets

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P



A-1182-4-25/1

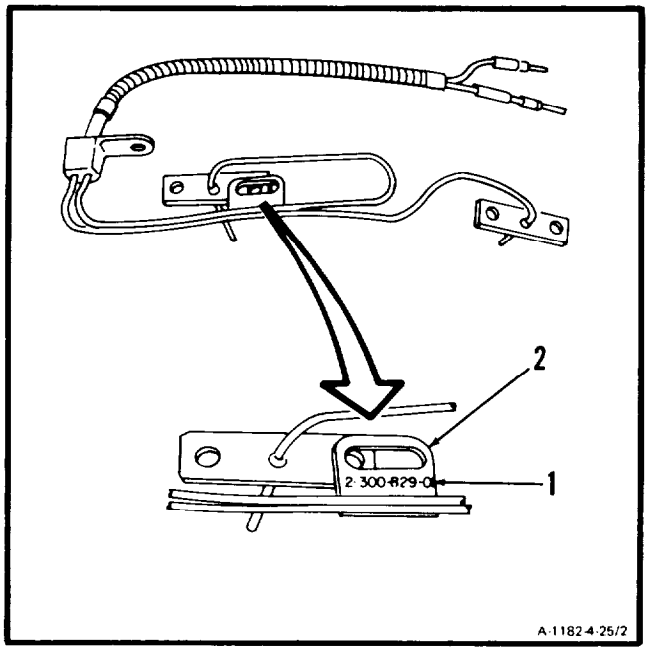
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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

NOTE

Following step applies to five thermocouple harness assemblies. Only one is shown.

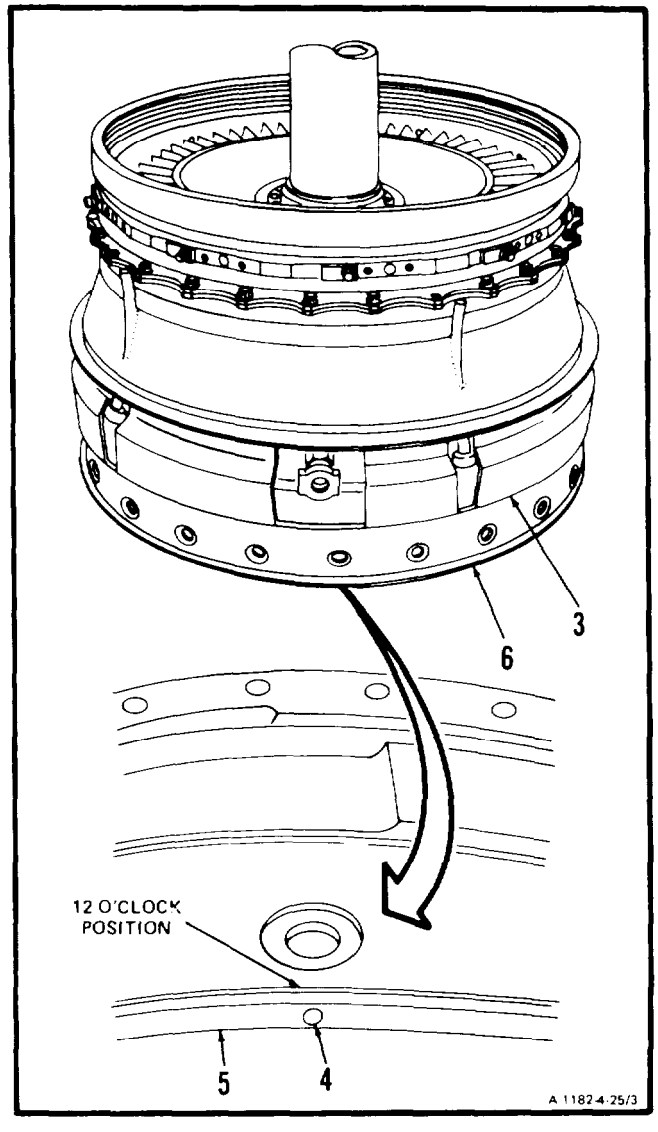
1. Locate part number (1) stamped on thermocouple harness assembly mounting tab (2).



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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

2. Locate 12 o'clock position on power turbine assembly (3). Use Indentation (4) in aft face (5) of aft flange (6) for reference.



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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

3. **Position five thermocouple harness assemblies (7, 8, 9, 10 and 11) as follows:**

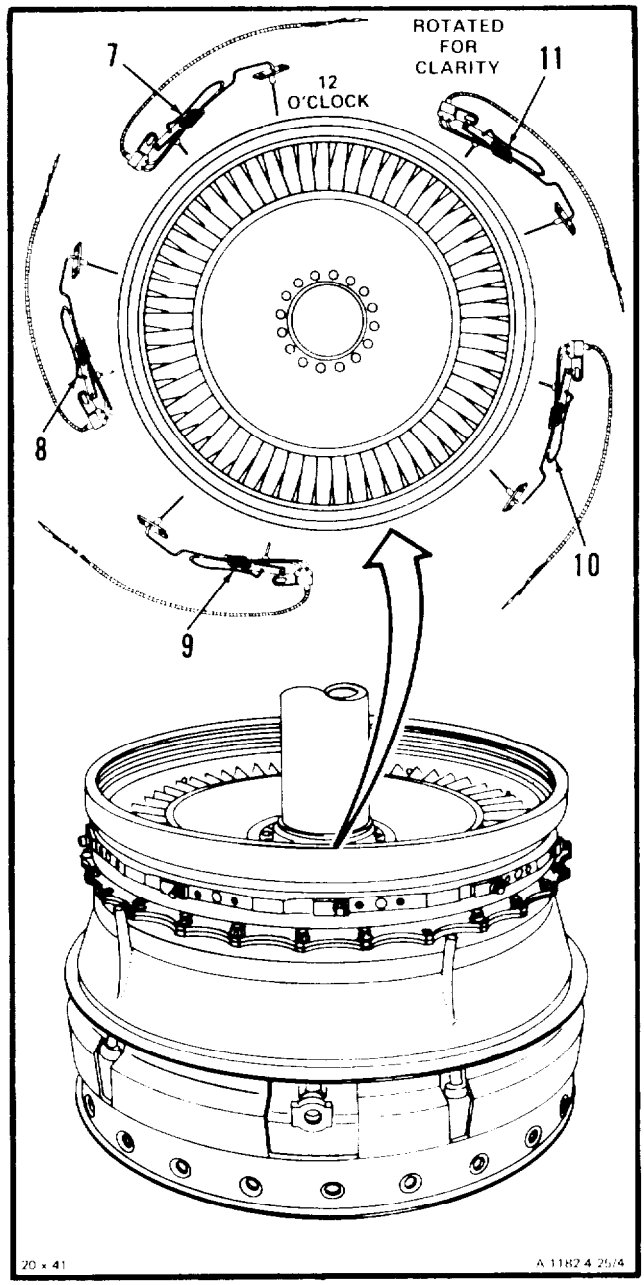
a. Position thermocouple harness assembly (7), Part No. 2-300-829-01, 2-300-958-01, 2-310-087-01, or TC45000-2 at 11 o'clock.

b. Position thermocouple harness assembly (8), Part No. 2-300-831-01, 2-300-831-02, 2-300-959-01, 2-310-088-01, or TC45000-3 at 9 o'clock.

c. Position thermocouple harness assembly (9), Part No. 2-300-828-01, 2-300-957-01, 2-310-086-01, or TC45000-1 at 7 o'clock.

d. Position thermocouple harness assembly (10), Part No. 2-300-829-01, 2-300-958-01, 2-310-087-01, or TC45000-2 at 4 o'clock

e. Position thermocouple harness assembly (11), Part No. 2-300-828-01, 2-300-957-01, 2-310-086-01, or TC45000-1 at 2 o'clock.



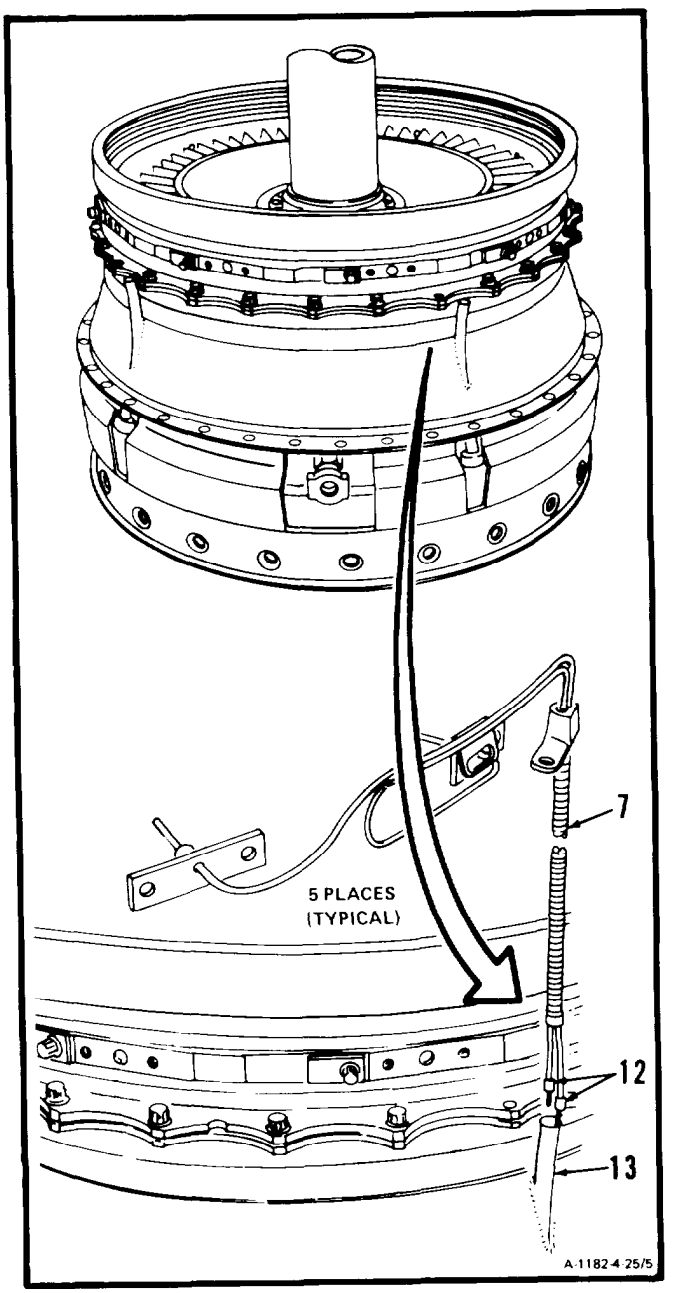
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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

CAUTION

In **following steps 4 thru 6, do not force pin leads through guide tubes. Damage to insulation or pins could result. This will cause erroneous temperature indication.**

4. Carefully insert pins (12) of thermocouple harness assembly (7) into guide tube (13).

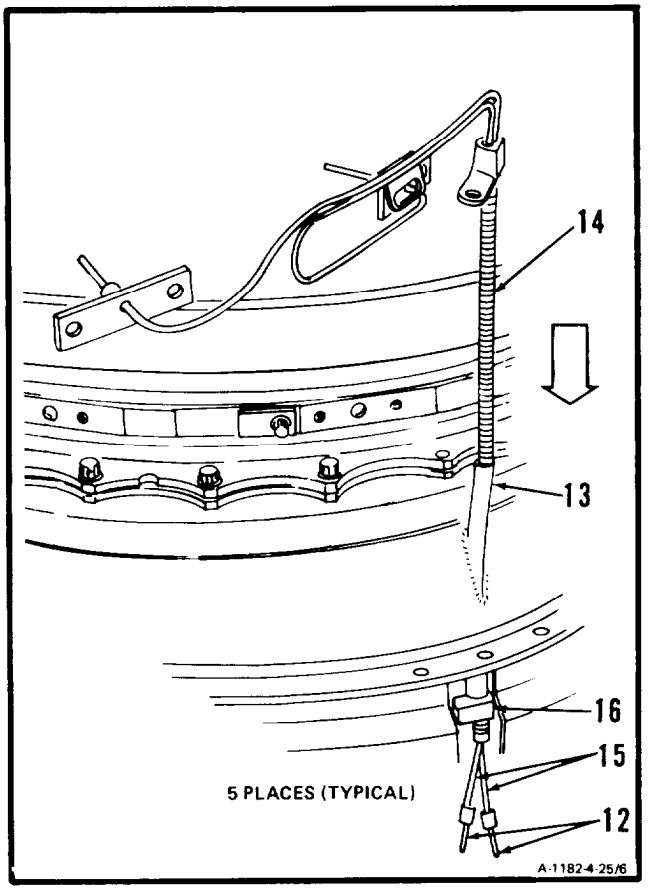


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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

5. Carefully feed cable (14) through guide tube (13) until pins (12) and pin leads (15) extend from aft end (16).

6. Repeat steps 4. and 5. for four remaining thermocouple harness assemblies.



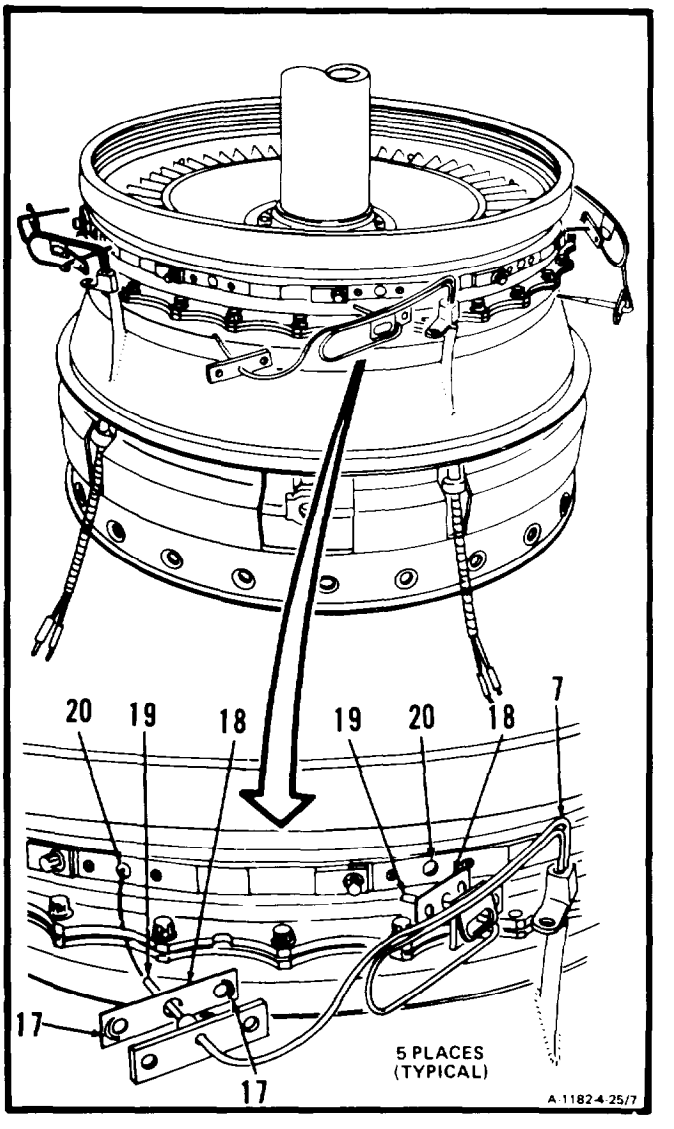
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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

NOTE

Raised sides of gasket indentations go toward thermocouple probe. Gasket may have to be turned to align bolt holes properly as holes are slightly off center.

7. Position raised indentations (17) toward thermocouple probe. **Install two gaskets (18)** and rotate thermocouple harness assembly (7) to align probes (19) with holes (20).

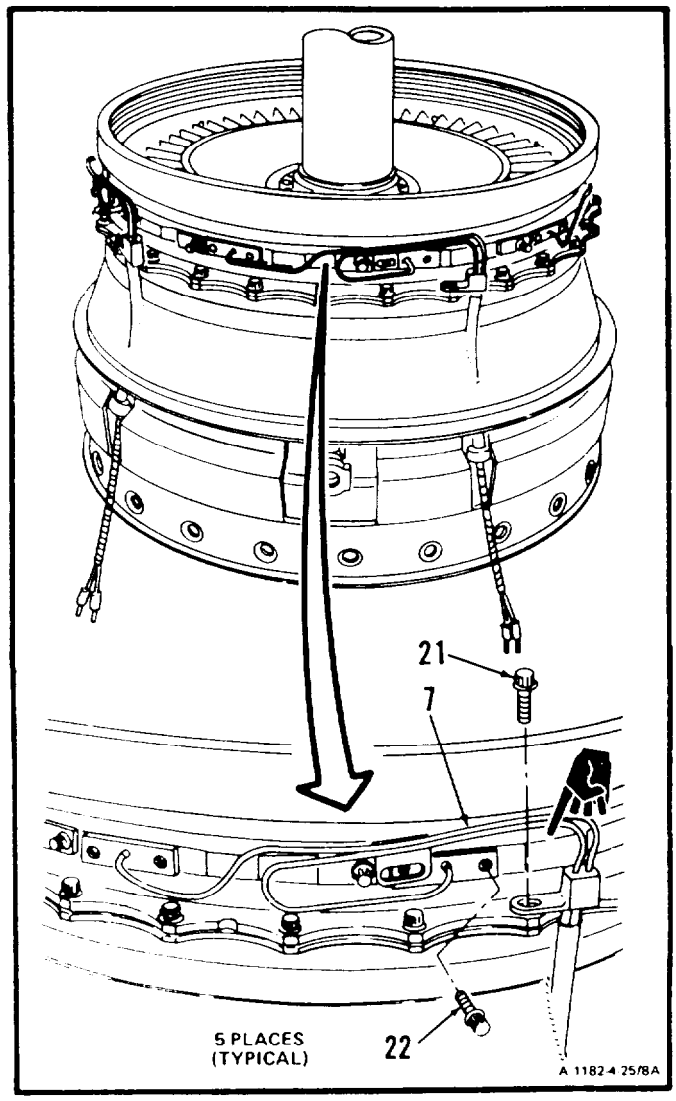


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4-25 INSTALLTHERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

8. Apply anti-seize compound (E5) to bolt (21) and 4 bolts (22). Install thermocouple harness assembly (7), bolt (21) and 4 bolts (22).

9. Repeat steps 7, and 8, for four remaining thermocouple harness assemblies.



GO TO NEXT PAGE

4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued)

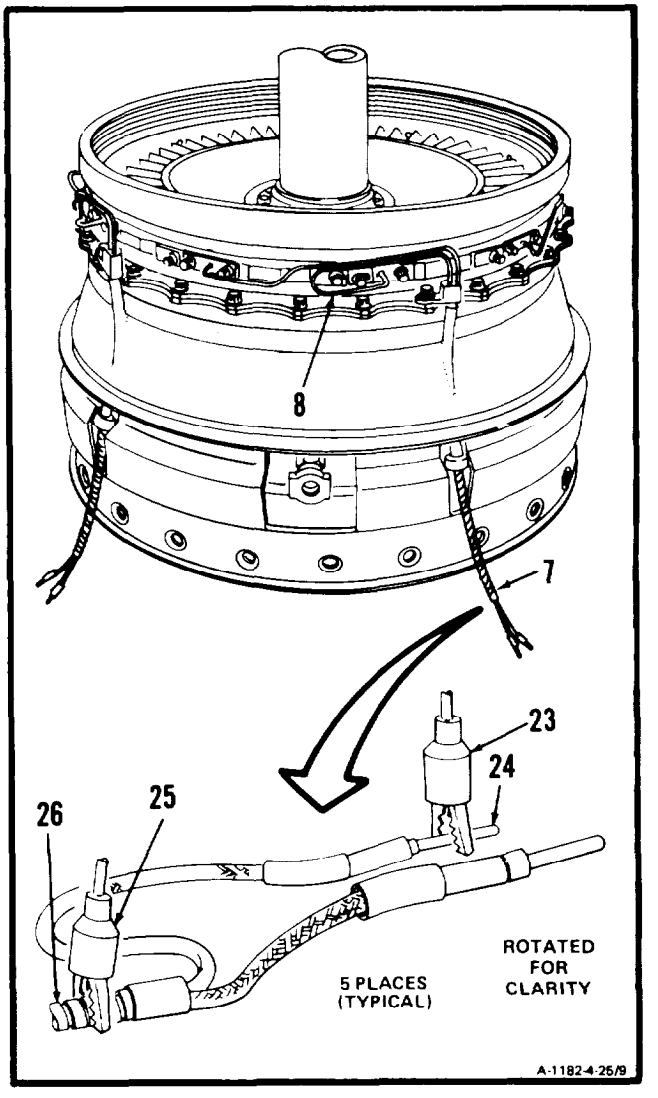
10. **Measure insulation resistance of thermocouple harness assembly (7)** as follows:

    a. Set multimeter range switch to R x 1000.

    b. Clip red lead (23) to pin (24).

    c. Clip black lead (25) to outer shield (26).

    d. Meter shall indicate 10,000 ohms minimum.

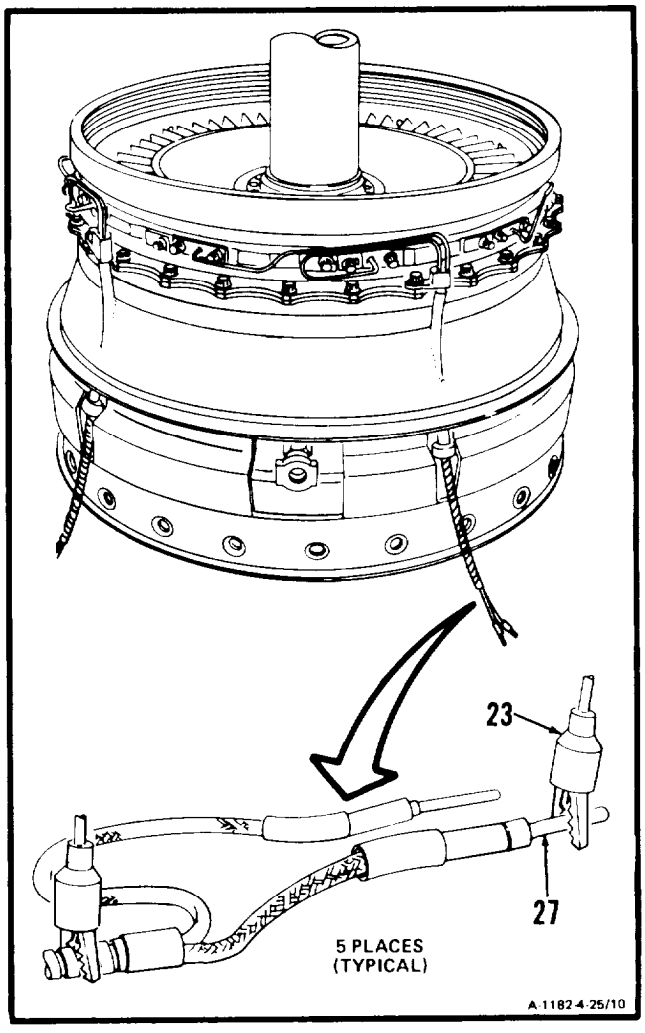


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4-25 INSTALL THERMOCOUPLE HARNESS ASSEMBLIES (AVIM) (Continued) 4-25

e. Clip red lead (23) to pin (27).

f. Meter shall indicate 10,000 ohms minimum



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11. **Measure continuity of thermocouple harness assembly (7)** as follows

    a. Set multimeter range switch to R x 1.

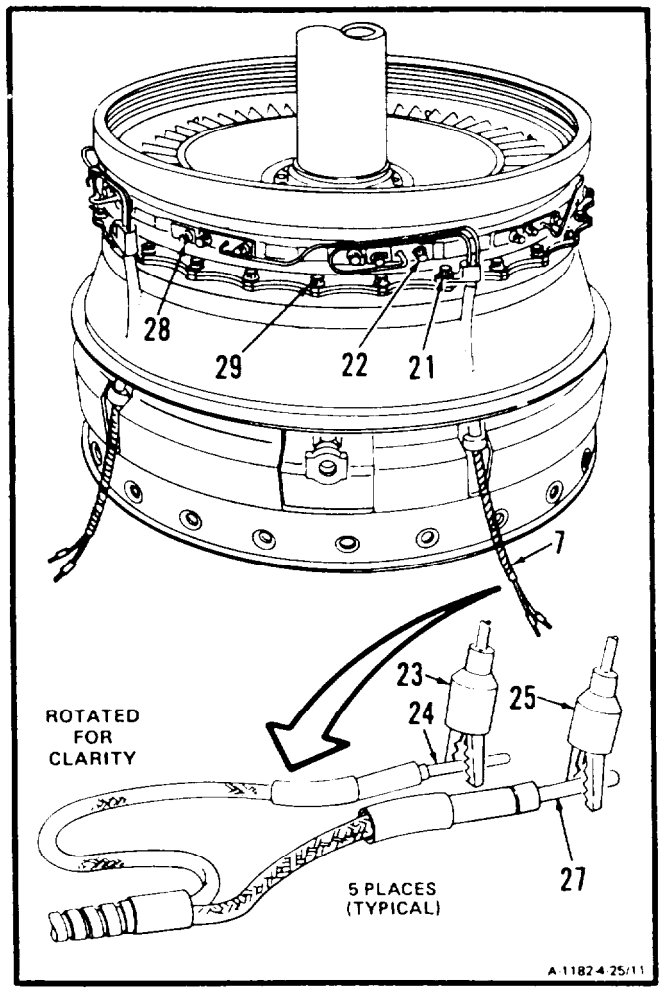
    b. Clip red lead (23) to pin (24)

    c. Clip black lead (25) to pin (27).

    d. Meter shall Indicate 3 ohms maximum

12. Repeat steps 10, and 11, for four remaining thermocouple harness assemblies.

13. Lockwire 5 bolts (21) and 20 bolts (22), ten bolts (28) and 23 bolts (29) Use lockwire (E28).

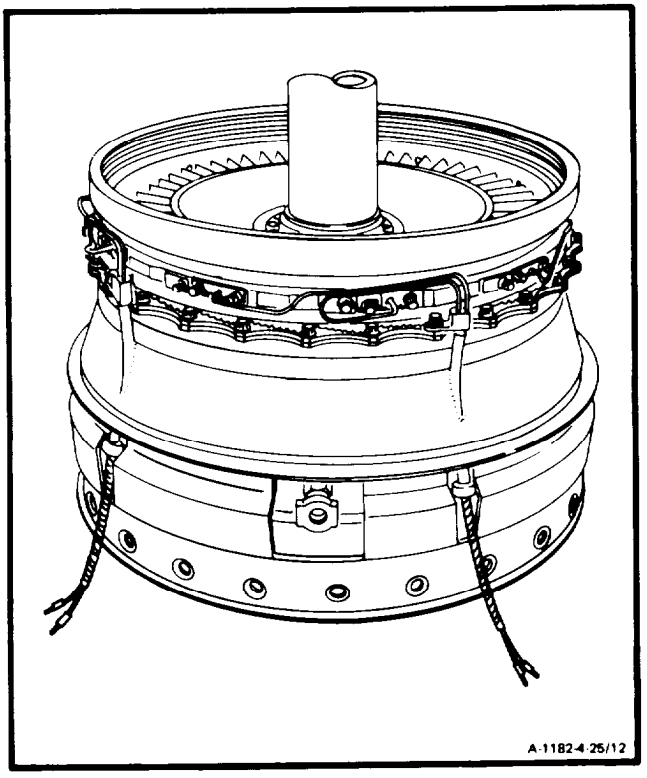


INSPECT

GO TO NEXT PAGE

FOLLOW-ON MAINTENANCE:

Assemble Combustion Section and Power Turbine (Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-26 REMOVE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) 4-26

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
Lockwire (E29)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)

GO TO NEXT PAGE

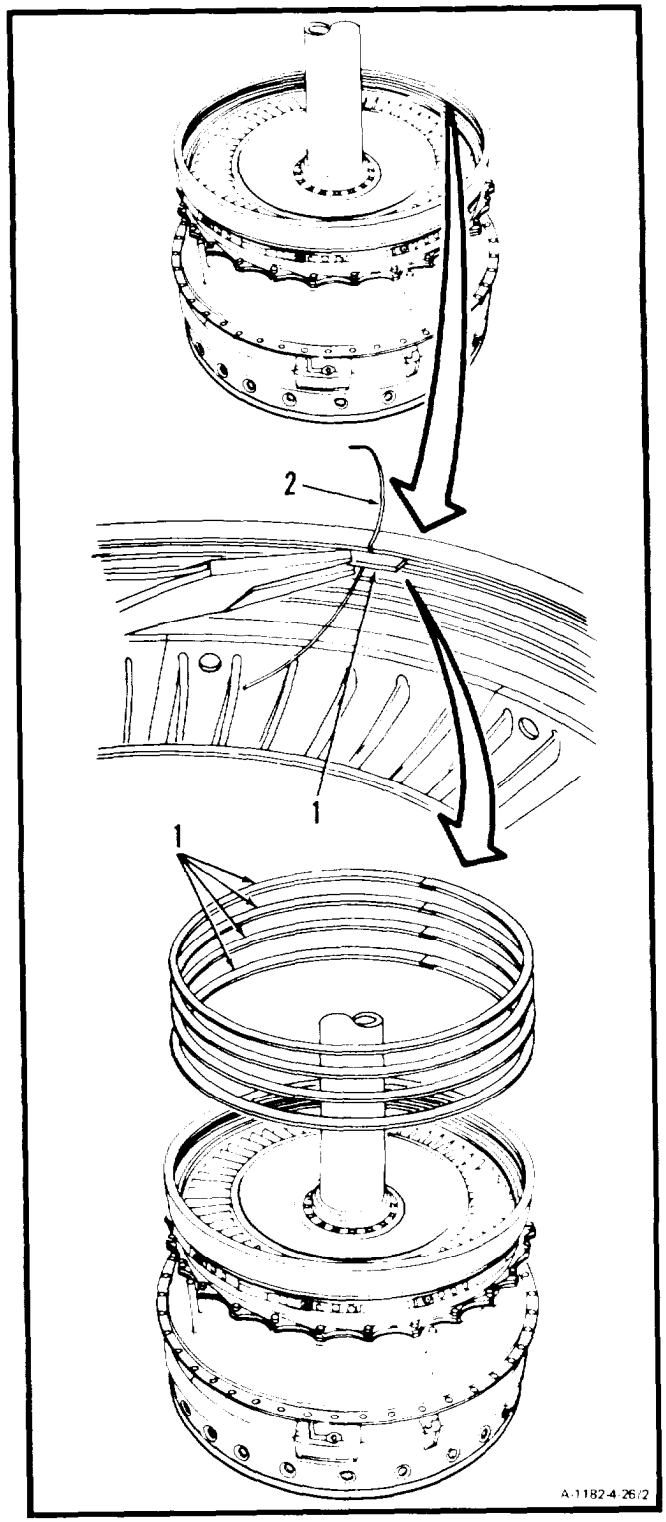
4-26 REMOVE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

NOTE

Steps 1. and 2. apply to removal of four seal rings. Instructions for removing one are given.

1. Pull out end of seal ring (1) with pliers. Slide a piece of lockwire (E29) (2) under end of seal ring (1).

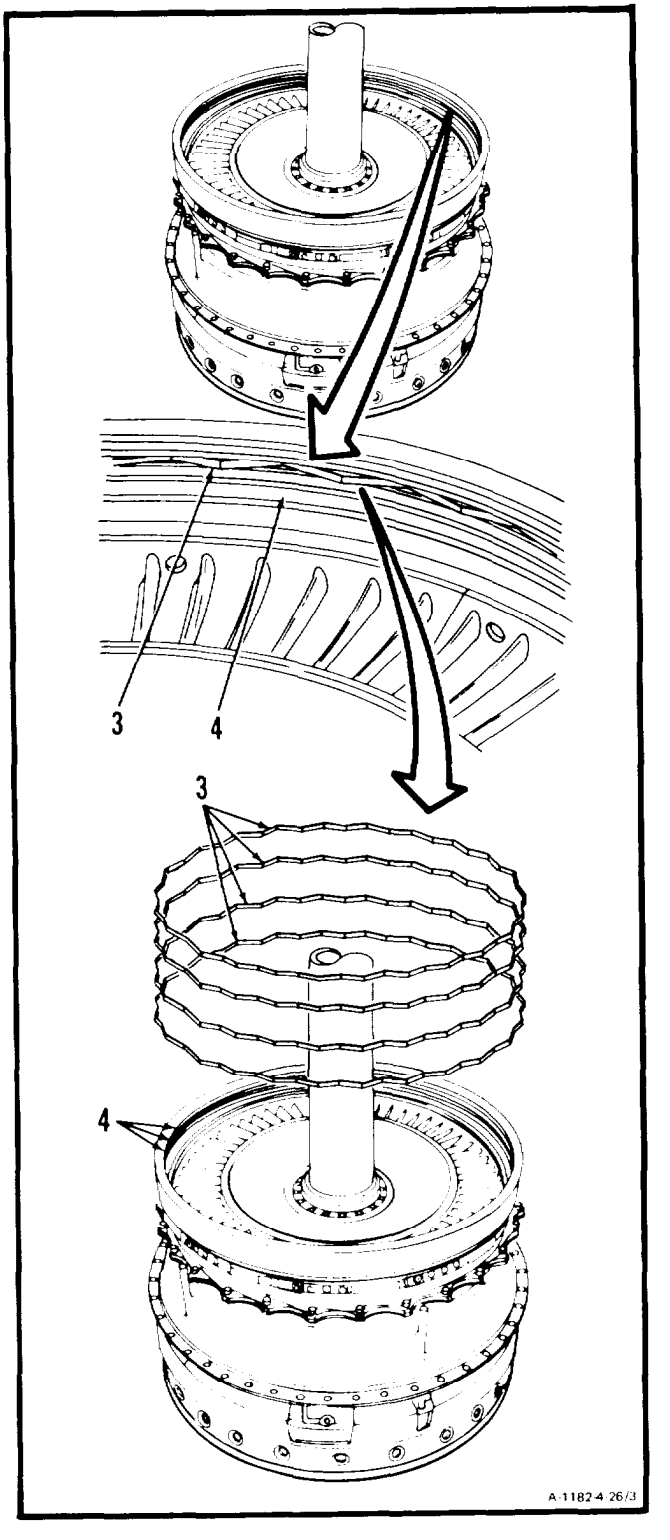
2. Slide lockwire (2) all around seal ring (1). **Remove seal ring (1).**



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4-26 REMOVE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

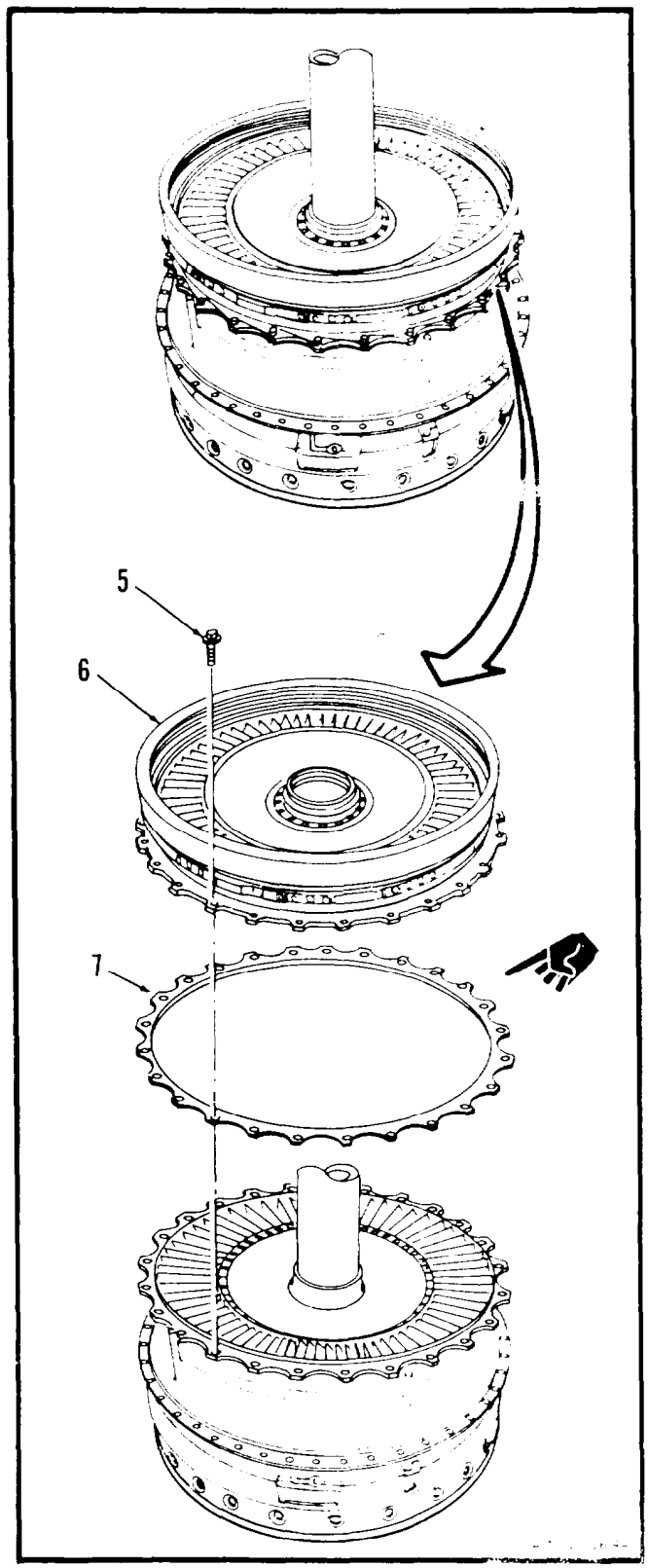
3. Remove four springs (3) from four seal ring grooves (4).



GO TO NEXT PAGE

4-26 REMOVE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-26

4. **Remove** lockwire, 23 bolts (5) and **third turbine nozzle and support (6) and shim (7) if installed.**

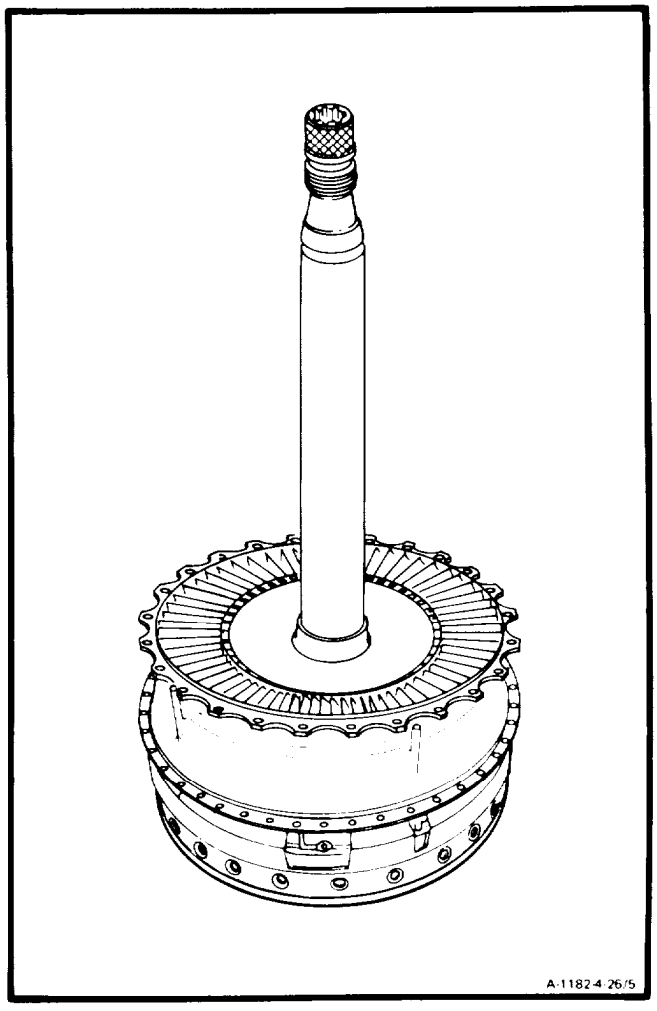


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4-26 REMOVE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-26

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-27 DISASSEMBLE THIRD TURBINE NOZZLE AND SUPPORT (AVIM)

INITIAL SETUP

Applicable Configurations:
All

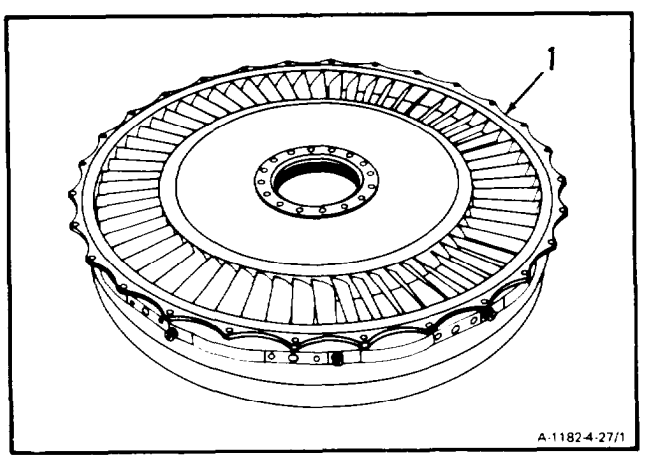
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
None

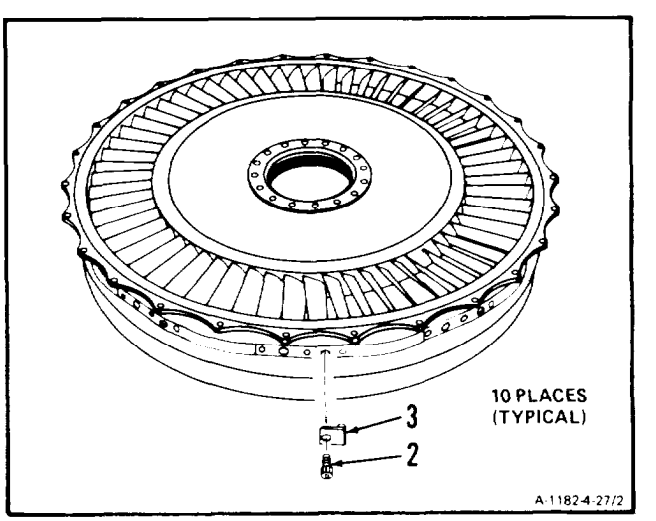
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)
Third Turbine Nozzle and Support Removed (Task 4-26)

1. Place third turbine nozzle and support (1) forward end down, on bench.

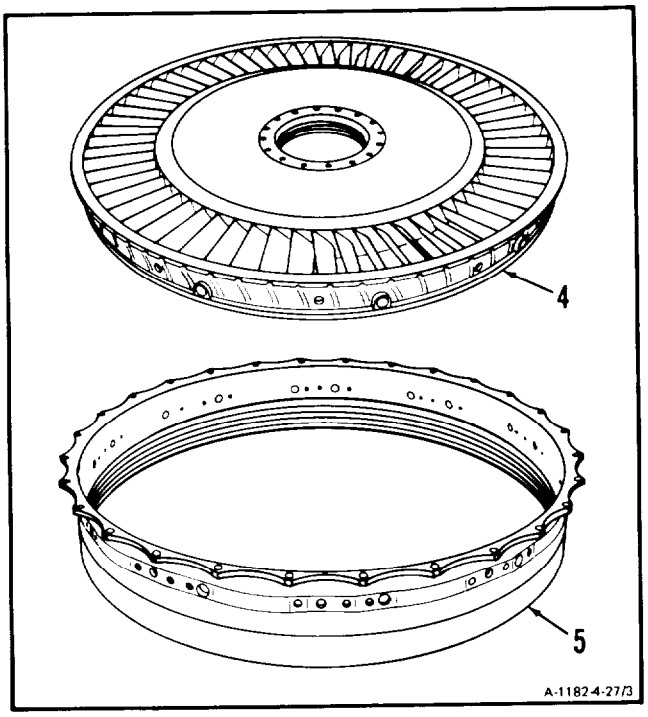


2. **Remove** ten bolts (2) and **pins (3).**



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3. **Remove third turbine nozzle (4)** from support (5).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-28 CLEAN THIRD TURBINE NOZZLE AND SUPPORT (AVIM) 4-28

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)
Third Turbine Nozzle and Support Removed (Task 4-26)
Third Turbine Nozzle and Support Disassembled (Task 4-27)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

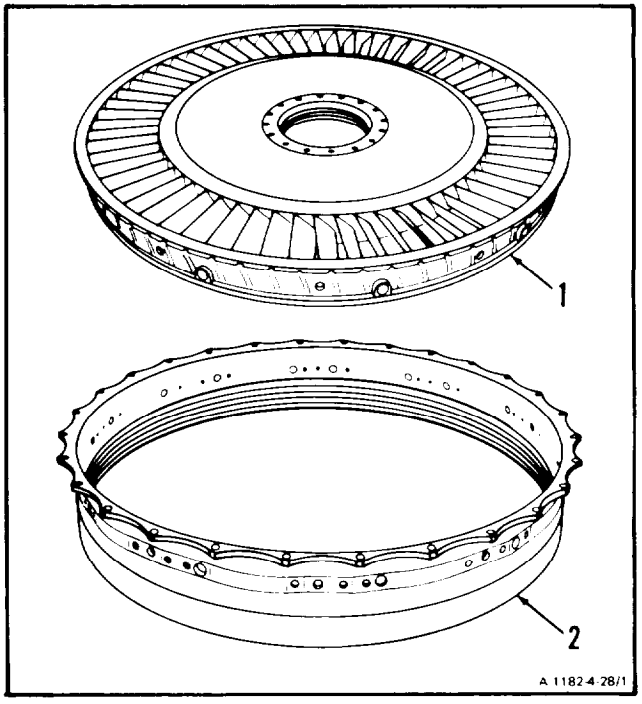
1 **Clean third turbine nozzle (1) and support (2)** as follows

a. Wear gloves (E20) and goggles. Use brush dampened III methyl ethyl ketone (E36).

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

b. Wear goggles. **Blow dry third turbine nozzle (1) and support (2).** Use clean, dry compressed air.



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FOLLOW-ON MAINTENANCE:

Inspect Third Turbine Nozzle and Support (Task 4-29).

END OF TASK

4-29 INSPECTTHIRD TURBINE NOZZLE AND SUPPORT (AVIM) 4-29

INITIAL SETUP

Applicable Configurations.
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

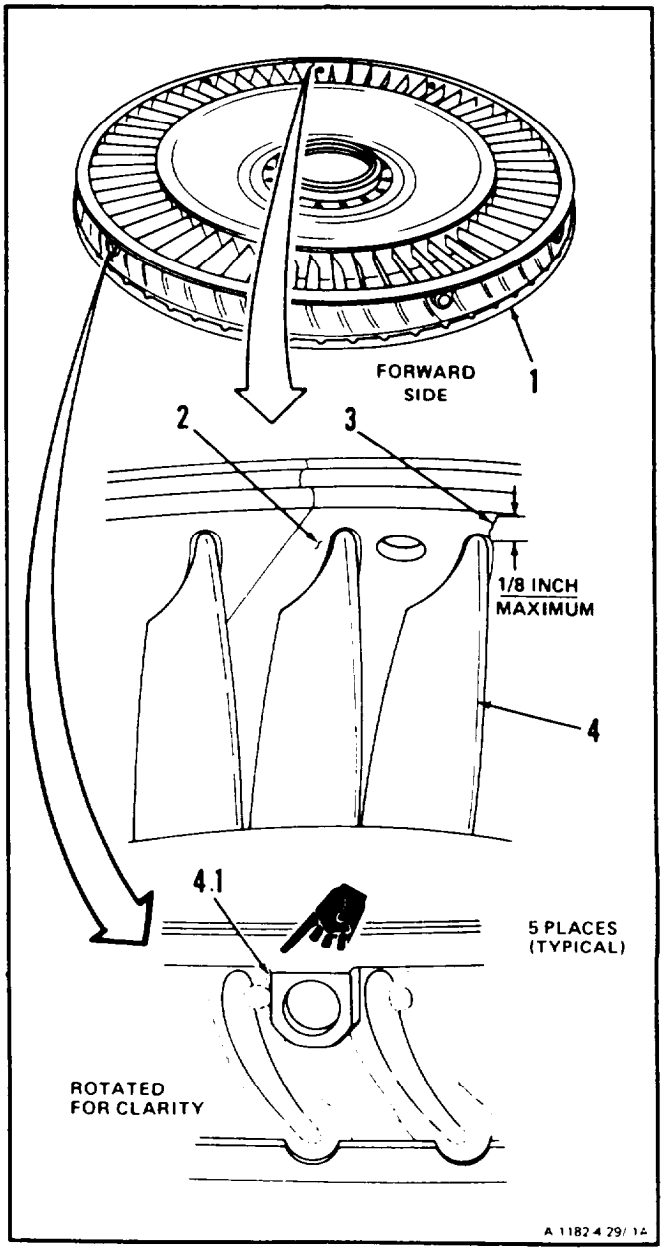
Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect forward side of third turbine nozzle (1)** as follows:

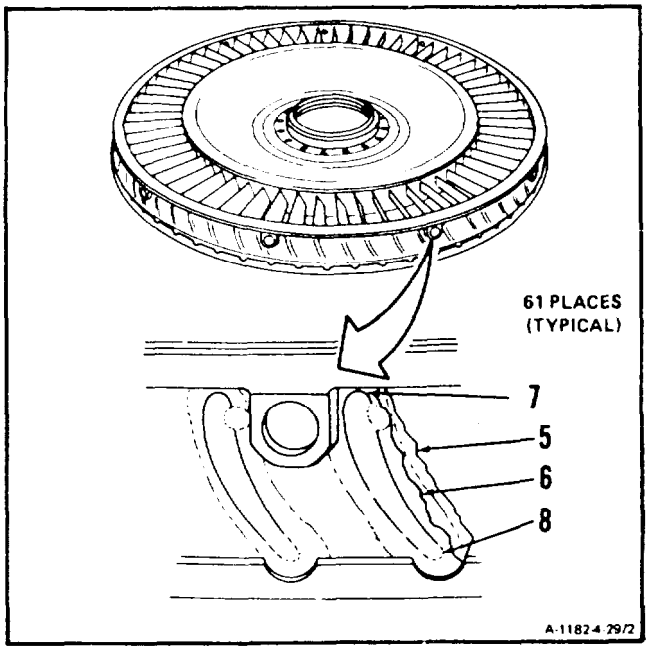
   a. **Inspect outer shroud (2).** There shall be no cracks (3) from vane leading edge (4) longer than 1/8 inch.

   a.1. There shall be no more than 1/4 inch cracking in boss brazed joints (4.1) up to a maximum of five bosses.



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b. **Inspect 61 vane brazements (5).** There shall be no more than five vane brazements with cracks (6) from leading edge (7) to trailing edge (8).



c. **Inspect 61 vanes (9)** as follows:

(1) There shall be no necks (10) in leading edge (11) deeper than 1/16 inch.

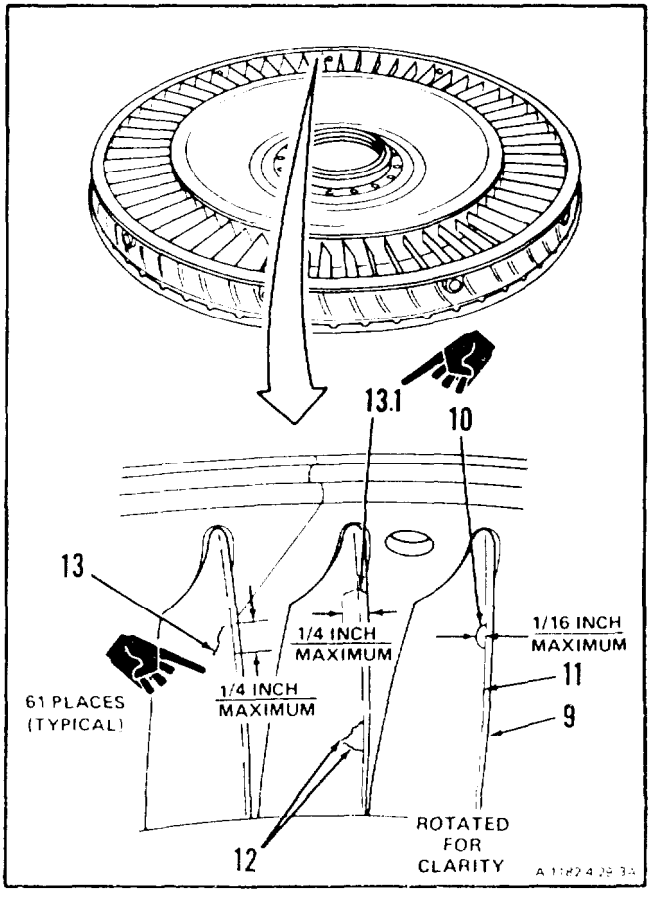
(2) There shall be no material burned off.

(3) There shall be no converging cracks (12).

(4) There shall be no radial cracks (13) longer than 1/4 inch.

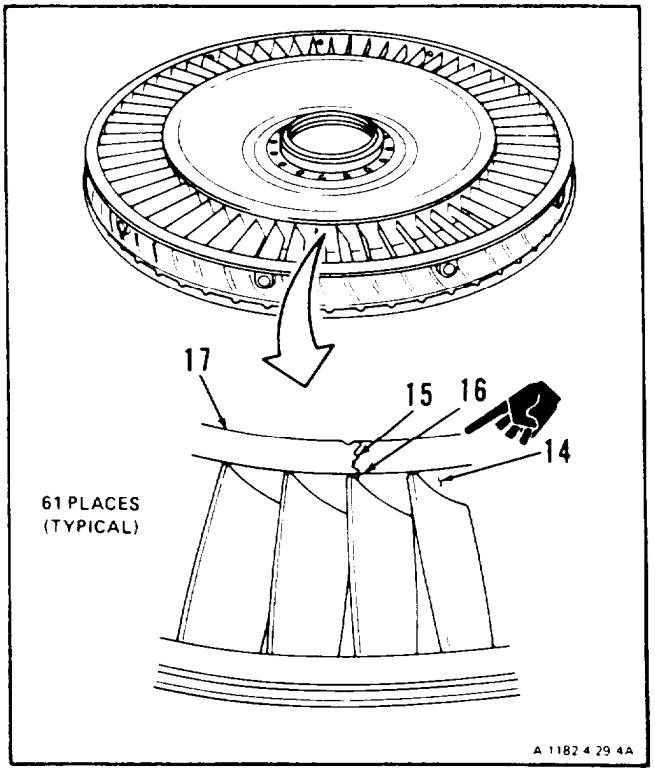
(5) There shall be no cracks in any area where vane has been bent.

(6) There shall be no chordal cracks (13.1) longer than 1/4 Inch.



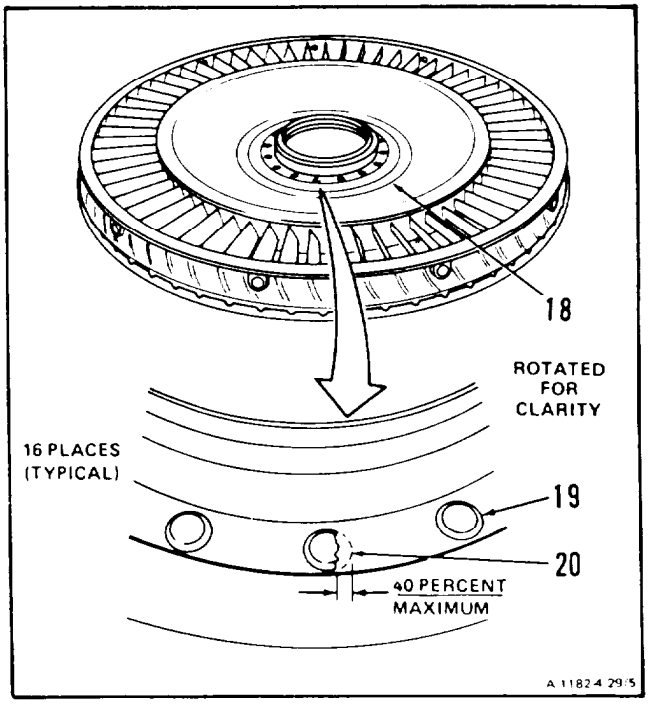
GO TO NEXT PAGE

d. **Inspect inner shroud (14).** There shall be no more than one crack (15) from each vane leading edge slot (16) to braze line (17).



e. **Inspect forward support (18).** There shall be no cracks

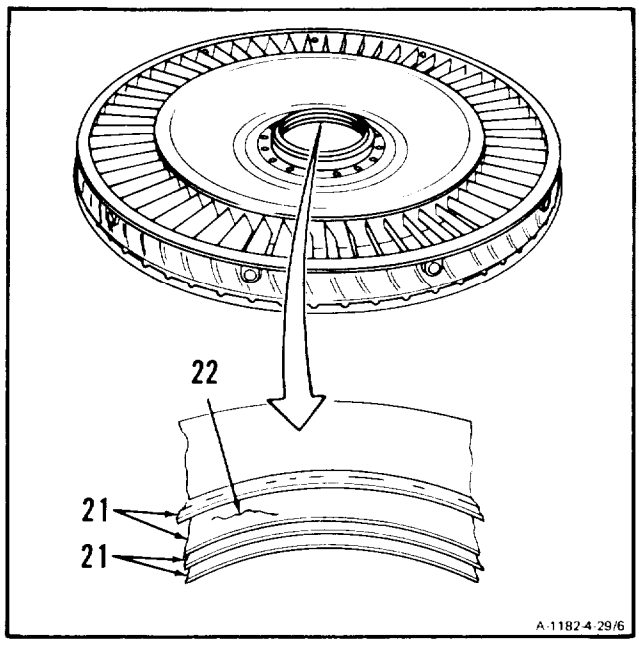
f. **Inspect 16 rivets (19).** There shall no? be more than 40 percent missing material (20).



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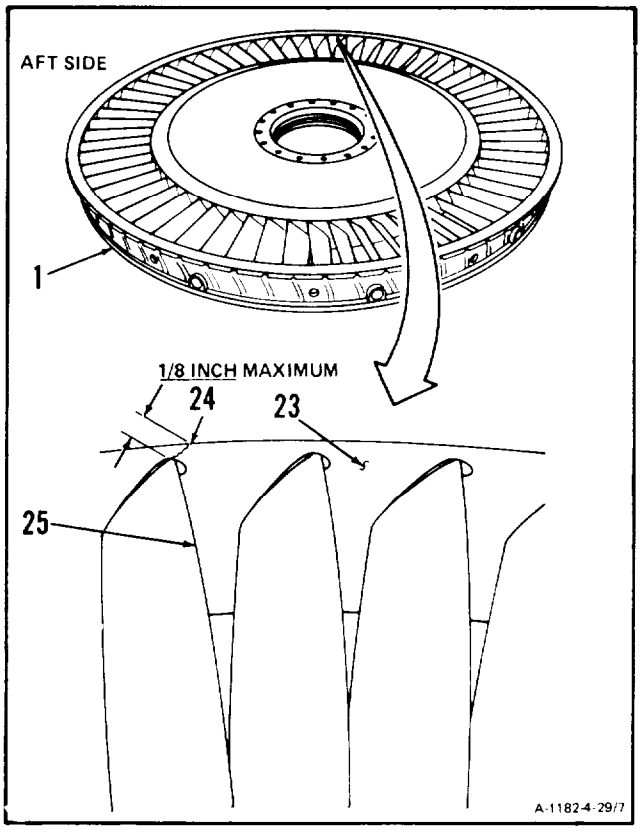
g. **Inspect four seals (21)** as follows:

(1) (22). shall be no circumferential cracks



2. **Inspect aft side of third turbine nozzle (1)** as follows:

a. Inspect outer shroud (23). There shall be no more than ten cracks (24) from vane trailing edges (25). These cracks (24) must not be longer than 1/8 inch.



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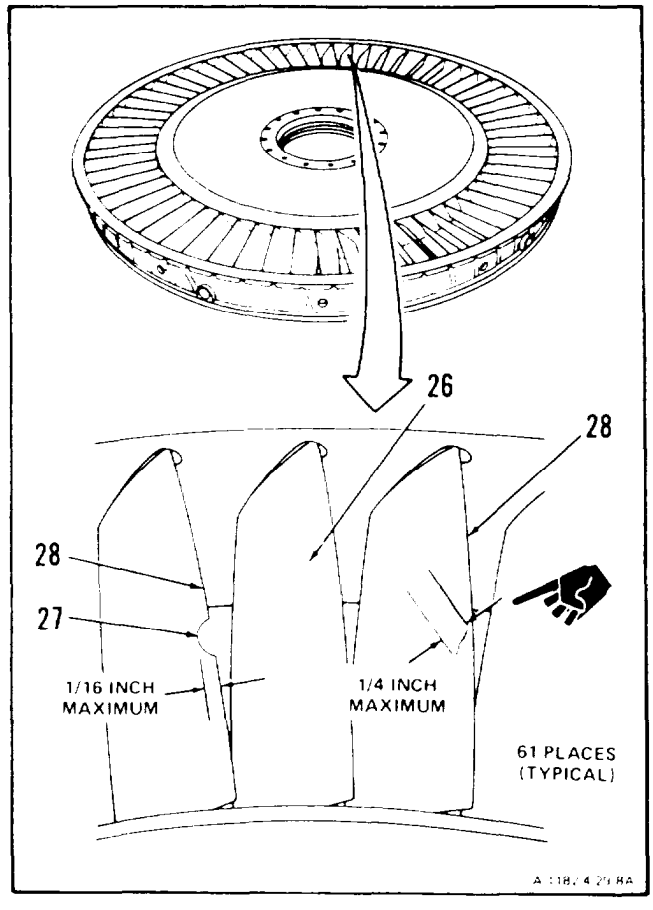
1-29 INSPECT THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

b. **Inspect 61 vanes (26)** as follows

(1) There shall be no nicks (27) in trailing edge (28) deeper than 1/6 inch.

(2) There shall be no cracks in trailing edge parent metal (28) longer than 1/4 inch.

(3) There shall be no cracks in any area. where vane has been bent.



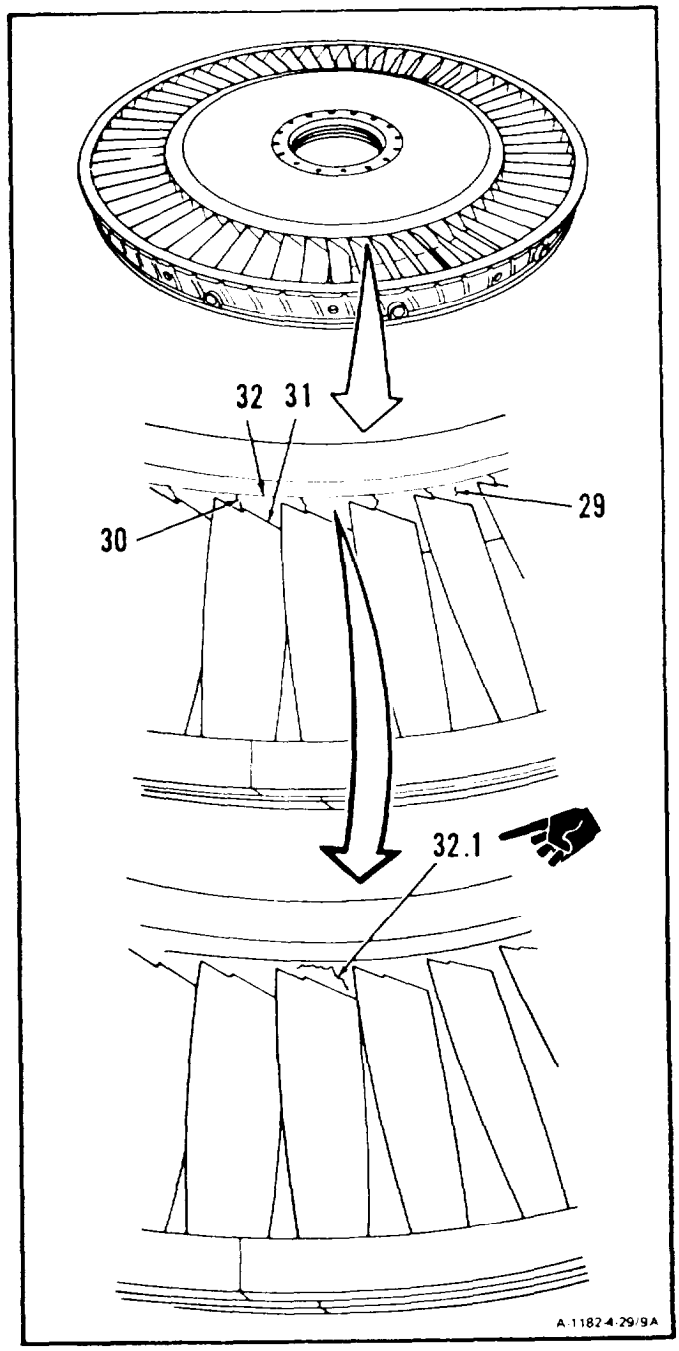
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4-29 INSPECTTHIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

c. **Inspect inner shroud (29)** as follows:

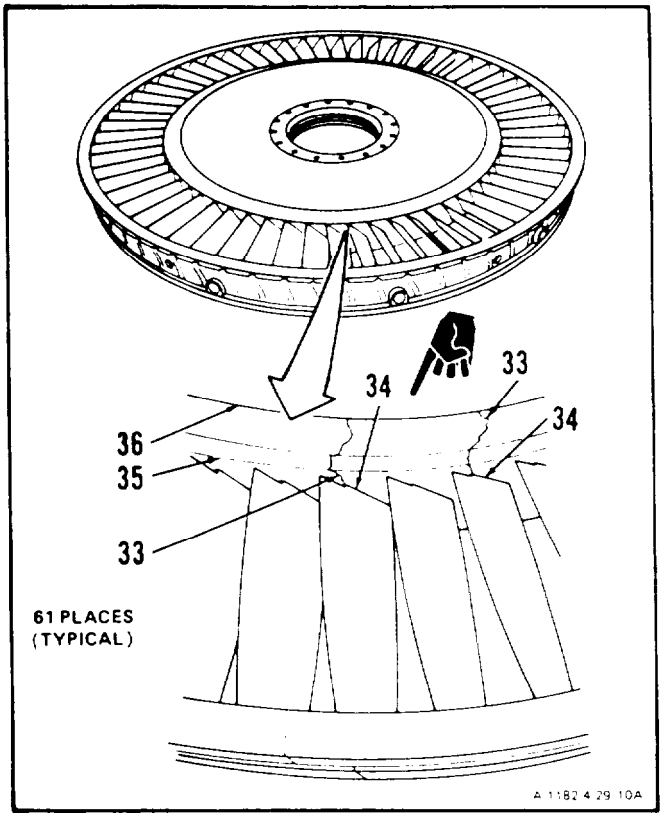
(1) a. There shall be no more than one crack (30) per vane extending from vane slot (31) to aft edge (32).

b. There shall be no circumferential cracks (32.1).

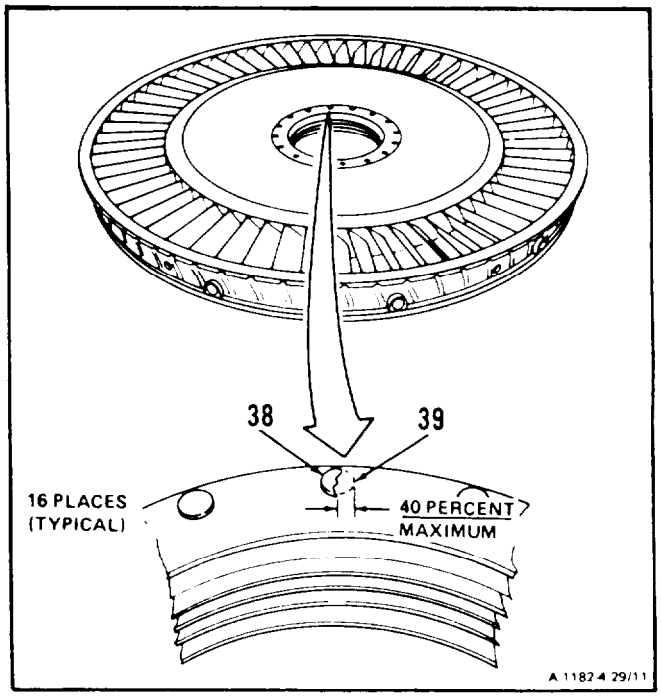


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(2) There shall be no more than 20 cracks (33) extending from vane slot (34) past aft edge (35) to braze line (36).



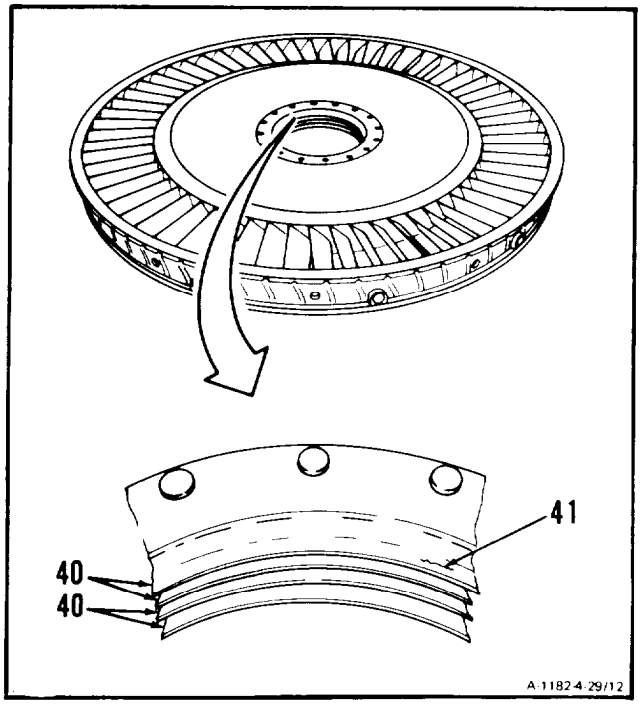
d. **Inspect 16 rivets (38).** There shall be no more than 40 percent of rivet material missing (39).



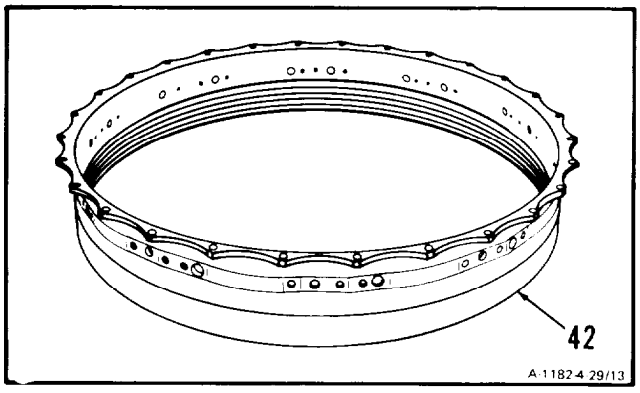
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e. **Inspect four seals (40)** as follows:

(1) There shall be no circumferential cracks (41).



3. **Inspect support (42).** There shall be no cracks.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-30 REPAIR THIRD TURBINE NOZZLE AND SUPPORT (AVIM) 4-30

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit
NSN 5180-00-323-5114

Materials:
Carborundum Stone (E10)
Crocus Cloth (E15)

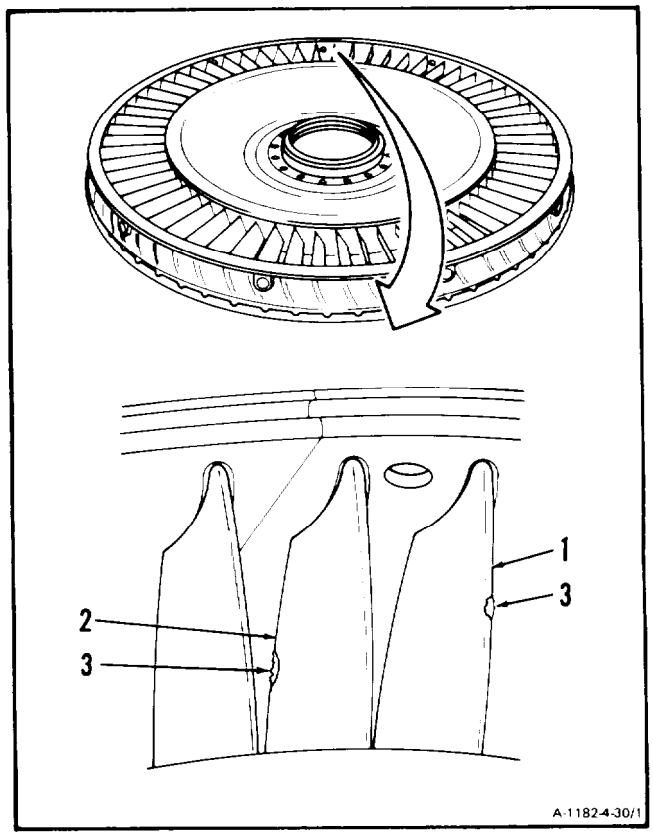
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Repair nicks up to 1/16 inch on vane leading edge (1) and trailing edge (2)** as follows:

   a. Blend all raised edges (3). Use Carborundum stone (E10).

   b. Polish to smooth finish. Use crocus cloth (El 5).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-31 ASSEMBLE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) 4-31

INITIAL SETUP

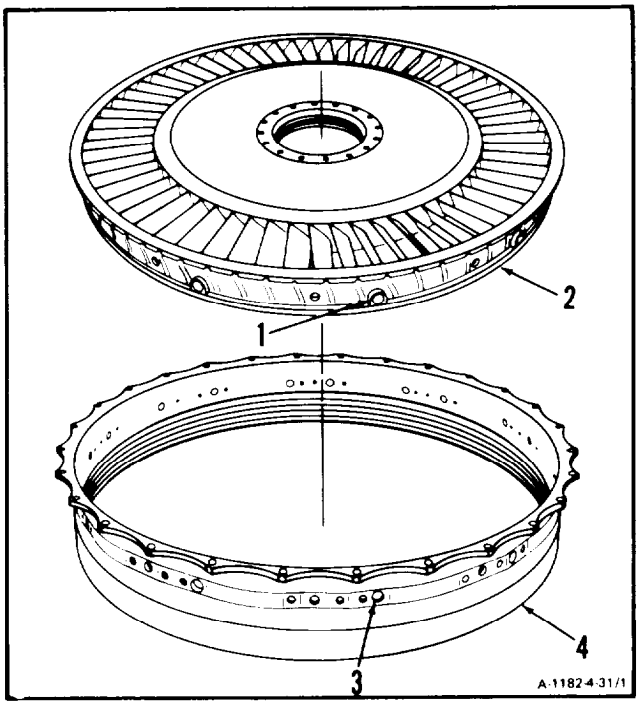
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

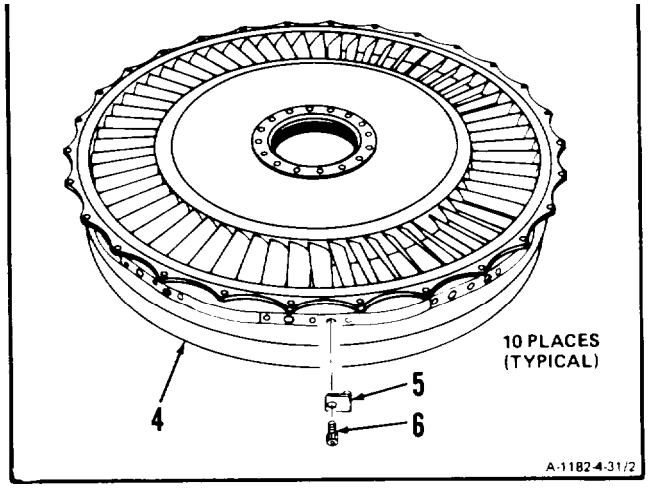
1. Align ten pin holes (1) in third turbine nozzle (2) with pin holes (3) in support (4). **Install third turbine nozzle (2)** in support (4).



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4-31 ASSEMBLE THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

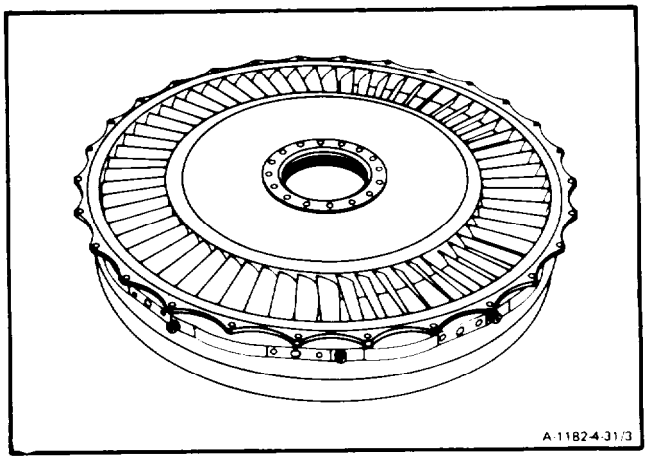
2. Install ten pins (5) and bolts (6) in support (4)



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM)

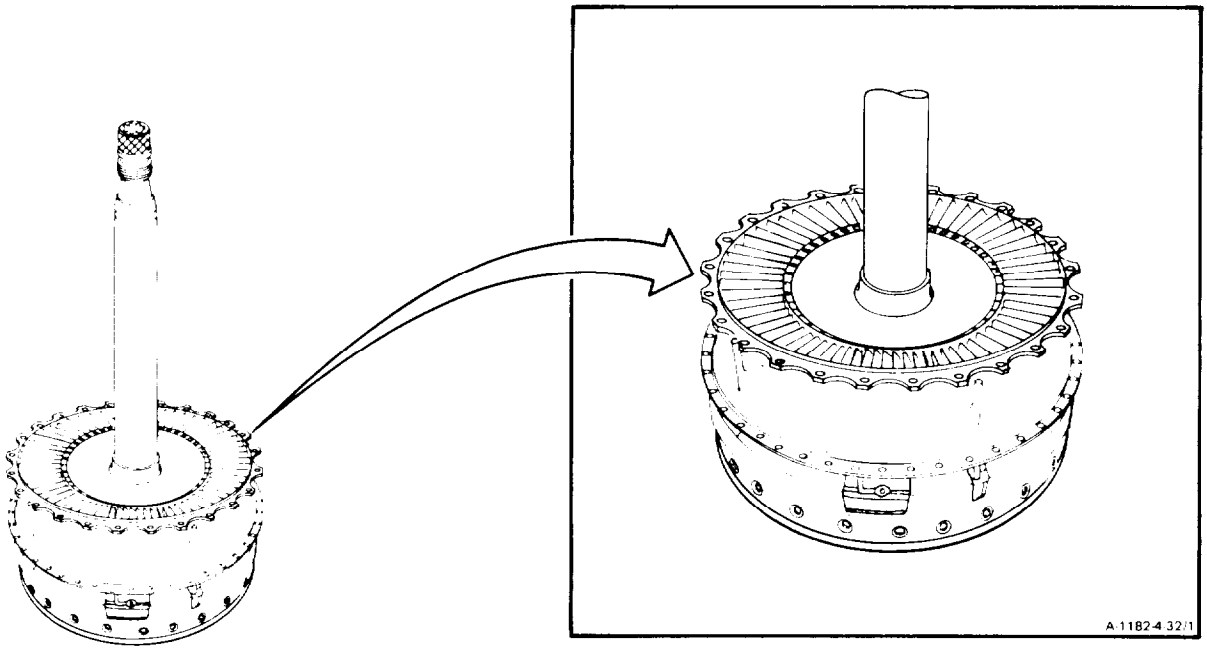
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Bent Wire Gage, 0.101 Inch (Appendix E)

Materials:
Anti-Seize Compound (E5)
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector



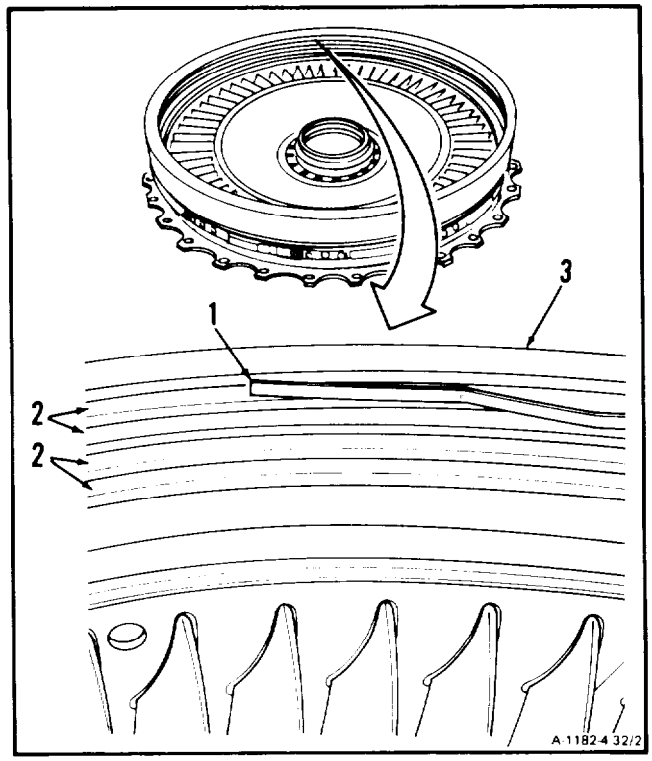
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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

NOTE

Steps 1. and 2. apply to four sets of seal rings and expander springs. One set is shown. Seal rings shall be installed so that slits are staggered.

1. **Install** end of **expander spring (1)** in groove (2) of third turbine support (3). Keep feeding expander spring (1) into groove (2) until entire spring is seated.



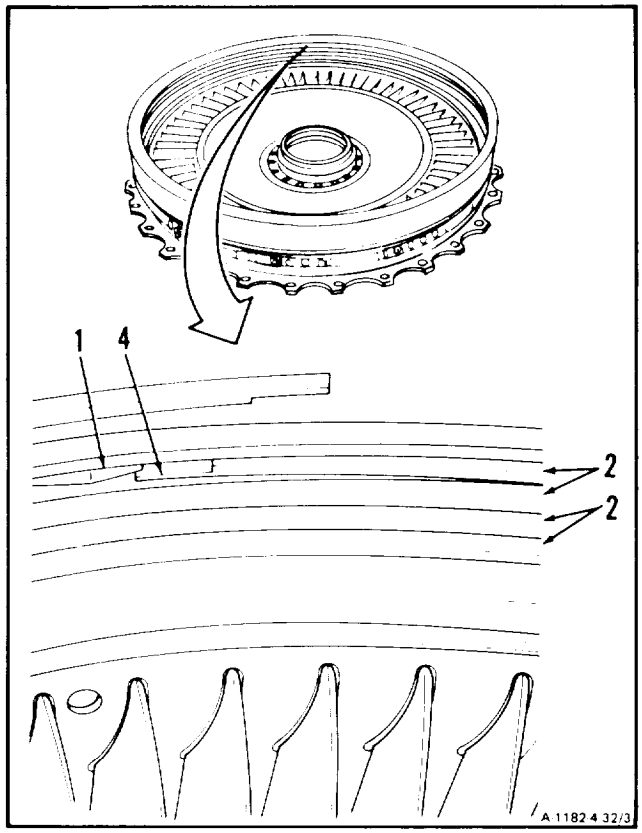
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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

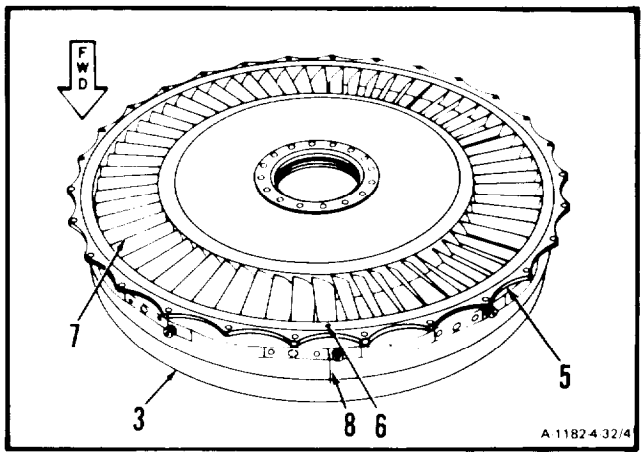
NOTE

Seal ring shall be installed with chamfered edge up.

2. **Install** end of **seal ring (4)** in groove (2) over expander spring (1), Keep, feeding seal ring (4) into grove (2) until entire seal ring is seated.



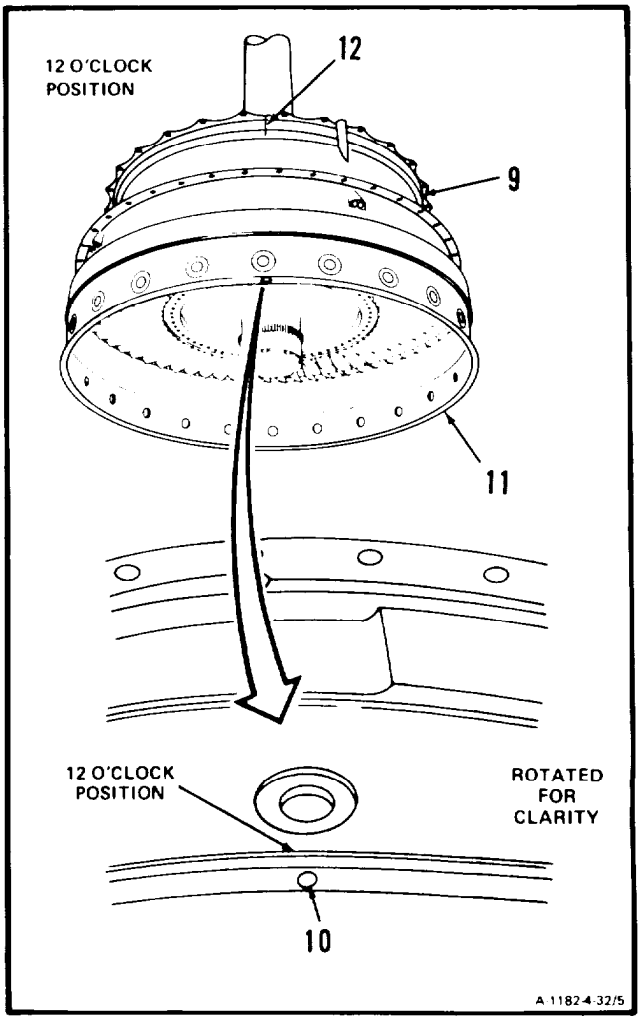
3. **Locate 12-o'clock position on third turbine nozzle and support (5).** Small indentation (6) on aft flange of nozzle (7) is at 12-o'clock position. Mark line (8) on outside of support (3). Use marking pencil (E34).



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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

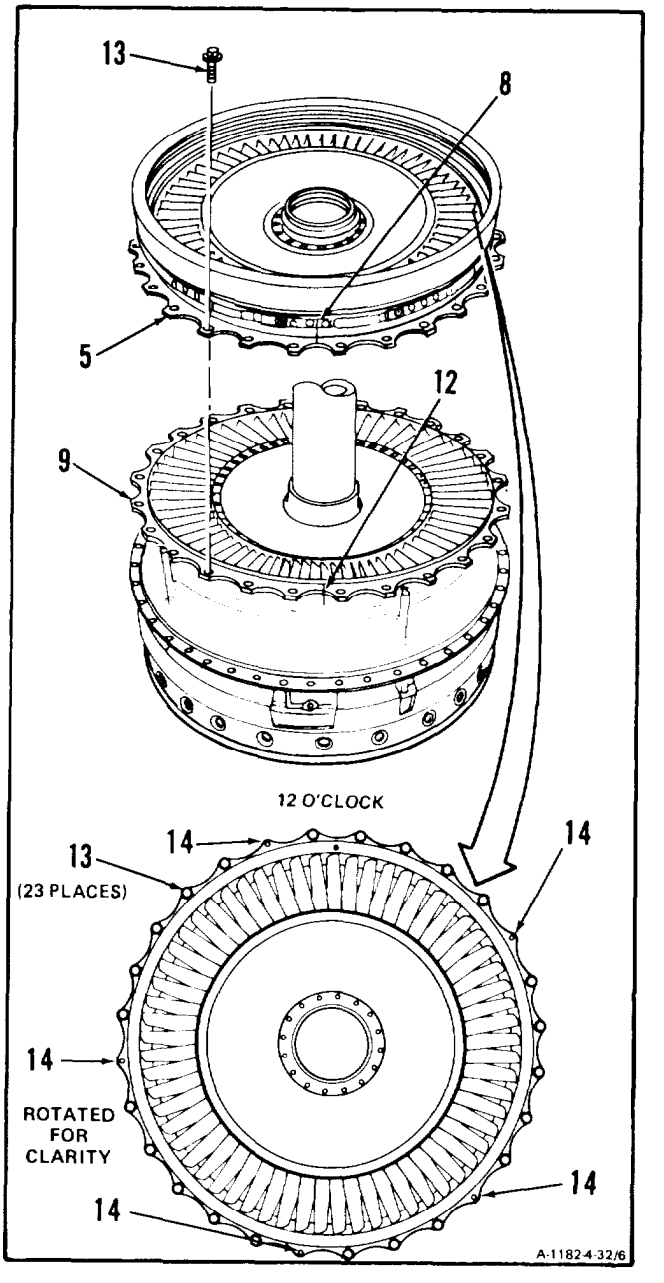
4. **Locate 12-o'clock position on power turbine assembly (9).** Indentation (10) in aft flange (11) is at 12 o'clock position. Mark line (12) on side of power turbine (9) at 12.o'clock position. Use marking pencil (E34).



GO TO NEXT PAGE

4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued)

5. Apply anti-seize compound (E5) to 23 bolts (13). Align matchmarks (8 and 12) and bolt holes. **Install third turbine nozzle and support (5)** and 23 bolts (13) on power turbine assembly (9). Do not install bolts (13) into five bolt holes (14) on left sides of thermocouple tubes.

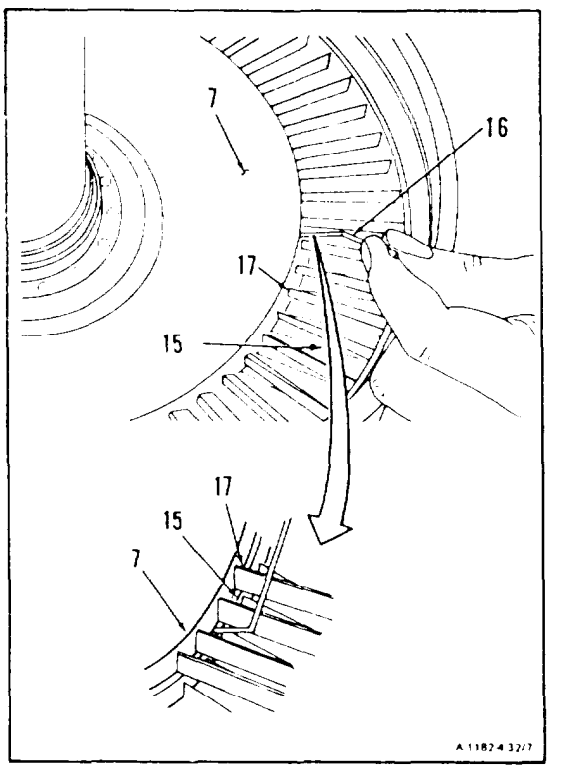


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6. **Check for axial clearance between third turbine rotor (15) and third turbine nozzle (7).** Use 0.101 inch bent wire gage Appendix E) (16) through third turbine nozzle vanes (17) **Clearance shall be 0.101 inch minimum**

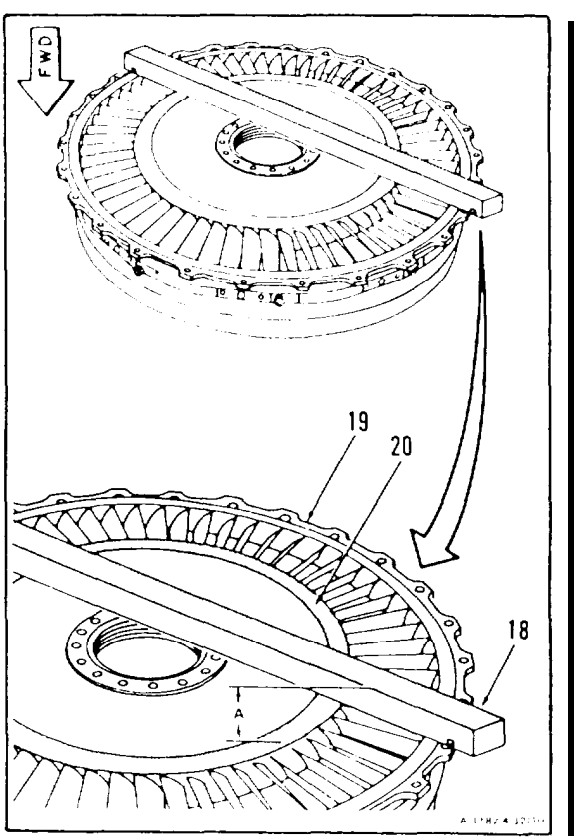
6.1 **If clearance is not proper,** remove third turbine nozzle and support installed in step 5 and do steps 6.2 and 6.3.

6.2 Determine thickness of sham required to establish clearance between third turbine rotor (15) and third turbine nozzle (7) as follows.



a Place locating bar (T1) (18) on third turbine nozzle and support aft flange (19).

b Measure from top of locating bar (T1) (18) to trailing edge of inner shroud of third turbine nozzle assembly (20) Use a micrometer depth gage Record as Dimension A.

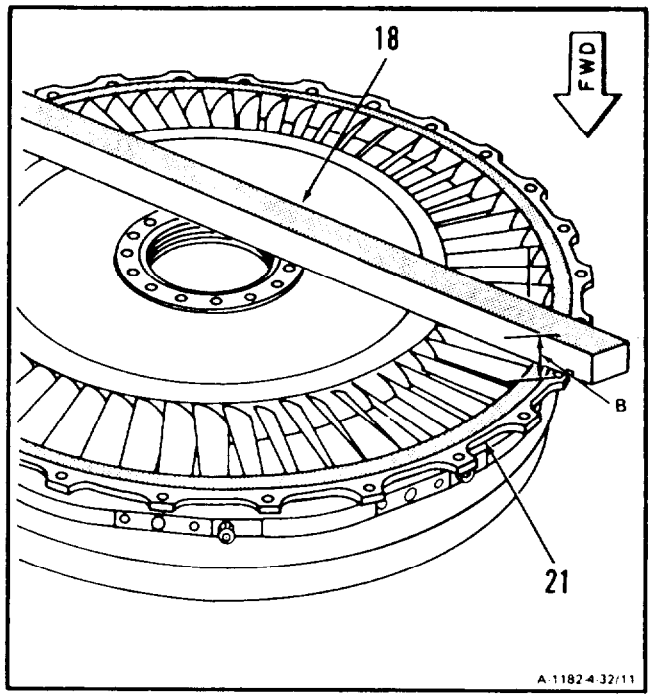


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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

c. Measure from top of locating bar (T1) (18) to third turbine nozzle support shoulder (21) (fourth stage turbine nozzle assembly third cylinder mating surface). Use micrometer depth gage. Record as Dimension B.

d. Subtract Dimension B from Dimension A Record as Dimension C.

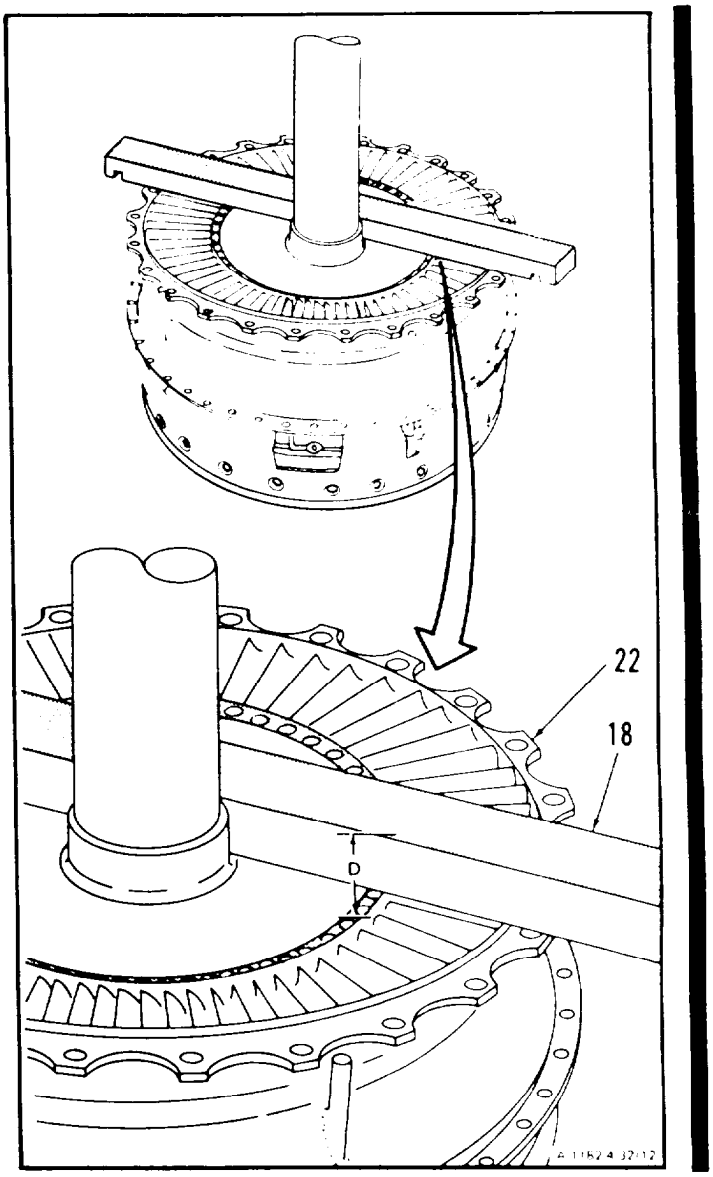


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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

e. Place locating bar (T1) (18) on fourth stage turbine nozzle outer flange (22).

f. Measure from top of locating bar (T1) (18) to leading edge of highest blade root. Use micrometer depth gage Record as Dimension D.

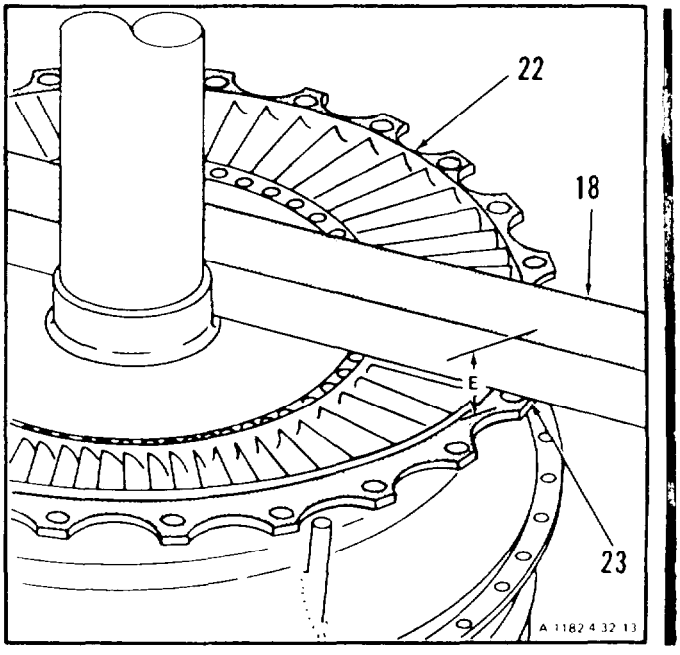


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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

g. Measure from top of locating bar (T1) (18) to forward face (23) of fourth stage turbine nozzle outer flange (22). Use micrometer depth gage. Record as Dimension E.

h. Subtract Dimension D from Dimension E Record as Dimension F.



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NOTE

Clearance required is 0.101 inch minimum.

i. Subtract Dimension F from Dimension C to determine clearance between third turbine nozzle (7) and third turbine rotor (15). Record as Dimension G.

Select shim from shim selection table to obtain 0.101 inch minimum. Use outside micrometer caliper.

Example: If Dimension G IS 0.090 inch, select shim Part No. 2-141-148-01. If Dimension G is 0.070 inch, select Shim Part No. 2-141-148-02. If Dimension G is 0.050 inch select Shim Part No. 2-141-148-03.

SHIM SELECTION TABLE

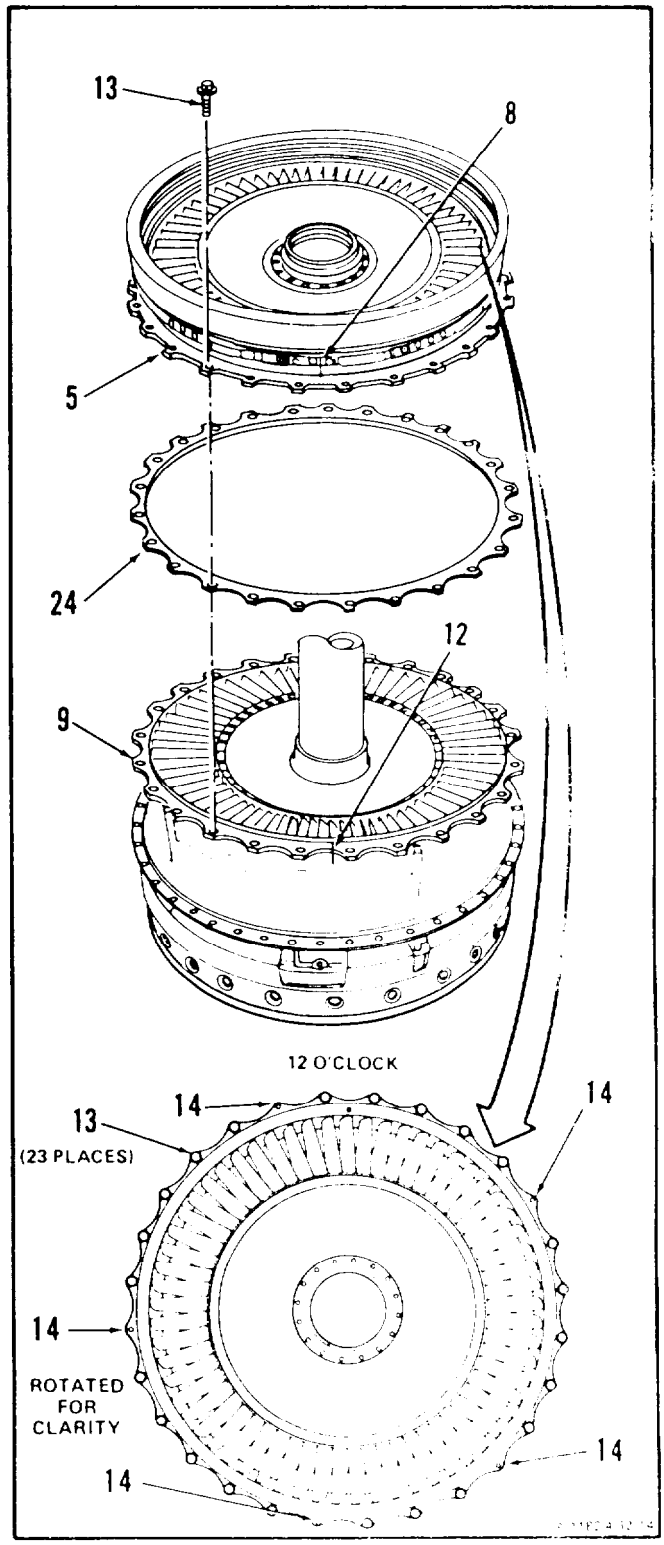
PART NUMBER	SHIM THICKNESS
2-141-148-01	0.022 inch
2-141-148-02	0.044 inch
2-141-148-03	0.063 inch

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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

6.3. Apply anti-seize compound (E5) to 23 bolts (13). Align matchmarks (8 and 12) and bolt holes. Install shim (24) on power turbine assembly (9).

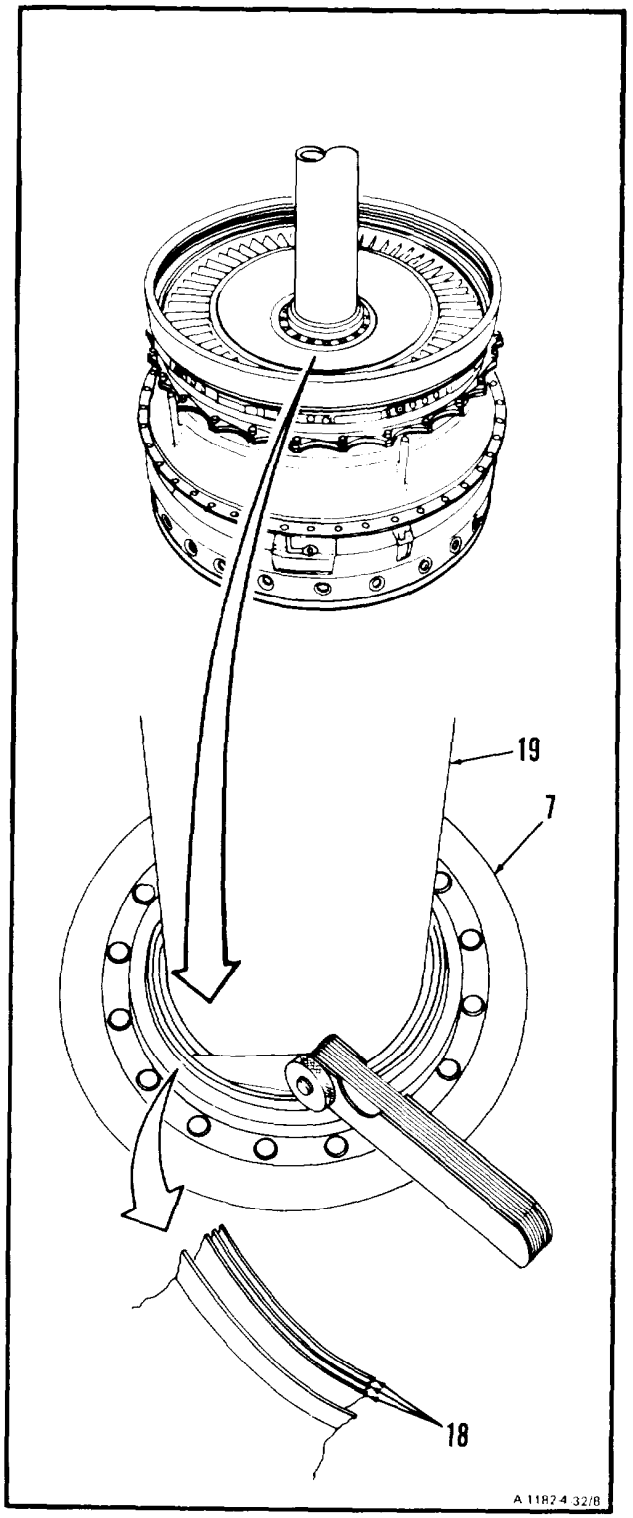
Install third turbine nozzle and support (5) and 23 bolts (13) on power turbine assembly (9). Do not install bolts (13) into five bolt holes (14) on left sides of thermocouple tubes.



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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

7. **Check radial clearance between aft three seals (18) of third turbine nozzle (7) and shaft (19).** Use thickness gage. Clearance shall not be less than 0.005 inch or more than 0.027 inch. If necessary, remove third turbine nozzle and support (5), and file seals (18) with half-round file to obtain clearance. Repeat steps 5, 6, and 7.



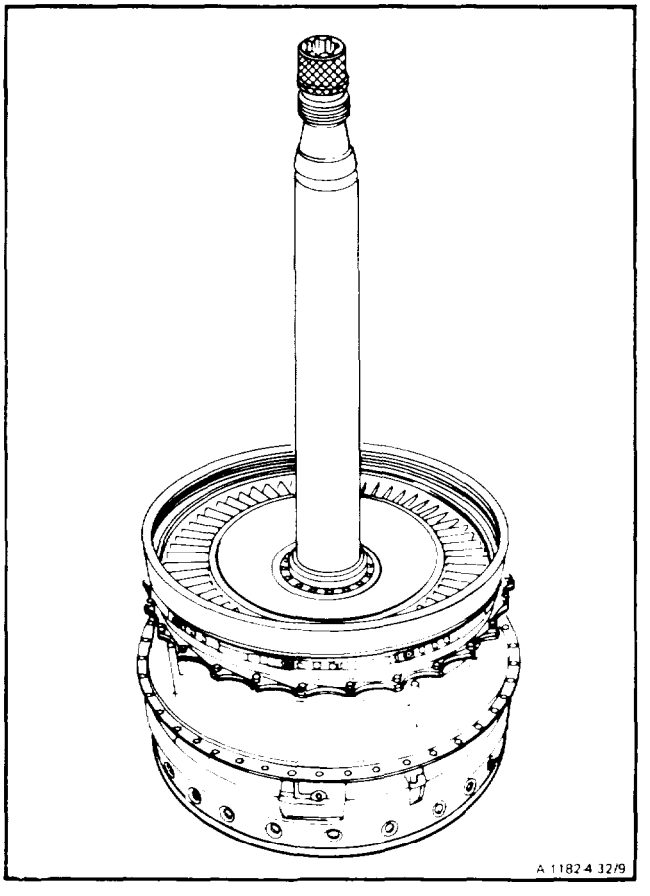
INSPECT

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4-32 INSTALL THIRD TURBINE NOZZLE AND SUPPORT (AVIM) (Continued) 4-32

FOLLOW-ON MAINTENANCE

Install Thermocouple Harness Assemblies (Task 4-25).
Assemble Combustion Section anti Power Turbine (Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) 4-33

INITIAL SETUP

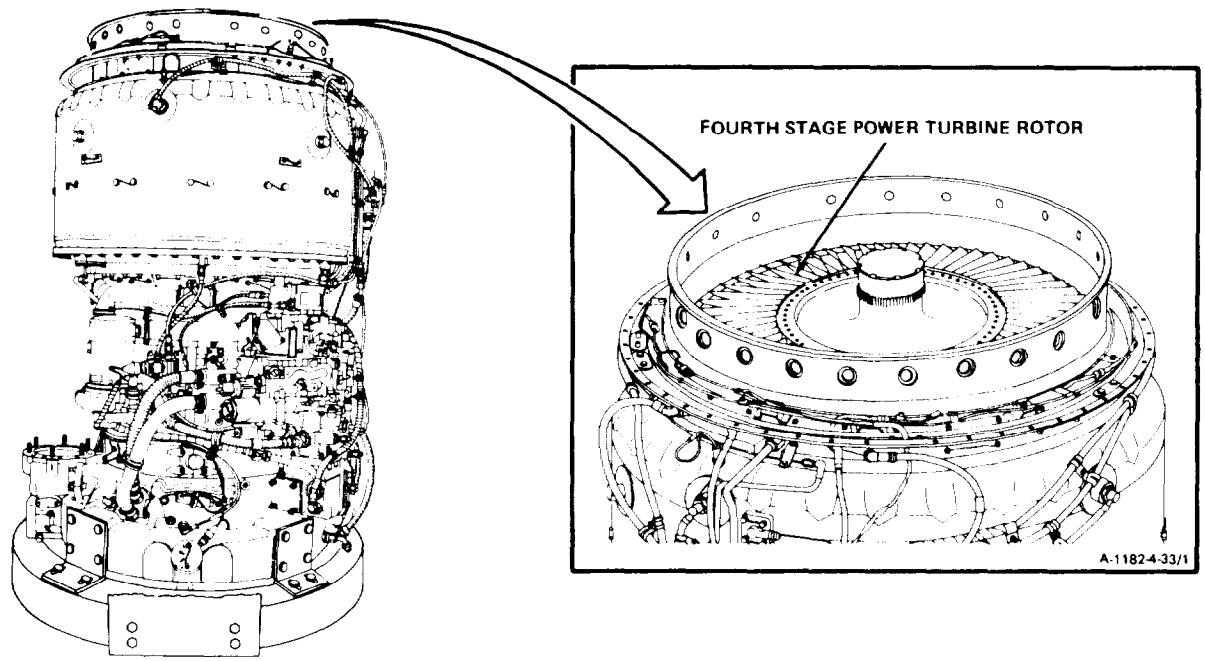
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Torque Fixture (T48)
Hydraulic Wheel Puller (T58)
Torque Multiplier (T63)

Materials:
Marking Pencil (E34)
Penetrating Oil (E39)
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

Equipment Condition:
Exit Vane Assembly Removed (Task 4-78)



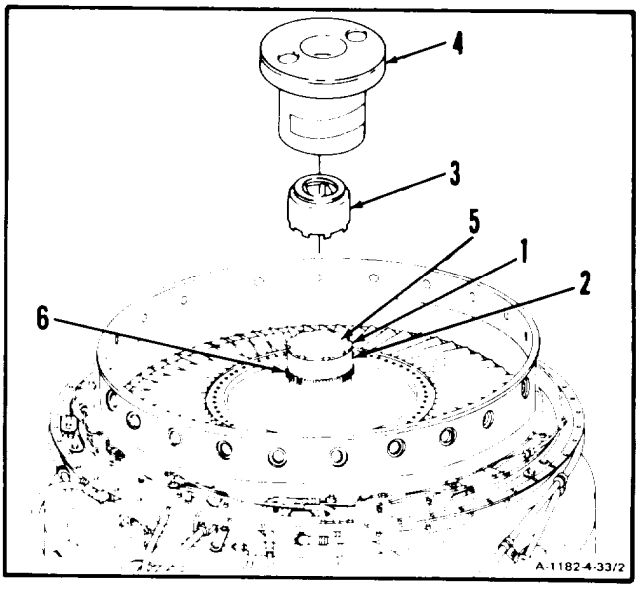
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4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-33

1. Straighten indents (1) of locking cup (2) and **install torque fixture (T48),** consisting of wrench (3) and holding fixture (4) as follows:

   a. Position wrench (3) on nut (5).

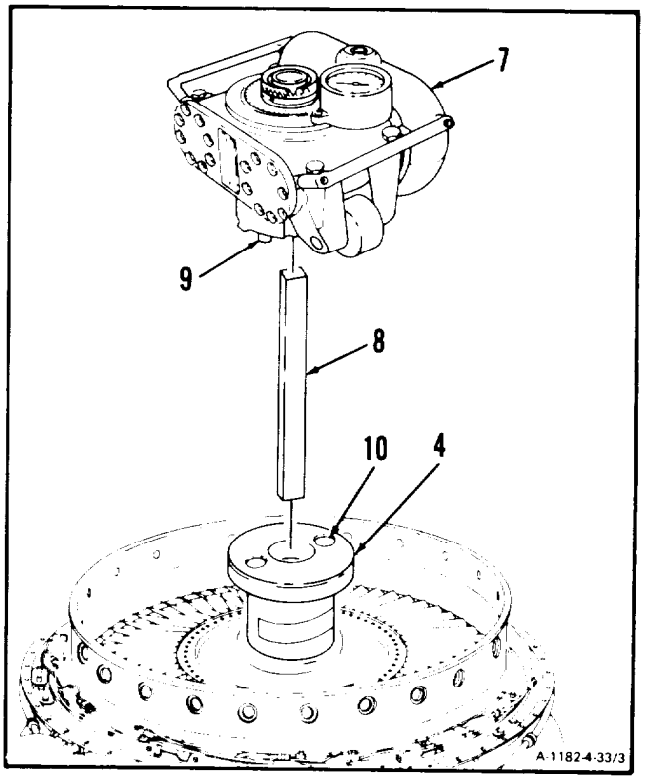
   b. Position holding fixture (4) on spline (6).



2. Using helper, **install torque multiplier (T63) (7)** as follows:

   a. Install drive bar (8) and position torque multiplier (T63) (7) over drive bar (8).

   b. Align two pins (9) with holes (10) in holding fixture (4). Place torque multiplier (T63) (7) on holding fixture (4).

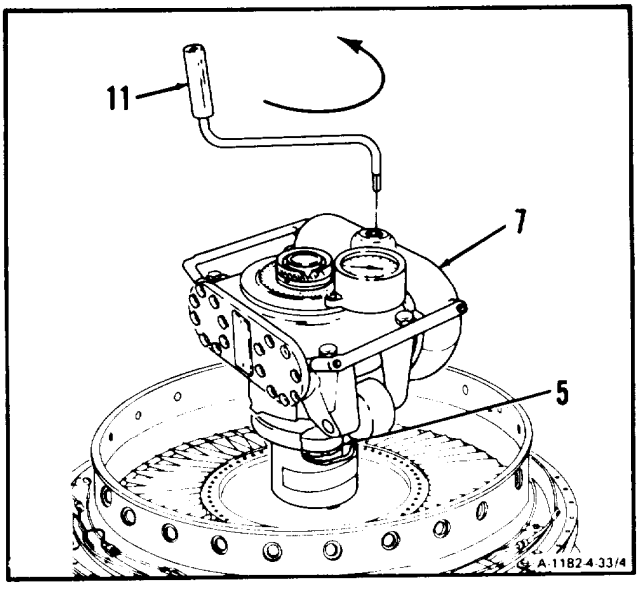


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4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-33

3. **Remove nut (5)** as follows:

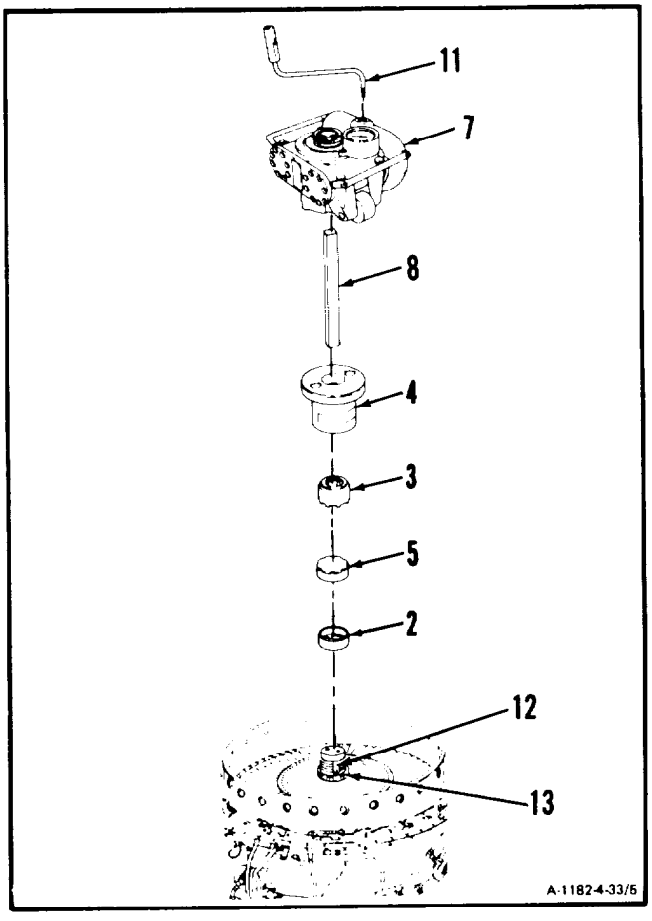
   a. Insert handle (11) in torque multiplier (T63) (7). Turn handle (11) counterclockwise until nut (5) is loose.



   b. Remove handle (11), torque multiplier (T63) (7), drive bar (8), and torque fixture (T48) consisting of wrench (3) and holding fixture (4).

   c. Remove nut (5) and locking cup (2).

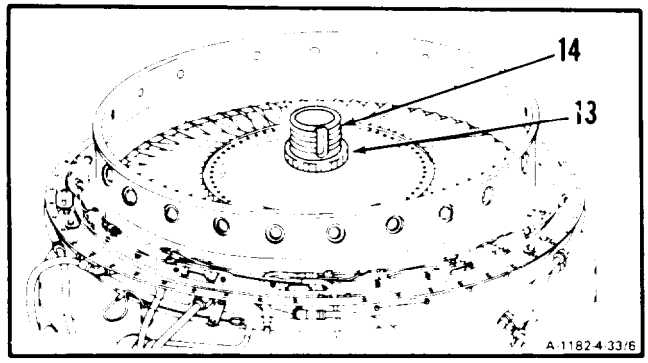
   d. Matchmark shaft groove (12) and fourth stage turbine rotor (13). Using marking pencil (E34).



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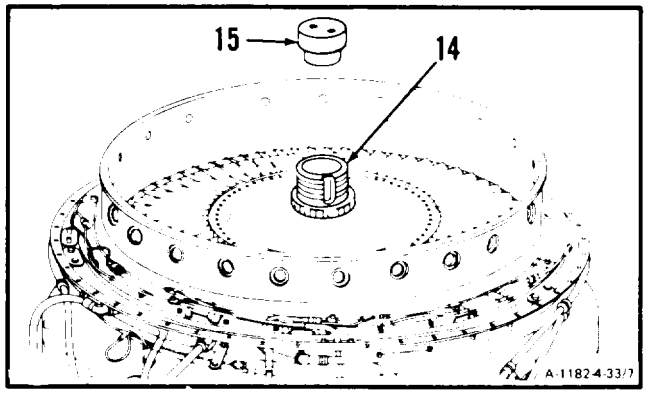
4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-33

4. **Soak shaft (14)** around rotor (13) with penetrating oil (E39).

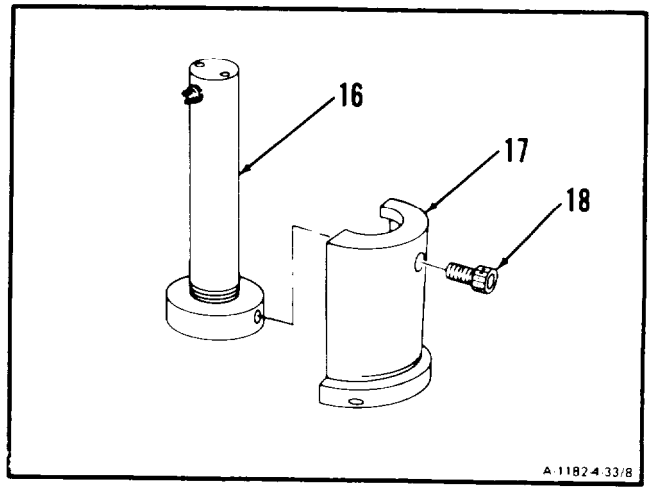


5. **Install hydraulic wheel puller (T58)** as follows:

   a. Position pilot (15) on shaft (14).



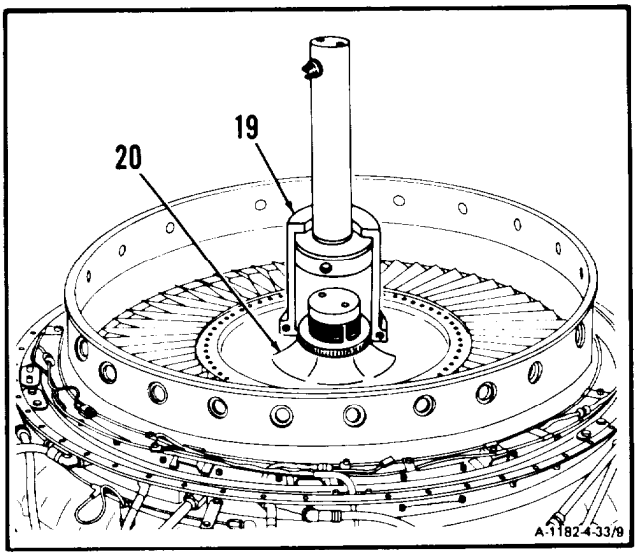
   b. Position hydraulic ram (16) in one half of body (17). Install screw (18).



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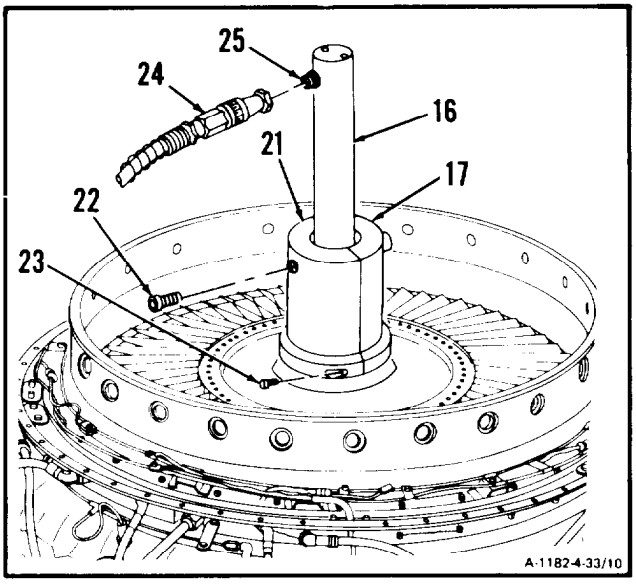
4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-33

c. Position partially assembled puller (19) on fourth stage power turbine rotor hub (20).



d. Place other half of body (21) on body half (17). Install screw (22) and two screws (23).

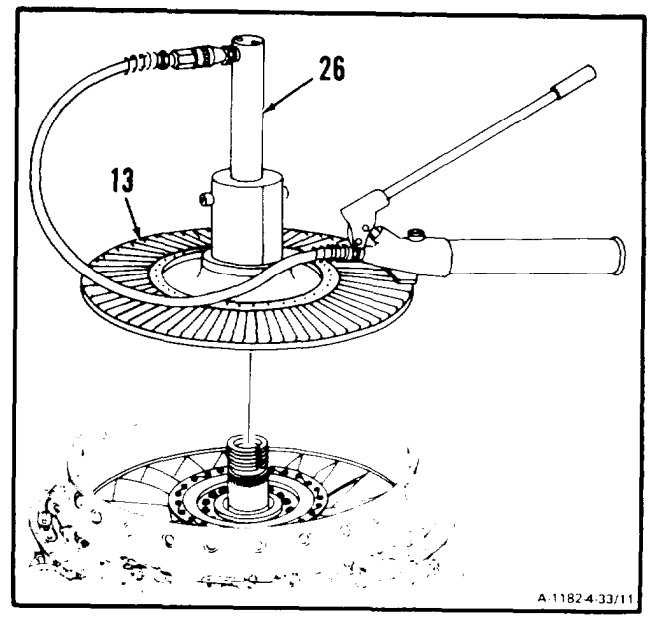
e. Connect hydraulic pump hose (24) to fitting (25) on hydraulic ram (16).



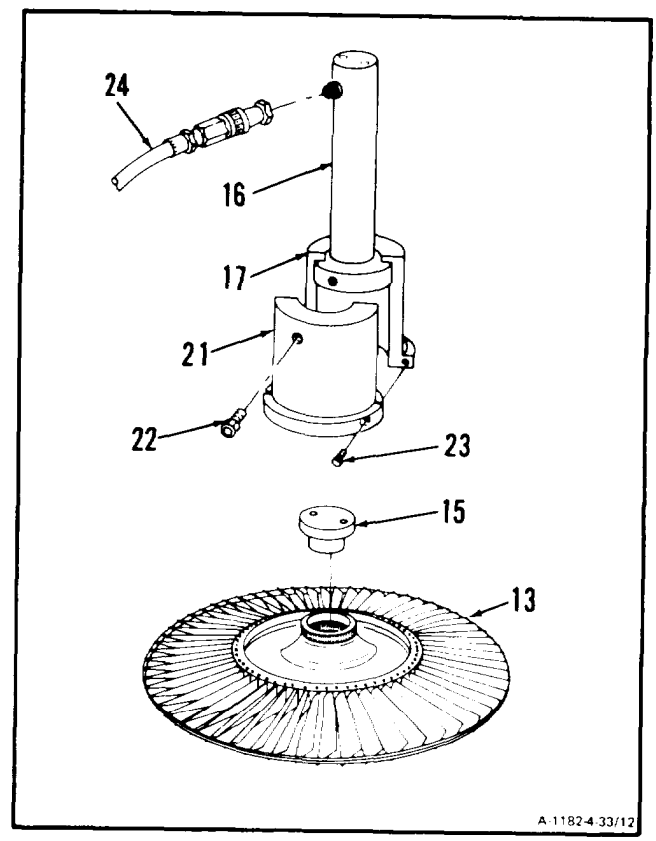
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4-33 REMOVE FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued)

6. Using helper, **remove fourth stage power turbine rotor (13).** Use hydraulic wheel puller (T58) (26).

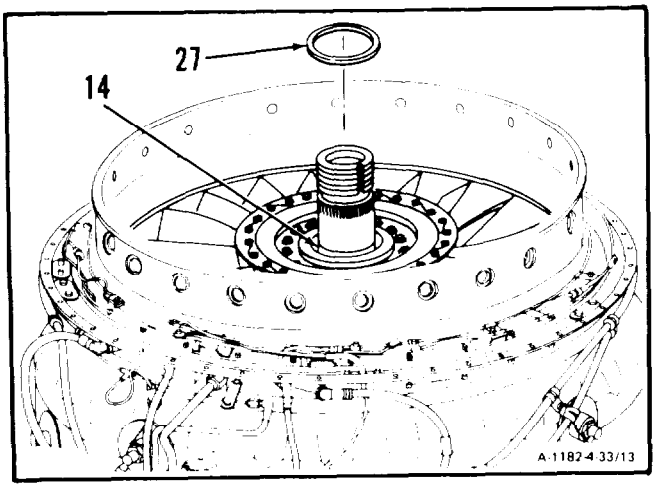


7. **Remove hydraulic wheel puller (T58)** consisting of hose (24), hydraulic ram (16), two body halves (17) and (21). screw (22) and two screws (23) and pilot (15) from fourth stage power turbine rotor (13).



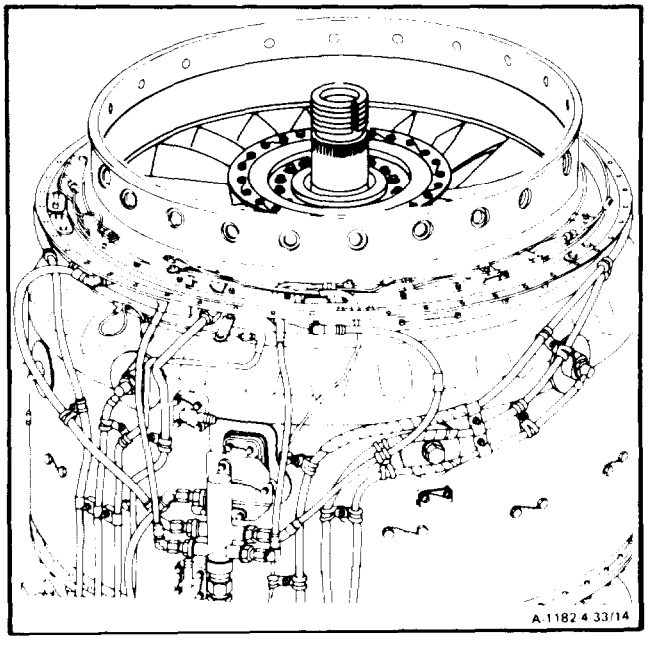
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8. **Remove spacer (27)** from shaft (14).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-34 CLEAN FOURTH STAGE POWER TURBINE ROTOR (AVIM) 4-34

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Exit Vane Assembly Removed (Task 4-78)
Fourth Stage Power Turbine Rotor Removed (Task 4-33)

General Safety Instructions:

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

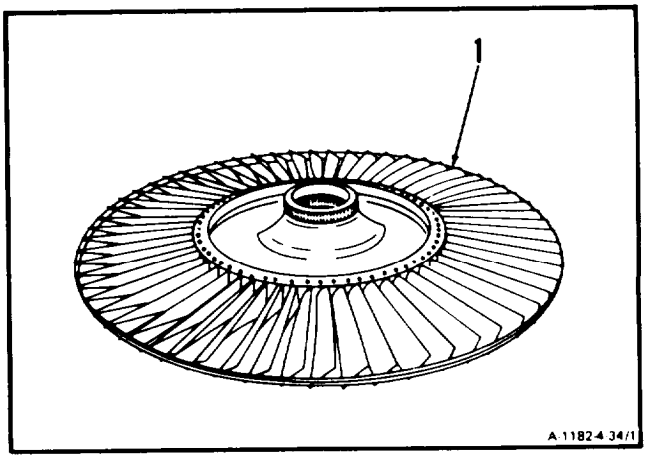
Do not remove matchmark during cleaning.

1. Wear gloves (E20). **Clean fourth stage turbine rotor (1)** with dry cleaning solvent (E17) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry fourth stage turbine rotor (1)** using clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Fourth Stage Power Turbine Rotor (Task 4-35).

END OF TASK

4-35 INSPECT FOURTH STAGE POWER TURBINE ROTOR (AVIM) 4-35

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials :
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect fourth stage power turbine rotor (1)** as follows:

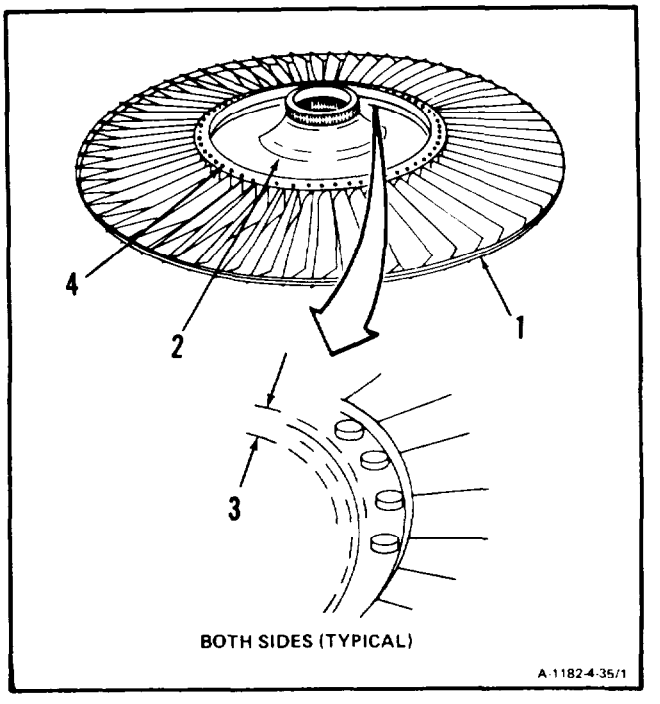
   a. **Inspect disc (2).**

      (1) There shall be no cracks.

      (2) There shall be no burns.

      (3) There shall be no nicks or rubs deeper than 0.010 inch. This limit does not apply to area (3) where material has been removed for balancing.

      (4) There shall be no loose or cracked pins (4).



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b. **Inspect 60 blades (5).** There shall be no more than 12 damaged blades.

(1) There shall be no cracks.

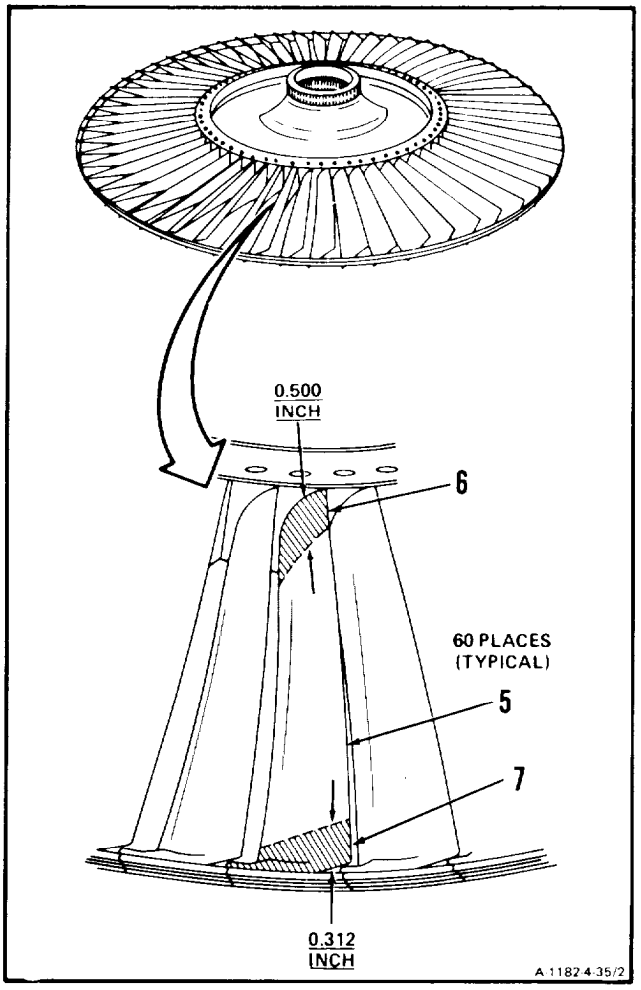
(2) There shall be no burns.

(3) There shall be no bending or distortion.

(4) There shall be no loss of material.

(5) There shall be no pitting deeper than 0.005 inch.

(6) There shall be no pitting, nicks or dents in inner critical area (6) or outer critical area (7).



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4-35 INSPECT FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-35

(7) Inspect inner half non-critical area (8) as follows:

(a) There shall be no more than four nicks (9) or dents (10) in surface (11) longer than 0.094 inch or deeper than 0.015 inch.

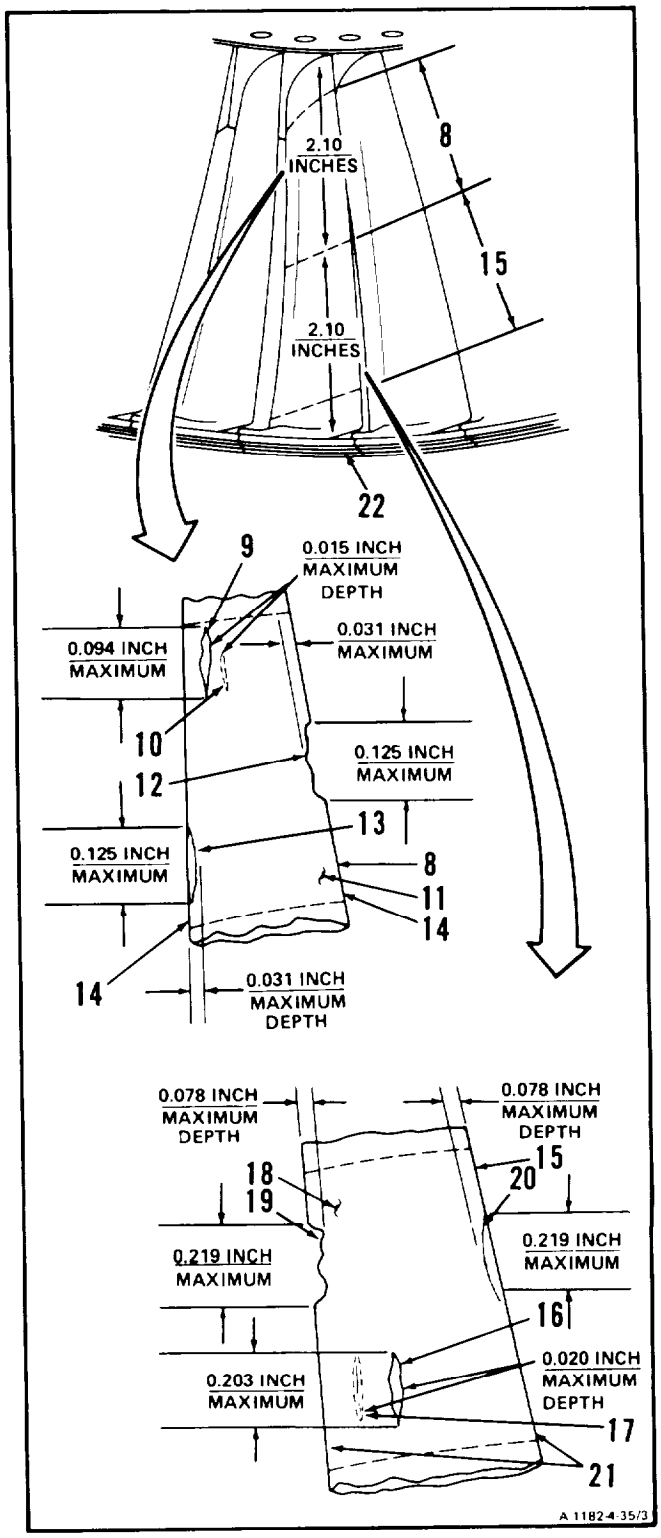
(b) There shall be no more than two nicks (12) or dents (13) on edges (14) longer than 0.125 inch or deeper than 0.031 inch.

(8) Inspect outer half non-critical area (15) as follows:

(a) There shall be no more than four nicks (16) or dents (17) in surface (18) longer than 0.203 inch or deeper than 0.020 inch.

(b) There shall be no more than two nicks (19) or dents (20) on edges (21) longer than 0.219 inch or deeper than 0.078 inch.

(9) There shall be no nicks deeper than 0.015 inch at tip labyrinth (22).



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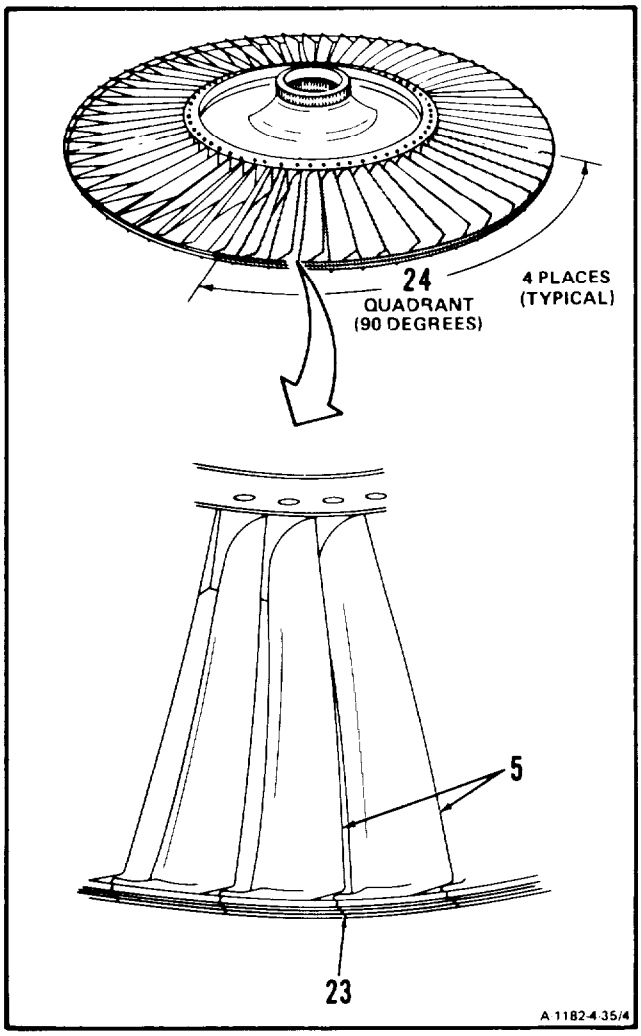
4-35 INSPECT FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-35

c. **Measure gap (23)** between blades (5). Use thickness gage.

(1) Total gap between all blades shall be no greater than 0.120 inch.

(2) Total gap between all blades in any 90 degree quadrant (24) shall be no greater than 0.030 inch.

(3) There shall be no gap greater than 0.012 inch. There shall be no more than one 0.012 inch gap in any quadrant.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) 4-36

INITIAL SETUP

Applicable Configurations:
All

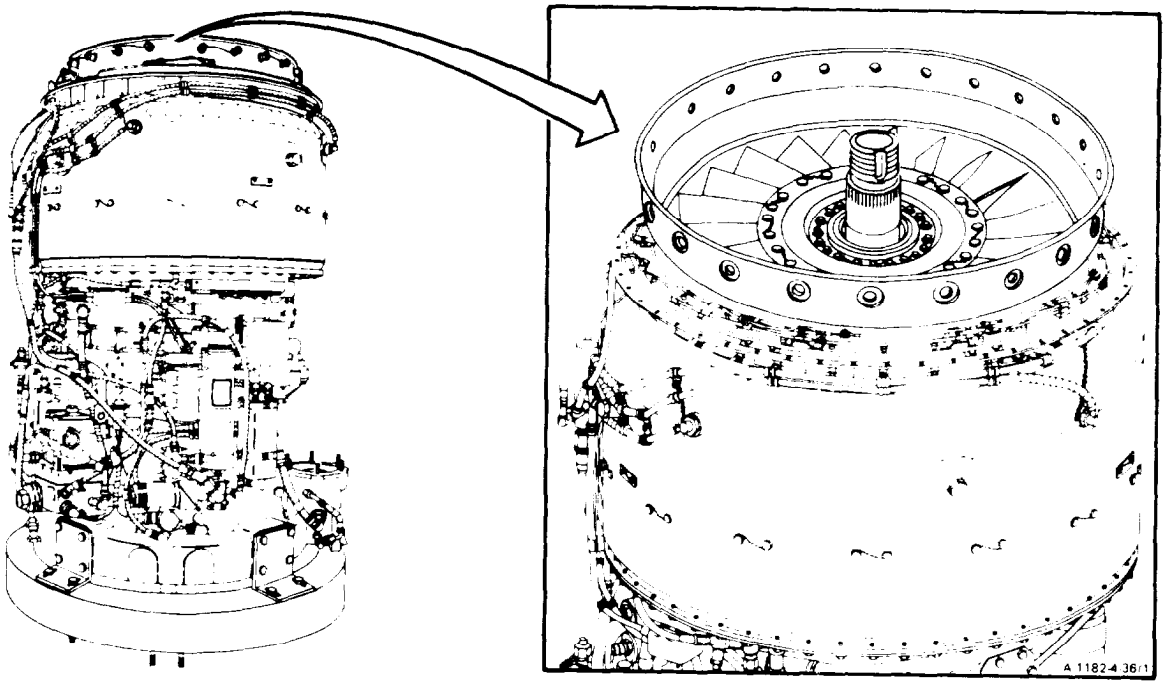
Tools:
Powerplant Mechanic's Tool Kit
NSN 5180-00-323-4944
Technical Inspection Tool Kit
NSN 5180-00-323-5114
Locating Bar (T1)
Torque Fixture (T48)
Induction Heater (T50)
Bearing Installing Tool (T51)
Control Unit (T55)
Holding Fixture (T63)
Torque Multiplier (T63)
Bent Wire Gage, 0.104 Inch (Appendix E)
Bent Wire Gage, 0.115 Inch (Appendix E)
Bent Wire Gage, 0.228 Inch (Appendix E)
Bent Wire Gage, 0.290 Inch (Appendix E)
Dial Indicator and Base
Asbestos Gloves
Outside Micrometer Caliper Set
Micrometer Depth Gage

Materials:
Nickel Ease (E37)
Ease Off 990 (E5)

Parts:
Locking Cup

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P
Task 3-6
Task 3-7
Task 4-33

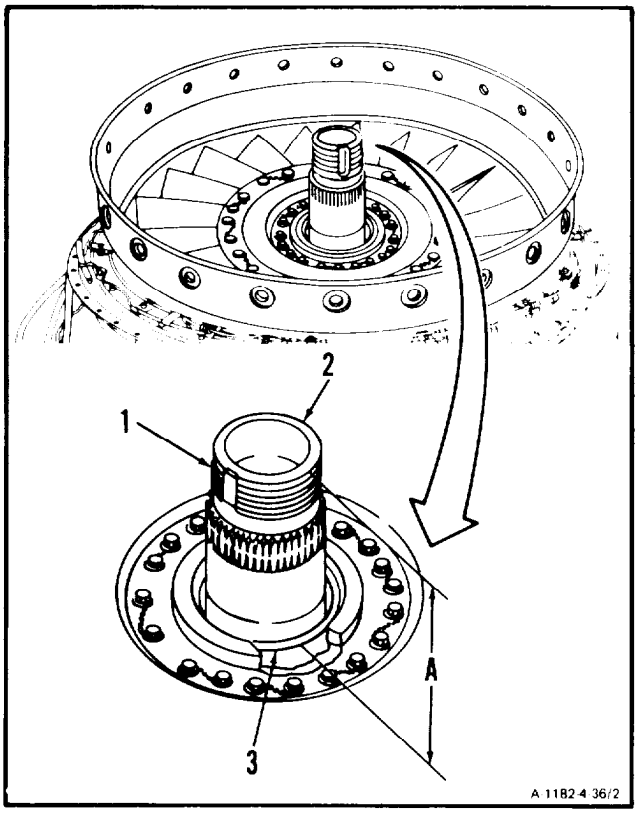


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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

1. **Determine how much of shaft (1) should protrude from fourth stage power turbine rotor** after fourth turbine rotor is installed.

   a. **Measure from end (2) of shaft (1) to aft face of faceplate (3).** Record as Dimension A.



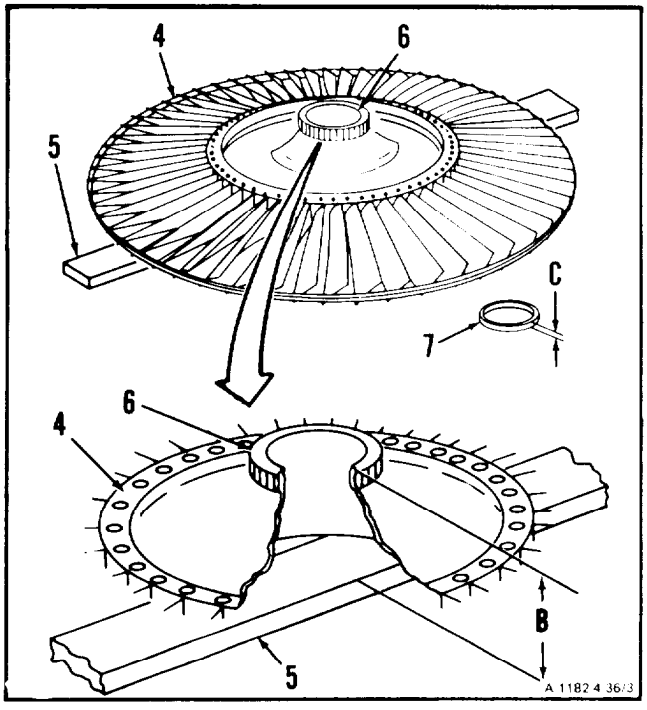
   b. Place fourth stage power turbine rotor (4) with hub on locating bar (T1) (5). **Measure from aft face of hub (6) to locating bar (T1) (5).** Record as Dimension B.

   c. If ring spacer (7) was not removed, subtract Dimension B from Dimension A. The answer is how much of shaft should protrude from fourth stage power turbine rotor. Record for later use.

NOTE

If ring spacer was not removed, go to step 3.

   d. **If ring spacer (7) was removed** (Ref. Task 4-33), **measure thickness of it.** Record as Dimension C.



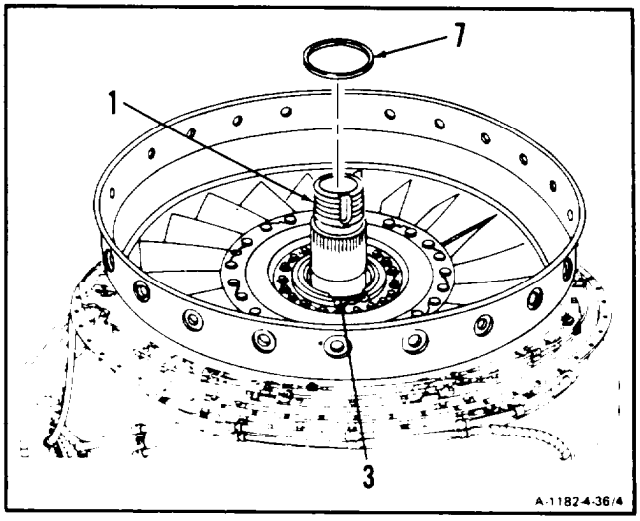
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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

e. **Add Dimension C to Dimension B.** Record answer as Dimension D.

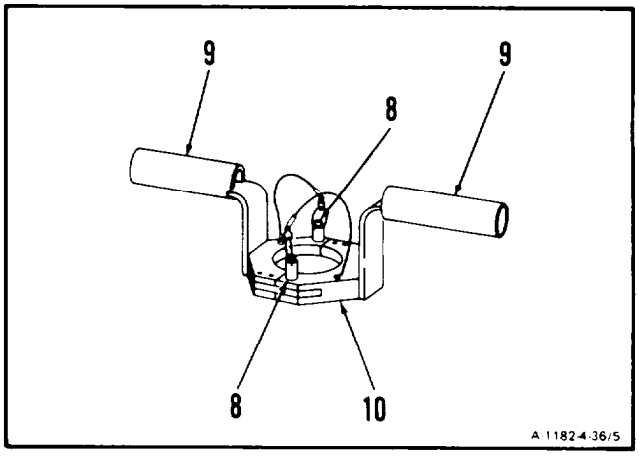
f. **Subtract Dimension D from Dimension A.** The answer is how much of shaft should protrude from fourth stage power turbine rotor. Record answer for later use.

2. If removed, install ring spacer (7) on shaft (1) and against faceplate (3).



3. **Install holding fixture (T56) (10)** on fourth stage power turbine rotor as follows:

a. Remove two pins (8) and **separate halves (9) of holding fixture (T56) (10).**



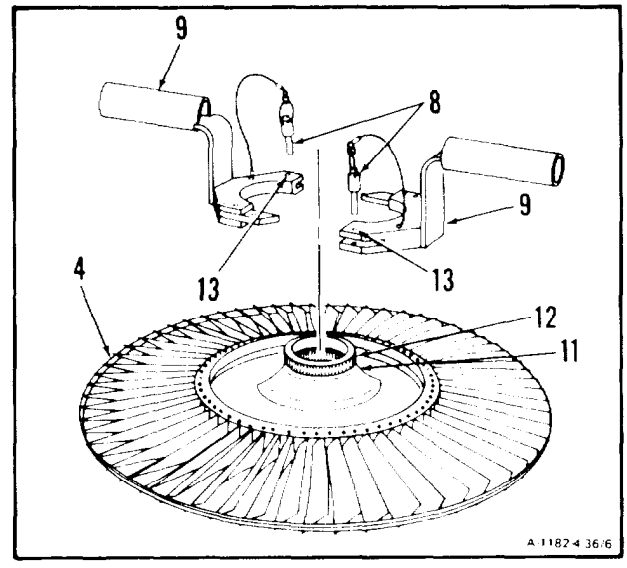
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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

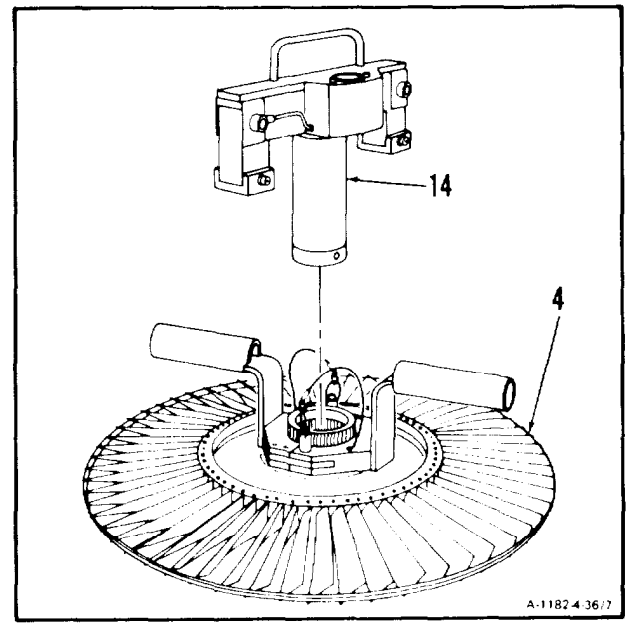
b. **Install** halves (9) of **holding fixture (T56) (10) on** hub (11) of **fourth stage power turbine rotor (4)** just under splines (12).

c. Install two pins (8) in holes (13).

d. Coat splines of third stage power turbine rotor shaft with Ease Off 990 (E5) before installing fourth stage power turbine rotor.



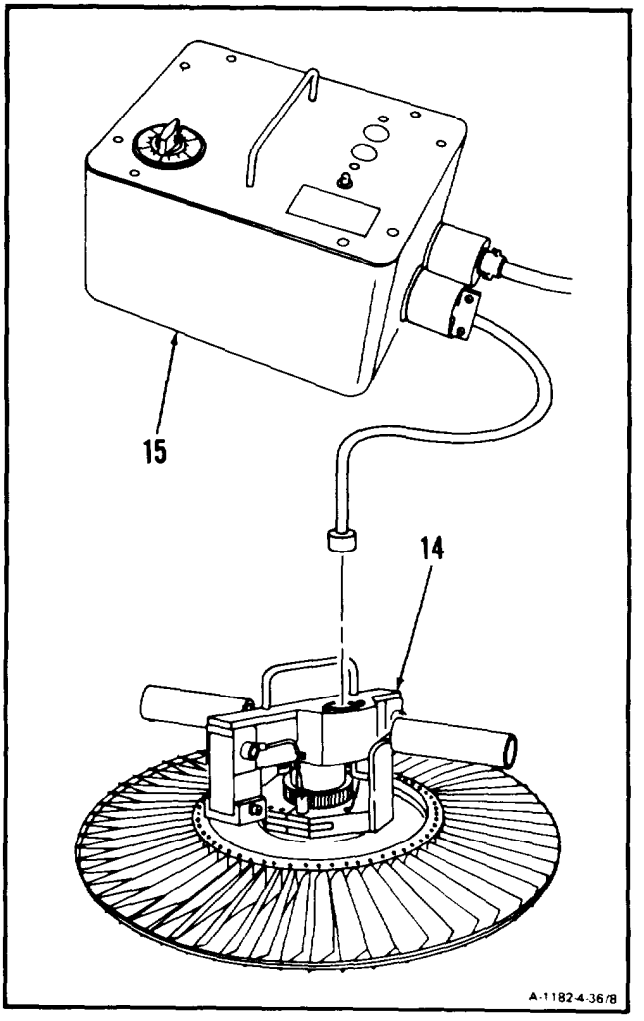
4. **Install induction heater (T50) (14)** on fourth stage power turbine rotor (4).



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

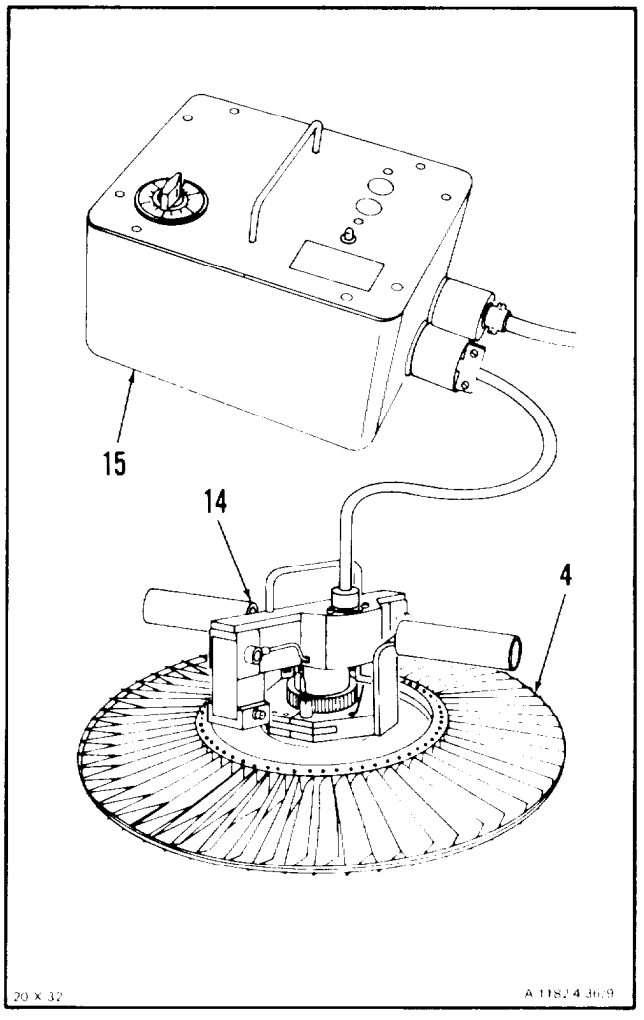
5. **Connect control unit (T55) (15)** to induction heater (T50) (14).



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4-26 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-26

6. Using induction heater (T50) (14) and control unit (T55 (15), **heat fourth stage power turbine rotor (4) for no more than ten minutes maximum.**



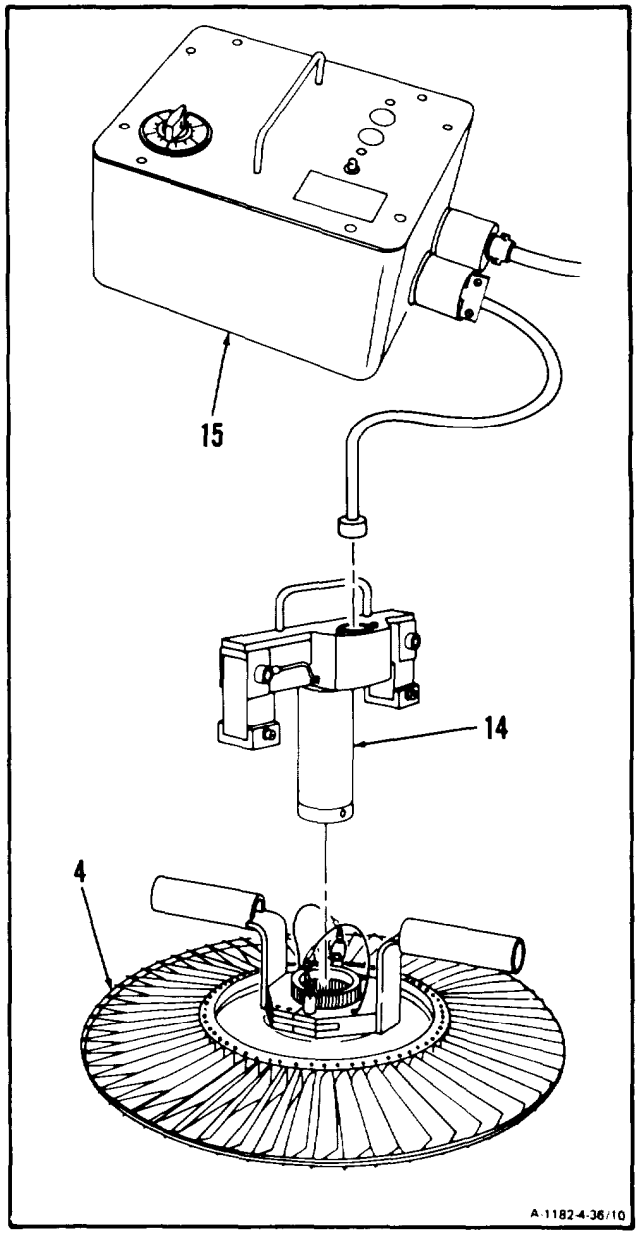
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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued)

WARNING

Wear asbestos gloves when handling heated fourth stage turbine rotor. Failure to comply may cause burns. Get medical attention for burns.

7. Disconnect control unit (T55) (15), and **remove induction heater (T56) (14)** from fourth stage power turbine rotor (4).

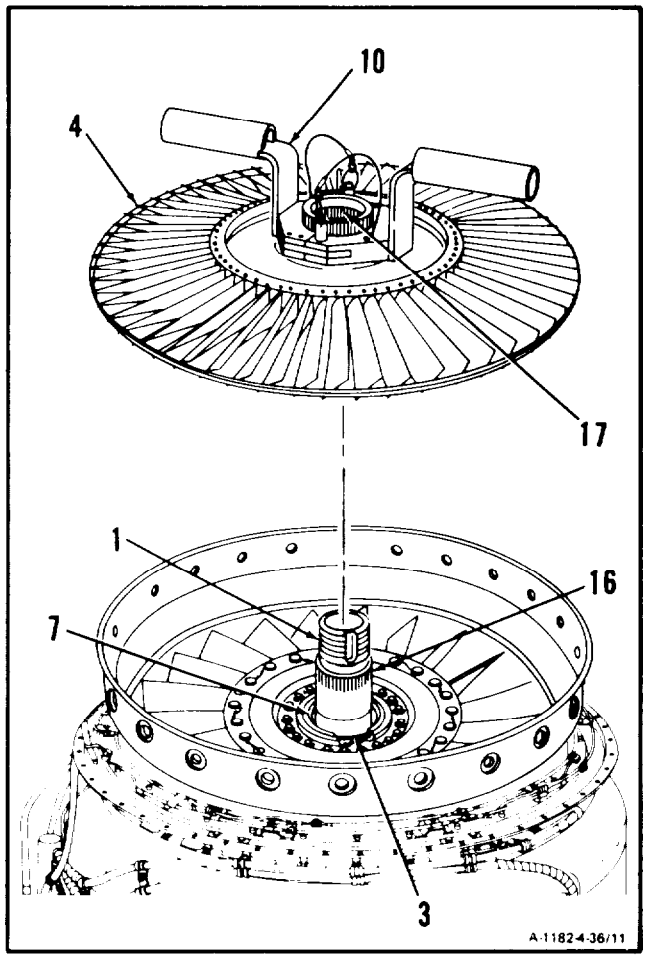


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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

8. **Align matchmarks on fourth stage power turbine** rotor (4) with matchmarks on shaft (1).

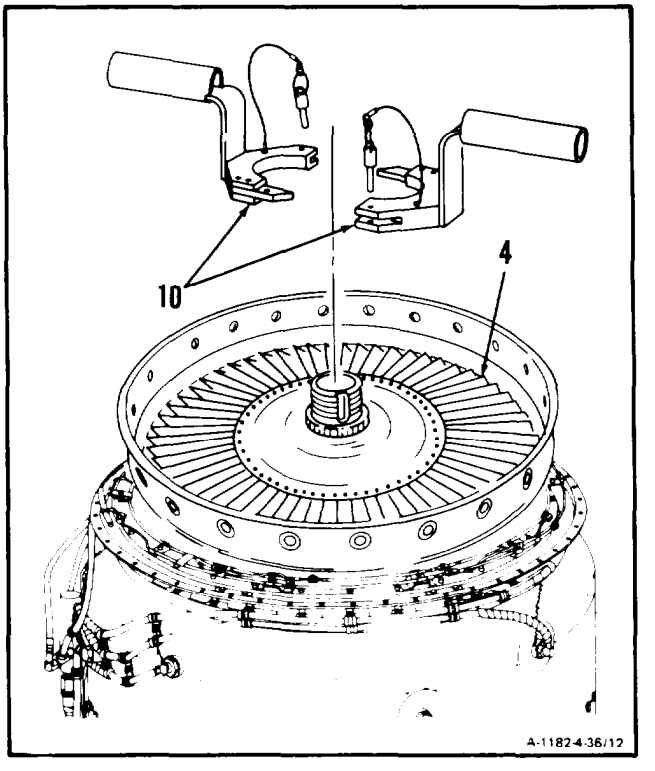
9. Use holding fixture (T56) (10). Align splines (16 and 17). **Install fourth stage power turbine rotor (4)** on shaft (1) until bottomed out against faceplate (3) or, if installed ring spacer (7).



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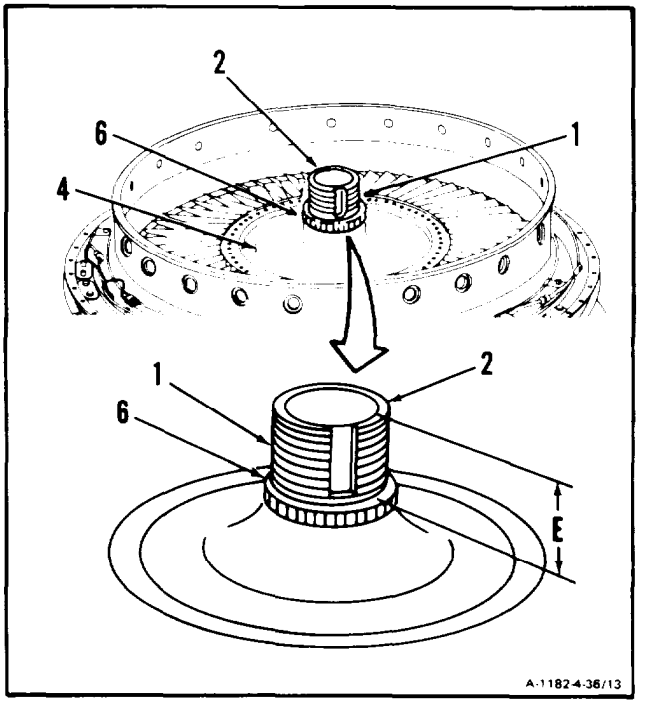
4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

10. Remove holding fixture (T56) (10), and **allow fourth stage power turbine rotor (4) to cool** to room temperature.



11. **Measure length of shaft (1) protruding out through fourth stage power turbine rotor (4).** Measure from end (2) of shaft (1) to aft face hub (6) of fourth stage power turbine rotor (4). Record as Dimension E.

12. **Compare Dimension E with dimension recorded in step l.c. or l.d.** Dimensions shall be no more than 0.005 inch apart.



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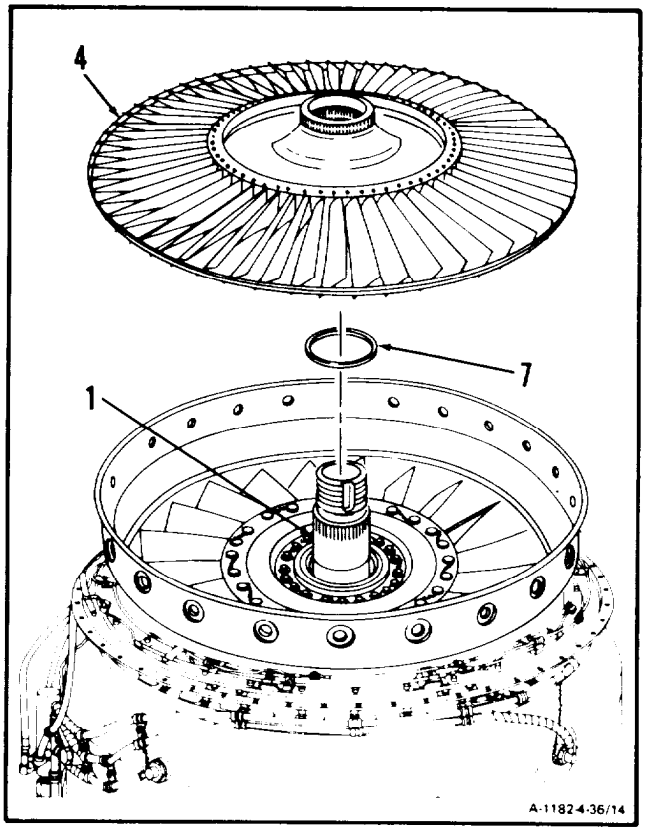
4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

NOTE

If calculated length and measured length are not within limits, do steps 13. thru 16. If calculated length and measured length are within limits, omit steps 13. thru 16.

13. **Remove fourth stage power turbine rotor (4)** (Ref. Task 4-33, steps 4 thru 8).

14. **Inspect shaft (1), fourth stage power turbine rotor (4) and, if installed ring spacer (7).** Check for contaminants or damage that caused rotor (4) to hang up. If hang up exists remove contaminants or replace power turbine assembly (Ref. Tasks 3-6 and 3-7).



GO TO NEXT PAGE

4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

15. Using bearing installing tool (T51) (18) reseat shaft (1) and No. 4 and 5 bearing package (19).

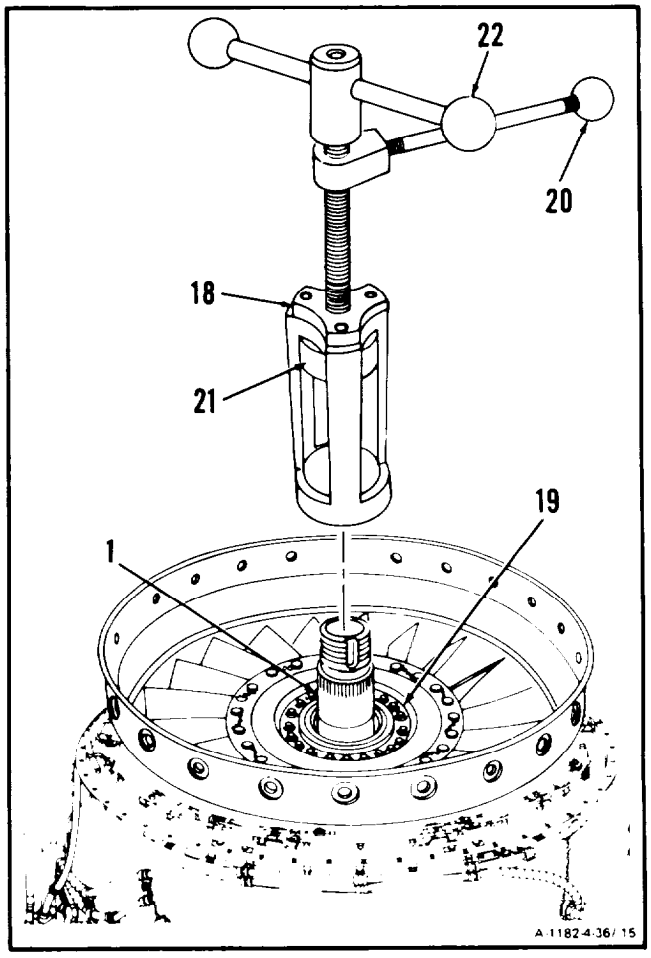
    a. Turn handle (20) counterclockwise all the way. Install nut (21) on shaft (1). Tighten nut (21) on shaft (1) turning T-handle (22) clockwise.

    b. Turn handle (20) clockwise to seat No. 4 and 5 bearing package (19) fully into position on third turbine rotor shoulder. Remove bearing installing tool (T51) (18).

NOTE

Be sure ring spacer does not stick to installing tool.

16. **Install fourth stage power turbine rotor (4)** (Ref. steps 1. through 12).



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

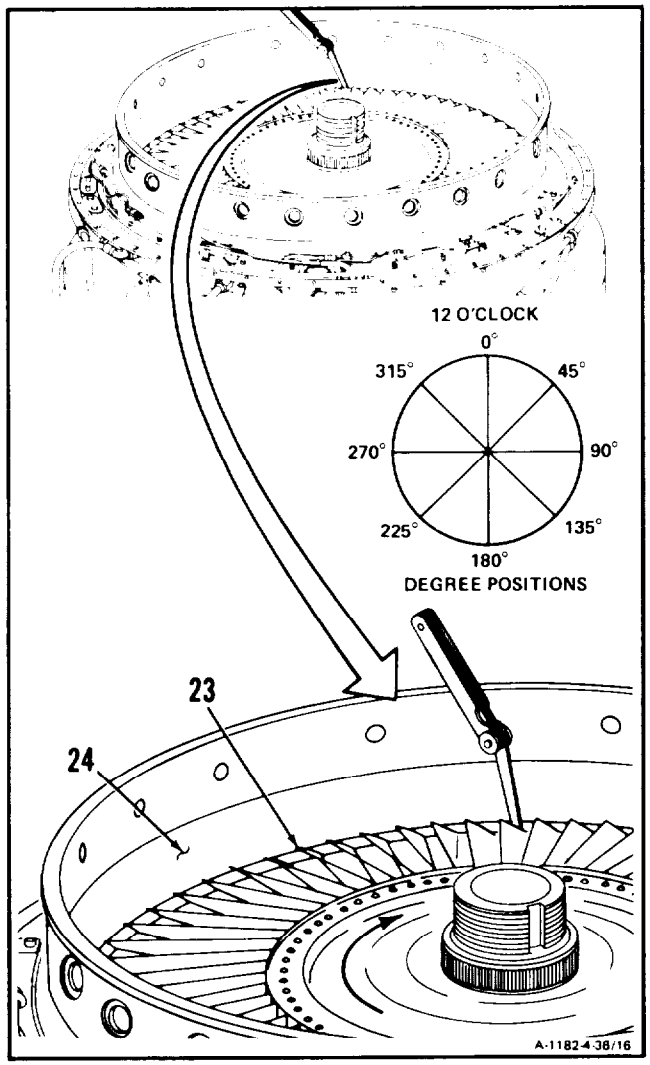
17. **Measure** clearance between blade tips (23) and fourth stage power turbine nozzle (24) **(tip clearance)** at 0, 45, 90, 135, 180, 225, 270 and 315 degree positions as follows:

    a. Insert thickness gage between fourth stage power turbine nozzle (24) and blade (23) tip. Rotate fourth stage turbine rotor (4) clockwise one revolution for each check.

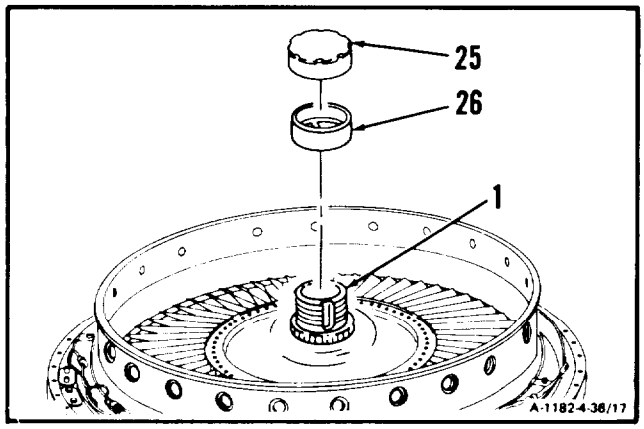
    b. Tip clearance shall be 0.020 inch minimum.

    NOTE

    If tip clearance is not within limits, replace power turbine assembly (Ref. Tasks 3-6 and 3-7).



18. Coat threads of nut (25) with nickel ease (E37). **Install** serviceable locking cup (26) and **nut (25)** on shaft (1).



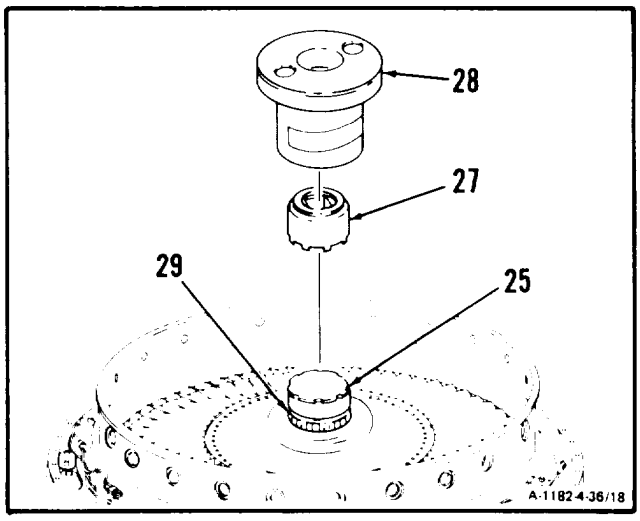
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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

19. **Install torque fixture (T48),** consisting of wrench (27) and holding fixture (28) as follows:

    a. Position wrench (27) on nut (25).

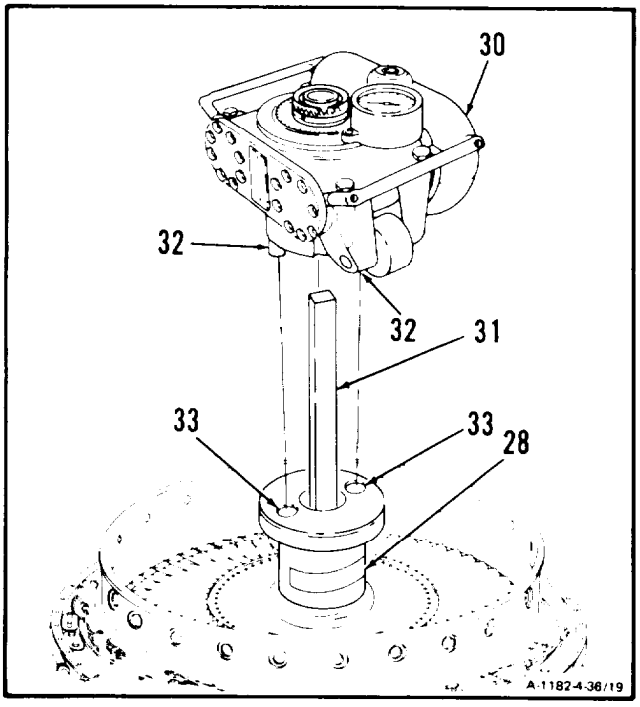
    b. Position holding fixture (28) on spline (29).



20. Using helper, **install torque multiplier (T63) (30)** as follows:

    a. Install drive bar (31) and position torque multiplier (T63) (30) over drive bar (31).

    b. Align two pins (32) with holes (33) in holding fixture (28). Place torque multiplier (T63) (30) on holding fixture (28).



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

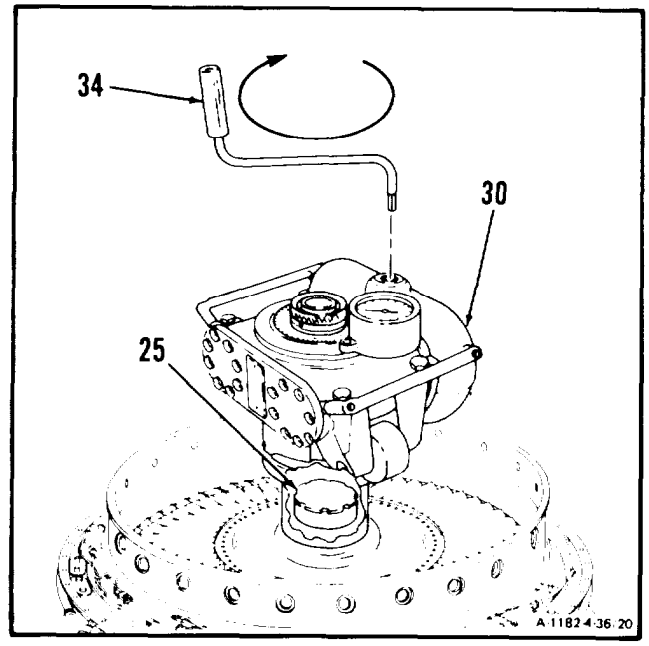
WARNING

Make sure handle is fully seated and ratchet selector on torque pack is properly set before applying torque. Rotating ratchet selector with load on torque pack can damage unit and injure personnel. If injury occurs, get medical attention.

WARNING

Do not change ratchet selector when torque load is on torque pack. Damage to equipment or injury to personnel can result. If injury occurs, get medical attention.

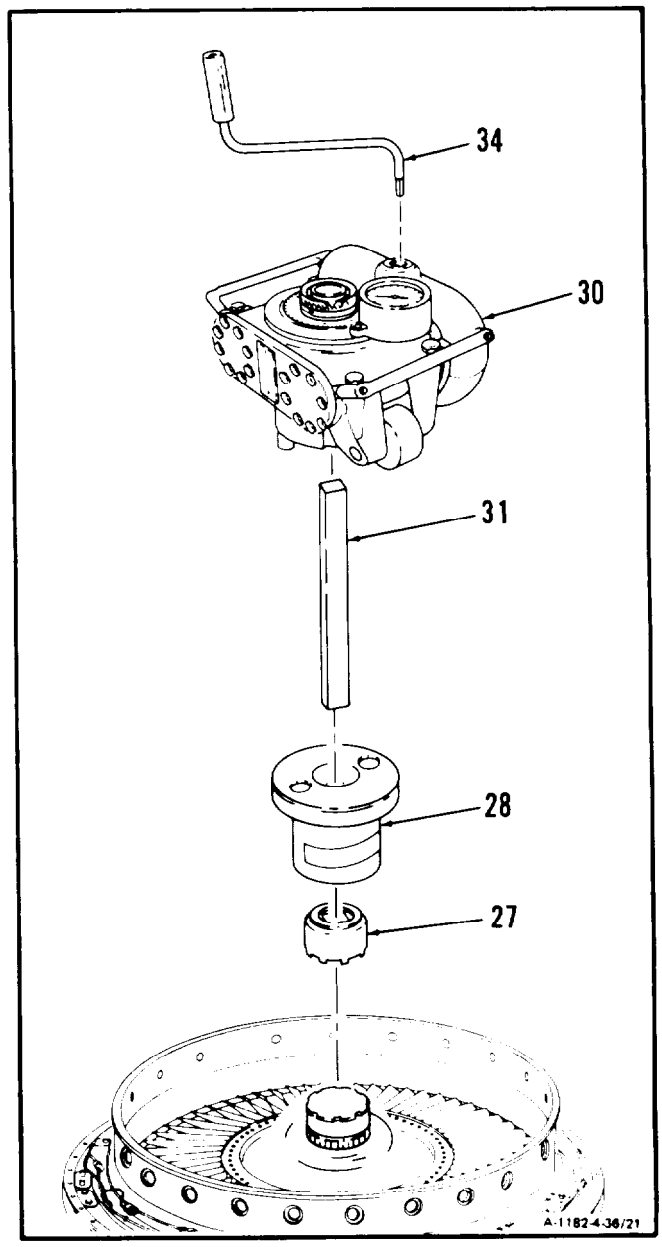
21. **Install handle (34)** in torque multiplier (T63) (30). Turn handle clockwise to torque nut (25) **Torque nut (25) to 475 foot-pounds.**



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued)

22. Remove handle (34), torque multiplier (T63) (30), drive bar (31), and torque fixture (T48), consisting of wrench (27) and holding fixture (28).

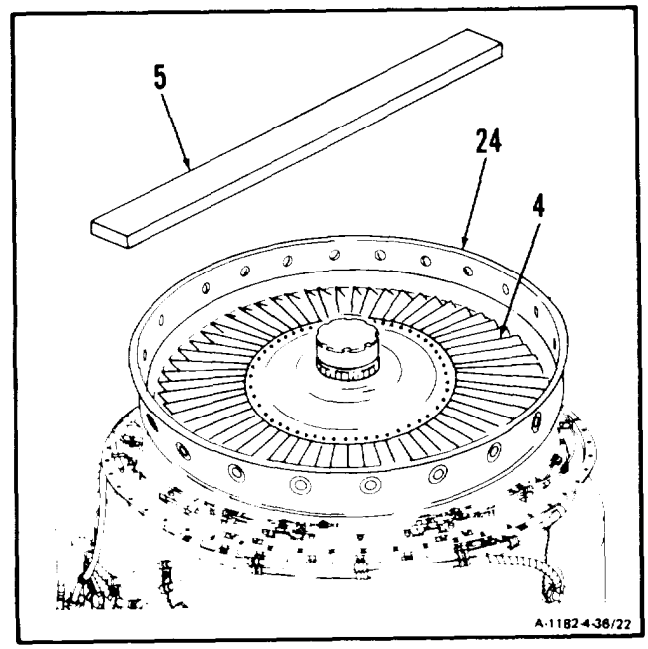


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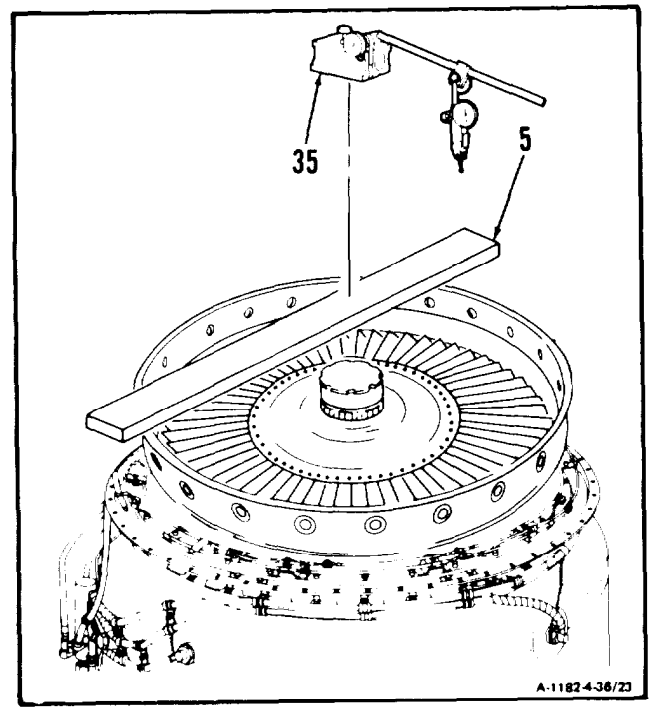
4-36 INSTALL FOUTH STAGE POWER TURBINE ROTOR (AVIM) (Continued)

23. **Check runout of fourth stage power turbine rotor (4).**

a. Place locating bar (T1) (5) on aft surface of fourth stage power turbine nozzle (24).



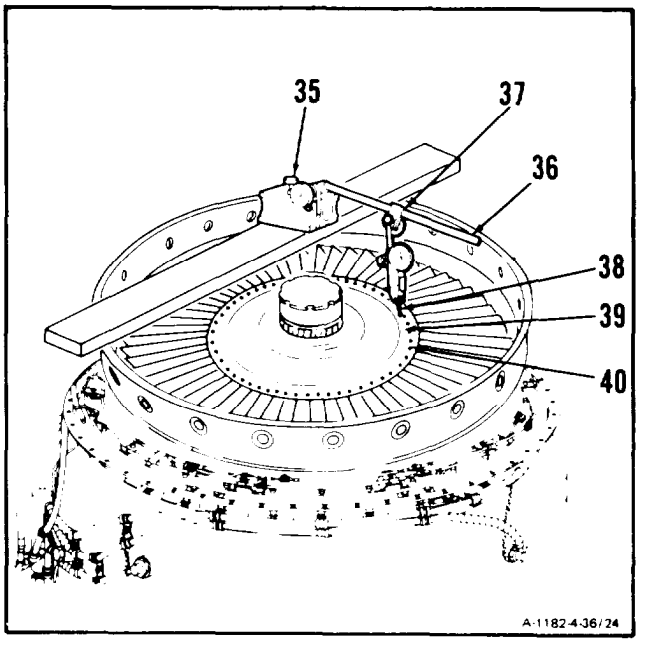
b. Place dial indicator magnetic base (35) on locating bar (T1) (5).



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

c. Adjust arm (36) on base (35) and clamp (37). Position pointer (38) on surface (39) just inside of blade retaining pins (40).



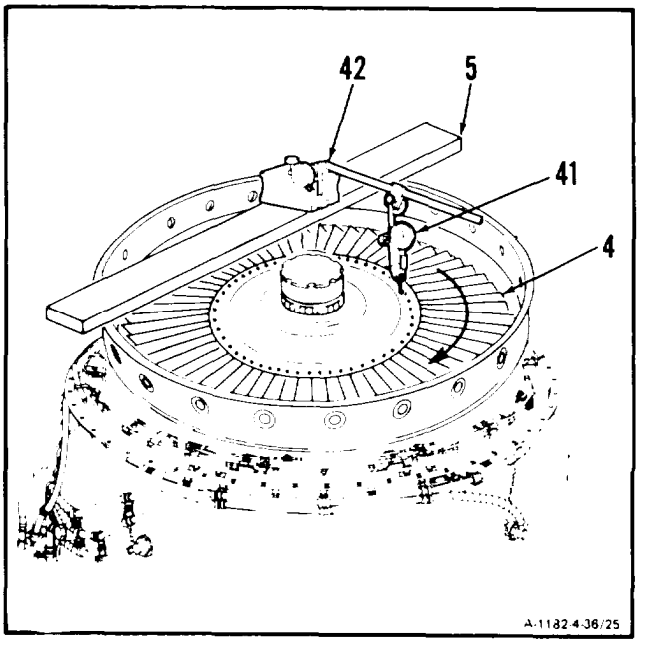
d. Zero indicator (41). Rotate fourth stage power turbine rotor (4) clockwise while noting indicator reading.

e. Total indication of runout shall be no more than 0.003 inch.

NOTE

If runout is not within limits, do steps 13 thru 23. If runout is still not within limits, replace power turbine assembly (Ref. Tasks 3-6 and 3-7).

f. Remove dial indicator assembly (42) and locating bar (5).



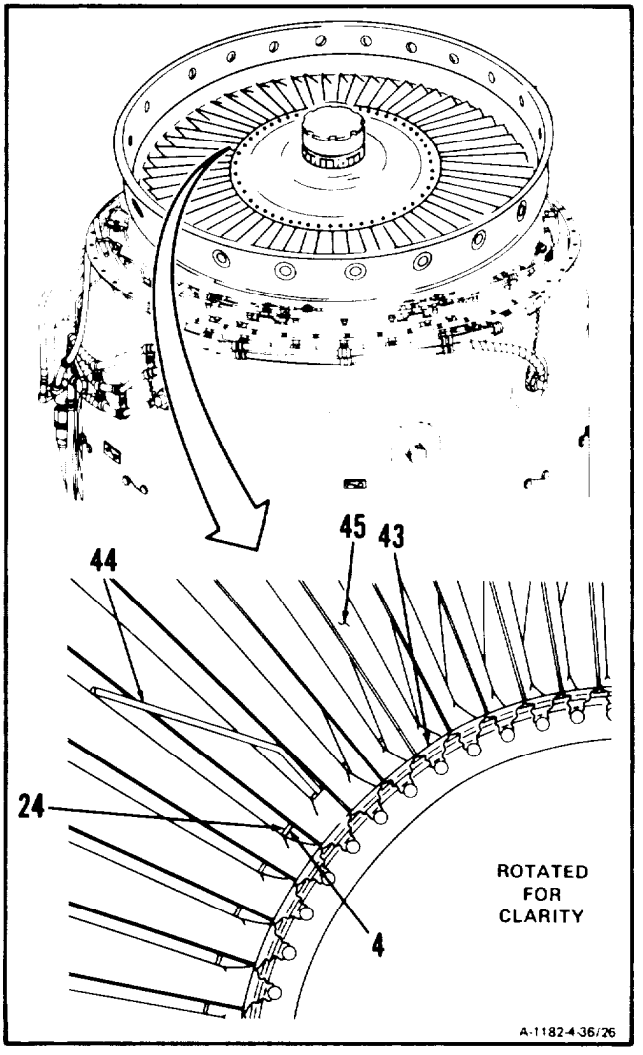
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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

24. **Check axial clearance between fourth stage power turbine rotor (4) and fourth stage power turbine nozzle (24) at blade roots (43).** Use 0.104 inch and 0.228 inch bent wire gage (Appendix E) (44) inserted between fourth stage power turbine rotor blades (45). Axial clearance shall not be less than 0.104 inch or more than 0.228 inch.

NOTE

If axial clearance is not within limits, do steps 13 through 24. Ring spacer may be installed or removed as necessary. Recheck clearance. If clearance still is not within limits, replace power turbine assembly (Ref. Task 3-6 and 3-7).

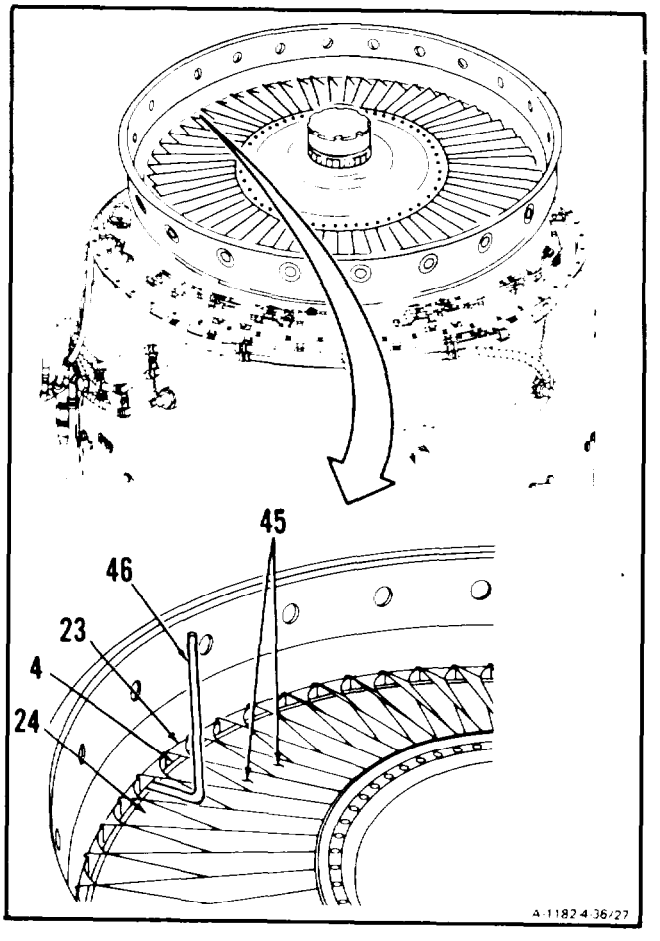


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25. **Check axial clearance between fourth stage power turbine rotor (4) and fourth stage power turbine nozzle (24) at blade tips (23).** Use 0.115 inch and 0.290 inch bent wire gage (Appendix E) (46) inserted between fourth stage power turbine rotor blades (45). Axial clearance shall not be less than 0.115 inch or more than 0.290 inch.

NOTE

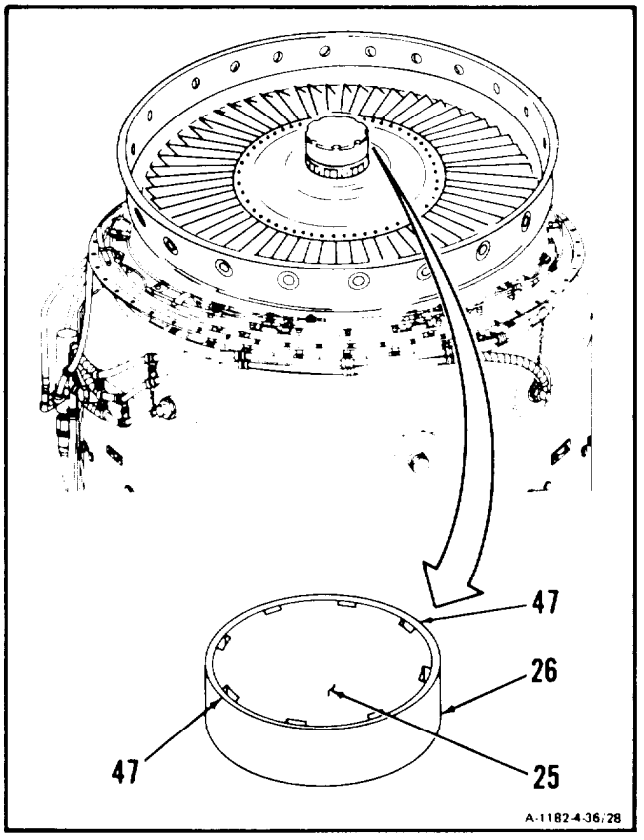
If axial clearance is not within limits, do steps 13 through 25. Ring spacer may be installed or removed as necessary. Recheck clearance. If clearance still is not within limits, replace power turbine assembly (Ref. Task 3-6 and 3-7).



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4-36 INSTALL FOURTH STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-36

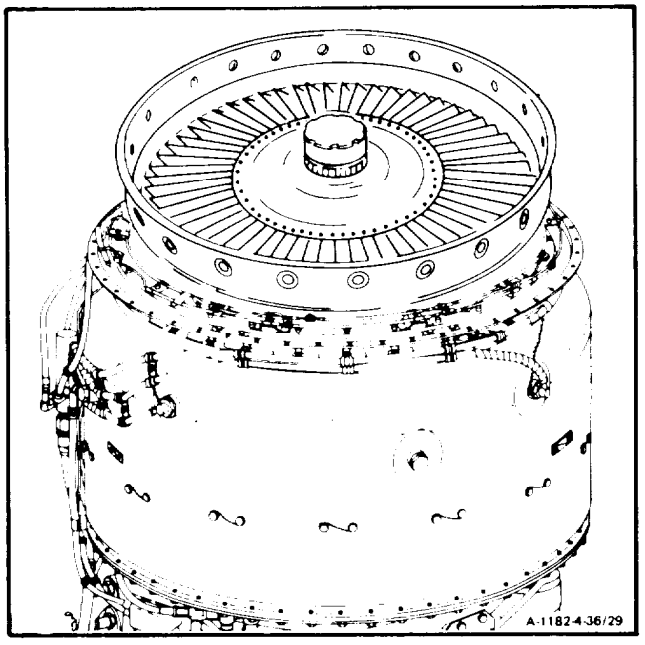
26. **Bend locking cup (26)** into nut (25) in two places (47), 180 degrees apart.



INSPECT

FOLLOW-ON MAINTENANCE

Install Exit Vane Assembly (Task 4-82).



END OF TASK

4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) 4-37

INITIAL SETUP

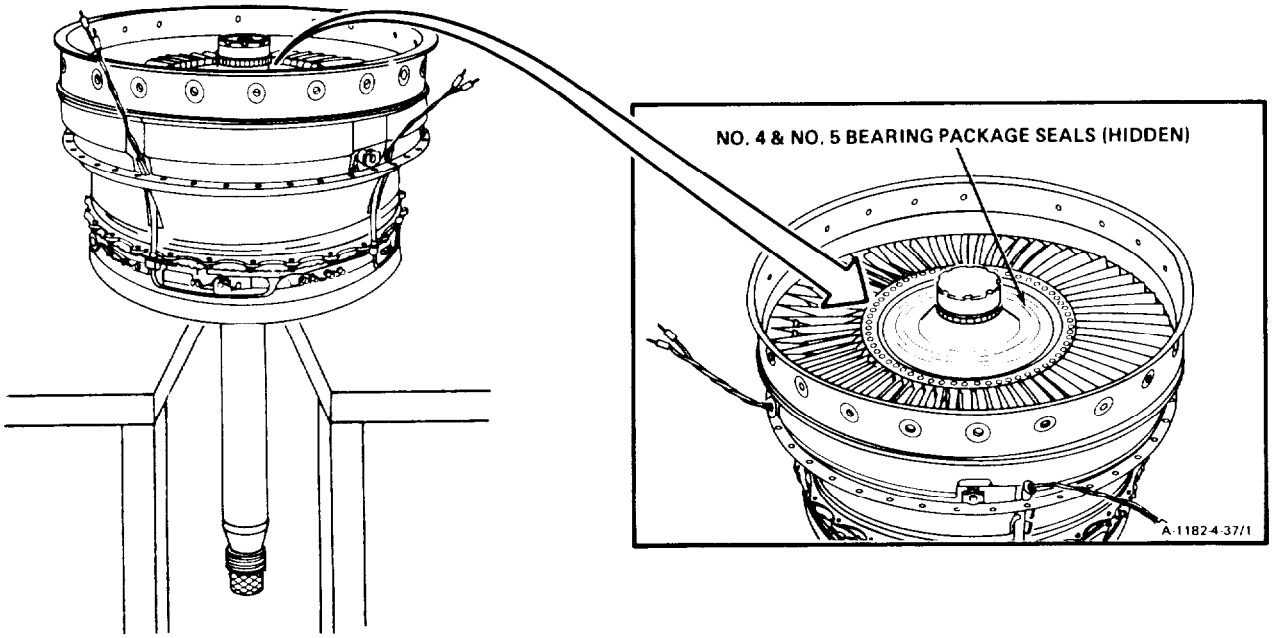
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Torque Fixture (T48)
Seal Removal Tool Set (T49)
Mechanical Puller (T52)
Hydraulic Wheel Puller (T58)
Torque Multiplier (T63)
Third Turbine Rotor Support Block (Appendix E)

Materials:
Marking Pencil (E34)
Penetrating Oil (E39)
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

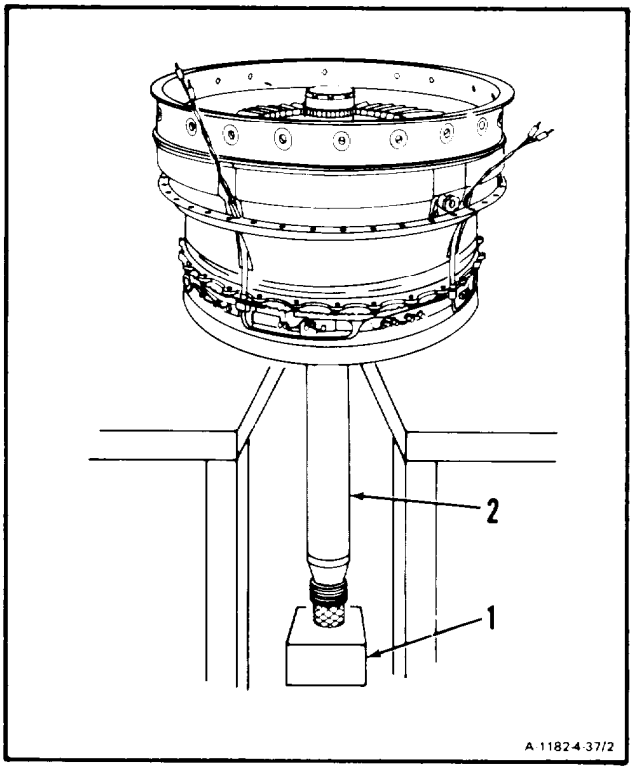
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)



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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

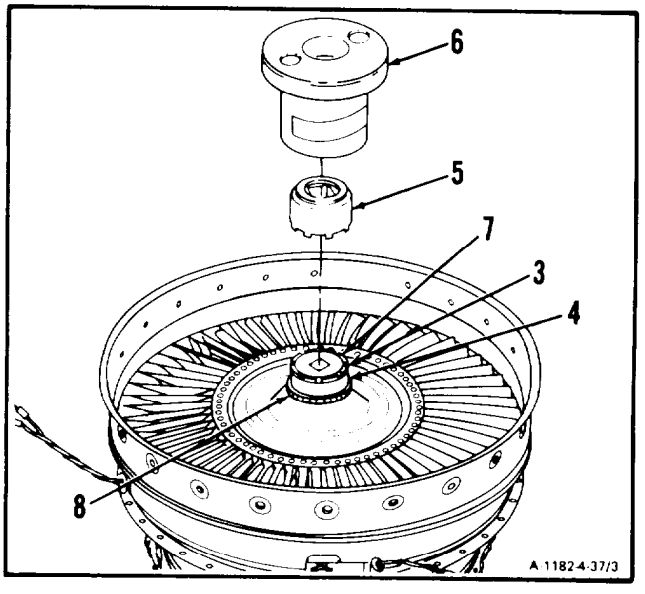
1. Place third turbine rotor support block (Appendix E) (1) under shaft (2).



2. Straighten indents (3) of locking cup (4) and **install torque fixture (T4B)** consisting of wrench (5) and holding fixture (6), as follows:

   a. Position wrench (5) on nut (7).

   b. Position holding fixture (6) on spline (8).



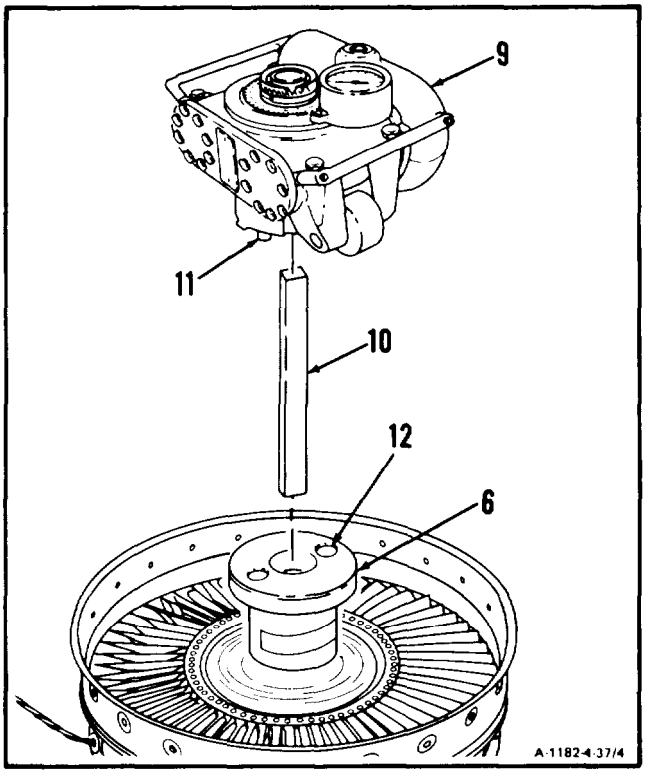
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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

3. Using helper, **install torque multipler (T63) (9)** as follows:

   a. Install drive bar (10) and position torque multiplier (T63) (9) over drive bar (10).

   b. Align two pins (1 1) with holes (12) in holding fixture (6). Place torque multiplier (T63) (9) on holding fixture (6).

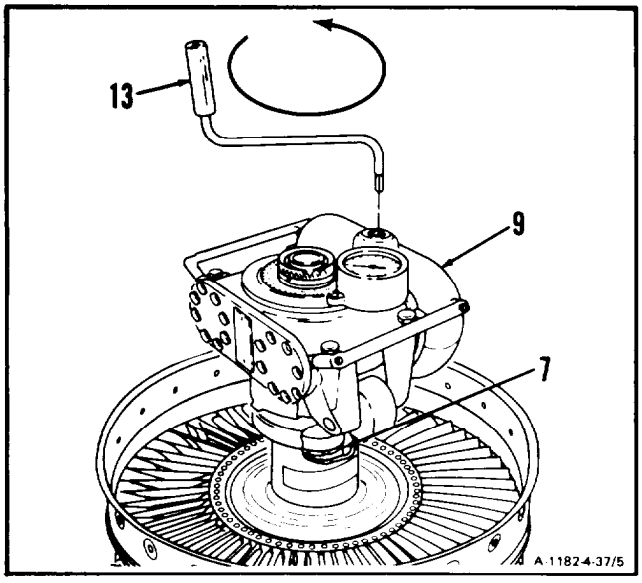


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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

4. **Remove nut (7)** as follows:

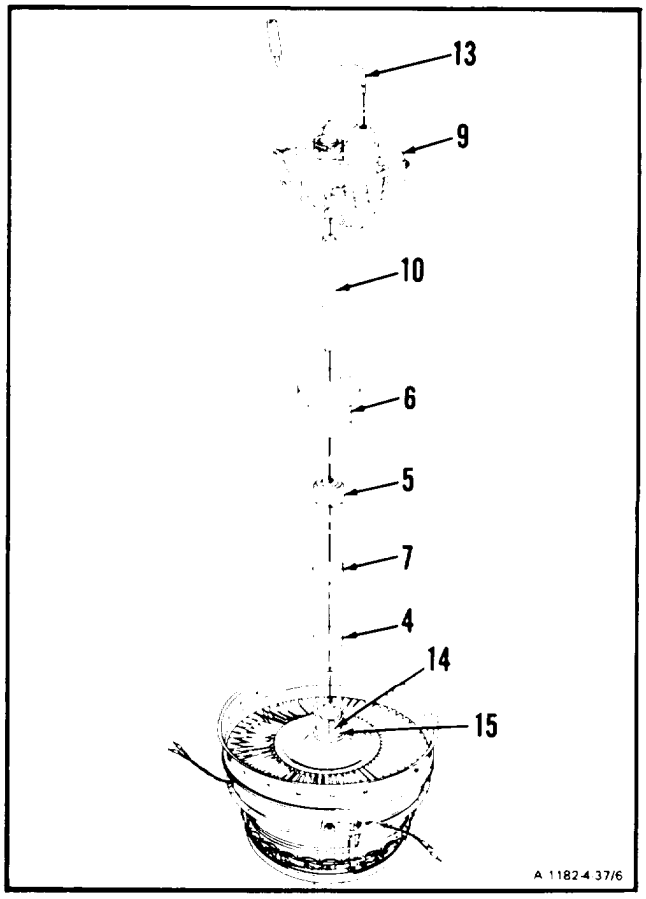
a. Insert handle (13) in torque multiplier (T63) (9). Turn handle (13) counterclockwise until nut (7) is loose.



b. Remove handle (13), torque multiplier (T63) (9), drive bar (10), and torque fixture (T48), consisting of wrench (5), and holding fixture (6).

c. Remove nut (7) and locking cup (4).

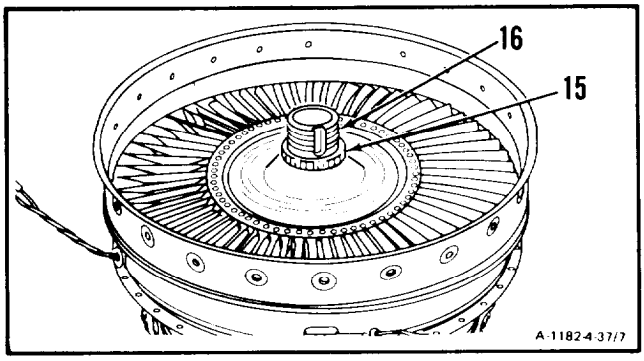
d. Matchmark shaft groove (14) and fourth stage turbine rotor (15). Use marking pencil (E34).



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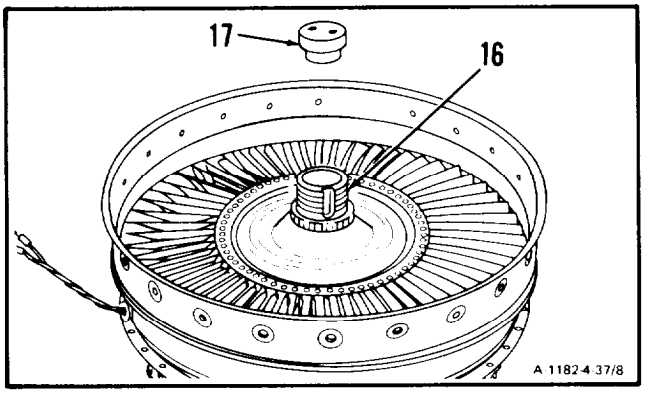
4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

5. **Soak shaft (16)** around rotor (15) with penetrating oil (E39).

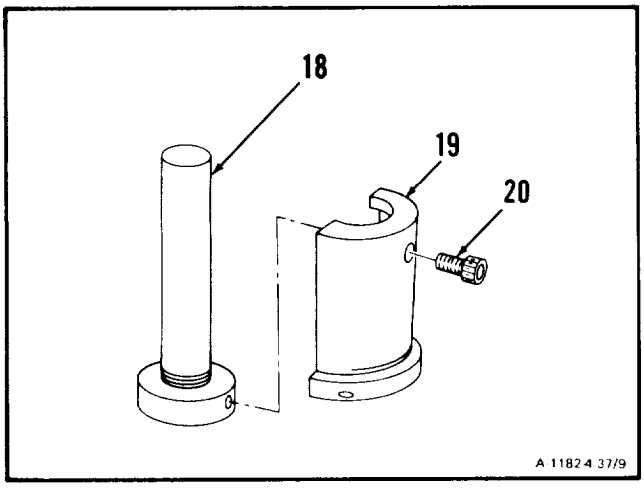


6. **Install hydraulic wheel puller (T58)** as follows:

   a. Position pilot (17) on shaft (16).



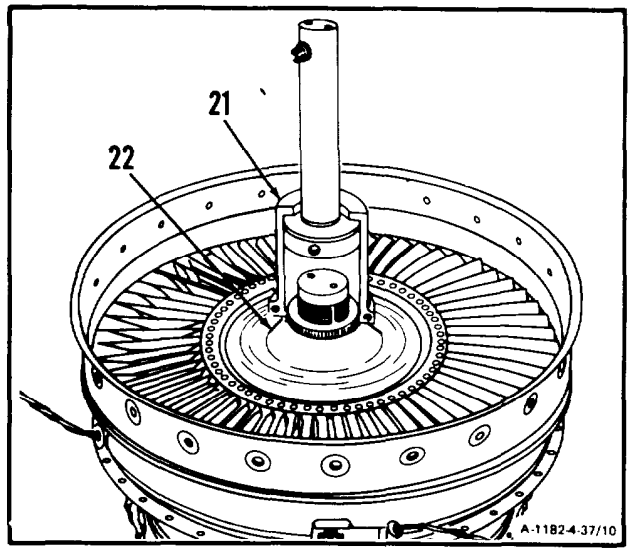
   b. Position hydraulic ram (18) in one half of body (19). Install screw (20).



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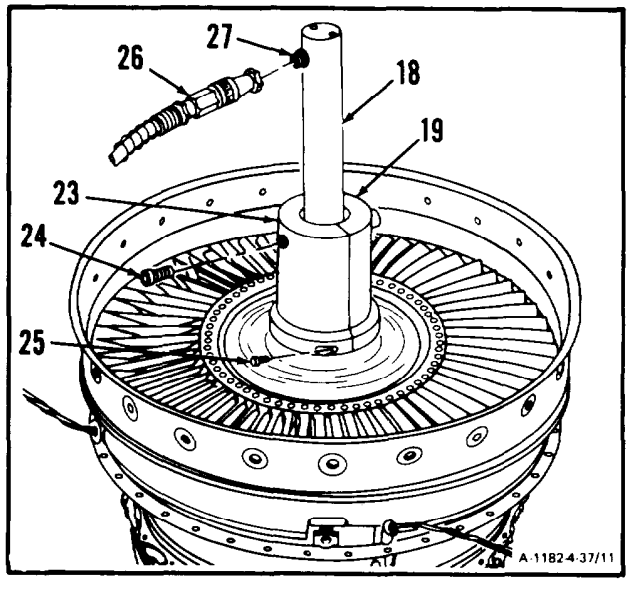
4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued)

c. Position partially assembled puller (21) on fourth stage turbine rotor hub (22).



d. Place other half of body (23) on body half (19). Install screw (24) and two screws (25).

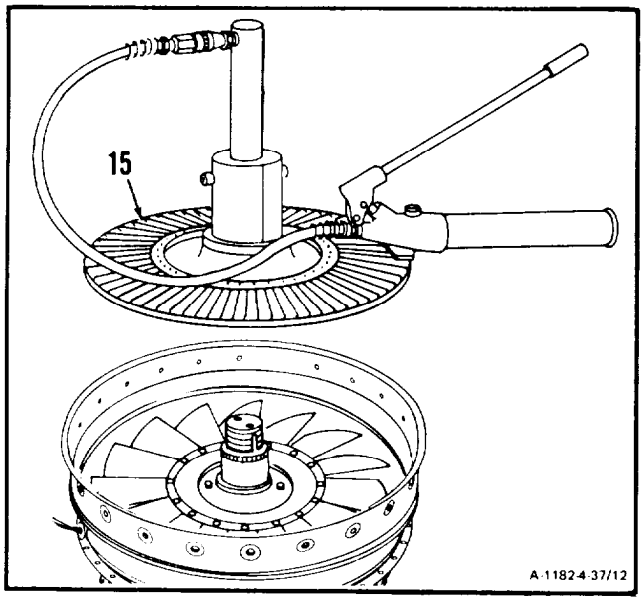
e. Connect hydraulic pump hose (26) to fitting (27) on hydraulic ram (18).



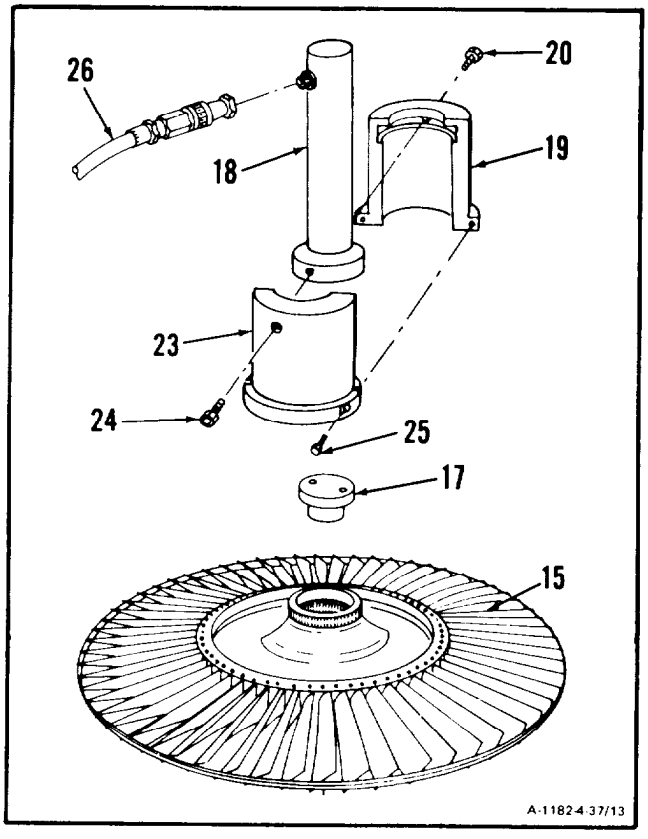
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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued)

7. Using helper, **remove fourth stage turbine rotor (15).** Use hydraulic wheel puller (T58).



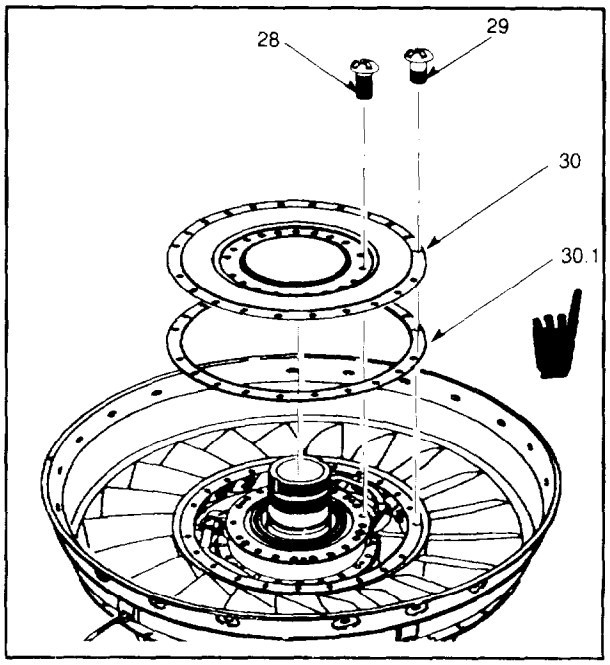
8. **Remove hydraulic wheel puller (T58),** consisting of hose (26), hydraulic ram (18), two body halves (19 and 23), two screws (20 and 24), two screws (25), and pilot (17) from fourth stage turbine rotor (15).



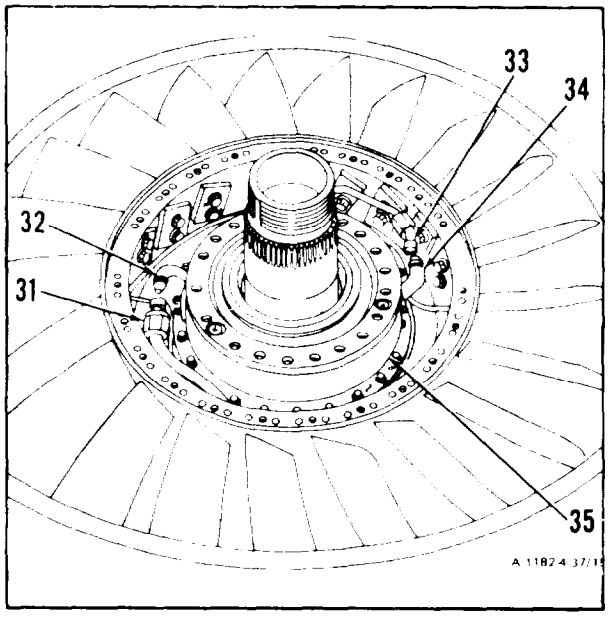
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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

9. Remove lockwire, 20 bolts (28), 22 screws (29), heat shield (30), and shim (30.1), if installed.



10. Remove lockwire and **disconnect tube (31)** from adapter (32).
11. Remove lockwire and **disconnect tube (33)** from adapter (34).
12. Remove lockwire and 19 bolts (35).



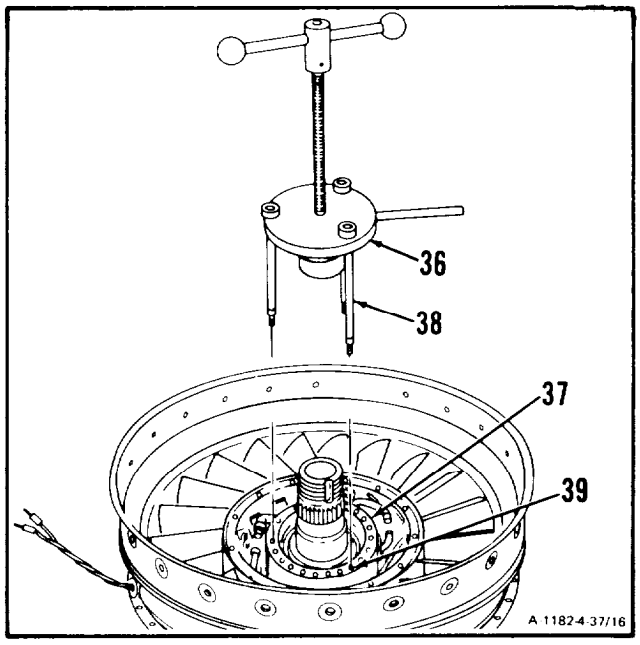
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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

13. **Install mechanical puller (T52) (36)** as follows:

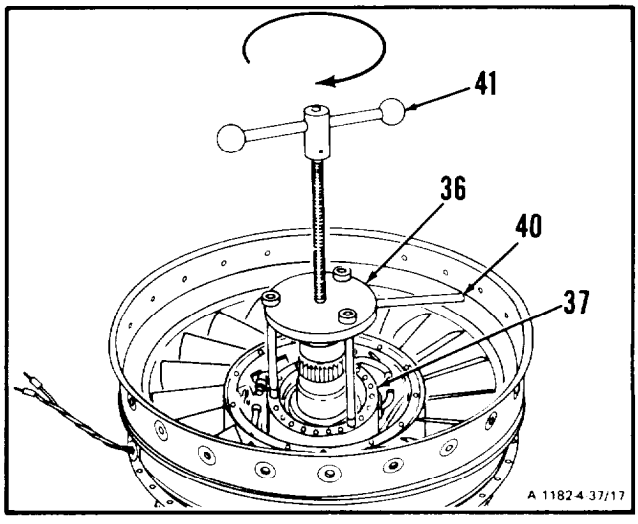
    a. Position puller (T52) (36) on No. 4 and 5 bearing package (37).

    b. Align three bolts (38) with three holes (39) and install bolts (38).



14. Hold handle (40) steady and turn handle (41) clockwise. **Remove No, 4 and 5 bearing package (37).**

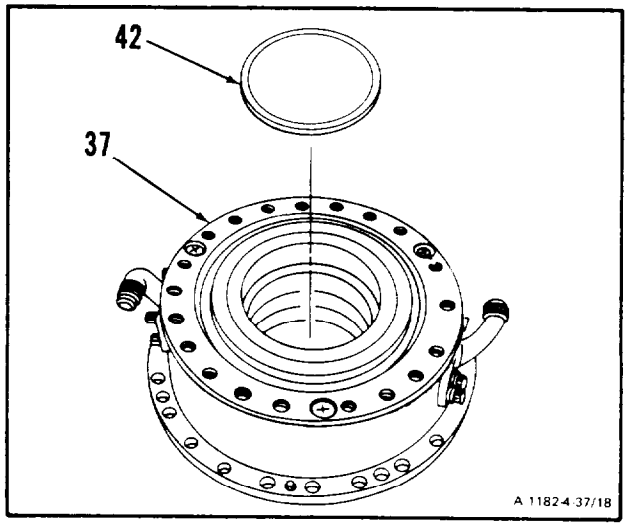
15. **Remove mechanical puller (T52) (36).**



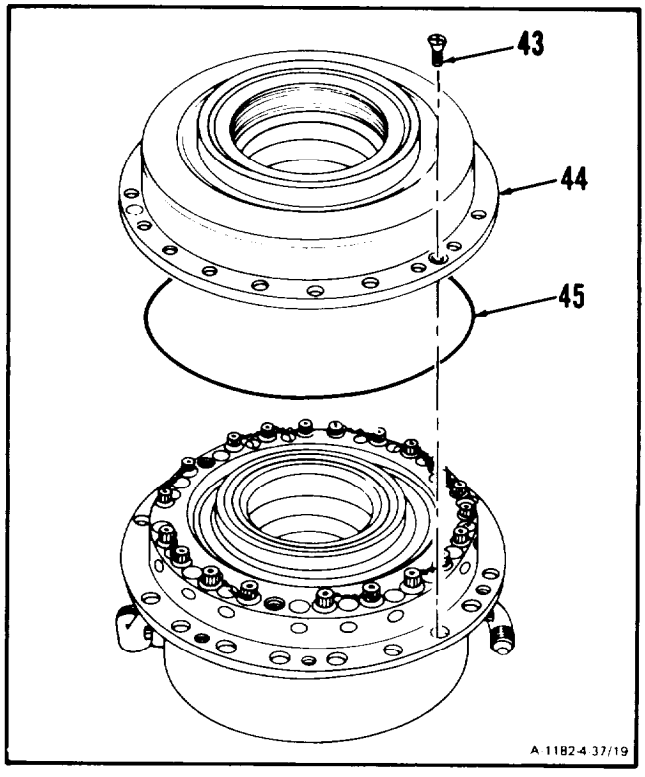
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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

16. If installed, remove spacer (42) from aft end of No. 4 and 5 bearing package (37).



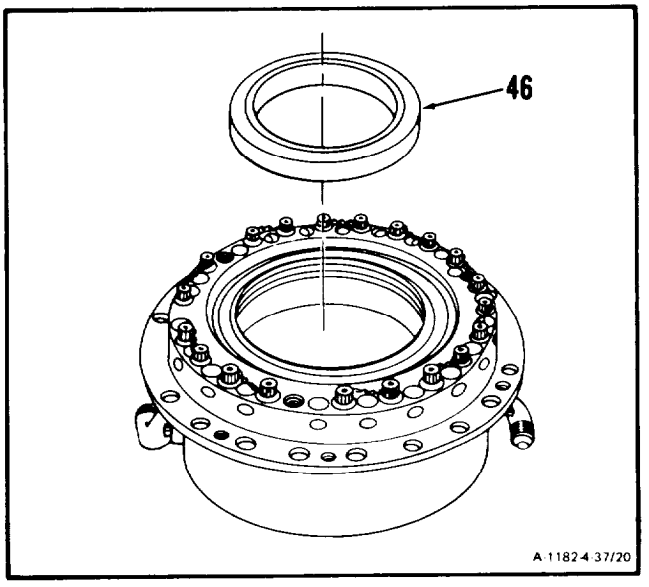
17. **Remove** three screws (43), **forward seal and retainer (44),** and gasket (45).



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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

18. **Remove faceplate (46).**



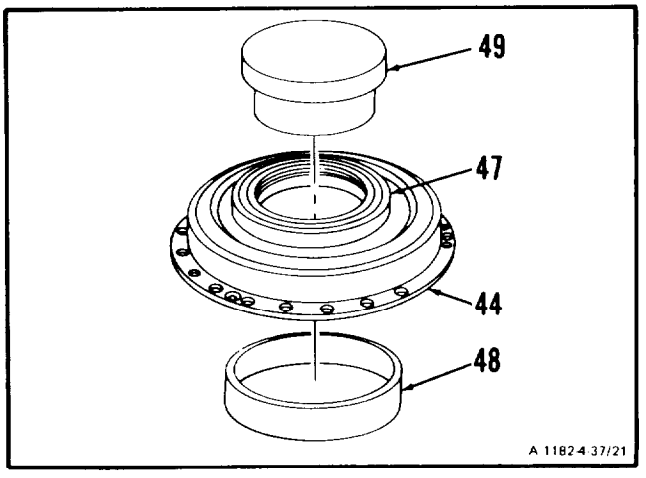
NOTE

in following step (19), tube (48) and pilot (49) are part of seal removal tool set (T49).

19. **Remove No. 4 and 5 bearing package forward seal (47) as follows:**

a. Position tube (48) on arbor press and place seal and retainer (44) on tube (48).

b. Install pilot (49) on seal (47). Remove Seal (47), using arbor press.

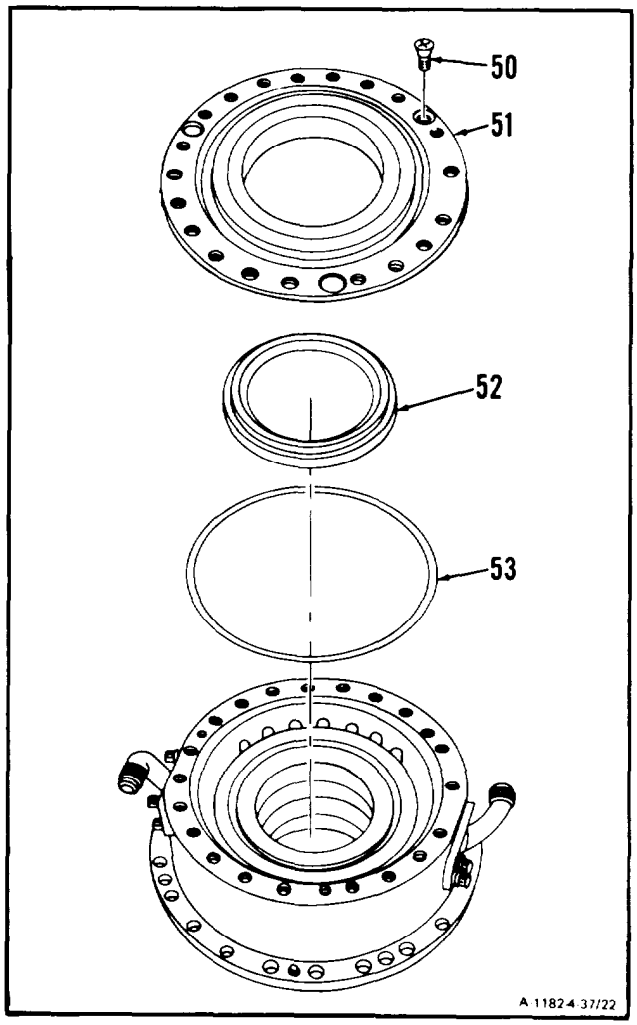


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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

20. Remove three screws (50), and **remove aft seal and retainer (51).**

21. Remove faceplate (52) and seal (53).



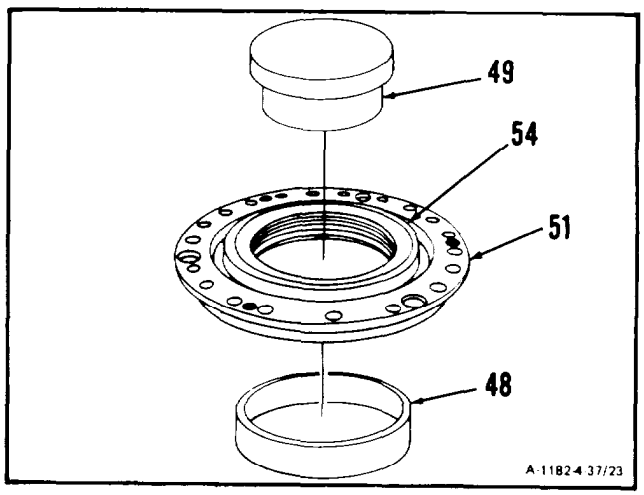
NOTE

In following step 22, tube (48) and pilot (49) are part of seal removal tool set (T49).

22. **Remove No. 4 and 5 bearing package aft seal (54)** as follows:

a. Position tube (48) on arbor press and place aft seal and retainer (51) on tube (48).

b. Install pilot (49) on seal (54). Remove seal (54), using arbor press.

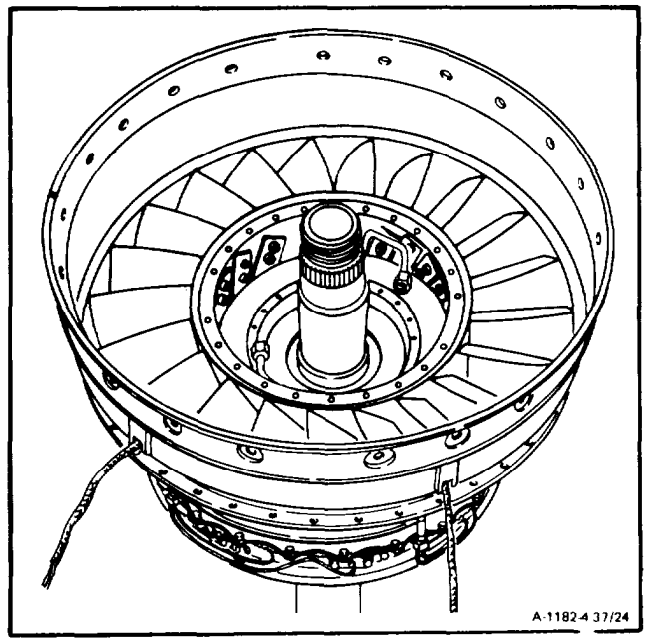


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4-37 REMOVE NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-37

FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-38 CLEAN NO. 4 AND 5 BEARING PACKAGE (AVIM) 4-38

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Free Cloth (E26)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task

General Safety Instructions:

WARNING

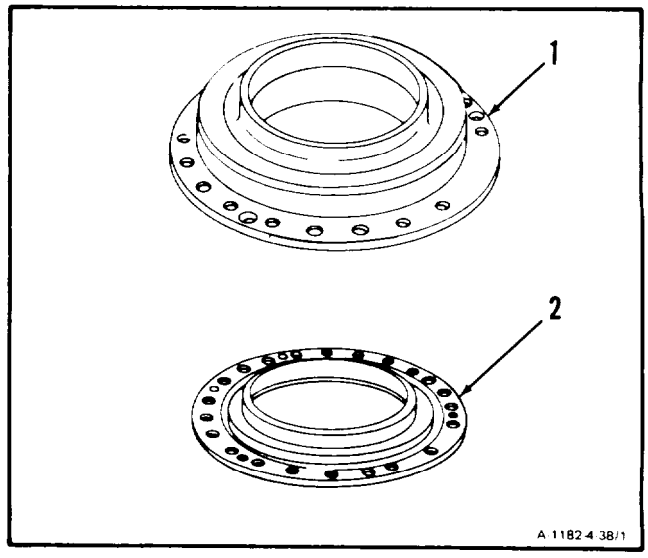
Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). Clean forward seal retainer (1) and aft seal retainer (2) with dry cleaning solvent (El 7) and with brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

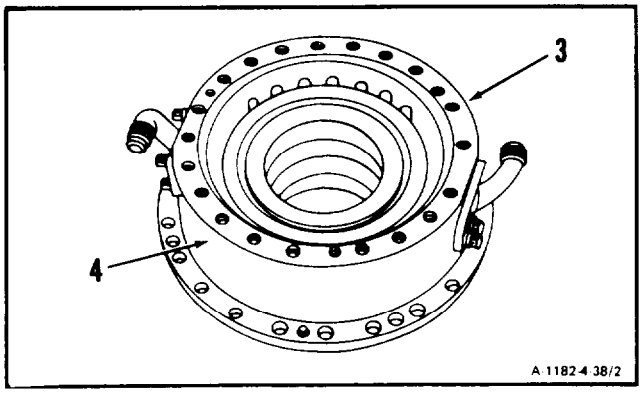
2. Wear goggles. Blow dry forward seal retainer (1) and aft seal retainer (2), using clean, dry compressed air.



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4-38 CLEAN NO. 4 AND 5 BEARING PACKAGE (AVIM) (Continued) 4-38

3. Clean No. 4 and 5 bearing housing (3) as follows.



CAUTION

Do not allow solvent to get down into bearings. Damage to bearings may result.

a. Using a lint-free cloth (E26) dampened with dry cleaning solvent (E17), wipe bearing housing external surface (4).

b. Wipe dry. Use clean, dry, lint-free cloth (E26).

FOLLOW-ON MAINTENANCE

Inspect No, 4 and 5 Bearing Package Seals (Task 4-39).

END OF TASK

4-39 INSPECT NO. 4 AND 5 BEARING PACKAGE (AVIM) 4-39

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect No. 4 and 5 bearings (1)** as follows.

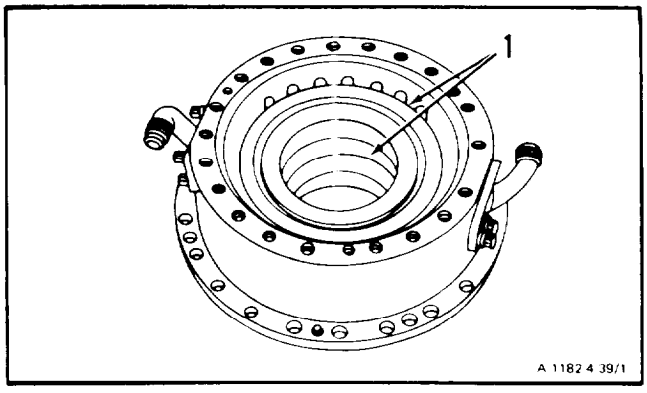
NOTE

Bearings shall remain in bearing housing during inspection.

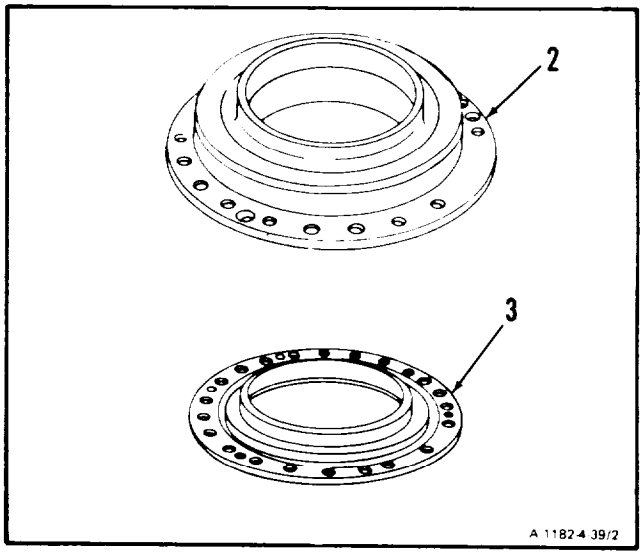
a. There shall be no rust or broken parts.

b. There shall be no foreign matter clogging the bearings which would prevent free rotation.

c. There shall be no purple, red purple, or blue discoloration.



2. **Inspect forward seal retainer (2) and aft seal retainer (3).** There shall be no cracks.



FOLLOW-ON MAINTENANCE.

None

END OF TASK

4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) 4-40

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Locating Bar (T1)
Oil Tube Fixture (T34)
Torque Fixture (T48)
Seal Removal Tool Set (T49)
Induction Heater (T50)
Bearing Installing Tool (T51)
Control Unit (T55)
Holding Fixture (T56)
Torque Multiplier (T63)
Bent Wire Gage, 0.104 Inch (Appendix E)
Bent Wire Gage, 0.115 Inch (Appendix E)
Bent Wire Gage, 0.228 Inch (Appendix E)
Bent Wire Gage, 0.290 Inch (Appendix E)
Arbor Press
Asbestos Gloves
Bolt, 1/4 x 28 x 1 Inch (2)
Dial Indicator and Base
Nut, 1/4 x 28 (2)
Reducer, P/N 2-141-121-04
Torque Wrench, 0 to 30 Inch-Pounds
Torque Wrench, 150 to 750 Inch-Pounds
Outside Micrometer Caliper Set
Micrometer Depth Gage

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)
Lubricating Oil (E32 or E33)
Nickel Ease (E37)

Parts:
Gasket
Locking Cup
Screws
Seals

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)
68830 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P
Task 3-6
Task 3-7
Task 4-33

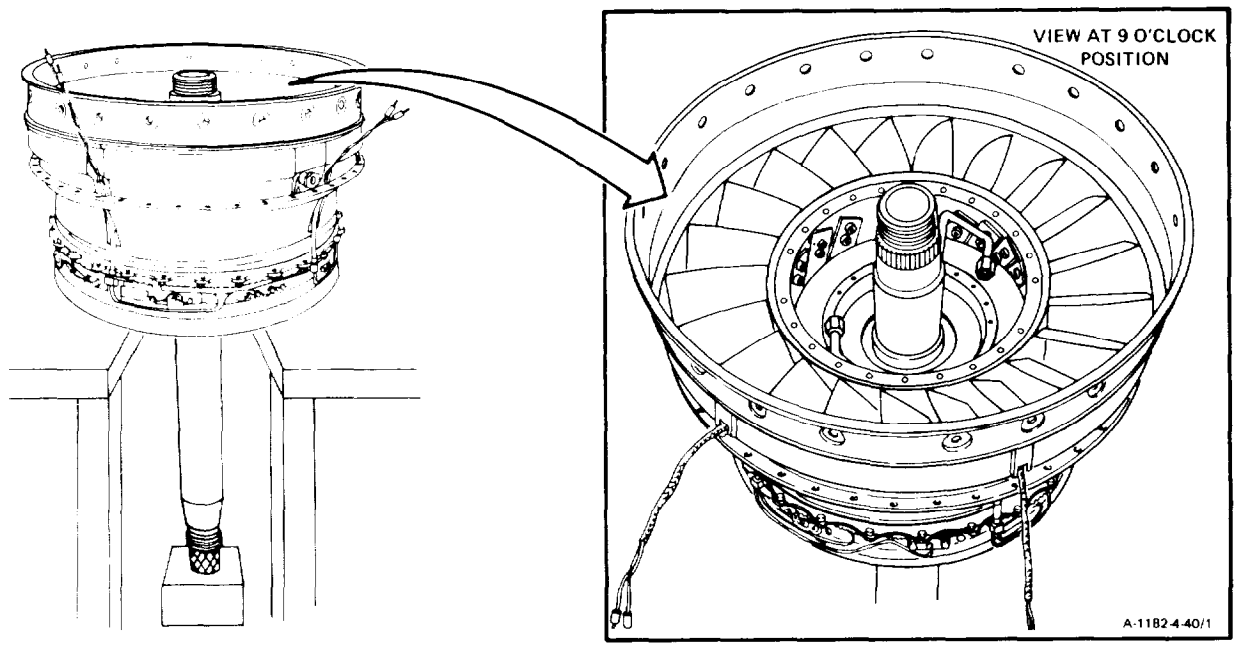
General Safety Instructions:

WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

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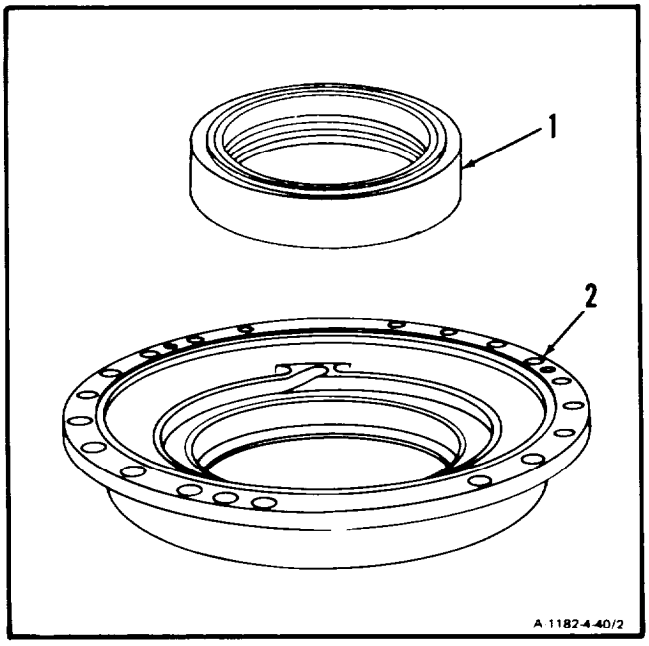
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40



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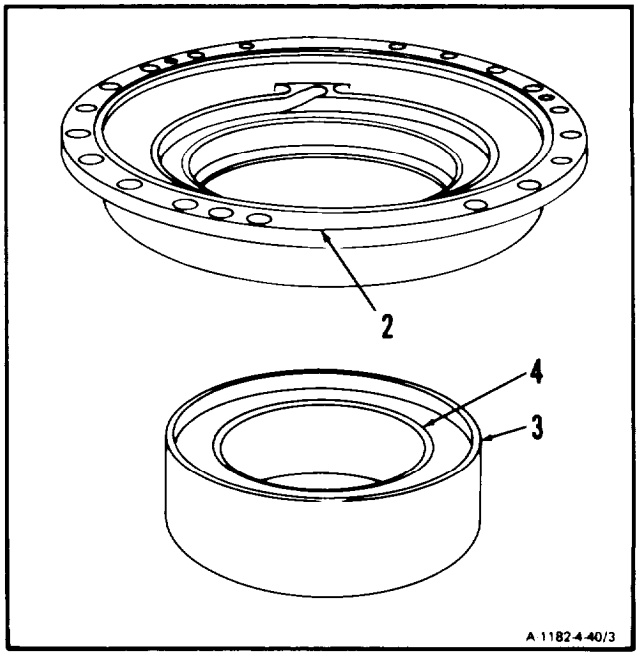
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

1. **Install forward seal (1)** into forward seal retainer **(2)** as follows:



a. Position base (3) of seal removal tool (T49) on arbor press with recess (4) facing UP.

b. Position forward seal retainer (2) on base (3).



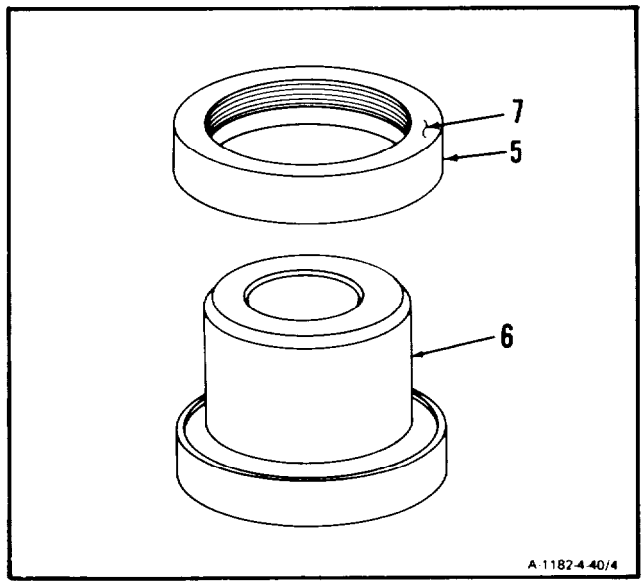
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

CAUTION

Care shall be taken when handling and installing seal. Carbon elements in seal could easily break. This will cause oil leakage and damage to engine.

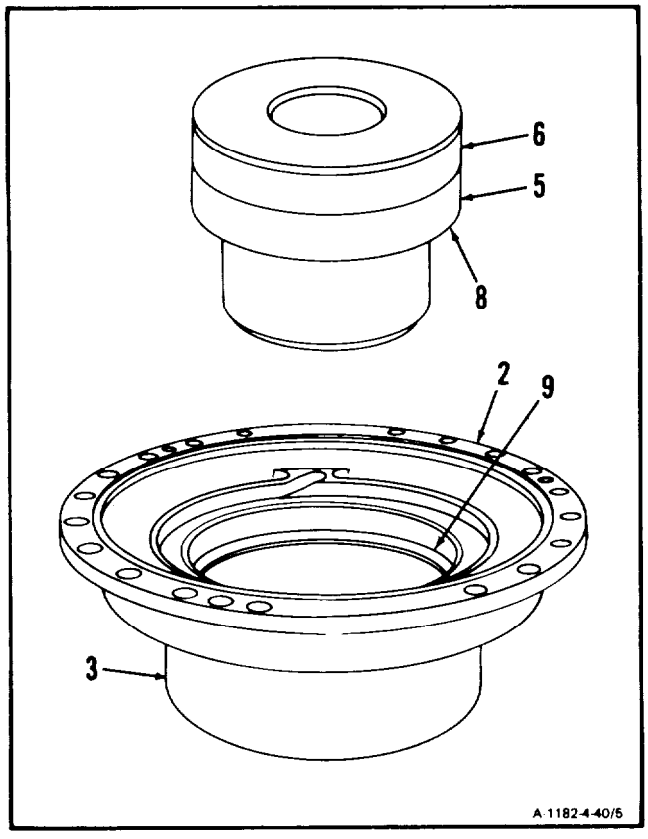
c. **Install seal (5)** carefully on adapter (6) of seal removal tool (T49) with flat side (7) facing up.



d. Install adapter (6) and seal (5) through forward seal retainer (2) and into base (3).

e. Press seal (5) into forward seal retainer (2) until seal face (8) touches shoulder (9). Use arbor press.

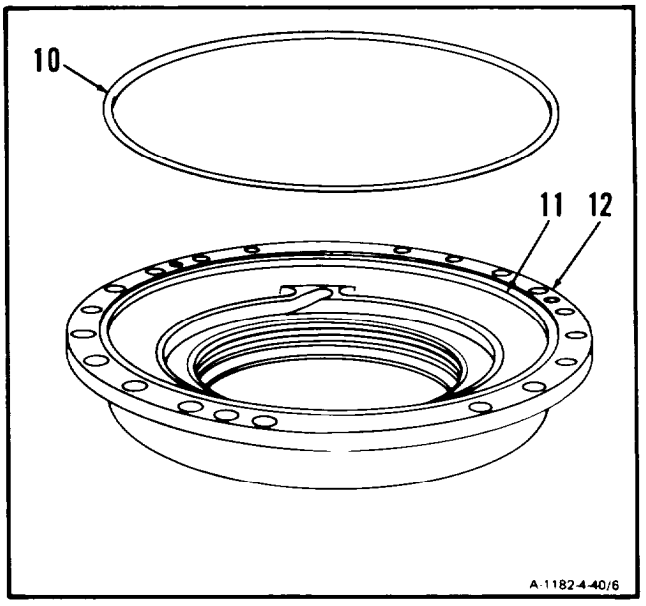
f. Remove adapter (6) and base (3).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

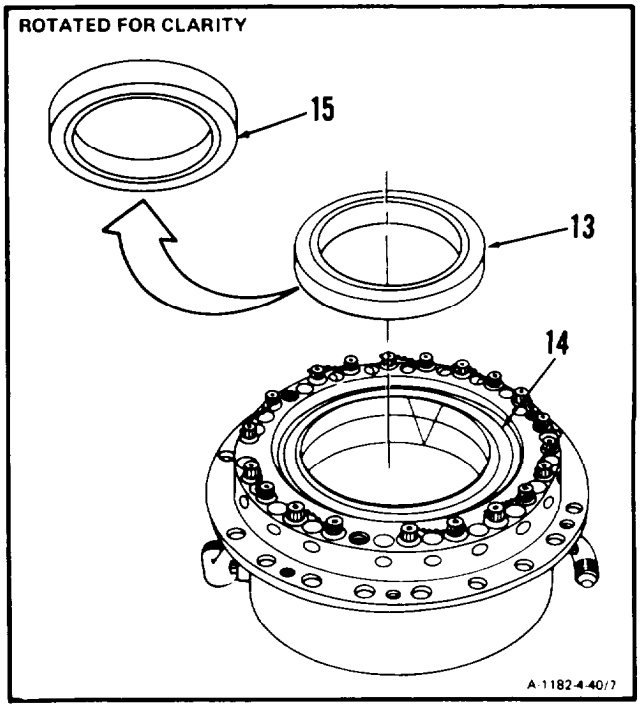
2. **Install gasket (10)** in groove (11) on forward seal and retainer (12).



CAUTION

Be sure to align apex marks on bearing inner races. If apex marks are not aligned, bearing will bind. This would cause engine damage.

3. **Install faceplate (13)** on bearing (14) with beveled side (15) facing down.



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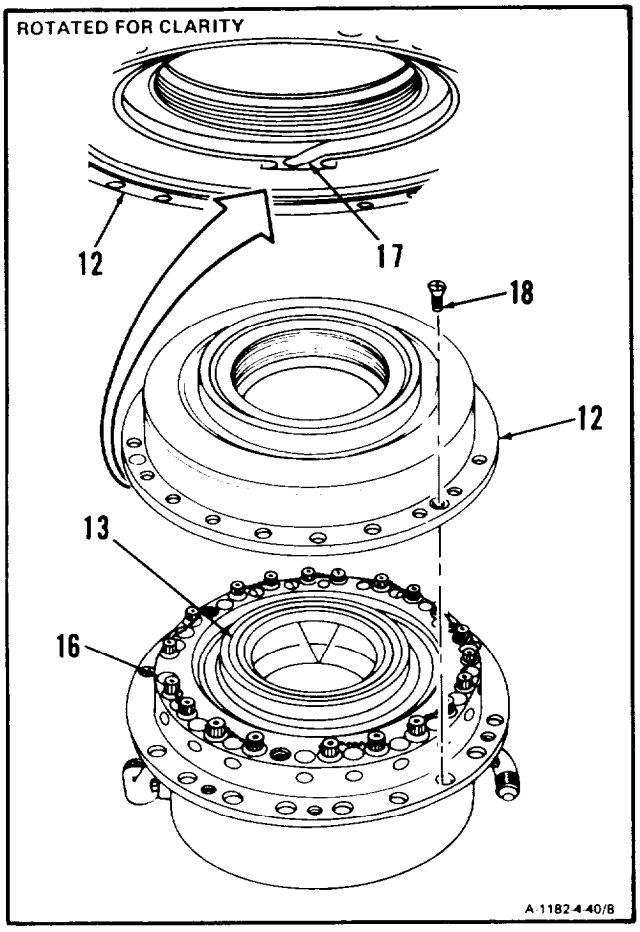
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

4. Align oil drain hole (16) with oil drain slot (17) on forward seal and retainer (12).

CAUTION

Be sure to apply a light coat of lubricating oil on faceplate before installation. Failure to comply will cause damage to forward seal and retainer during dry running period of initial engine starts.

5. Apply a light coat of lubricating oil (E32 or E33) on faceplate (13). **Install forward seal and retainer (12)** and three screws (18).



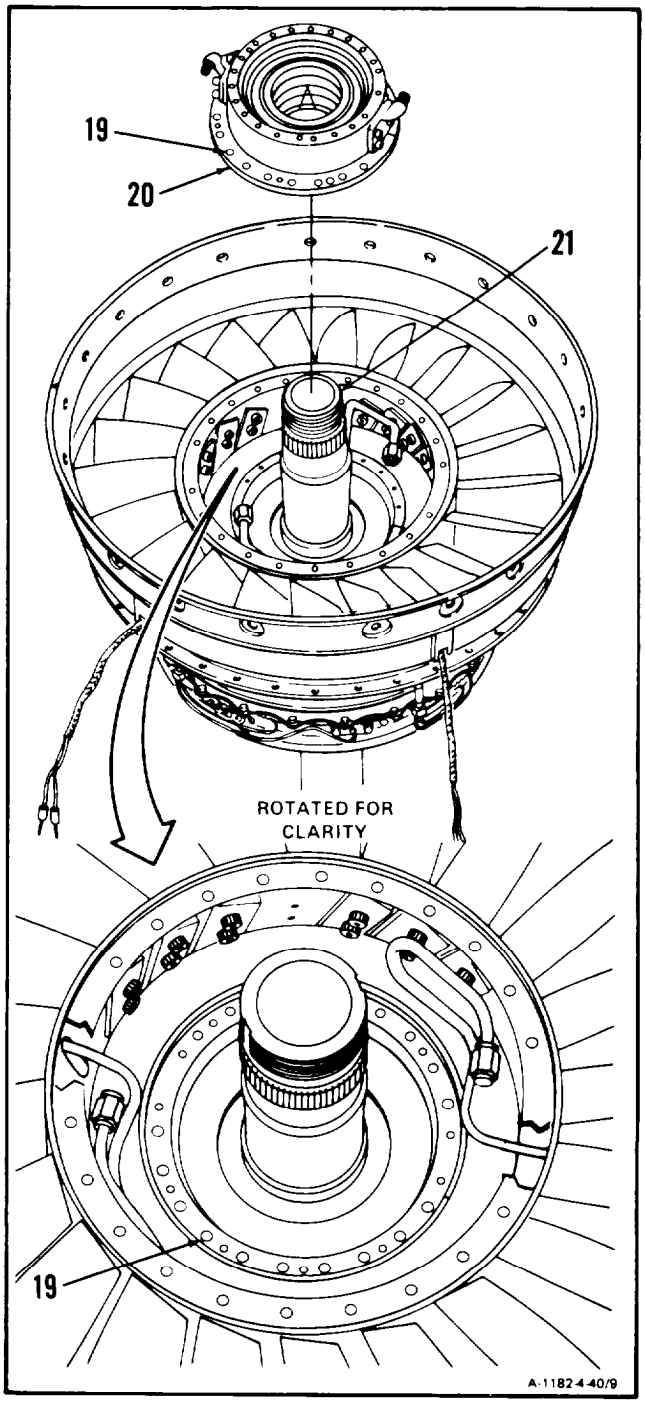
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

CAUTION

In following step 6., be sure to install bearing package carefully and straight on shaft. Failure to comply could cause breakage of carbon elements. This would cause oil leakage and engine damage.

6. Align bolt holes (19) and **position No. 4 and 5 bearing package (20) on shaft (21).**



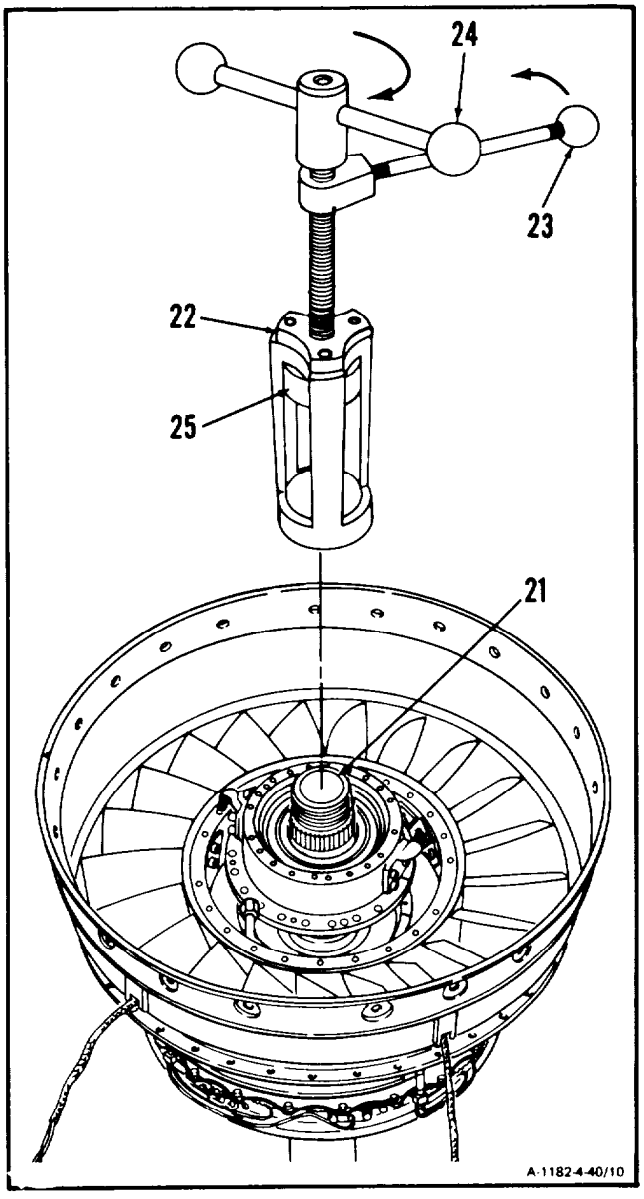
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

7. **Install bearing installing tool (T51) (22)** as follows:

   a. Turn handle (23) counterclockwise until it is backed out all the way.

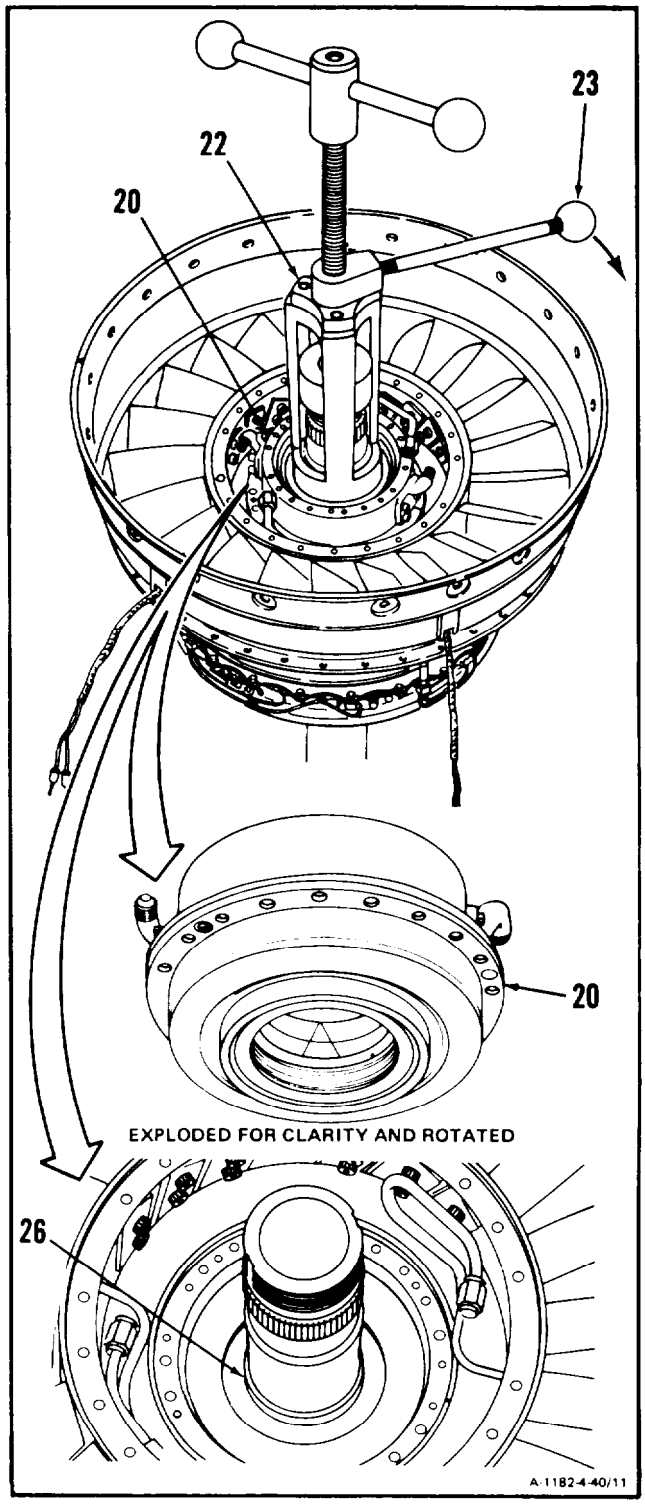
   b. Install nut (25) on shaft (21). Turn T-handle (24) clockwise until nut (25) is tight.



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

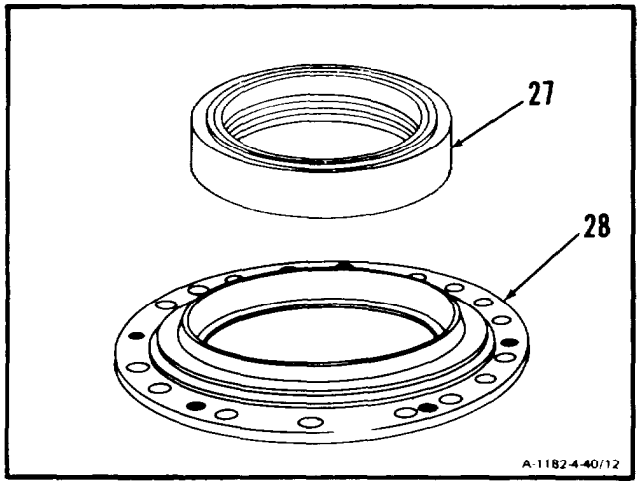
8. Seat No. 4 and 5 bearing package (20) onto third turbine rotor shoulder (26) by turning handle (23) clockwise. Remove bearing package installing tool (T51) (22).



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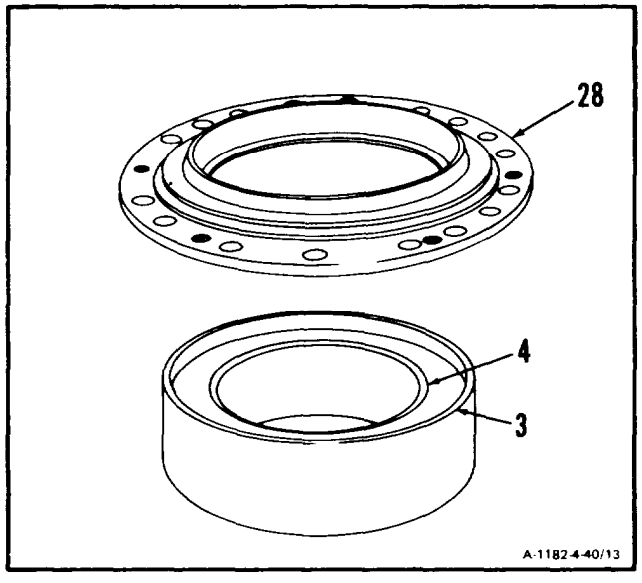
4-40 INSTALL NO, 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

9. **Install aft seal (27) into aft seal retainer (28)** as follows:



a. Position base (3) of seal removal tool (T49) on arbor press with recess (4) facing up.

b. Position aft sea l retainer (28) on base (3).



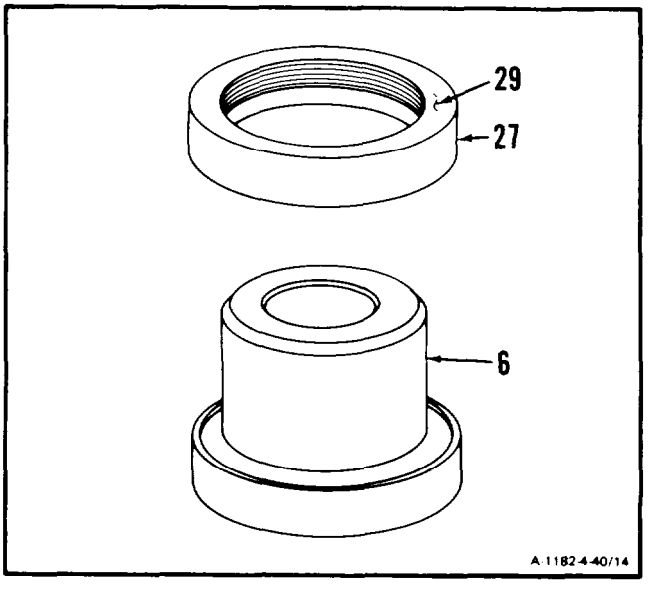
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

CAUTION

Be careful when handling and installing seal. Carbon elements in seal could easily break. This will cause oil leakage and damage to engine.

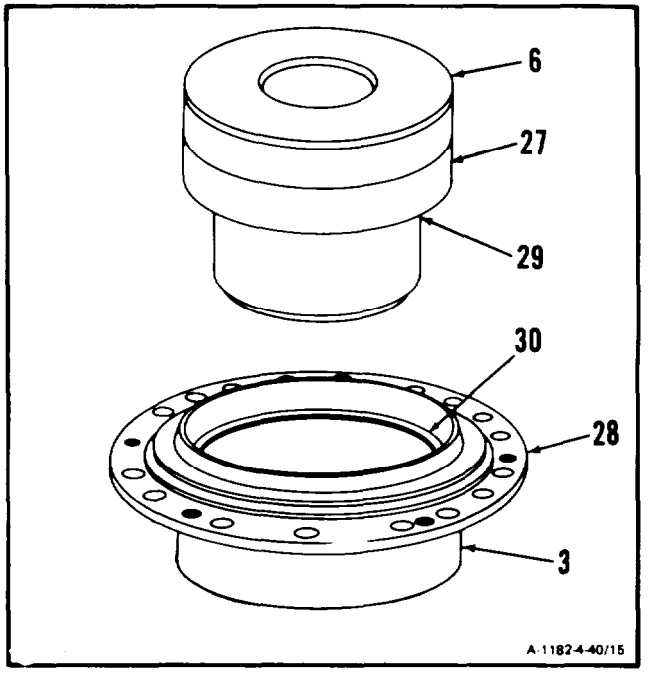
c. **Install seal (27)** carefully, on adapter (6) of seal removal tool (T49) with seal face (flat side) (29) facing up.



d. Install adapter (6) and seal (27) through aft seal retainer (28) and into base (3).

e. Press seal (27) into aft seal retainer (28) until seal face (29) touches shoulder (30). Use arbor press.

f. Remove adapter (6) and base (3).



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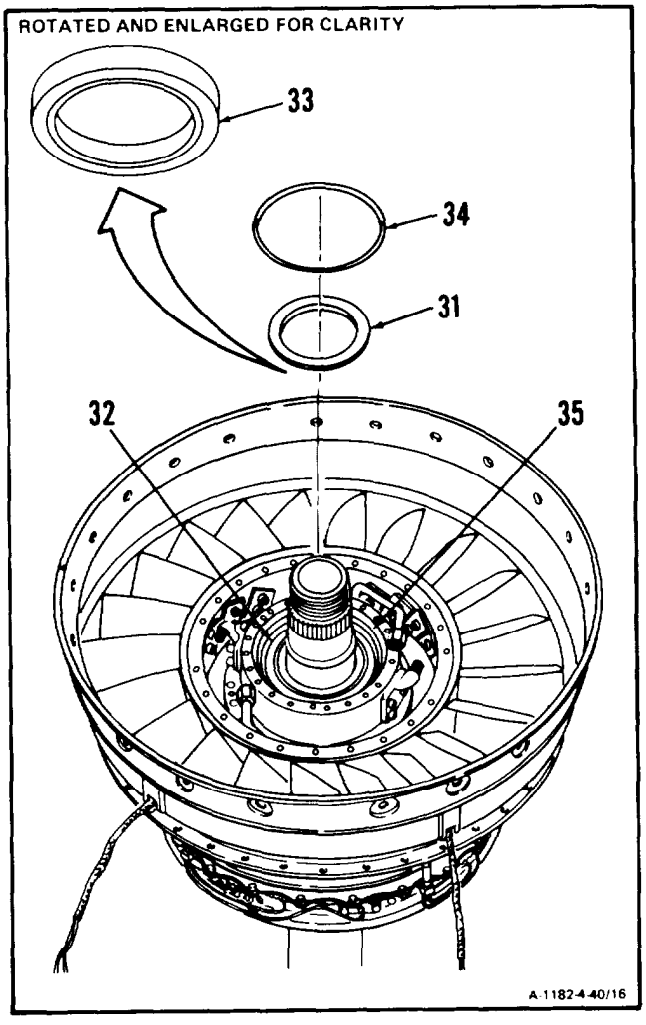
440 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

10. **Install faceplate (31)** on bearing (32) with beveled side (33) facing down.

CAUTION

Seal must be dipped in lubricating oil before installation. Failure to comply will cause damage to seal during dry running period of initial engine starts.

11. Dip serviceable seal (34) in lubricating oil (E32 or E33). **Install seal (34)** in groove (35).



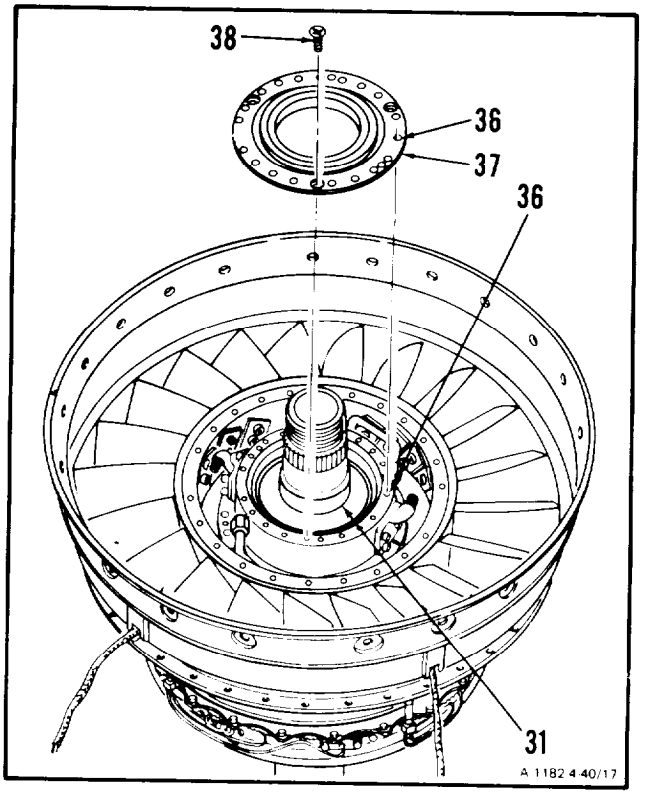
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

CAUTION

Be sure to apply a light coat of lubricating oil on faceplate before installation. Failure to comply will cause damage to aft seal and retainer during dry running period of initial engine starts.

12. Apply a light coat of lubricating oil (E32 or E33) on faceplate (31). Align bolt hole (36) and **install aft seal and retainer (37)** and three screws (38).

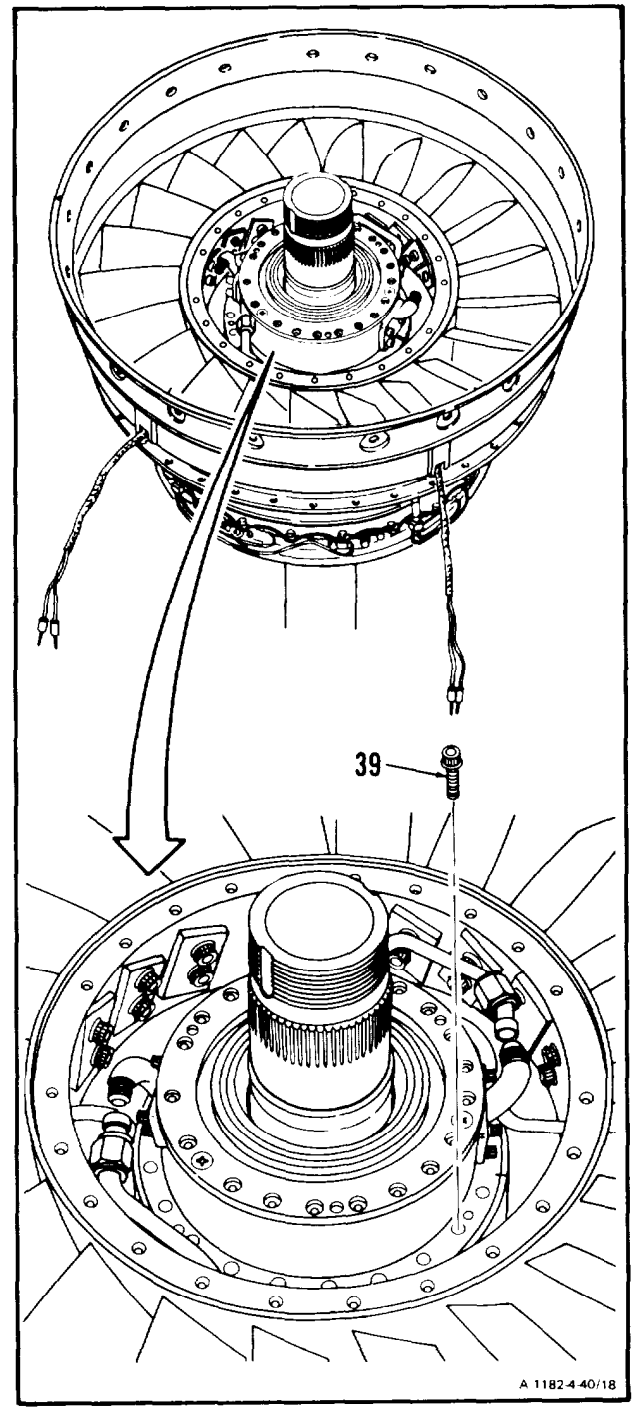


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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

13. Apply anti-seize compound (E5) to 19 bolts (39). **Install 19 bolts (39).**

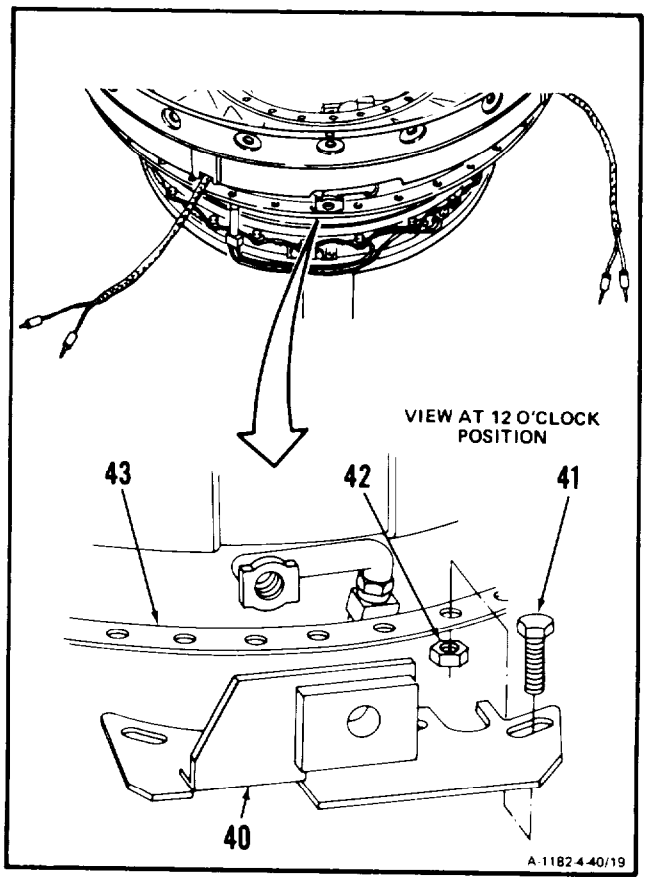
14. **Lockwire bolts (39).** Use lockwire (E29).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

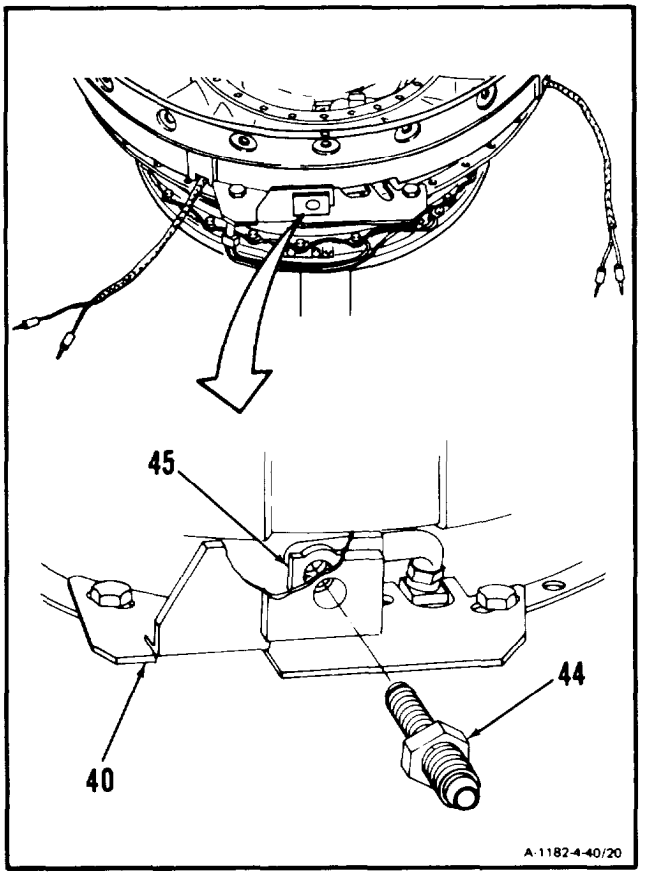
15. **Install oil tube fixture (T34) (40),** two 1/4 x 28 bolts (41), and 1/4 x 28 nuts (42) on nozzle flange (43) at the 12-o'clock position.



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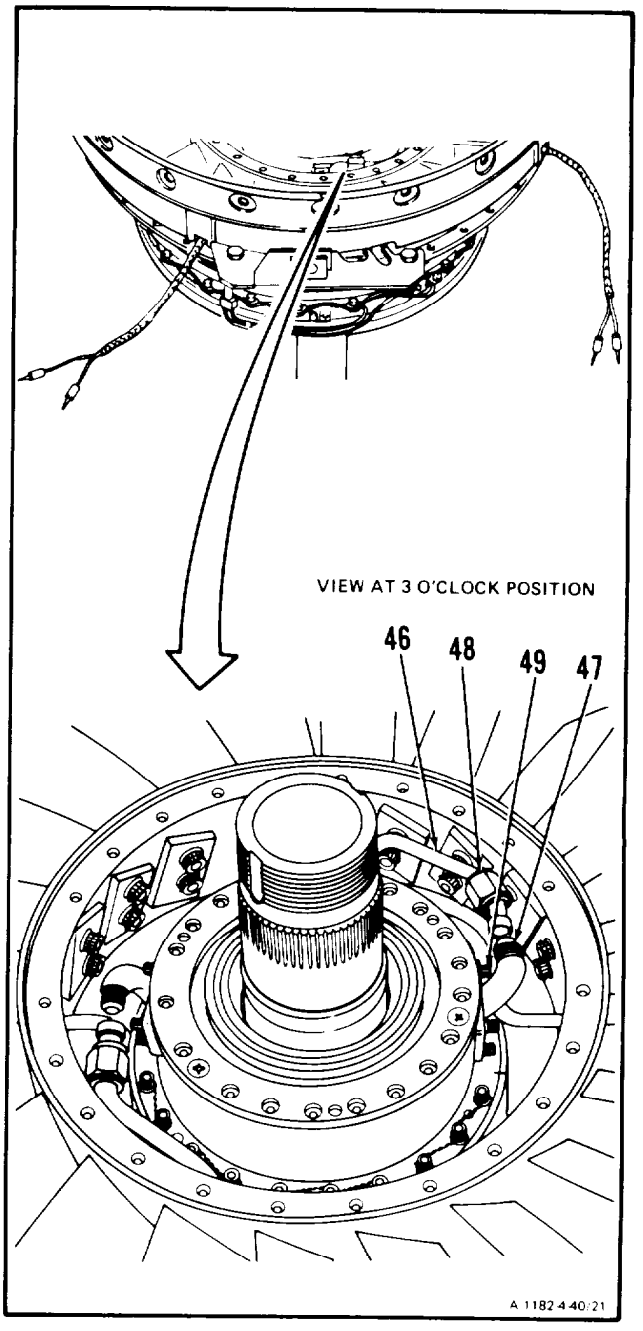
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

16. **Thread reducer, P/N 2-141-121-04 (44) into oil pressure tube adapter (45)** until adapter (45) is firmly seated in oil tube fixture (T34) (40).



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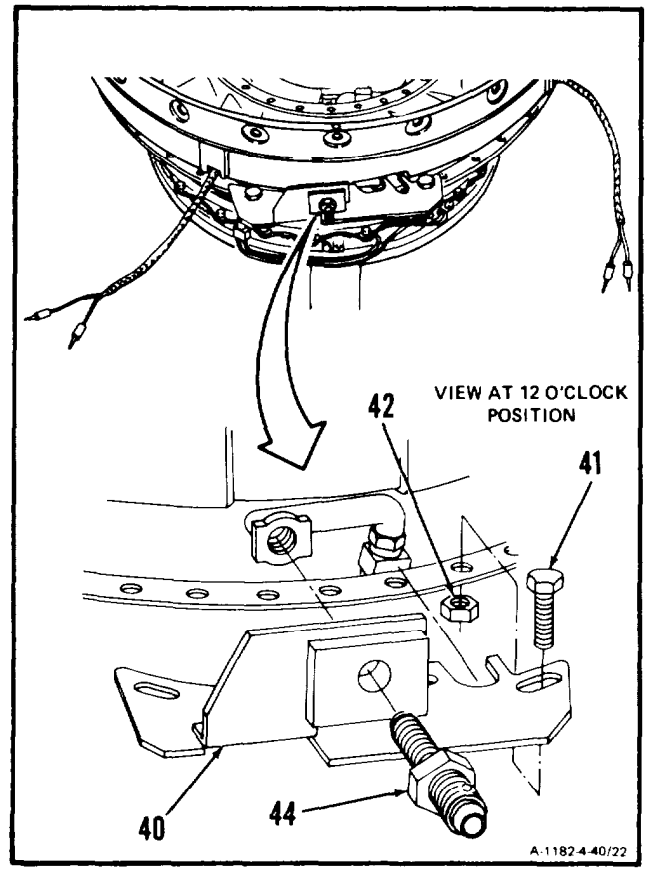
17. **Connect tube (46)** to adapter (47). **Torque, nut (48) to 190 inch-pounds.** Lockwire nut (48) to bolt (49). Use lockwire (E29).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

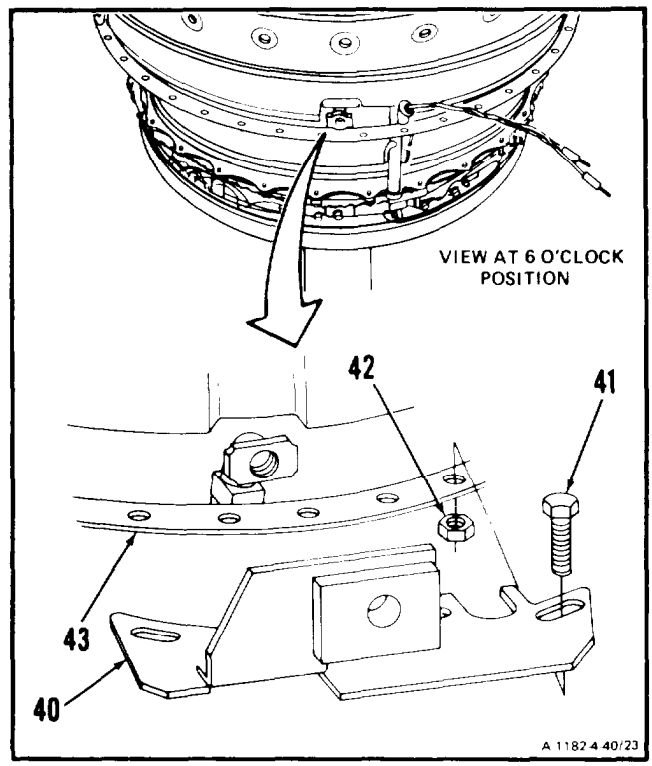
18. Remove reducer (44), two nuts (42), bolts (41), and oil tube fixture (T34) (40).



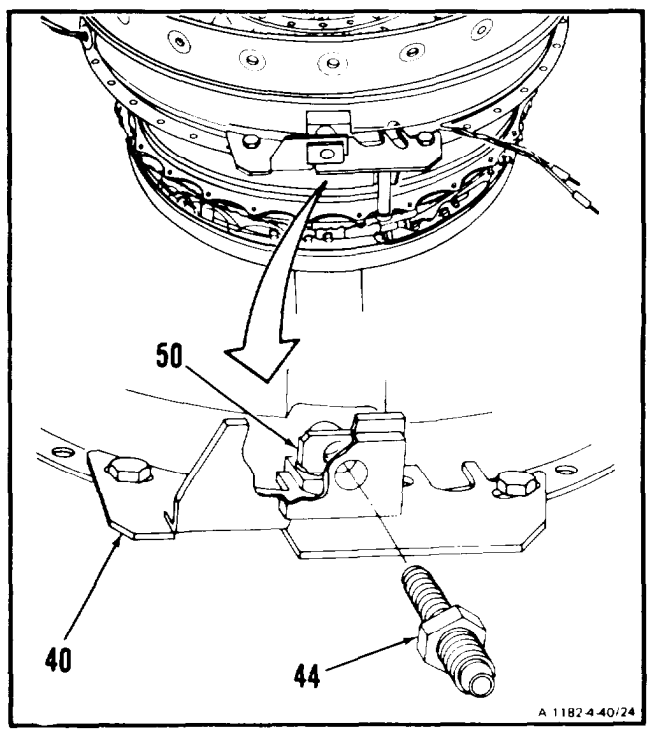
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

19. **Install oil tube fixture (T34) (40).** two 1/4 x 28 bolts (41), and 14 x 28 nuts (42) on nozzle flange (43) at the 6-o'clock position.



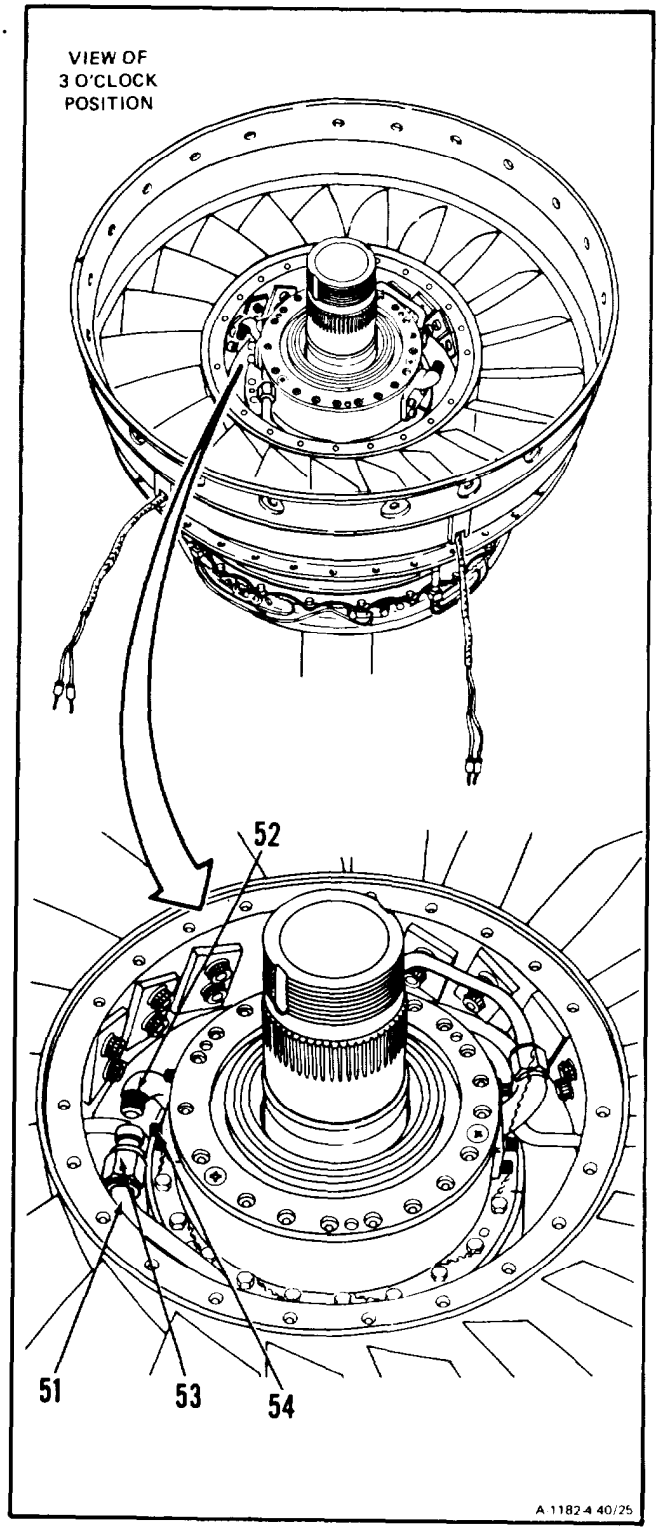
20. **Thread reducer, P/N 2-141-121-04 (44) into oil scavenge tube adapter (50)** until adapter (50) is firmly seated in oil tube fixture (T34) (40).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

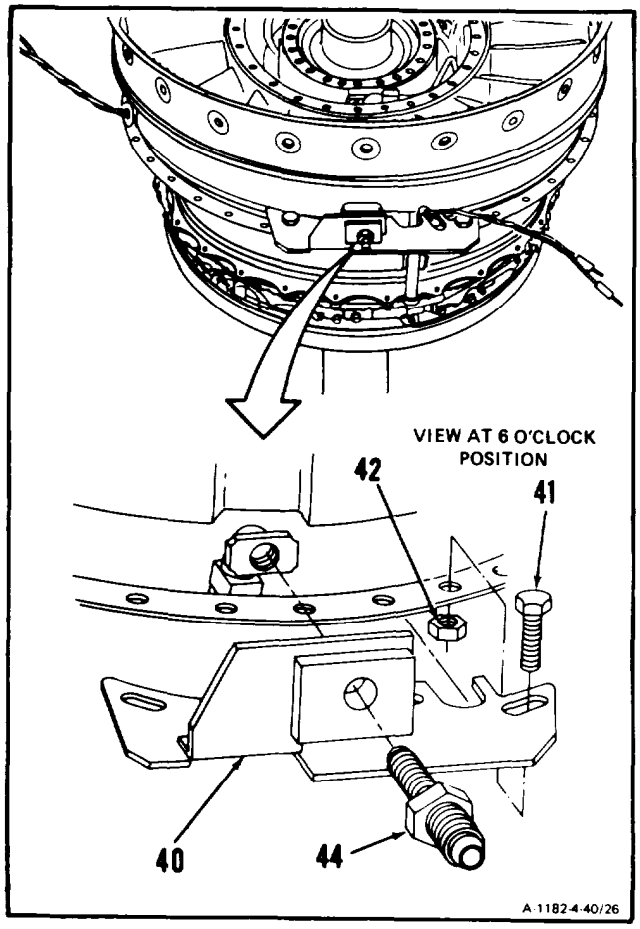
21. **Connect tube assembly (51)** to adapter (52). **Torque nut (53) to 190-inch pounds.** Lockwire nut (53) to bolt (54). Use lockwire (E29)



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

22. Remove reducer (44), two nuts (42), bolts (41), and oil tube fixture (T34) (40).



INSPECT

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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

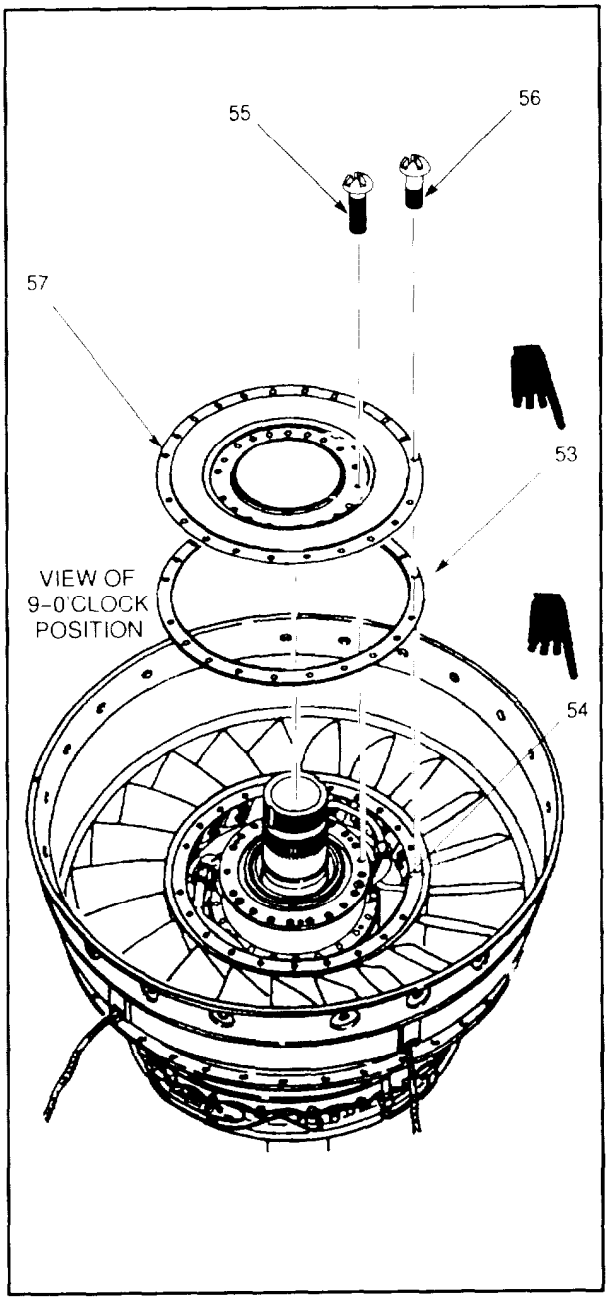
22.1 If removed, install shim (53) on inner bolt circle on aft face of fourth turbine nozzle assembly (54).

CAUTION

In following step, be sure to use 22 new screws. Used screws could break and cause damage to engine.

23. Coat 20 bolts (55) and 22 screws (56) with anti-seize compound (E5).

24. **Install heat shield (57),** 22 screws (56) and 20 bolts (55). Toruqe screws (56) to 23 inch-pounds, then torque bolts (55) to (83) inch-pounds. Lockwire screws (56) and bolts (55). Use lock-wire (E29).



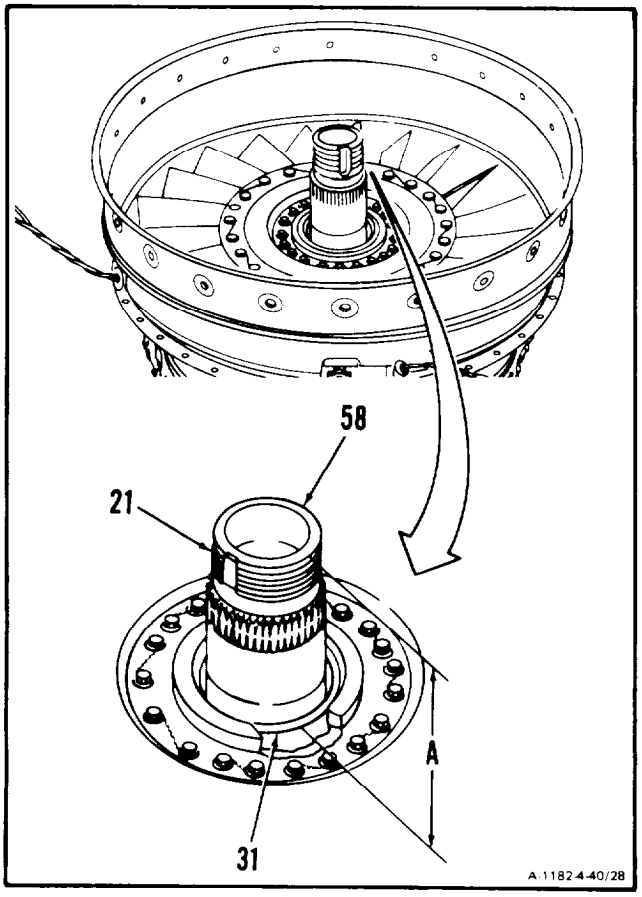
INSPECT

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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

25. **Determine how much of shaft (21) should protrude from fourth stage power turbine rotor** after fourth turbine rotor is installed.

    a. **Measure from end (58) of shaft (21) to aft face of faceplate (31).** Record as Dimension A.



GO TO NEXT PAGE

b. Place fourth stage power turbine rotor (59) with hub on locating bar (T1) (60). **Measure from aft face of hub (61) to locating bar (T1) (60).** Record as Dimension B.

c. If ring spacer (62) was not removed, subtract Dimension B from Dimension A. The answer is how much of shaft should protrude from fourth stage power turbine rotor. Record for later use.

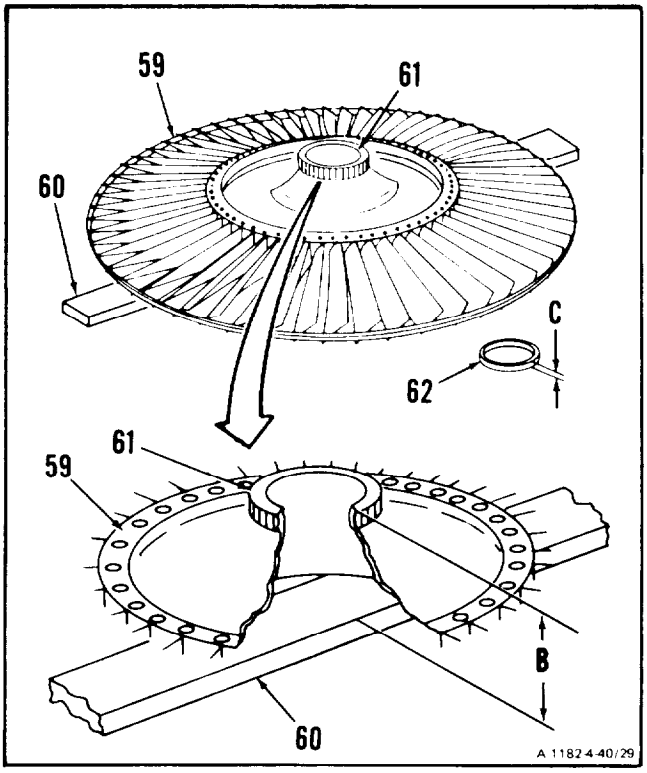
NOTE

If ring spacer was not removed, go to step 27.

d. **If ring spacer (62) was removed** (Ref. Task 4-33), **measure thickness of it.** Record as Dimension C.

e. **Add Dimension C to Dimension B.** Record answer as Dimension D.

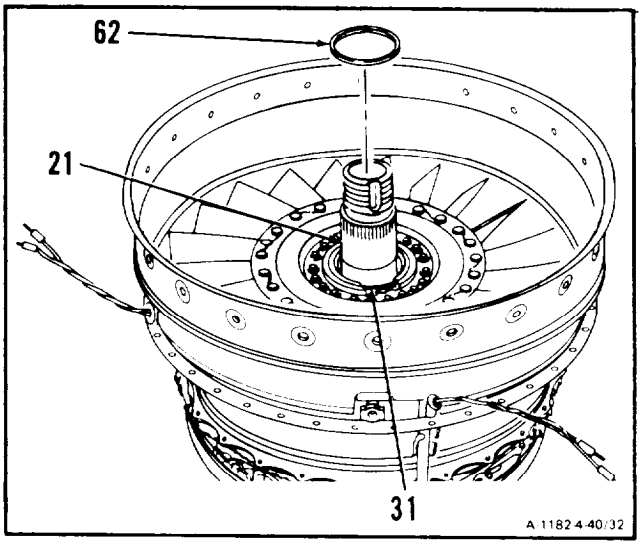
f. **Subtract Dimension D from Dimension A.** The answer is how much of shaft should protrude from fourth stage power turbine rotor. Record answer for later use.



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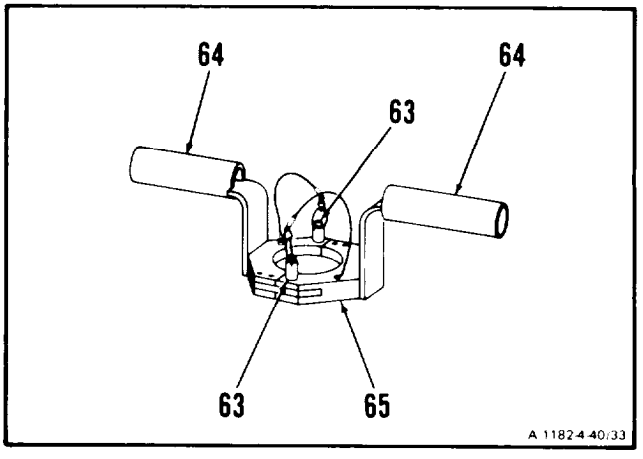
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

26. If removed, install ring spacer (62) on shaft (21) and against faceplate (31).



27. **Install holding fixture (T56)** on fourth stage power turbine rotor as follows:

    a. Remove two pins (63) and **separate halves (64) of holding fixture (T56) (65).**

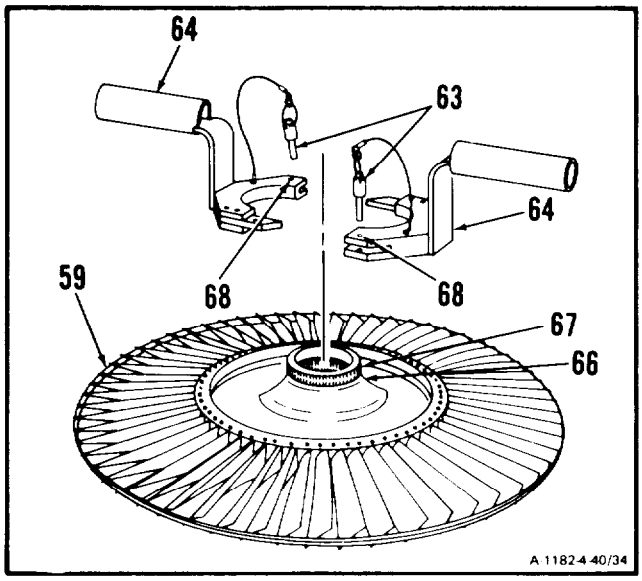


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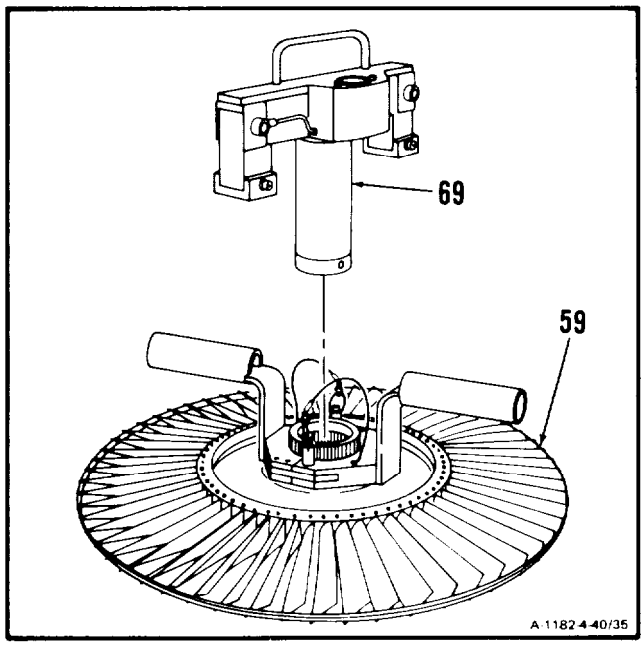
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

b. **Install** halves (64) of **holding fixture (T56)** on hub (66) of **fourth stage power turbine** rotor (59) just under splines (67).

c. Install two pins (63) in holes (68).

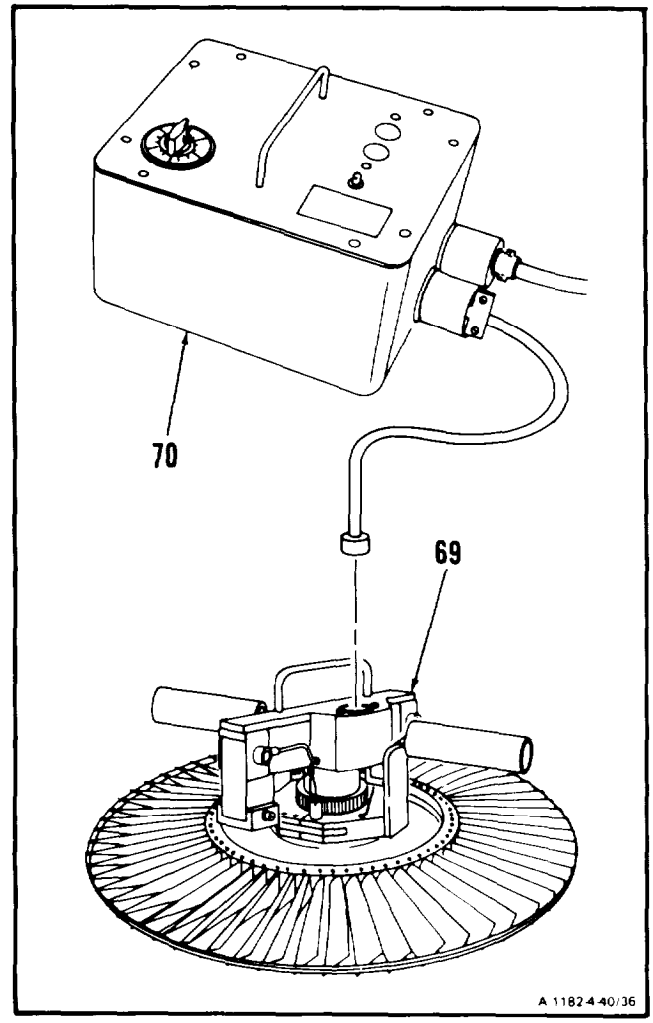


28. **Install induction heater (T50) (69)** on fourth stage power turbine rotor (59).



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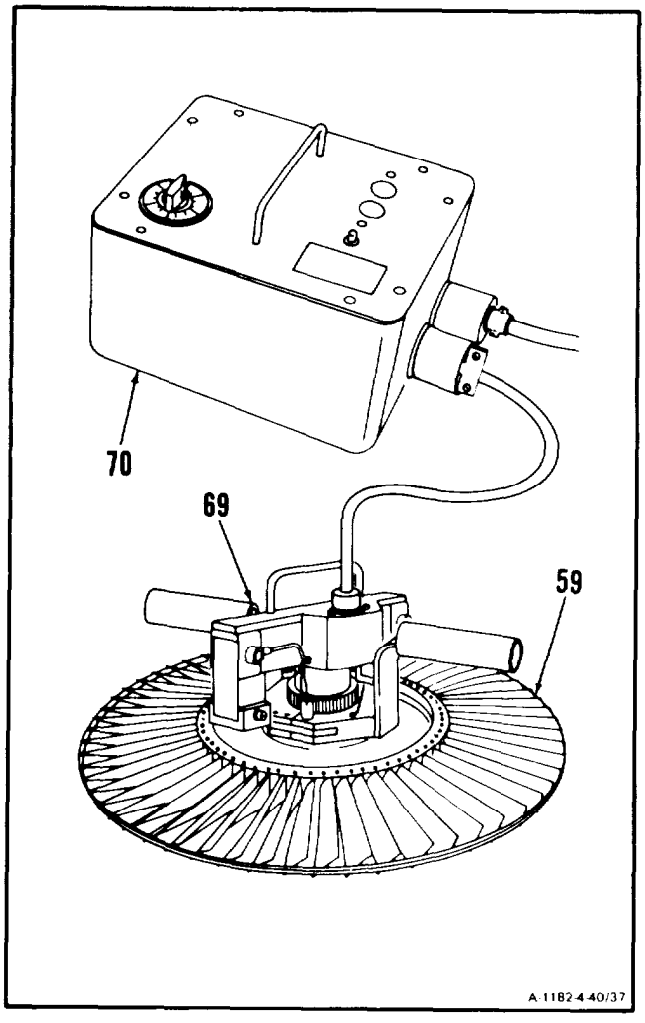
29. **Connect control unit (T55) (70)** to induction heater (T50) (69).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

30. Using induction heater (69) and control unit (70), **heat fourth stage power turbine rotor (59) for nine minutes.**



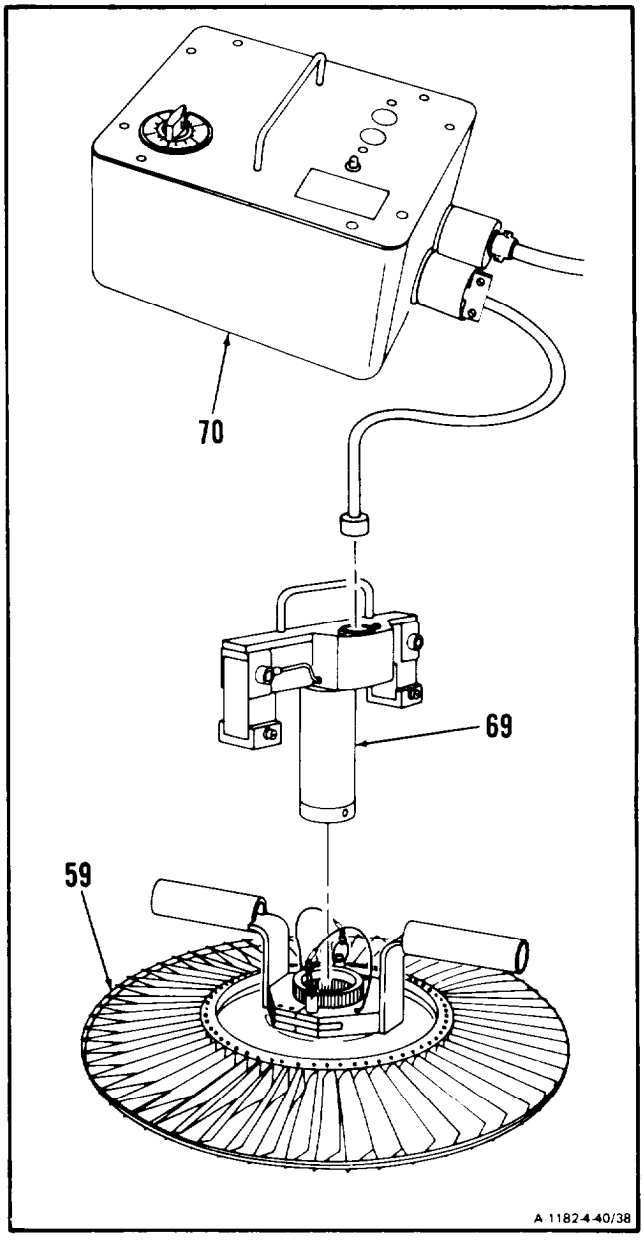
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

WARNING

Wear asbestos gloves when handling heated fourth stage turbine rotor. Failure to comply may cause burns. Get medical attention for burns.

31. Disconnect control unit (70), and **remove induction heater (69)** from fourth stage power turbine rotor (59).

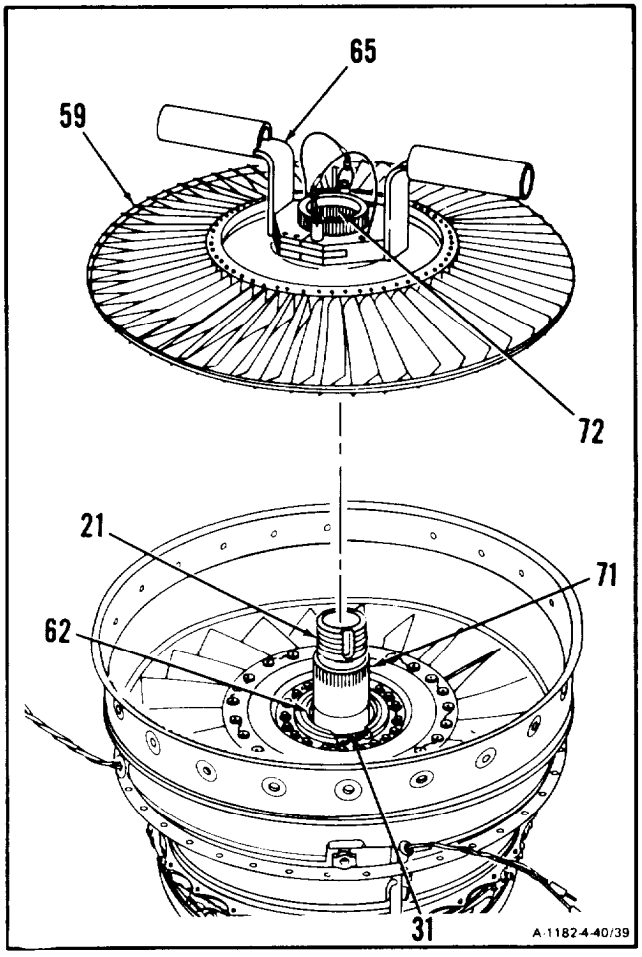


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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

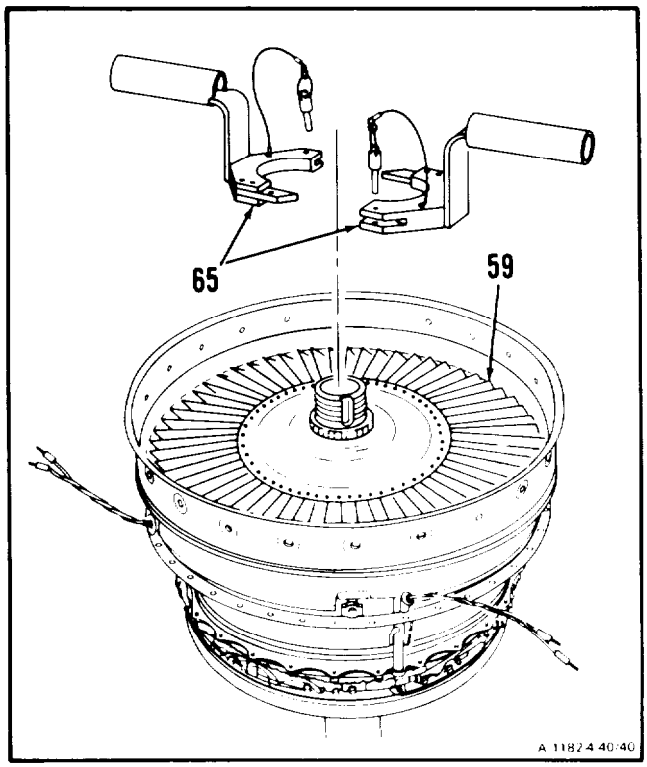
32. **Align matchmarks on fourth stage power turbine** rotor (59) with matchmarks on shaft (21).

33. Use holding fixture (T56) (65). Align splines (71 and 72). **Install fourth stage power turbine rotor (59)** on shaft (21) until bottomed out against faceplate (31) or, if installed, ring spacer (62).



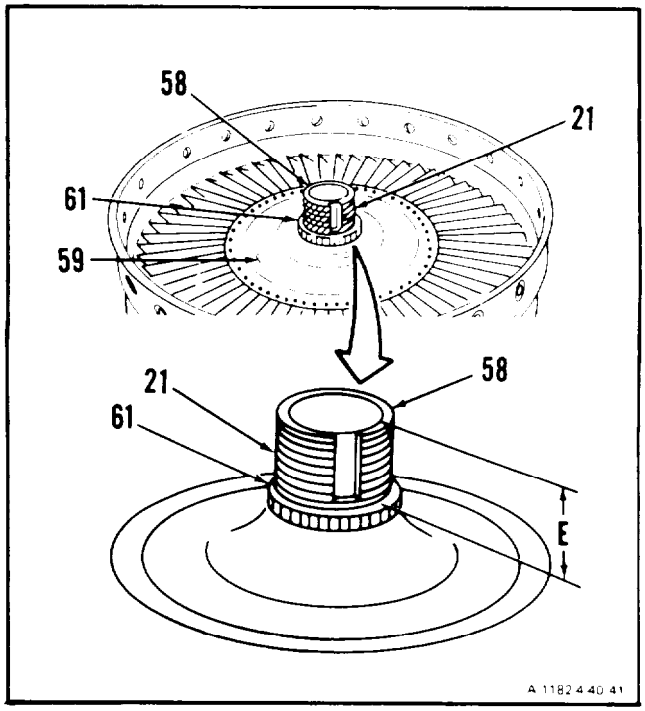
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34. Remove holding fixture (65), and **allow fourth stage power turbine rotor (59) to cool** to room temperature.



35. **Measure length of shaft (21) protruding out through fourth stage power turbine rotor (59).** Measure from end (58) of shaft (21) to aft face of hub (61) on fourth stage power turbine rotor (59). Record as Dimension E.

36. **Compare Dimension E with dimension recorded in step 25.c. or f.** Dimensions shall be no more than 0.005 inch apart.



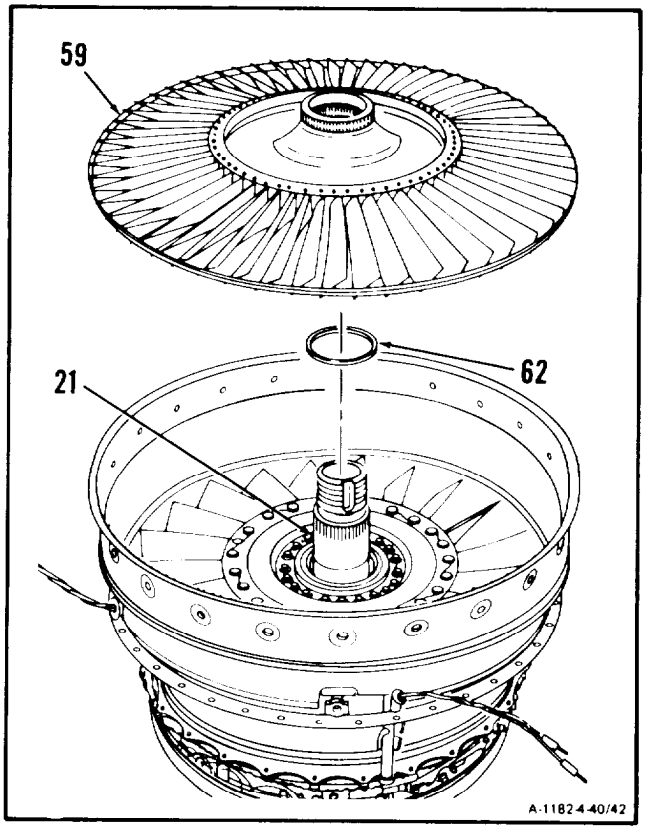
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NOTE

If calculated length and measured length are not within limits, do steps 37 thru 40. If calculated length and measured length are within limits, omit steps 37 through 40.

37. **Remove fourth stage power turbine rotor (59)** (Ref. Task 4-33, steps 4. thru 8).

38. **Inspect shaft (21), fourth stage power turbine rotor (59) and, if installed, spacer (62).** Check for contaminants or damage that caused rotor (59) to hang up. If hang up exists, remove contaminants or replace power turbine assembly.



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

39. Using bearing package installing tool (T51) (22) re-seat third power turbine shaft (73) and No. 4 and 5 bearing package (20).

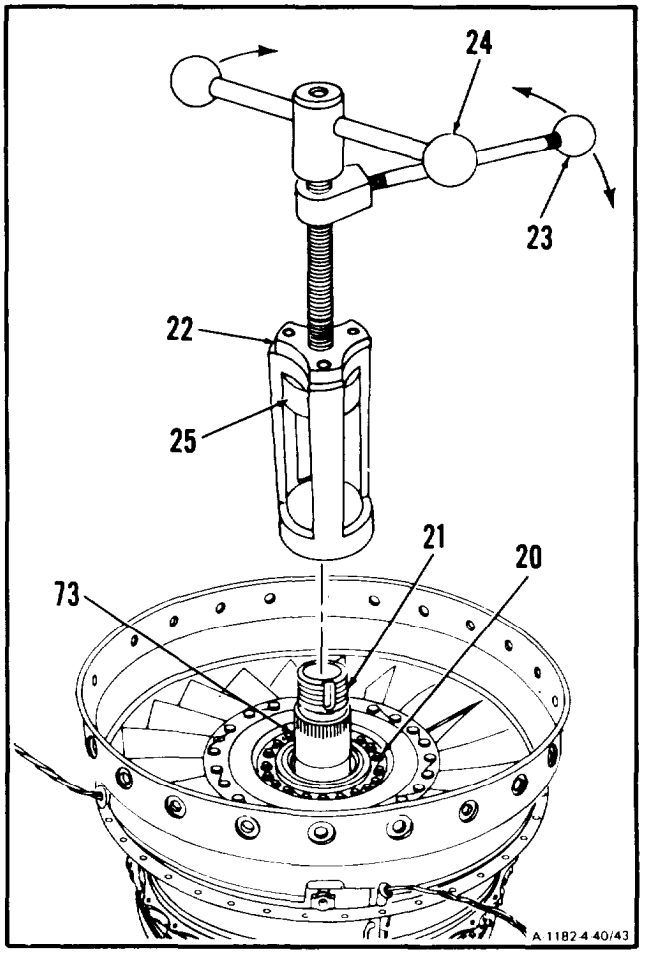
    a. Turn handle (23) counterclockwise all the way. Install nut (25) on shaft (21). Tighten nut (25) on shaft (21), turning T-handle (24) clockwise.

    b. Turn handle (23) clockwise to seat bearing package (20) fully into position on third turbine rotor shoulder. Remove bearing package installing tool (T51) (22).

NOTE

Be sure ring spacer does not stick to removal tool.

40. **Install fourth stage power turbine rotor (59)** (Ref. steps 25. thru 36).



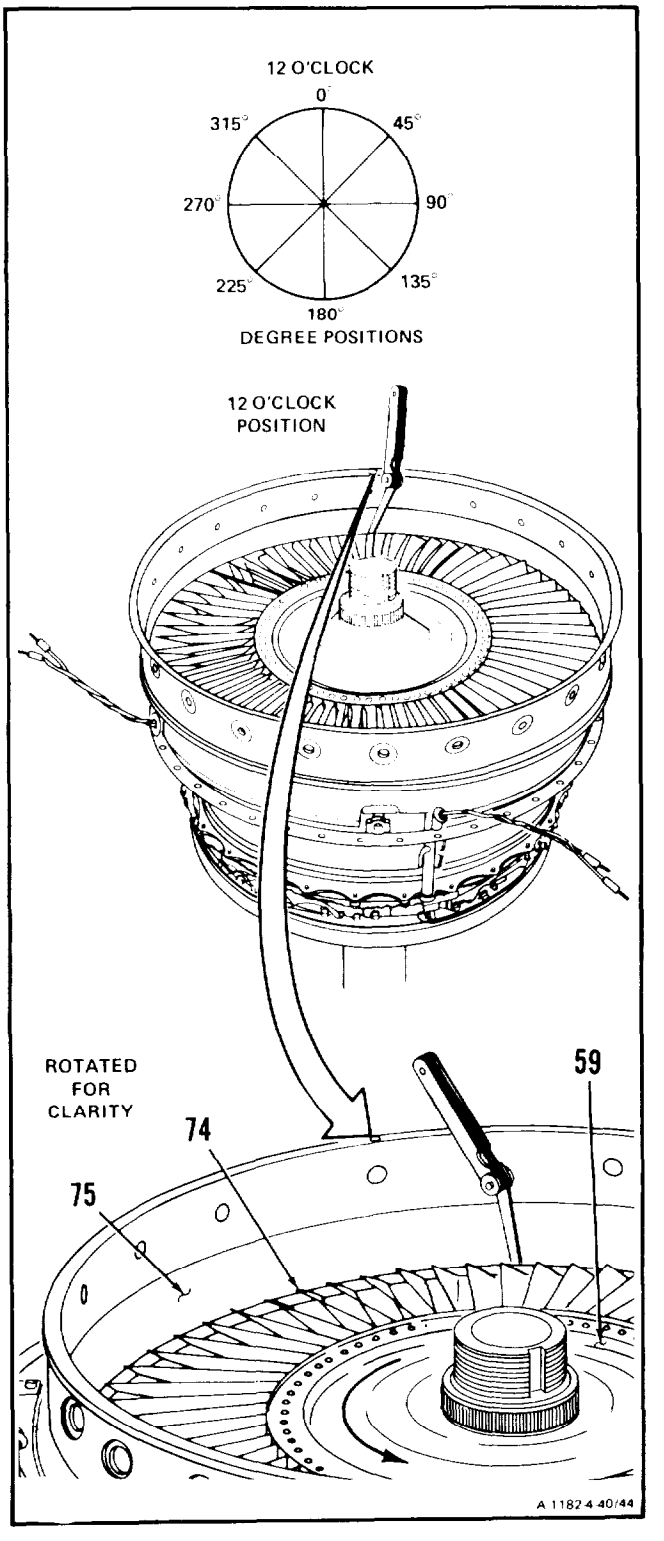
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

41. **Measure** clearance between tips of blades (74) and fourth stage power turbine nozzle (75) **(tip clearance)** at 0, 45, 90, 135, 180, 225, 270 and 315-degree positions as follows:

    a. Insert thickness gage between fourth stage power turbine nozzle (75) and blade (74) tip. Rotate fourth stage turbine rotor (59) counterclockwise one revolution for each check.

    b. Tip clearance shall be 0.020 inch minimum.

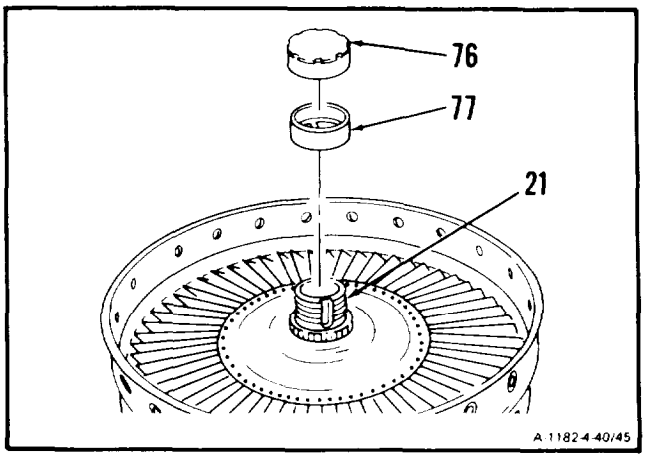


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NOTE

If tip clearance is not within limits, replace power turbine assembly.

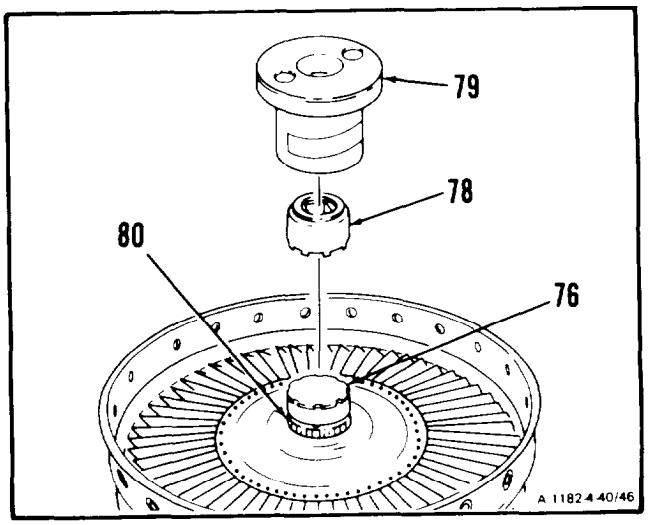
42. Coat threads of nut (76) with nickel ease (E37). **Install** locking cup (77) and **nut (76)** on shaft (21).



43. **Install torque fixture (T48),** consisting of wrench (78) and holding fixture (79) as follows:

a. Position wrench (78) on nut (76).

b. Position holding fixture (79) on spline (80).



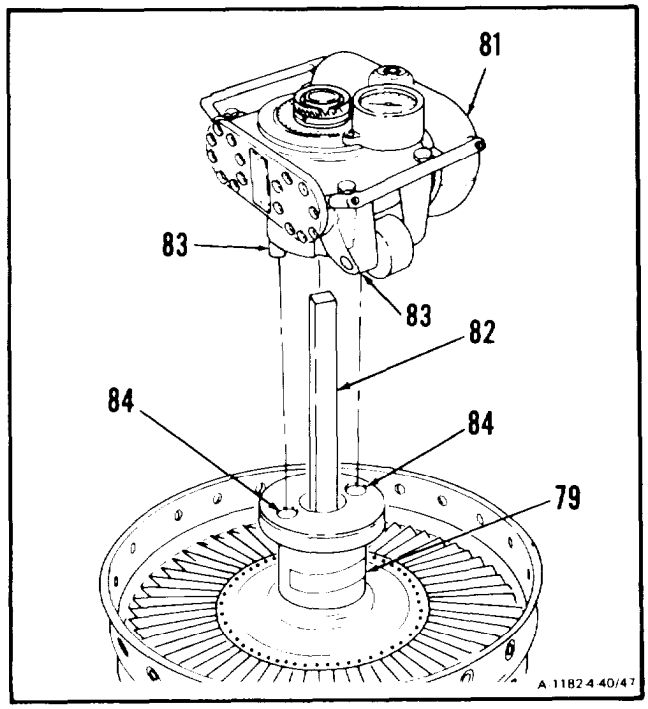
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

44. Using helper, **install torque multiplier (T63) (81)** as follows:

    a. Install drive bar (82) and position torque multiplier (T63) (81) over drive bar (82).

    b. Align two pins (83) with holes (84) in holding fixture (79). Place torque multiplier (T63) (81) on holding fixture (79).



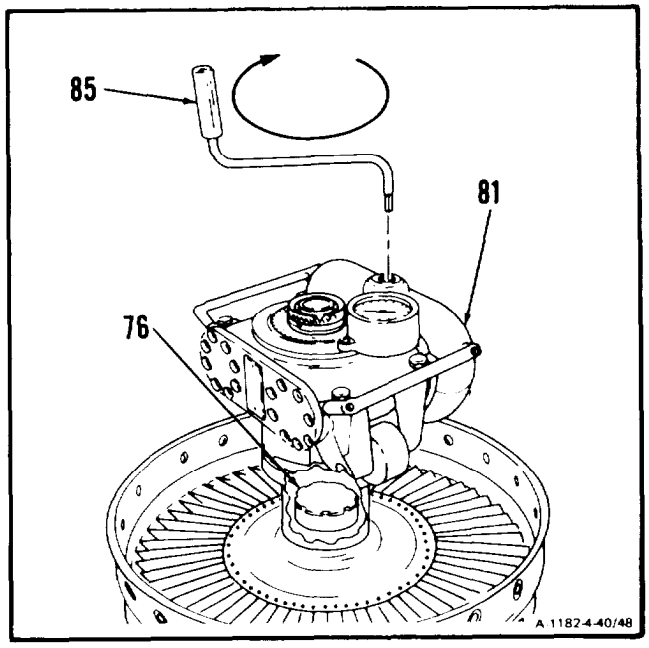
WARNING

Make sure handle is fully seated and ratchet selector on torque pack is properly set before applying torque. Rotating ratchet selector with load on torque pack can damage unit and injure personnel. If injury occurs, get medical attention.

WARNING

Do not change ratchet selector when torque load is on torque pack. Damage to equipment or injury to personnel can result. If injury occurs, get medical attention.

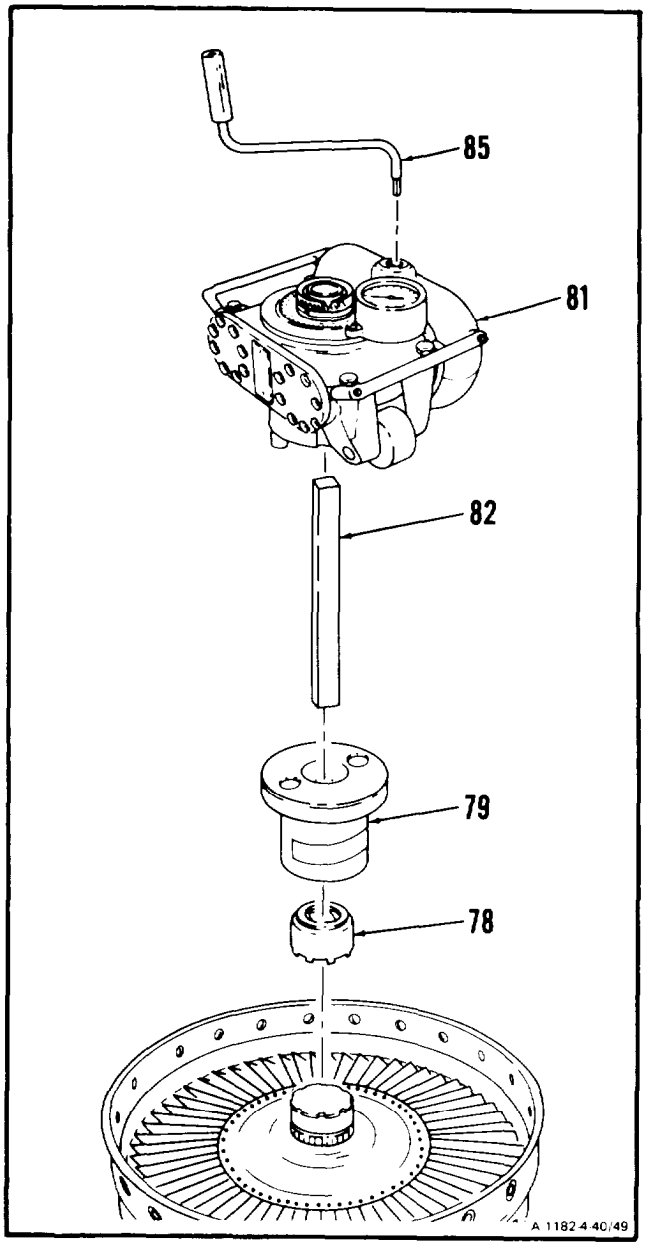
45. **Install handle (85)** in torque multiplier (T63) (81). Turn handle clockwise to torque nut (76). **Torque nut (76) to 475 foot-pounds.**



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

46. Remove handle (85), torque multiplier (T63) (81), drive bar (82), and torque fixture (T48), consisting of wench (78) and holding fixture (79).

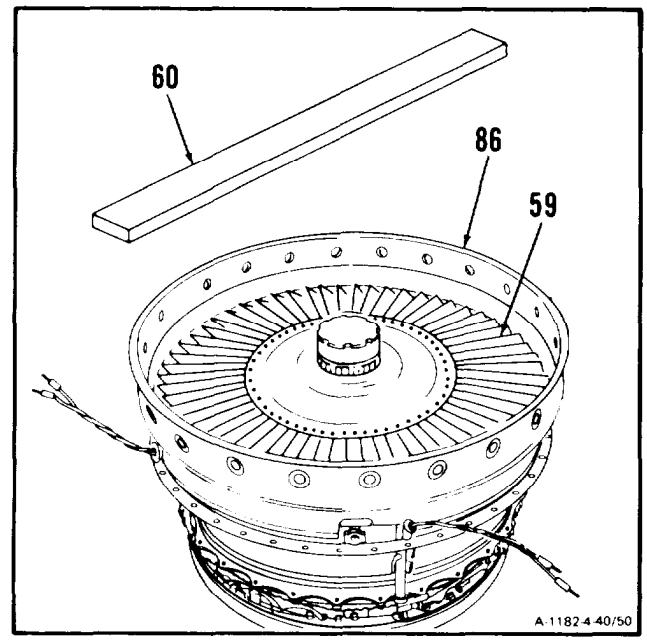


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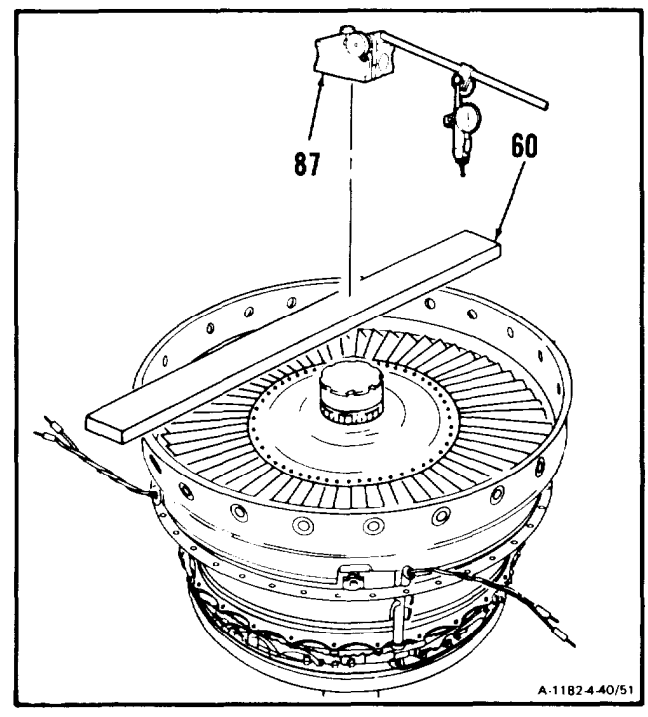
4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

47. **Check runout of fourth stage power turbine rotor (59).**

a. Place locating bar (T1) (60) on aft surface of fourth stage power turbine nozzle (86).



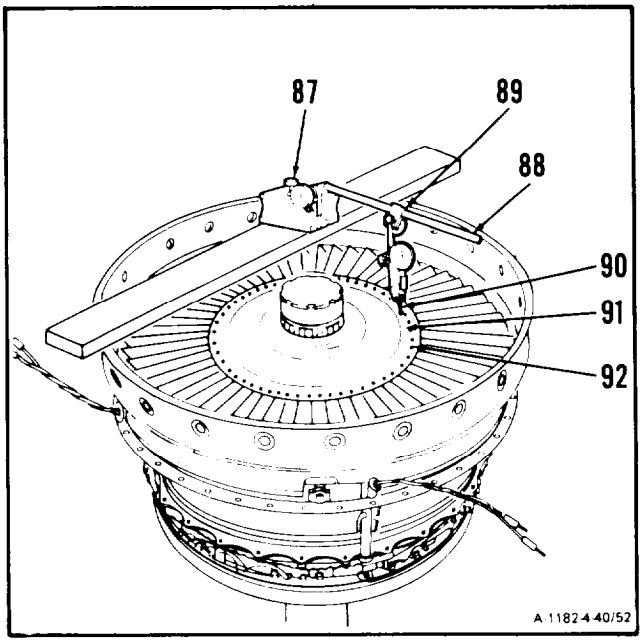
b. Place dial indicator magnetic base (87) on locating bar (T1) (60).



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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

c. Adjust arm 188) at base (87) and clamp (89). Position pointer (90) on surface (91), just Inside of blade retaining pins (92).



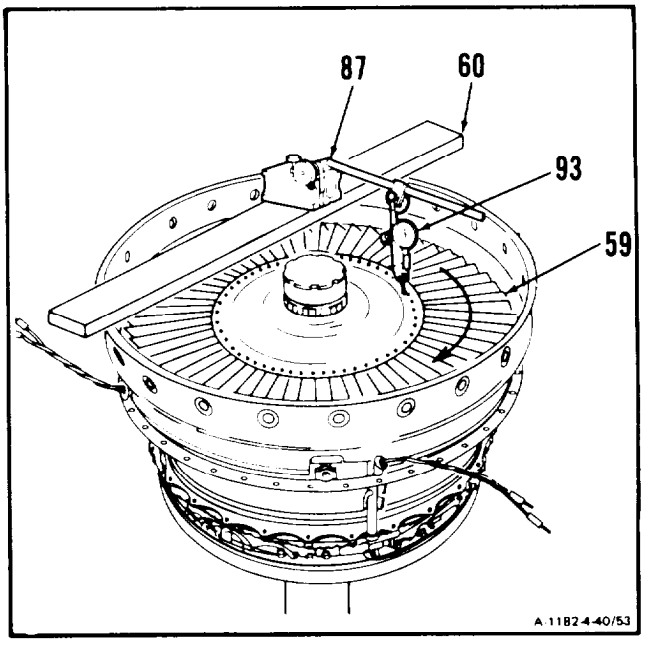
d. Zero indicator (93). Rotate fourth stage power turbine rotor (59) clockwise while noting Indicator reading.

e. Runout shall be no more than 0.003 inch.

NOTE

If runout is not within limits, do steps 37. through 47. If runout is still not within limits, replace power turbine assembly.

f. Remove dial indicator (87) and locating bar (T1) (60).



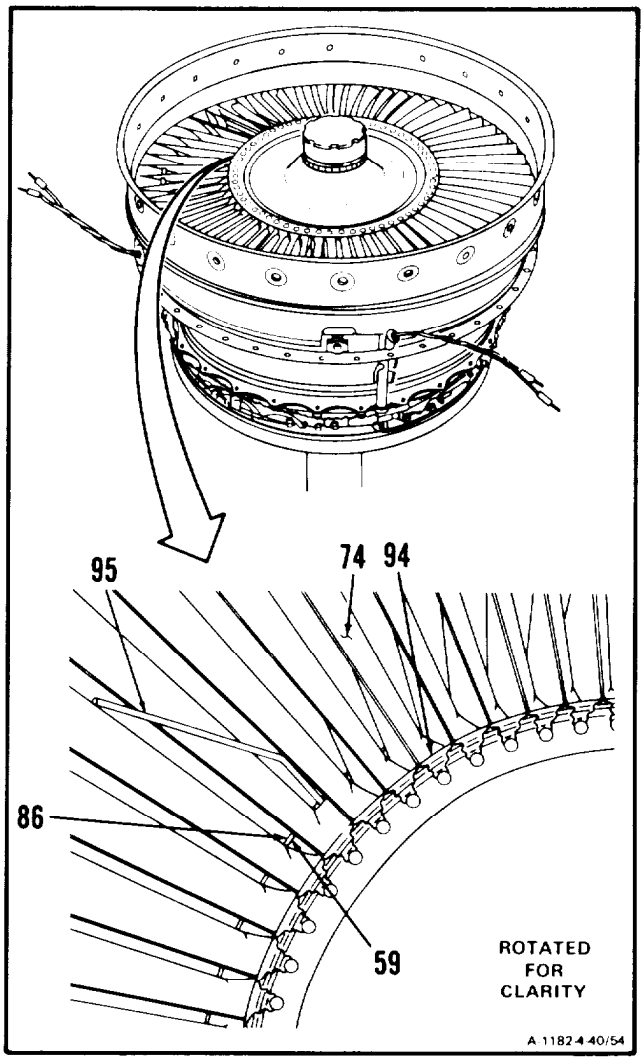
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

48. **Check axial clearance between fourth stage power turbine rotor (59) and fourth stage power turbine nozzle (86) at blade roots (94).** Use 0.104 inch and 0.228 inch bent wire gages. (Appendix E) (95) inserted between fourth stage power turbine rotor blades (74). Axial clearance shall not be less than 0.104 inch or more than 0.228 inch.

NOTE

If axial clearance is not within limits, do steps 37. through 48. Ring spacer may be installed or removed as necessary. Re-check clearance. If clearance still is not within limits, replace power turbine assembly



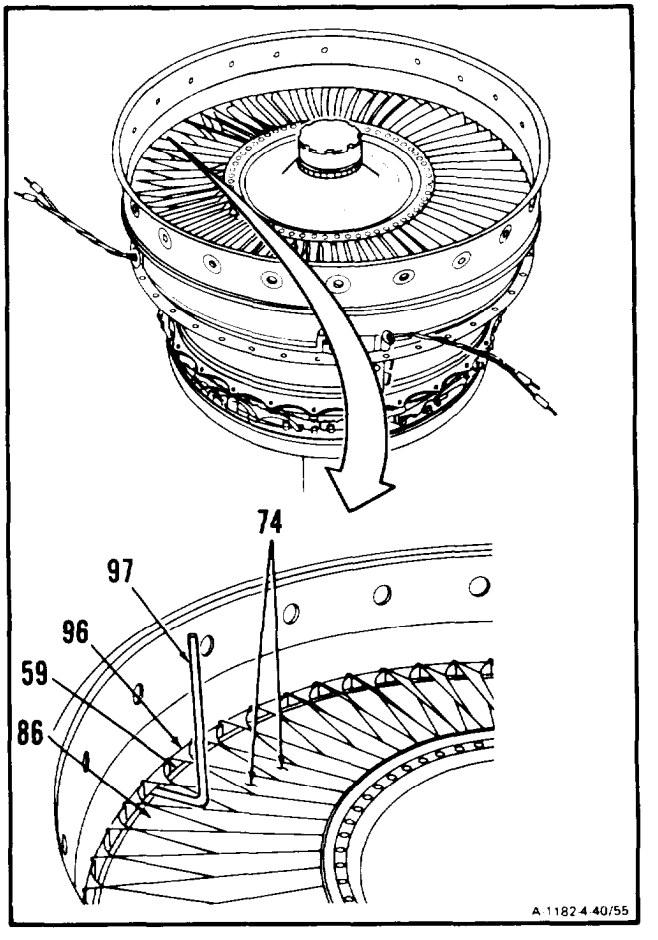
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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

49. **Check axial clearance between fourth stage power turbine rotor (59) and fourth stage power turbine nozzle (86) at blade tips (96).** Use 0.115 inch and 0.290 inch bent wire gage (Appendix E) (97) inserted between fourth stage power turbine rotor blades (74). Axial clearance shall not be less than 0.115 inch or more than 0.290 inch.

NOTE

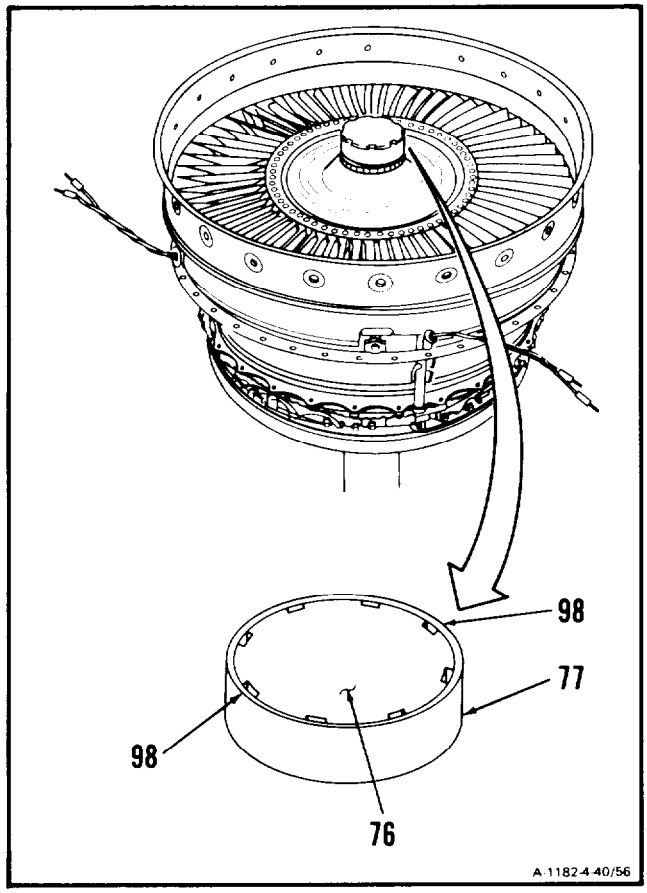
If axial clearance is not within limits, do steps 37. through 49. Ring spacer may be installed or removed as necessary. Recheck clearance. If clearance still is not within limits, replace power turbine assembly.



GO TO NEXT PAGE

4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

50. Bend locking cup (77) into nut (76) in two places (98), 180 degrees apart.



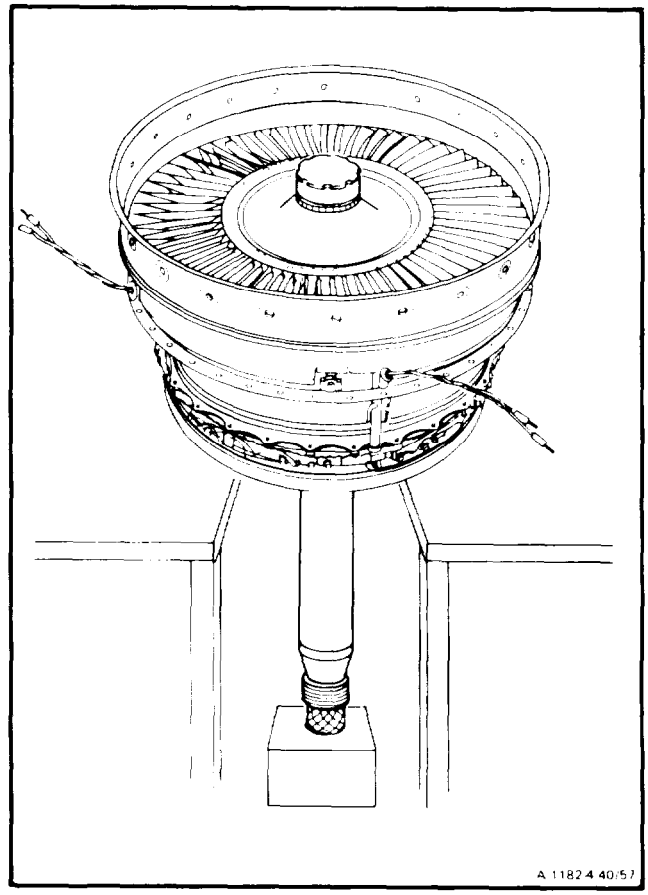
INSPECT

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4-40 INSTALL NO. 4 AND 5 BEARING PACKAGE SEALS (AVIM) (Continued) 4-40

FOLLOW-ON MAINTENANCE

Assemble Combustion Section and Power Turbine (Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-41 REMOVE NO. 4 AND 5 BEARING OIL TUBES (AVIM) 4-41

INITIAL SETUP

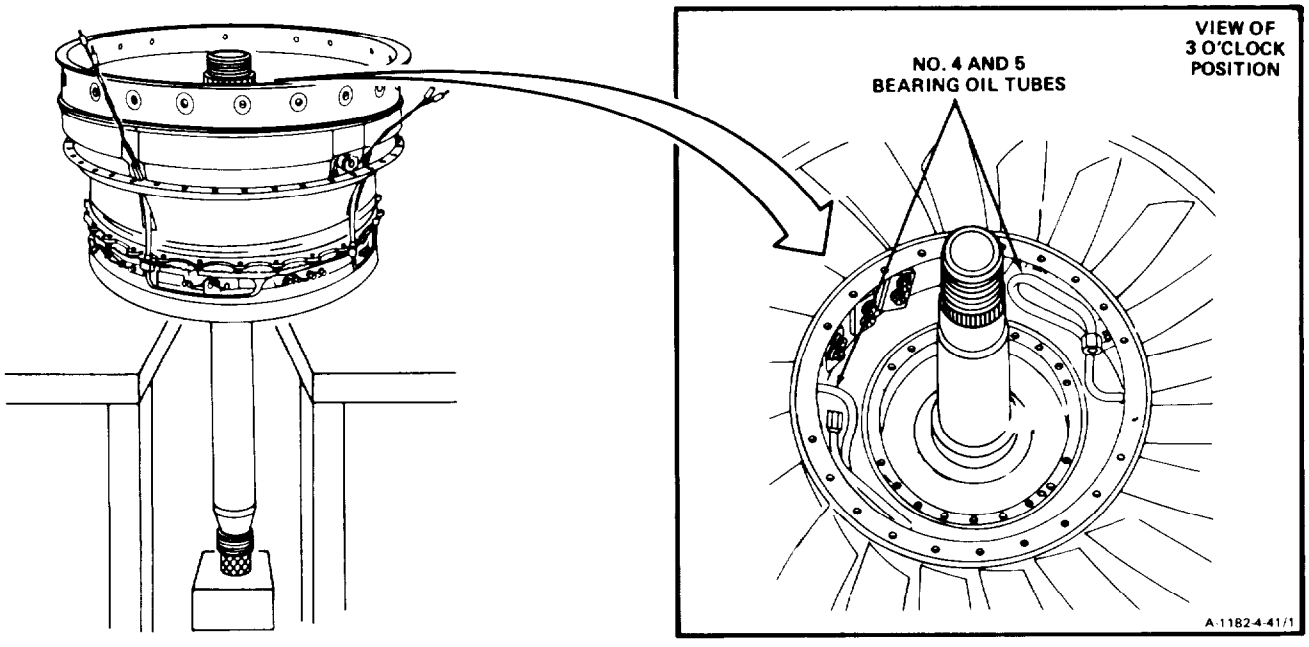
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
No. 4 and 5 Bearing Package Removed (Task 4-37, Steps 1 thru 15)



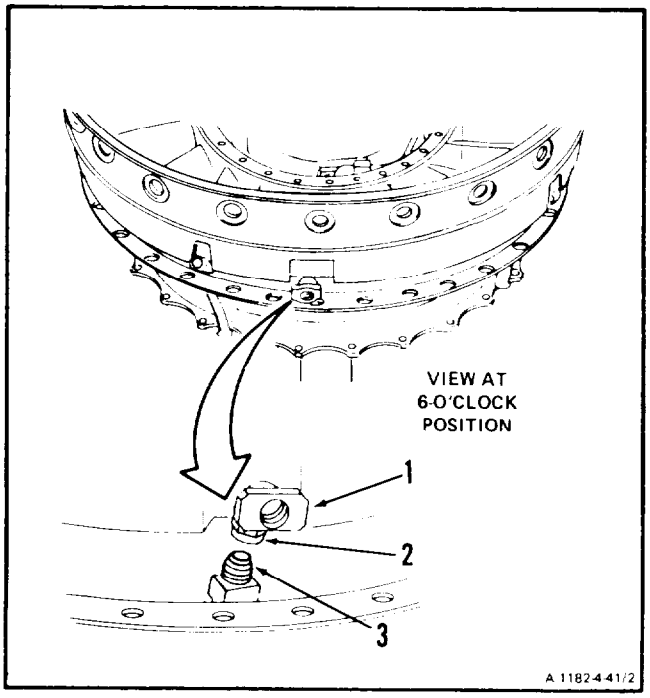
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4-41 REMOVE NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-41

1. Remove No. 4 and 5 bearing oil scavenge tube adapter (1) as follows:

a. Remove lockwire from adapter nut (2).

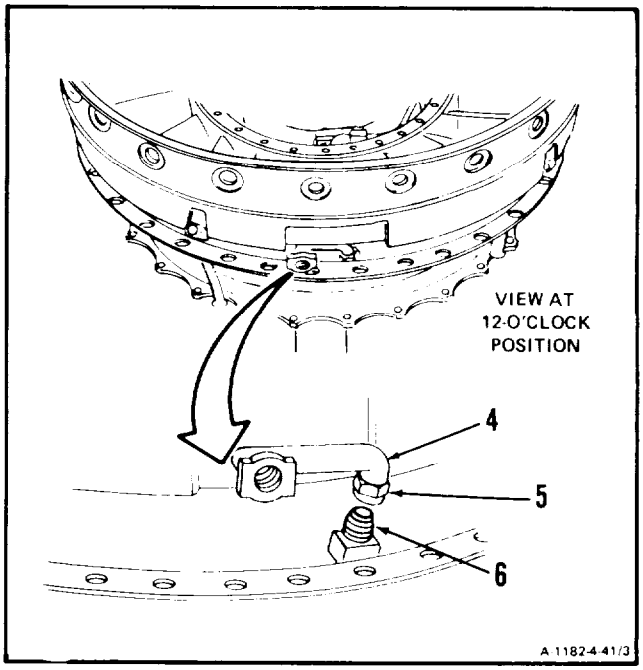
b. Remove adapter (1) from tube assembly (3).



2. Remove No. 4 and 5 bearing oil pressure tube adapter (4) as follows:

a. Remove lockwire from adapter nut (5).

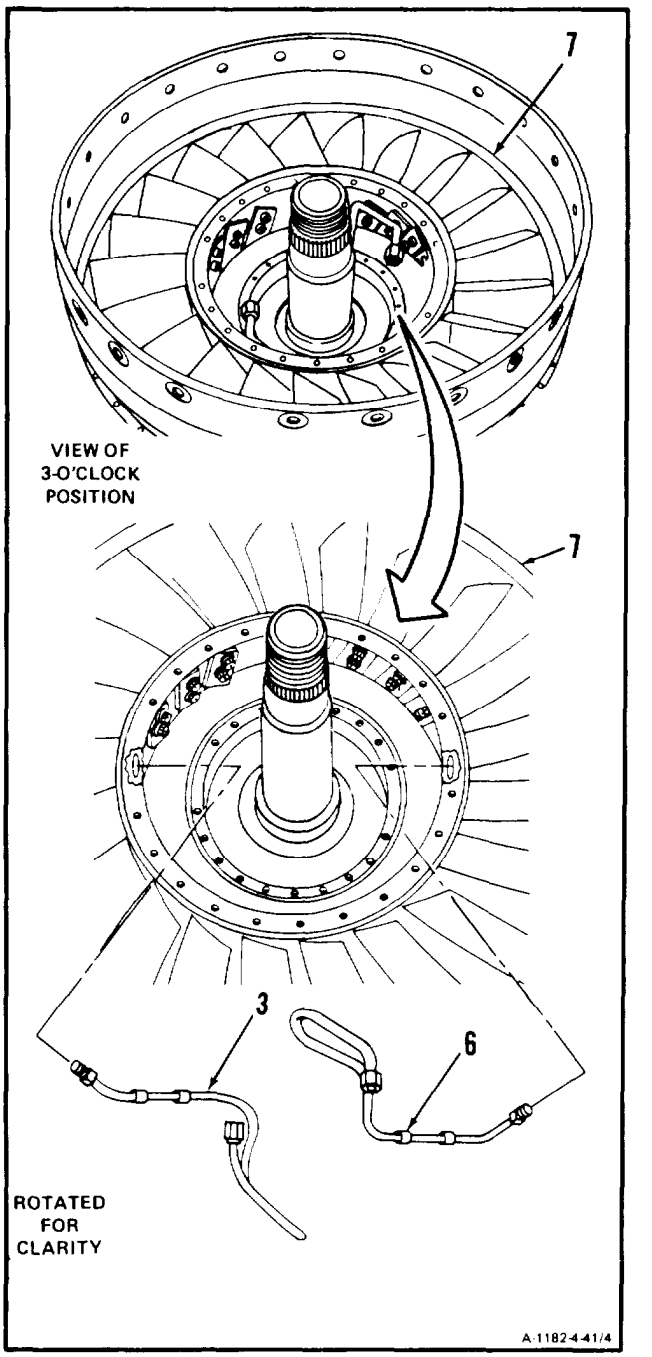
b. Remove adapter (4) from tube assembly (6).



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4-41 REMOVE NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued)

3. Remove tube assemblies (3) and (6) from fourth stage power turbine nozzle (7).

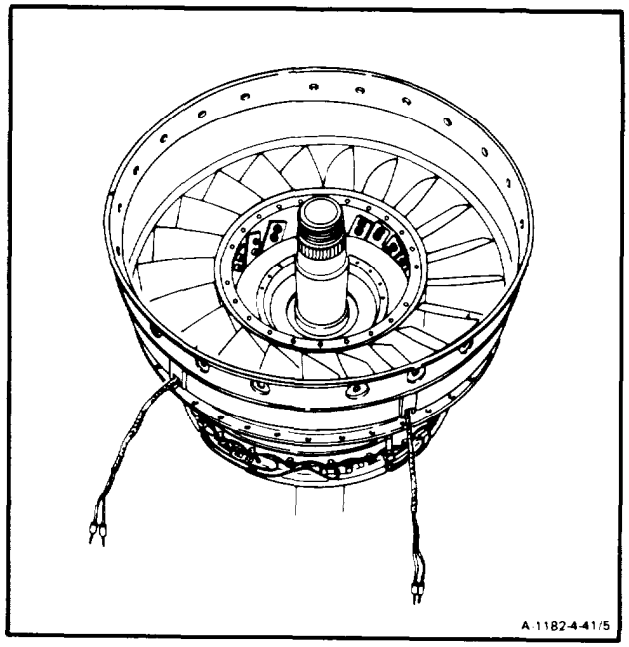


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4-41 REMOVE NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-41

FOLLOW-ON MAINTENANCE.

None



END OF TASK

4-42 CLEAN NO. 4 AND 5 BEARING OIL TUBES (AVIM) 4-42

INITIAL SETUP

Applicable Configurations.
All

Tools.
Compressed Air Source
Fiber Brush
Goggles

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition :
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
No, 4 and 5 Bearing Oil Tubes Removed (Task 4-41)

General Safety Instructions.

WARNING

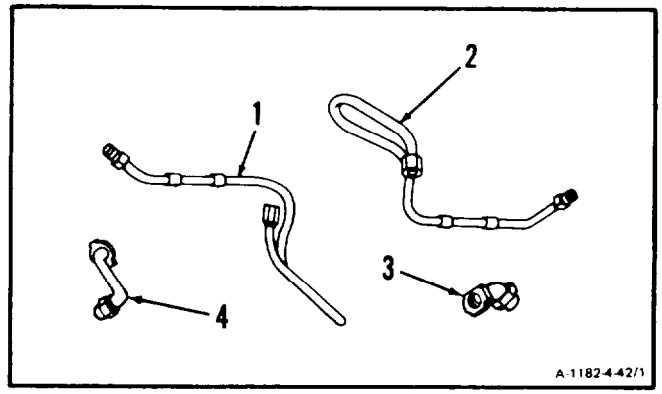
Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20) and goggles, **Clean oil tube assemblies (1 and 2) and adapters (3 and 4).** Use methyl ethyl ketone and fiber brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry internal and external surfaces** of oil tube assemblies (1 and 2) and adapters (3 and 4). Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE'

Inspect No. 4 and 5 Bearing Oil Tubes (Task 4-43).

END OF TASK

4-43 INSPECT NO. 4 AND 5 BEARING OIL TUBES (AVIM) 4-43

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

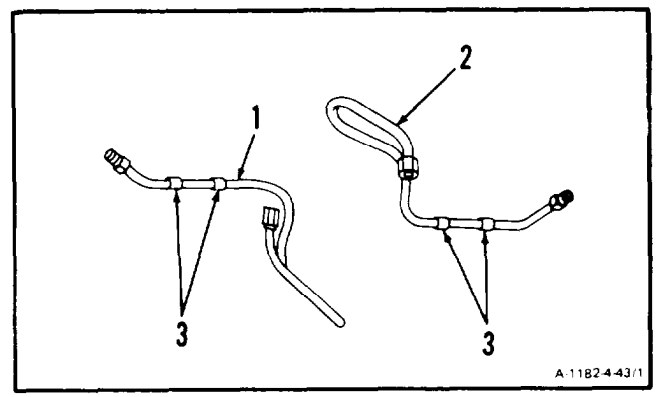
Equipment Condition:
Off Engine Task

1. **Inspect No. 4 and 5 bearing oil tubes (1 and 2)** as follows:

   a. There shall be no cracks.

   b. There shall be no nicks, dents or rub wear greater than 0.040 inch depth on oil tube sleeves (3).

   c. There shall be no nicks, dents or rub wear greater than 0.030 inch depth on oil tubes (1 and 2).

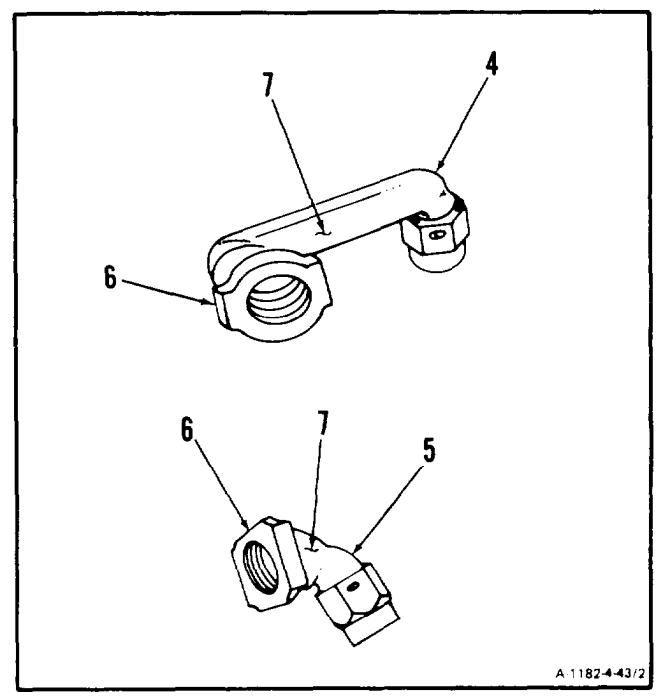


2. **Inspect adapters (4 and 5)** as follows:

   a. There shall be no cracks.

   b. There shall be no nicks, dents or rub wear greater than 0.050 inch depth on adapter squared ends (6).

   c. There shall be no nicks, dents or rub wear greater than 0.020 inch depth on adapter tube areas (7).



FOLLOW-ON MAINTENANCE.

None

END OF TASK

4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) 4-44

INITIAL SETUP

Applicable Configurations:
All

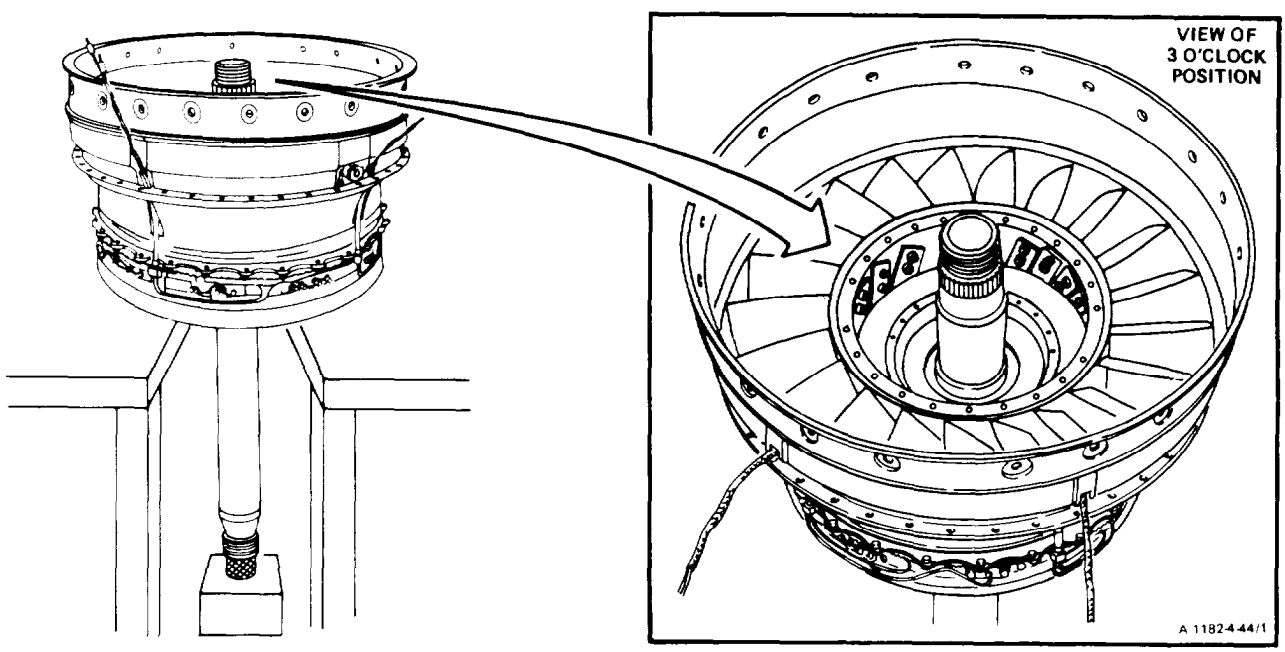
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Oil Tube Fixture (T34)
Bearing Installing Tool (T51)
Reducer, P/N 2-141-121-04
Bolt, 1/4 x 28 x 1-Inch (2)
Nut, 1/4 x 28 (2)
Torque Wrench, 0-30 Inch-Pounds
Torque Wrench, 30-150 Inch-Pounds
Torque Wrench, 100-750 Inch-Pounds

Parts.
Seal
Screws

Materials:
Anti-Seize Compund (E5)
Lockwire (E28)
Lockwire (E29)
Lubricating Oil (E32 or E33)

Personnel Required.
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

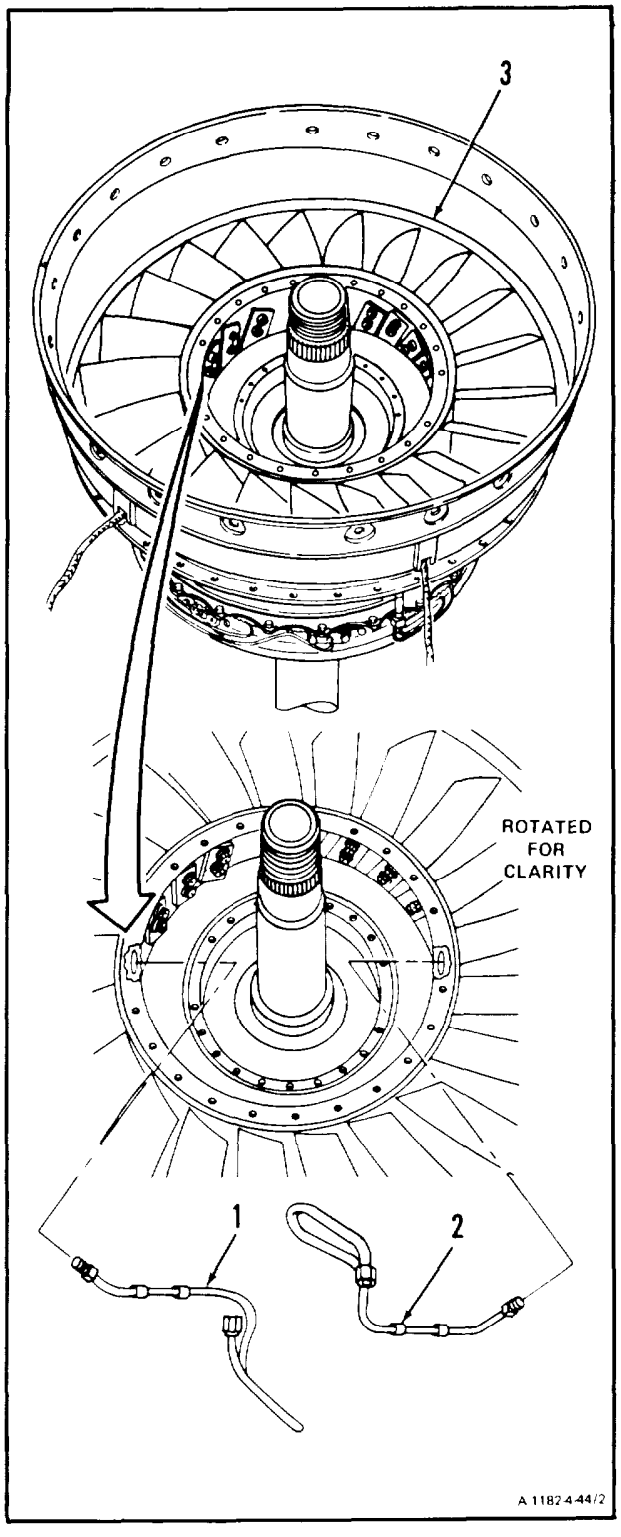
References:
TM 55-2840-254-23P
Task 4-40



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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

1. **Install tube assemblies (1 and 2)** into fourth stage power turbine nozzle (3) at 6- and 12-o'clock positions as follows

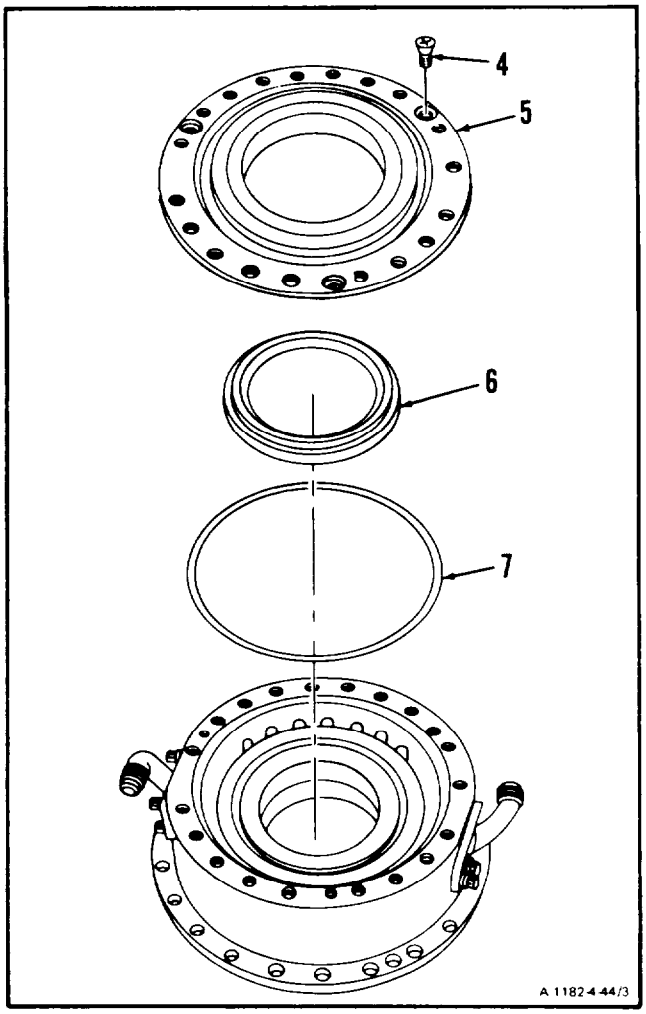


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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued)

a. Remove three screws (4) and remove aft seal and retainer (5).

b. Remove faceplate (6) and seal (7).



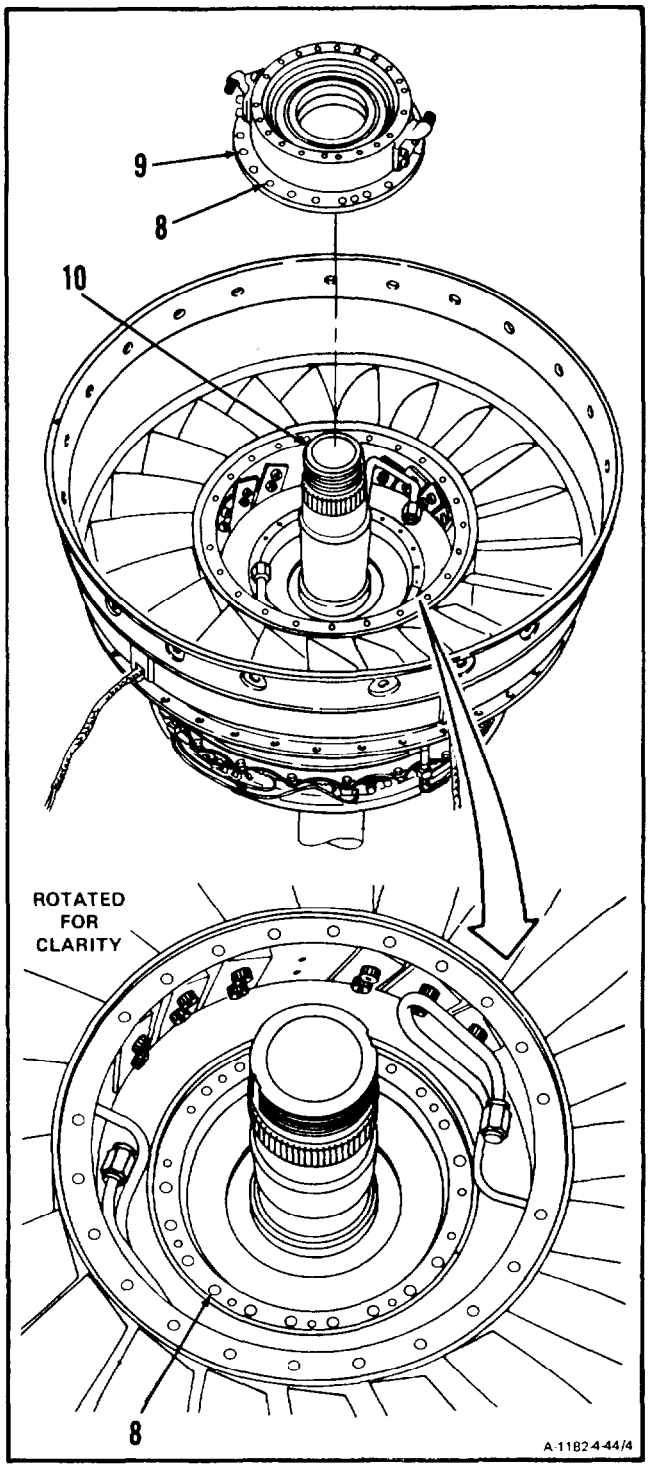
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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

CAUTION

Be sure to install bearing package carefully and straight. Carbon seal elements could easily break. This would cause oil leakage and engine damage.

c. Align bolt holes (8) and position No. 4 and 5 bearing package (9) on integral shaft assembly (10).



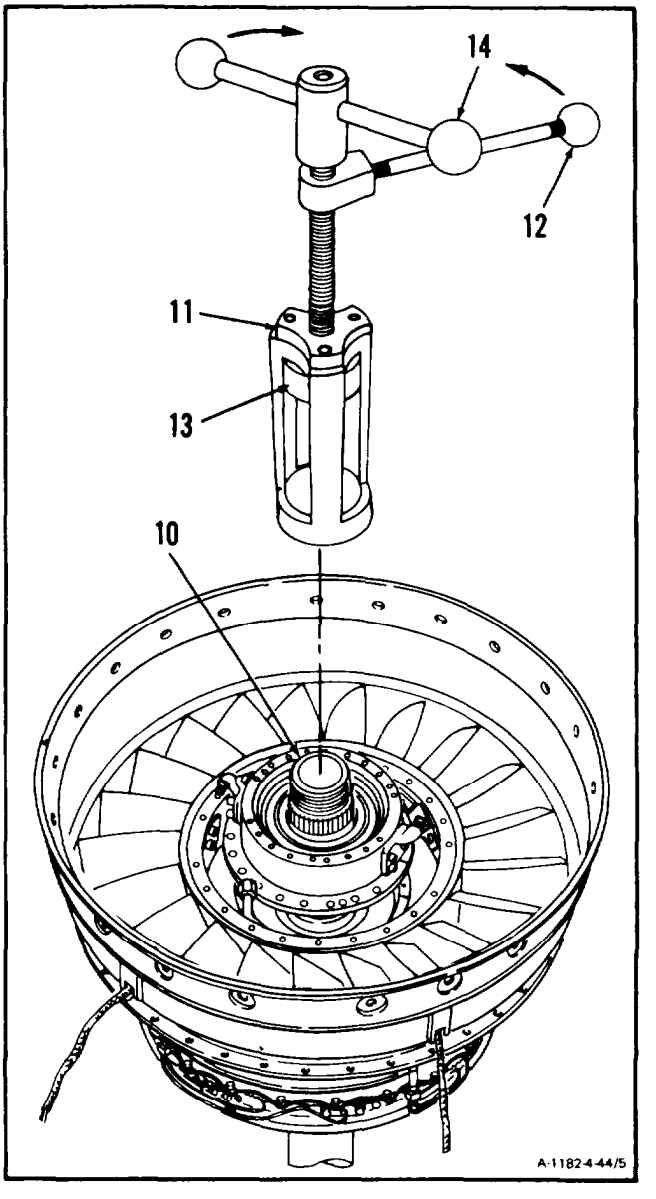
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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

d. **Install bearing installing tool (T51)** (11) as follows

(1) Turn handle (12) counterclockwise until it is backed out all the way.

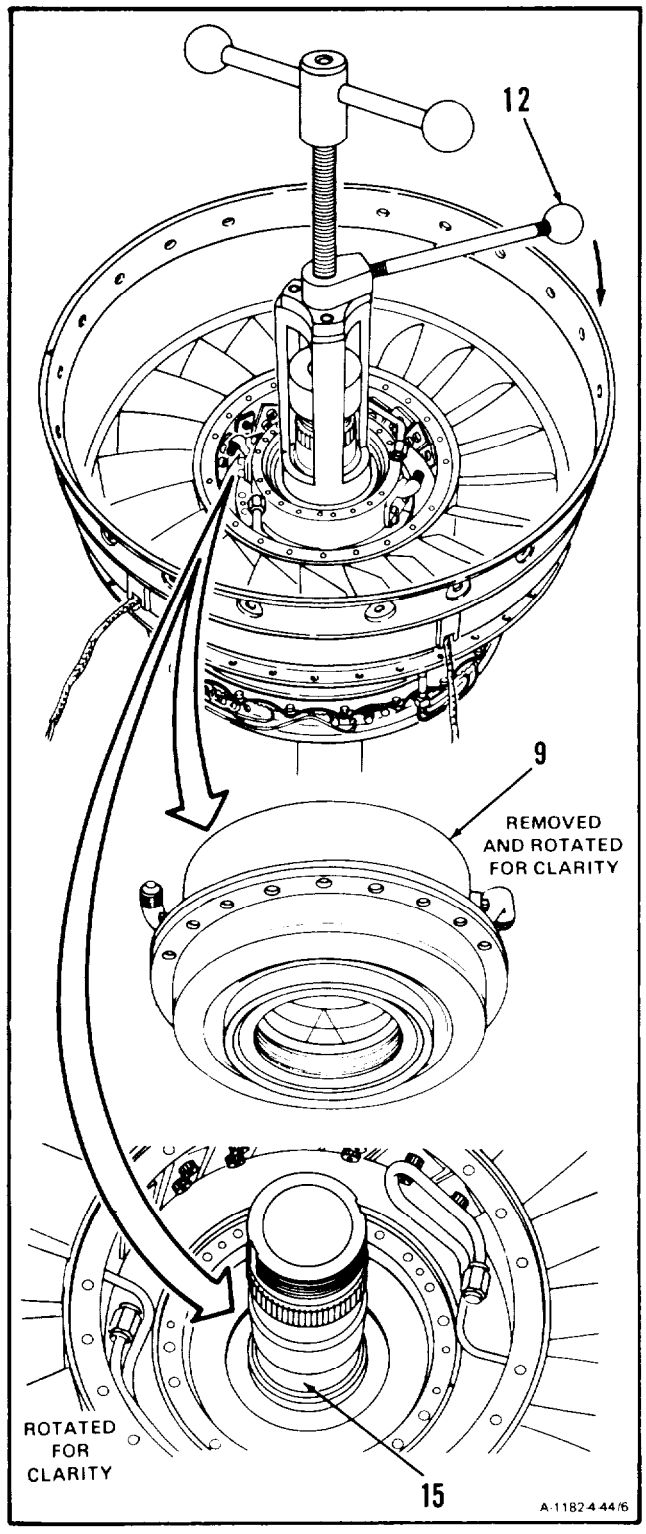
(2) Install nut (13) on shaft (10). Turn T-handle (14) clockwise until nut (13) is tight.



GO TO NEXT PAGE

4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

e. **Seat No. 4 and 5 bearing package (9)** onto third turbine rotor shaft shoulder (15) by turning handle (12) clockwise.

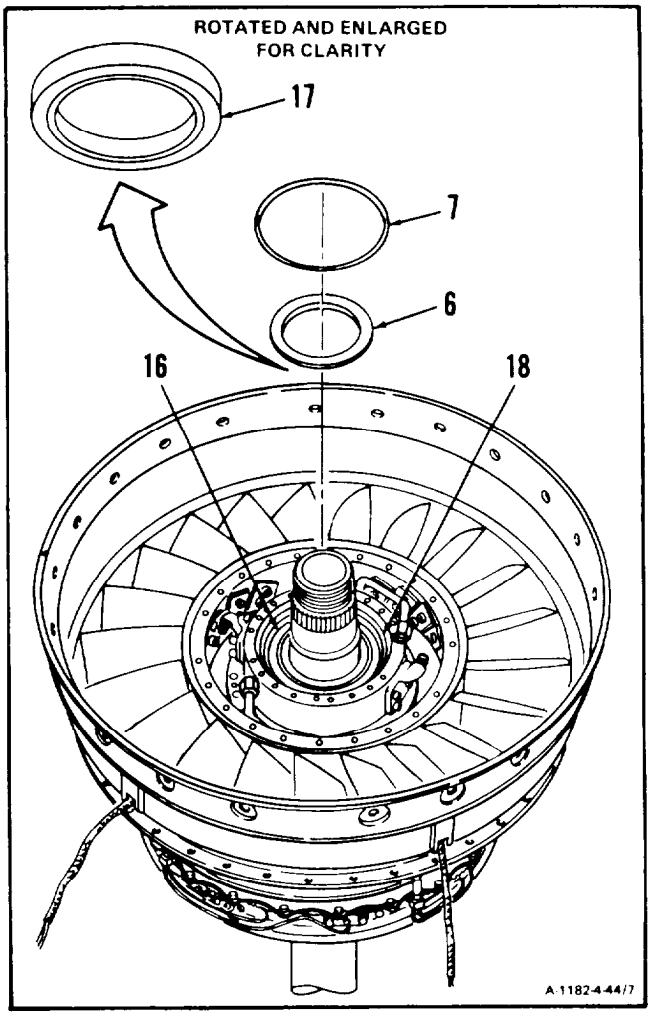


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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued)

f. **Install faceplate (6)** on bearing (16) with beveled side (17) facing down.

g. **Install seal (7)** in groove (18).



INSPECT

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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

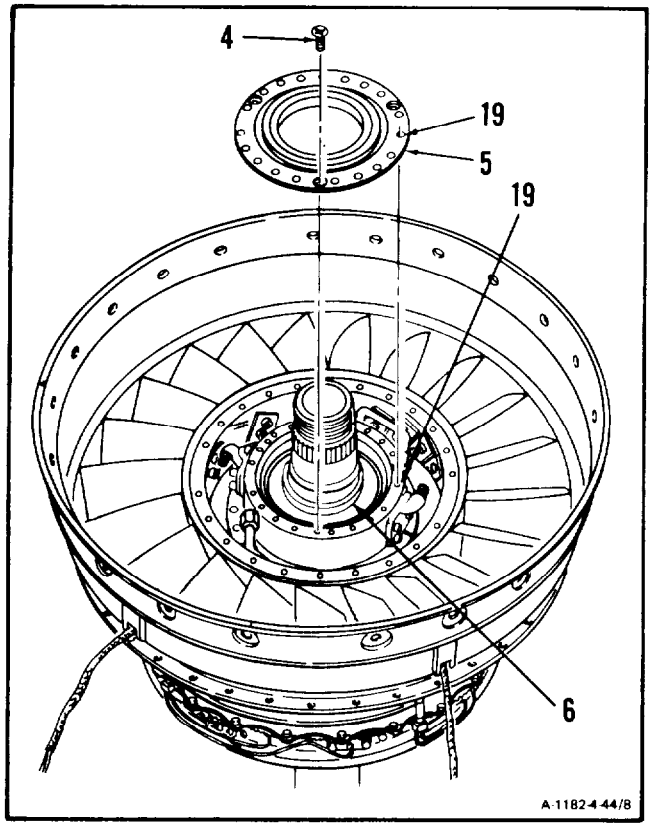
WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

CAUTION

Be sure to apply a light coat of lubricating oil on faceplate before installation. Failure to comply will cause damage to aft seal during dry running of initial engine starts.

h. Apply light coat of lubricating oil (E32 or E33) on faceplate (6). Align bolt holes (19) and **install aft seal and retainer (5)** and three screws (4).

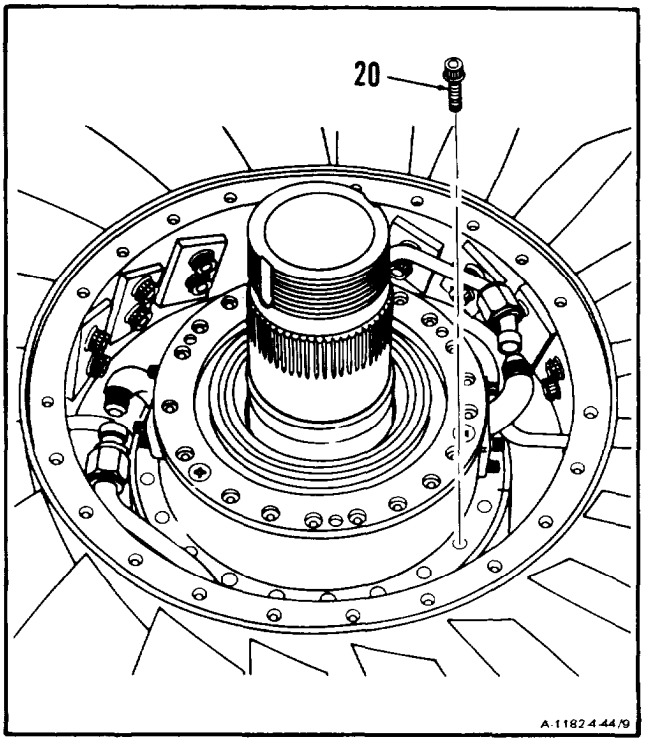


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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

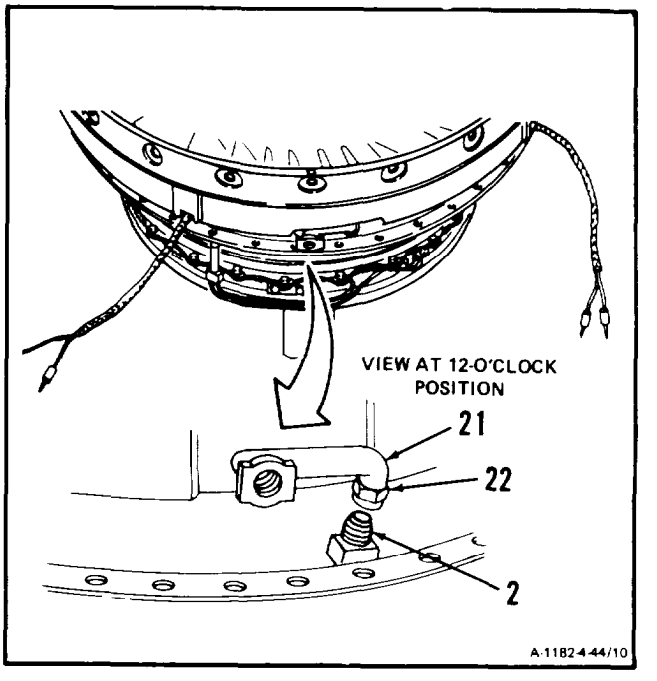
i. Apply anti-seize compound (E5) to 19 bolts (20). Install 19 bolts (20).

j. Lockwire bolts (20). Use lockwire (E29).



k. **Install No. 4 and 5 bearing oil pressure tube adapter (21)** at 12-o'clock position as follows:

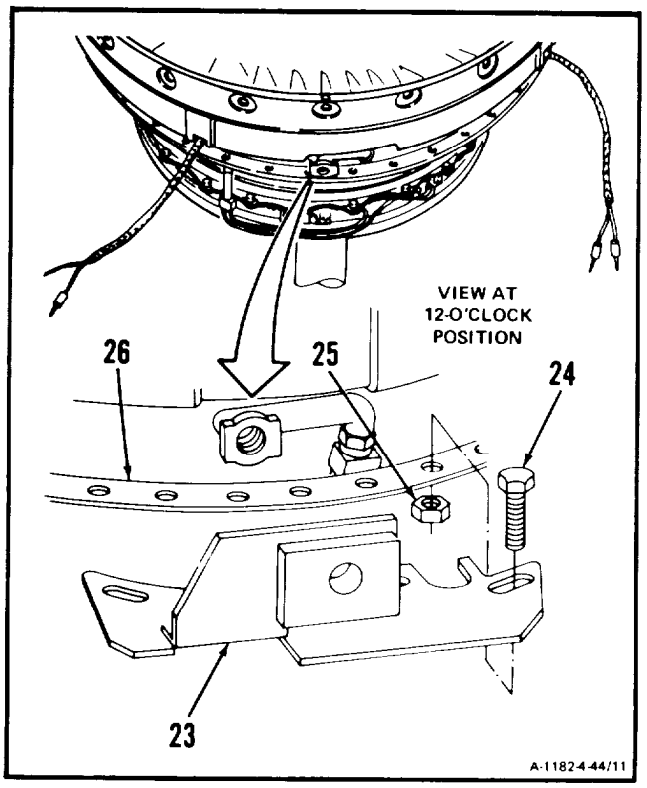
(1) **Install adapter (21)** on tube assembly (2). Tighten nut (22) finger tight.



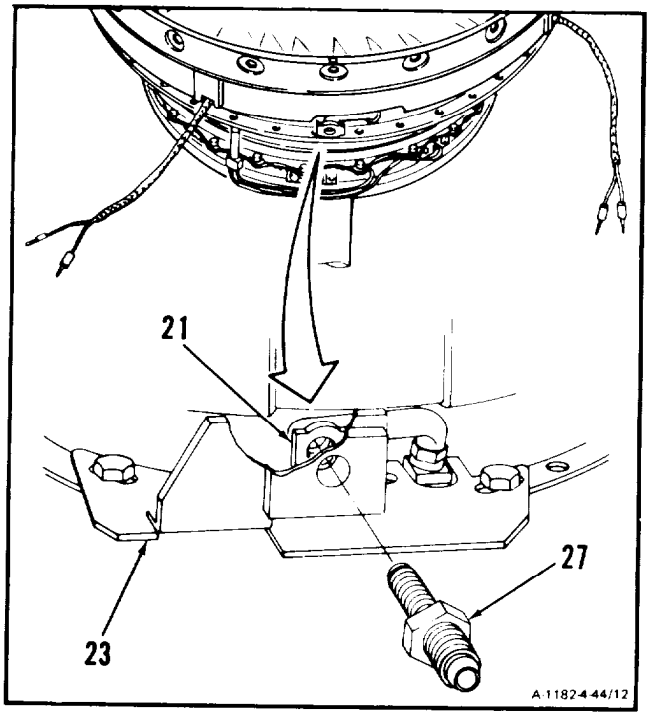
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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

(2) **Install oil tube fixture (T34) (23)** two 1/4 x 28 bolts (24) and 1/4 x 28 nuts (25) on nozzle flange (26) at the 12-o'clock position.



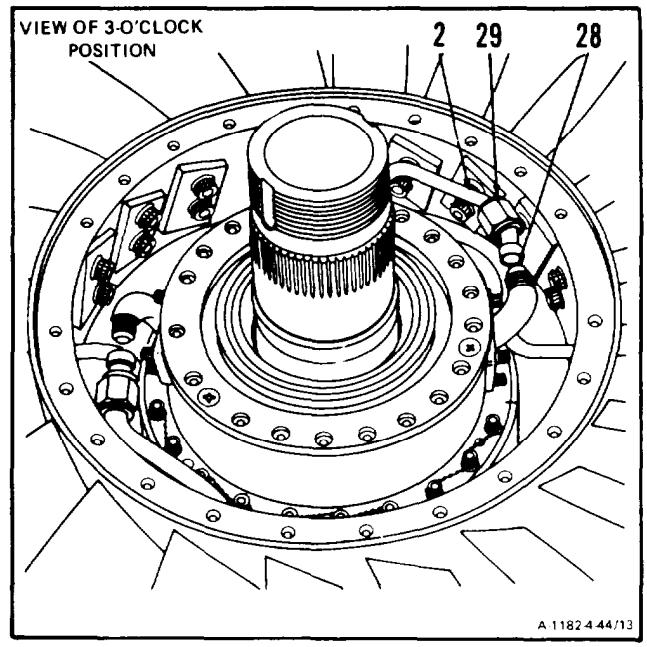
(3) **Thread reducer, P/N 2-141-121-04 (27) into oil pressure tube adapter (21)** until adapter (21) is firmly seated in oil tube fixture (T34) (23).



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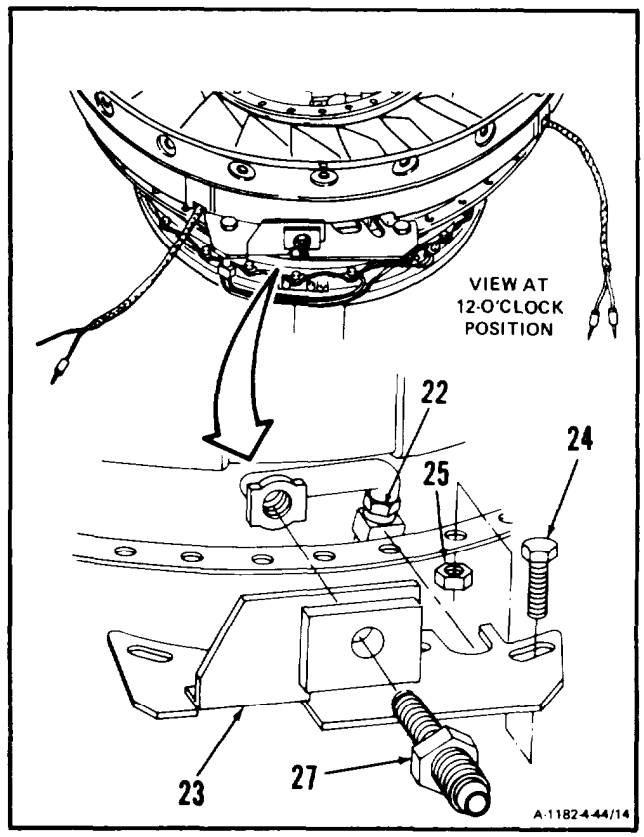
4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

(4) **Connect tube (2)** to adapter (28). **Torque nut (29) to 190 inch-pounds.** Lockwire nut (29). Use lockwire (E29).



(5) Remove reducer (27), two nuts (25), bolts (24) and oil tube fixture (T34) (23).

(6) **Tighten adapter nut (22). Torque to 140 inch-pounds.** Lockwire adapter nut (22). Use lockwire (E28).

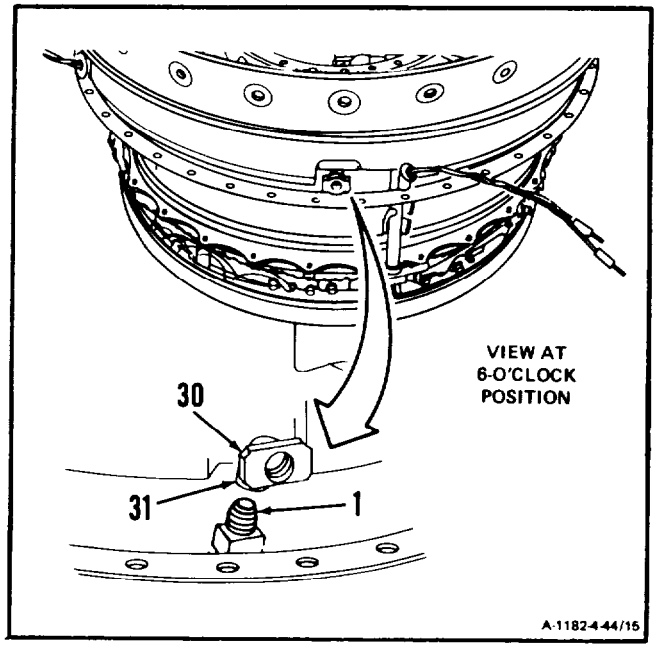


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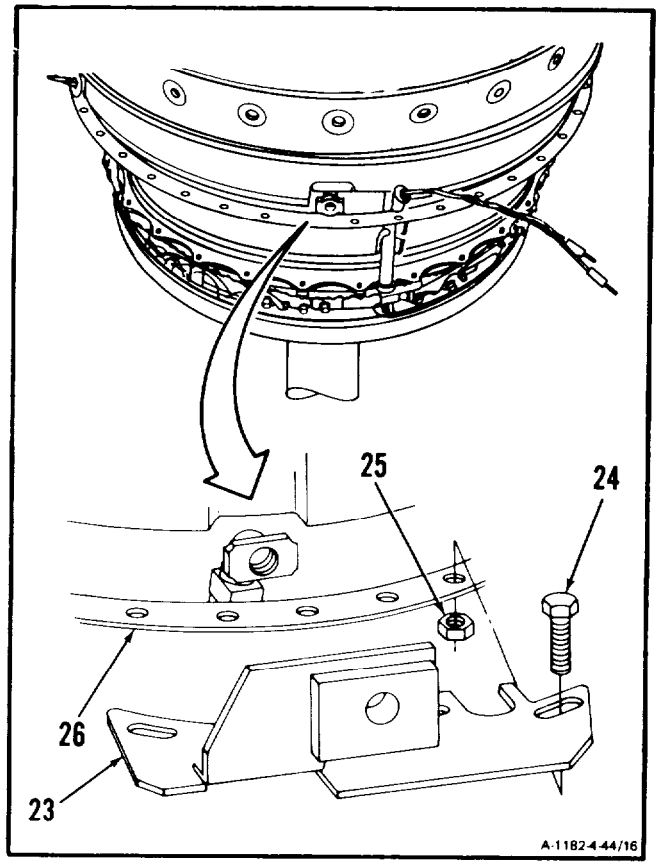
4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

I. **Install No. 4 and 5 bearing oil scavenge tube adapter (30)** at 6-o'clock position as follows:

(1) Install adapter (30) on tube assembly (1). Tighten nut 131) finger-tight.

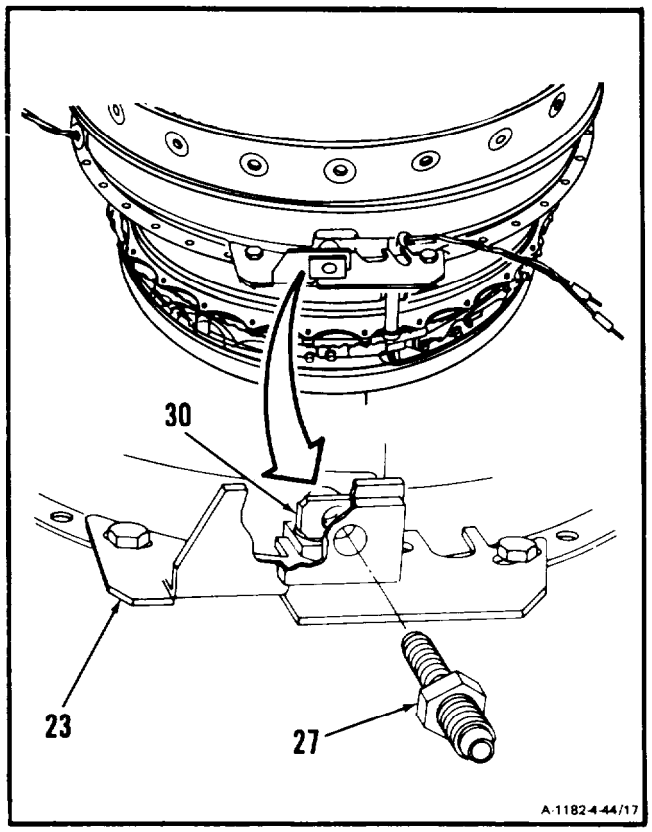


(2) **Install oil tube fixture (T34) (23),** two 1/4 x 28 bolts (24) and 1/4 x 28 nuts (25) on nozzle flange (26) at the 6-o'clock position.

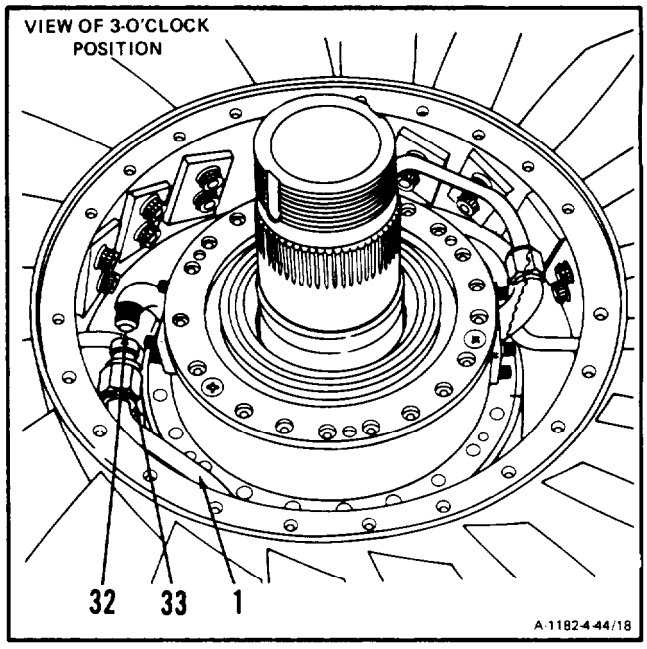


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(3) **Thread reducer, P/N 2-141-121-04 (27) into oil scavenge tube adapter (30)** until adapter (30) is firmly seated in oil tube fixture (T34) (23).



(4) **Connect tube assembly (1)** to adapter (32). **Torque nut (33) to 190 inch-pounds.** Lockwire nut (33). Use lockwire

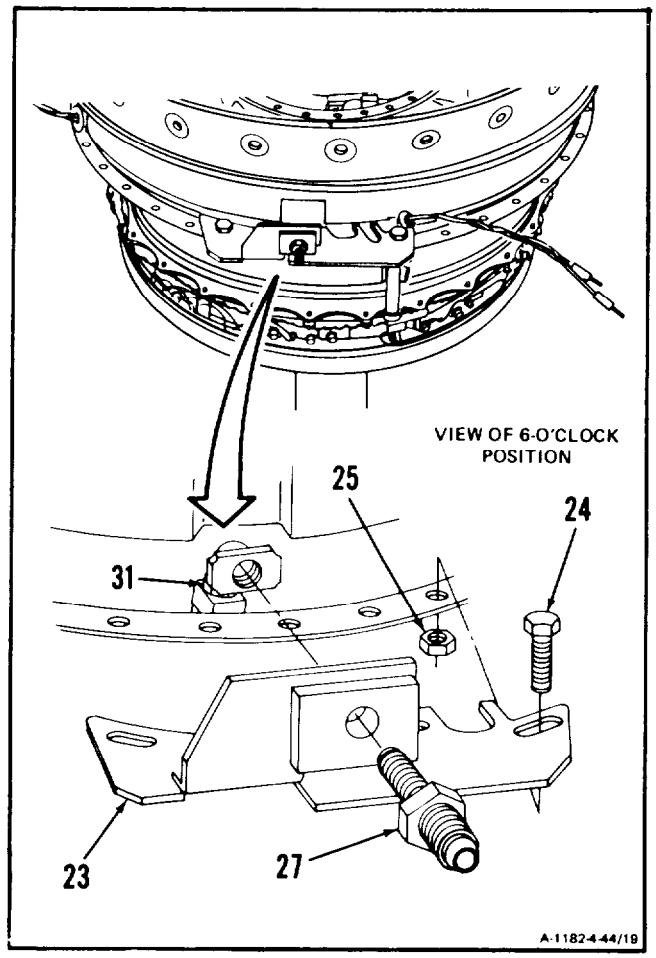


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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

(5) Remove reducer (27), two nuts (251, bolts (24) and oil tube fixture (T34) (23).

(6) **Tighten adapter nut (31). Torque to 140 inch-pounds.** Lockwire adapter nut (31). Use lockwire (E28).



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4-44 INSTALL NO. 4 AND 5 BEARING OIL TUBES (AVIM) (Continued) 4-44

CAUTION

In following step, be sure to use 22 new screws. Used screws could break and cause damage to engine.

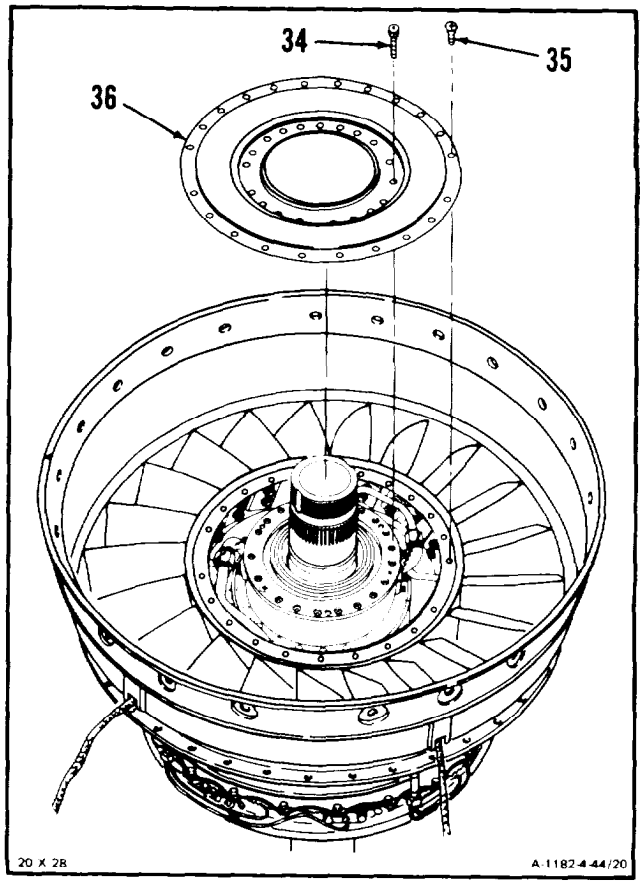
m. Coat 20 bolts (34) and 22 screws (35) with anti-seize compound (E5).

CAUTION

In following step, outer bolts are to be torqued first to reduce breakage of screws that can cause damage to plate.

n. **Install heat shield (36),** 22 screws (35) and 20 bolts (34). **Torque screws (35) to 23 inch-pounds, then torque bolts (34) to 83 inch-pounds.** Lockwire screws (35) and bolts (34). Use lockwire (E29).

o. **Install fourth stage power turbine rotor.** (Ref. Task 4-40, steps 25 thru 50).

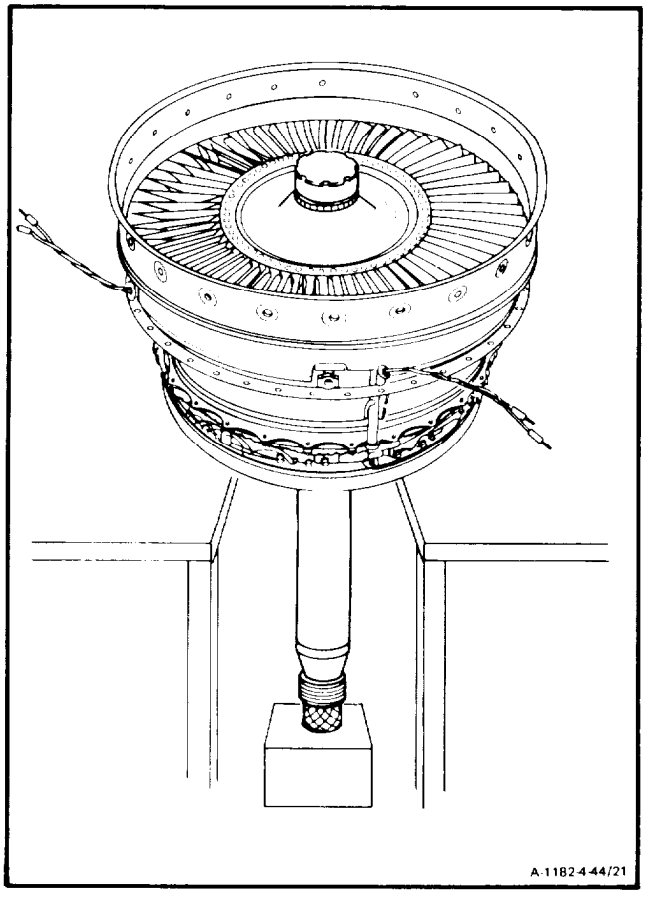


INSPECT

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FOLLOW-ON MAINTENANCE.

Assemble Combustion Section and Power Turbine (Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-45 REMOVE FOURTH STAGE POWER TURBINE NOZZLE (AVIM) 4-45

INITIAL SETUP

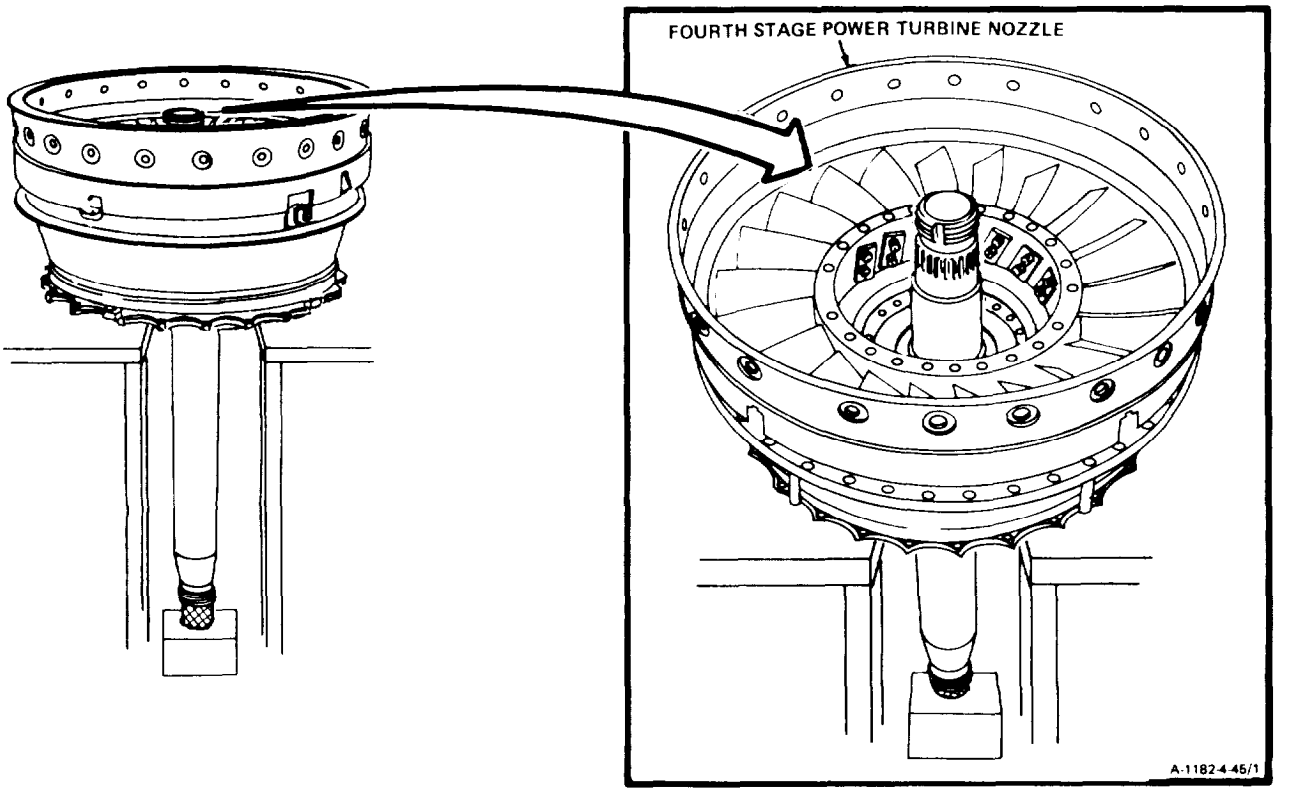
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

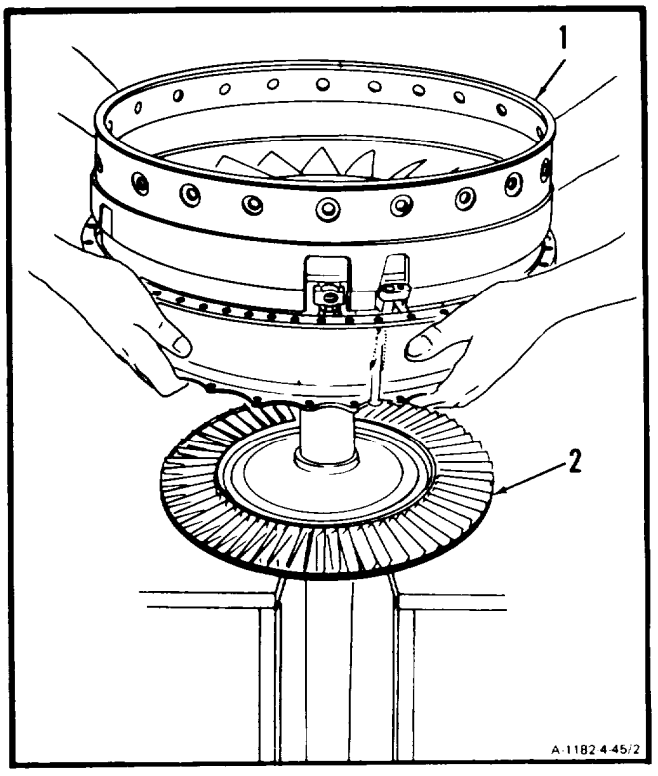
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)
Third Turbine Nozzle and Support Removed (Task 4-26)
No. 4 and 5 Bearing Package Removed (Task 4-37, Steps 1 thru 15)
No. 4 and 5 Bearing Oil Tubes Removed (Task 4-41)



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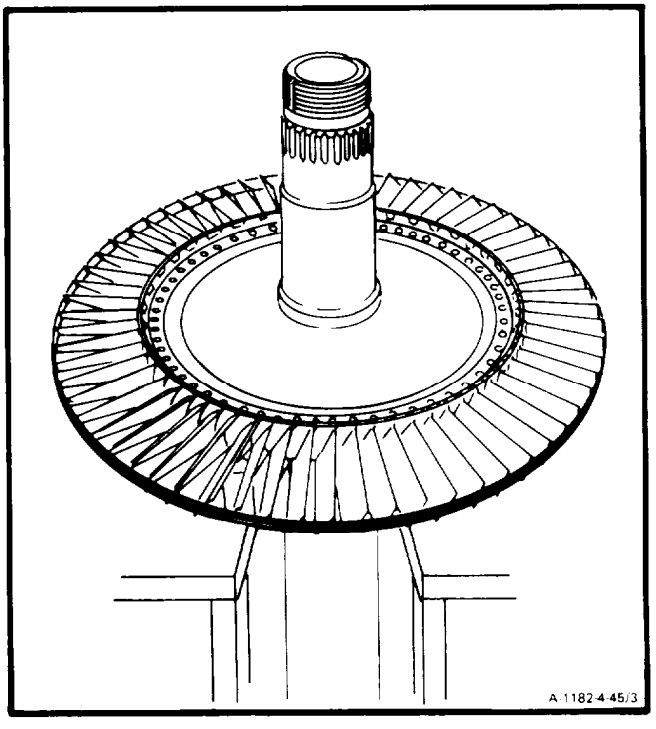
4-45 REMOVE FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-45

1. Using helper, **remove fourth stage power turbine nozzle (1)** from third stage power turbine rotor (2).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-46 CLEAN FOURTH STAGE POWER TURBINE NOZZLE (AVIM) 4-46

INITIAL SETUP

Applicable Configurations:
All

Tools:
Compressed Air Source
Fiber Brush
Goggles

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)
Third Turbine Nozzle and Support Removed (Task 4-26)
No. 4 and 5 Bearing Package Removed (Task 4-37, Steps 1 thru 15)
No. 4 and 5 Bearing Oil Tubes Removed (Task 4-41)
Fourth Stage Power Turbine Nozzle Removed (Task 4-45)

General Safety Instructions:

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. **Clean fourth stage power turbine nozzle (1).**

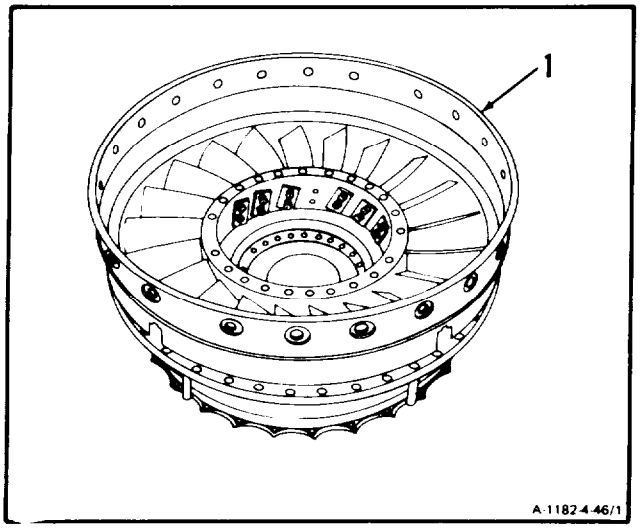
   a. Wear gloves (E20). **Clean nozzle with dry cleaning solvent (E17).**

   b. Remove contaminants by scrubbing with a fiber brush.

   WARNING

   When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

   c. Wear goggles. **Blow dry nozzle (1),** using clean, dry compressed air.



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4-46 CLEAN FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-46

FOLLOW-ON MAINTENANCE:

Inspect Fourth Stage Power Turbine Nozzle (Task 4-47).

END OF TASK

4-47 INSPECT FOURTH STAGE POWER TURBINE NOZZLE (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

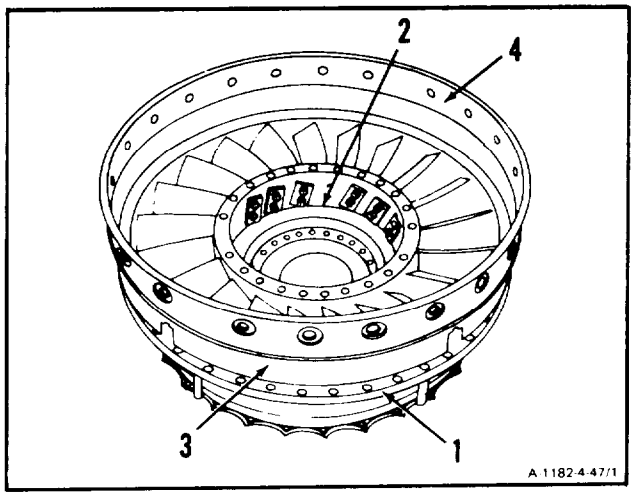
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect fourth stage power turbine nozzle (1)** as follows:

   a. **Inspect inner support area (2), outer support area (3), and rear flange area (4).** There shall be no cracks or indications of burning.



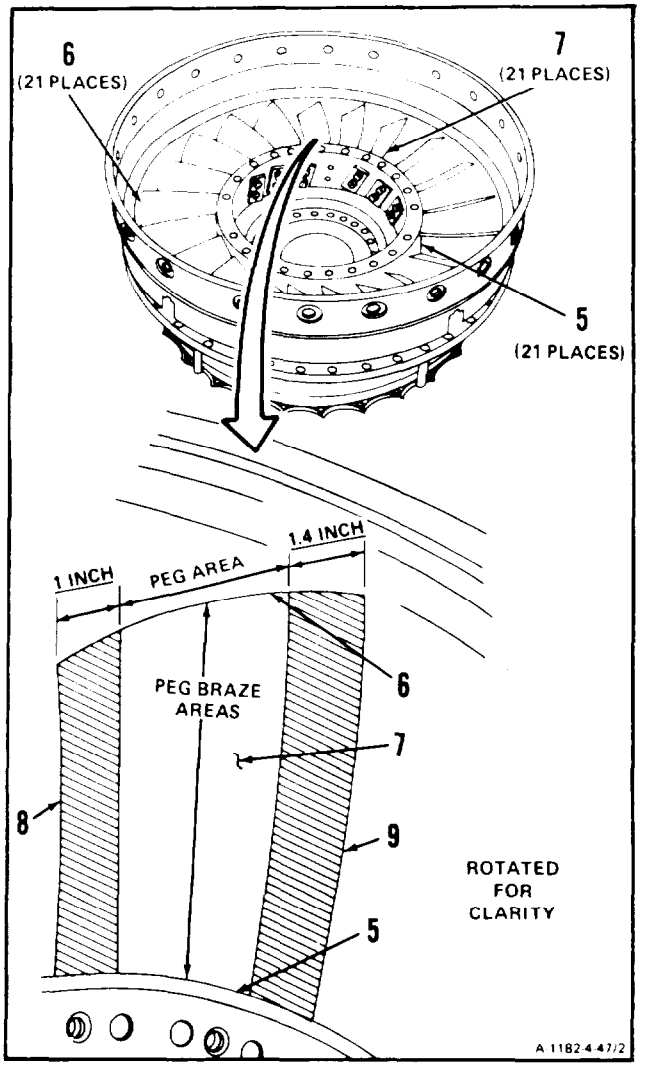
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b. Inspect inner shroud to vane brazements (5) and outer shroud to vane brazements (6) as follows:

(1) **Determine peg area of vanes (7).** Measure 1 inch in from leading edge (8) and 1.4 inches in from trailing edge (9) at brazements (5 and 6). Vane peg area is between measurements.

(2) **Inspect brazements (5) in peg area.** Total length of all cracks in all brazements (5) in peg area shall not be more than 1.25 inches.

(3) **Inspect brazements (6) in peg area.** Total length of all cracks in all brazements (6) in peg area shall not be more than 1.50 inches.

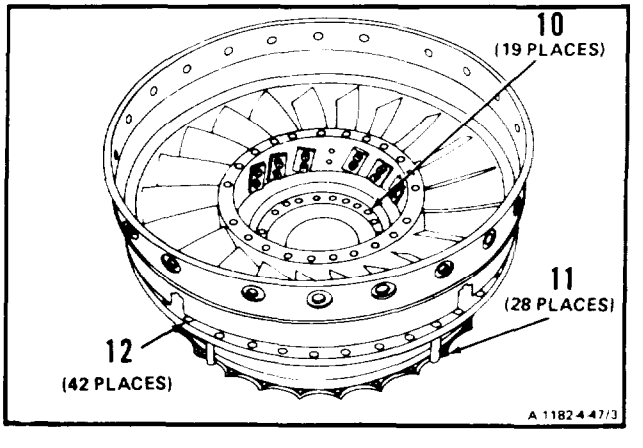


c. **Inspect areas around bolt holes (10, 11 and 12).**

(1) There shall be no more than one crack starting from any one hole.

(2) There shall be no cracks which could result in material fallout.

(3) There shall be at least one hole without cracks separating holes with cracks.



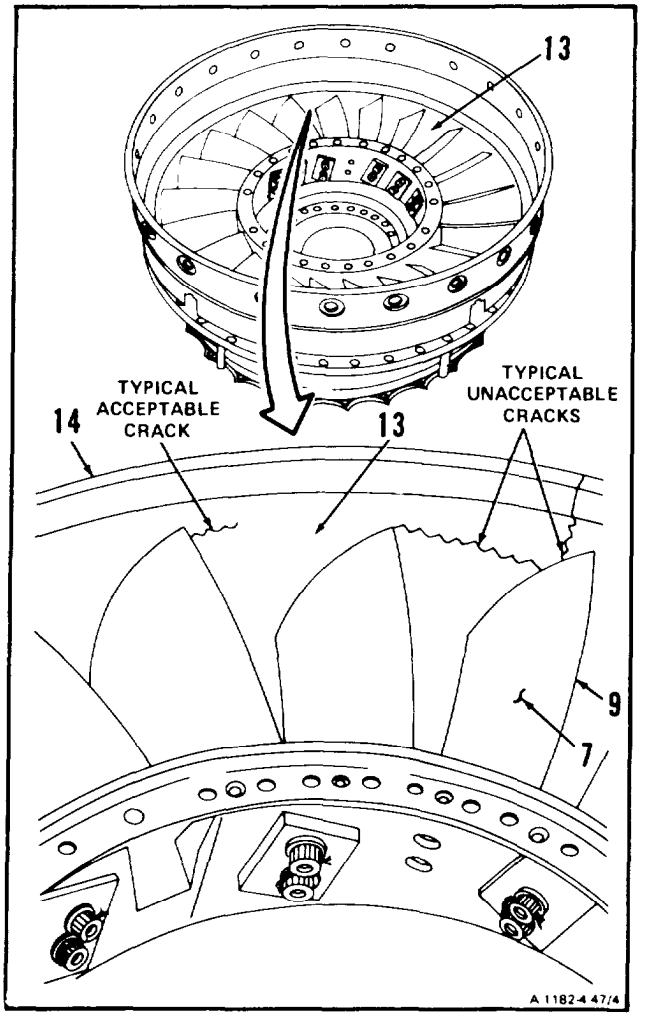
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4-47 INSPECT FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-47

d. **Inspect outer shroud (13).**

(1) There shall be no cracks extending from trailing edge (9) of vane (7) into weldment (14).

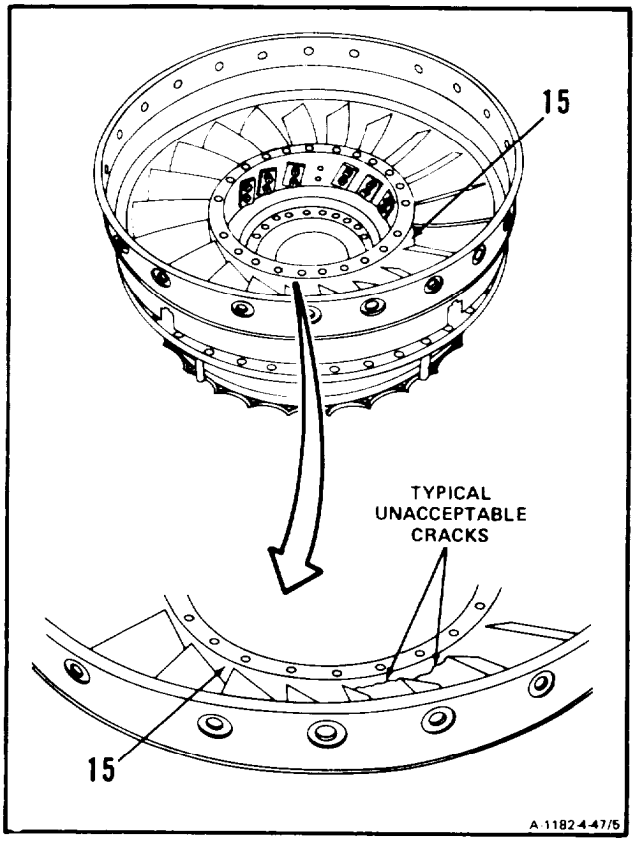
(2) There shall be no vane-to-vane cracks.



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4-47 INSPECT FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-47

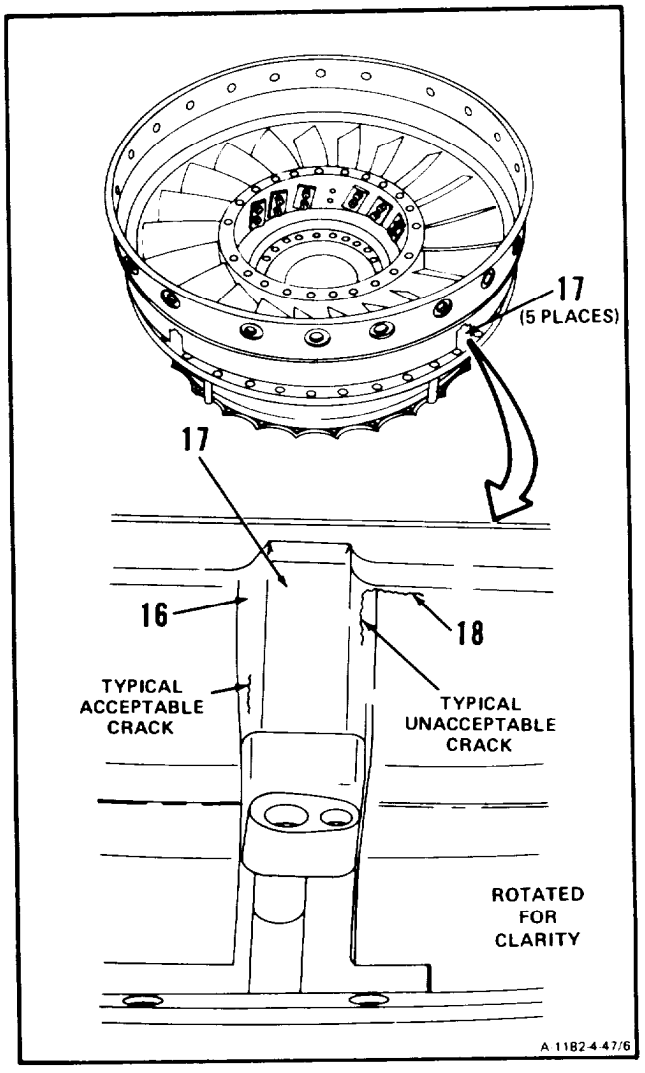
e. **Inspect inner shroud (15).** There shall be no vane-to-vane cracks.



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4-47 INSPECT FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued)

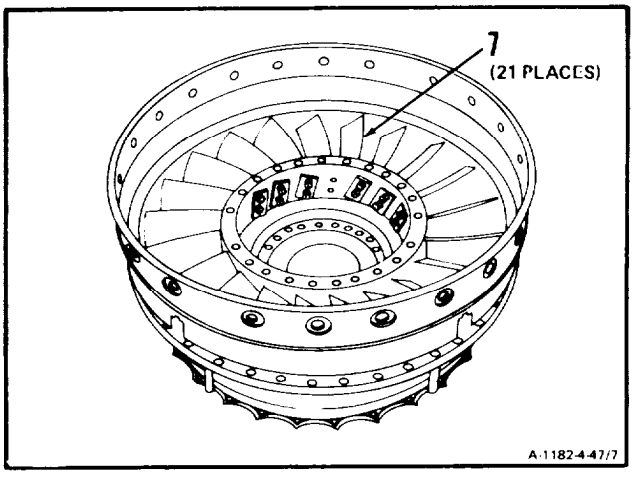
f. **Inspect stiffener ring weldments (16) at five cutout areas (17).** There shall be no circumferential cracks (18).



g. **Inspect 21 vanes (7).**

(1) There shall be no nicks, dents, or scratches, anywhere on vane, deeper than 0.030 inch.

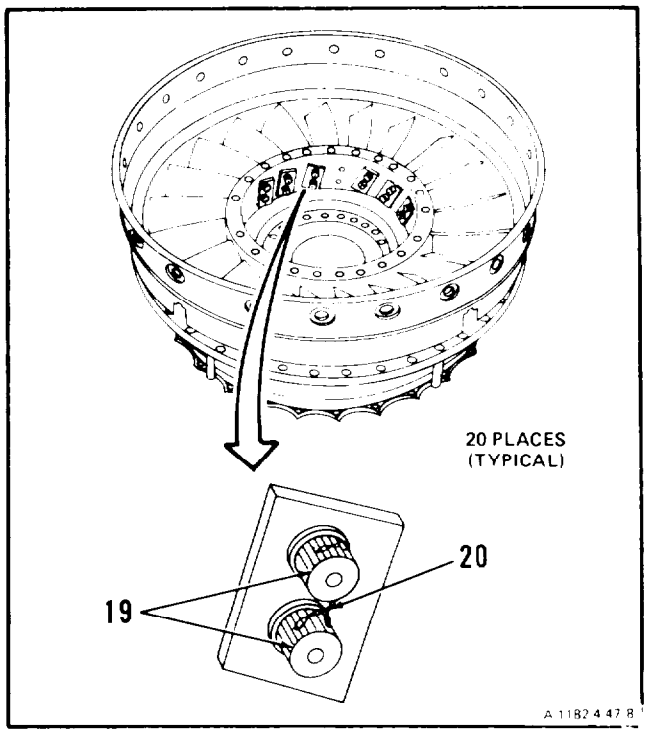
(2) There shall be no punctures in the vanes.



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4-47 INSPECT FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-47

h. **Inspect retention bolts (19).** There shall be no broken lockwire (20).



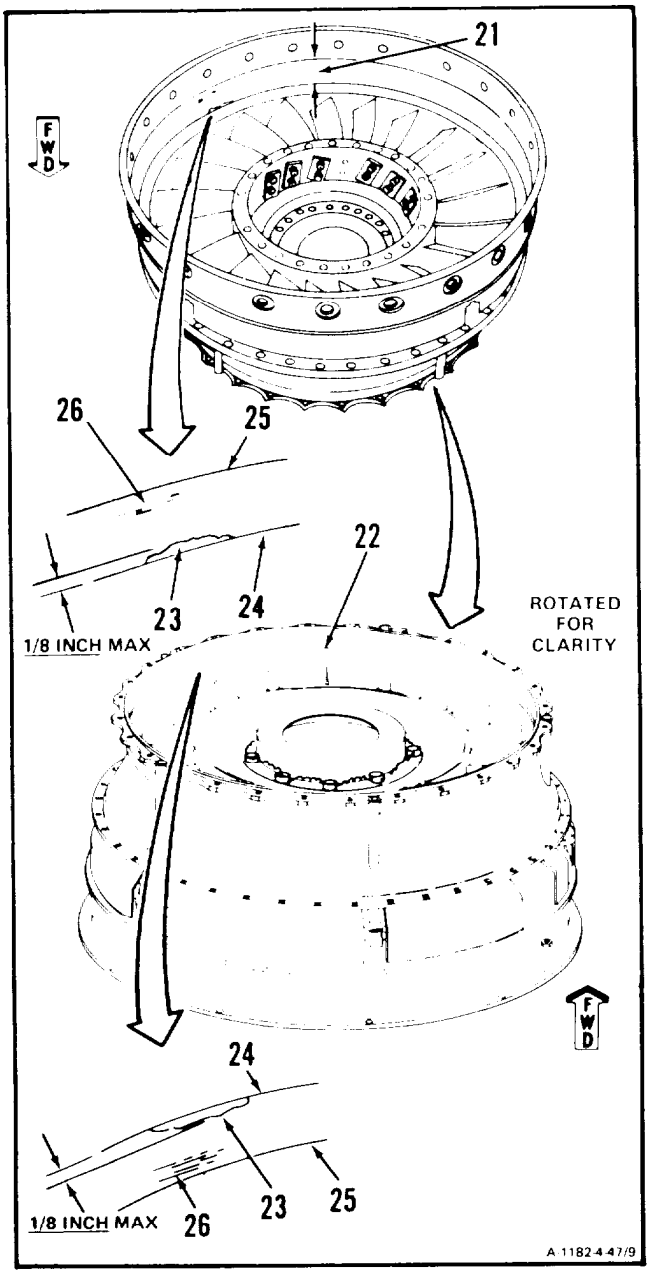
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i. **Inspect plasma sprayed area of cylinder (21) and third turbine nozzle contact area (22)** as follows.

(1) There shall be no chips (23) in coating on forward edge (24) greater than 1/8 inch long axially.

(2) There shall be no chips in coating on aft edge (251.

(3) There shall be no rubs (26) in blade track area that breaks through coating to base metal.



FOLLOW-ON MAINTENANCE

None

END OF TASK

4-48 REPAIR FOURTH STAGE POWER TURBINE NOZZLE (AVIM) 4-48

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Hand File Set
Torque Wrench, 0-30 Inch-Pounds

Materials:
Crocus Cloth (E15)
Lockwire (E29)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

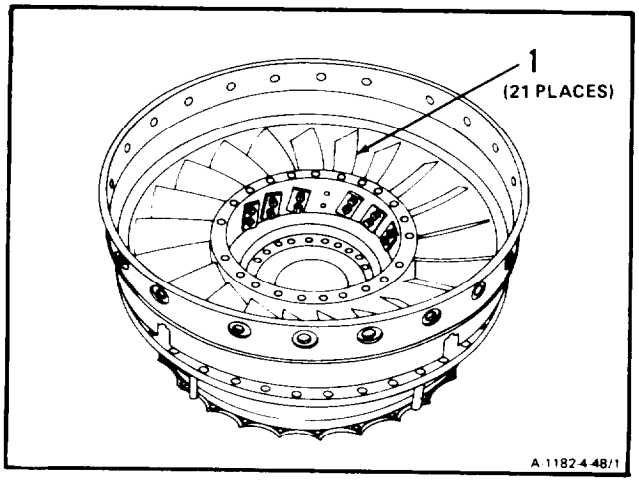
1. **Repair nicks, dents, and scratches, 0.030 inch deep or less, in vanes (1).**

NOTE

Repair depth shall not exceed 0.030 inch.

a. Blend-repair defect. Use file.

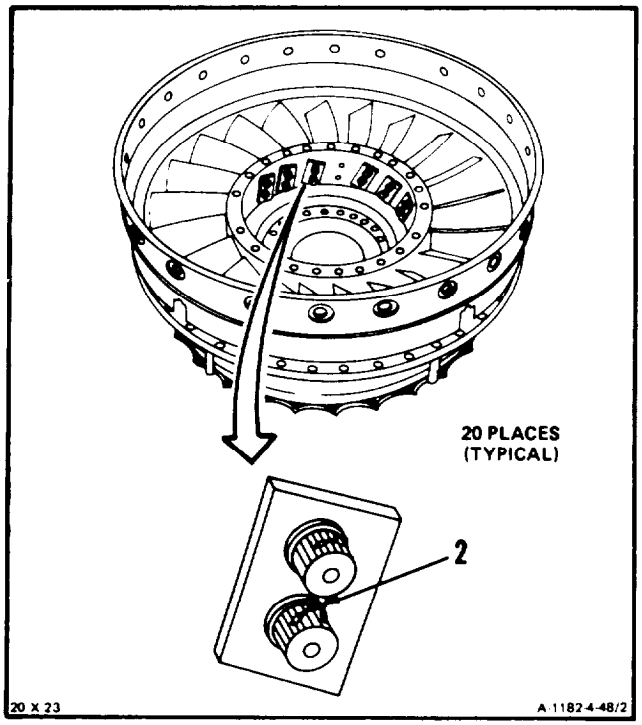
b. Polish blended area with crocus cloth (E15)



INSPECT

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2. **Replace broken lockwire (2).**

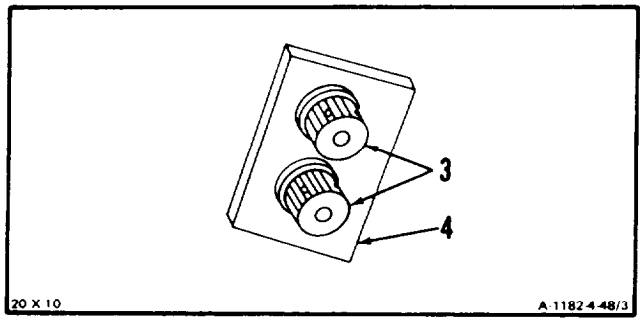


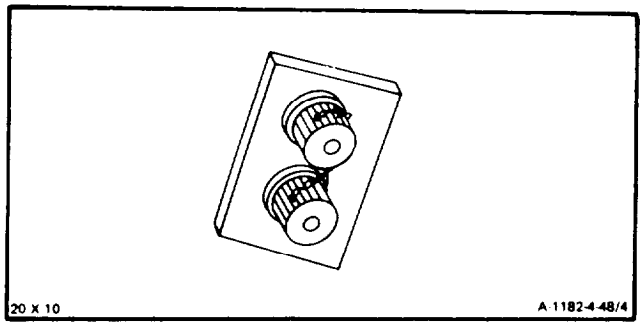
NOTE

In following step a., thread drag may cause indication of contact. Apply up to 10 foot-pounds of torque to overcome thread drag.

a. Remove lockwire (2) and loosen bolts (3) approximately one full turn, then tighten bolts (3) until bolt heads contact plate (4).

b. Back-off bolts (3) one-half to three-quarter turn and lockwire. Use lockwire (E29).





INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) 4-49

INITIAL SETUP

Applicable Configurations:
All

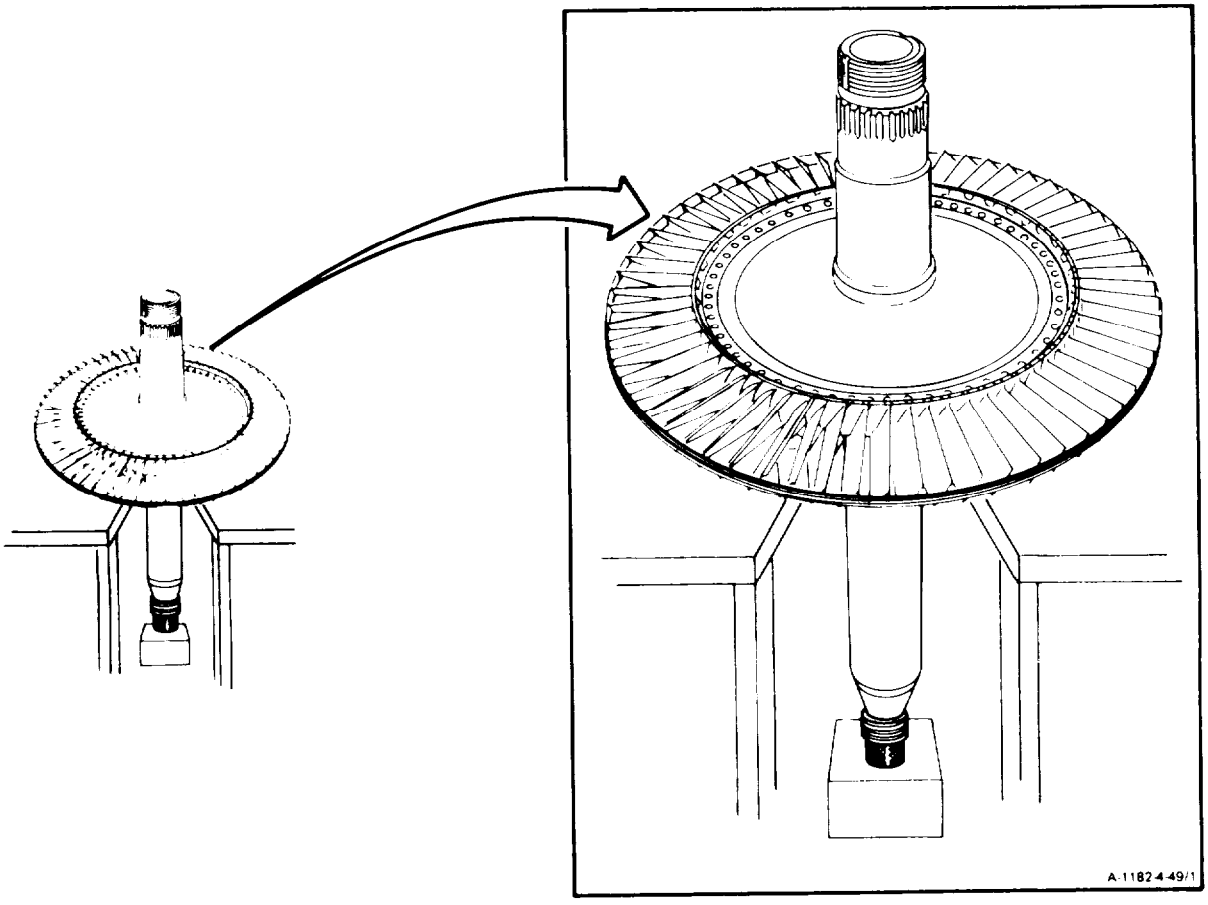
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Oil Tube Fixture (T34)
Bearing Installing Tool (T51)
Torque Wrench, 0-30 Inch-Pounds
Torque Wrench, 30-150 Inch-Pounds
Torque Wrench, 100-750 Inch-Pounds
Reducer, P/N 2-141-121-04
Bolt, 1/4 x 28 x 1 Inch (2)
Nut, 1/4 x 28 (2)

Materials :
Anti-Seize Compound (E5)
Lockwire (E29)
Lubricating Oil (E32 or E33)

Parts :
Seals
Screws

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

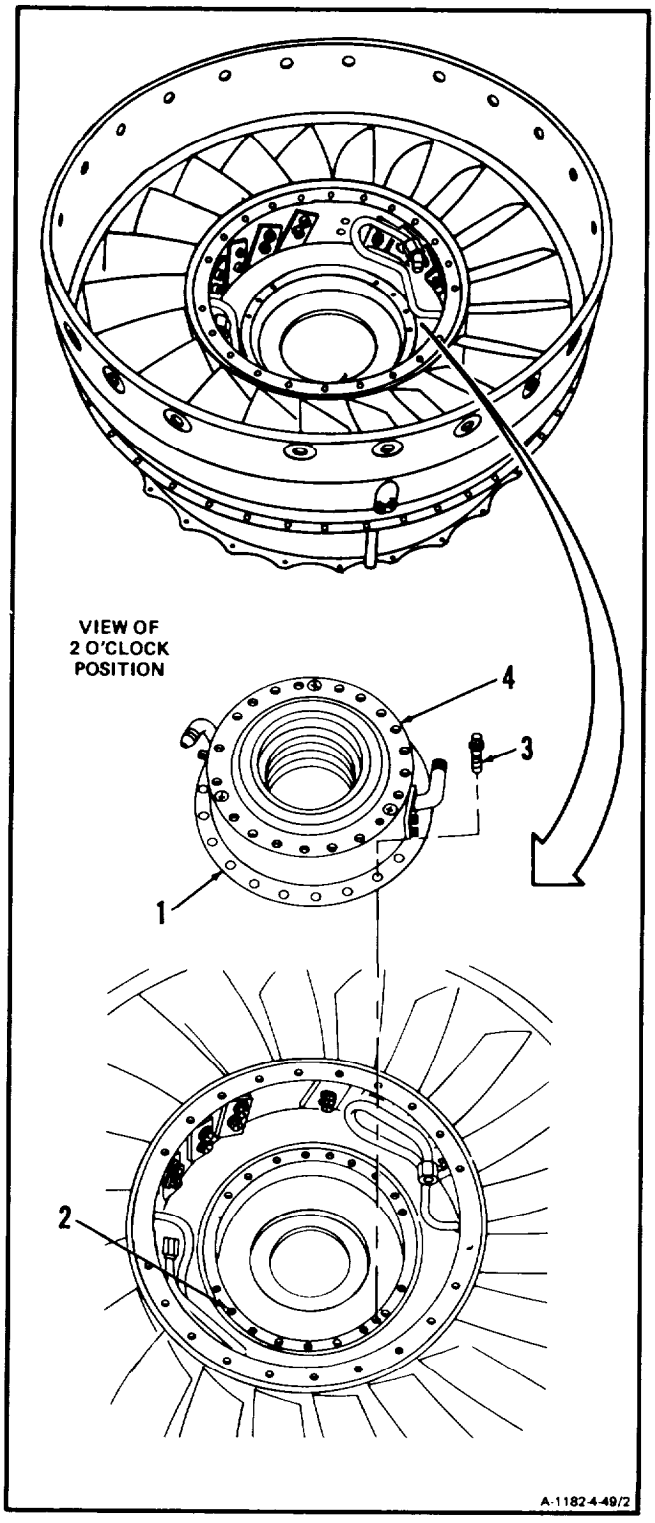
References:
TM 55-2840-254-23P
Task 4-44



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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued)

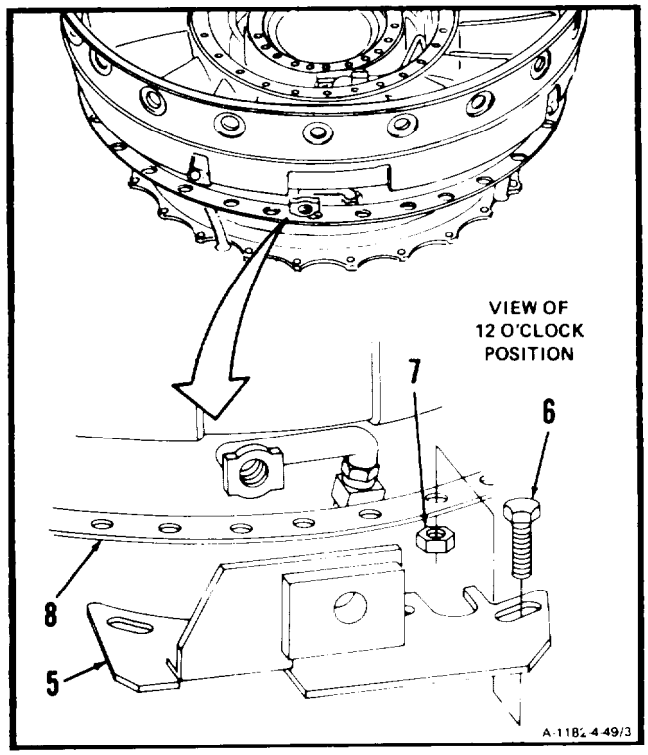
1. **Install No. 4 and 5 bearing oil tubes** (Ref. Task 4-44).
2. Align bolt hole (1) with bolt hole (2).
3. Apply anti-seize compound (E5) to 19 bolts (3).
4. **Install No. 4 and 5 bearing package (4)** and 19 bolts (3).
5. **Lockwire bolts (3).** Use lockwire (E29).



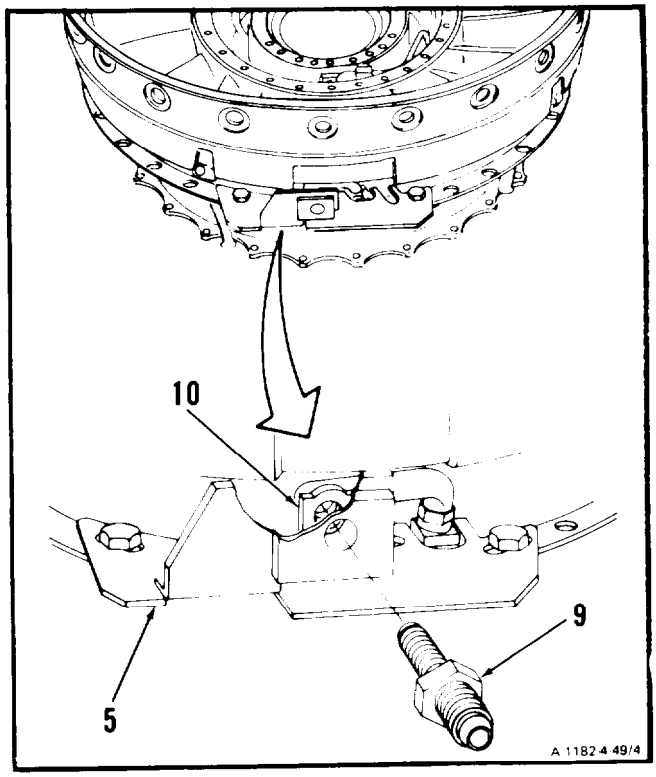
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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued)

6. **Install oil tube fixture (T34) (5),** two 1/4 x 28 bolts (6), and 1/4 x 28 nuts (7) on nozzle flange (8) at the 12-o'clock position.



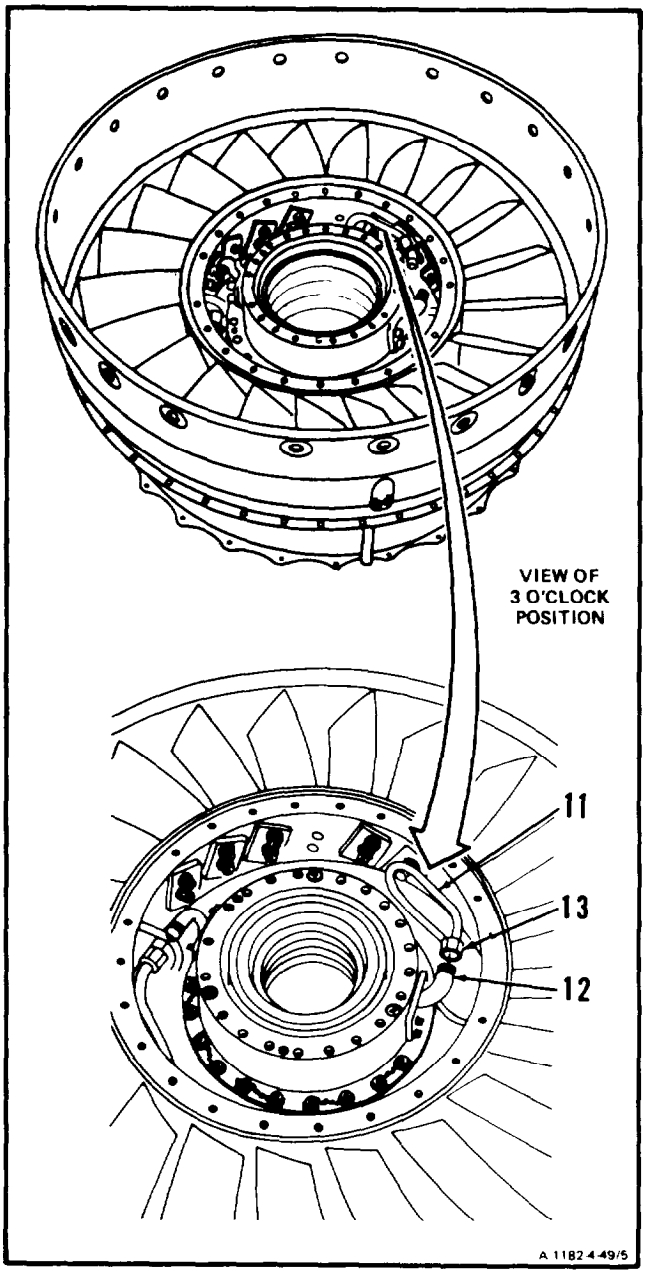
7. **Thread reducer, P/N 2-141-121-04 (9) into lube-in adapter (10)** until adapter (10) is firmly seated in oil tube fixture (T34) (5).



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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

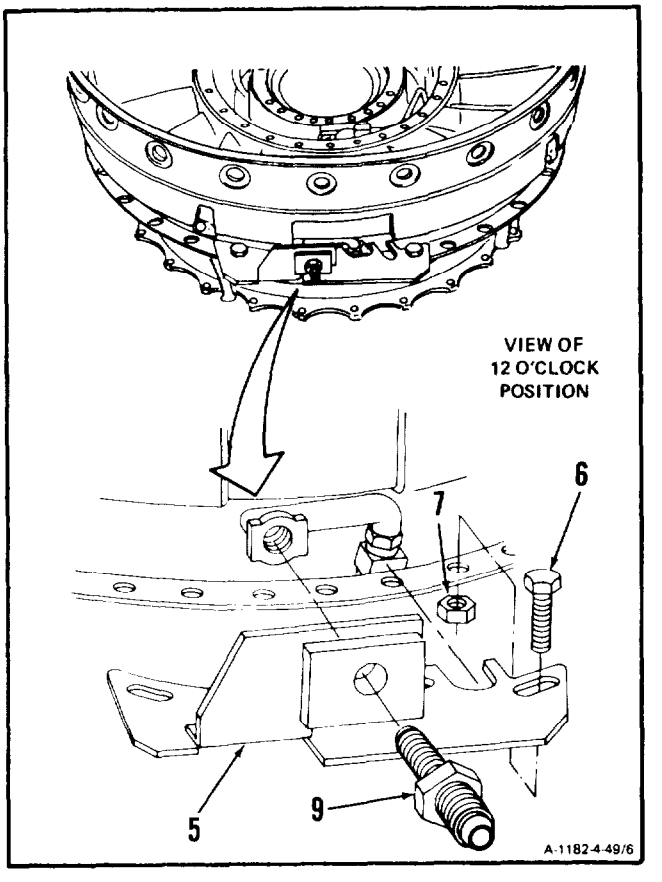
8. Connect tube assembly (11) to adapter (12) at 12-o'clock position. **Torque nut (13) to 190 inch pounds.** Lockwire nut (13). Use lockwire (E29).



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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued)

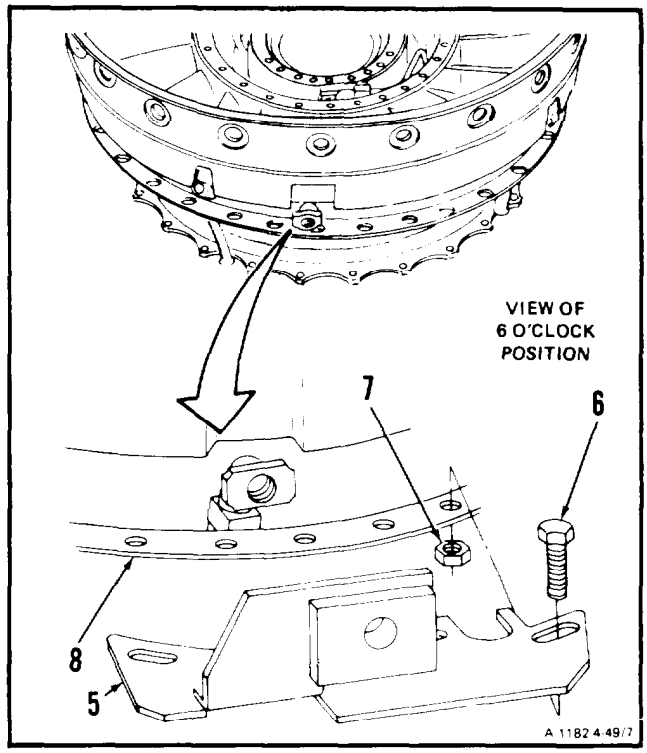
9. Remove reducer (9), bolts (6), nuts (7), and oil tube fixture (T34) (5).



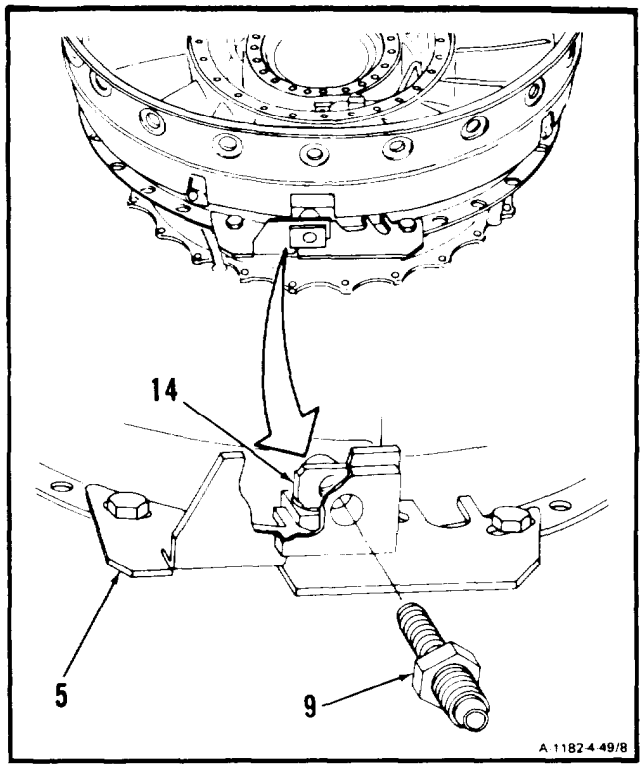
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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

10. **Install oil tube fixture (T34) (5),** two 1/4 x 28 bolts (6), and 1/4 x 28 nuts (7) on nozzle flange (8) at the 6-o'clock position.

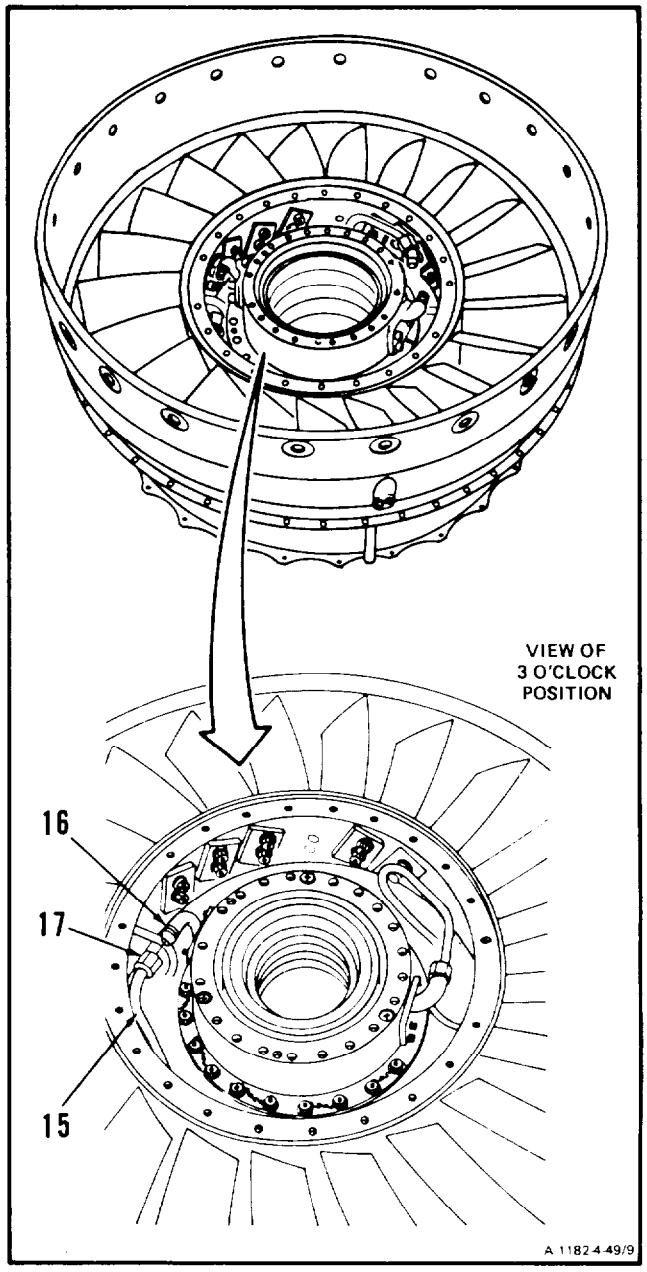


11. **Thread reducer, P/N 2-141-121-04 (9) into lube scavenge adapter (14)** until adapter (14) IS firmly seated in oil tube fixture (T34) (5).



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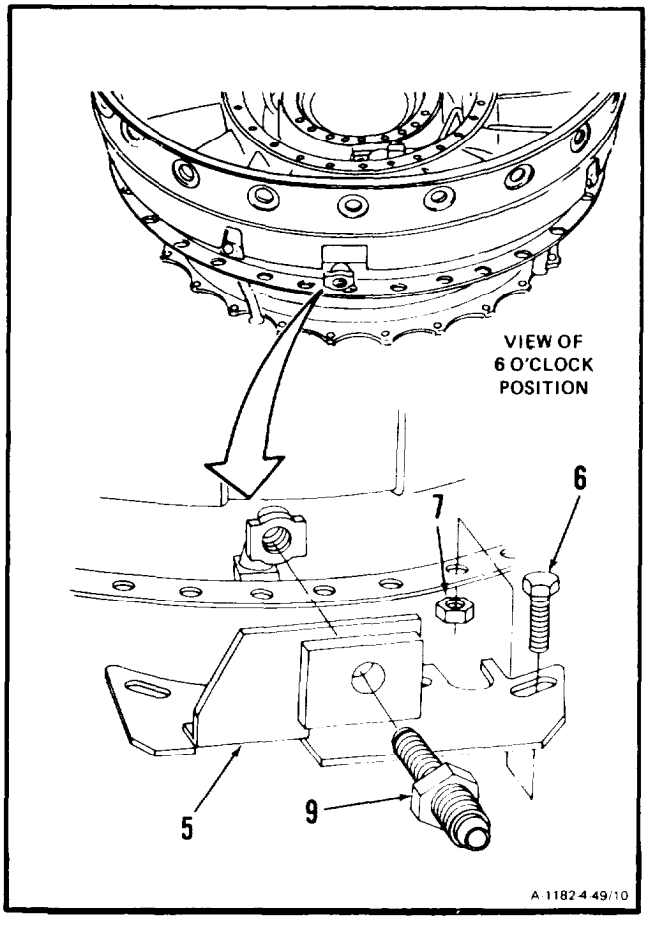
12. **Connect tube assembly (15)** to adapter (16) at 6-o'clock position. **Torque nut (17) to 190 inch-pounds.** Lockwire nut (17). Use lockwire (E29).



GO TO NEXT PAGE

4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

13. Remove reducer (9), two bolts (6), nuts (7), and oil tube fixture (T34) (5).

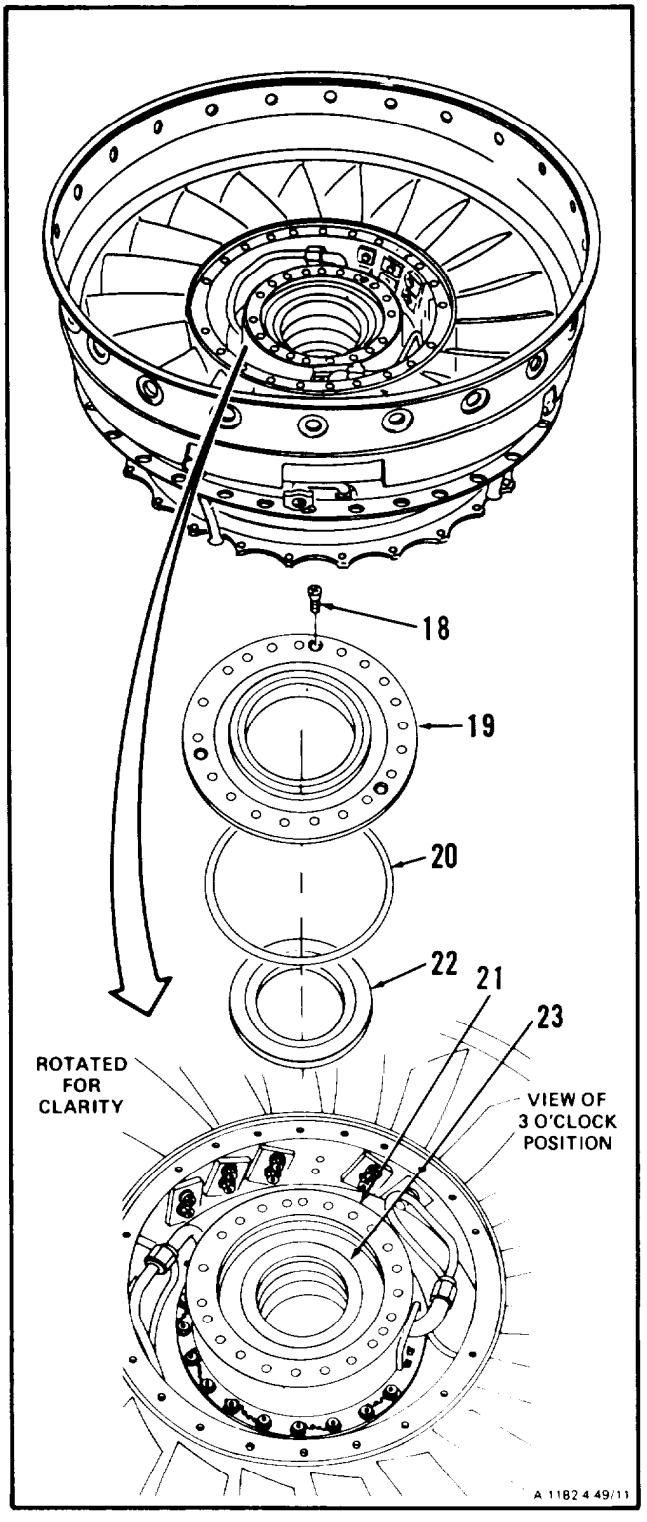


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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

14. **Remove** three screws (18), **aft seal retainer (19),** and seal (20) from bearing housing (21).

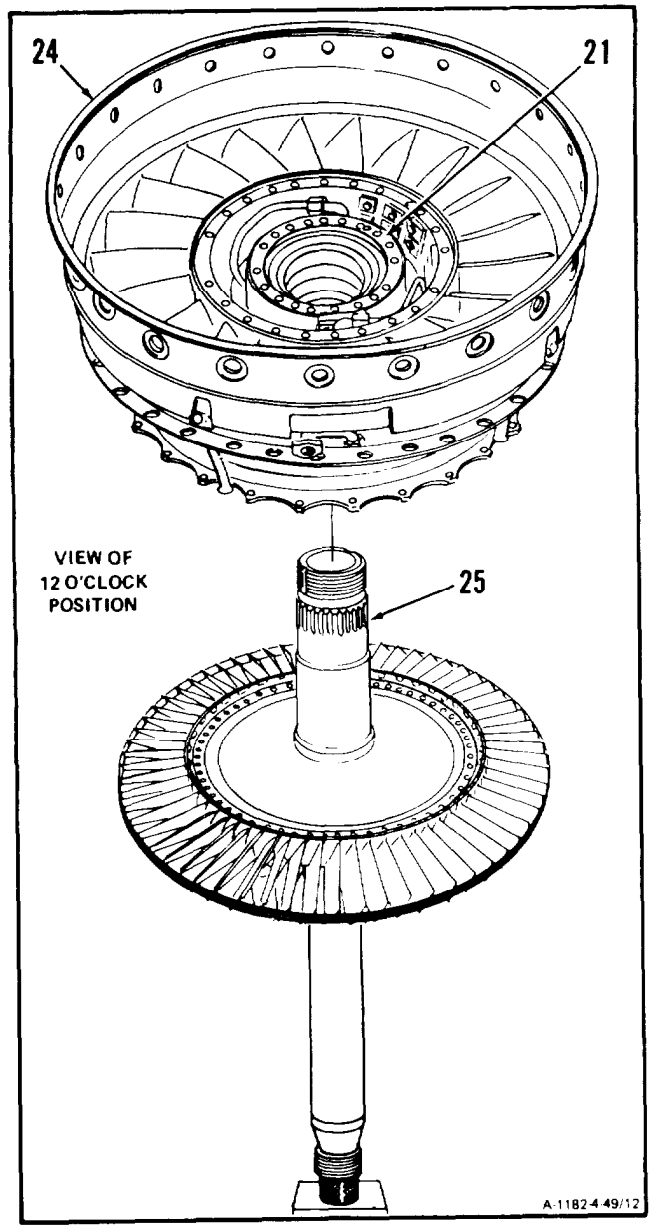
15. **Remove faceplate (22)** from bearing (23).



GO TO NEXT PAGE

4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

16. **Install fourth stage power turbine nozzle (24) with bearing housing (21) installed,** on rear shaft of integral shaft assembly (25).

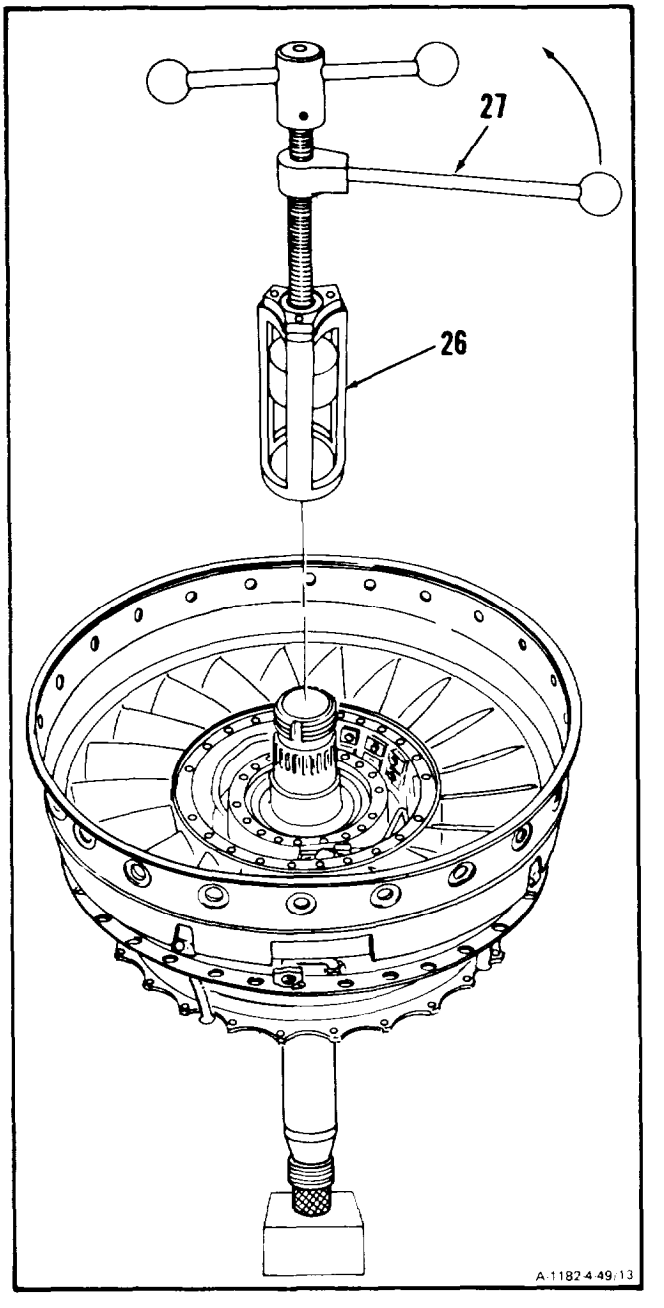


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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

17. **Install bearing installing tool (T51) (26)** as follows:

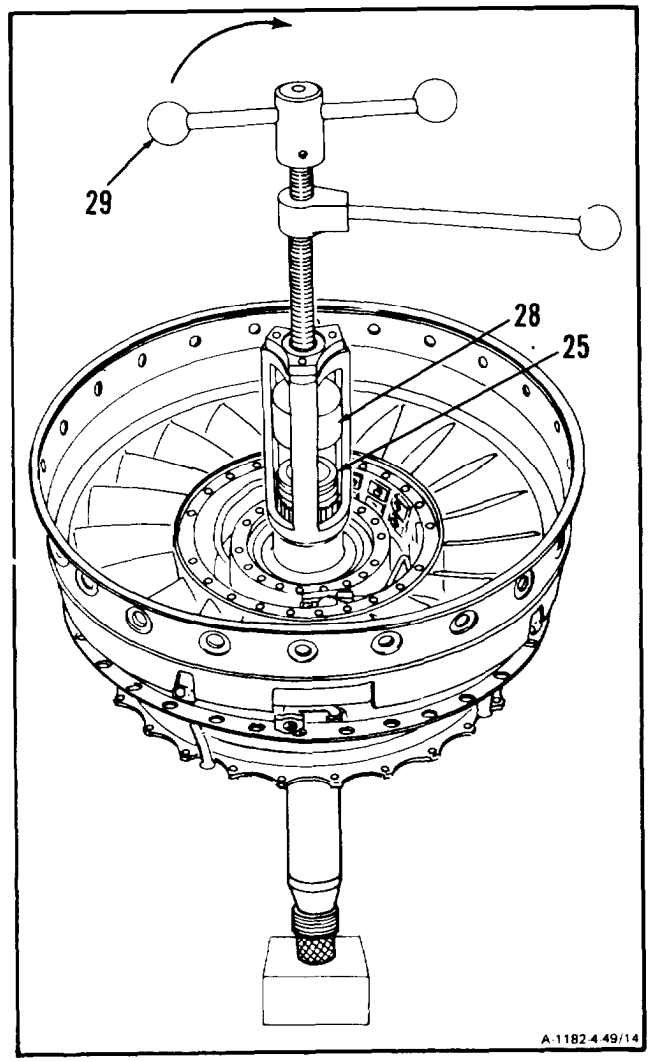
    a. Turn handle (27) counterclockwise until it is backed out all the way.



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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

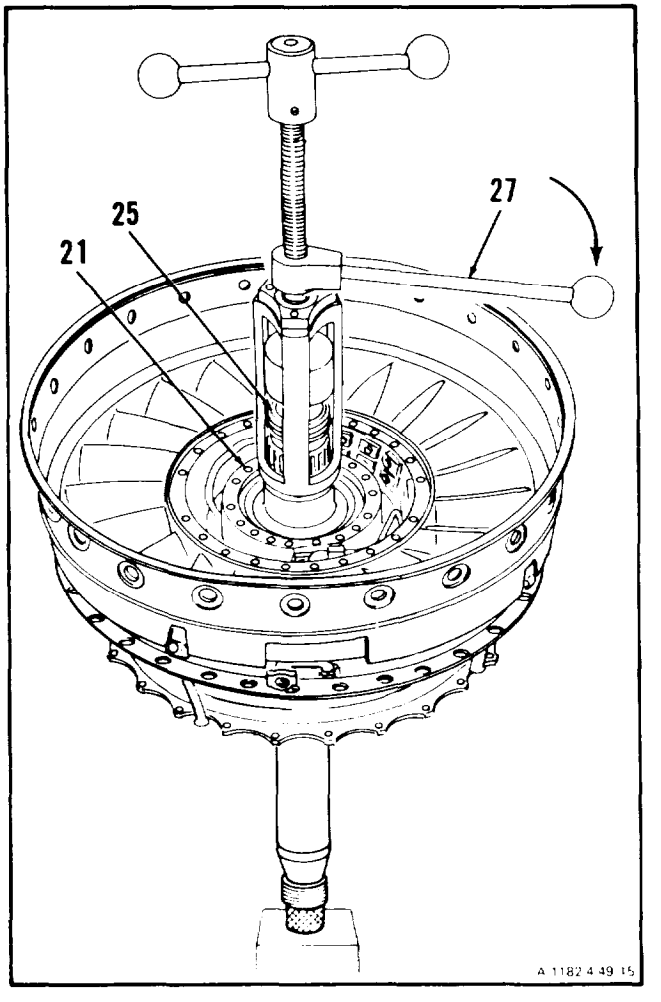
b. Install nut (28) on integral shaft assembly (25). Turn T-handle (29) clockwise until nut (28) is tight.



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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

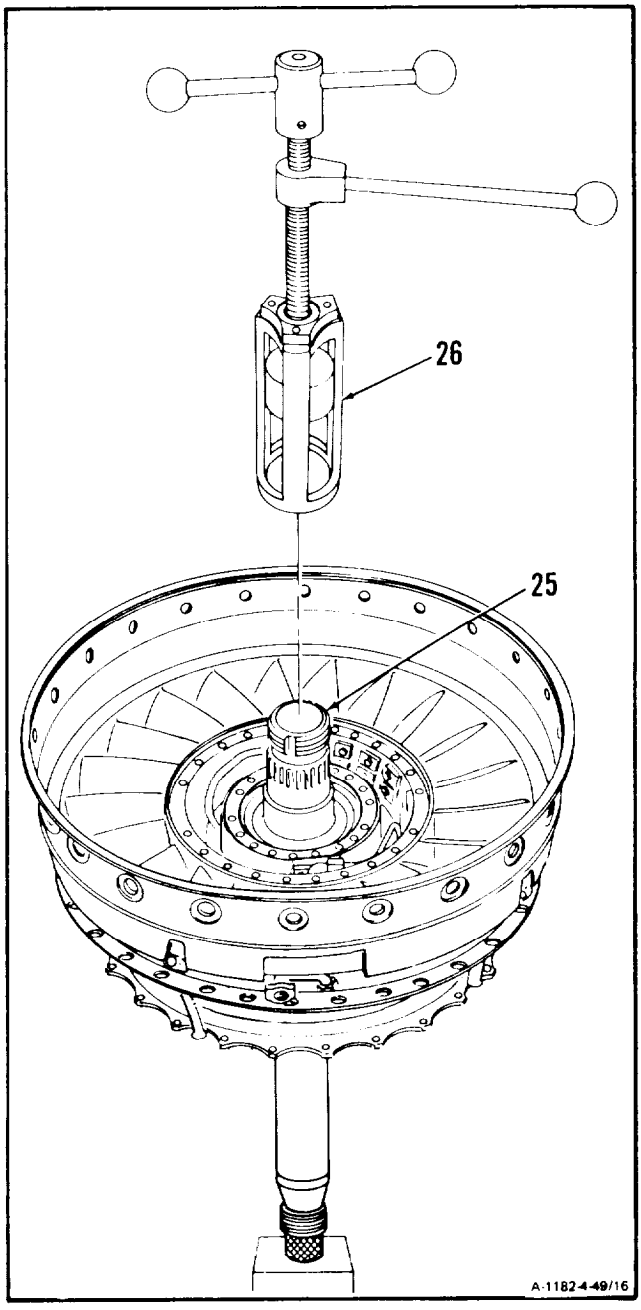
18. **Seat No. 4 and 5 bearing package (21)** against integral shaft assembly (25) by turning handle (27) clockwise.



GO TO NEXT PAGE

4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued)

19. **Remove bearing installing tool (T51) (26)** from integral shaft assembly (25).



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20. **Install faceplate (22),** beveled side down, on No. 5 bearing (23).

21. **Install seal (20).**

INSPECT

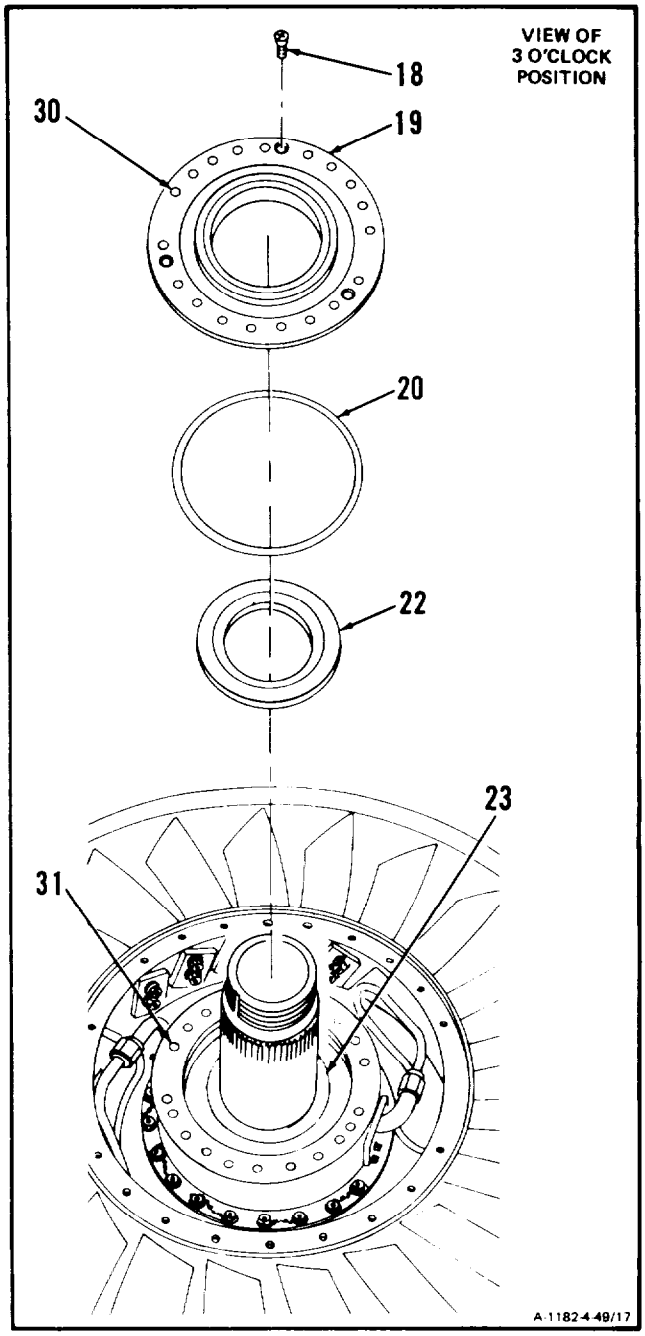
WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

CAUTION

Be sure to apply a light coat of lubricating oil on faceplate before installation. Failure to comply will cause damage to aft seal during dry running of initial engine starts.

22. Apply light coat of lubricating oil (E32 or E33) on faceplate (22). Align bolt holes (30) with bolt holes (31) and **install aft seal and retainer (19)** and three screws (18).



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CAUTION

In following step, be sure to use 22 new screws. Used screws could break and cause damage to engine.

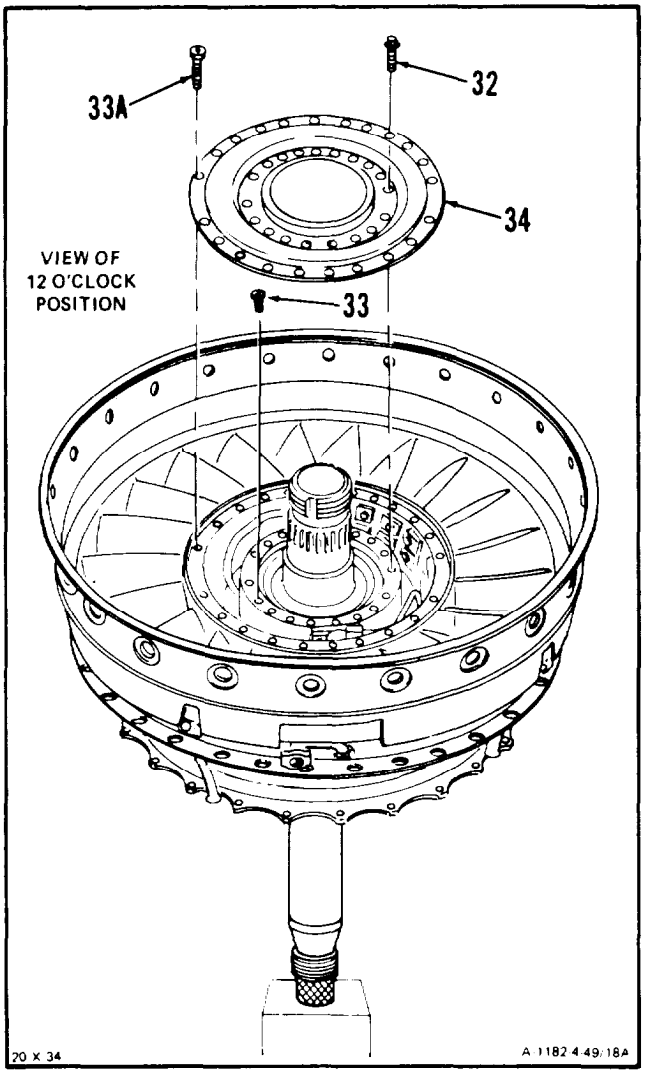
22A. Install 20 bolts (32). **Torque bolts (32) to 85 inch-pounds.** Retighten three screws (33) as required. Remove 20 bolts (32).

23. Coat 20 bolts (32) and 22 screws (33A) with anti-seize compound (E5).

CAUTION

In following step, outer bolts are to be torqued first to reduce breakage of screws that can cause damage to plate.

24. **Install heat shield (34),** 22 screws (33A) and 20 bolts (32). **Torque screws (33A) to 23 inch-pounds, then torque bolts (32) to 83 inch-pounds:** Lockwire screws (33A) and bolts (32). Use lockwire (E29).



INSPECT

GO TO NEXT PAGE

4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

25. **Turn fourth stage power turbine nozzle (24) over on table.**

26. **Measure third stage power turbine rotor (35) tip clearance** at 0, 45, 90, 135, 180, 225, 270 and 315 degree positions as follows.

a. Insert thickness gage between third stage power turbine rotor blades (36) and fourth stage power turbine nozzle (24).

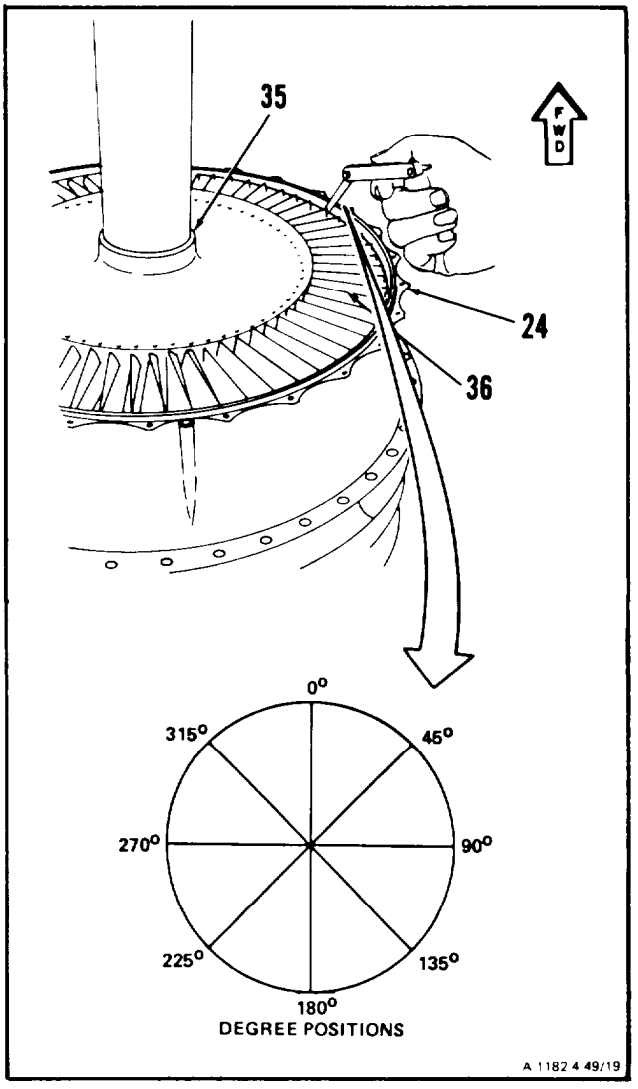
b. Rotate third stage power turbine rotor (35) counterclockwise one revolution for each check.

c. Tip clearance shall be 0.020 inch minimum.

d. If tip clearance is below 0.020 inch, replace power turbine assembly.

27. **Turn fourth stage power turbine nozzle (24) over on two tables.**

INSPECT

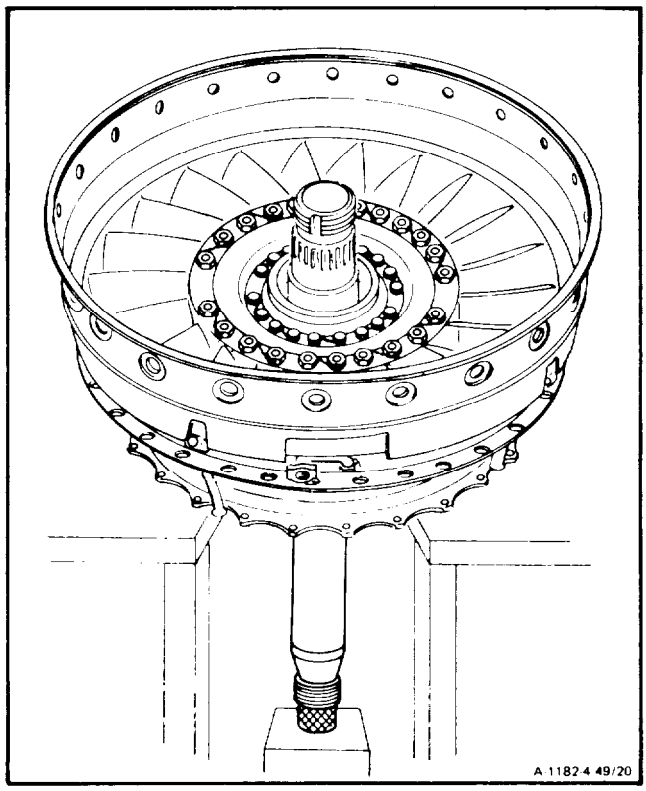


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4-49 INSTALL FOURTH STAGE POWER TURBINE NOZZLE (AVIM) (Continued) 4-49

FOLLOW-ON MAINTENANCE:

Install Fourth Stage Power Turbine Rotor (Task 4-36).
Install Third Turbine Nozzle and Support (Task 4-32).
Install Thermocouple Harness Assemblies (Task 4-25).
Assemble Combustion Section and Power Turbine (Task 3-7).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-50 CLEAN THIRD STAGE POWER TURBINE ROTOR (AVIM) 4-50

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Combustion Section and Power Turbine Disassembled (Task 3-6)
Thermocouple Harness Assemblies Removed (Task 4-20)
Third Turbine Nozzle and Support Removed (Task 4-26)
No. 4 and 5 Bearing Package Removed (Task 4-37, Steps 1 thru 15)
Fourth Stage Power Turbine Nozzle Removed (Task 4-45)

GO TO NEXT PAGE

4-50 CLEAN THIRD STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-50

1. Remove vexar nylon webbing from shaft journal area (1).

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

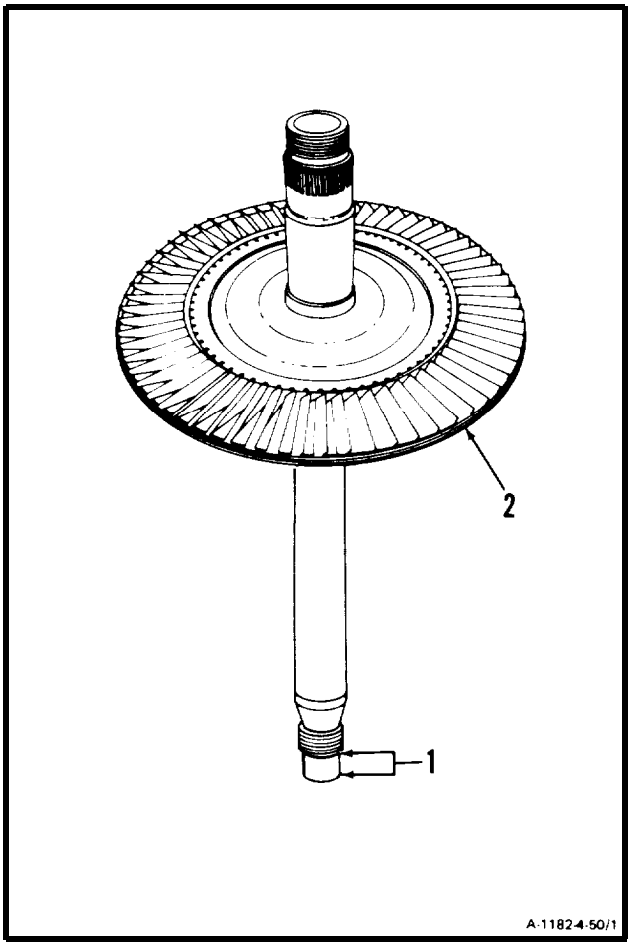
Do not remove matchmarks.

2. Wear gloves (E20) and goggles. **Clean third stage power turbine rotor (2)** using methyl ethyl ketone (E36) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

3. Wear goggles. **Blow dry third stage power turbine rotor (2)** using clean dry compressed air.



FOLLOW-ON MAINTENANCE

Inspect Third Stage Power Turbine Rotor (Task 4-51).

END OF TASK

4-51 INSPECT THIRD STAGE POWER TURBINE ROTOR (AVIM) 4-51

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Outside Micrometer Caliper Set

Materials:
Vexar Nylon Webbing (E56)

Personnel Required:
68B30 Aircraft Powerplant Inspector

References:
Task 1-118

Equipment Condition:
Off Engine Task

1. **Inspect third stage power turbine rotor (1)** as follows:

   a. **Inspect disc (2).**

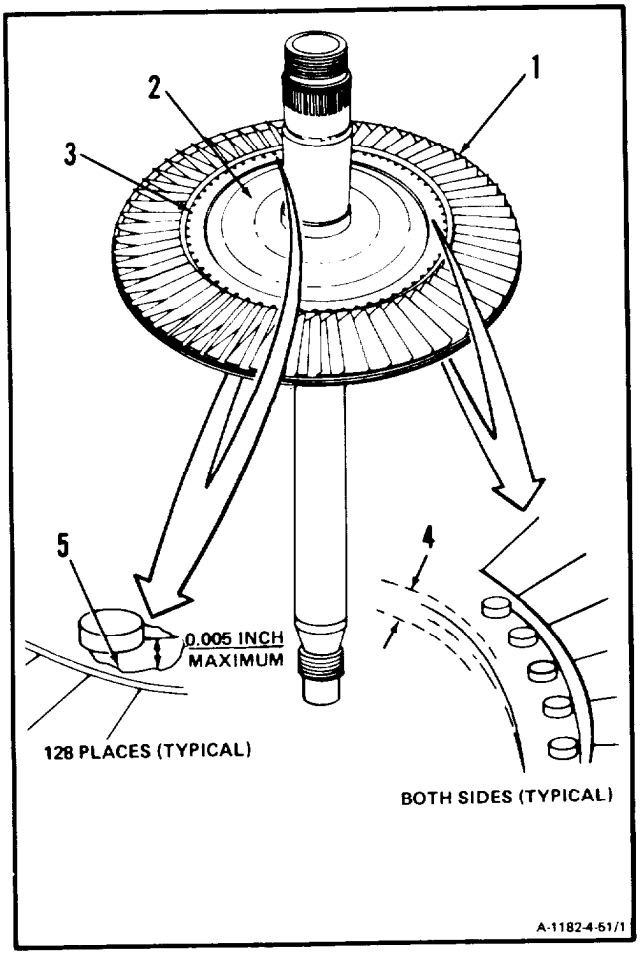
      (1) There shall be no cracks.

      (2) There shall be no burns.

      (3) There shall be no loose or cracked pins (3).

      (4) There shall be no pitting, nicks or rubs deeper than 0.010 inch. This limit does not apply to area (4) where material has been removed for balancing.

      (5) Inspect pin head area (5). There shall be no indents deeper than 0.005 inch. There shall be no indents which do not have a smooth contour. There shall be no cracks.



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4-51 INSPECT THIRD STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-51

NOTE

The following inspection applies to both sides of blades. Only one side is shown.

b. **Inspect 64 blades (6).** There shall be no more than 12 damaged blades.

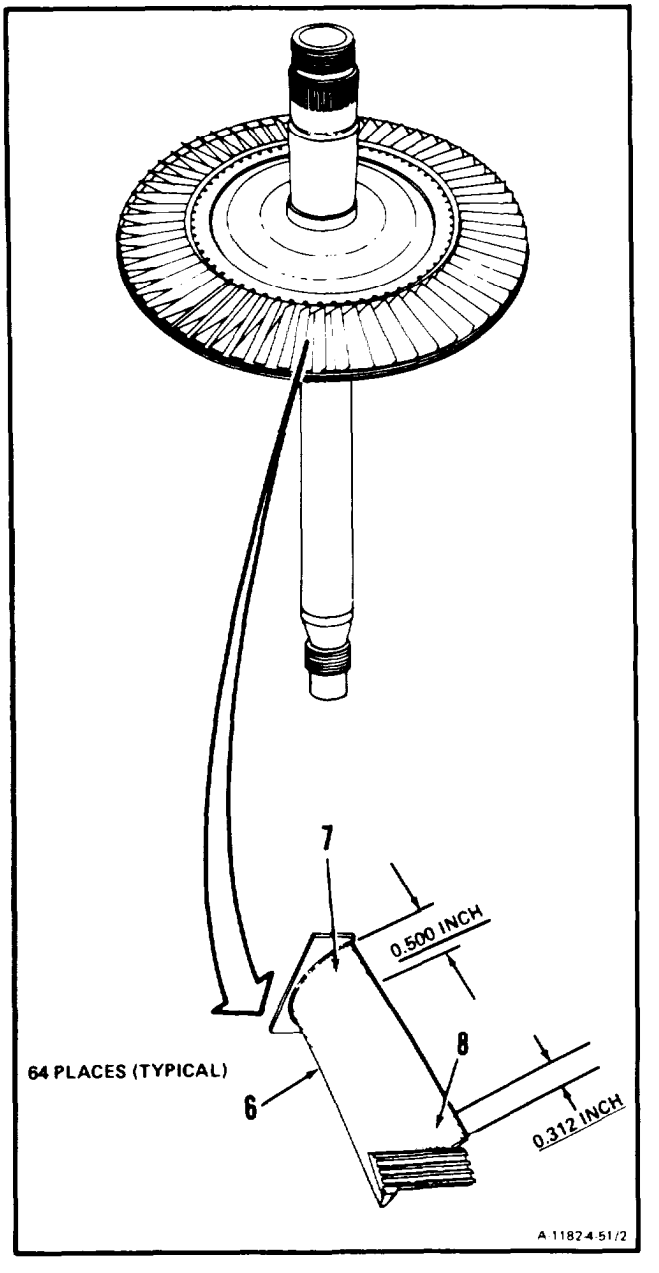
(1) There shall be no cracks.

(2) There shall be no burns.

(3) There shall be no bending or distortion.

(4) There shall be no loss of material.

(5) There shall be no nicks, dents or pitting in inner critical area (7) or outer critical area (8).



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4-51 INSPECT THIRD STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-51

(6) Inspect inner half non-critical area (9) as follows:

(a) There shall be no nicks or dents (10) in airfoil surface (11) longer than 0.078 inch or deeper than 0.010 inch.

(b) There shall be no nicks or dents (12) in edges (13) longer than 0.125 inch or deeper than 0.031 inch.

(c) There shall be no pitting deeper than 0.010 inch.

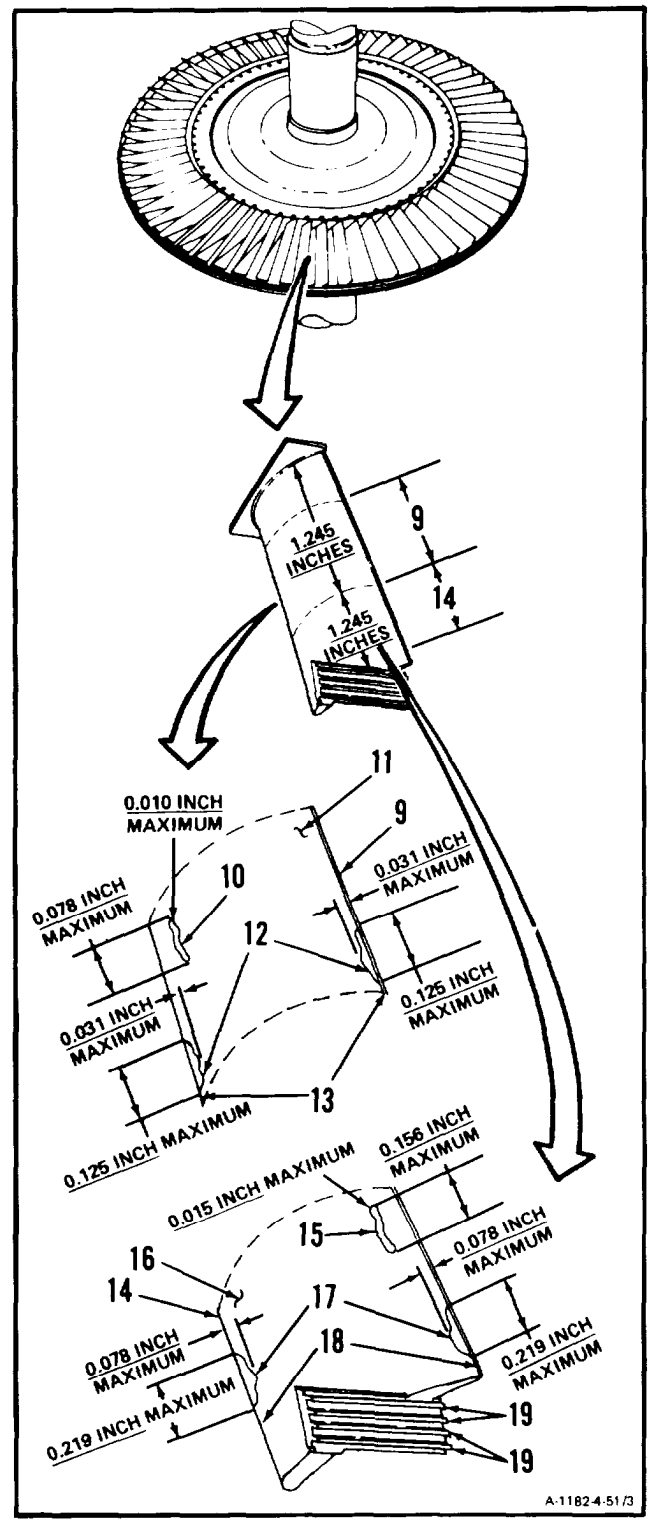
(7) Inspect outer half non-critical area (14) as follows:

(a) There shall be no nicks or dents (15) in airfoil surface (16) longer than 0.156 inch or deeper than 0.015 inch.

(b) There shall be no nicks or dents (17) in edges (18) longer than 0.219 inch or deeper than 0.078 inch.

(c) There shall be no pitting deeper than 0.010 inch.

(8) There shall be no nicks deeper than 0.015 inch at tip labyrinth (19).



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c. **Inspect shaft (20).**

(1) There shall be no cracks.

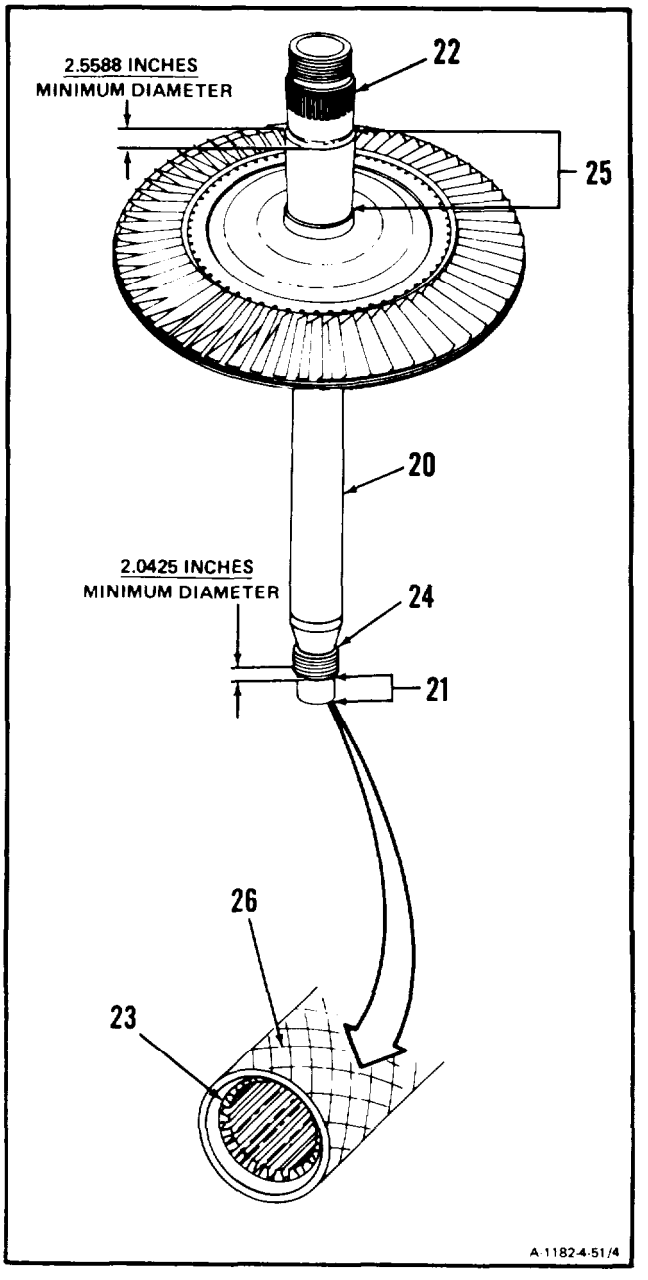
(2) Inspect shaft journal area (21). There shall be no pitting or nicking. The outside diameter shall not be worn to less than 2.0425 inches.

(3) Inspect splines (22 and 23). (Ref. Task 1-118). There shall be no wear deeper than 0.007 inch on spline (22) and 0.005 inch on spline (23).

(4) Inspect labyrinth seal (24) for cracks.

(5) Inspect shaft journal area (25). The outside diameter shall not be worn to less than 2.5588 inches.

2. Install vexar nylon webbing (E56) (26) over shaft journal area (21).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-52 REPAIR THIRD STAGE POWER TURBINE ROTOR (AVIM) 4-52

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Carborundum Stone (E10)
Crocus Cloth (E15)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

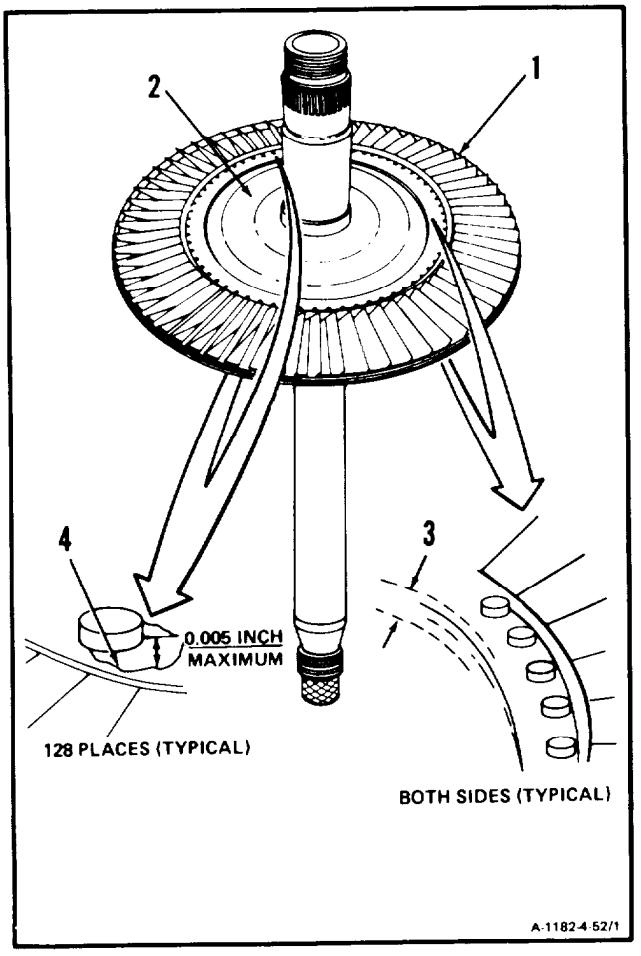
Equipment Condition:
Off Engine Task

1. **Repair third stage power turbine rotor (1)** as follows:

   a. **Repair disc (2).**

      (1) Blend repair pits, nicks and rubs up to 0.010 inch deep except in area (3) where material has been removed for balancing. Use Carborundum stone (E10). Polish to smooth finish. Use crocus cloth (E15).

      (2) Polish indents in pin head area (4) up to 0.005 inch deep. Use crocus cloth (E15) to polish to smooth contour.



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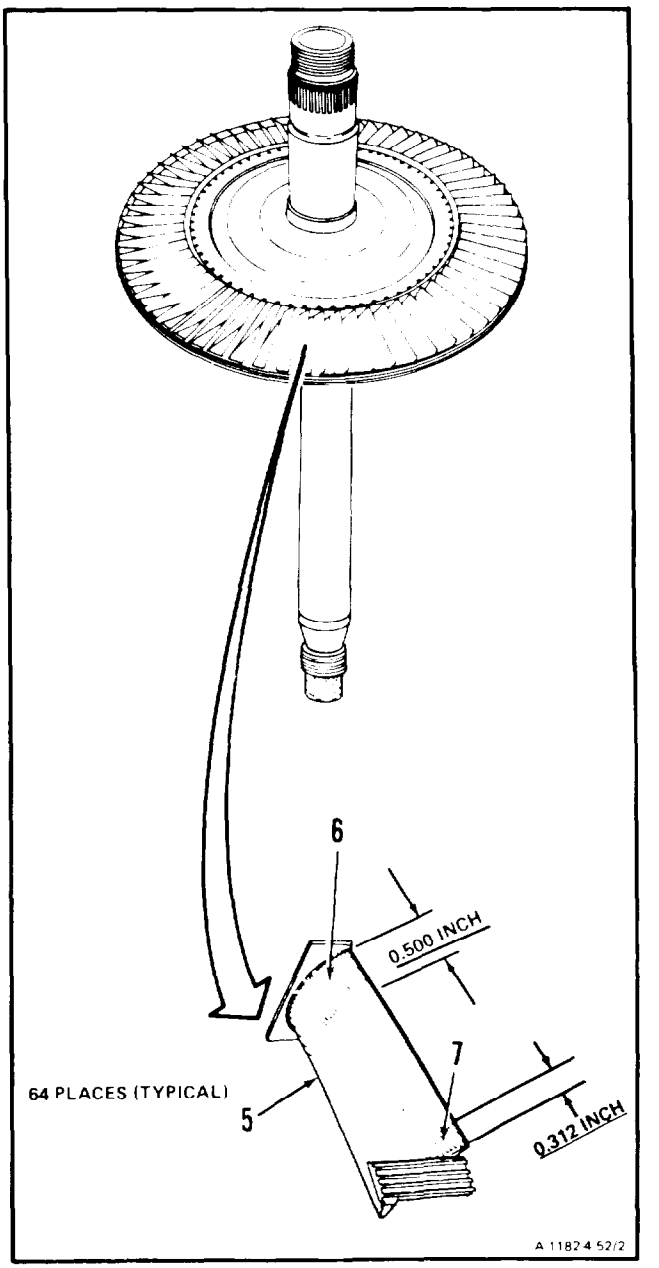
b. **Repair 64 blades (5).** There shall be no more than 12 damaged blades.

NOTE

The following repair applies to both sides of blades. Only one side is shown.

(1) There shall be no repair in inner (6) or outer (7) critical area.

(2) Blend repair pits up to 0.010 inch deep. Use Carborundum stone (E10) and crocus cloth (E15).



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4-52 REPAIR THIRD STAGE POWER TURBINE ROTOR (AVIM) (Continued) 4-52

(3) Blend repair inner non-critical area (8) up to the following limits:

(a) Nicks and dents (9) in airfoil surface (10) up to 0.010 inch deep and up to 0.078 inch long.

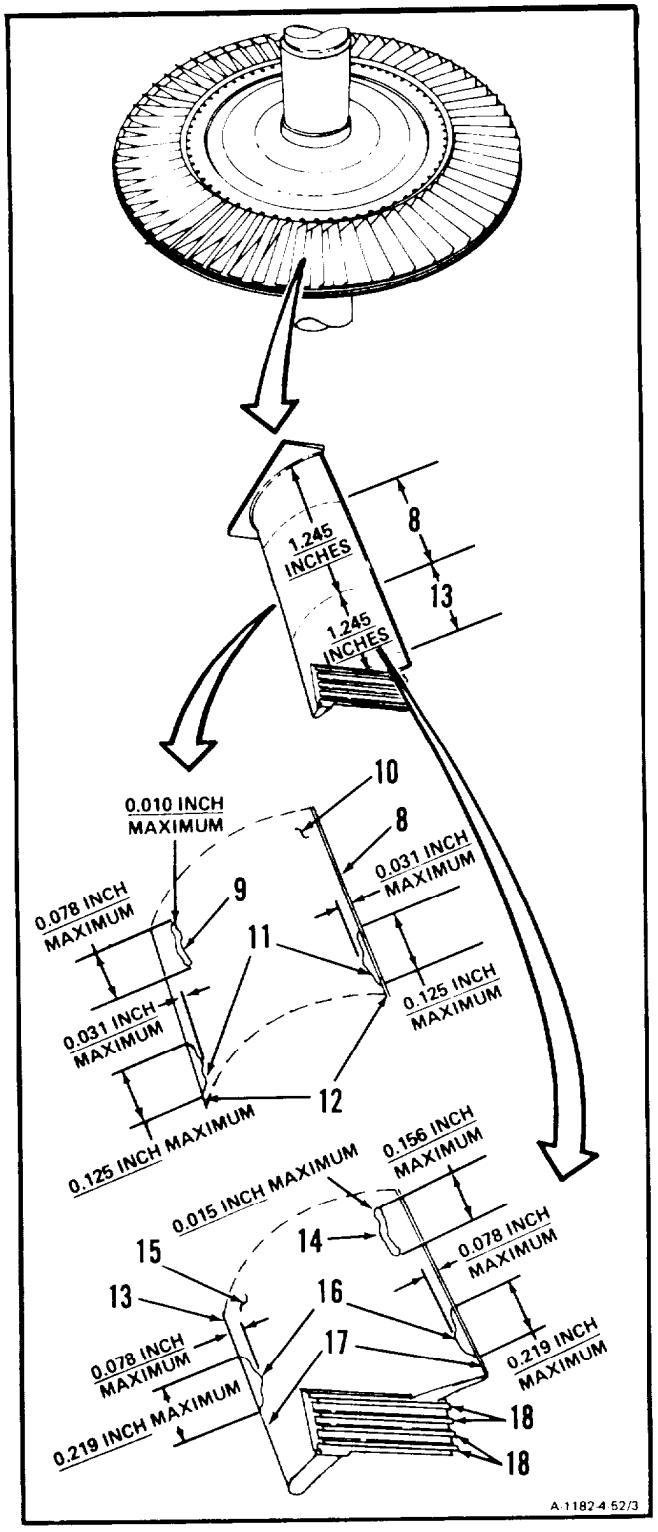
(b) Nicks and dents (11) in edges (12) up to 0.031 inch deep and up to 0.125 inch long.

(4) Blend repair outer non-critical area (13) up to the following limits:

(a) Nicks and dents (14) in airfoil surface (15) up to 0.015 inch deep and up to 0.156 inch long.

(b) Nicks and dents (16) in edges (17) up to 0.078 inch deep and up to 0.219 inch long.

(5) Blend repair nicks up to 0.015 inch deep at tip labyrinth (18).



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NOTE

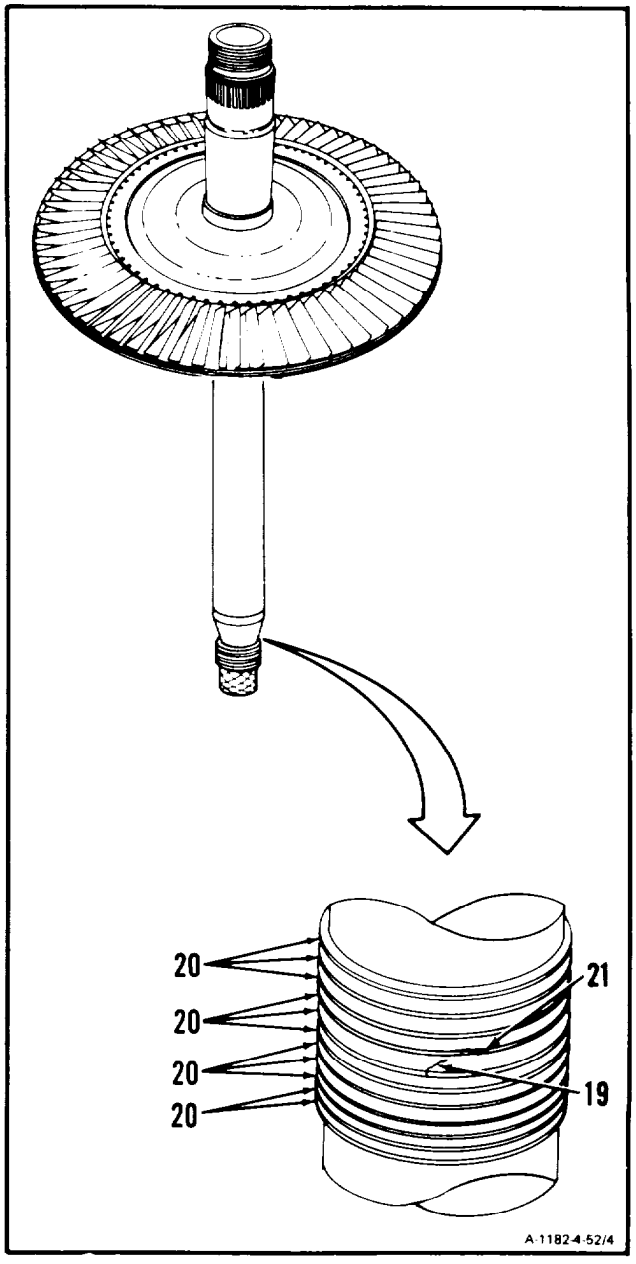
Repair is allowed to any depth provided no cracks are visible.

c. **Repair labyrinth seals (20).** Repair cracks (19) in labyrinth seals (20) as follows:

(1) Blend all sharp edges (21). Use carborundum stone (E10).

(2) Polish to smooth finish. Use crocus cloth (E15).

(3) All seals can be blend repaired. One seal (20) must have at least 0.010 inch material remaining after repair.



INSPECT

FOLLOW-ON MAINTENANCE

None

END OF TASK

4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) 4-53

INITIAL SETUP

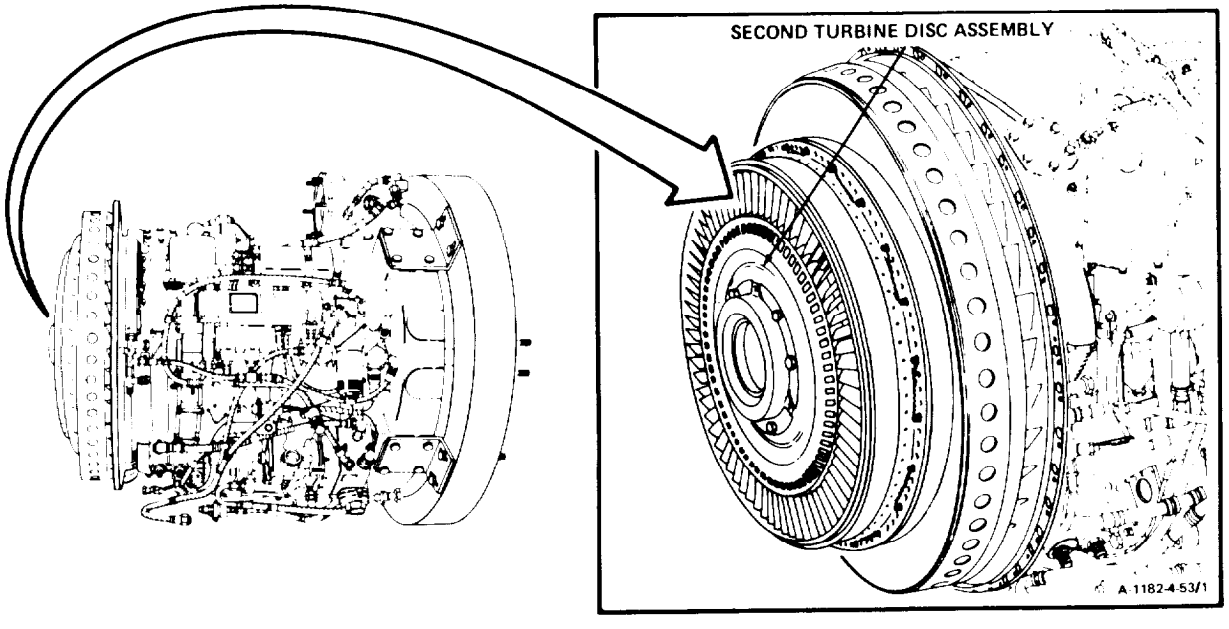
Applicable Configurations:
None

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Mechanical Puller (T61)
Turbine Disc Puller (T62)

Materials:
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

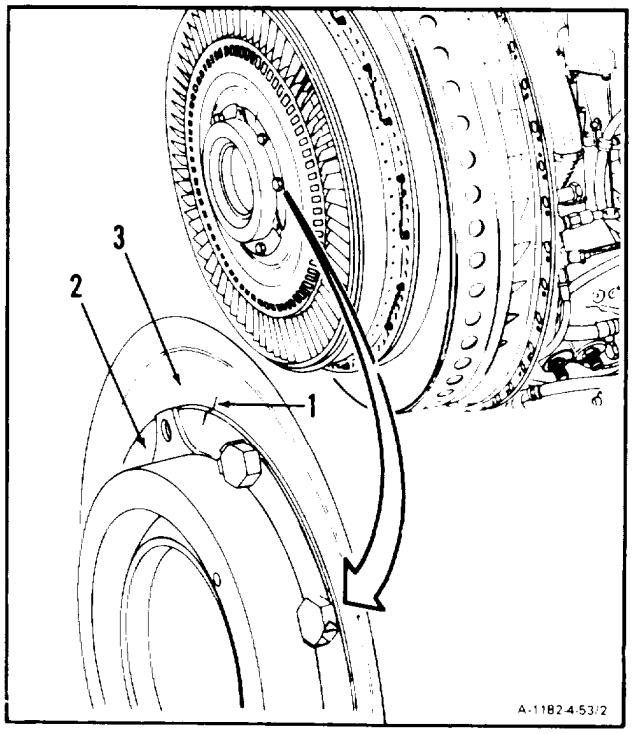
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)



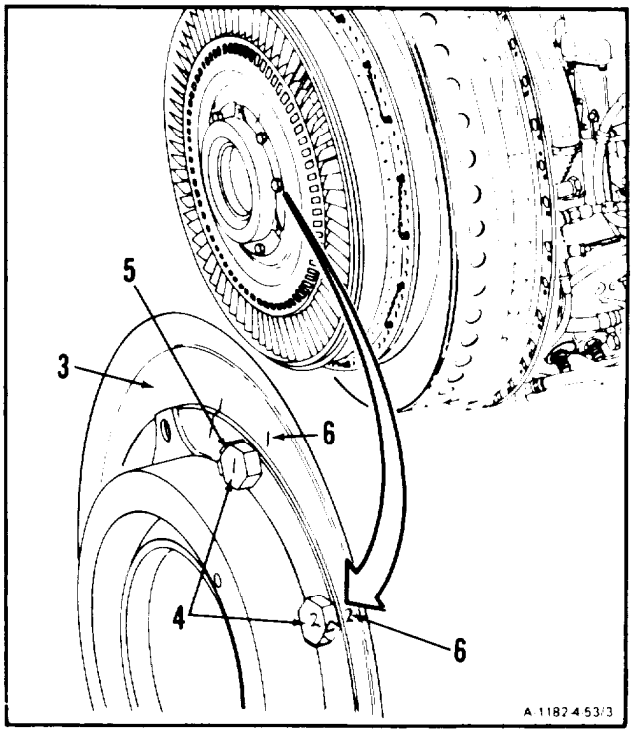
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4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued)

1. Draw matchmark (1) from seal (2) to second turbine disc (3) using marking pencil (E34).



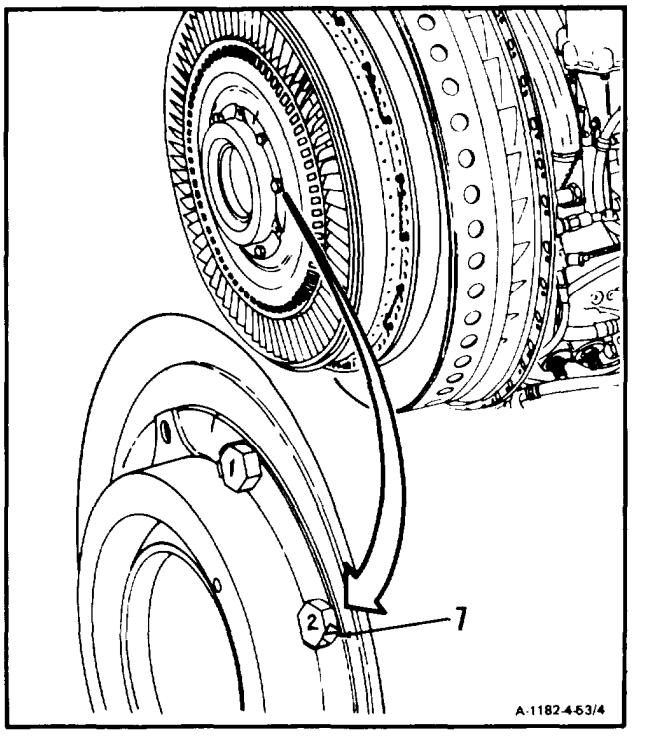
2. Mark index numbers (4) on each of six bolts (5) and mark six matching numbers (6) on second turbine disc (3) using marking pencil (E34).



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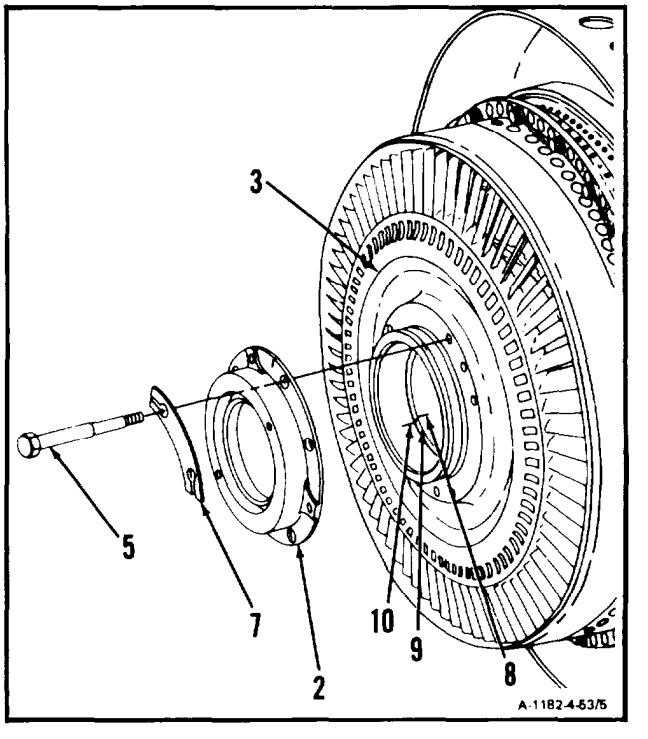
4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued)

3. **Straighten tabs of three locking plates (7).**



4. **Remove** six bolts (5), three locking plates (7) and **seal (2).**

5. Draw matchmark (8) on inside surface of shaft (9) in line with matchmark (10) on second turbine disc (3).

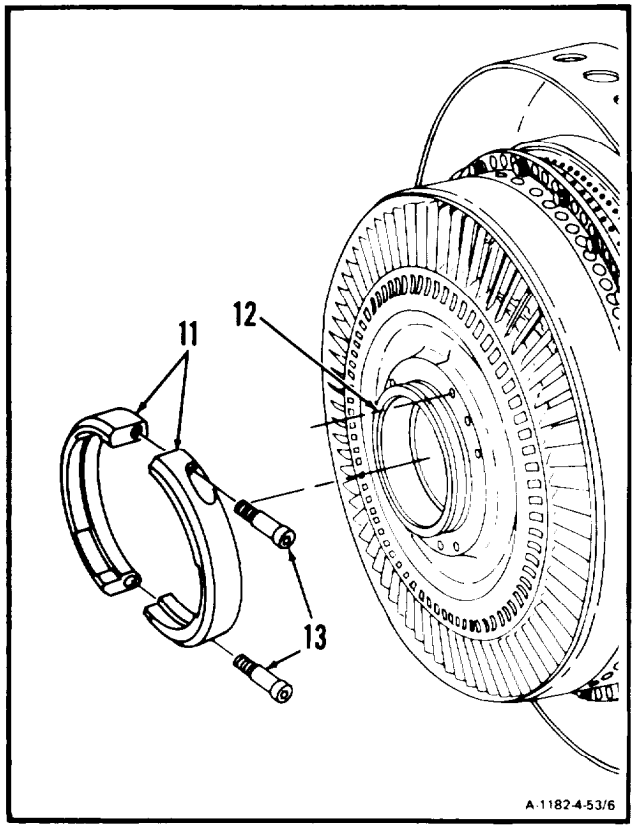


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4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-53

6. **Position turbine disc puller (T62) (11)** around flange (12) of second turbine disc.

7. **Secure** both halves of **turbine disc puller (T62) (11)** with two bolts (13).



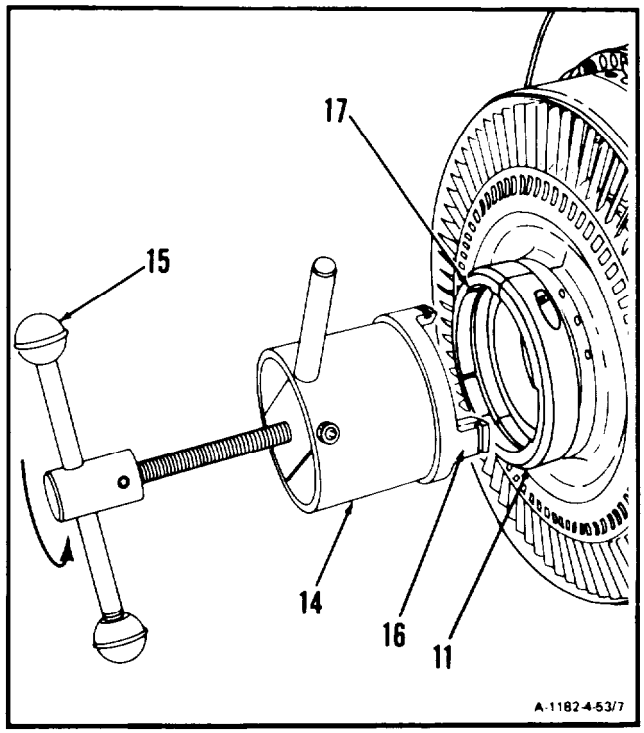
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4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-53

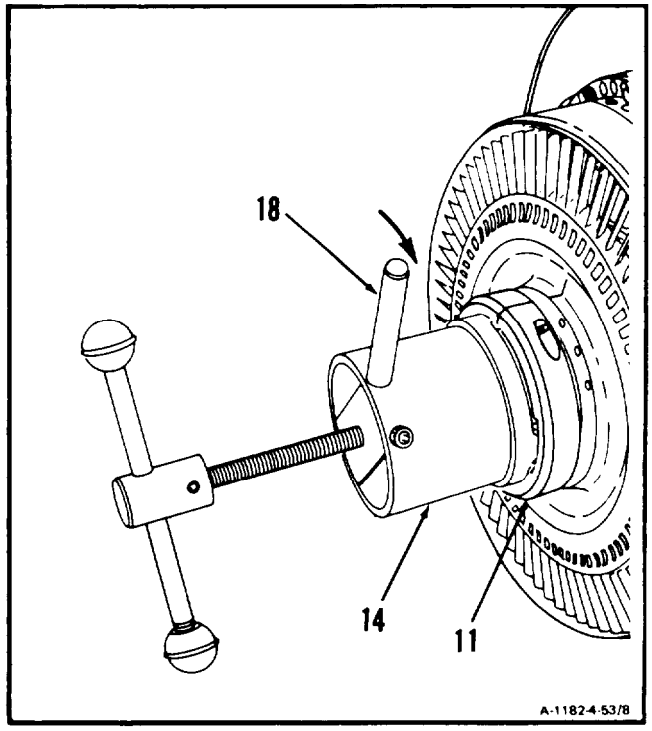
8. **Install mechanical puller (T61) (14)** in turbine disc puller (T62) (11) as follows:

   a. Turn T-handle (15) counterclockwise all the way.

   b. Align three puller lugs (16) with three slots (17) in turbine disc puller (T62) (11).



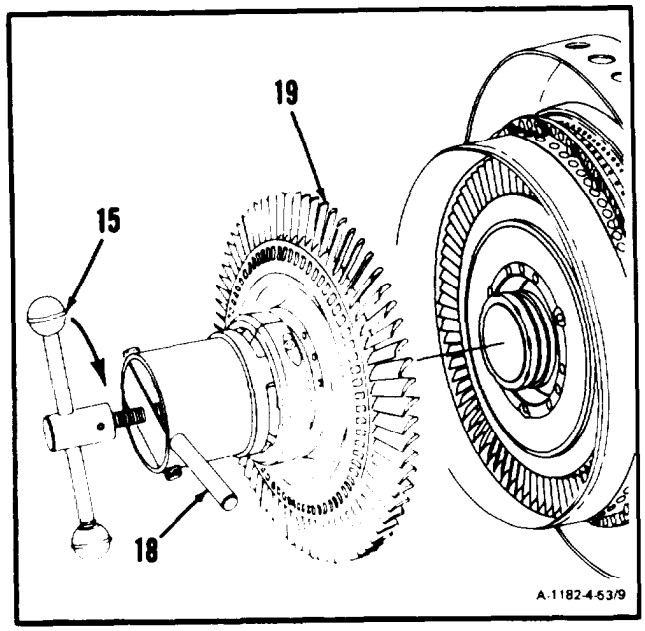
9. Install mechanical puller (T61) (14) fully and rotate puller handle (18) 1/3 turn clockwise, to engage mechanical puller (T61) (14) in turbine disc puller (T62) (11).



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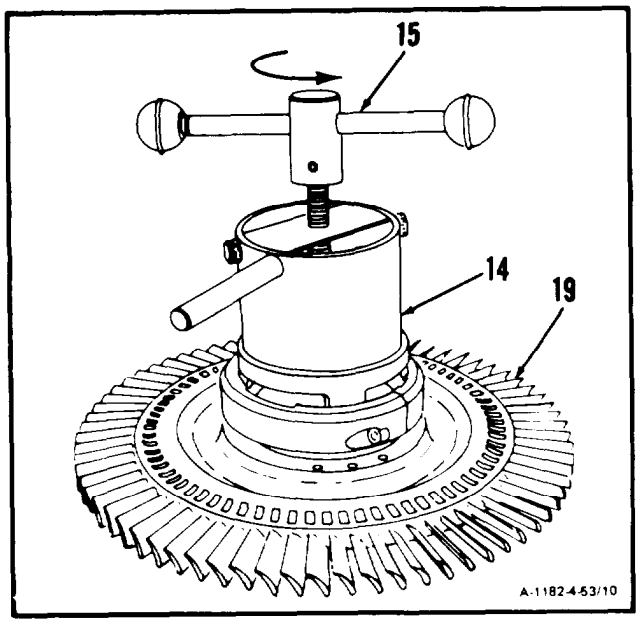
4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-53

10. Hold puller handle (18) and turn T-handle (15) clockwise to **remove second turbine disc assembly (19).** Have helper support assembly during removal.



11. Turn T-handle (15) counterclockwise until loose.

12. **Remove mechanical puller (T61) (14)** from second turbine disc assembly (19).

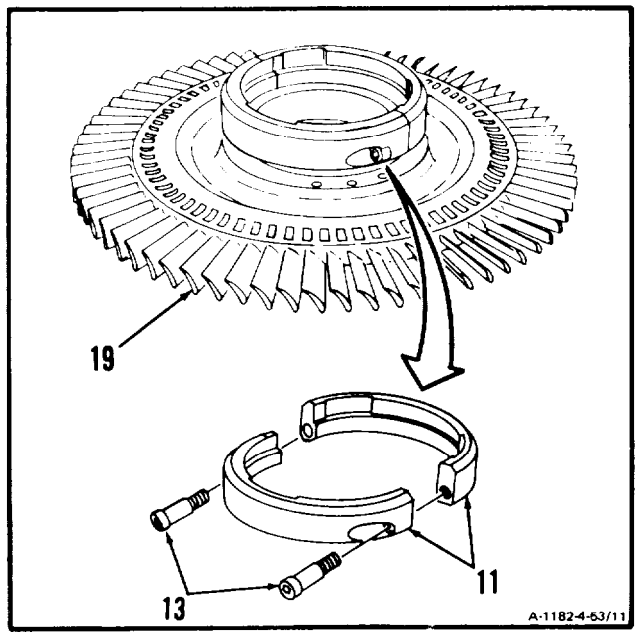


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4-53 REMOVE SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-53

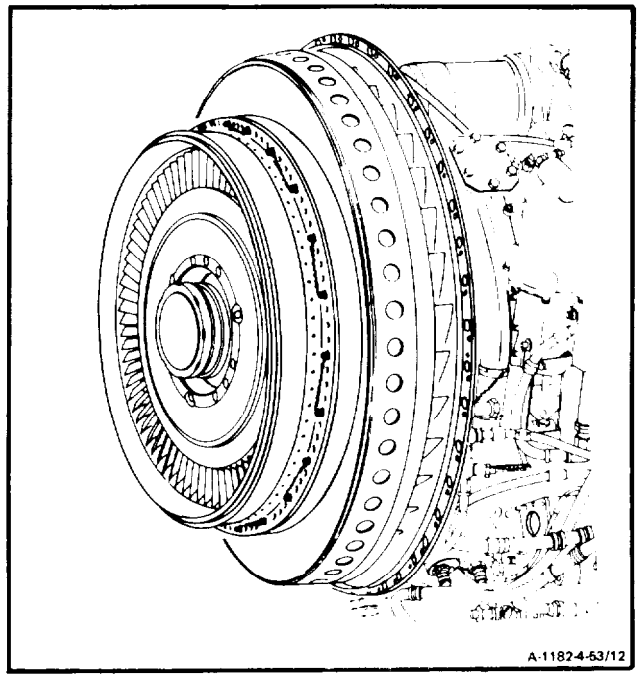
13. Loosen two bolts (13) to **separate** both halves of **turbine disc puller (T62) (11).**

14. **Remove turbine disc puller (T62) (11)** from second turbine disc assembly (19).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-54 CLEAN SECOND TURBINE DISC ASSEMBLY (AVIM) 4-54

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

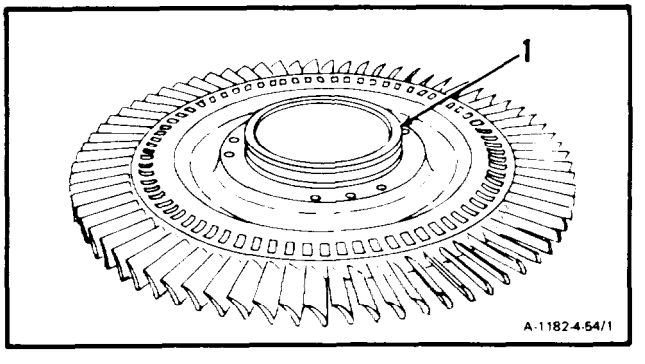
1. **Clean second turbine disc assembly (1)** as follows:

   a. Wear gloves (E20) and goggles. **Clean second turbine disc (1)** using methyl ethyl ketone (E36) and brush.

   CAUTION

   In following step, avoid directing air at blade air cooling passages. Failure to comply may cause blockage of blade air cooling passages.

   b. **Blow dry second turbine disc assembly (1),** using clean, dry compressed air.



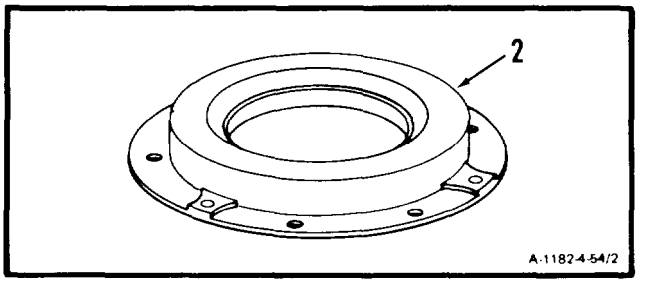
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4-54 CLEAN SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-54

2. **Clean seal (2)** as follows:

   a. Wear gloves and goggles. **Clean seal (2),** using methyl ethyl ketone (E36) and brush.

   b. **Blow dry seal (2)** using clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Second Turbine Disc Assembly (Task 4-55).

END OF TASK

4-55 INSPECT SECOND TURBINE DISC ASSEMBLY (AVIM) 4-55

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect rotor blades (1) and second turbine disc assembly (2).** There shall be no cracks.

   a. **Inspect blades (1).**

      (1) There shall be no nicks deeper than 0.015 inch.

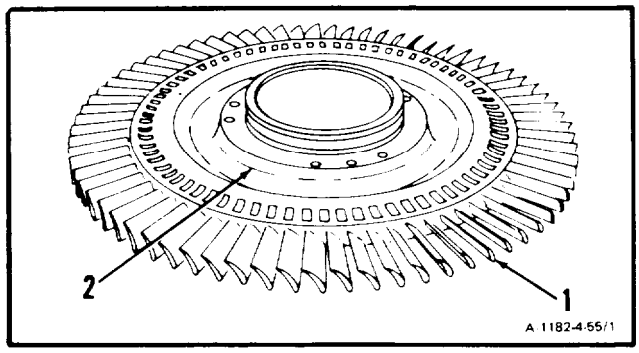
      (2) There shall be no bent or distorted blades.

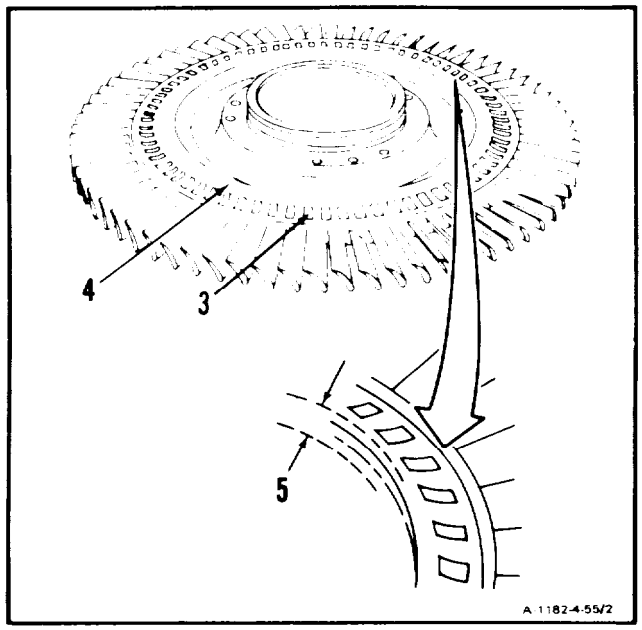
      (3) Tip rubs shall not be deeper than 0.010 inch.

      (4) Surface oxidation is acceptable provided there is no burning or loss of material.

   b. **Inspect sealing plates (3).** There shall be no loose or missing sealing plates.

   c. **Inspect disc face (4).** Scoring shall not be deeper than 0.010 inch. This limit does not apply to area (5) where material has been removed for balancing.

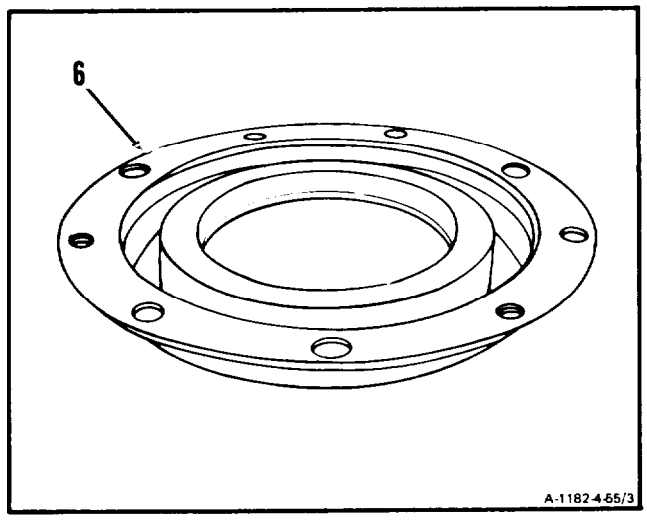




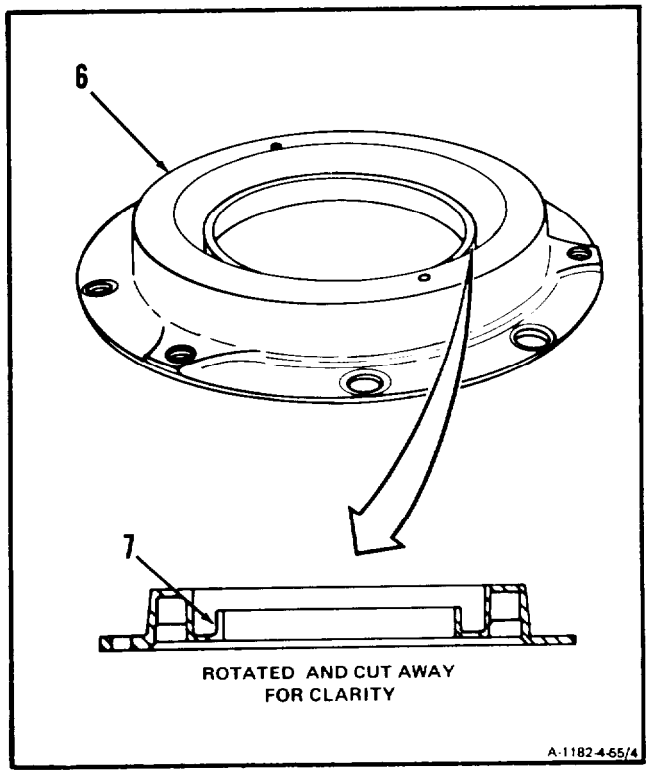
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4-55 INSPECT SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued)

2. **Inspect seal (6).** There shall be no cracks.



3. **Inspect seal (6)** inside diameter (7). Rubs shall not be deeper than 0.010 inch.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) 4-56

INITIAL SETUP

Applicable Configurations:
All

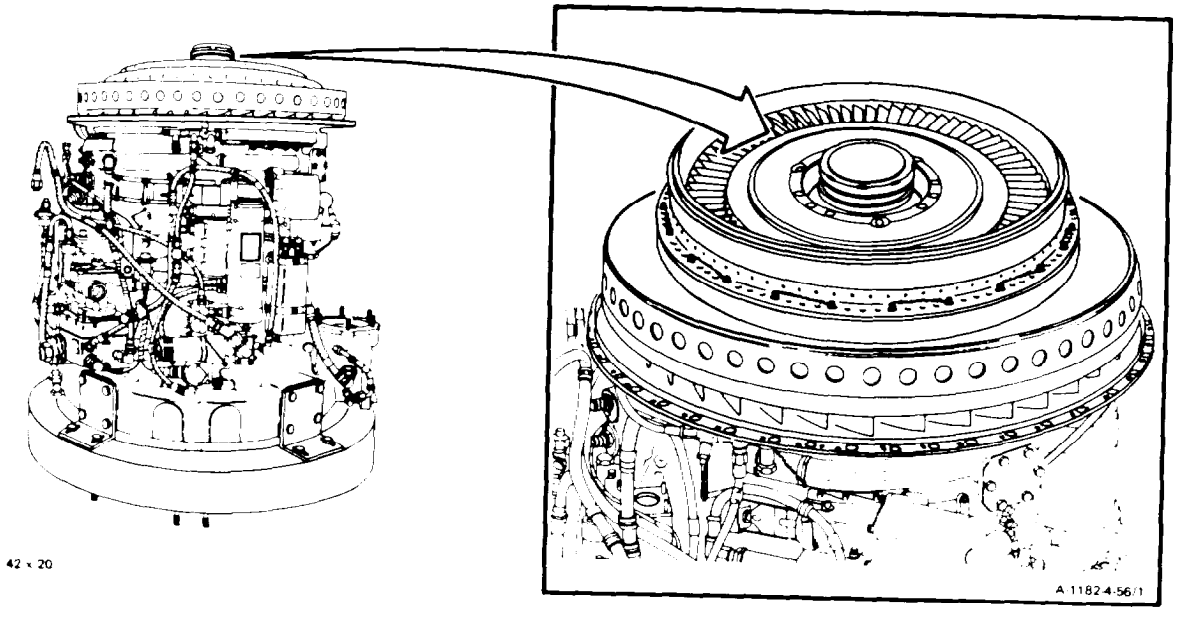
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspecton Tool Kit, NSN 5180-00-323-5114
Dial Indicator Support(T27)
Dial Indicator and Base
Torque Wrench, 100 to 750 Inch-Pounds
Slave Bolt, P/N STD3053-31 (3)

Materials:
Nickel Ease (E37)

Parts:
Lockplates

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23
TM 55-2840-254-23P
Task 1-107
Task 4-53
Task 4-56
Task 4-57
Task 4-60
Task 4-61
Task 4-62
Task 4-66
Task 4-72



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4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

NOTE

The first turbine disc assembly, turbine spacer, second turbine disc assembly, seal, three locking plates and six bolts are supplied as a balanced matched set. If the second turbine disc assembly is replaced, all other parts in the balanced, matched set shall be replaced. Use field replacement first and second turbine disc assembly, part number 2-121-480-03

NOTE

if same second turbine disc assembly that was removed is being installed, omit steps 1 through 5.

If second turbine disc assembly is being replaced do all steps.

1. **Remove second turbine nozzle, spacer and case** (Ref. Task 4-57).

2. **Remove first turbine disc assembly** (Ref. Task 4-62).

3. **Place in service field replacement first and second turbine disc assembly** (Ref. Task 4-72).

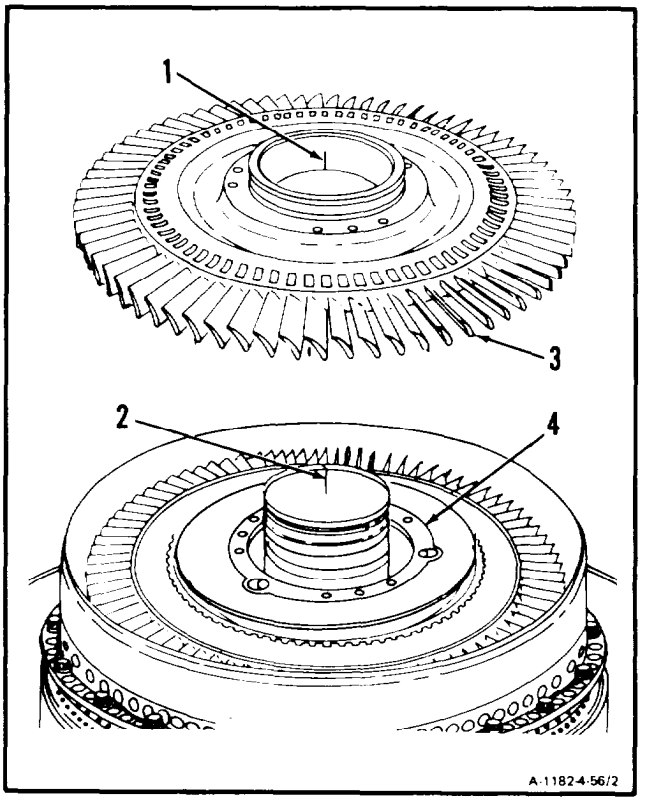
4. **Install first turbine disc assembly** (Ref. Task 4-66).

5. **Install second turbine nozzle, spacer and case and turbine rotor case** (Ref. Task 4-61).

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4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

6. Align matchmarks (1 and 2) and **seat second turbine disc assembly (3) on turbine spacer (4).**



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4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

7. Coat underside of head and threads of six bolts (5) with Nickel Ease (E37).

NOTE

Do not bend up tabs of locking plates.

NOTE

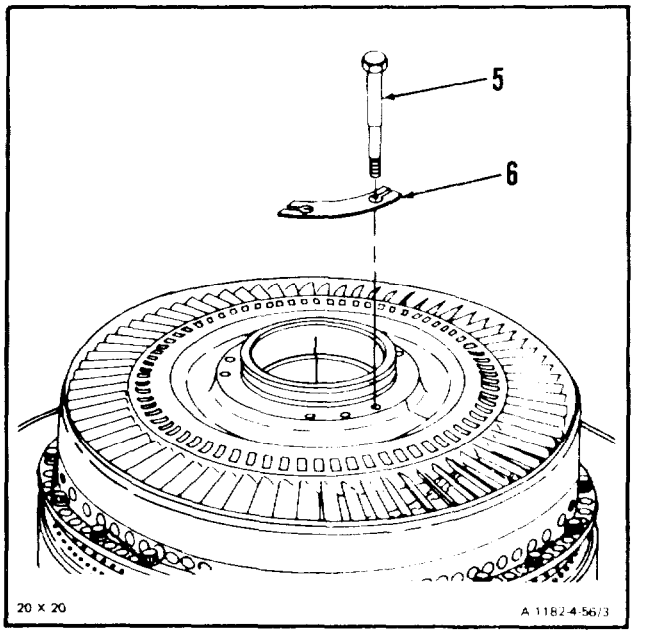
Bolts must be installed in accordance with index numbers marked on bolt heads and second turbine disc assembly. If any of the six bolts are lost, all six bolts must be replaced and a vibration test performed (Ref. Task 1-107 or TM 55-1520-240-23).

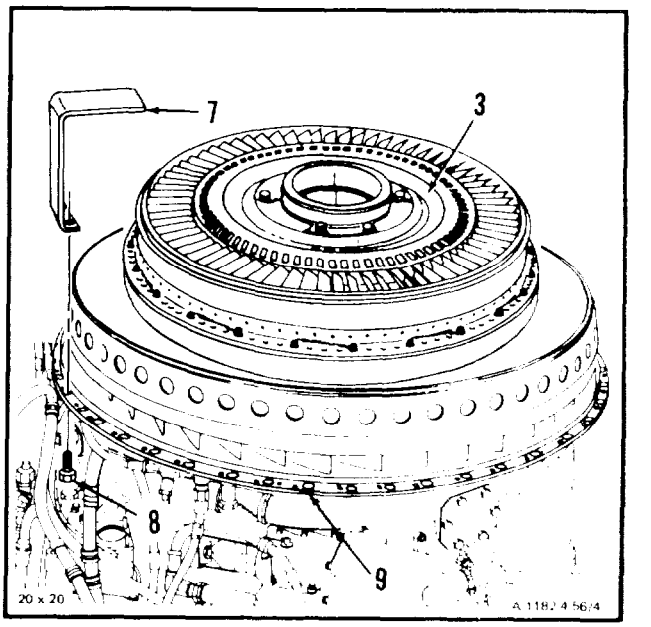
8. **Install new locking plates (6) and bolts (5)** into second turbine.

9. **Torque bolts (5) to 155 inch pounds.**

10. **Check runout of second turbine disc assembly (3)** as follows:

    a. Install dial indicator support (T27) (7) and three slave bolts (8) on air diffuser (9).

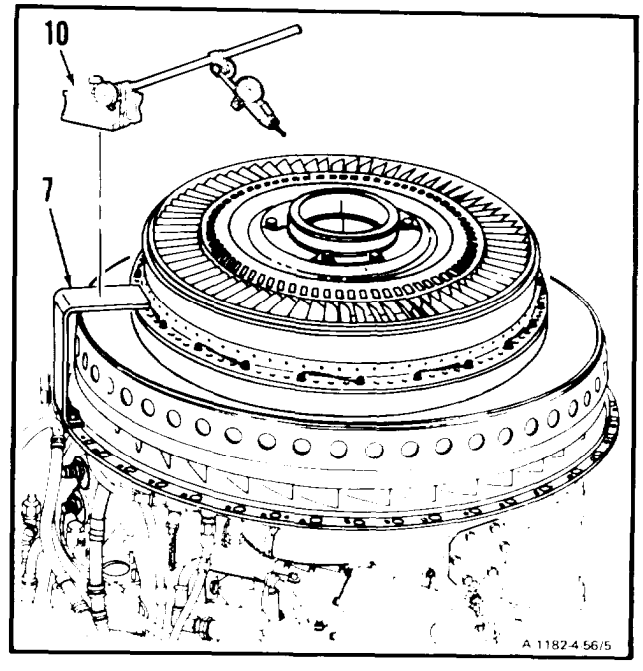




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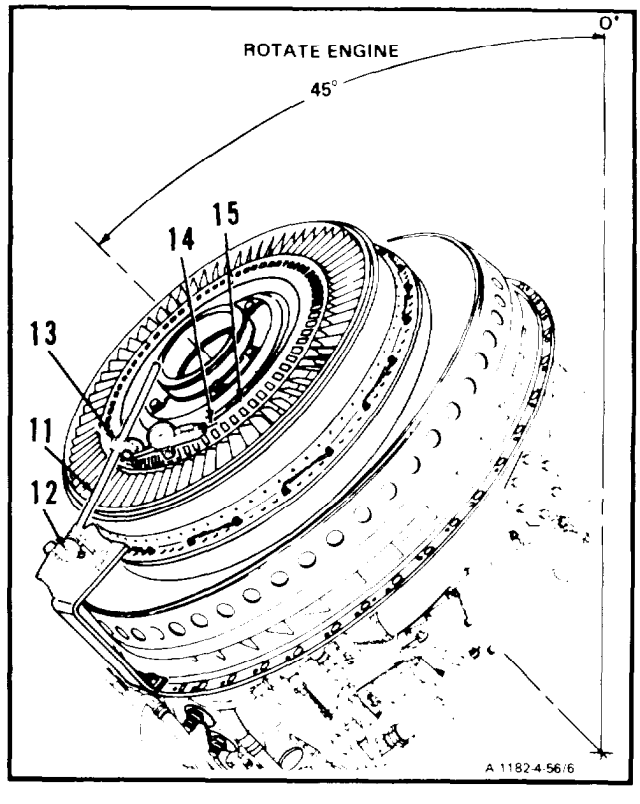
4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

b. Place magnetic base of dial indicator (10) on dial indicator support (T27) (7).



c. Rotate engine to approximately 45 degrees.

d. Adjust arm (11) at base (12) and indicator clamp (13) to position pointer (14) on outer surface (15) next to blade roots.



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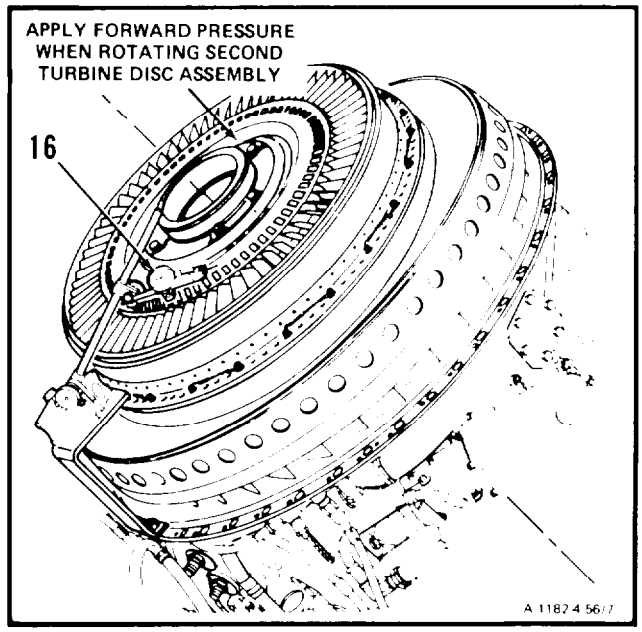
4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

NOTE

When checking runout, apply forward pressure to compensate for bearing internal clearance.

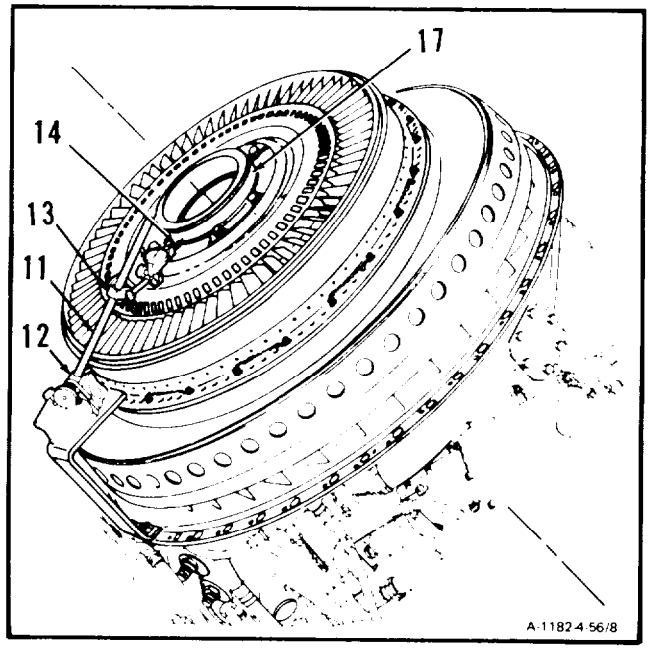
e. Zero indicator (16) and rotate second turbine disc assembly counterclockwise while recording dimension.

f. Maximum allowable runout shall be 0.004 inch. Record runout.



INSPECT

g. Adjust arm (11) at base (12) and indicator clamp (13) to position pointer (14) on hub (17).



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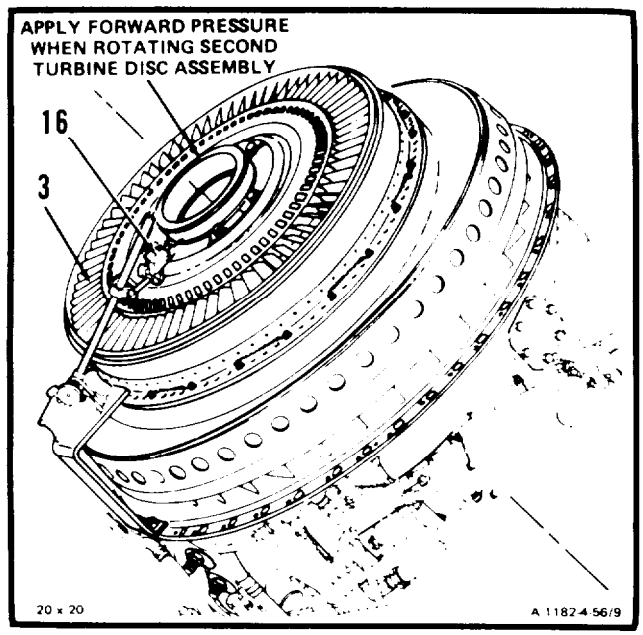
4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

NOTE

When checking runout, apply forward pressure to compensate for bearing internal clearance.

h. Zero indicator (16) and rotate second turbine disc assembly (3) counterclockwise while recording dimension.

i. Maximum allowable runout shall be 0.003 inch. Record runout.



INSPECT

NOTE

If runouts measured in steps f. and i. are not met, do steps j., k., and l. otherwise proceed to step n.

j. Loosen arm (11) at base (12) and move arm (11) away from second turbine disc assembly (3).

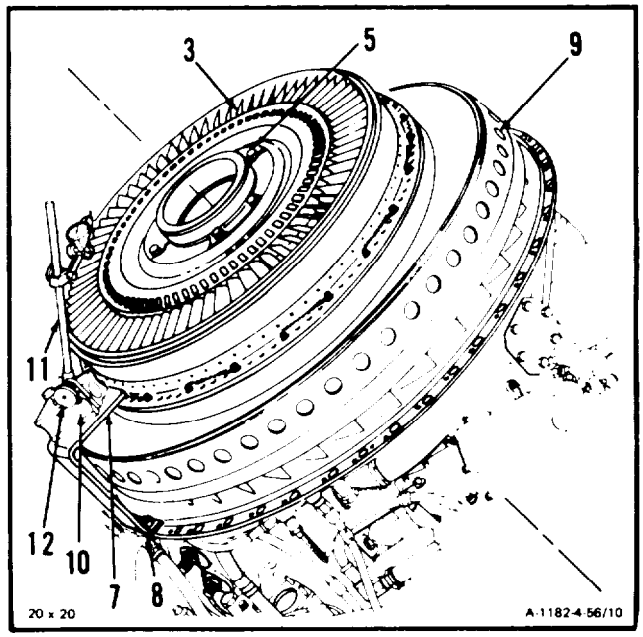
k. Loosen and **retorque six bolts (5) to 155 inch-pounds.**

l. Repeat preceding steps d through i.

m. If runouts are still not met, **replace second turbine disc assembly** (Ref. Task 4-53 and 4-56).

n. Remove dial indicator (10), three slave bolts (8), and support (7) from air diffuser (9).

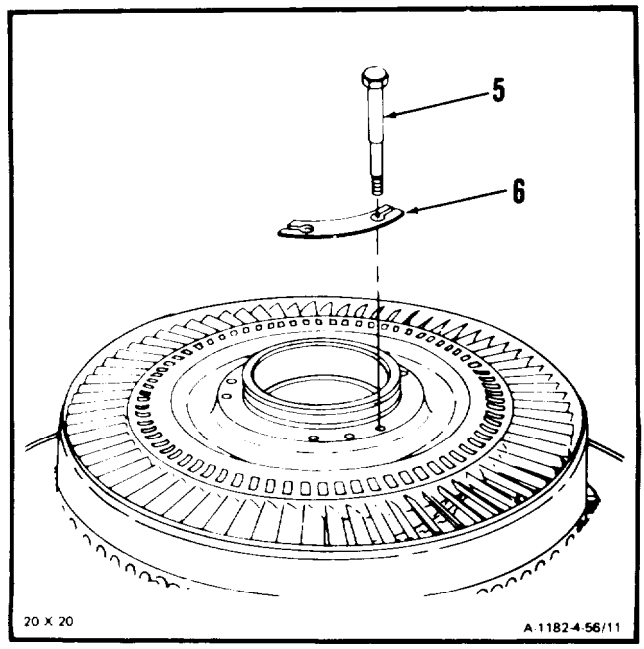
o. Rotate engine 45 degrees to vertical position.



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4-56 INSTALL SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-56

11. **Remove** six bolts (5) and three **locking plates (6).**



NOTE

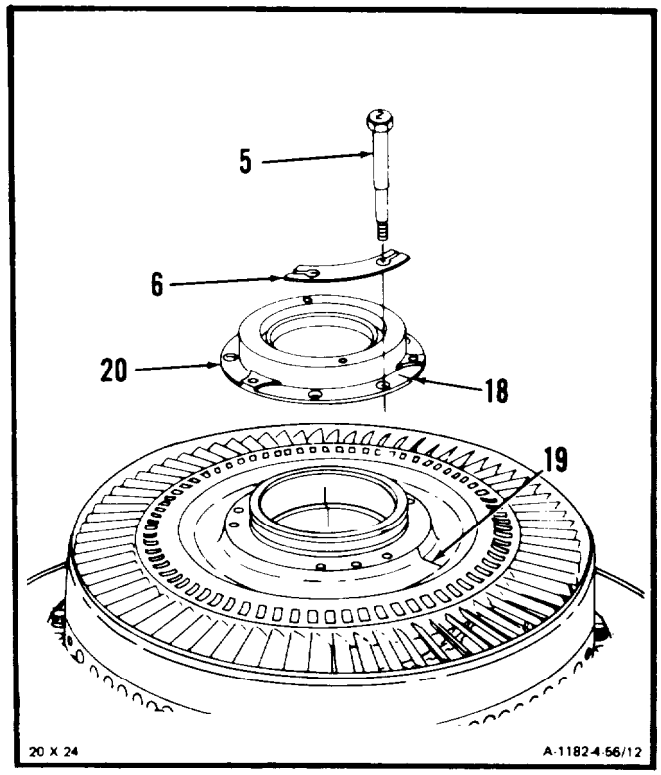
Bolts must be Installed in accordance with index numbers marked on bolt heads and second turbine disc assembly.

NOTE

In following step 12., do not bend up tabs of locking plates.

12. Align matchmarks (18 and 19) and **install seal (20), three locking plates (6) and six bolts (5).**

13. **Torque bolts (5) to 155 inch-pounds.**



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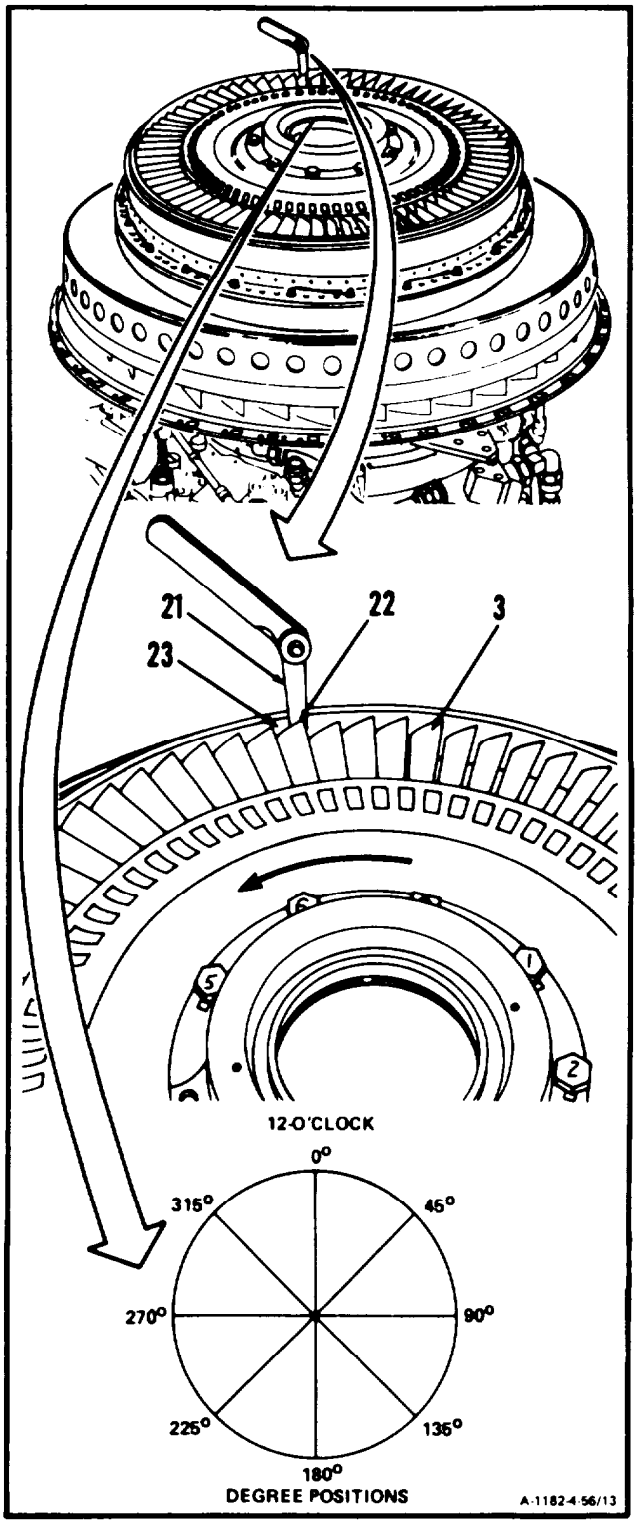
14. **Measure second turbine disc assembly (3) tip clearance** at 0, 45, 90, 135, 180, 225, 270 and 315 degree positions as follows:

    a. Insert thickness gage (21) between blade tip (22) and second turbine nozzle inside diameter (23).

    b. **Measure and record minimum tip clearance** while rotating second turbine disc assembly (3) counterclockwise one revolution.

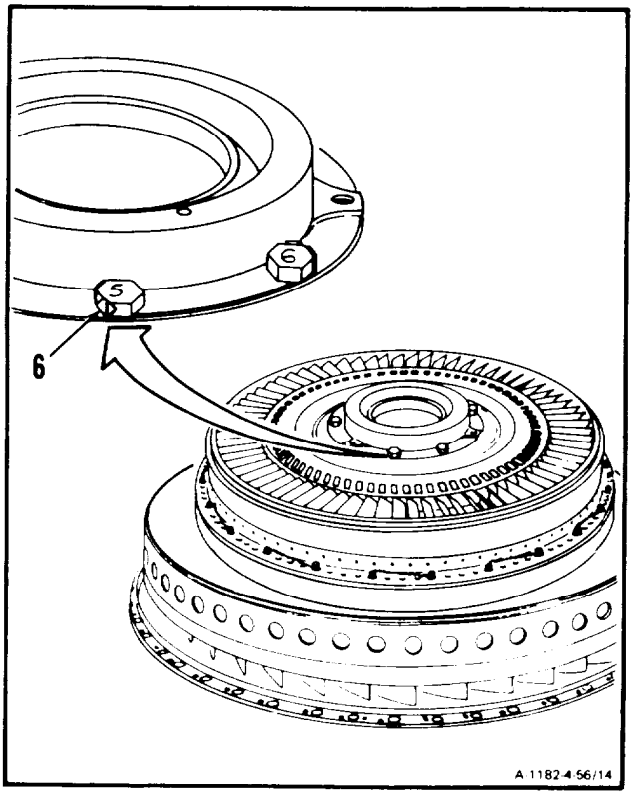
    c. Tip clearance shall be 0.025 inch minimum.

    d. **If tip clearance is less than 0.025 inch, repair second turbine nozzle** (Ref. Task 4-60).



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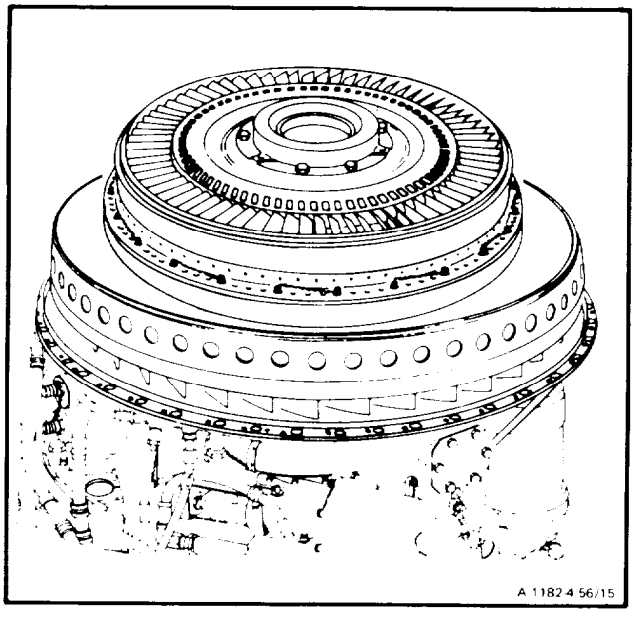
15. Bend up tabs of three locking plates (6).



INSPECT

FOLLOW-ON MAINTENANCE.

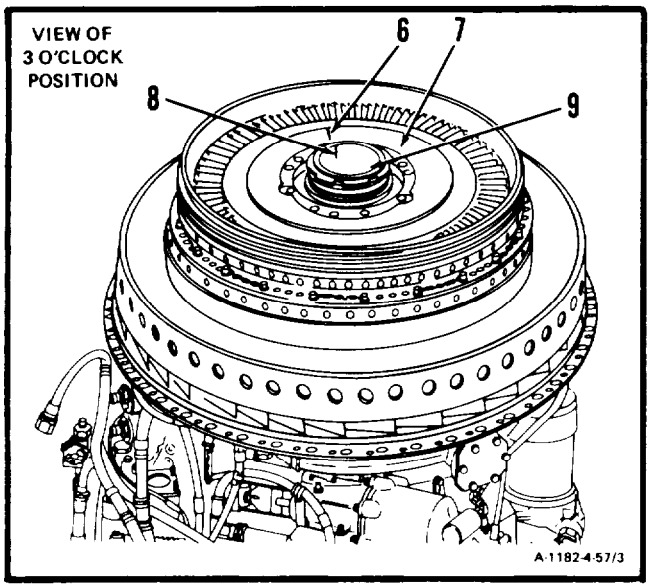
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

2. Draw matchmark (6) on turbine spacer (7) in line with matchmark (8) on inside of shaft (9). Use marking pencil (E34).

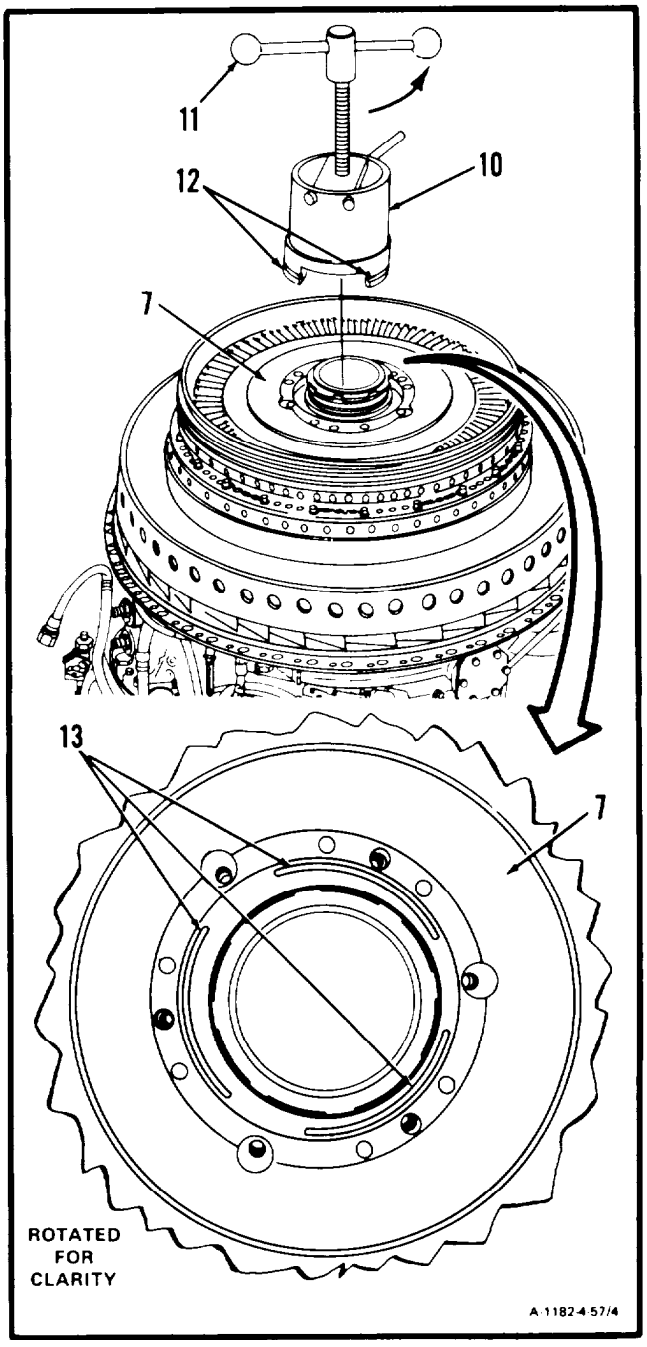


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3. **Install mechanical puller (T61) (10) on turbine spacer (7)** as follows:

   a. Turn T-handle (11) counterclockwise all the way.

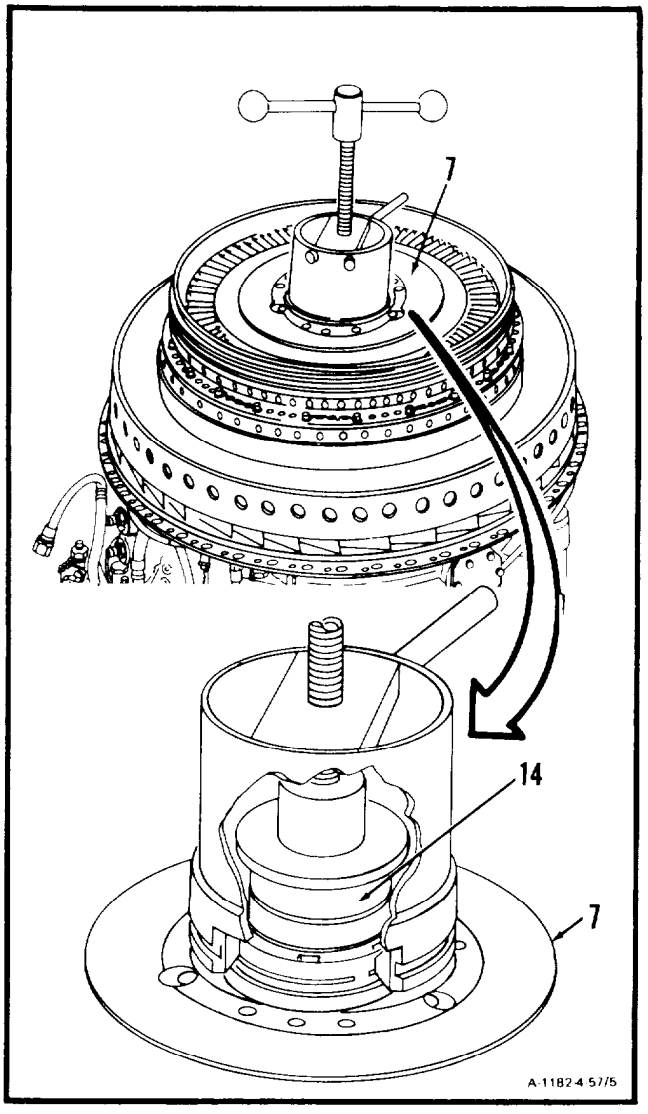
   b. Align three puller lugs (12) with three slots (13) in turbine spacer (7).



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4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

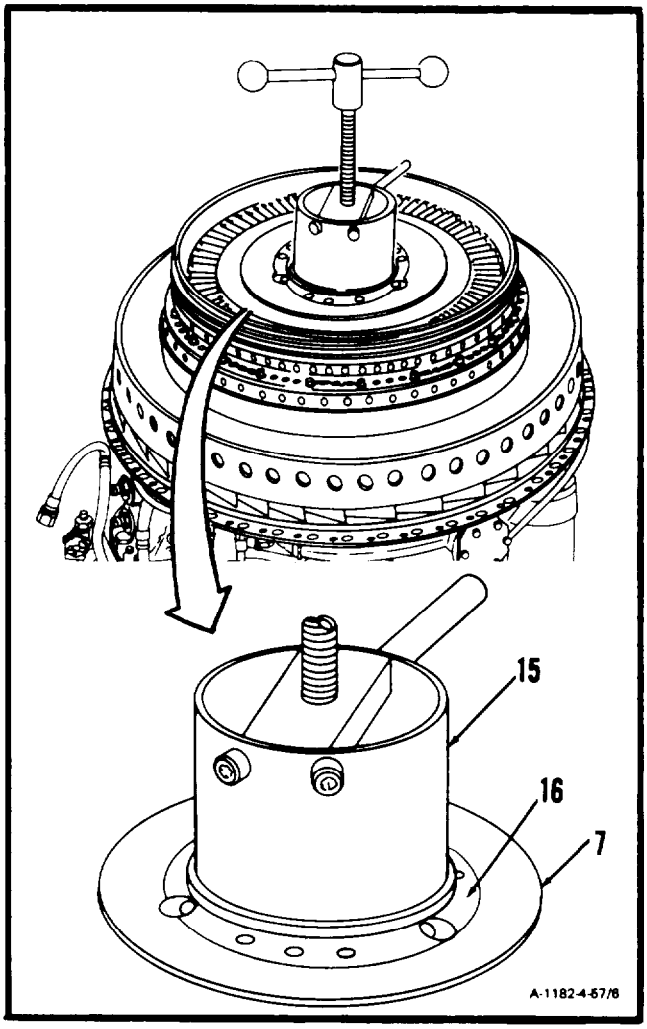
c. Install pusher end (14) in turbine spacer (7).



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4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

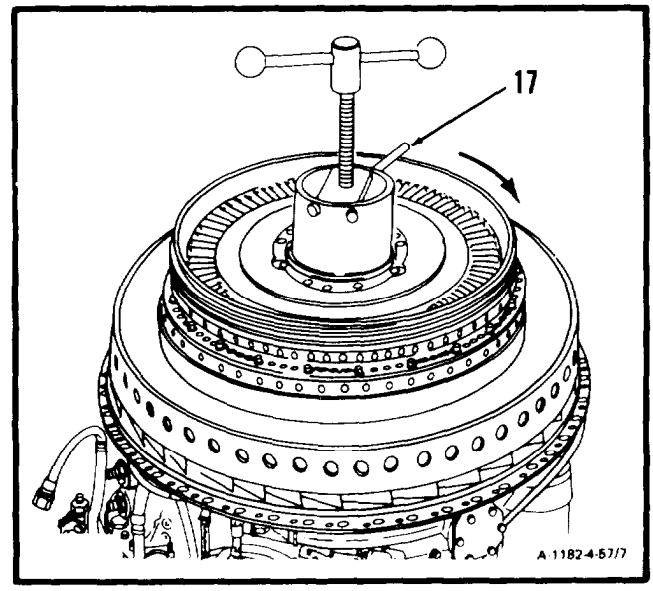
d. Hold puller hub shoulder (15) against aft face (16) of turbine spacer (7).



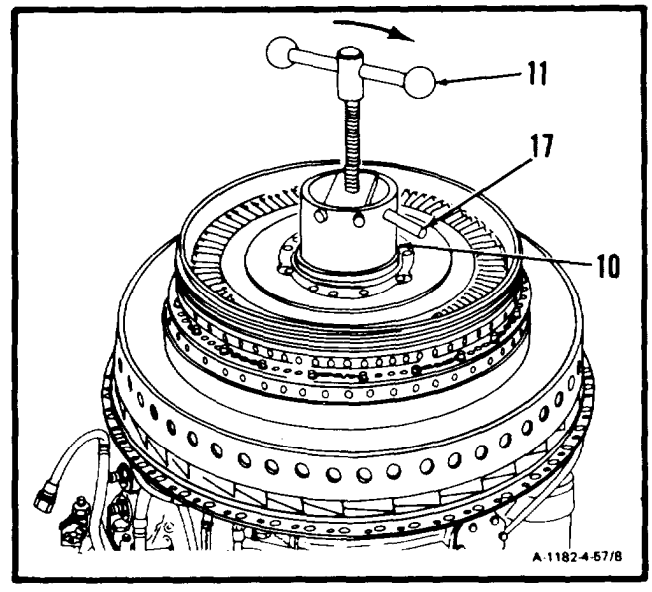
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4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

e. Rotate puller handle (17) 1/3 turn clockwise.



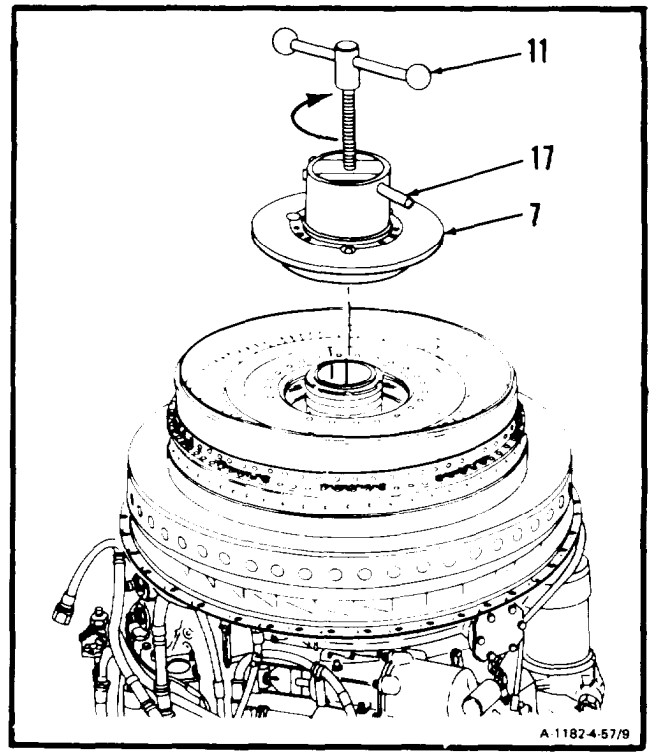
f. Hold puller handle (17). Turn T-handle (11) clockwise until mechanical puller (T61) (10) is locked in position.



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4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

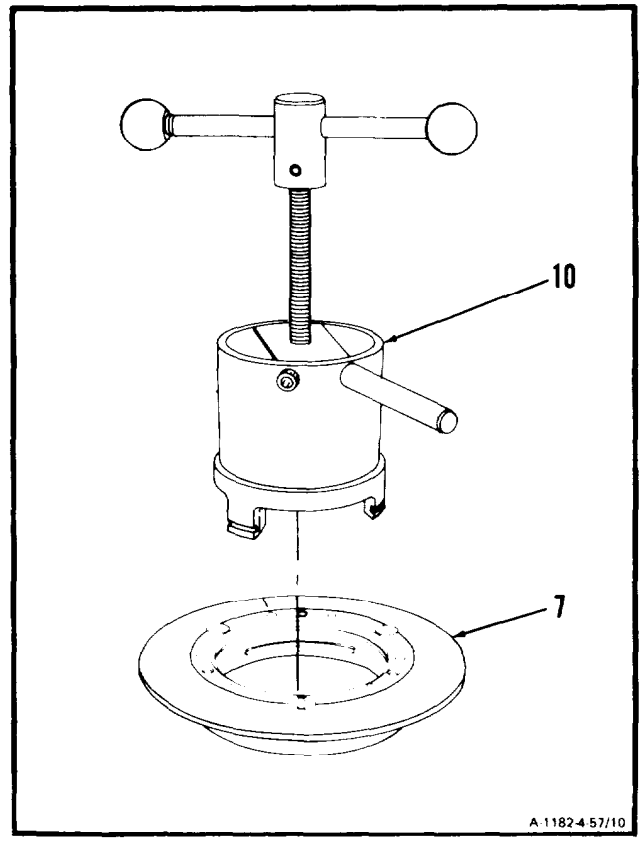
g. Have helper hold puller handle (17). Turn T-handle (11) clockwise and remove turbine spacer (7).



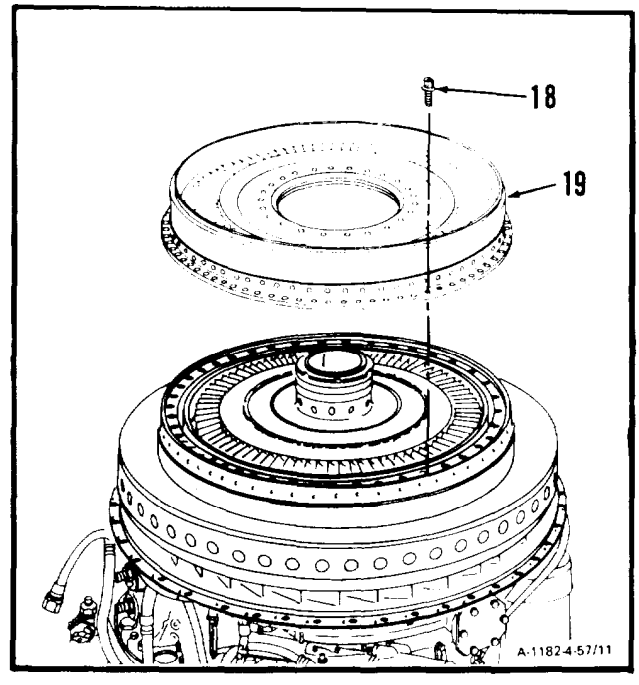
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4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

4. **Remove mechanical puller (T61) (10)** from turbine spacer (7).



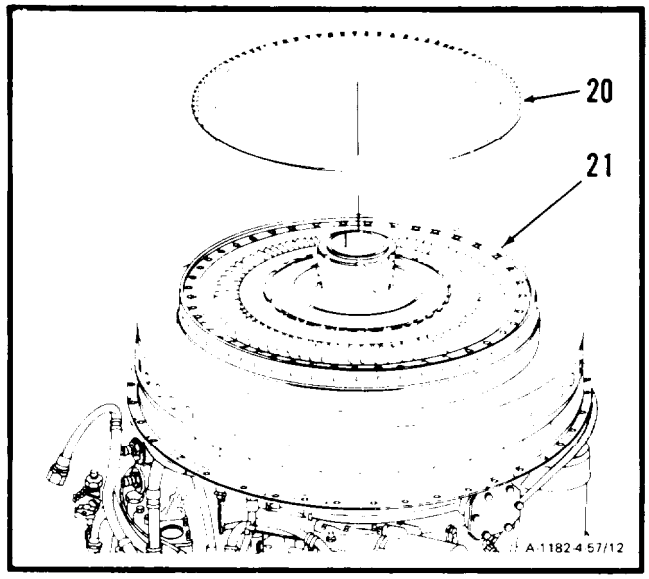
5. **Remove** lockwire, 24 bolts (18) and **second turbine nozzle (19).**



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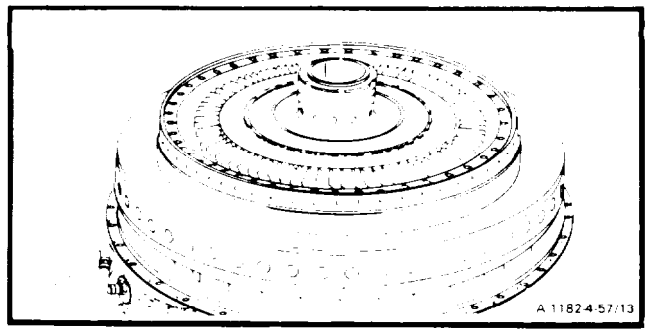
4-57 REMOVE SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-57

6. Matchmark turbine rotor case (20) to first turbine nozzle (21) using marking pencil (E34). **Remove turbine rotor case (20).**



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-58 CLEAN SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) 4-58

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Lint-Free Cloth (E26)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine DISC Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62).

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

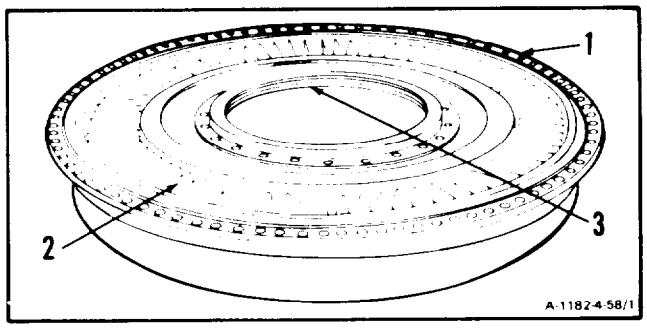
WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

1. **Clean second turbine nozzle (1)** as follows:

   a. Wear gloves (E20). Wipe second turbine nozzle (1) with lint-free cloth (E26) dampened in methyl ethyl ketone (E36). Use brush on vanes (2) and seal rings (3).

   b. Wear goggles. **Blow dry nozzle.** Use clean, dry compressed air.



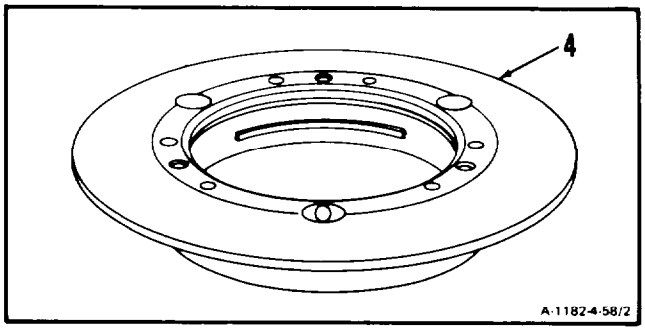
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4-58 CLEAN SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-58

2. **Clean turbine spacer (4)** as follows:

   a. Wipe turbine spacer (4) with lint-free cloth (E26) dampened in methyl ethyl ketone (E36).

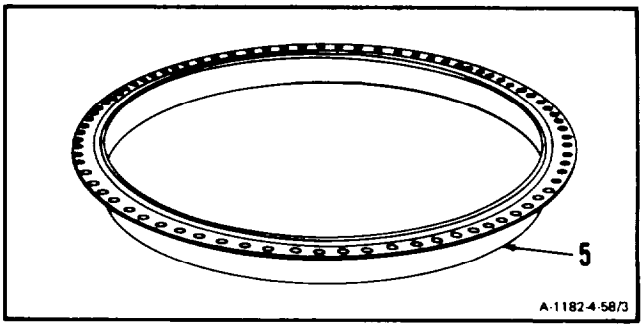
   b. **Blow dry spacer.** Use clean, dry compressed air.



3. **Clean turbine rotor case (5)** as follows:

   a. Wipe turbine rotor case (5) with lint-free cloth (E26) dampened in methyl ethyl ketone (E36).

   b. **Blow dry case.** Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE

Inspect Second Turbine Nozzle, Spacer, and Case (Task 4-59).

END OF TASK

4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

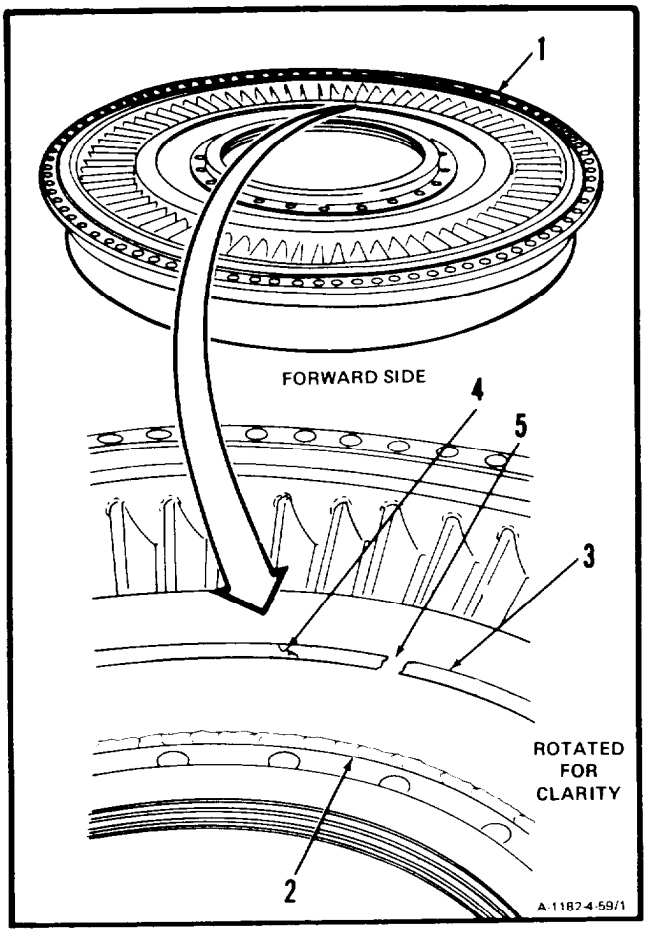
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

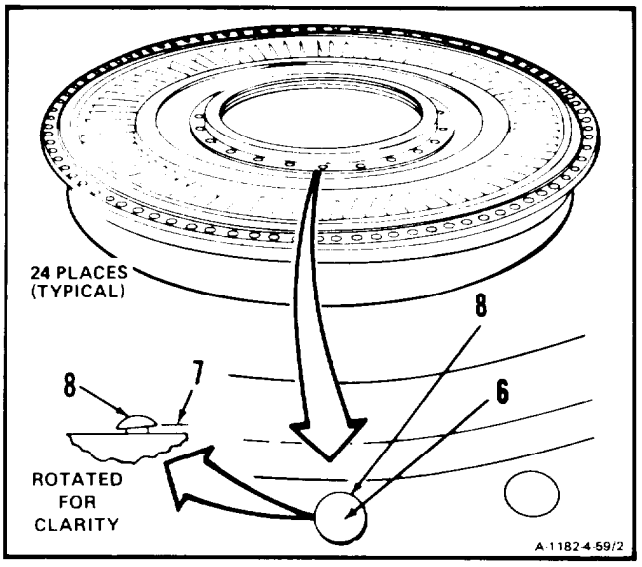
1. **Inspect forward side of second turbine nozzle (1)** as follows:

   a. **Inspect welded joint (2) and inner shroud to support brazement (3).** There shall be no cracks (4) or voids (5).



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b. **Inspect 24 rivets (6).** There shall be no gaps (7) under heads (8).

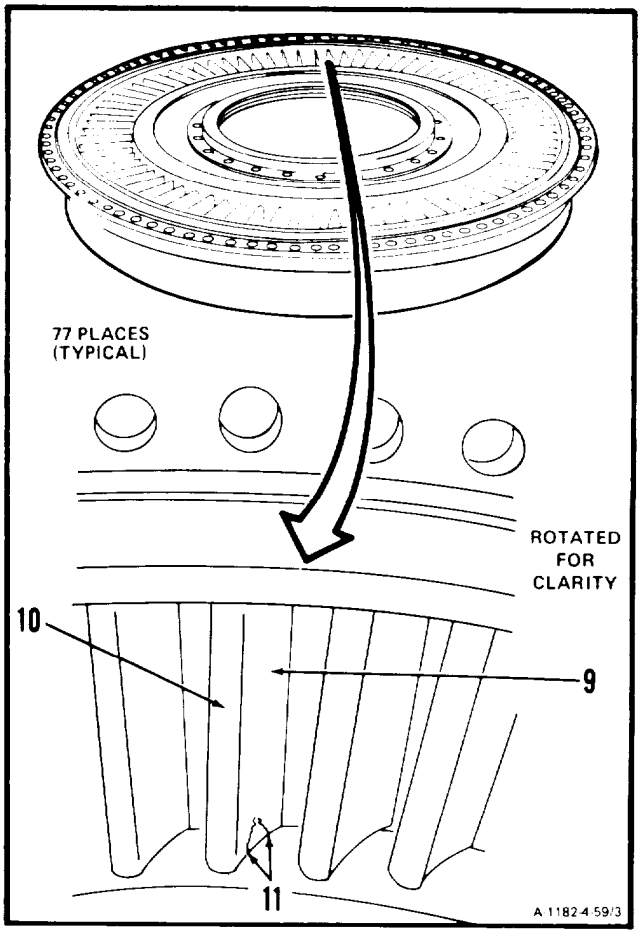


c. **Inspect 77 vanes (9)** as follows:

(1) There shall be no cracks in vane leading edge (10).

(2) There shall be no converging cracks (11).

(3) There shall be no material burned off.



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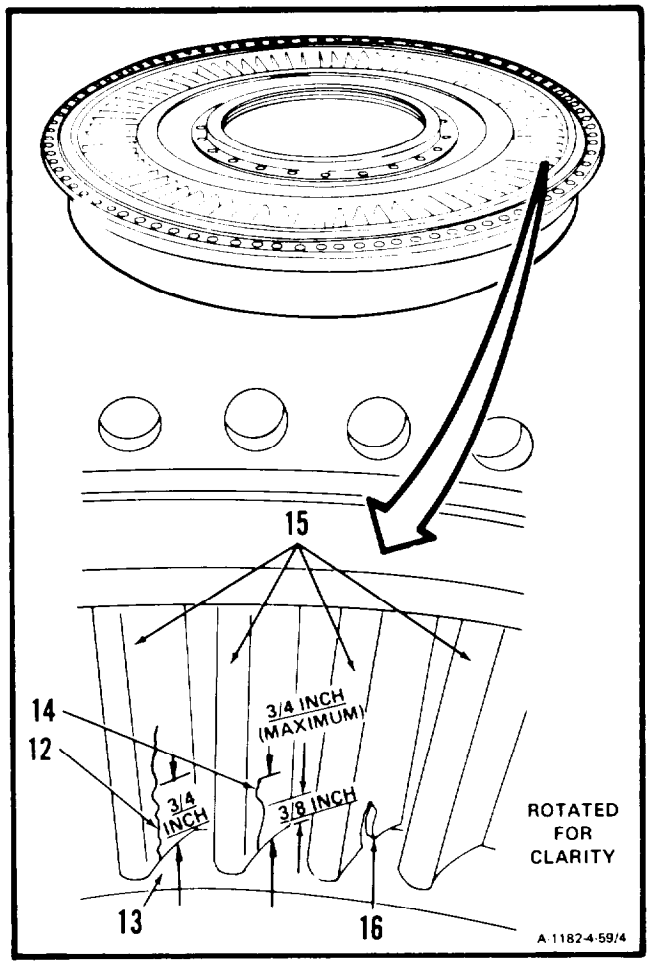
4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

(4) There shall be no radial cracks (12) from inner shroud (13) longer than 3/4 inch.

(5) There shall be no more than four vanes (15) with radial cracks (14) from inner shroud (13) longer than 3/8 inch.

(6) There shall be no cracks (16) with vane core visible.

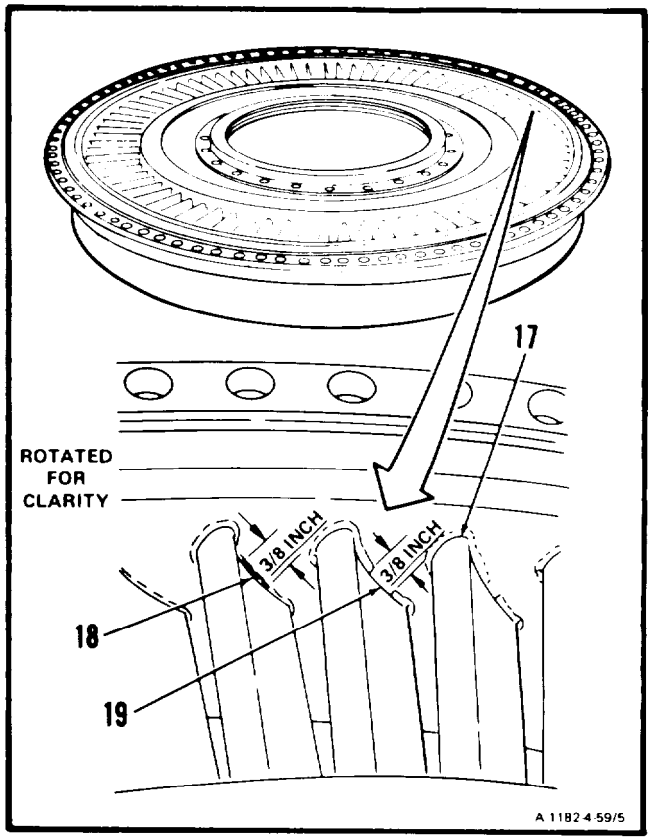
(7) There shall be no vane with more than three radial cracks longer than 3/8 inch.



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

d. **Inspect brazement (17).** There shall be no cracks (18) or voids (19) longer than 3/8 inch.



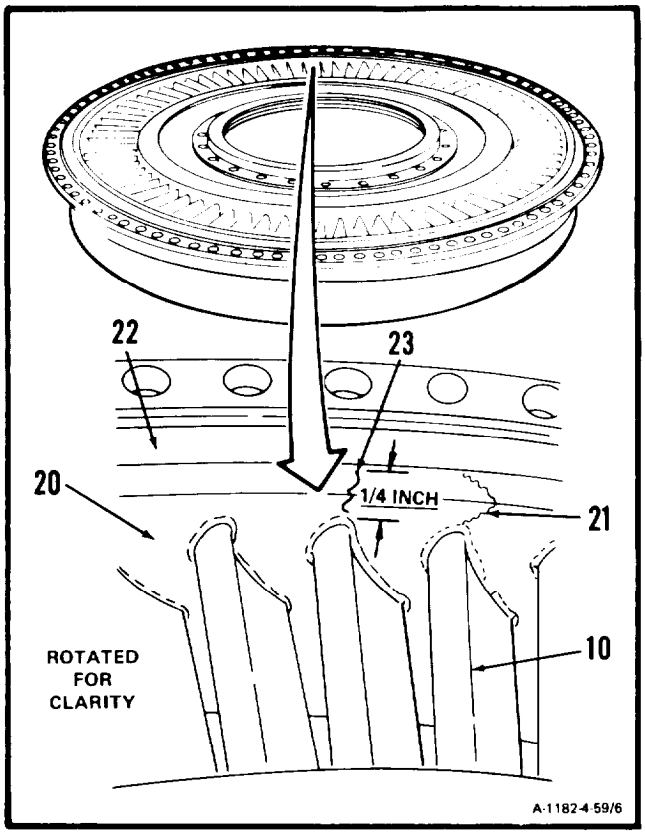
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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

e. **Inspect outer shroud (20)** as follows:

(1) There shall be no more than five cracks (21) which extend from vane leading edge (10) to seal ring area (22). These cracks can be full depth and progress radially, but must be separated by at least two vanes.

(2) There shall be no axial cracks (23) from vane leading edge (10) longer than 1/4 inch.



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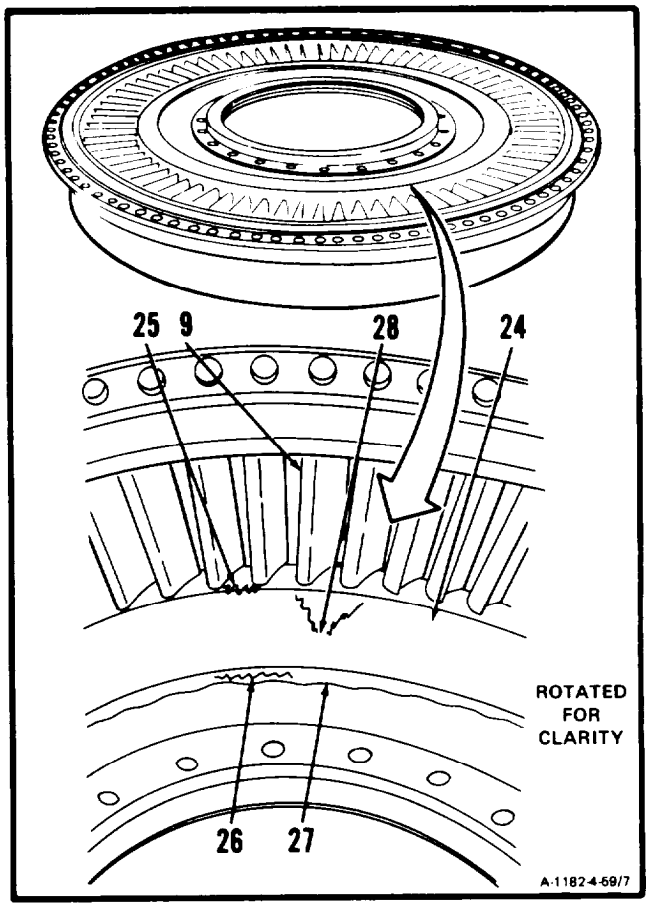
4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

f. **Inspect inner shroud (24)** as follows:

(1) There shall be no cracks (25) between leading edges of vanes (9).

(2) There shall be no circumferential cracks (26) in inner shroud to support brazement (27).

(3) There shall be no converging cracks (28).



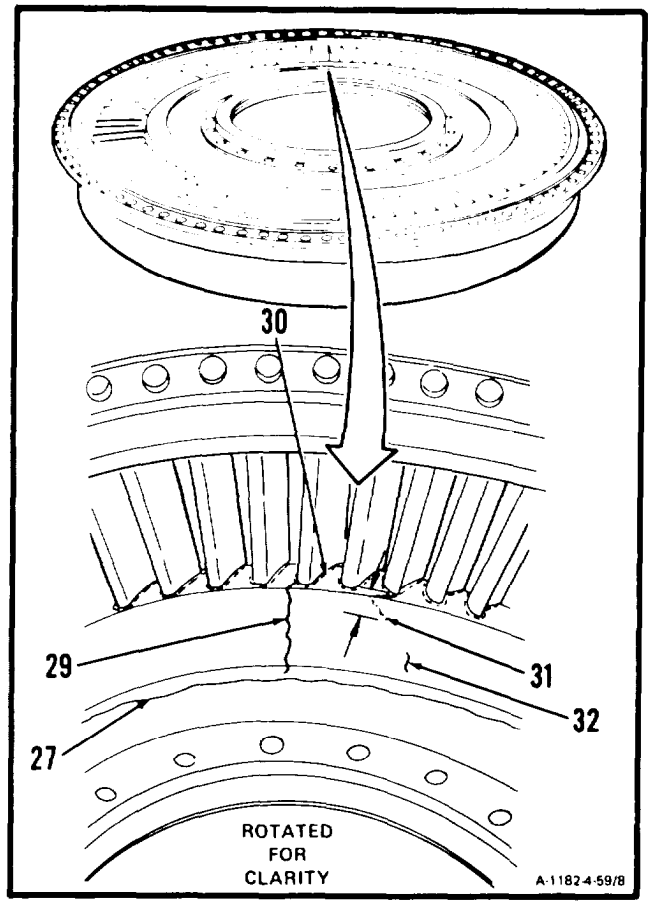
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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued)

(4) There shall he no more than five cracks (29) between brazement (30) and brazement (27).

(5) There shall be no more than 15 3/8 inch long cracks (31) which progress radially down vertical face (32).

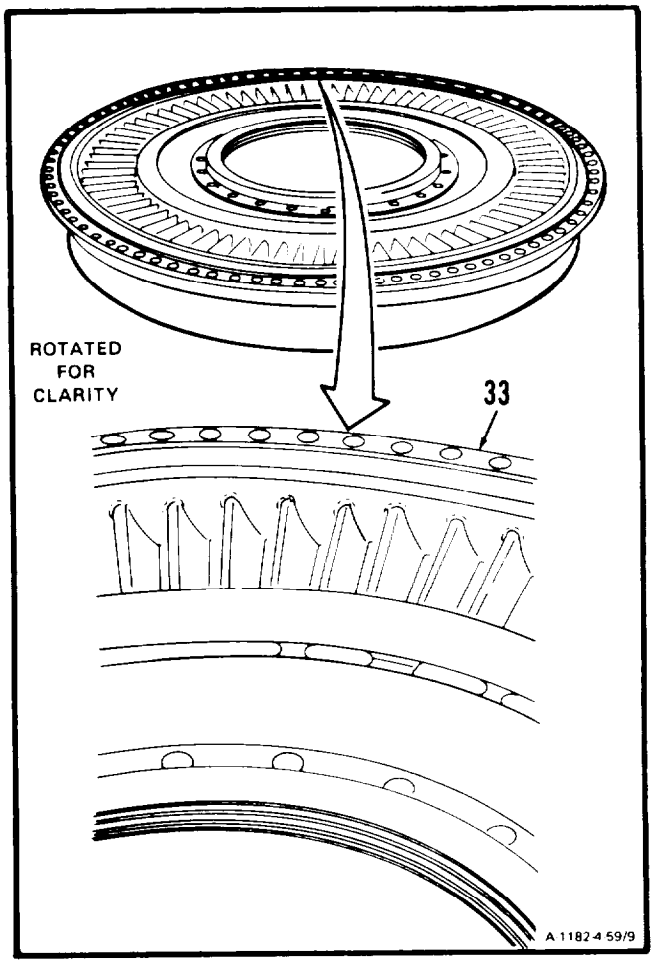
(6) There shall be no other cracks longer than 5/32 inch which progress radially down vertical face (32).



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

g. **Inspect mount ring (33).** There shall be no cracks.



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h. **Inspect seals (34)** as follows:

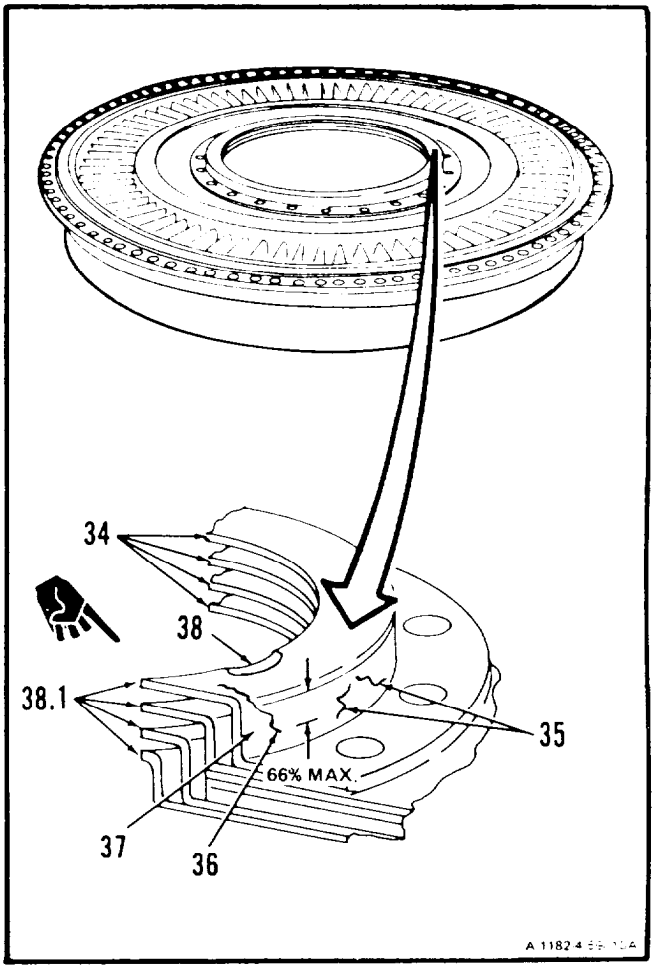
(1) There shall be no converging cracks (35).

(2) There shall be no axial cracks (36) extending more than 66 percent across the axial surface (37).

(3) Deleted

(4) Deleted

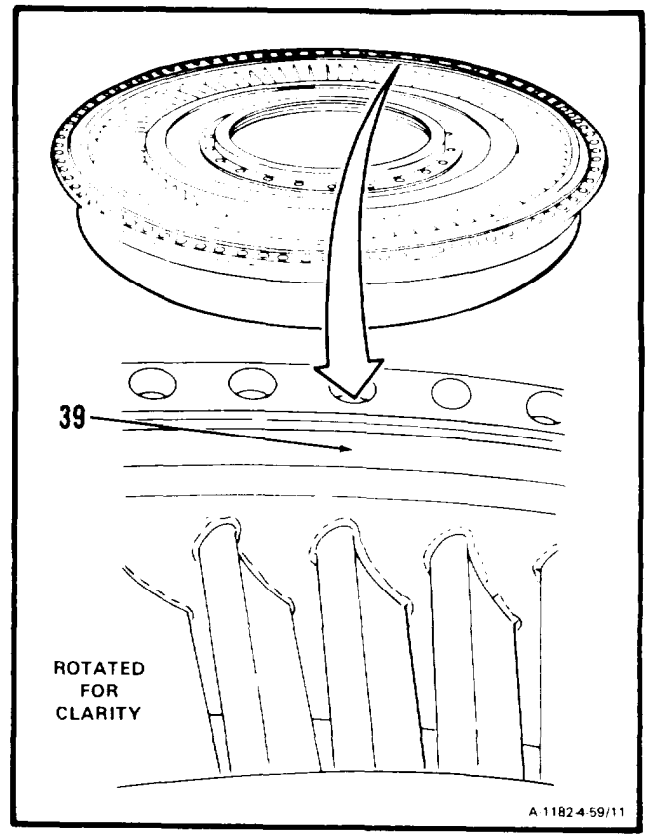
(5) There shall be no rubs or deformations (38) of knife edge areas (38.1) that cannot be blend repaired Buildup clearances must be maintained.



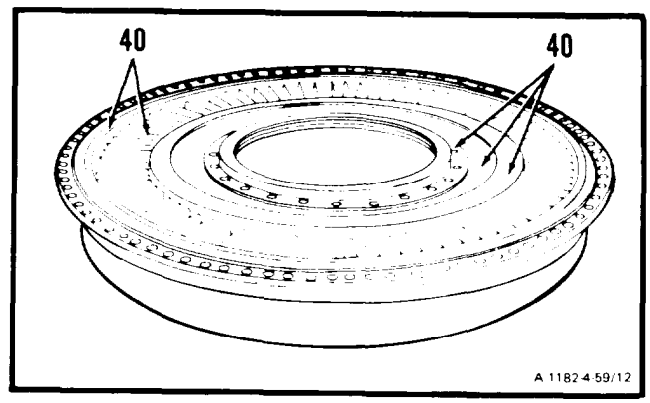
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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

i. **Inspect sealing ring (39).** There shall be no cracks.



j. **Inspect forward surfaces (40)** for dents. There shall be no dents deeper than 1/16 inch.



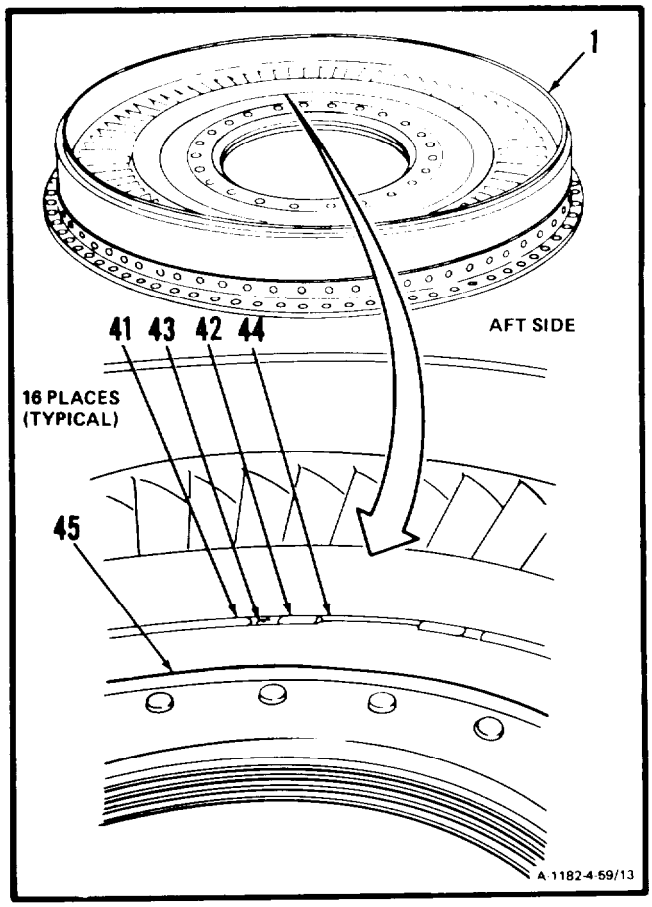
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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

2. **Inspect aft side of second turbine nozzle (1)** as follows:

   a. **Inspect plug welds (41) and inner shroud to support brazement (42).** There shall be no cracks (43) or voids (44)

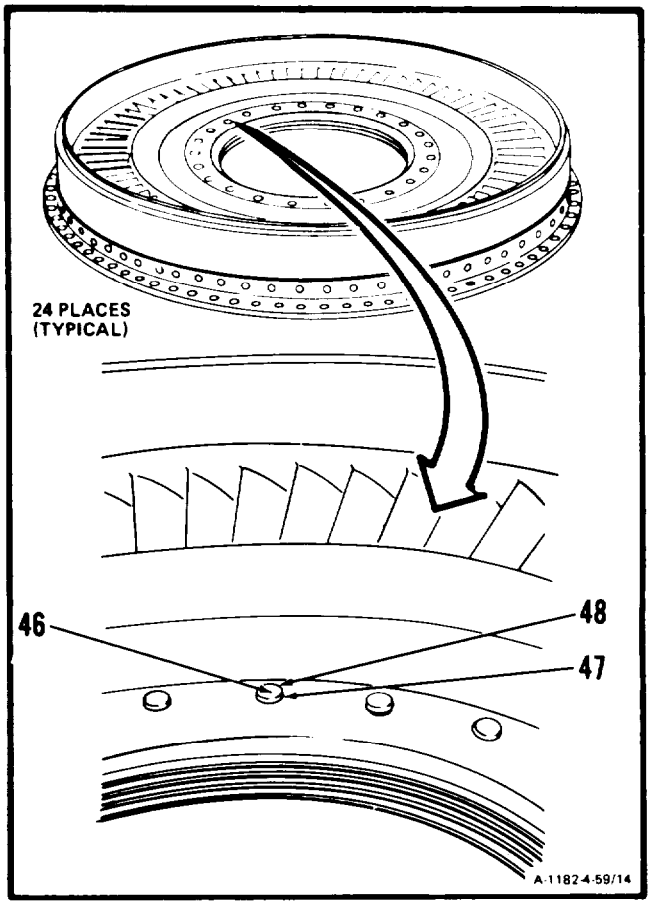
   b. Inspect welded joint (45). There shall be no cracks.



GO TO NEXT PAGE

4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

c. **Inspect 24 rivets (46).** There shall be no gaps (47) under upset heads (48).



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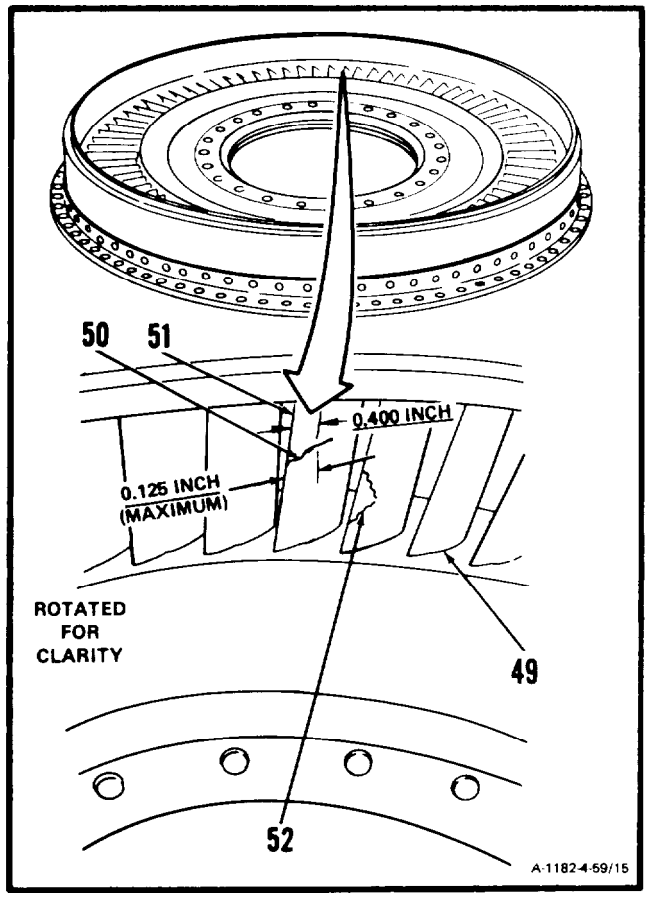
d. **Inspect 77 vanes (49)** as follows:

(1) There shall be no cracks (50) in trailing edge (51) longer than 0.400 inch.

(2) There shall be no more than one crack (50) in trailing edge (51) of each vane longer than 0.125 inch.

(3) There shall be no converging cracks (52) in trailing edge (51).

(4) There shall be no material burned off.



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

(5) There shall be no radial cracks (53) from inner shroud (54) longer than 3/4 inch.

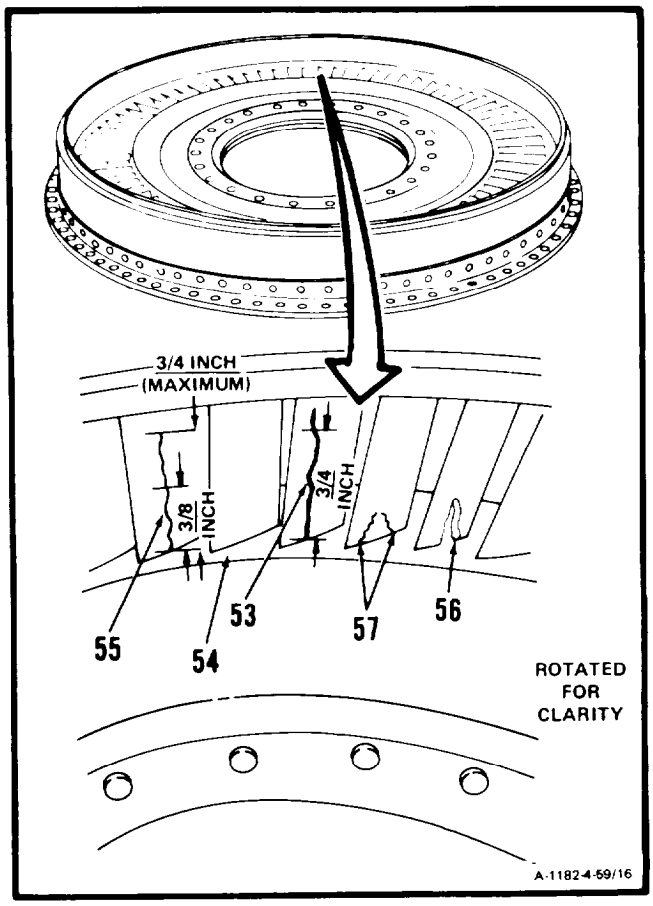
(6) There shall be no more than one radial crack (55) on each vane from inner shroud (54) longer than 3/8 inch.

(7) There shall be no more than four vanes with radial cracks (55) from inner shroud (54) longer than 3/8 inch.

(8) There shall be no cracks (56) with vane core visible.

(9) There shall be no converging radial cracks (57).

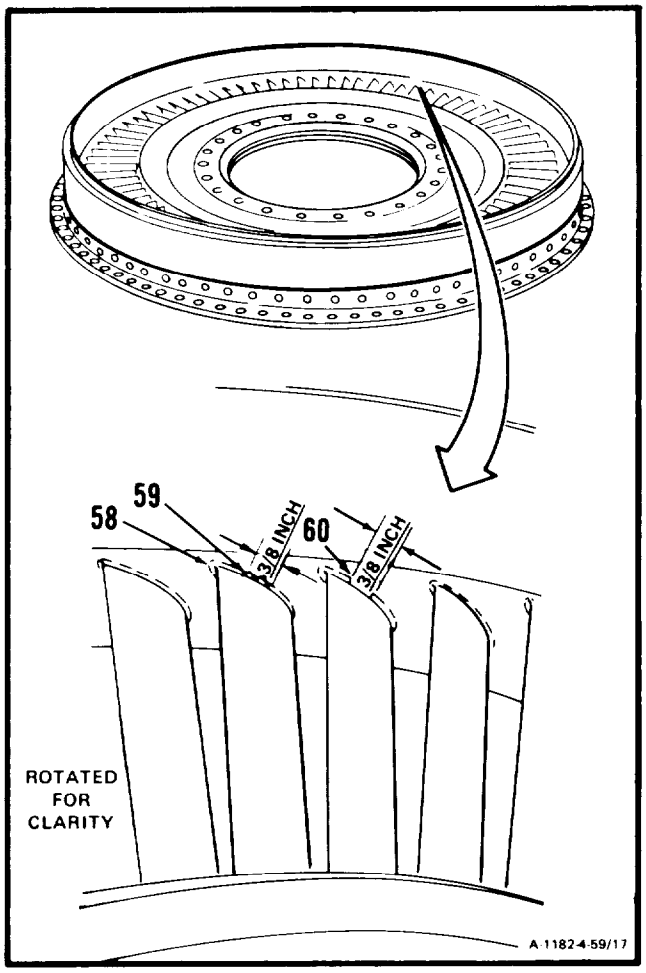
(10) There shall be no vane with more than three radial cracks longer than 3/8 inch.



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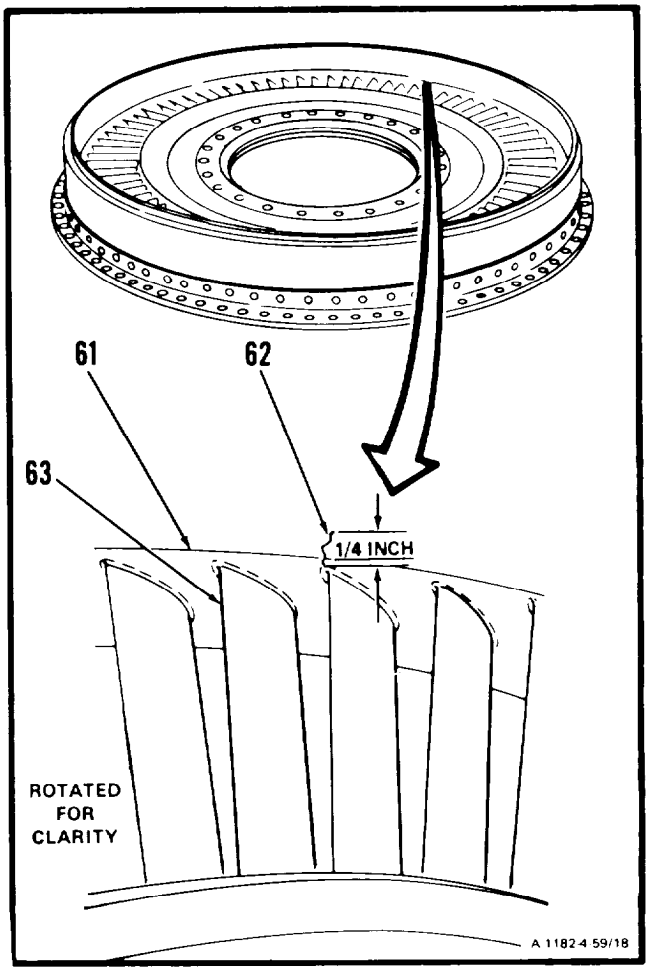
4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

e. **Inspect brazement (58).** There shall be no cracks (59) or voids (60) longer than 3/8 inch.



GO TO NEXT PAGE

f. **Inspect outer shroud (61).** There shall be no axial cracks (62) from vane trailing edge (63) longer than 1/4 inch.



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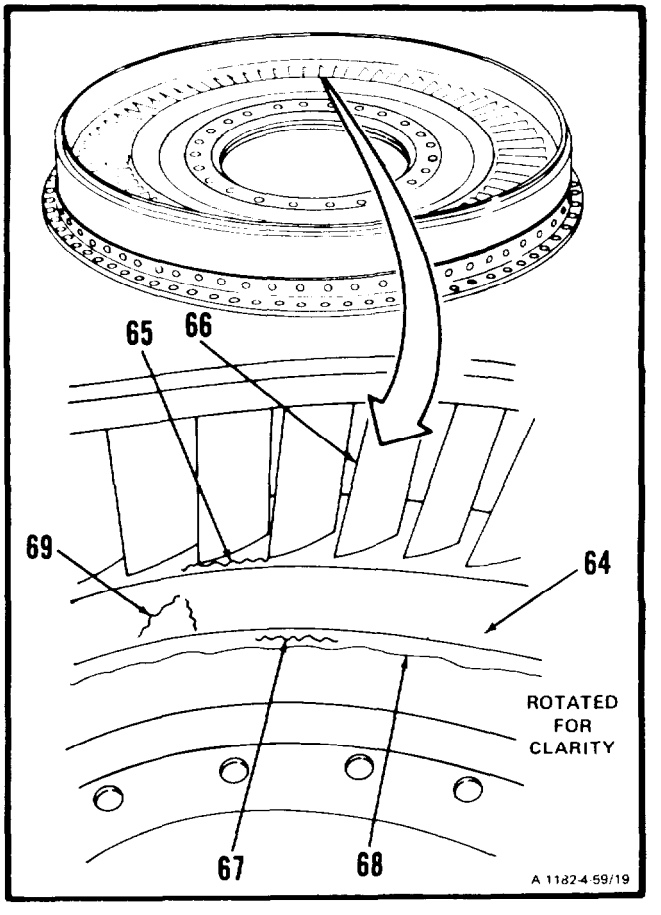
4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

g. **Inspect inner shroud (64)** as follows:

(1) There shall be no cracks (65) between trailing edges of vanes (66).

(2) There shall be no circumferential cracks (67) in inner shroud to support brazement (68).

(3) There shall be no converging cracks (69).



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

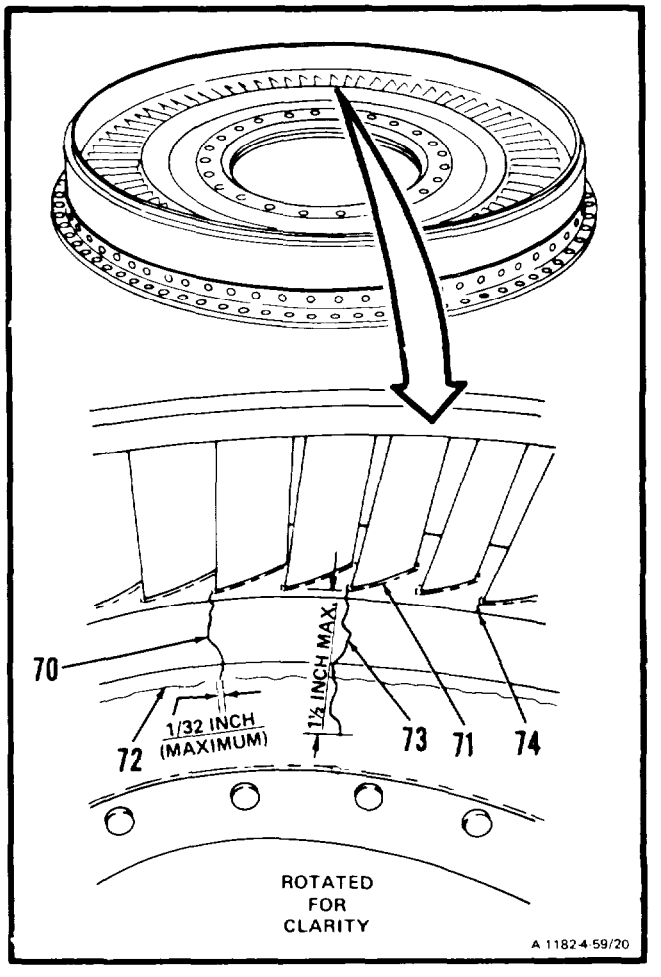
NOTE

In following steps (4) and (5), cracks between 3/8 inch and 1-1/2 inches long shall not be less than four vanes apart and must be tight-lipped.

(4) There shall be no more than 12 cracks (70) between cutout (71) and brazement (72). They shall not be wider than 1/32 inch.

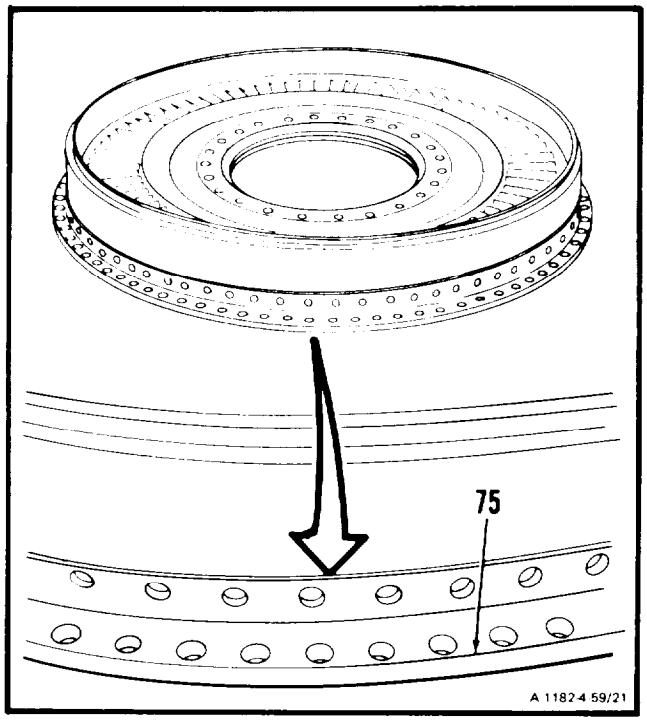
(5) Of these 12 cracks, there shall be no more than seven cracks (73) which progress radially down vertical face. These cracks shall be no longer than 1-1/2 inches.

(6) There shall be no other axial cracks (74) which extend past aft edge.



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h. **Inspect mount ring (75).** There shall be no cracks.



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

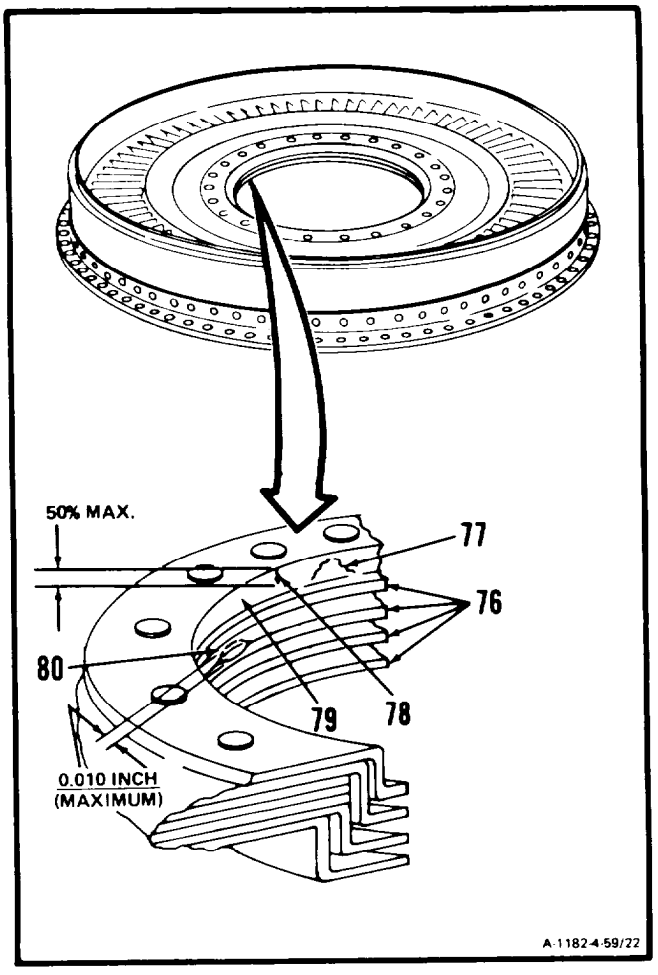
I. **Inspect seals (76)** as follows:

(1) There shall be no converging cracks (77).

(2) There shall be no axial cracks (78) extending more than halfway across the axial surface (79).

(3) There shall be no deformation over 1/8 inch.

(4) There shall be no rubs (80) over 0.010 inch.



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

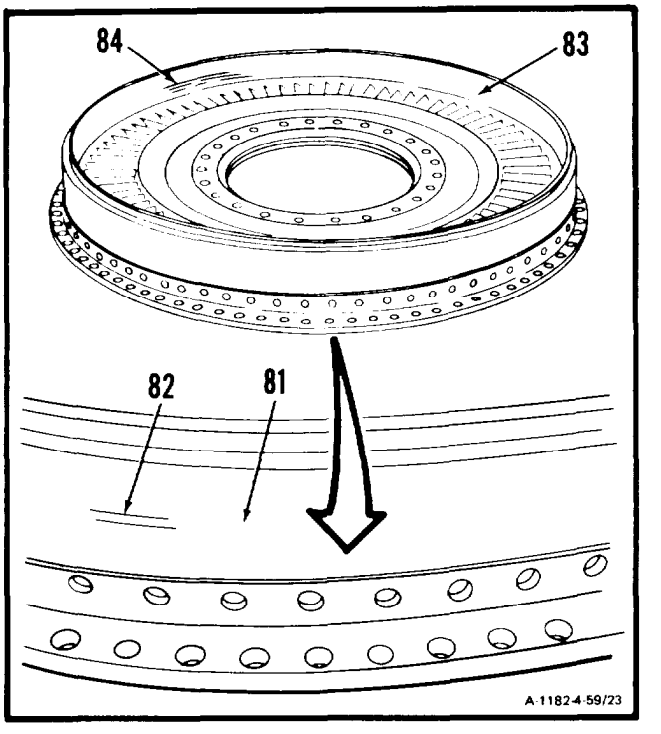
j. **Inspect outer shroud cylinder (81).** There shall be no grooves (82) deeper than 0.010 inch.

k. Inspect cylinder inner diameter (83) as follows:

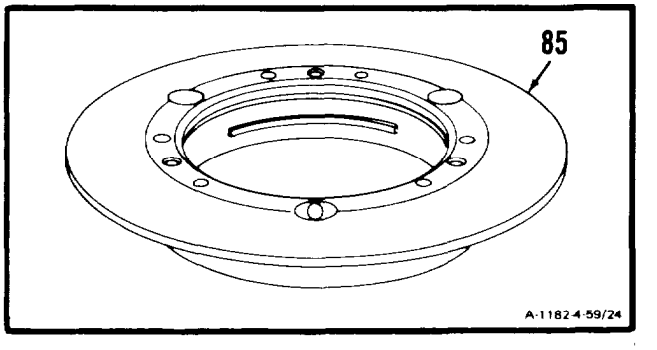
(1) There shall be no cracks.

(2) There shall be no rubs (84) deeper than 0.010 inch.

(3) If rubs are deeper than 0.010 inch and less than 0.028 inch, repair second turbine nozzle (Ref. Task 4-60).



3. **Inspect turbine spacer (85).** There shall be no cracks. There shall be no dents deeper than 1/8 inch.



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4-59 INSPECT SECOND TURBINE NOZZLE, SPACER AND CASE (AVIM) (Continued) 4-59

4. **Inspect turbine rotor case (86)** as follows:

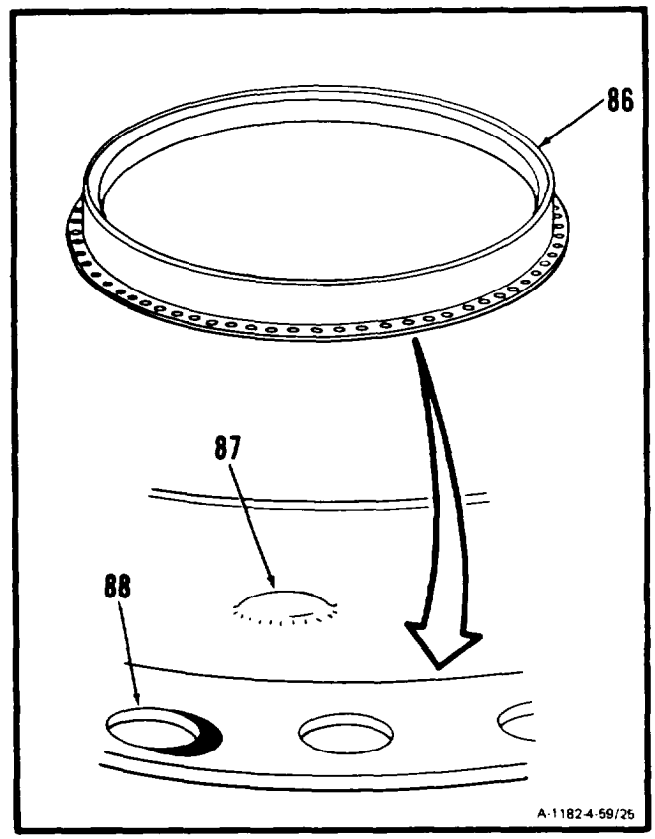
   a. There shall be no cracks.

   b. There shall be no dents (87) deeper than 1/8 inch.

NOTE

In following step c., the bolt holes are located closer to the outer edge.

   c. The bolt holes (88) shall not be elongated.



FOLLOW-ON MAINTENANCE.

None

END OF TASK

4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) 4-60

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Skimming Maintenance Kit (T32)
Sound Protector
Goggles
Vernier Caliper, 1-Inch
Vacuum Cleaner

Materials:
Emery Cloth (E18)
Lockwire (E29)
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B20 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)

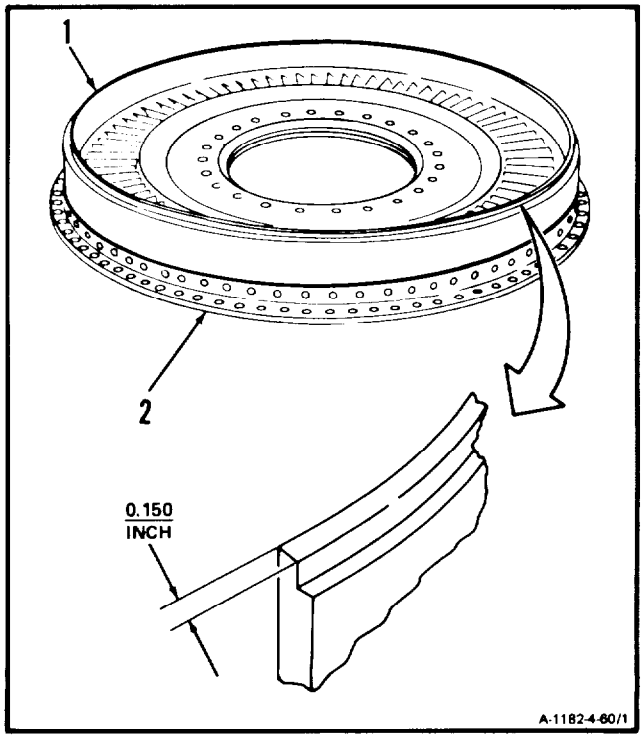
References:
Task 4-56

General Safety Instructions:

WARNING

Exposure to skimming maintenance kit noise may cause ringing in ears, and temporary or permanent hearing loss. When using skimming maintenance kit, wear approved hearing protection. If ringing in ears or loss of hearing persists, get medical attention.

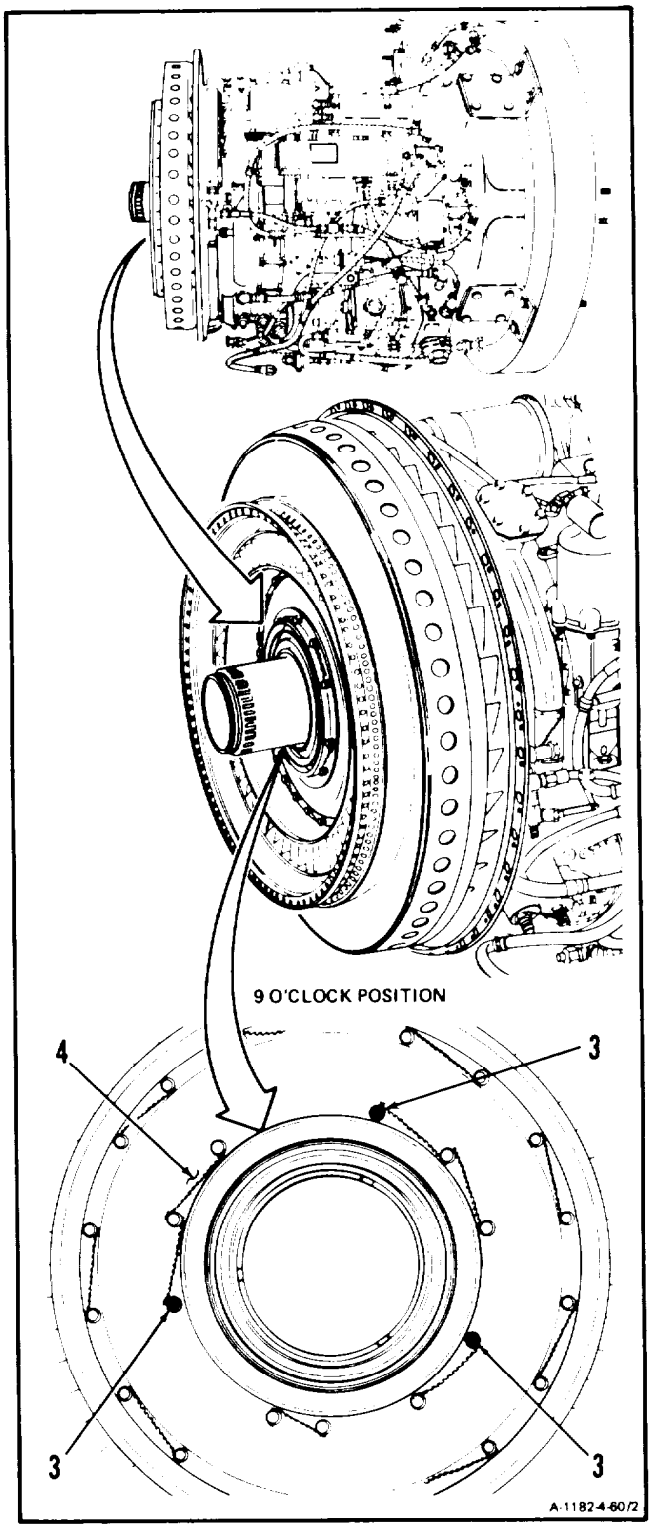
1. **Measure wall thickness of case (1)** of second turbine nozzle (2). Use vernier caliper. If amount of material to be removed results in a wall thickness of less than 0.150 inch, replace nozzle assembly.



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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

2. Remove lockwire and three bolts (3) from baffle retainer (4).

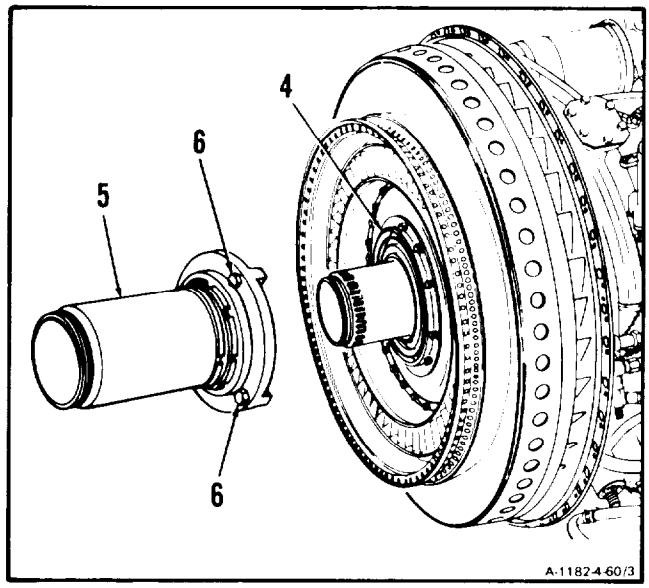


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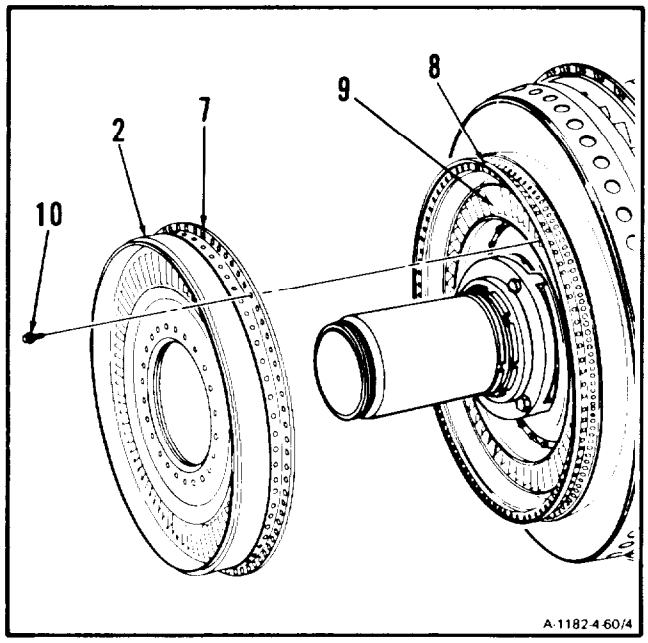
4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

3. **Install adapter (5).** part of skimming maintenance kit (T32), on baffle retainer (4).

4. Tighten three bolts (6).



5. Align matchmark (7) on second turbine nozzle (2) and matchmark (8) on first turbine nozzle (9). **Install second turbine nozzle (2)** and 24 bolts (10).



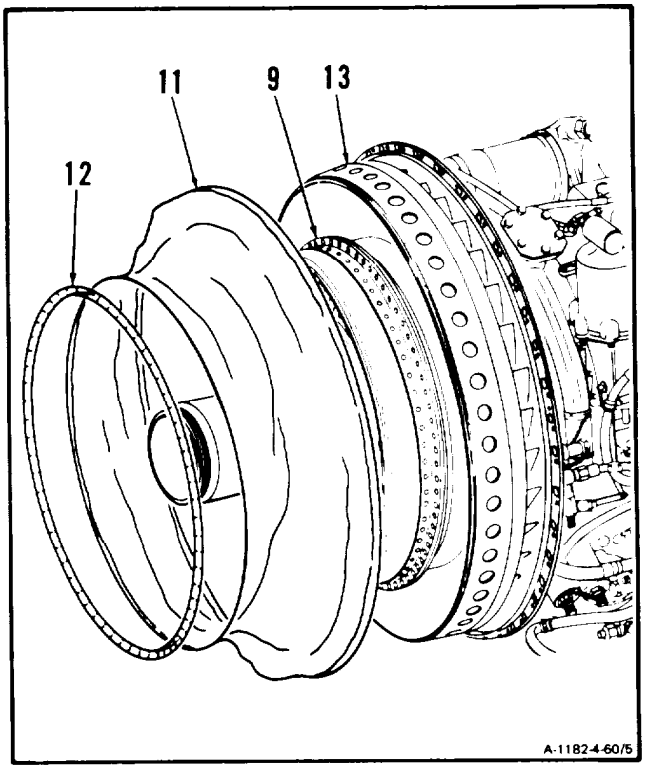
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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

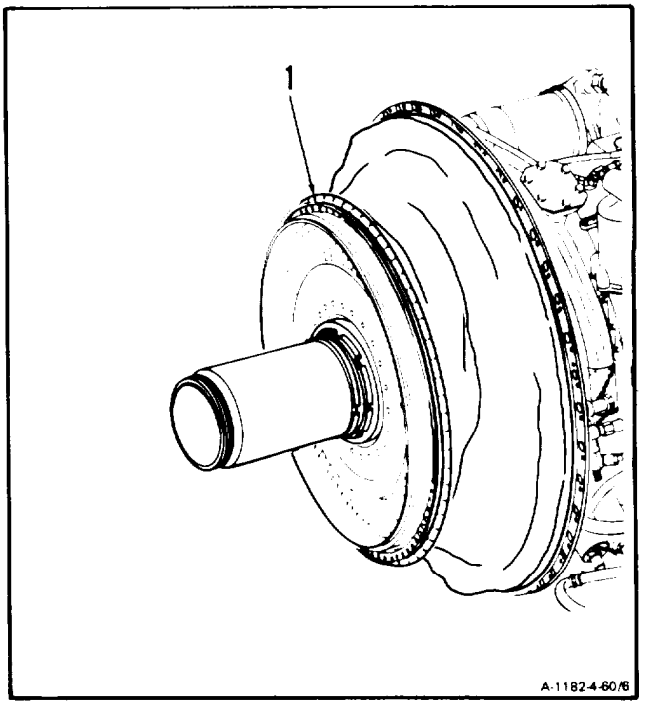
NOTE

In following step 6., difficulty may be encountered when installing cover due to tight fit of cover around air diffuser assembly. The tight fit is necessary to ensure that machining chips do not enter air diffuser assembly.

6. **Install protective cover (11) and spring (12),** part of skimming maintenance kit (T32), on first turbine nozzle (9) and air diffuser assembly (13).



7. Measure tip clearance (Ref. Task 4-56) and **mark case (1)** of second turbine nozzle at the point of lowest tip clearance. Use marking pencil (E34).



GO TO NEXT PAGE

4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

8. Subtract lowest tip clearance from MINIMUM required tip clearance (0.025 inch.) Result is the amount of material to be removed from case (1).

Example:

Minimum Tip Clearance Required	0.025 inch
Subtract Lowest Tip Clearance	−0.020 inch
Amount of Material to be Removed	0.005 inch

NOTE

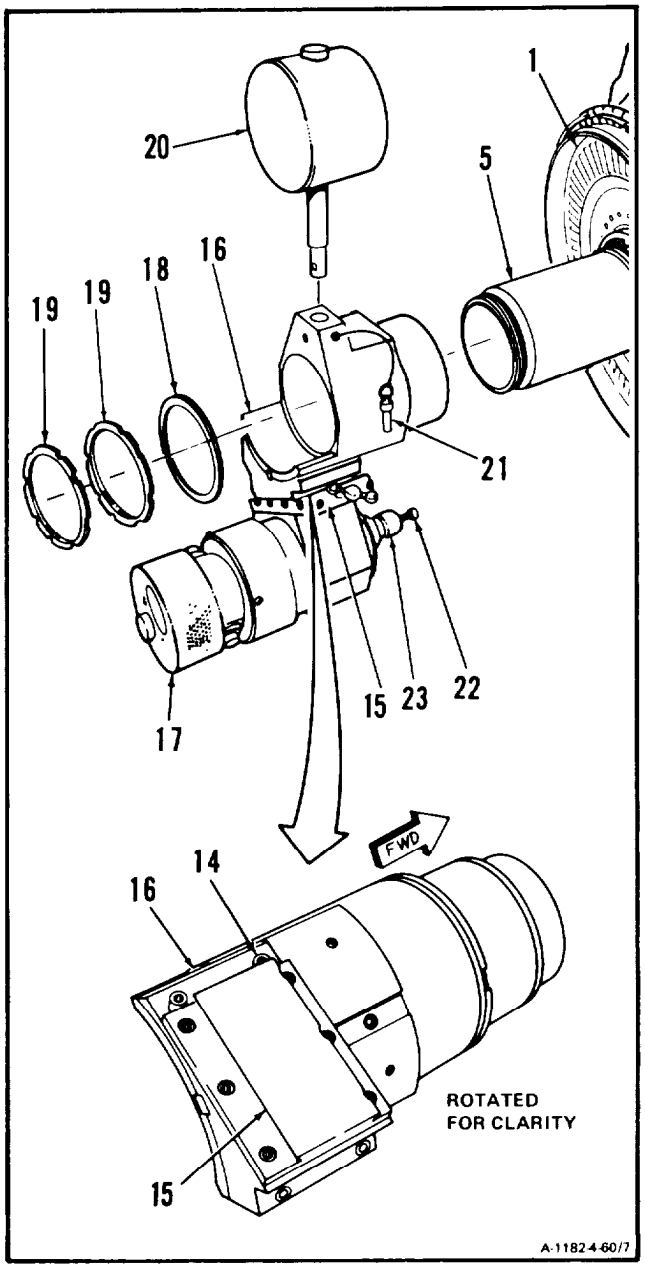
Check housing for position of support. Support must be installed at the rear position on housing. If support is not installed at the rear position on housing. perform step 9.

9. Remove four screws (14) and move support (15) to aft position on housing (16). Install four screws (14).

10. Use helper and **install milling machine (17),** part of skimming maintenance kit (T32), on adapter (5). Install washer (18) and two nuts (19), using spanner wrench, part of skimming maintenance kit (T32).

11. **Install counterweight (20) and pin (21).**

12. **Install cutter (22),** part of skimming maintenance kit (T32), **in collet (23).** Do not tighten collet (23).



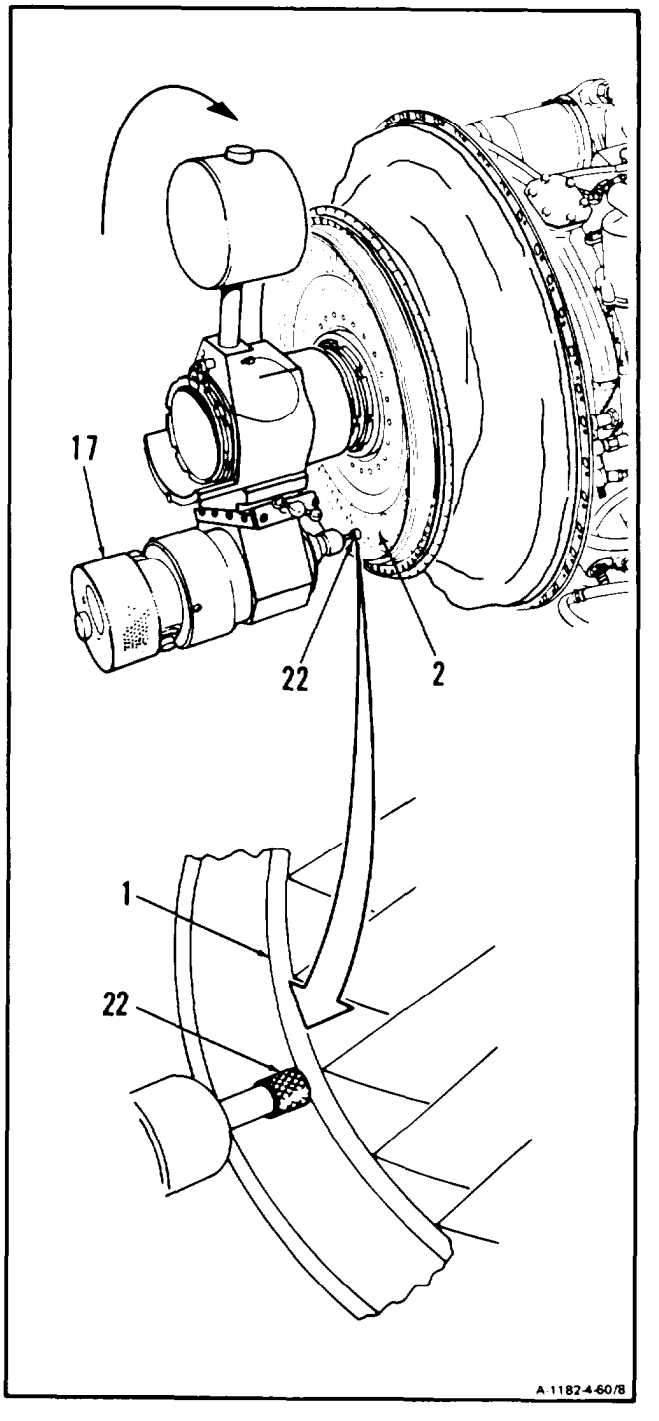
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13. **Rotate milling machine (17) clockwise** until front stop is reached.

CAUTION

In following step, do not allow cutter to project beyond edge of taper in case. Failure to comply will cause damage to nozzle during milling operation.

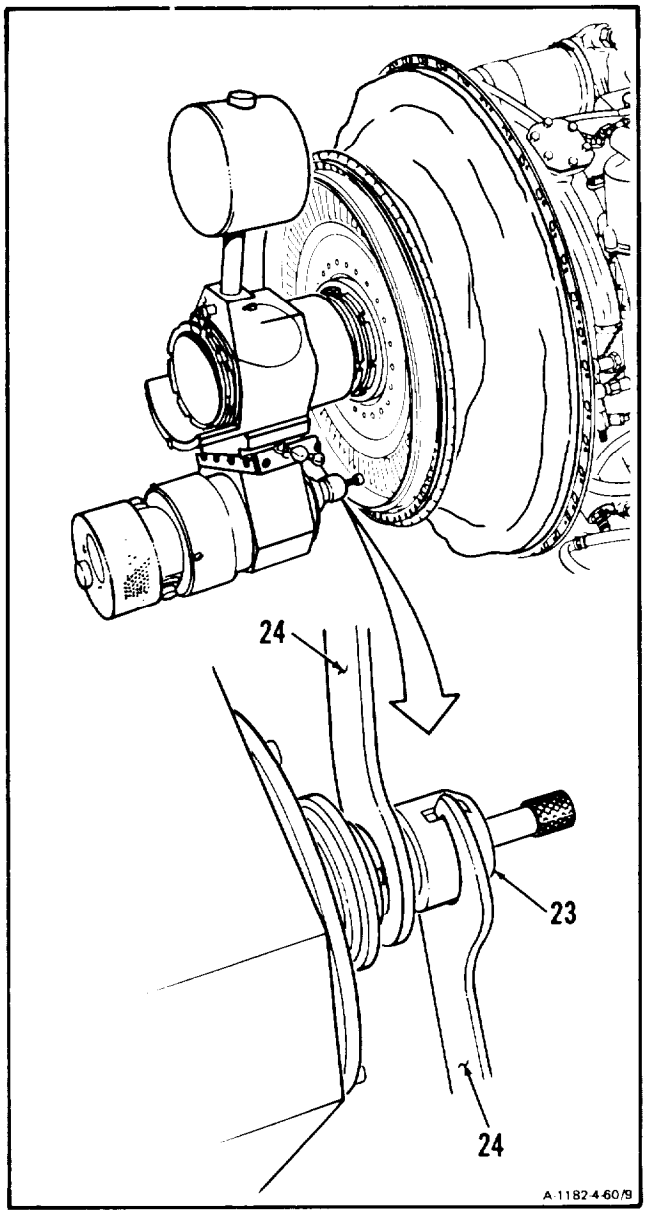
14. **Adjust cutter (22)** until forward edge of cutter reaches edge of taper in case (1) of second turbine nozzle (2). Do not adjust cutter (22) beyond this point.



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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

15. **Tighten collet (23)** with two spanner wrenches (24), part of skimming maintenance kit (T32).



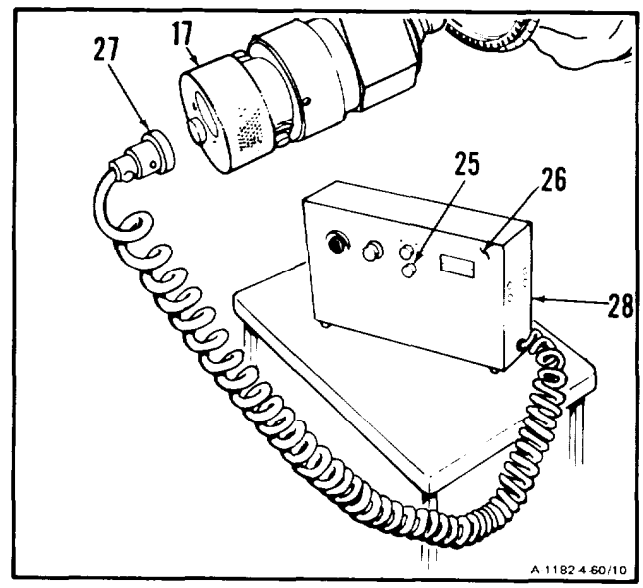
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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

16. **Press STOP button (25)** on control panel (26).

17. **Connect control box connector (27)** to milling machine (17).

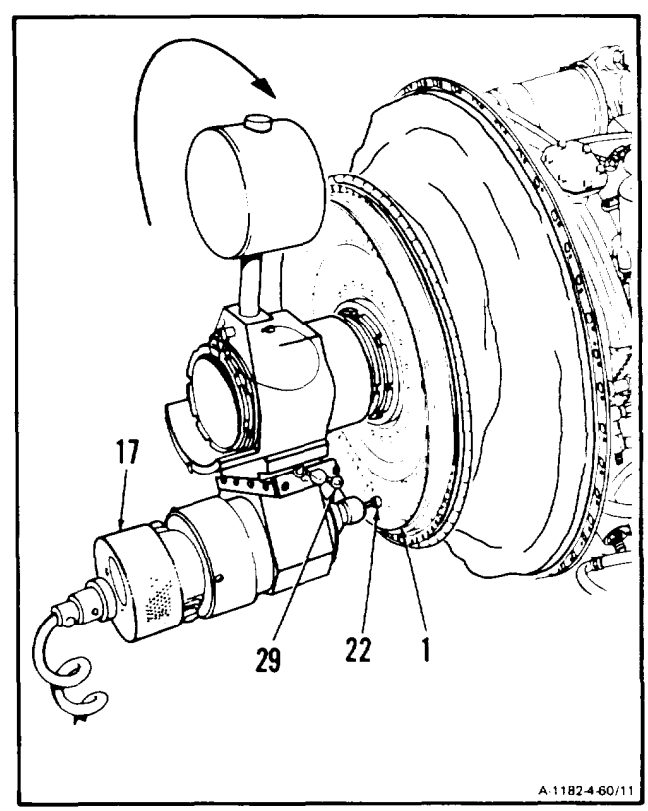
18. **Connect control box (28) to a 110 VAC power source.**



19. **Rotate milling machine (17) counterclockwise** until cutter (22) is on mark that was recorded on case (1) in step 7.

20. **Turn adjusting knob (29)** on milling machine (17) until cutter (22) just makes contact with case (1) inner diameter.

21. **Rotate milling machine (17) clockwise** until front stop is reached.



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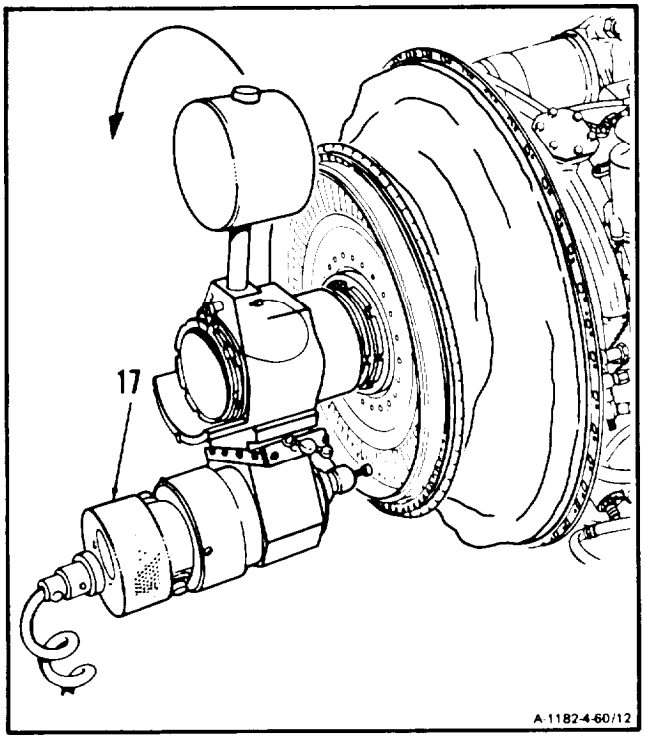
4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

NOTE

In following step, ensure that no binding occurs when milling machine returns to rear stop.

22. **Rotate milling machine (17) counterclockwise** until rear stop is reached.

23. If binding occurs, repeat step 20. at area where binding occured.



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WARNING

Keep hands and clothing away from rotating parts. Contact with rotating parts could cause injury. If injury occurs, get medical attention.

WARNING

Exposure to skimming maintenance kit noise may cause ringing in ears, and temporary or permanent hearing loss. When using skimming maintenance kit, wear approved hearing protection. If ringing in ears or loss of hearing persists, get medical attention.

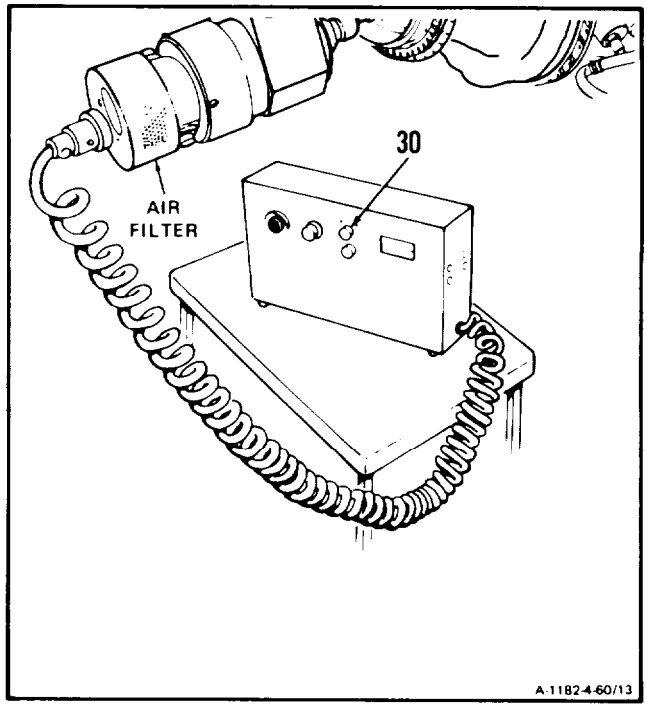
CAUTION

Make sure air filter of milling machine is unblocked at all times during operation. Failure to comply will reduce flow of cooling air through the motor.

NOTE

In following step, allow motor to run for 15 seconds to reach operating speed.

24. Wear goggles and sound protector. **Press START button (30).**



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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

CAUTION

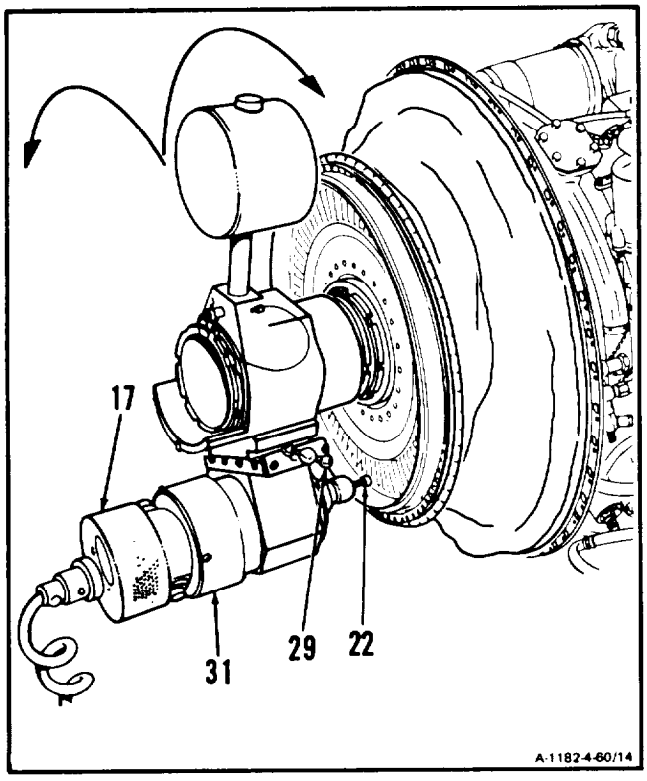
In following step, do not stop rotation during the clockwise or counterclockwise movement until stops are reached. Stopping cutter before stops are reached may cause deep gouges or chatter marks in case.

25. Place hands on collar (31) and **rotate milling machine (17) clockwise** until front stop is reached and immediately rotate milling machine (17) counterclockwise until rear stop is reached.

CAUTION

Do not advance cutter more than one increment for any cut. All clockwise and counterclockwise rotations must be made slowly and without stopping.

26. **Turn adjusting knob (29) one increment clockwise.** One increment clockwise advances cutter (22) radially 0.001 inch.



27. Deleted.

28. Continue to repeat steps 25. and 26. until amount of material to be removed, which was determined in step 8, is completed.

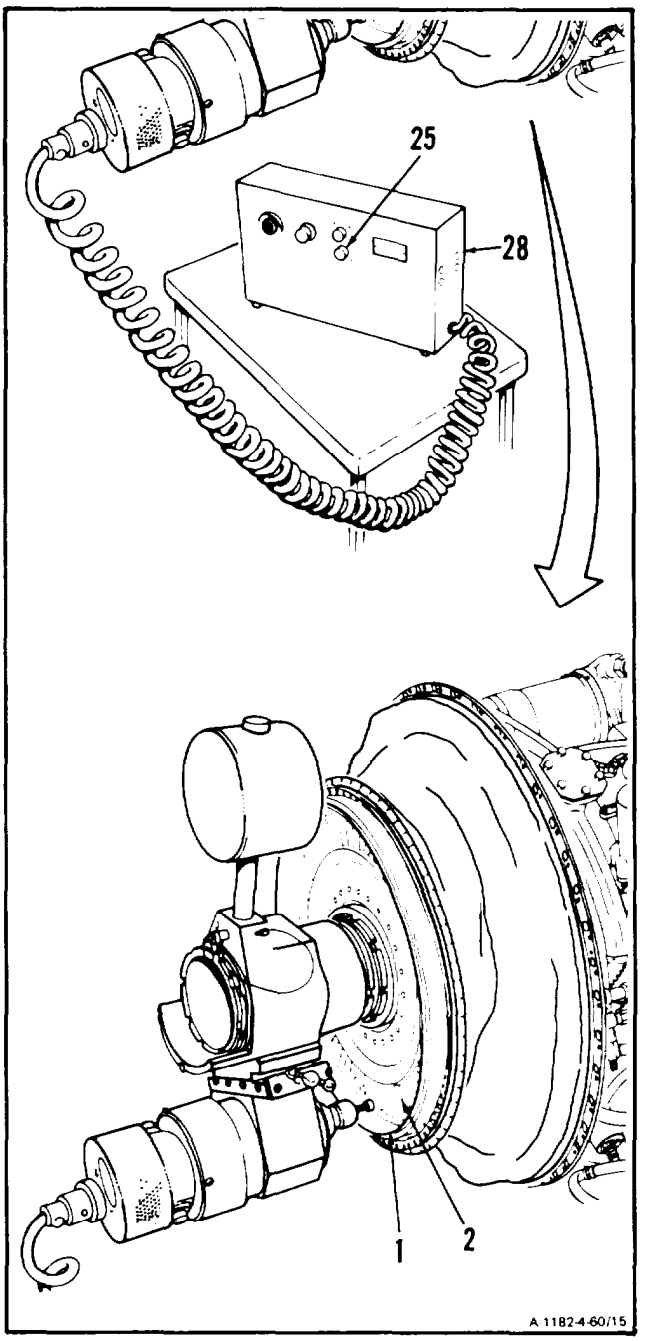
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29. **Press STOP button (25).**

30. Unplug control box (28) from electrical power source.

31. Remove any chips or burrs from inside of case (1). Use fine emery cloth (E18).

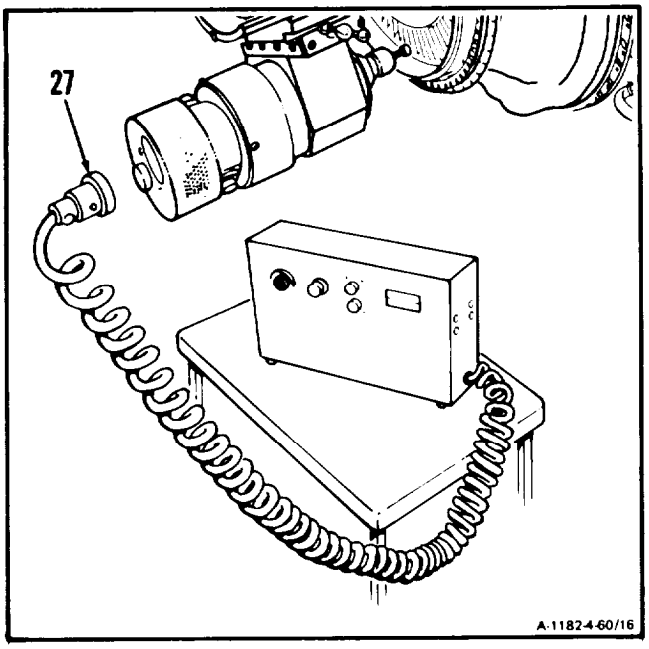
32. **Measure wall thickness of case (1)** of second turbine nozzle (2). Wall thickness shall not be less than 0.150 inch.



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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

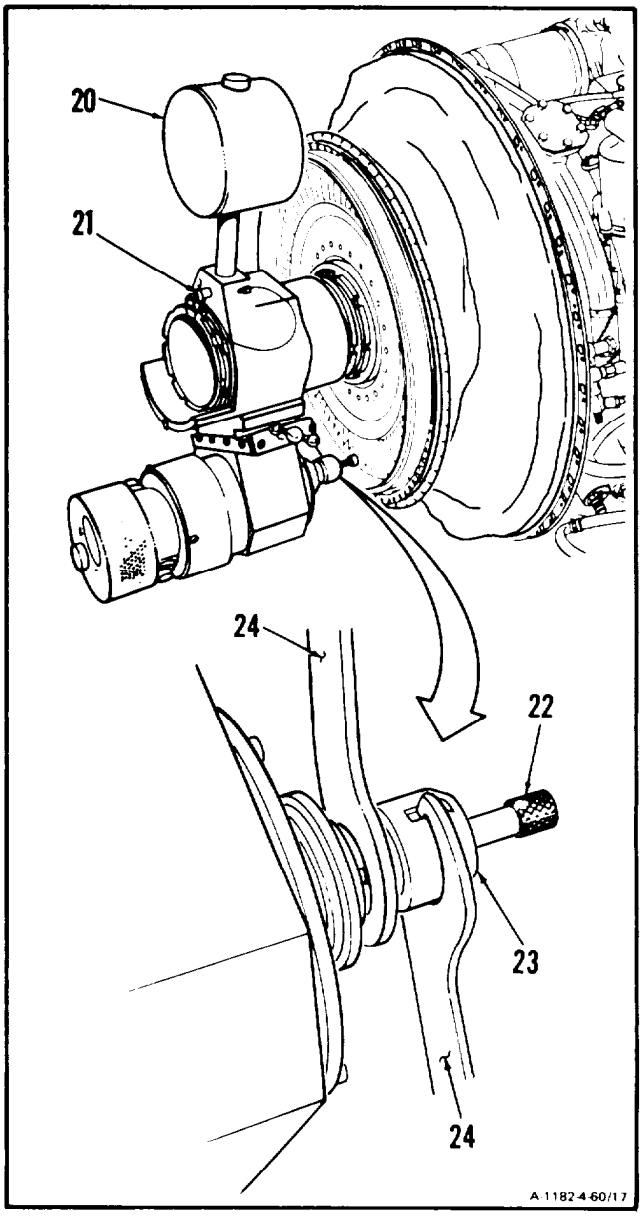
33. Disconnect connector (27).



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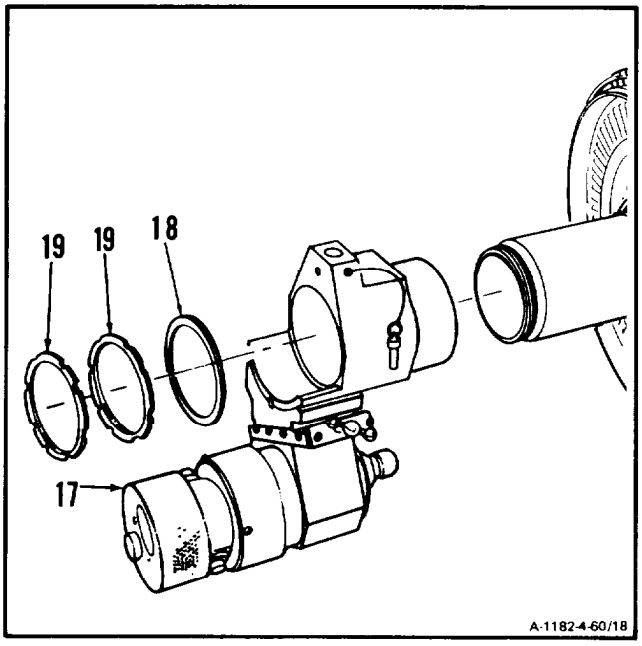
34. **Remove cutter (22)** from collet (23) using two spanner wrenches (24) part of skimming maintenance kit (T32).

35. Pull pin (21) and **remove counterweight (20).**

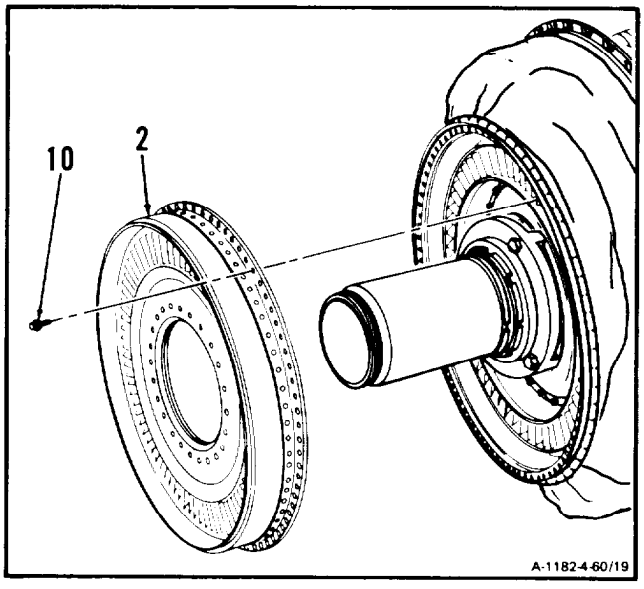


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36. Using spanner wrench, part of skimming maintenance kit (T32), remove two nuts (19) and washer (18). Using helper, **remove milling machine (17).**



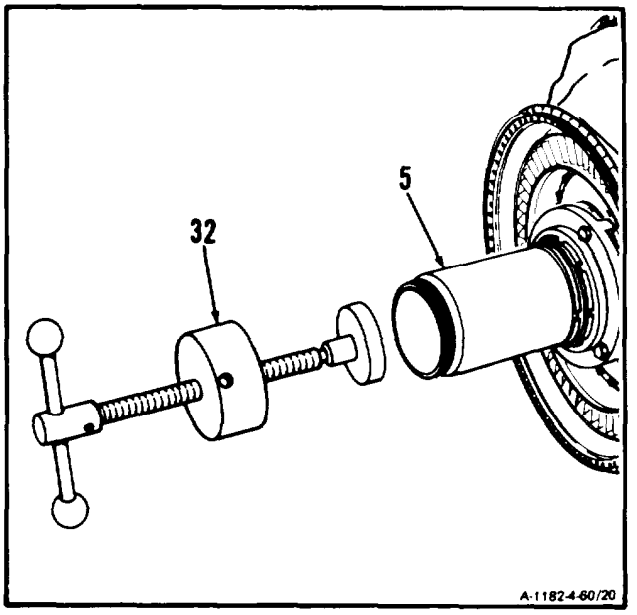
37. **Remove** 24 bolts (10) and second **turbine nozzle (2).**



GO TO NEXT PAGE

4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

38. **Install mechanical puller (32),** part of skimming maintenance kit (T32) on adapter (5). Tighten puller (32) until it bottoms on adapter (5).

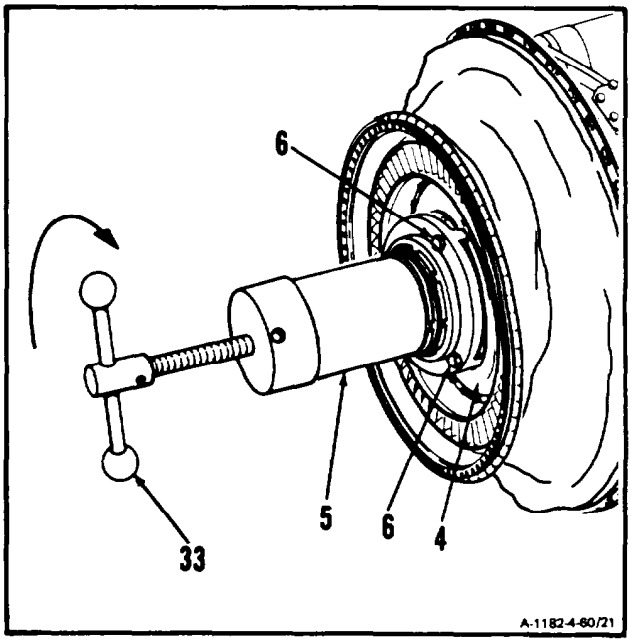


39. Loosen three bolts (6) until they are free of baffle retainer (4).

CAUTION

In following step, support adapter while it is being removed. Failure to comply will cause damage to second turbine nozzle.

40. **Turn handle (33) clockwise until adapter (5) is removed.**



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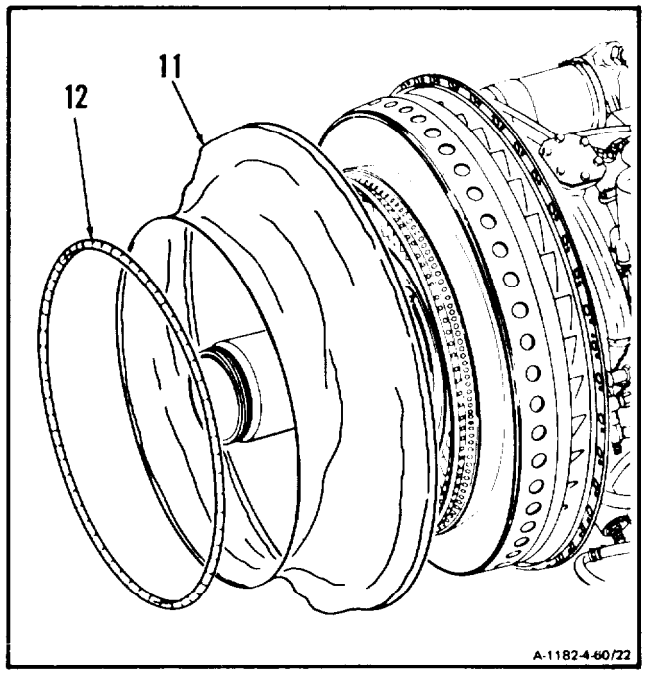
4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

NOTE

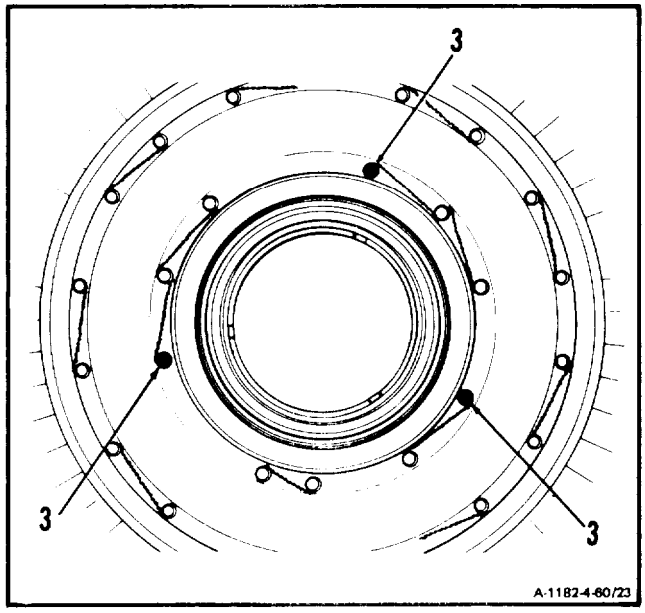
In following step, difficulty may be encountered when removing cover due to tight fit of cover around air diffuser assembly. The tight fit is necessary to ensure that machining chips do not enter air diffuser assembly.

41. **Remove spring (12) and cover (11).**

42. Use vacuum cleaner to **remove metal particles.**



43. **Install three bolts (3).** Lockwire bolts (3). Use lockwire (E29).



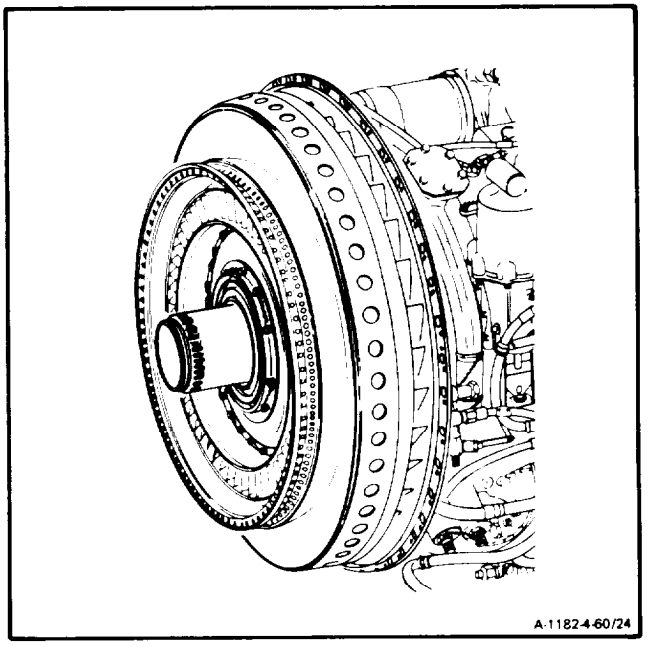
INSPECT

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4-60 REPAIR SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-60

FOLLOW-ON MAINTENANCE:

Install First Turbine Disc Assembly (Task 4-66).
Install Second Turbine Nozzle, Spacer, and Case (Task 4-61).
Install Second Turbine Disc Assembly (Task 4-56).
Install Combustor Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) 4-61

INITIAL SETUP

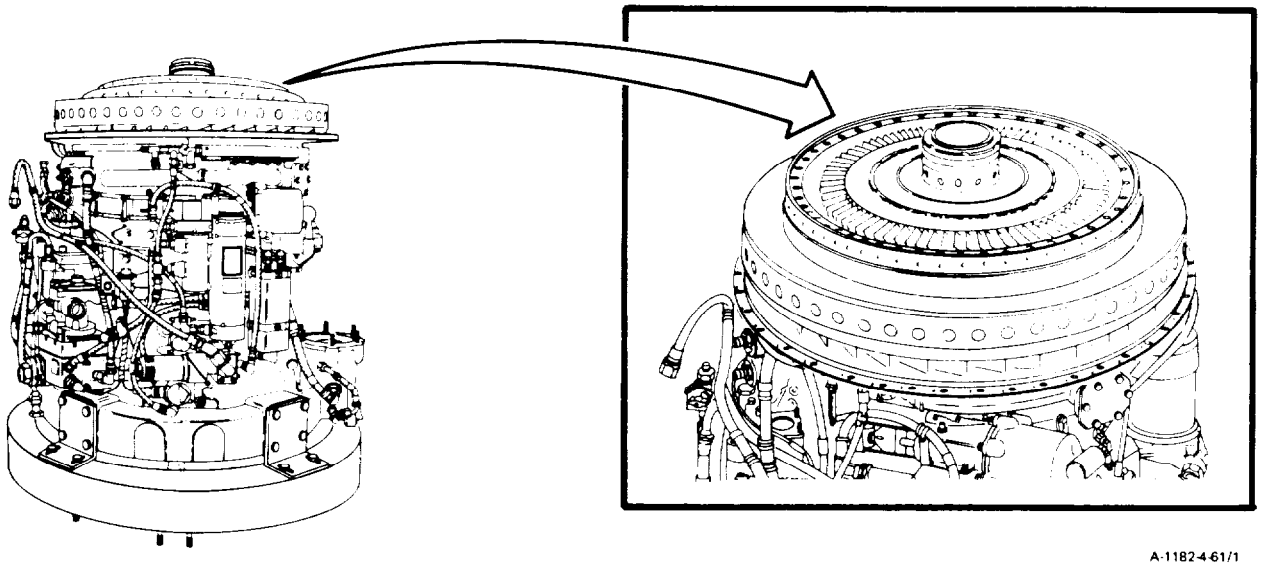
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Alignment Pins (T39)
Bent Wire Gage, 0.066 Inch (Appendix E)
Thickness Gage (Appendix E)

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)

Personnel Required:
68B10 Aircraft Power-plant Repairer
68B30 Aircraft Powerplant Inspector

References:
Task 4-57
Task 4-62
Task 4-66
Task 4-70
Task 4-72



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4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

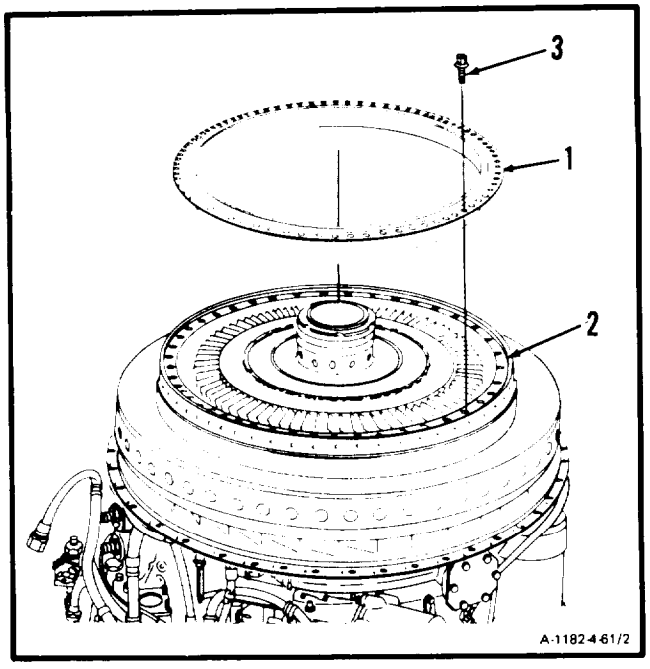
NOTE

The first turbine disc assembly, turbine spacer, second turbine disc assembly, seal, three locking plates and six bolts are supplied as a balanced, matched set. If the turbine spacer is replaced, all other parts in the balanced, matched set shall be replaced. Use field replacement first and second turbine disc assembly, part number 2-121-480-03.

NOTE

If same turbine spacer that was removed is being installed, omit steps 1 thru 3. If turbine spacer is being replaced, do all steps.

1. **Remove first turbine disc assembly** (Ref. Task 4-62).
2. **Place in service field replacement first and second turbine disc assembly** (Ref. Task 4-72).
3. **Install first turbine disc assembly** (Ref. Task 4-66).
4. **Install turbine rotor case (1)** on first turbine nozzle (2) and temporarily install 12 bolts (3).



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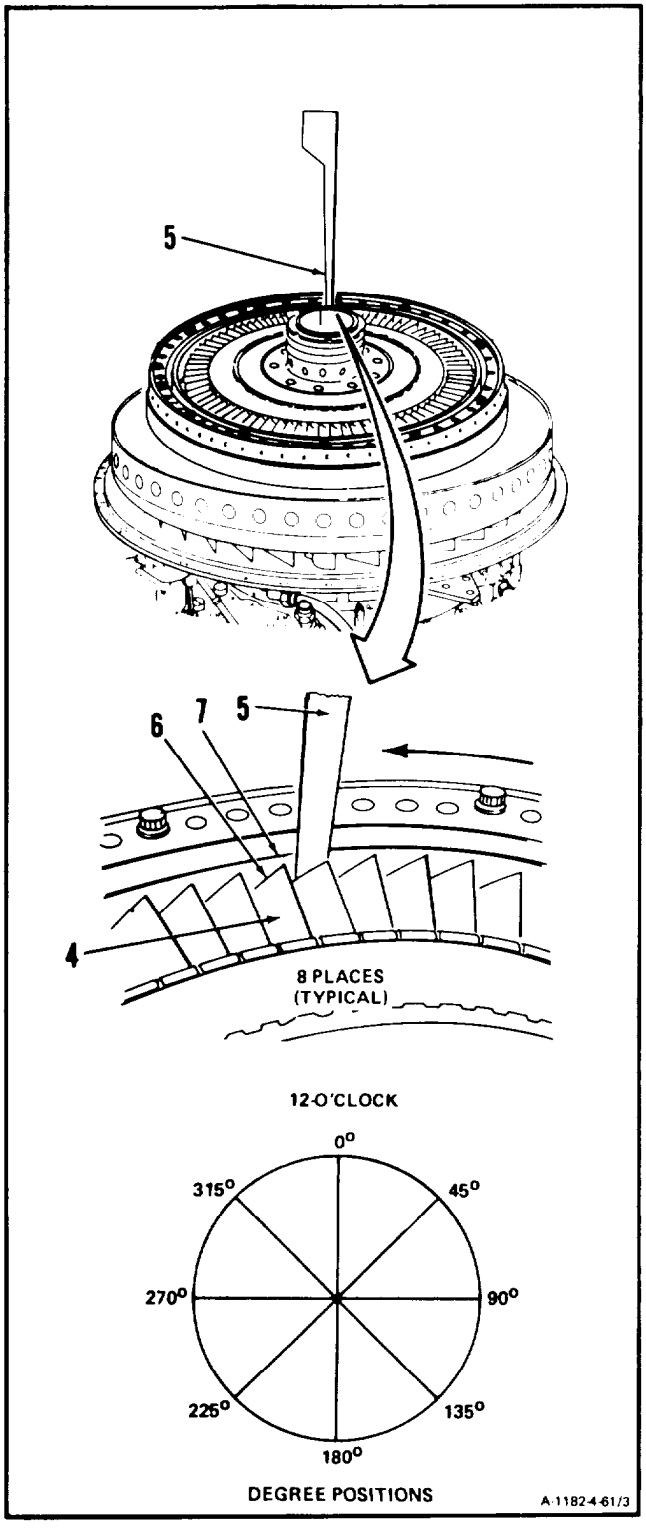
5. **Measure first turbine disc assembly (4) tip clearance** at 0, 45, 90, 135, 180, 225, 270, and 315 degree positions as follows:

   a. Insert thickness gage (Appendix E) (5) between blade tip (6) and turbine rotor case inside diameter (7).

   b. Rotate first turbine disc assembly (4) counterclockwise one revolution for each check.

   c. Tip clearance shall be 0.019 inch minimum.

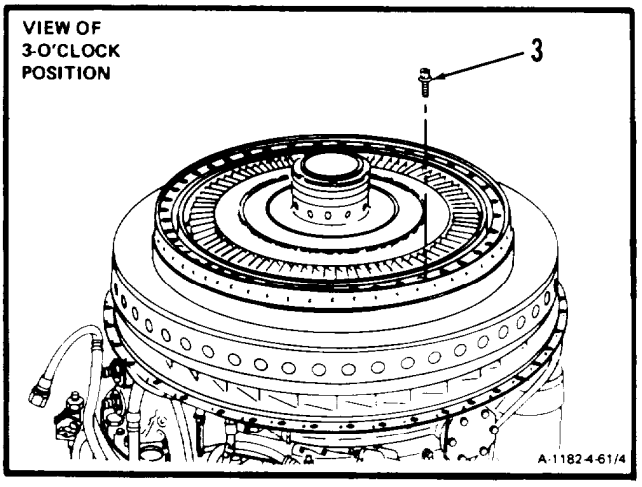
   d. **If tip clearance is less than 0.019 inch, repair first turbine rotor case** (Ref. Task 4-70).



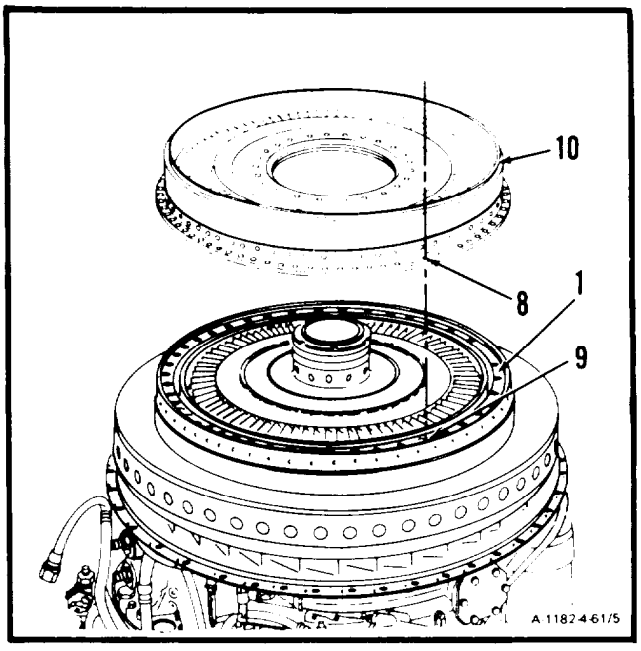
INSPECT

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6. **Remove 12 bolts (3).**



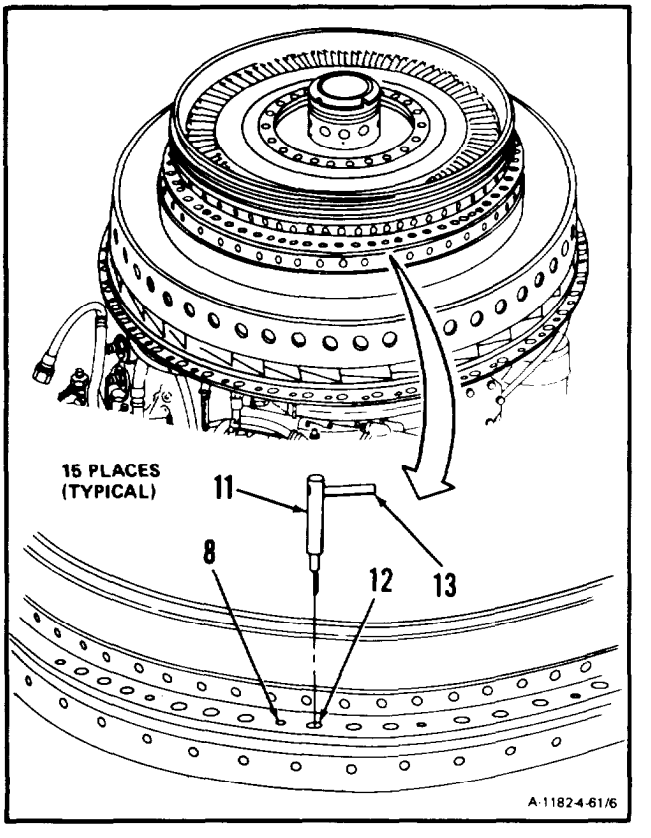
7. Align bolt holes (8 and 9) and **install second turbine nozzle (10)** on turbine rotor case (1).



GO TO NEXT PAGE

4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

8. **Install 15 alignment pins (T39)** (11) in 15 unthreaded holes (12) next to bolt holes (8) with handles (13) facing sideways. Space alignment pins evenly.



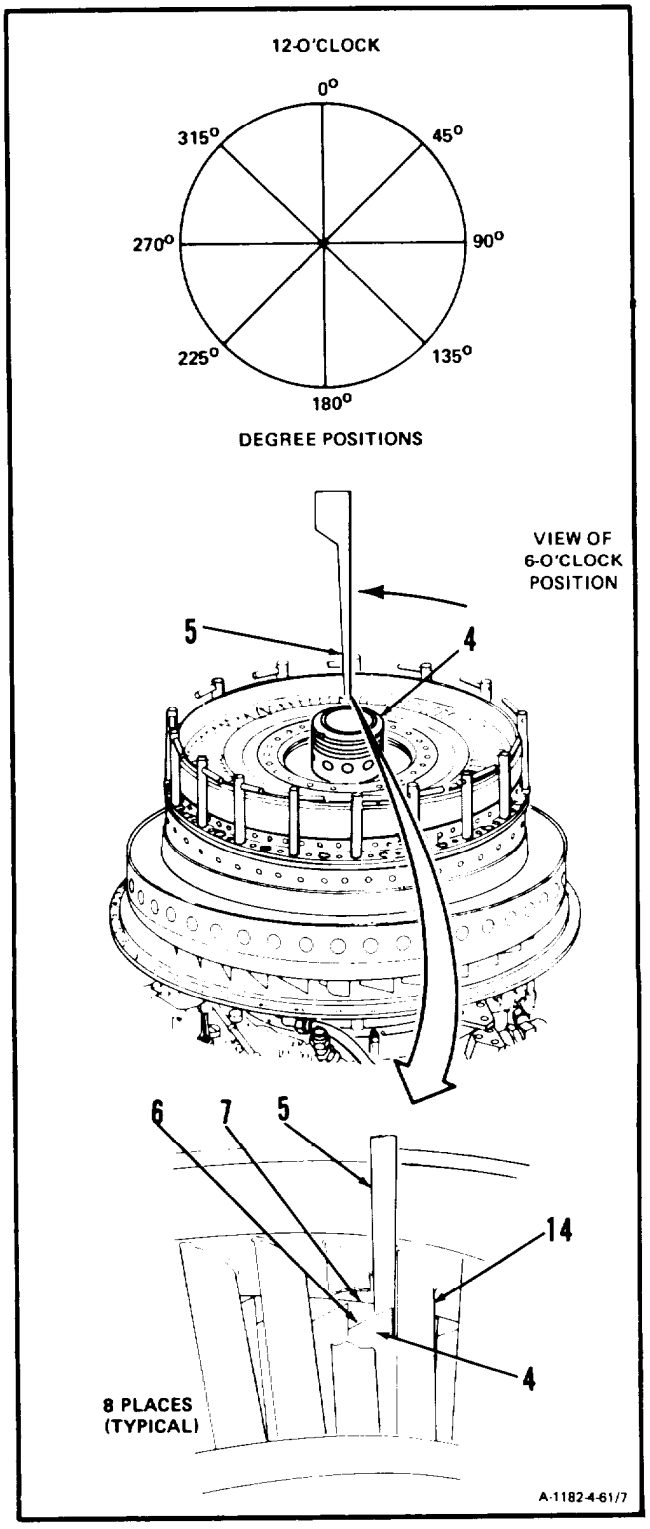
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4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

9. **Measure first turbine disc assembly (4) tip clearance** at 0, 45, 90, 135, 180, 225, 270, and 315 degree positions as follows:

   a. Insert thickness gage (Appendix E) (5) between second turbine nozzle vanes (14) and between blade tip (6) and turbine rotor case inside diameter (7).

   b. Rotate first turbine disc assembly (4) counterclockwise one revolution for each check.

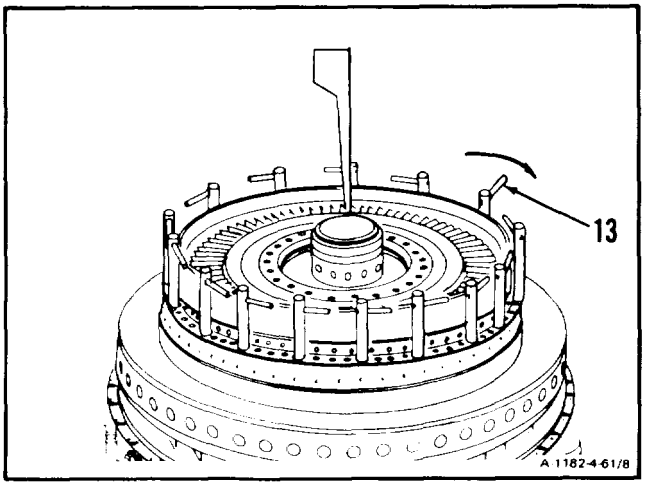


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4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

c. **Turn alignment pin handles (13) clockwise as required to obtain minimum tip clearance.** Tip clearance shall be 0.019 inch minimum.

d. **If tip clearance is less than 0.019 inch, repair first turbine rotor case** (Ref. Task 4-70).



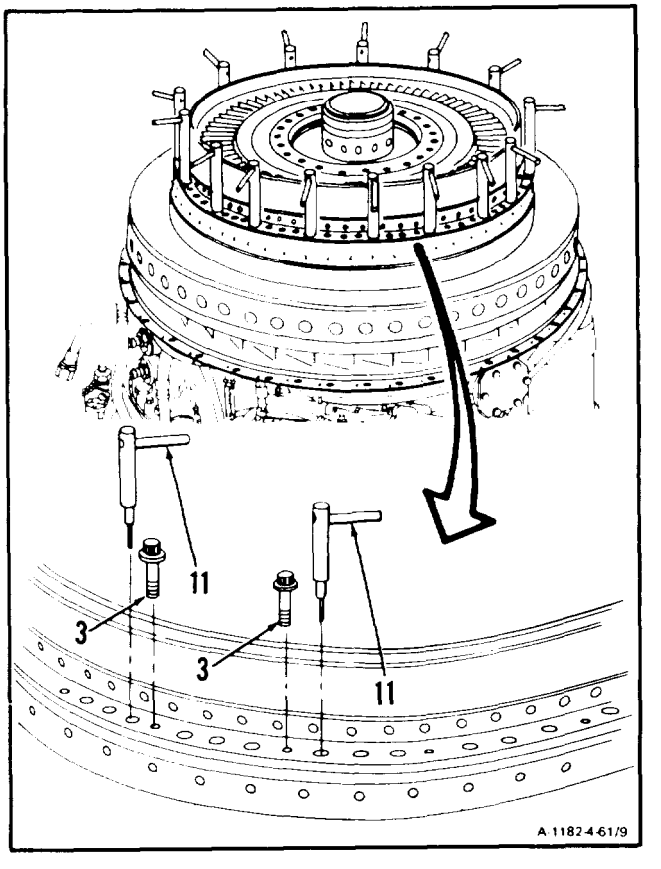
INSPECT

10. Coat 24 bolts (3) with anti-seize compound (E5).

11 **Install 24 bolts (3).**

12. Remove 15 alignment pins (T39) (11).

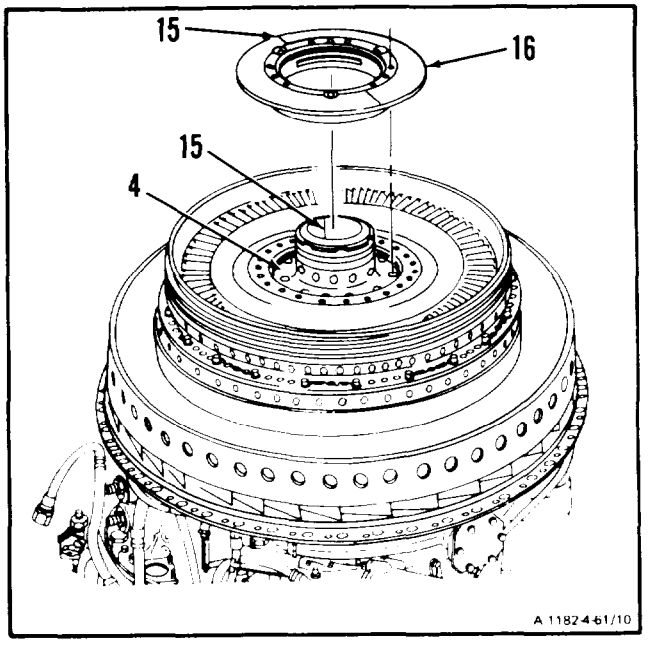
13. Lockwire 24 bolts (3). Use lockwire (E29).



GO TO NEXT PAGE

4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

14. Align matchmarks (15) and **install turbine spacer (16)** on first turbine disc assembly (4).



GO TO NEXT PAGE

4-61 INSTALL SECOND TURBINE NOZZLE, SPACER, AND CASE (AVIM) (Continued) 4-61

15. Check axial clearance between first turbine disc assembly (4) and second turbine nozzle (10). Use 0.066 inch bent wire gage (Appendix E) (17) inserted through second turbine nozzle vanes (14).

INSPECT

16. If clearance cannot be obtained recheck first turbine rotor installation procedure.

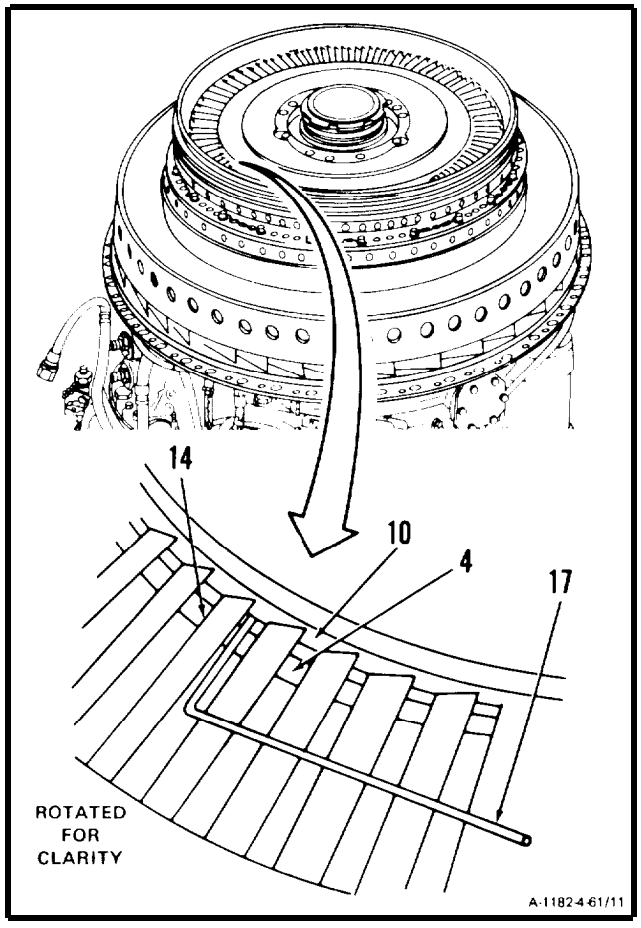
    a. **Remove second turbine nozzle** (Ref. Task 4-57).

    b. **Remove first turbine disc assembly** (Ref. Task 4-62).

    c. **Install first turbine disc assembly** (Ref. Task 4-66). Maintain as close to minimum clearance 0.100 inch between first turbine disc assemblv and first turbine nozzle as possible.

    d. Repeat steps 4. thru 16.

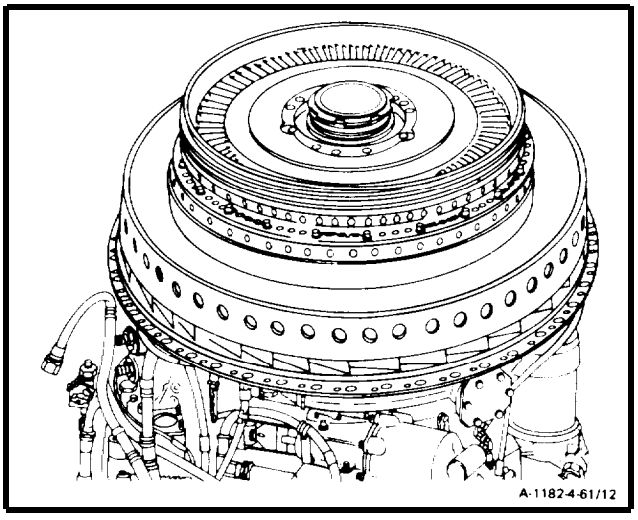
17. If clearance still cannot be met replace parts as necessary.



INSPECT

FOLLOW-ON MAINTENANCE:

Install Second Turbine Disc Assembly (Task 4-56).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM)

4-62

INITIAL SETUP

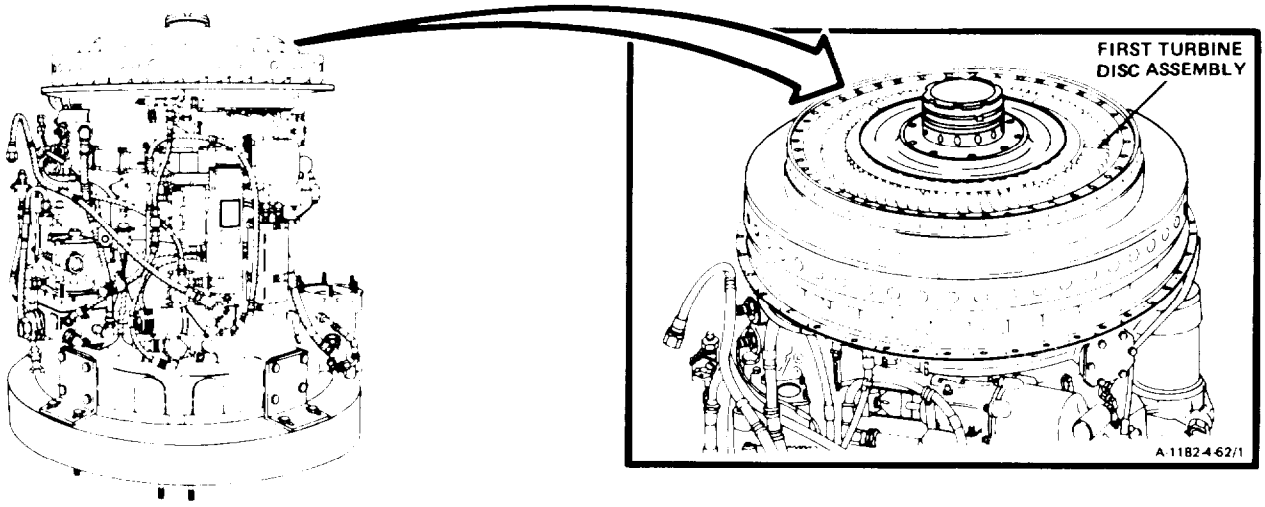
Applicable Configurations.
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Mechanical Puller (T14)
Torque Fixture (T40)
Torque Multiplier (T63)

Materials:
None

Personnel Required.
68B10 Aircraft Powerplant Repairer (2)

Equipment Condition.
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer and Case Removed (Task 4-57)



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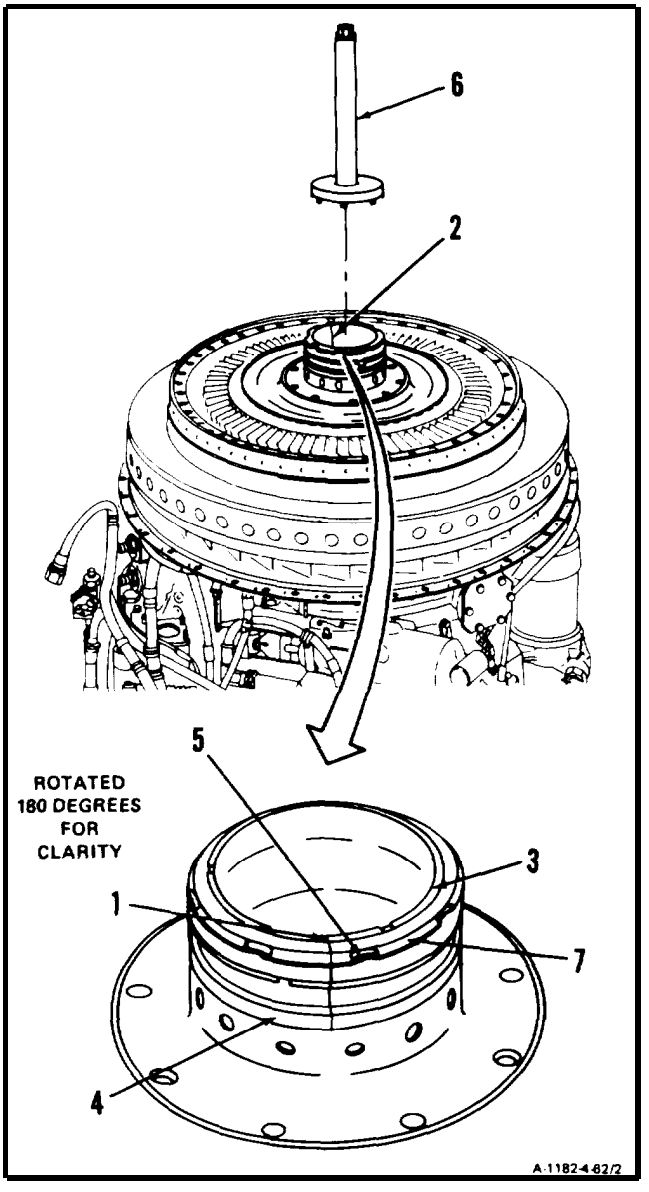
4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

1. Draw matchmark (1), in line with matchmark (2) on inside of compressor shaft, from top of compressor shaft (3) to first turbine disc assembly (4).

2. **Install torque fixture (T40)** as follows:

   a. Straighten indents of retaining washer (5).

   b. Position wrench (6) on retaining nut (7).



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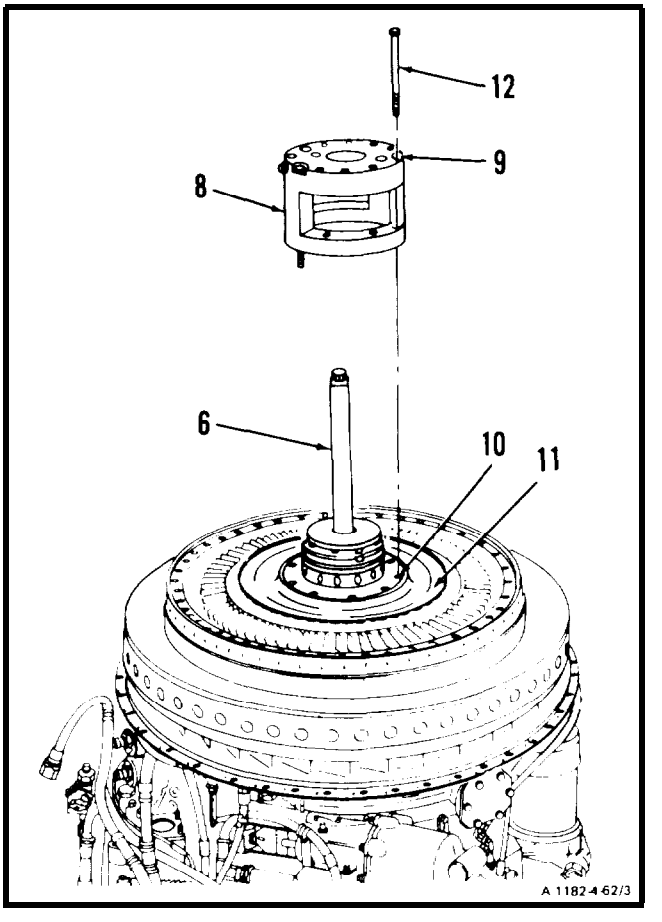
4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

NOTE

In following step c. align large holes on bottom of adapter with hollow pins on disc assembly.

c. Position adapter (8) on wrench (6). Align three bolt holes (9) with holes (10) in disc assembly (11).

d. Install three bolts (12) in bolt holes (9).

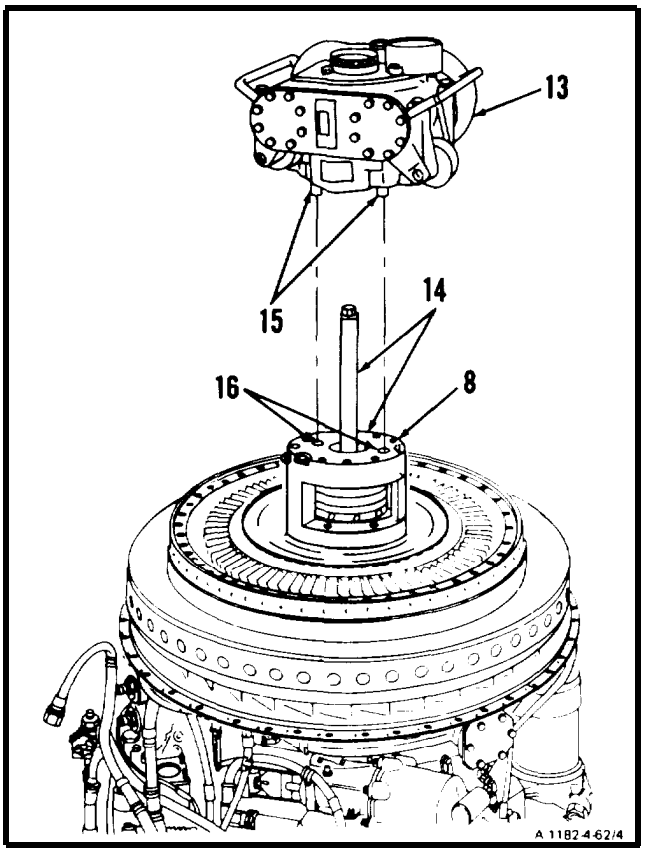


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4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

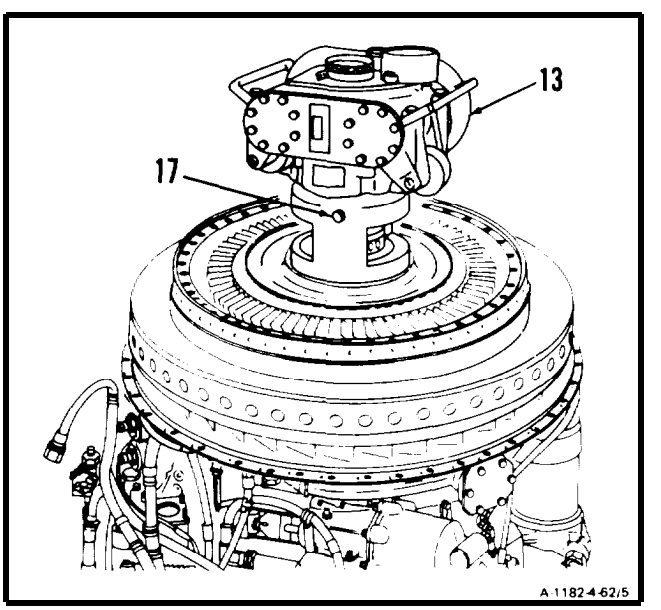
3. **Install torque multiplier (T63) (13)** as follows.

   a. Have helper assist and position torque multiplier (T63) (13) over torque fixture (T40) (14). Align two pins (15) with holes (16) in adapter (8). Place torque multiplier (T63) (13) on adapter (8).



   b. Loosen lockpin (17) to lower torque multiplier (T63) (13).

   c. Tighten lockpin (17) to lock torque multiplier (T63) (13) in place.

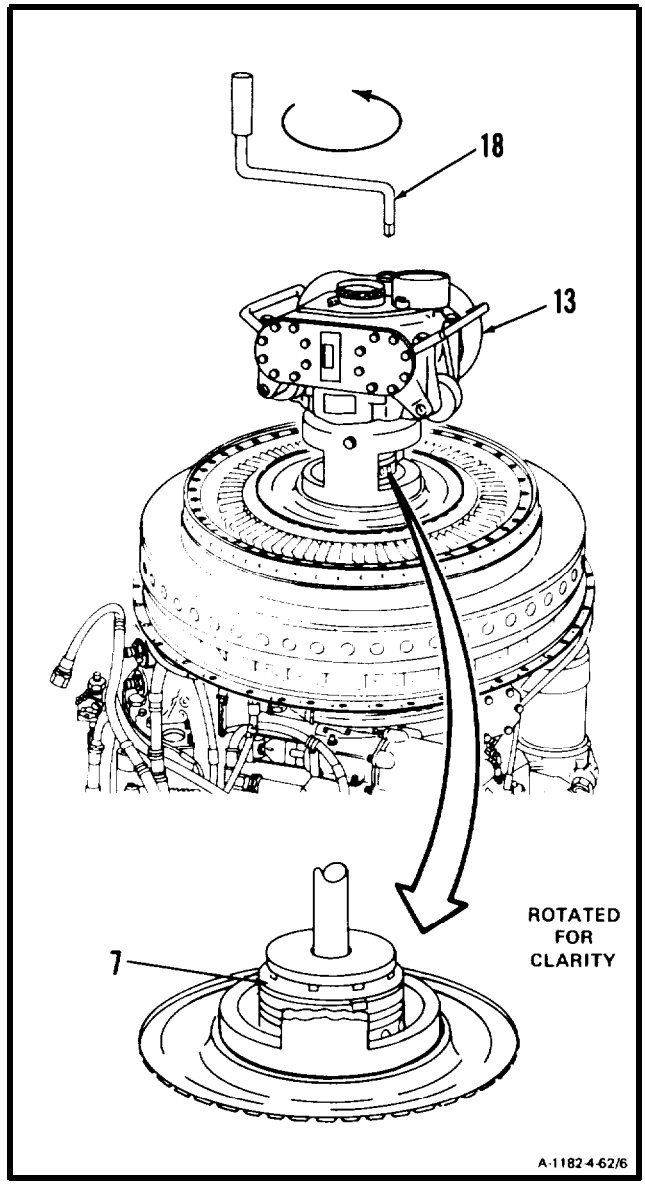


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4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

4. **Remove nut (7)** as follows:

   a. Insert handle (18) in torque multiplier (T63) (13). Turn handle (18) counterclockwise until nut (7) is loose.



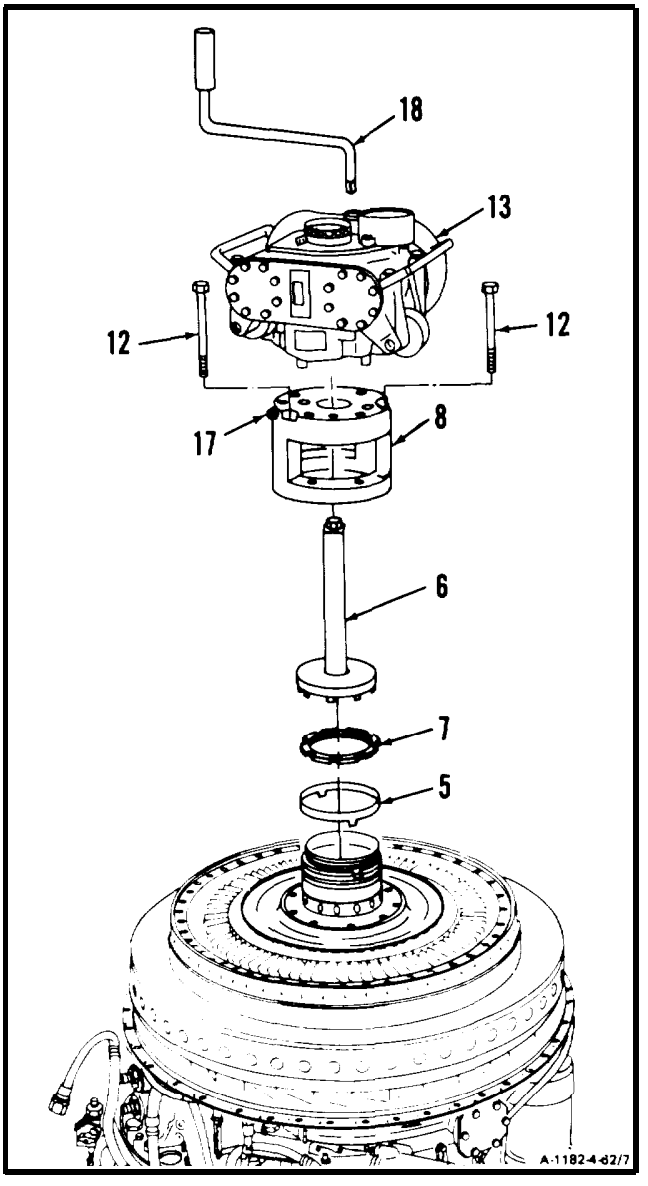
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4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

b. Loosen lockpin (17).

c. Remove handle (18), torque multiplier (T63) (13), torque fixture (T40), consisting of adapter (8), wrench (6), and bolts (12).

d. Remove retaining nut (7) and retaining washer (5).



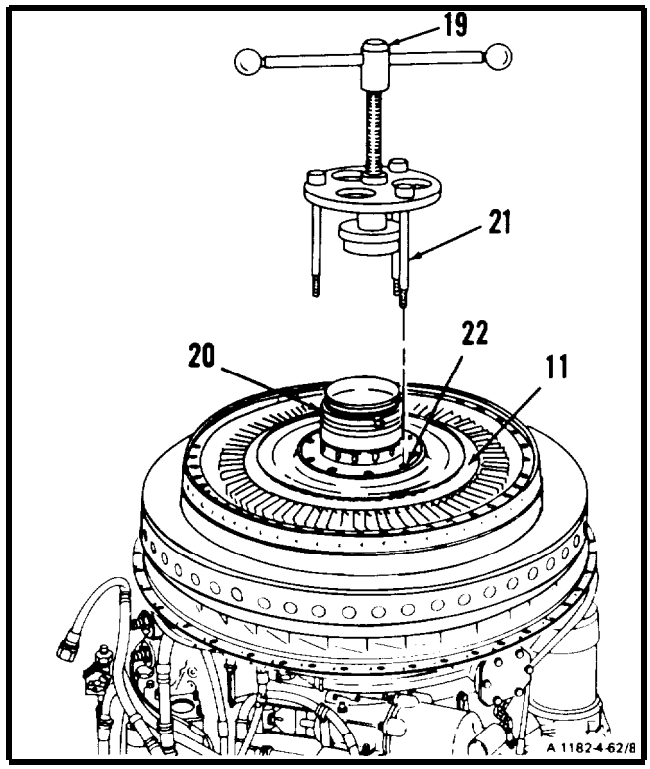
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4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

5. **Install puller (T14) (19)** as follows:

   a. Position puller (T14) (19) on shaft (20). Align three bolts (21) with three bolt holes (22) in discassembly (11).

   b. Tighten three bolts (21) until bottomed on disc assemblv (11).



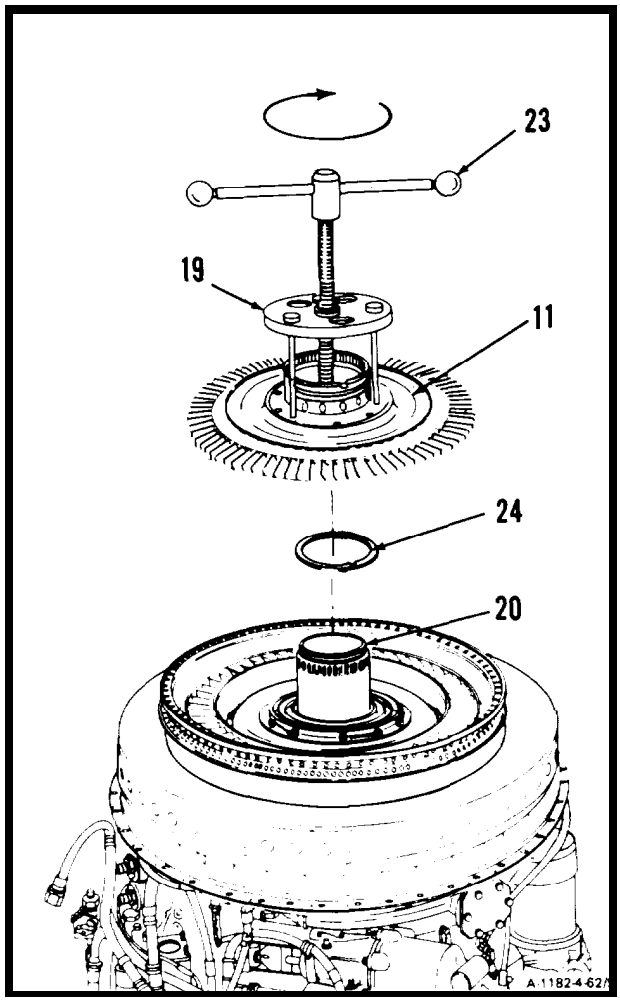
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4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

6. **Remove disc assembly (11)** as follows:

   a. Turn handle (23) clockwise until disc assembly (11) is free of shaft (20). Have helper hold mechanical puller (T14) (19).

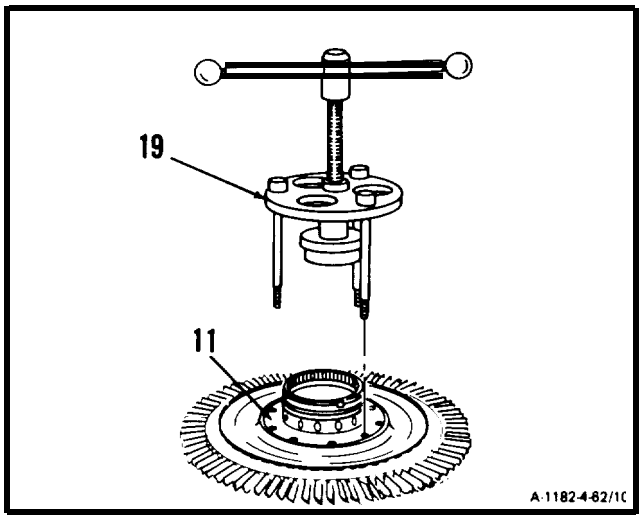
   b. Remove disc assembly (11) and shim (24).



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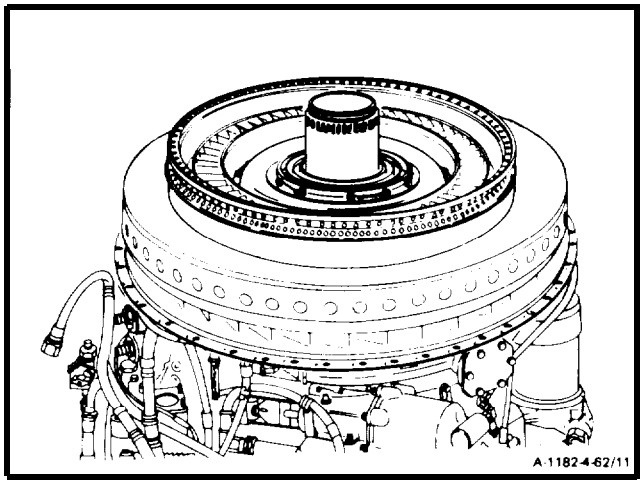
4-62 REMOVE FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-62

7. **Remove puller (T14) (19)** from disc assembly (11).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-63 CLEAN FIRST TURBINE DISC ASSEMBLY (AVIM) 4-63

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)

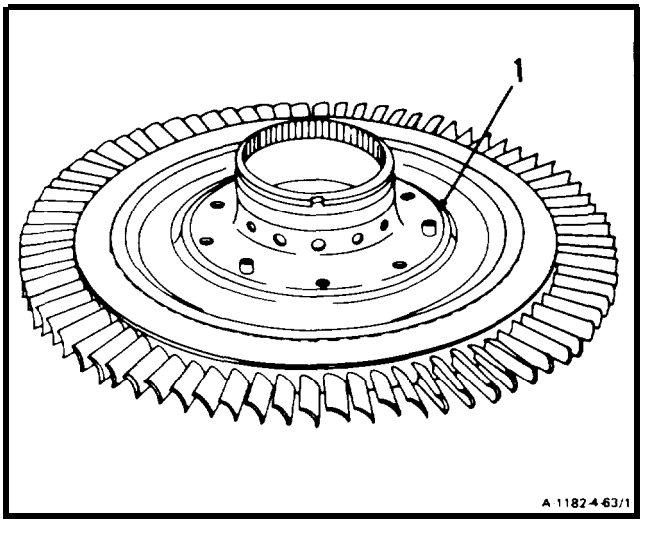
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). Clean **first turbine disc assembly (1)** with brush dampened in dry cleaning solvent (E17).



WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry disc assembly.** Use clean, dry compressed air.

FOLLOW-ON MAINTENANCE.
Inspect First Turbine Disc Assembly (Task 4-64).

END OF TASK

4-64 INSPECT FIRST TURBINE DISC ASSEMBLY (AVIM) 4-64

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool KIT,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

References:
Task 1-118

Equipment Condition:
Off Engine Task

1. **Inspect first turbine disc assembly (1)** as follows:

   a. **Inspect 80 blades (2).**

      (1) There shall be no nicks, dents, or scratches deeper than 0.015 inch.

      (2) There shall be no bends or distortion.

      (3) There shall be no cracks.

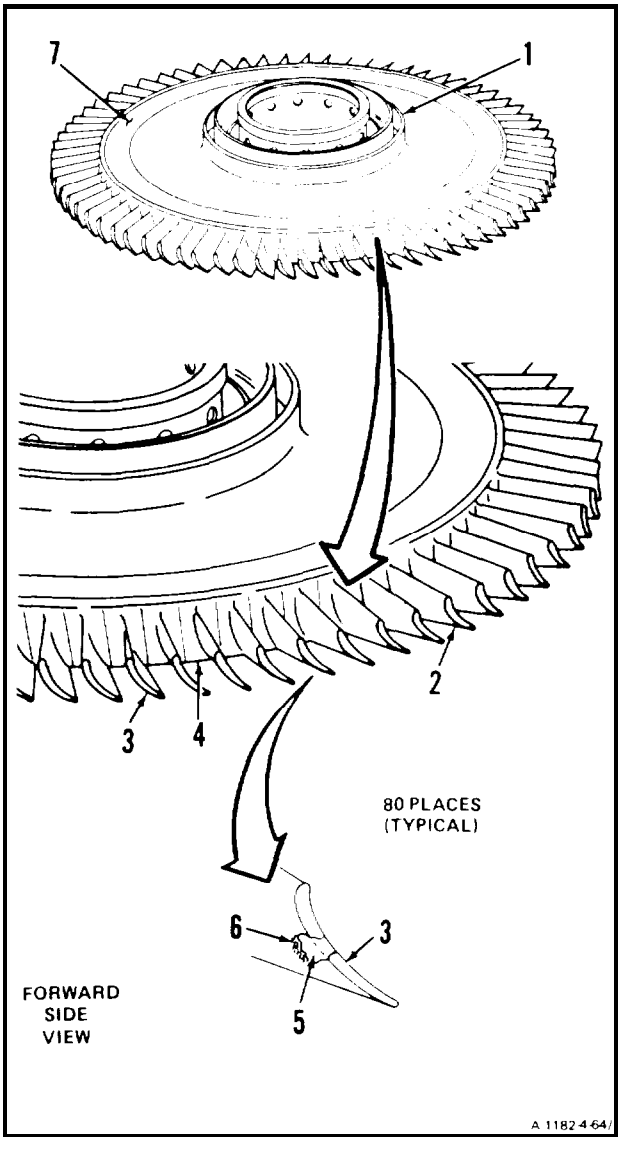
      (4) There shall be no rubs on blade tips (3) or blade platform (4) deeper than 0.015 inch.

      (5) There shall be no loss of material due to burning.

      (6) There shall be no material rollover (5) on blade tips (3).

      (7) There shall be no bluish-black discoloration in area (6) adjacent to rollover (5).

   b. **Inspect sealing plate** (7). There shall be no cracks.



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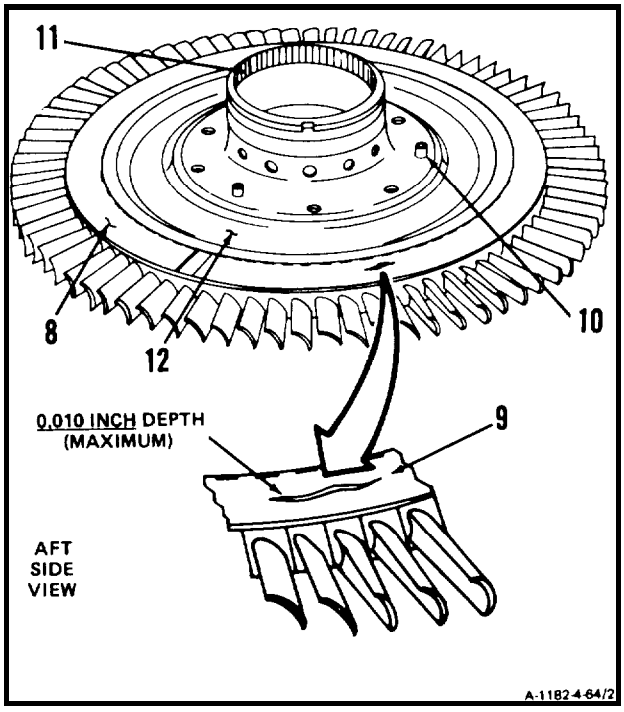
4-64 INSPECT FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued)

c. **Inspect retaining ring (8).** There shall be no cracks. There shall be no scoring (9) deeper than 0.010 inch.

d. **Inspect three hollow pins (10).** There shall be none missing or broken.

e. **Inspect spline (11)** (Task 1-18). There shall be no wear deeper than 0.005 inch on spline (11).

f. **Inspect disc (12).** There shall be no cracks.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-65 REPAIR FIRST TURBINE DISC ASSEMBLY (AVIM) 4-65

INITIAL SETUP

Applicable Configurations:
A11

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Carborundum Stone (E10)
Crocus Cloth (E15)

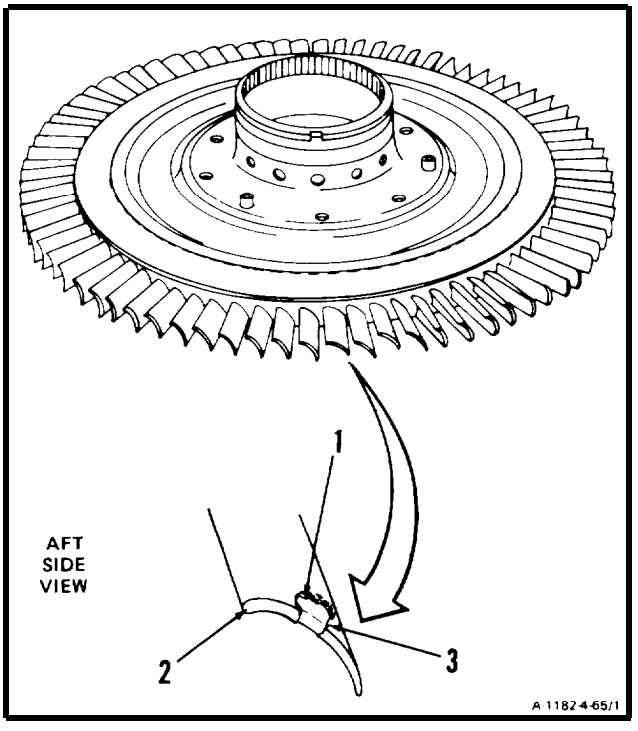
Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Repair material rollover (1) on blade tips (2)** as follows:

   a. Blend all sharp edges (3). Use carborundum stone (E10).

   b. Polish to smooth finish. Use crocus cloth (E15).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) 4-66

INITIAL SETUP

Applicable Configuration:
All

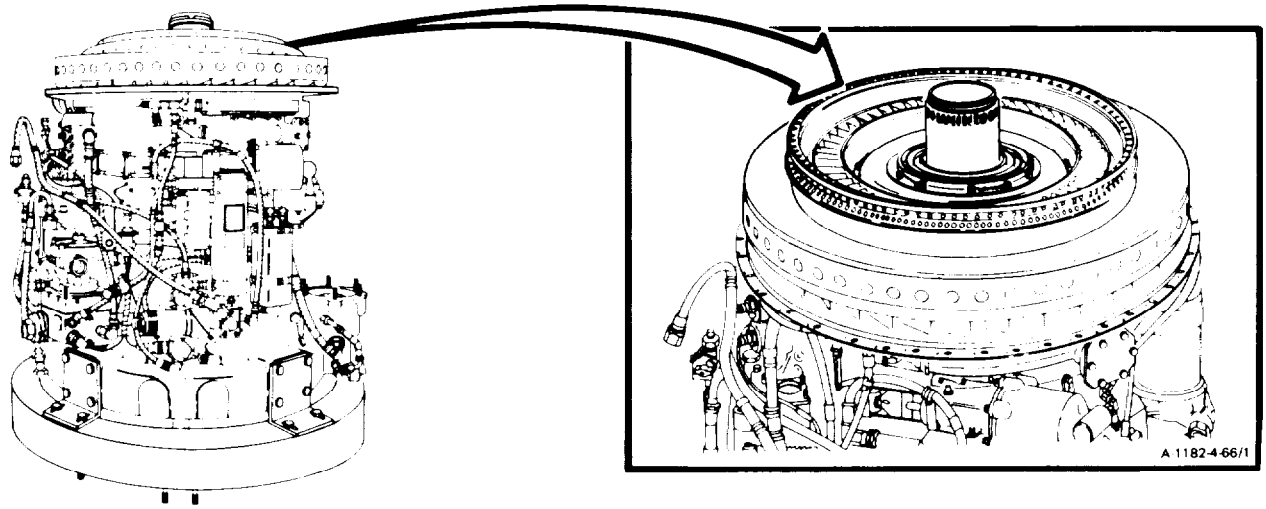
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Locating Bar (T1)
Dial Indicator Support (T27)
Assembling Fixture (Bore Heater) (T30)
Torque Fixture (T40)
Control Unit (T55)
Torque Multiplier (T63)
Bent Wire Gage, 0.100 Inch (Appendix E)
Micrometer Depth Gage
Dial Indicator and Base
Asbestos Gloves
Outside Micrometer Caliper Set
Slave Bolt, P/N STD3053-31 (3)

Materials:
Anti-Seize Compound (E5)
Marking Pencil (E34)

Parts:
Shims
Washer

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P
Task 4-62
Task 4-72



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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

NOTE

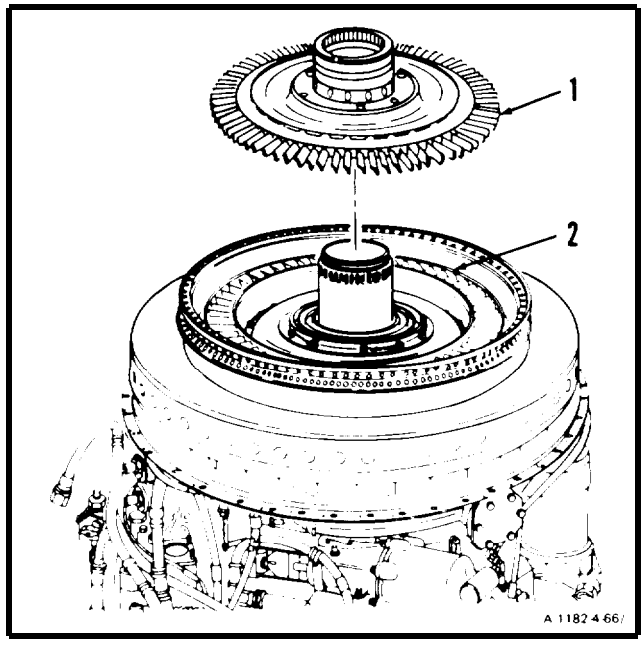
The first turbine disc assembly, spacer, second turbine disc assembly, seal, three locking plates, and six bolts are supplied as a balanced, matched set. If the first turbine disc assembly is replaced, all other parts in the balanced, matched set shall be replaced. Use field replacement first and second turbine disc assembly, Part No. 2-121-480-03.

NOTE

If same first turbine disc assembly that was removed is being installed, omit step 1. If first turbine disc assembly is being replaced, do all steps.

1. **Place in service field replacement first and second turbine disc assembly (Ref. Task 4-72).**

2. **Determine thickness of rotor shim to establish clearance between first turbine disc assembly (1) and first turbine nozzle (2)** as follows:

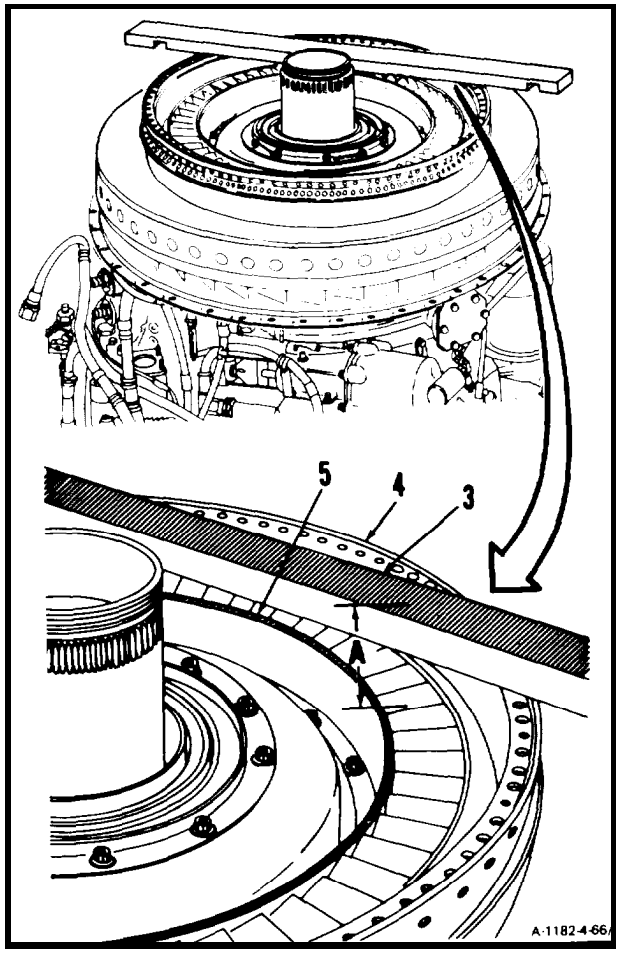


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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

a. Place locating bar (T1) (3) on first turbine nozzle outer flange (4).

b. Measure from top of locating bar (T1) (3) to edge of first turbine nozzle inner shroud (5). Use micrometer depth gage. Record as dimension A.

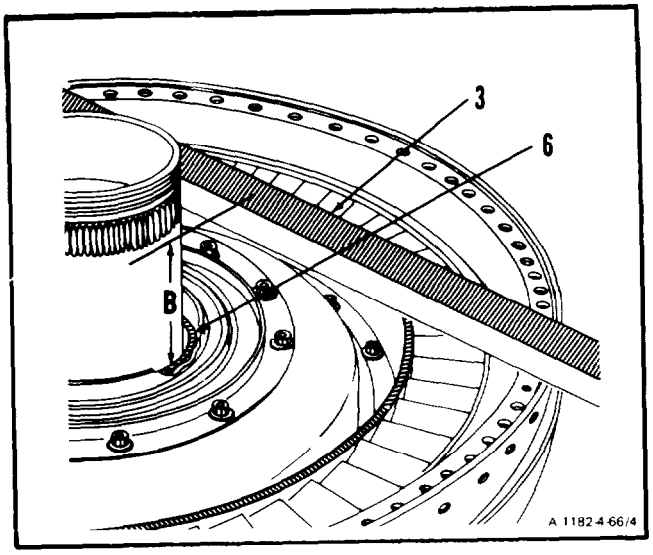


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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

c. Measure from top of locating bar (T1) (3) to rear face of rear seal sleeve (6). Use micrometer depth gage. Record as dimension 6.

d. Subtract dimension A from dimension 6. Record as dimension C.

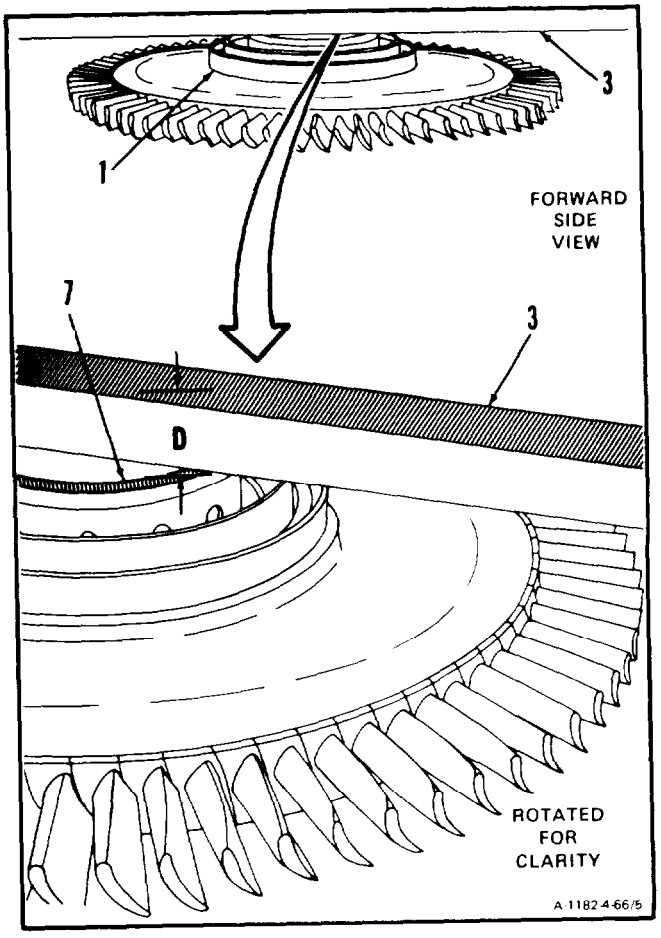


e. Place locating bar (T1) (3) on first turbine disc assembly (1) forward side.

NOTE

In following step f., dimension D is thickness of locating bar (T1) (3).

f. Measure from top of locating bar (T1) (3) to first turbine disc assembly mounting face (7). Use micrometer depth gage. Record as dimension D.



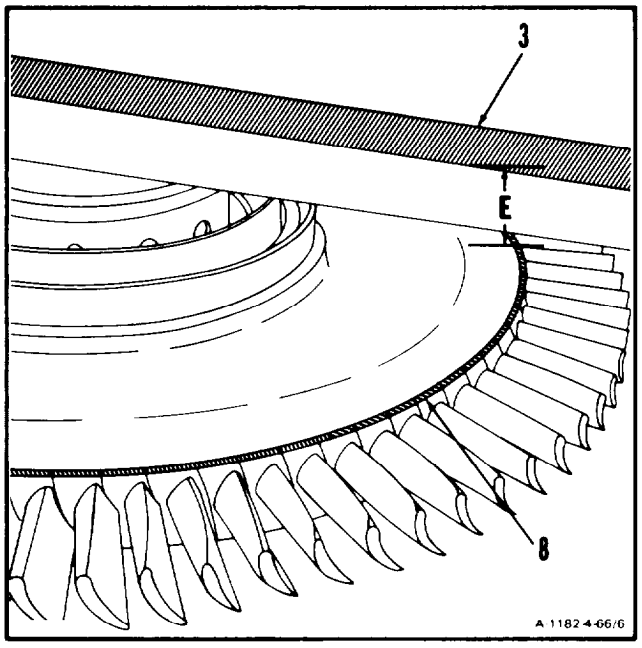
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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

g. Measure from top of locating bar (T1) (3) to first turbine disc assembly outer rim (8). Use micrometer depth gage. Record as Dimension E.

h. Subtract Dimension D from Dimension E. Record as Dimension F.

i. Subtract Dimension C from Dimension F. Record as Dimension G.



NOTE

Clearance required is 0.100 inch minimum.

j. Subtract Dimension G from 0.100 inch. **Select shim from shim selection table** to obtain 0.100 inch minimum. Check shim thickness. Use outside micrometer caliper.

Example: If Dimension G is 0.085 inch, select Shim Part No. 2-121-089-01. If Dimension G is 0.050 inch, select Shim Part No. 2-121-089-03.

SHIM SELECTION TABLE

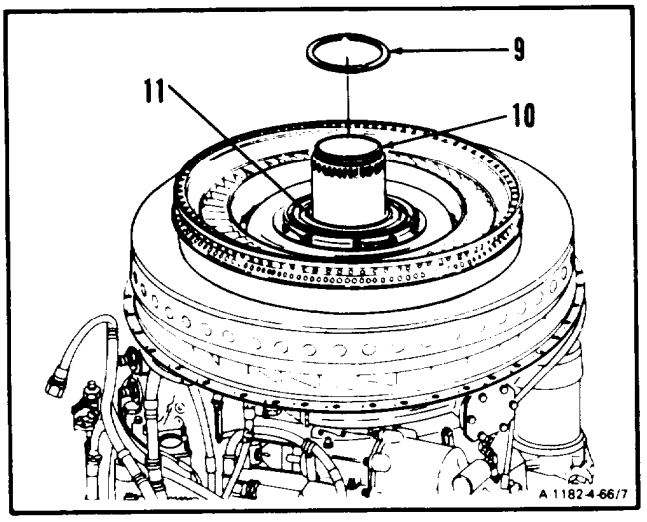
PART NUMBER	SHIM THICKNESS
2-121-089-01	0.020 inch
2-121-089-02	0.040 inch
2-121-089-03	0.055 inch

INSPECT

GO TO NEXT PAGE

4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

3. Install shim (9) over shaft (10). Position shim (9) on compressor rotor hub (11).



4. Heat first turbine disc assembly hub (12) as follows:

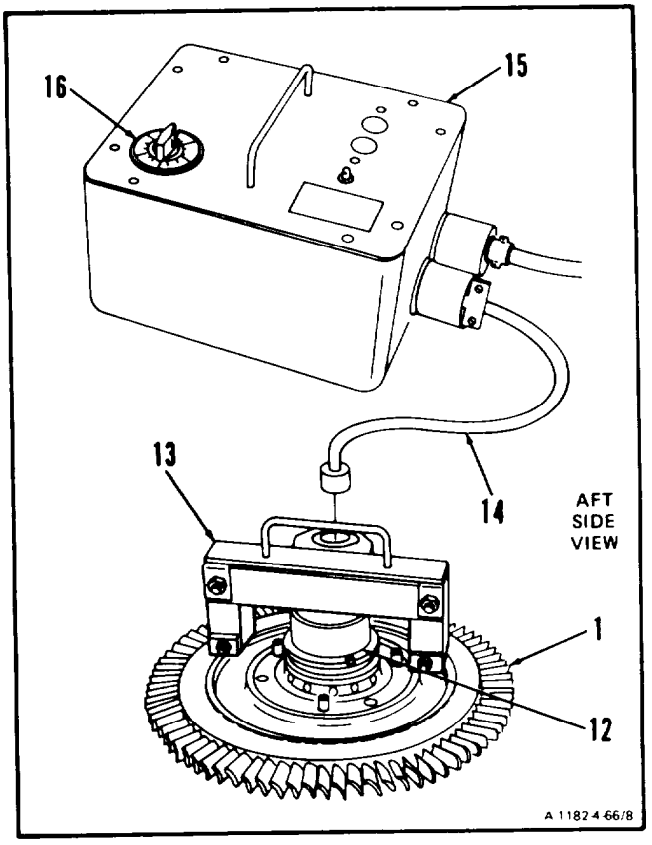
   a. Place first turbine disc assembly (1) on heat resistant work surface.

   b. Position bore heater (T30) (13) on hub (12).

   c. Connect cable (14) of control unit (T55) (15) to heater (T30) (13).

   d. Connect control unit (T55) (15) to power source.

   e. Set timer (16) for three minutes.



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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

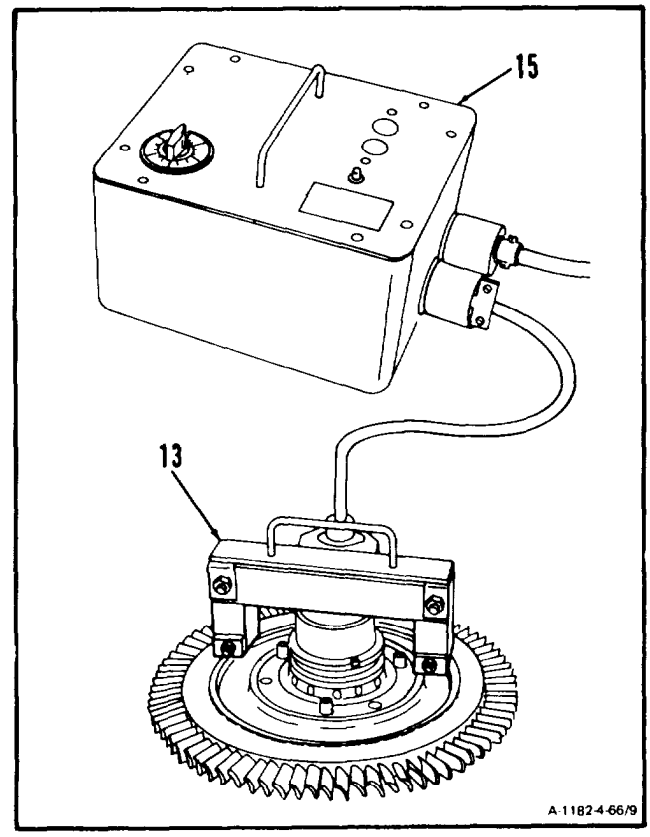
WARNING

Wear asbestos gloves when handling heated parts. Heated parts can cause burns. If burns occur, get medical attention.

CAUTION

Do not allow bore heater to operate for more than 3 minutes. Bore heater heating element could be damaged.

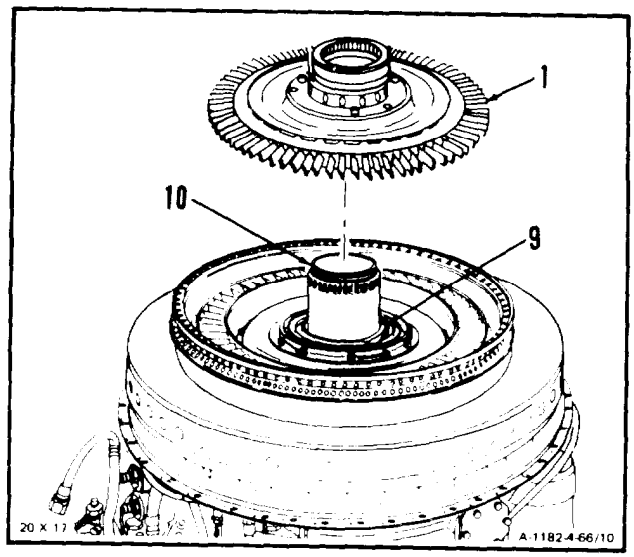
f. Wear asbestos gloves. After three minute heating period, disconnect control unit (T55) (15) and remove bore heater (T30) (13).



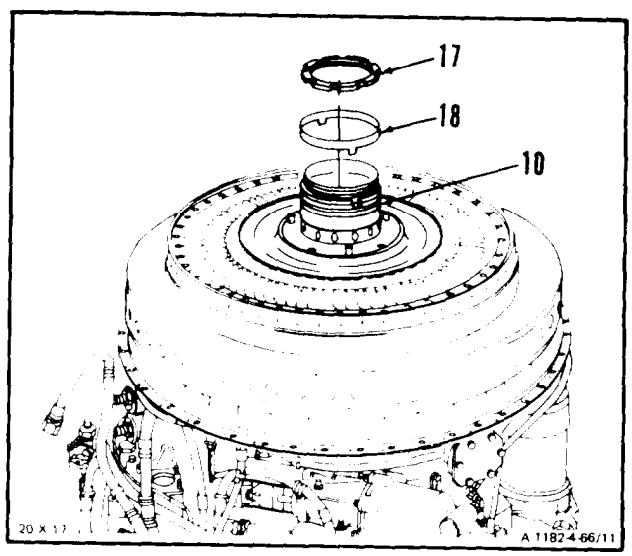
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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

5. Wear asbestos gloves. Align balance matchmarks. Install heated first turbine disc assembly (1) on compressor shaft (10) until seated on shim (9).



6. Coat threads and bearing surface of nut (17) with Nickel Ease (E37). **Install washer (18) and nut (17) on shaft (10).**

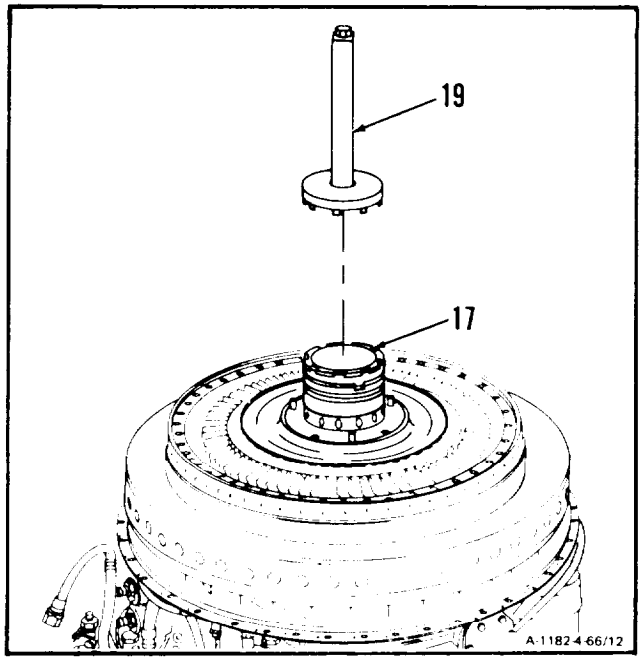


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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

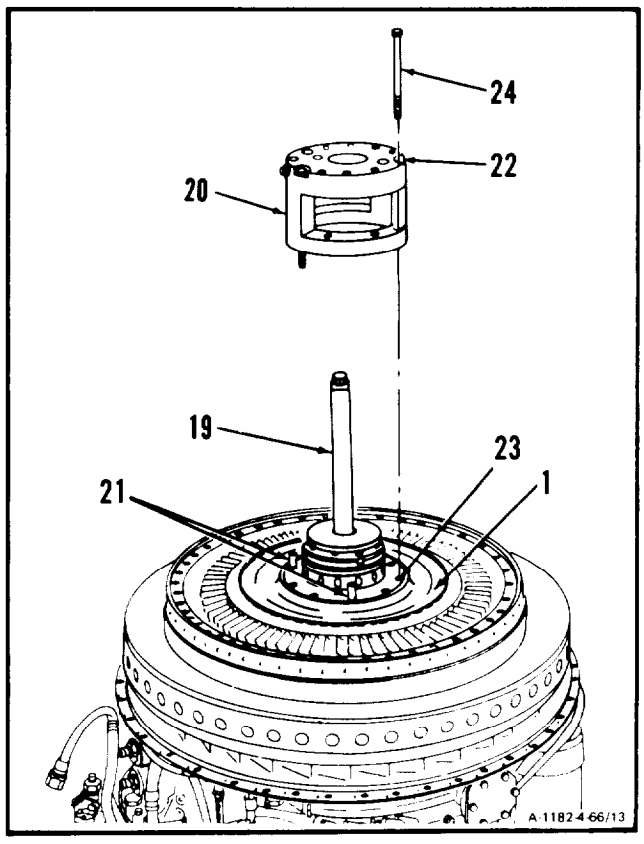
7. **Install torque fixture (T40)** as follows:

   a. Position wrench (19) on nut (17).



   b. Align large holes in bottom of adapter (20) with hollow pins (21) in disc assembly (1). Position adapter (20) on wrench (19). Align three bolt holes (22) with holes (23) in disc assembly (1).

   c. Install three bolts (24) in holes (22).

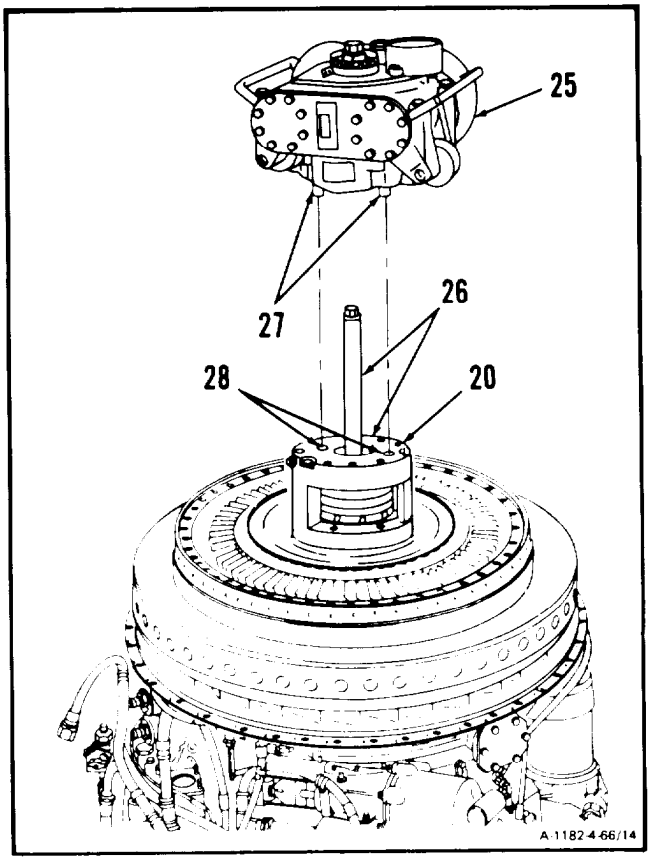


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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

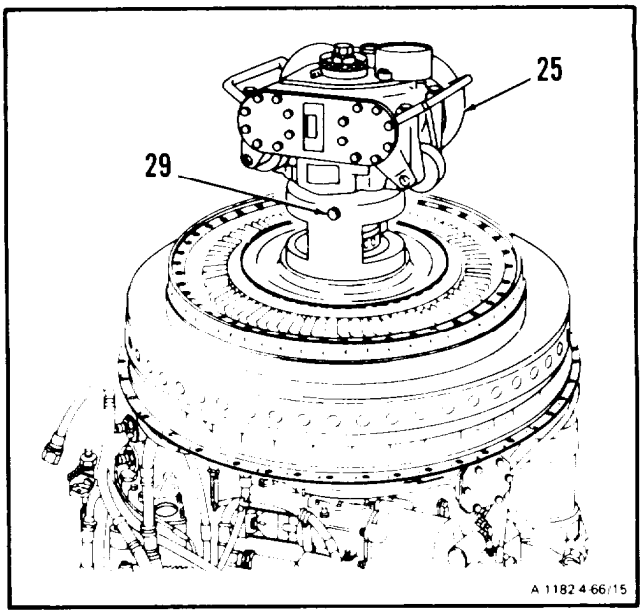
8. Have helper assist, and **install torque multiplier (T63) (25)** as follows:

   a. Position torque multiplier (T63) (25) over torque fixture (T40) (26). Align two pins (27) with holes (28) in adapter (20). Place torque multiplier (T63) (25) on adapter (20).



   b. Loosen lockpin (29) to lower torque multiplier (T63) (25).

   c. Tighten lockpln (29) to lock torque multiplier (T63) (25) in place.



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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

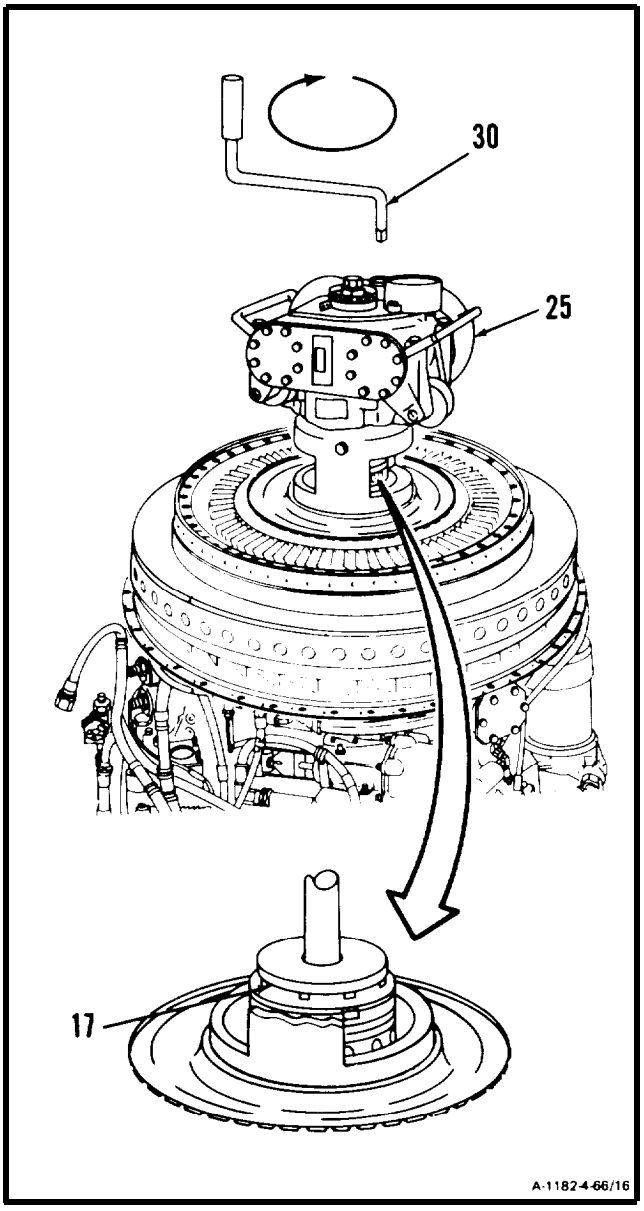
WARNING

Make sure handle is fully seated and ratchet selector on torque pack is properly set before applying torque. Rotating ratchet selector with load on torque pack can damage unit and injure personnel. If injury occurs, get medical attention.

WARNING

Do not change ratchet selector when torque load is on torque pack. Damage to equipment or injury to personnel can result. If injury occurs, get medical attention.

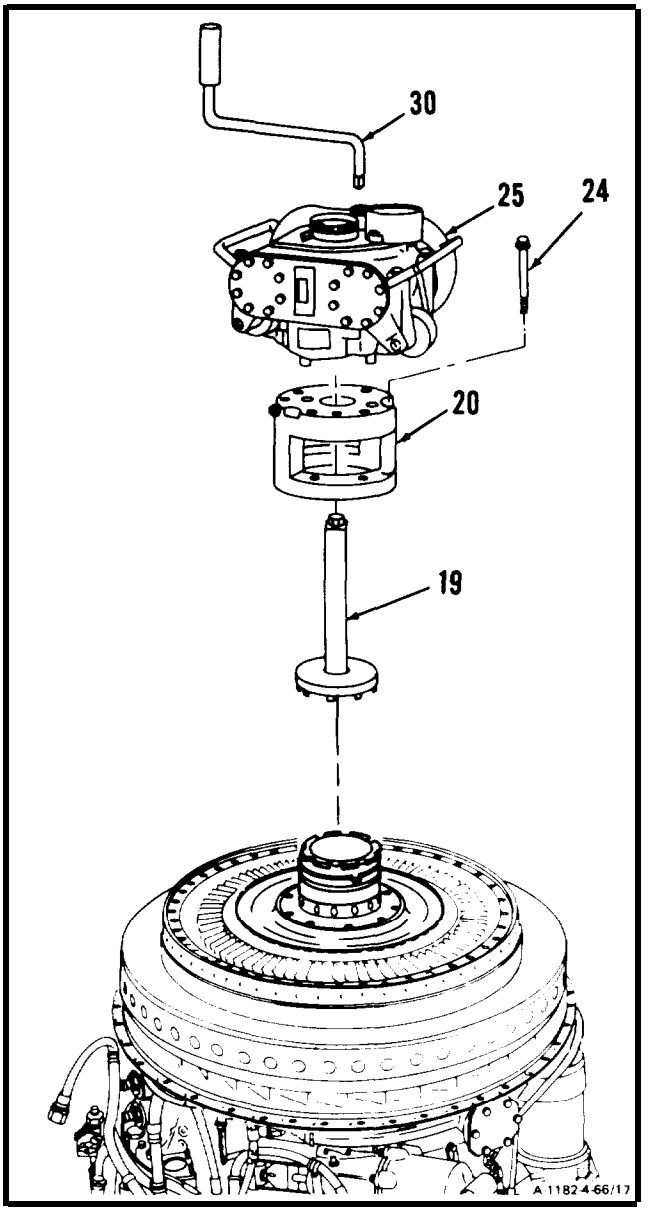
9. Insert handle (30) in torque multiplier (T63) (25). Turn handle (30) clockwise. **Torque nut (17) to 375 foot-pounds.**



GO TO NEXT PAGE

4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

10. **Remove handle (30), torque multiplier (T63) (25), and torque fixture (T40),** consisting of adapter (20), and wrench (19) and bolts (24).

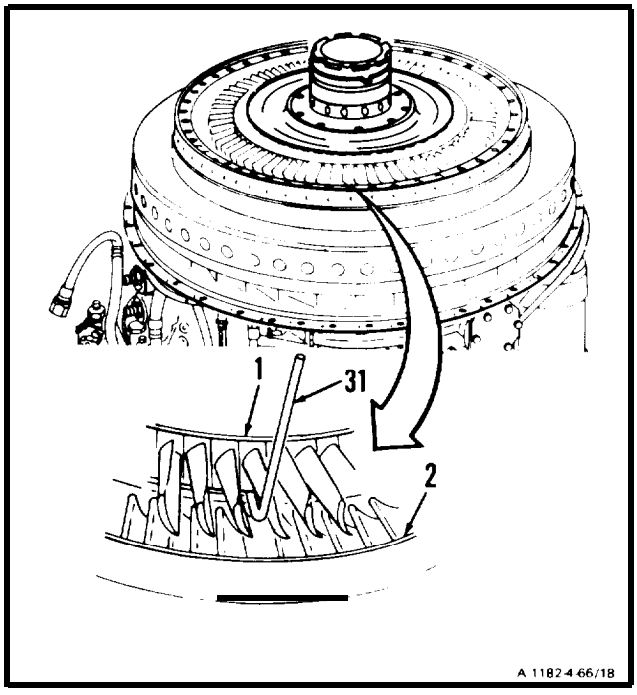


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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

11. **Check axial clearance between first turbine nozzle (2) and first turbine disc assembly (1).** Use bent wire gage (Appendix E) (31) inserted between first turbine nozzle (2) and first turbine disc assembly (1). **Clearance shall be 0.100 inch minimum.**

12. **If clearance is not proper, remove parts and recheck shim thickness (step 2).**



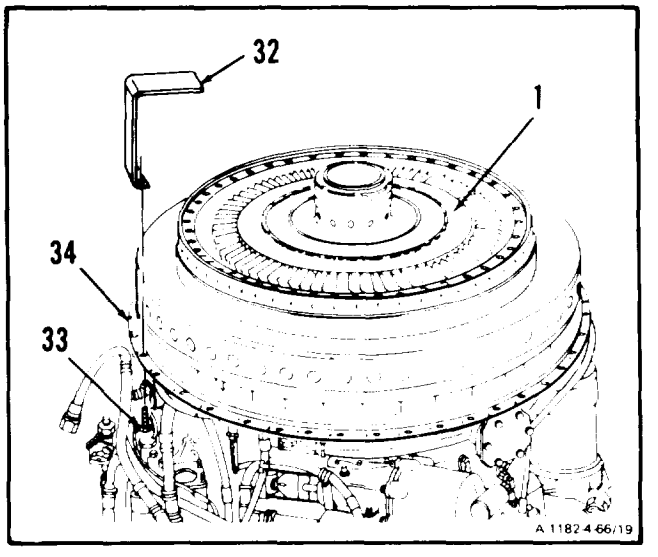
INSPECT

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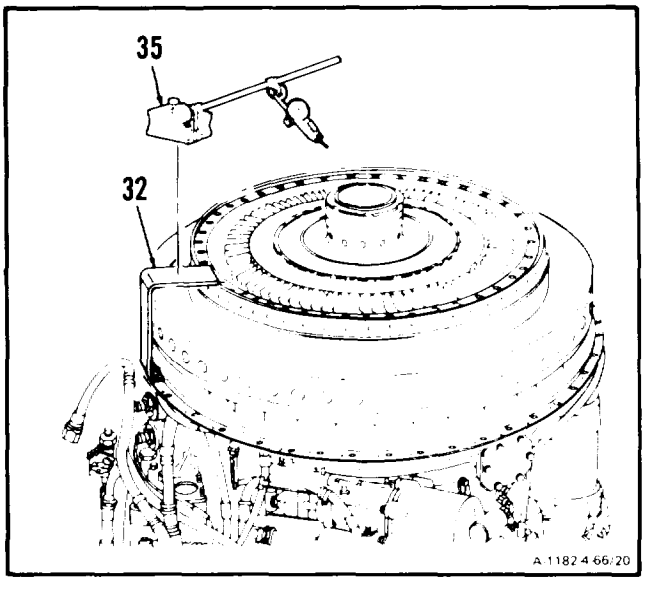
4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

13. **Check runout of first turbine disc assembly (1)** as follows:

a. Install dial indicator support (T27) (32) and three slave bolts, P/N STD3053-31 (33) on air diffuser (34).



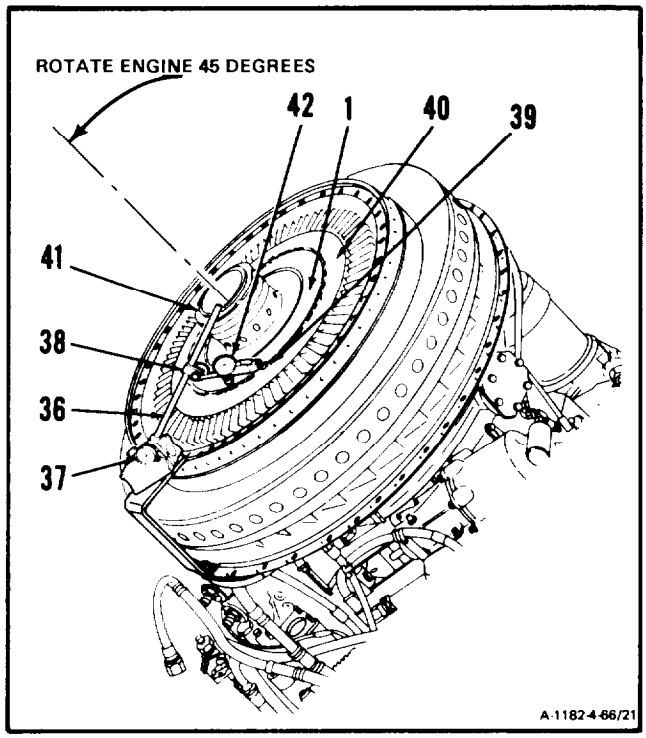
b. Place dial indicator and base (35) on support (T27) (32).



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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

c. Rotate engine to approximately 45 degrees.



NOTE

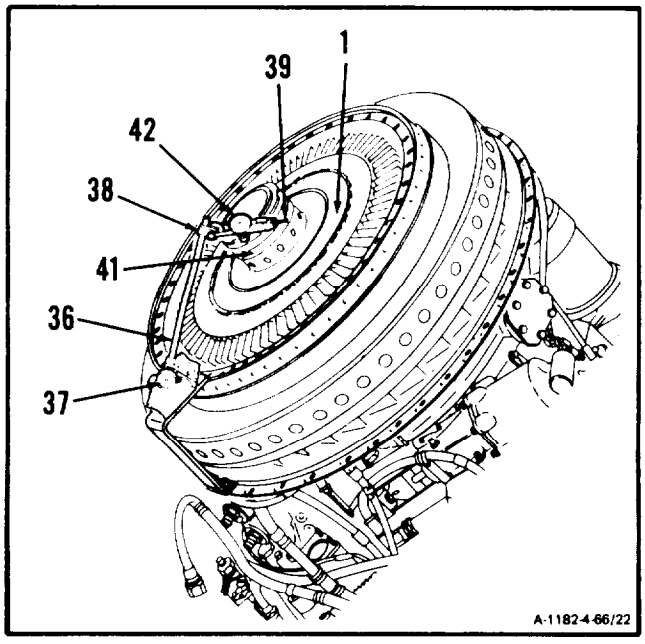
In following step d., be sure pointer is on disc rim and not on retaining plate.

d. Adjust arm (36) at base (37) and clamp (38) to position pointer (39) on outer surface (40) adjacent to blade roots.

NOTE

When checking runout, apply forward pressure to hub (41) to compensate for bearing internal clearance.

e. Zero indicator (42) and rotate first turbine disc assembly (1). Record dimension. Maximum allowable runout shall be 0.004 inch.



f. Adjust arm (36) at base (37) and clamp (38) position pointer (39) on hub (41).

g. Zero indicator (42) and rotate first turbine disc assembly (1). Record dimension. Maximum allowable runout shall be 0.002 inch.

NOTE

If dimensions recorded in steps 13.e. and 13.g. are not within limits, do following steps 14. thru 21. If dimensions recorded in steps 13.e. and 13.g. are within limits, omit steps 14 thru 21.

INSPECT

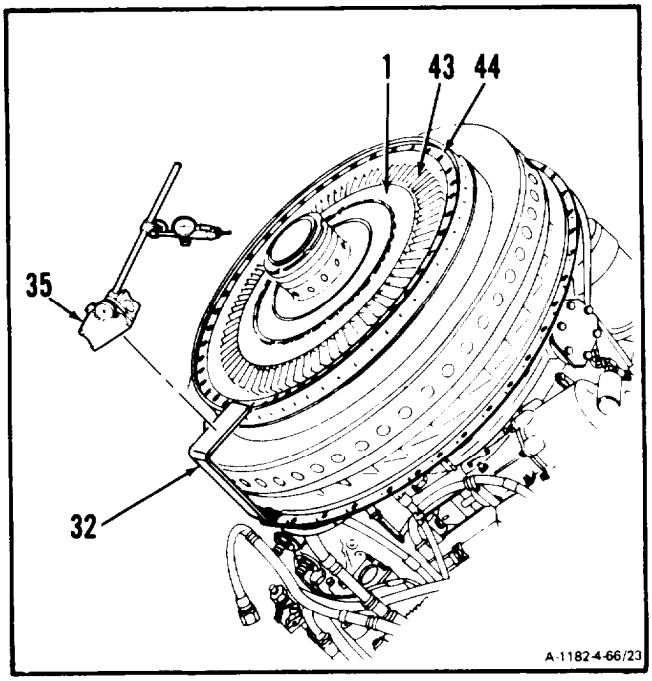
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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued)

14. **Remove dial indicator and bare (35)** and support (32).

15. Hold disc assembly (1) steady. **Draw a matchmark on a blade (43) and flange (44)** using marking pencil (E34).

16. **Remove first turbine disc assembly (1)** (Ref. Task 4-62).



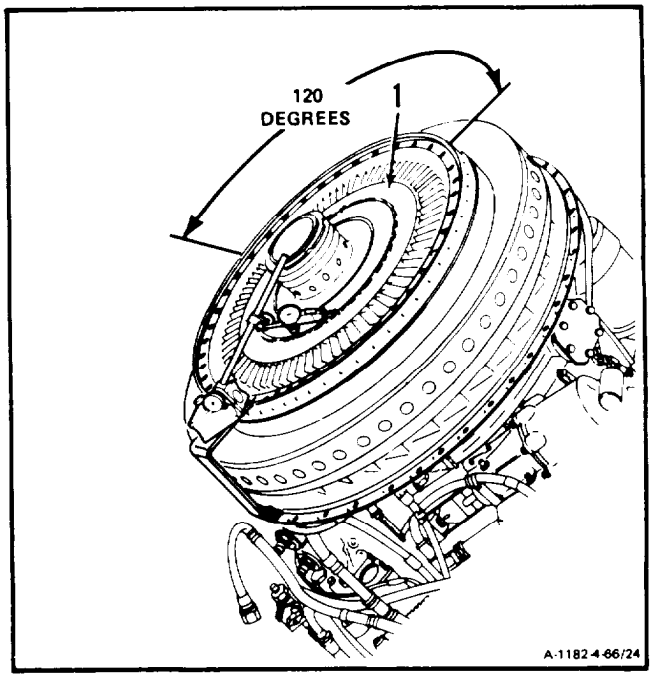
CAUTION

If following step brings dimensions within limits, matchmark on compressor shaft shall be relocated to align with first turbine disc. Failure to comply will result in out of balance condition of all gas producer parts.

17. **Install disc assembly (1) rotated approximately 120 degrees.** Repeat steps 4. thru 13.

18. If first turbine disc (1) is rotated so matchmarks do not align, erase old matchmark on compressor shaft. Remark matchmark on compressor shaft to align with matchmark on first turbine disc (1). Use marking pencil (E34).

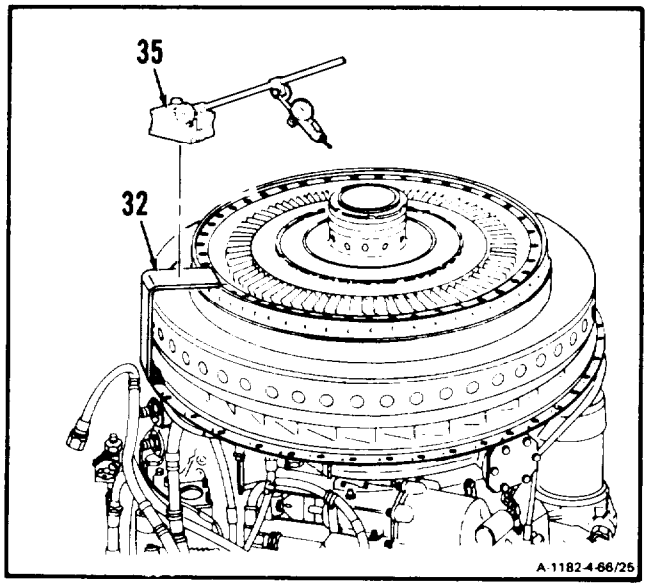
19. Rotate engine to vertical position.



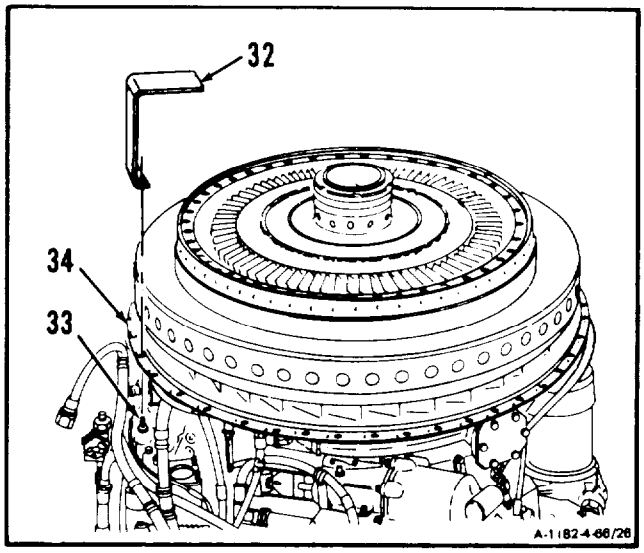
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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

20. **Remove dial indicator and base (35)** from support (32).



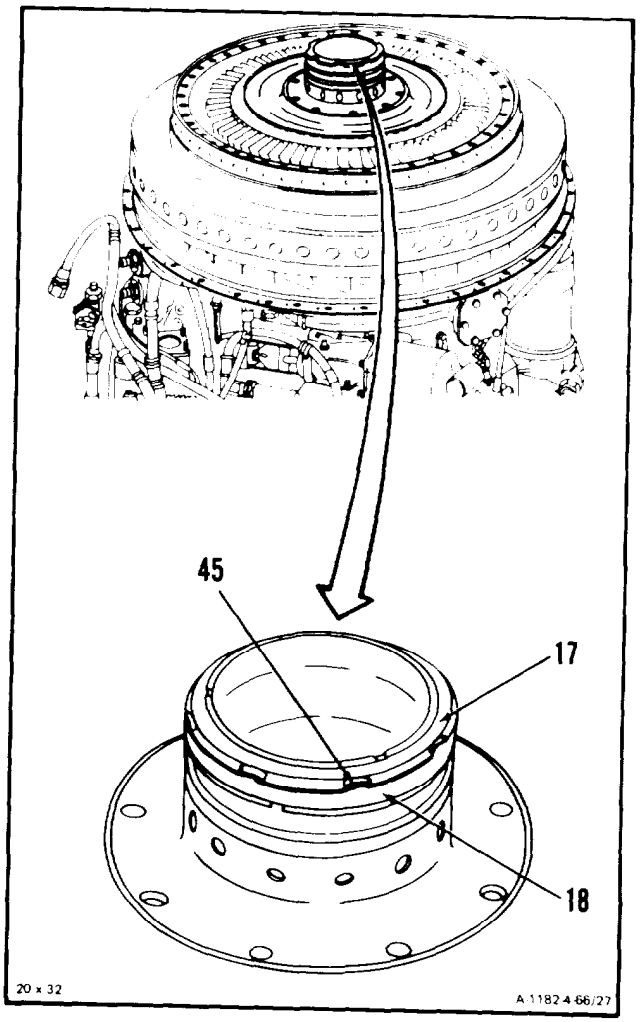
21. **Remove** three slave bolts (33) and **dial indicator support (32)** from air diffuser (34).



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4-66 INSTALL FIRST TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-66

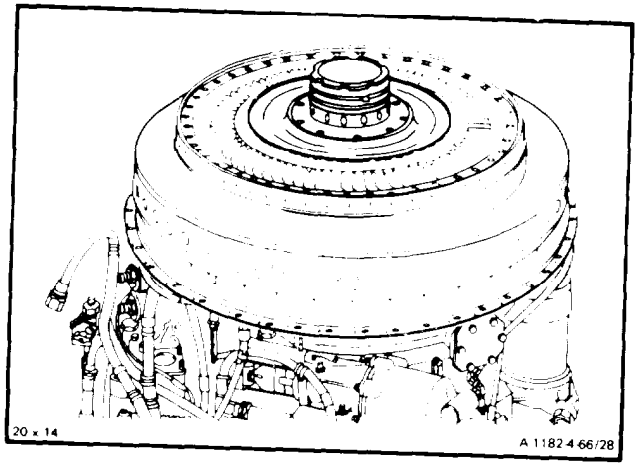
22. Bend washer (18) into two nut cutouts (45), 180 degrees apart, to **lock nut (17).**



INSPECT

FOLLOW-ON MAINTENANCE:

Install Second Turbine Nozzle, Spacer, and Case (Task 4-61).
Install Second Turbine Disc Assembly (Task 4-56).
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-67 REMOVE FIRST TURBINE NOZZLE (AVIM) 4-67

INITIAL SETUP

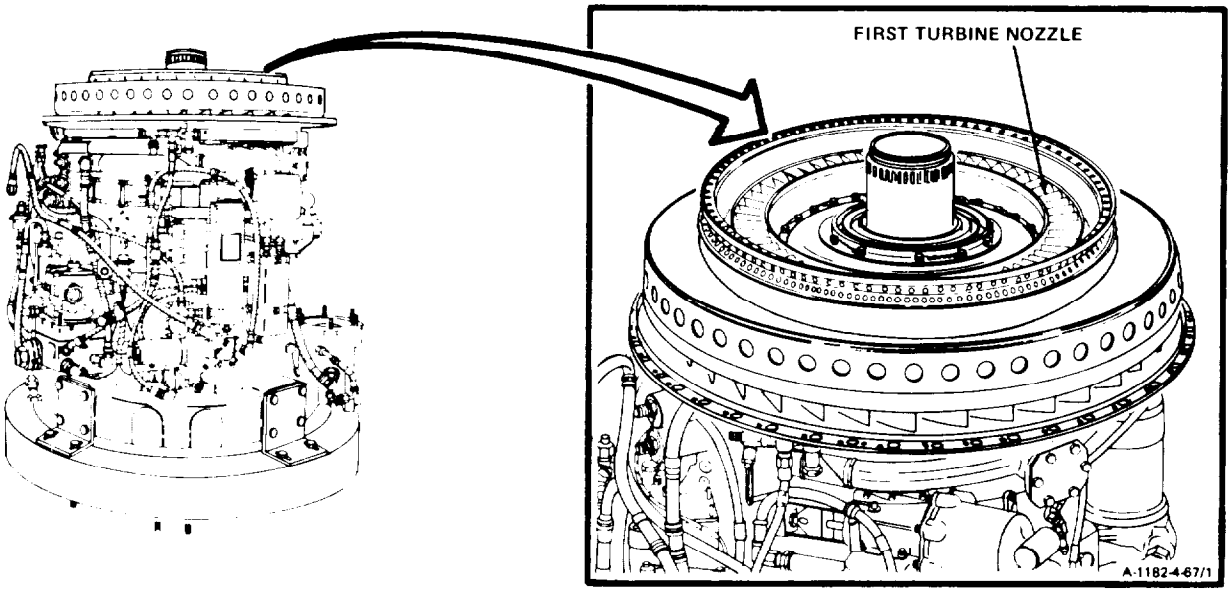
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

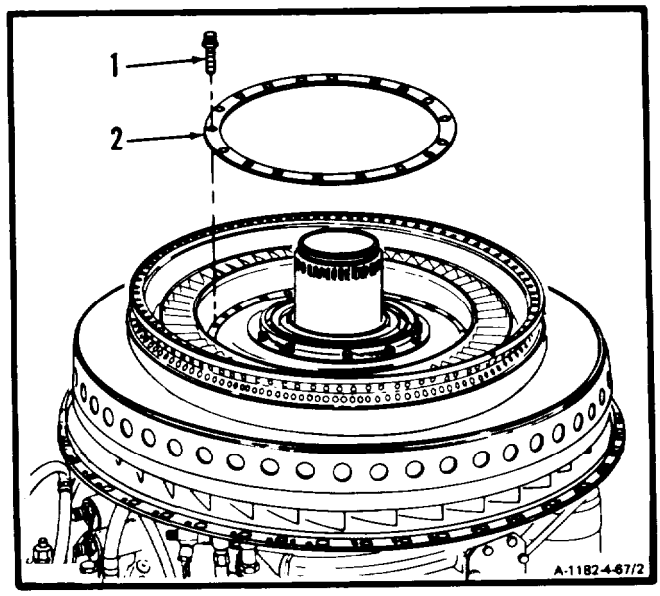
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)



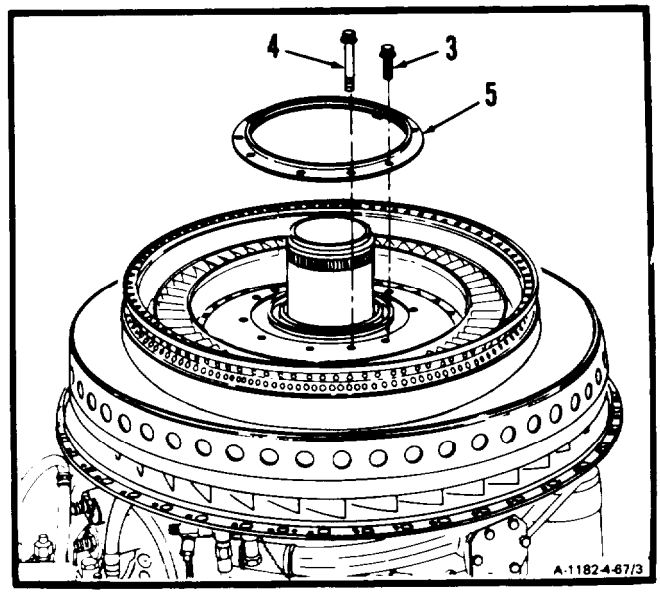
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4-67 REMOVE FIRST TURBINE NOZZLE (AVIM) (Continued) 4-67

1. Remove lockwire and 18 bolts (1).
2. Remove baffle retainer (2).



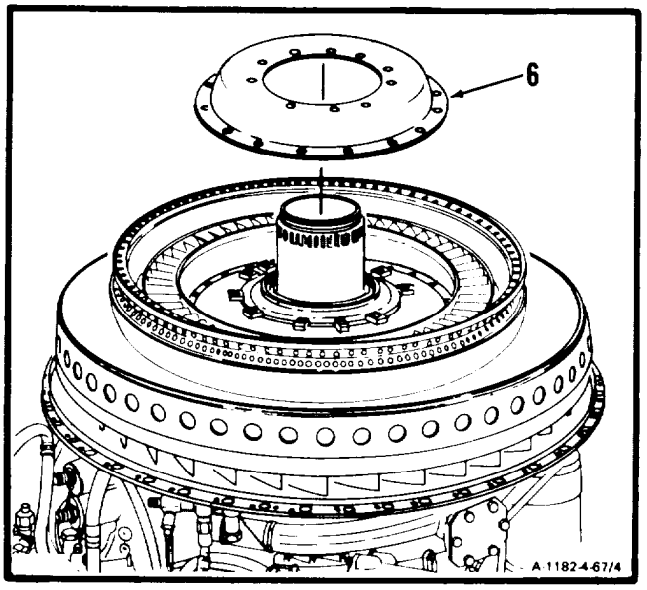
3. Remove lockwire, four bolts (3) and six bolts (4).
4. Remove seal (5).



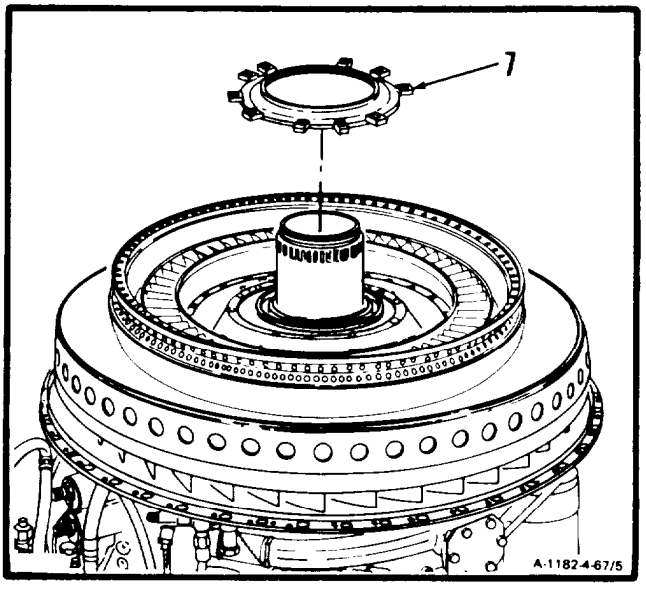
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4-67 REMOVE FIRST TURBINE NOZZLE (AVIM) (Continued)

5. **Remove baffle (6).**



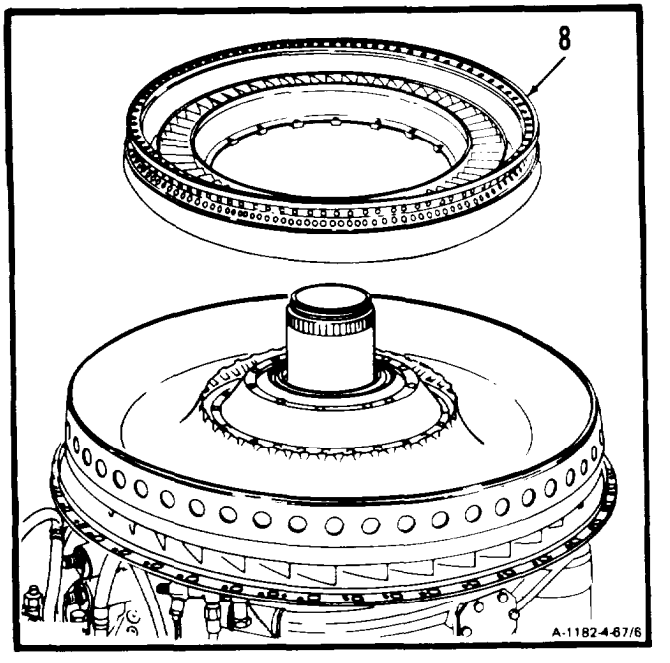
6. **Remove seal ring (7).**



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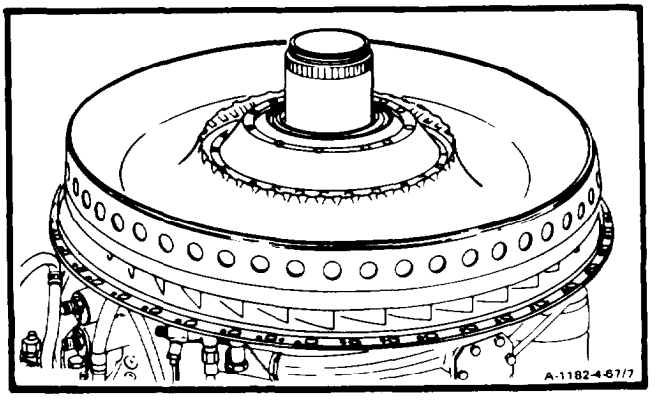
4-67 REMOVE FIRST TURBINE NOZZLE (AVIM) (Continued)

7. **Remove first turbine nozzle (8).**



FOLLOW-ON MAINTENANCE.

None



END OF TASK

4-68 CLEAN FIRST TURBINE NOZZLE (AVIM) 4-68

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)
First Turbine Nozzle Removed (Task 4-67)

General Safety Instructions:

WARNING

Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

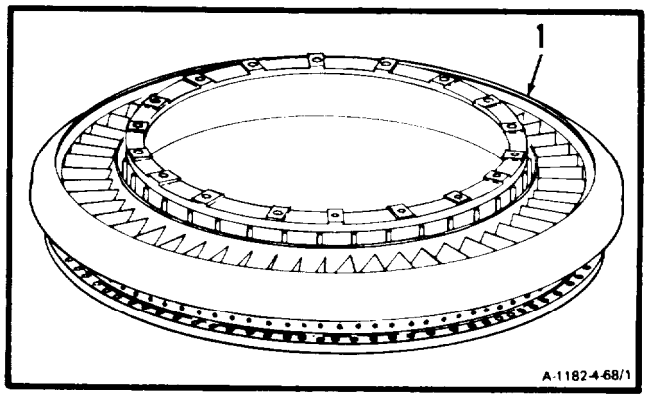
WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

1. **Clean first turbine nozzle (1)** as follows.

   a. Wear gloves (E20) and goggles. Use brush dampened in methyl ethyl ketone (E36).

   b. **Blow dry first turbine nozzle (1).** Use clean, dry compressed air.



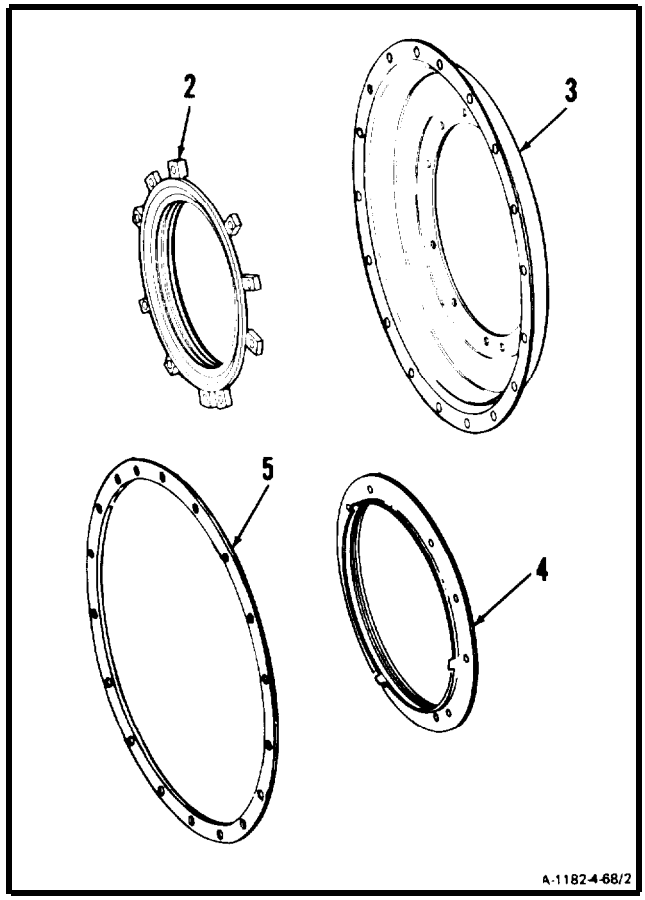
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4-68 CLEAN FIRST TURBINE NOZZLE (AVIM) (Continued) 4-68

2. **Clean seal ring (2), baffle (3), seal (4), and baffle retainer (5)** as follows:

   a. Use brush dampened in methyl ethyl ketone (E36).

   b. **Blow dry parts.** Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE.

Inspect First Turbine Nozzle (Task 4-69).

END OF TASK

4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) 4-69

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect first turbine nozzle (1)** as follows:

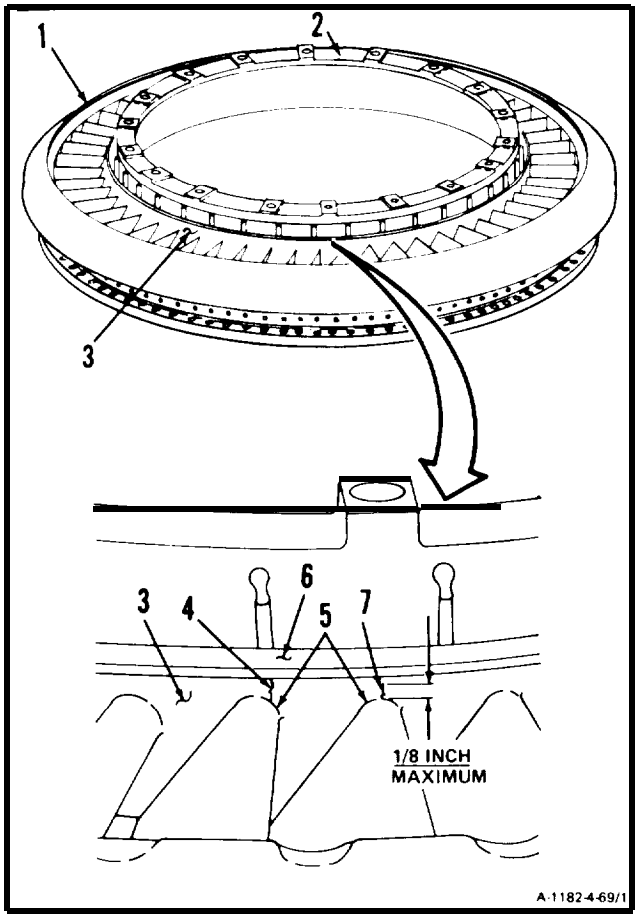
   a. There shall be no nicks or dents with sharp edges.

   b. **Inspect forward side (2)** as follows:

      (1) **Inspect inner shroud (3).**

         (a) There shall be no more than five cracks (4) extending from vane leading edge (5) to forward face (6).

         (b) There shall be no other cracks (7) from vane leading edge (5) longer than 1/8 inch.



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4-69 INSPECT FIRSTTURBINE NOZZLE (AVIM) (Continued) 4-69

(2) **Inspect 55 vanes (8).**

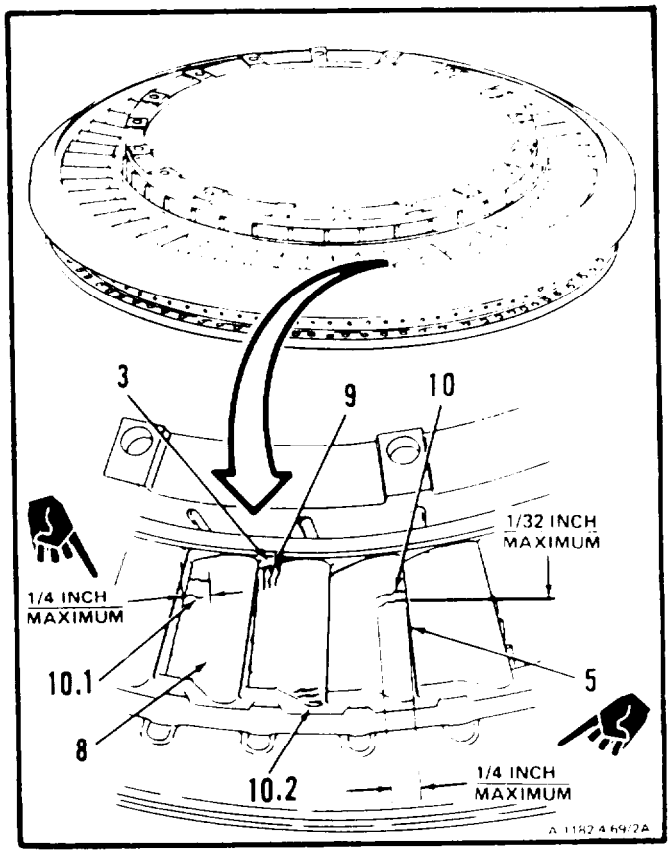
(a) There shall be no burning or loss of material.

(b) There shall be no more than three cracks (9) in any vane from inner shroud (3). There shall be no more than 25 vanes with these cracks (9).

(c) There shall be no cracks (10) from vane leading edge (5) wider than 1/32 inch.

(d) There shall be no chordial cracks on training edge (10.1) longer than 1/4 inch.

(e) Cracks in vane to shroud junction corner (10.2) are acceptable.



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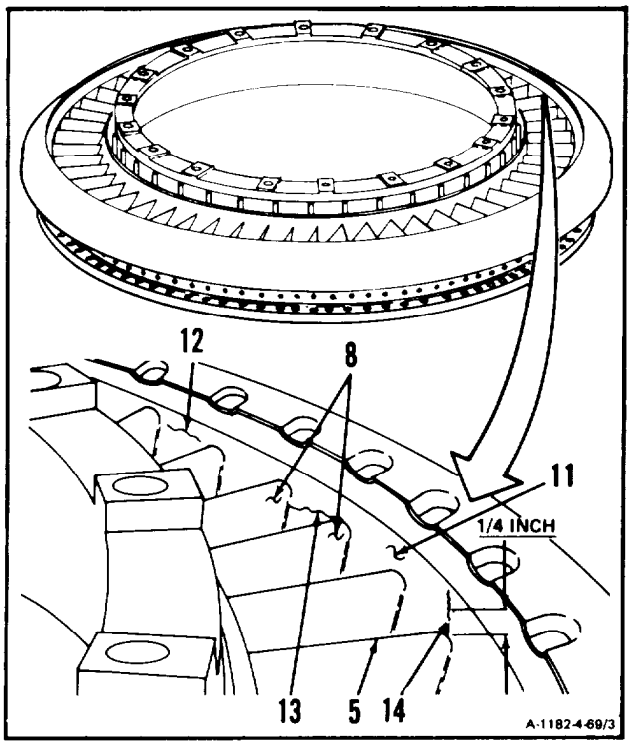
4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued) 4-69

(3) **Inspect outer shroud (11).**

(a) There shall be no circumferential cracks (12).

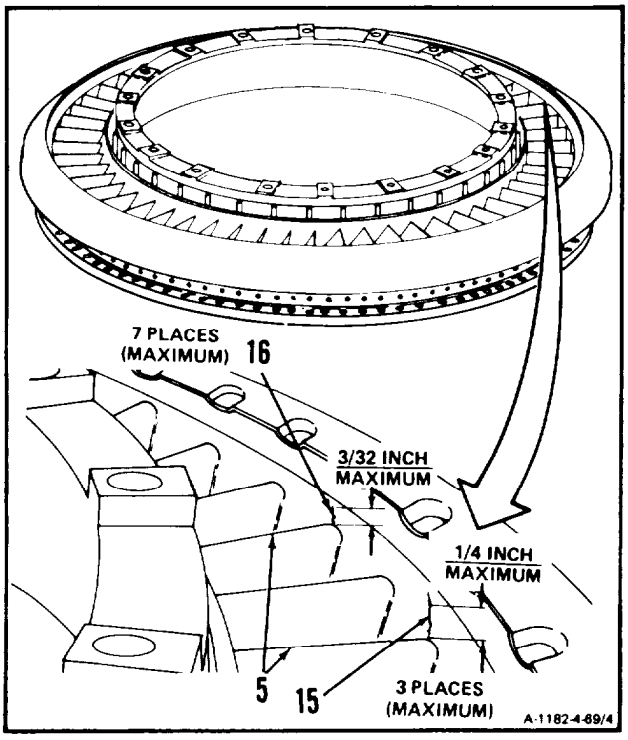
(b) There shall be no cracks (13) between vanes (8).

(c) There shall be no cracks (14) from vane leading edge (5) longer than 1/4 inch.



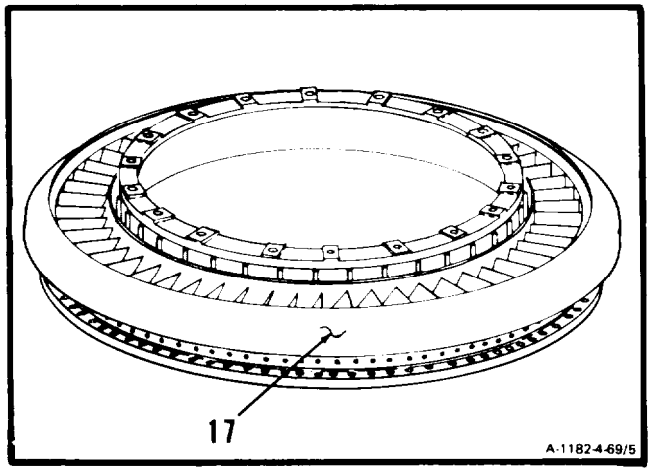
(d) There shall be no more than three cracks (15) longer than 3/32 inch.

(e) There shall be no more than seven additional cracks (16) from vane leading edge (5).



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(4) **Inspect curl (17).** There shall be no cracks.



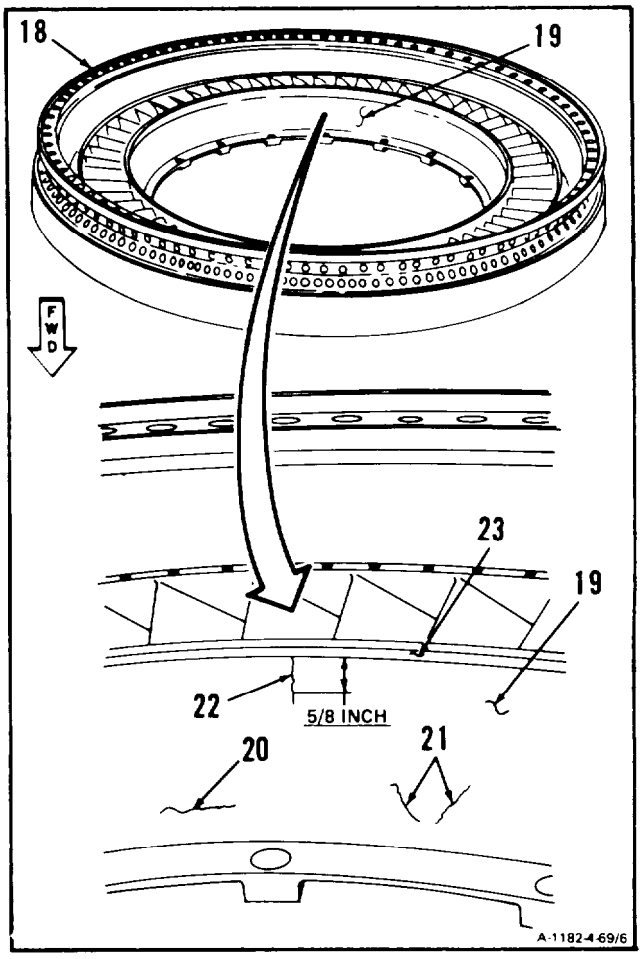
c. **Inspect aft side (18)** as follows.

(1) **Inspect inner flange (19).**

(a) There shall be no circumferential cracks (20).

(b) There shall be no converging cracks (21).

(c) There shall be no cracks (22) from aft face (23) longer than 5/8 inch.

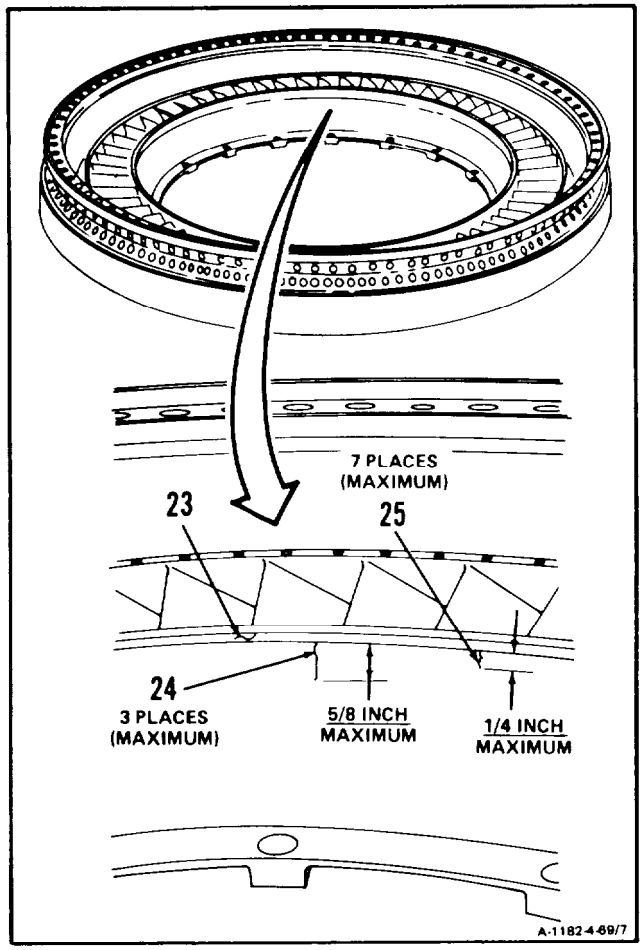


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4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued) 4-69

(d) There shall be no more than three cracks (24) longer than 5/8 inch,

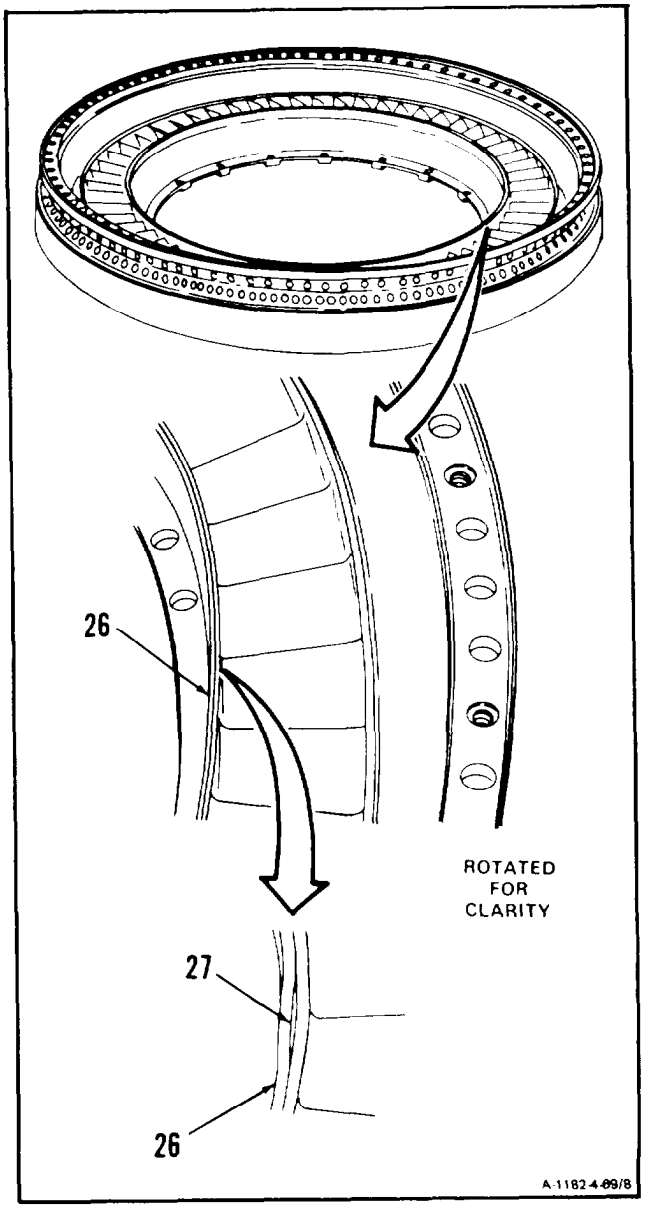
(e) There shall be no more than seven additional cracks (25) from aft face (23) longer than 1/4 inch.



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4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued)

(2) **Inspect braze joint (26).** There shall be no separation (27).



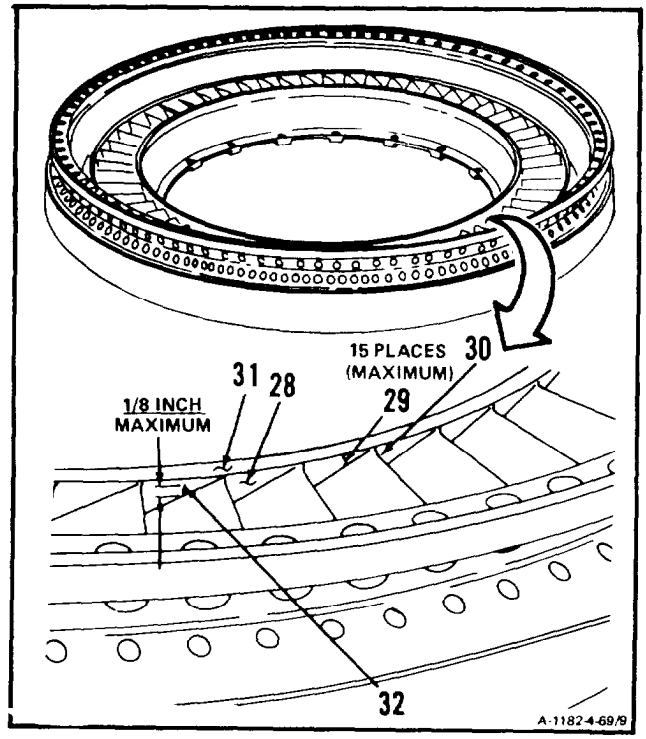
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4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued)

(3) **Inspect inner shroud (28).**

(a) There shall be no more than 15 cracks (29) extending from vane edge (30) to aft face (31).

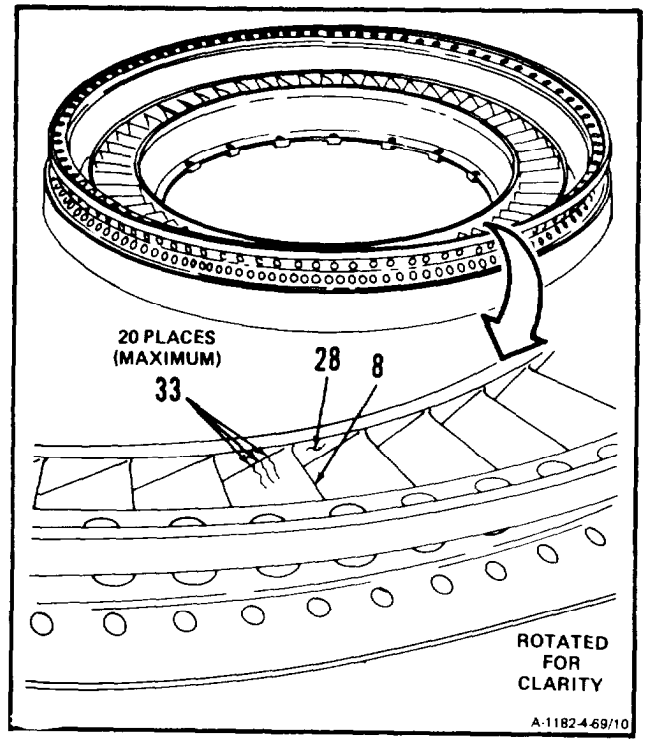
(b) There shall be no other cracks (32) from vane edge (30) longer than 1/8 inch.



(4) **Inspect 55 vanes (8).**

(a) There shall be no burning or loss of material.

(b) There shall be no more than three cracks (33) in any vane from inner shroud (28). There shall be no more than 20 vanes with these cracks (33).



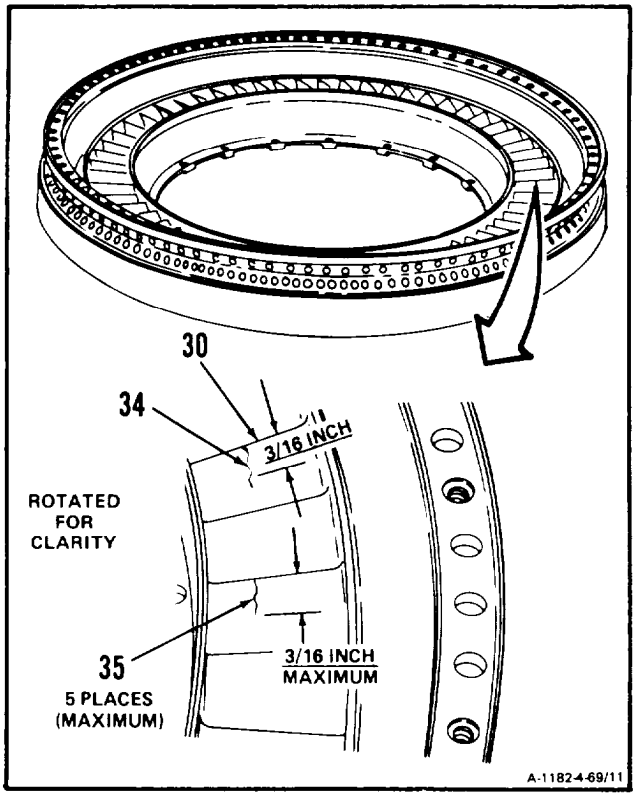
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4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued) 4-69

(c) There shall be no cracks (34) from vane edge (30) longer than 3/16 inch.

(d) There shall be no more than five vanes with cracks (35) up to 3/16 inch in length. These cracks (35) shall not be converging.

(e) There shall be no more than three cracks allowed per vane.



GO TO NEXT PAGE

4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued) 4-69

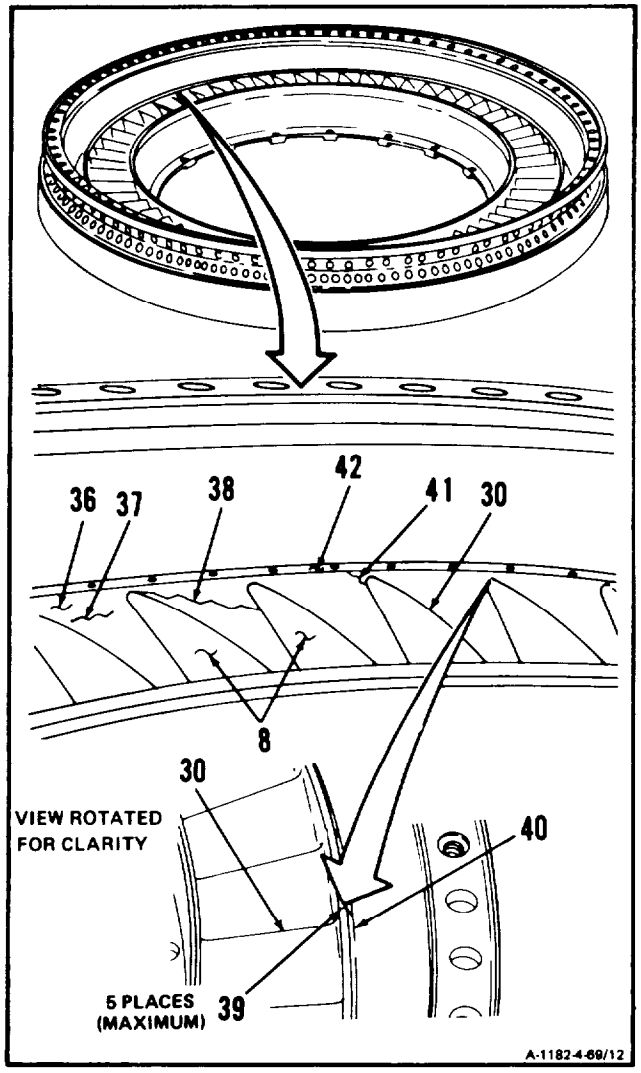
(5) **Inspect outer shroud (36).**

(a) There shall be no circumferential cracks (37).

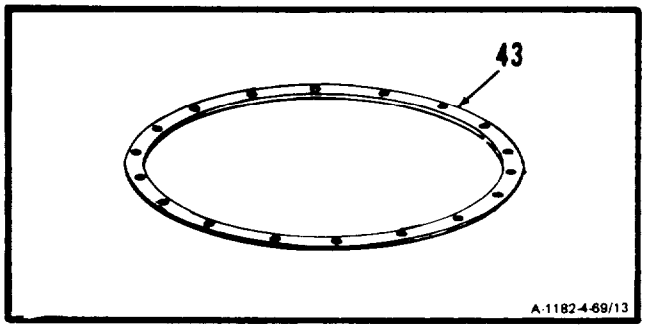
(b) There shall be no cracks (38) between vanes (8).

(c) There shall be no more than five cracks (39) extending from vane edge (30) to inner baffle radius (40).

(d) There shall be no more than ten additional cracks (41) extending from vane edge (30) to aft face (42).



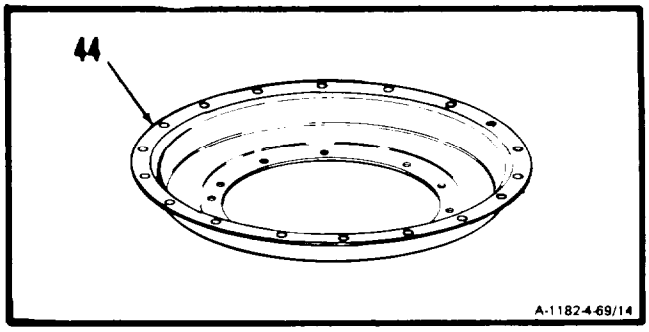
2. **Inspect baffle retainer (43).** There shall be no cracks.



GO TO NEXT PAGE

4-69 INSPECT FIRST TURBINE NOZZLE (AVIM) (Continued) 4-69

3. **Inspect baffle (44).** There shall be no cracks.



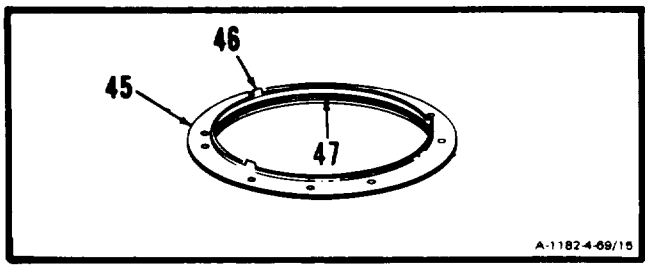
4. **Inspect seal (45)** as follows:

   a. Inspect seal (45). There shall be no cracks.

   b. Inspect tangs (46). They shall not be broken or bent.

NOTE

Sides of fins need not be parallel or straight. Waviness is permitted.



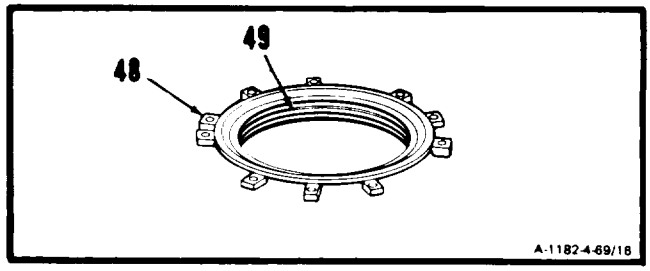
   c. Inspect fins (47). There shall be no rubbing or wear which causes fins to touch each other.

5. **Inspect seal ring (48)** as as follows:

   a. Inspect seal ring (48). There shall be no cracks.

NOTE

Sides of fins need not be parallel or straight. Waviness is permitted.



   b. Inspect fins (49). There shall be no rubbing or wear which causes fins to touch each other.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) 4-70

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Skimming Maintenance Kit (T32)
Sound Protector
Goggles
Vernier Caliper, 1-Inch
Vacuum Cleaner

Materials:
Emery Cloth (E18)
Lockwire (E29)
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B20 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
Task 4-61

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)

General Safety Instructions:

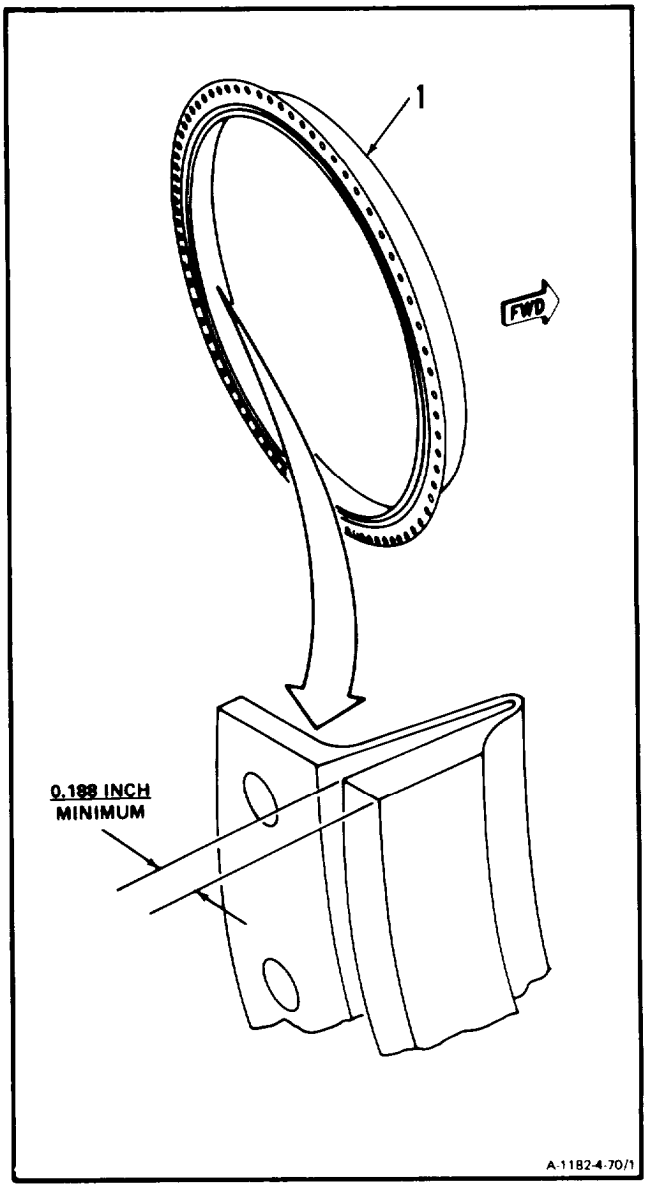
WARNING

Exposure to skimming maintenance kit noise may cause ringing in ears, and temporary or permanent hearing loss. When using skimming maintenance kit, wear approved hearing protection. If ringing in ears or loss of hearing persists, get medical attention.

GO TO NEXT PAGE

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

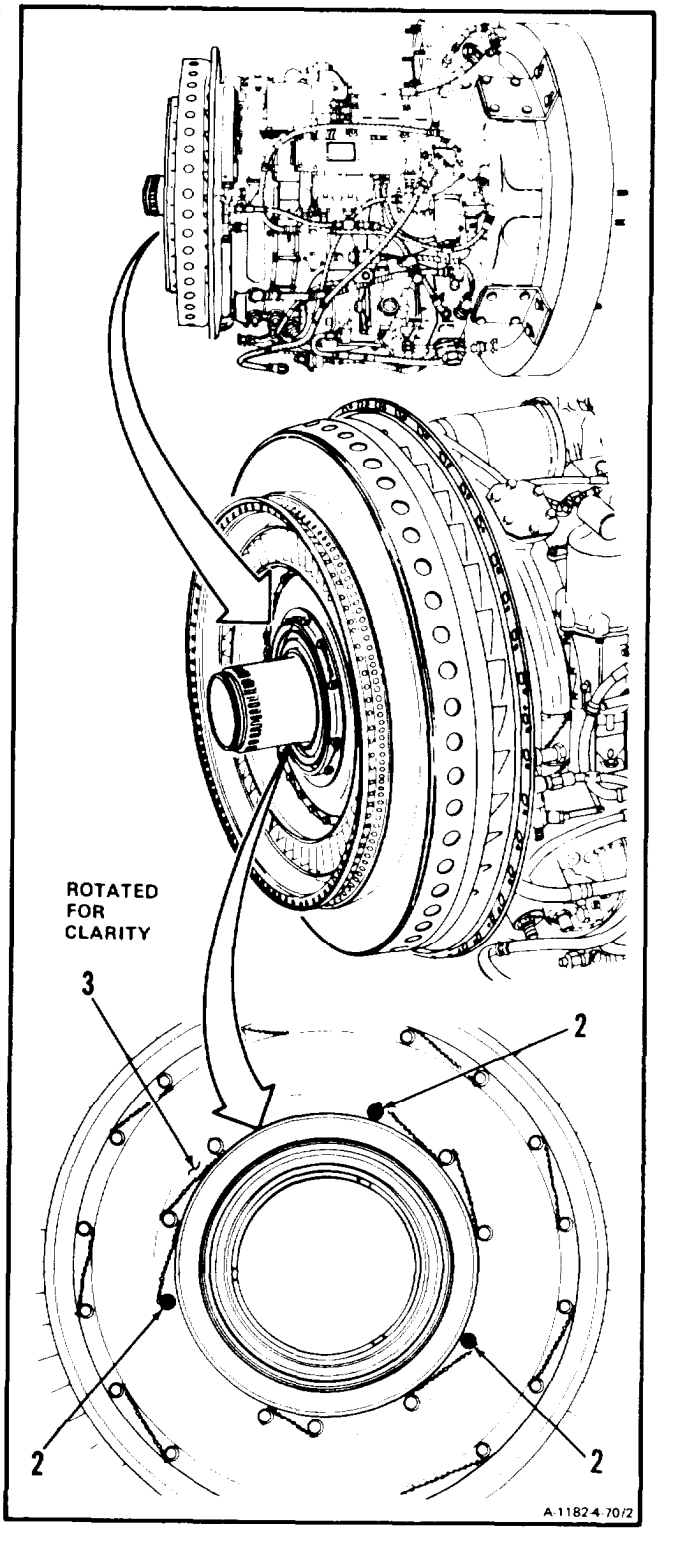
1. **Measure wall thickness of first turbine rotor case (1).** Use vernier caliper. If amount of material to be removed results in a wall thickness of less than 0.188 inch, replace case.



GO TO NEXT PAGE

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

2. **Remove** lockwire and **three bolts (2)** from baffle retainer (3).

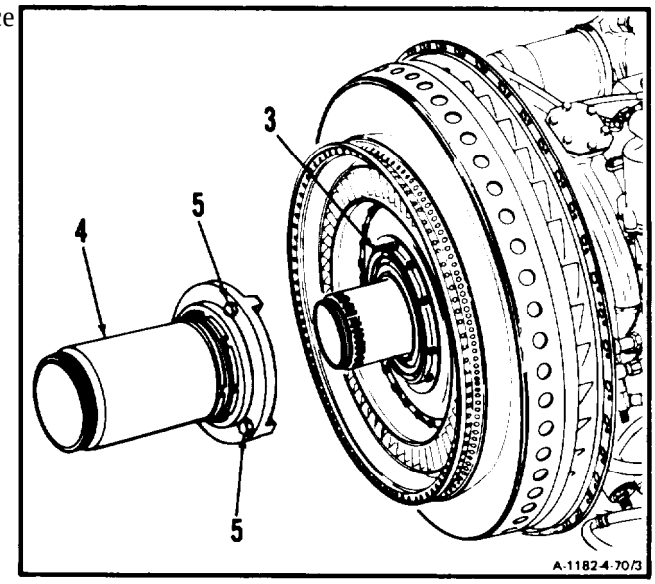


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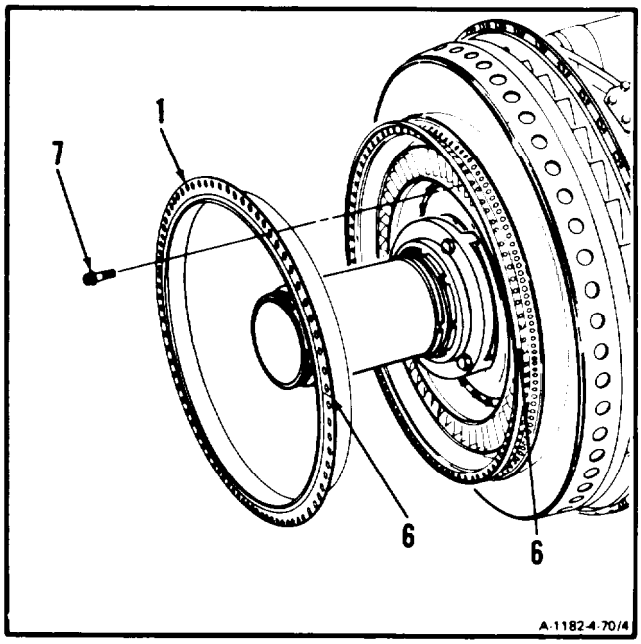
4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

3. **Install adapter (4),** part of skimming maintenance kit (T32), on baffle retainer (3).

4. Tighten three bolts (5).



5. Align matchmarks (6) and **install first turbine rotor case (1)** and 24 bolts (7).



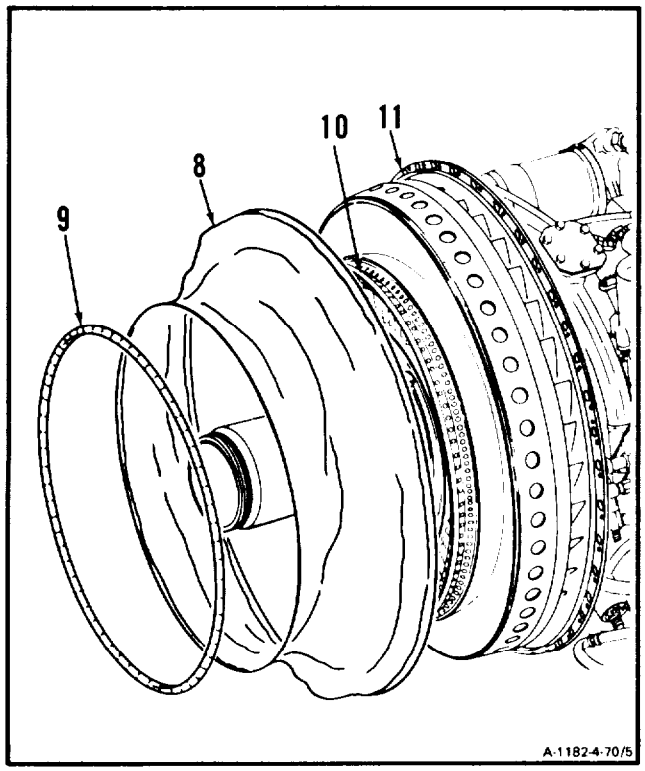
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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

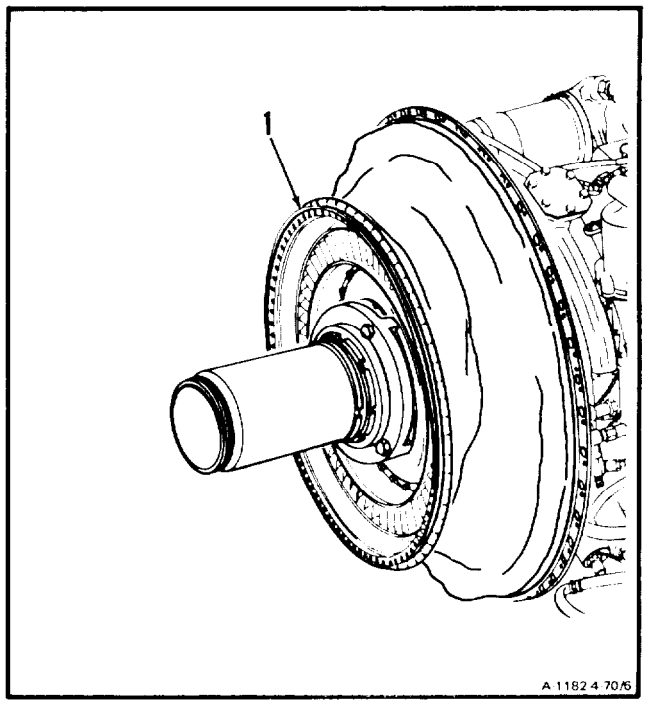
NOTE

In following step 6., difficulty may be encountered when installing cover due to tight fit of cover around air diffuser assembly. The tight fit is necessary to ensure that machining chips do not enter air diffuser assembly.

6. **Install protective cover (8) and spring (9),** part of skimming maintenance kit (T32), on first turbine nozzle (10) and air diffuser assembly (11).



7. Measure tip clearance (Ref. Task 4-61) and **mark case (1)** at the point of lowest tip clearance. Use marking pencil (E34).



GO TO NEXT PAGE

8. Subtract lowest tip clearance from MINIMUM required tip clearance (0.019 inch). Result is the amount of material to be removed from case (1).

Example:	
Minimum Tip Clearance Required	0.019 inch
Subtract Lowest Tip Clearance	0.015 inch
Amount of Material to be Removed	0.004 inch

NOTE

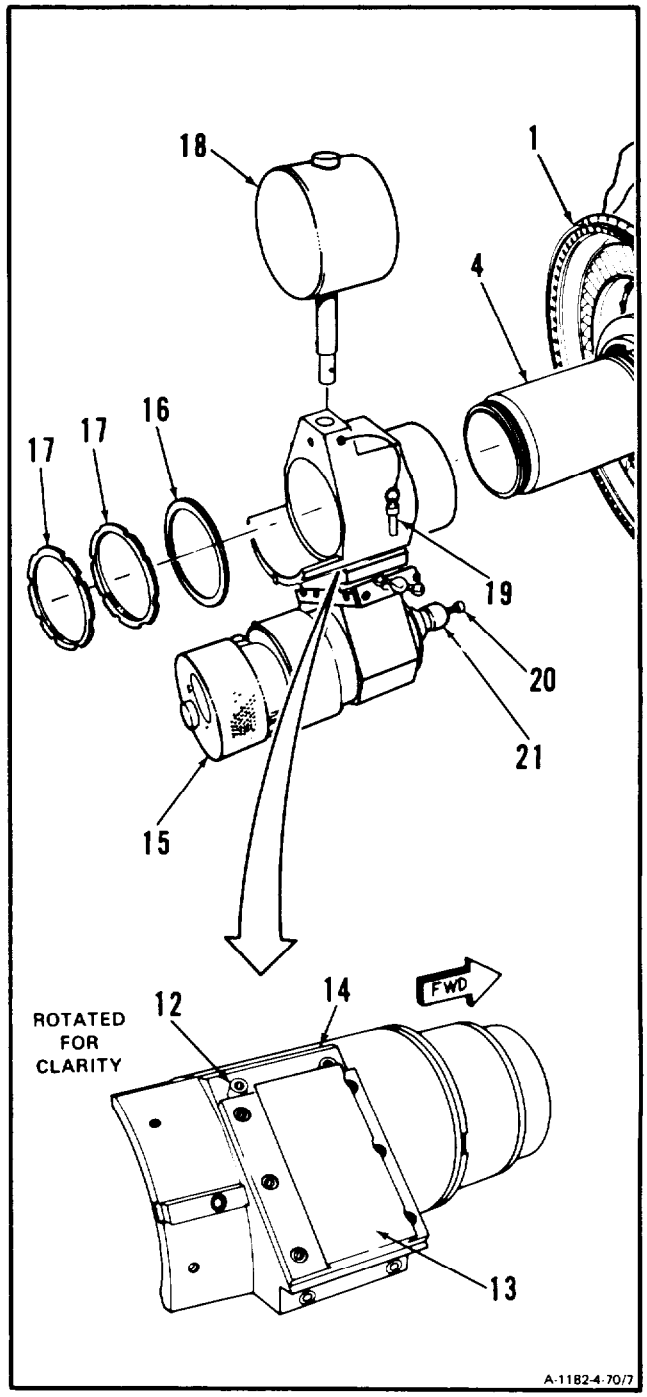
Check housing for position of support. Support must be installed at the forward position on housing. If support is not installed at the forward position on housing, perform step 9.

9. Remove four screws (12) and move support (13) to forward position on housing (14). Install four screws (12).

10. Use helper and **install milling machine (15),** part of skimming maintenance kit (T32), on adapter (4). Install washer (16) and two nuts (17) using spanner wrench, part of skimming maintenance kit (T32).

11. **Install counterweight (18)** and pin (19)

12. **Install cutter (20),** part of skimming maintenance kit (T32), **in collet (21).** Do not tighten collet (21).



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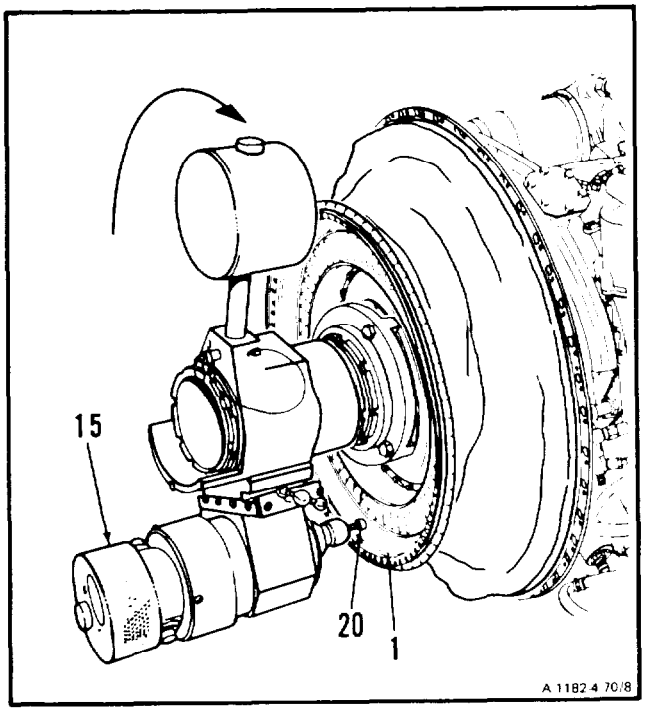
4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

13. **Rotate milling machine (15) clockwise** until front stop is reached.

CAUTION

In following step, do not allow cutter to project beyond forward edge of case. Failure to comply will cause damage to nozzle outer shroud during milling operation.

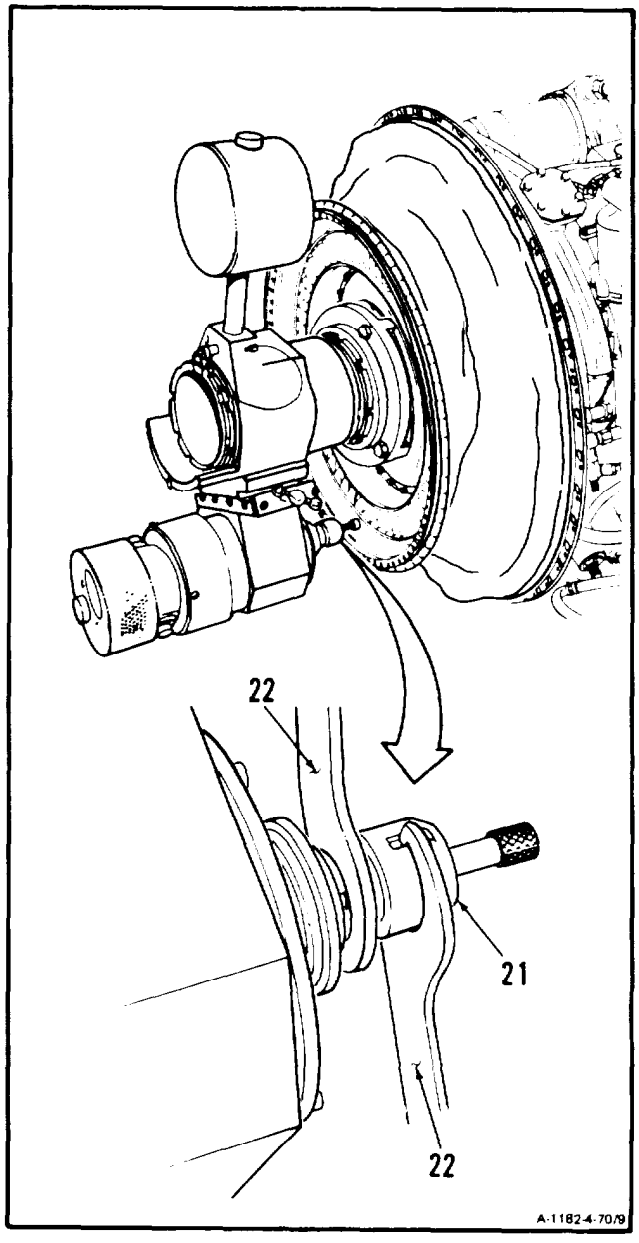
14. **Adjust cutter (20)** until forward edge of cutter reaches forward edge of case (1). Do not adjust cutter beyond this point.



GO TO NEXT PAGE

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

15. **Tighten collet (21)** with two spanner wrenches (22), part of skimming maintenance kit (T32).



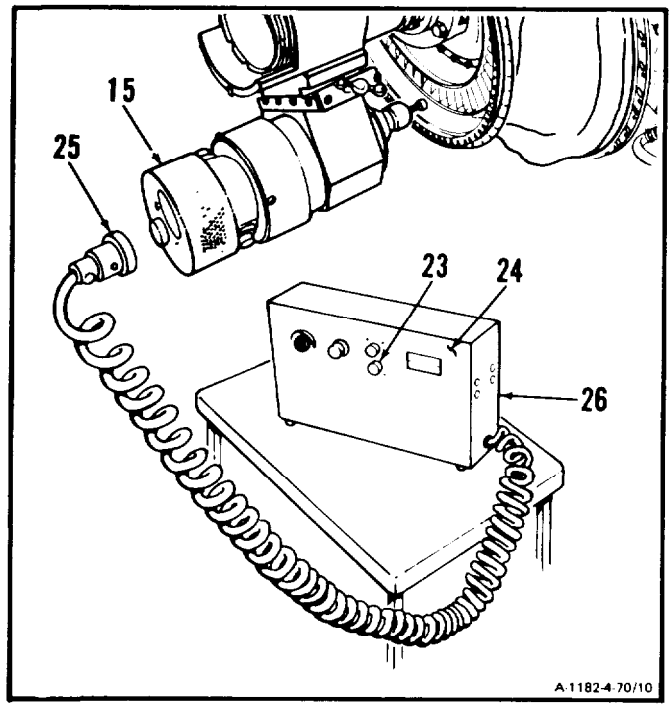
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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

16. **Press STOP button (23)** on control panel (24).

17. **Connect control box connector (25)** to milling machine (15).

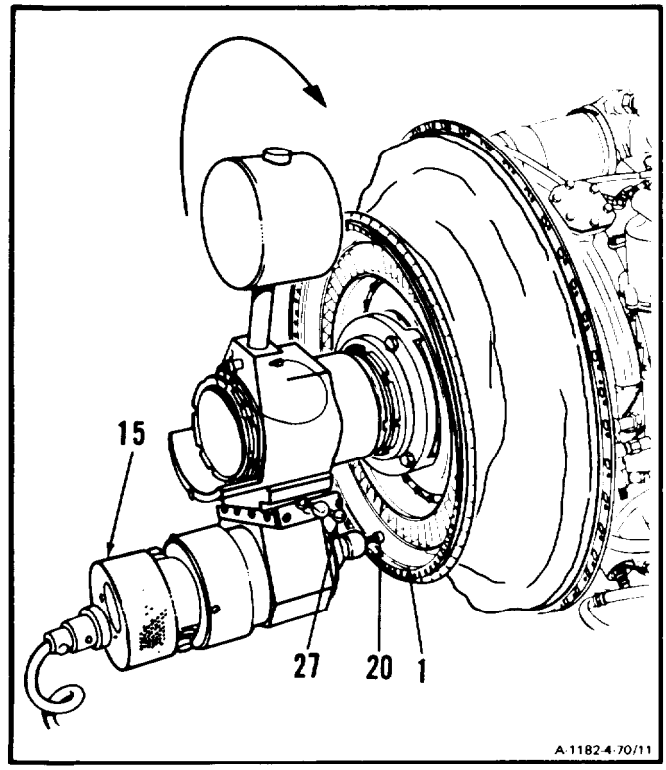
18. **Connect control box (26) to a 110 VAC power source.**



19. **Rotate milling machine (15) counterclockwise,** until cutter (20) is on mark that was recorded on case (1) in step 7.

20. **Turn adjusting knob (27)** on milling machine (15) until cutter (20) just makes contact with case (1) inner diameter.

21. **Rotate milling machine (15) clockwise** until front stop is reached.



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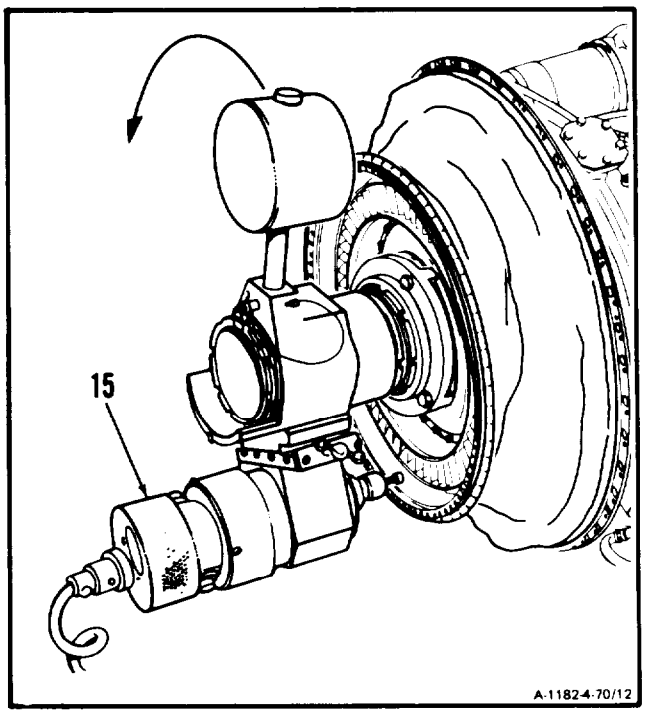
4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

NOTE

In following step, ensure that no binding occurs when milling machine returns to rear stop.

22. **Rotate milling machine (15) counterclockwise** until rear stop is reached.

23. If binding occurs, repeat step 20, at area where binding occured.



GO TO NEXT PAGE

4-70 REPAIR OF FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

WARNING

Keep hands and clothing away from rotating parts. Contact with rotating parts could cause injury. If injury occurs, get medical attention.

WARNING

Exposure to skimming maintenance kit noise may cause ringing in ears, and temporary or permanent hearing loss. When using skimming maintenance kit wear approved hearing protection. If ringing in ears or loss of hearing persists, get medical attention.

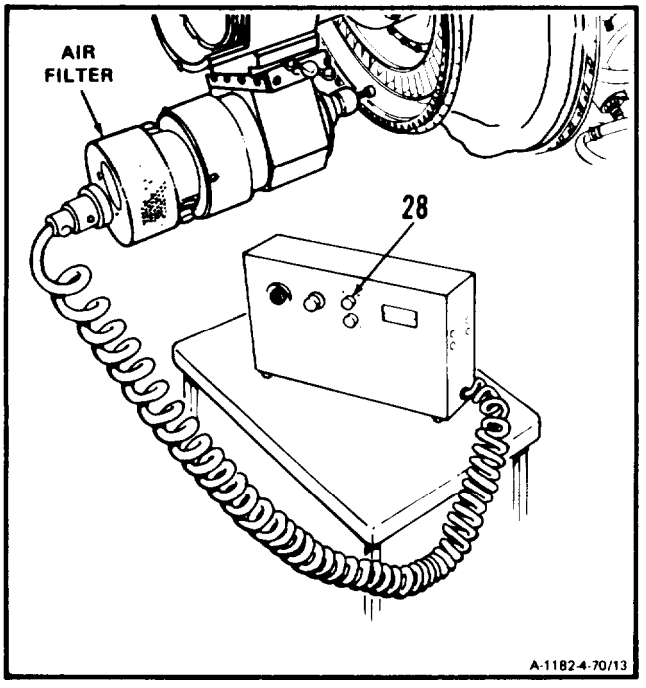
CAUTION

Make sure air filter of milling machine is unblocked at all times during operation. Failure to comply will reduce flow of cooling air through the motor.

NOTE

In following step, allow motor to run for 15 seconds to reach operating speed

24. Wear goggles and sound protector. **PressSTART button (28).**



GO TO NEXT PAGE

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued)

CAUTION

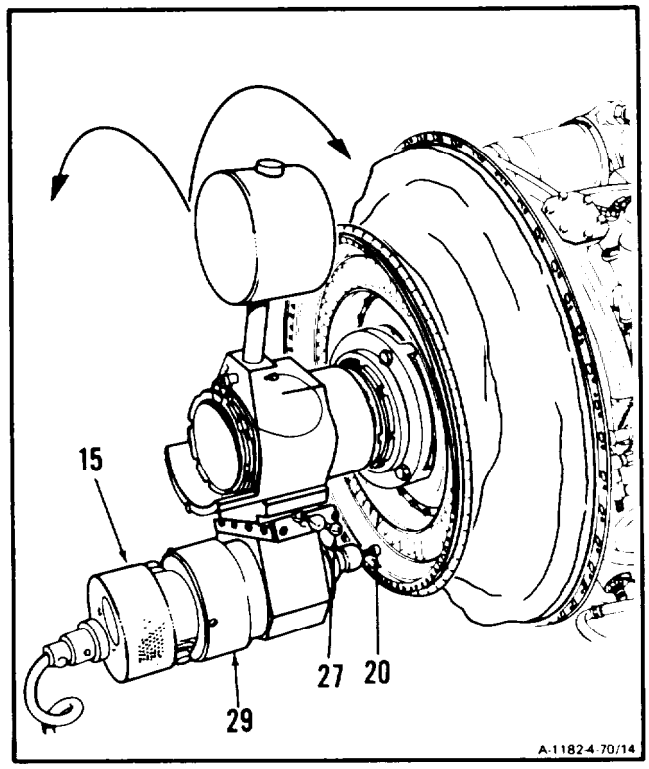
In following step, do not stop rotation during the clockwise or counterclockwise movement until stops are reached. Stopping cutter before stops are reached may cause deep gouges or chatter marks in case

25. Place hands on collar (29) and **rotate milling machine (15) clockwise** until front stop is reached and immediately rotate milling machine (15) counterclockwise until rear stop is reached.

CAUTION

Do not advance cutter more than one increment for any cut. All clockwise and counterclockwise rotations must be made slowly and without stopping.

26. **Turn adjusting knob (27) one increment clockwise.** One increment clockwise advances cutter (20) radially 0.001 inch.



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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

27. Deleted.

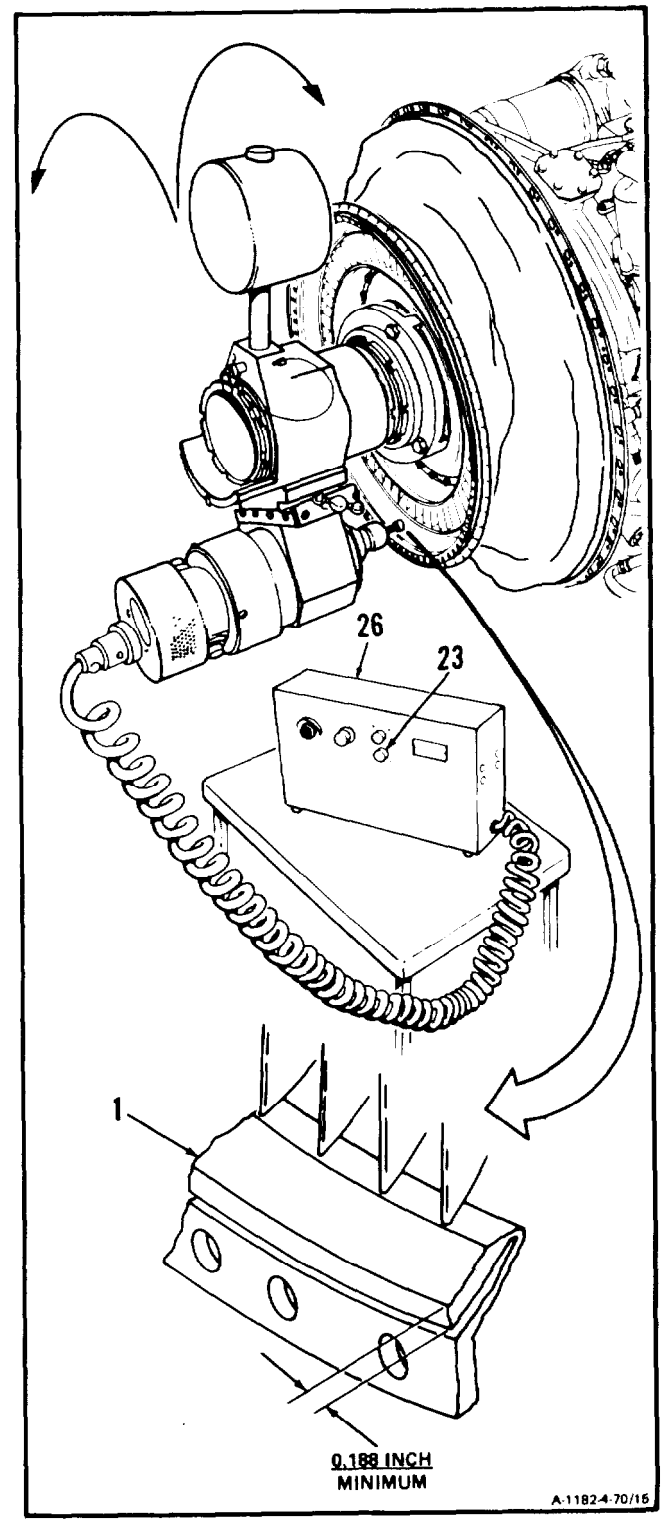
28. Continue to repeat steps 25. and 26. until amount of material which was determined in step 8. is completely removed.

29. **Press STOP button (23).**

30. **Unplug control box (26)** from electrical power source.

31. **Remove** any **burrs** from inside of case (1). Use fine emery cloth (E18).

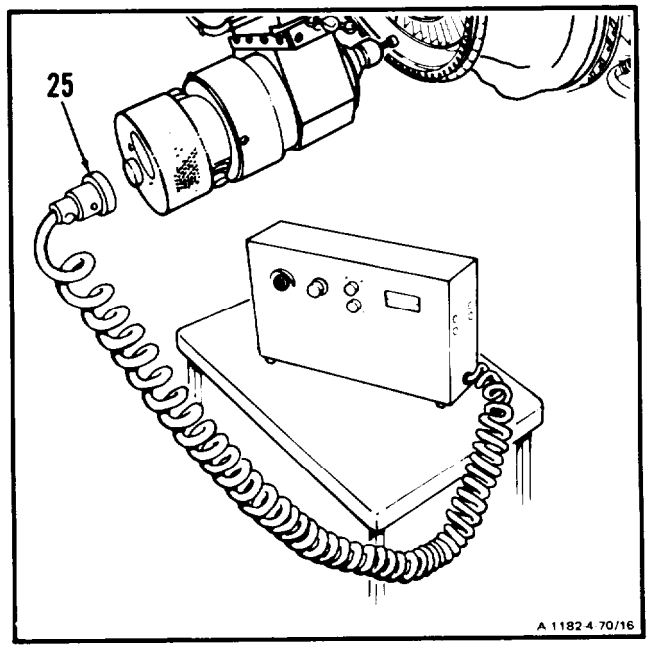
32. **Measure wall thickness of case (1).** Wall thickness shall not be less than 0.188 inch.



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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

33. **Disconnect connector (25).**

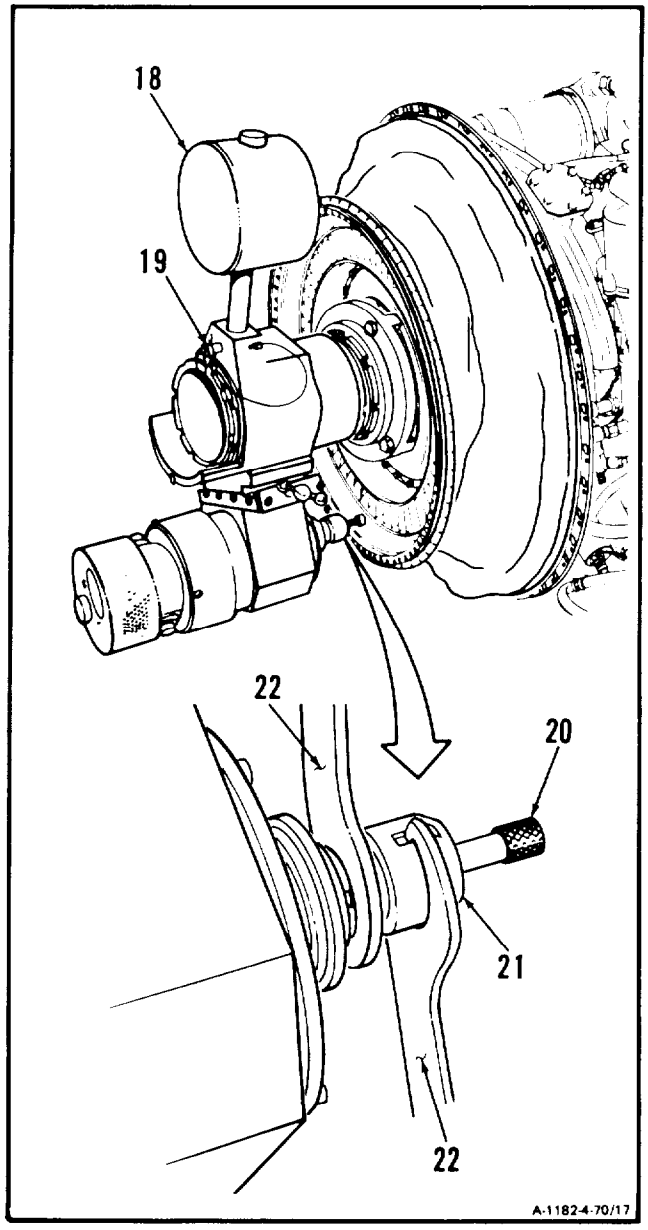


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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

34. **Remove cutter (20)** from collet (21), using two spanner wrenches (22), part of skimming maintenance kit (T32).

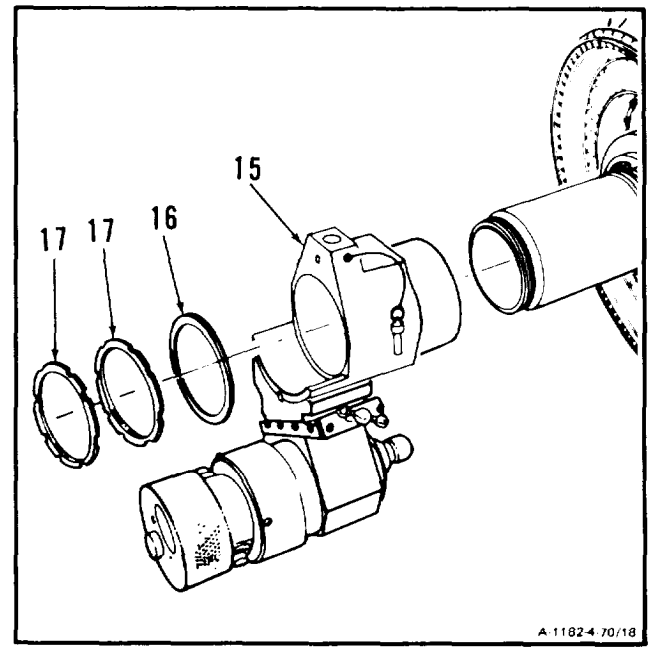
35. Pull pin (19) and **remove counterweight (18).**



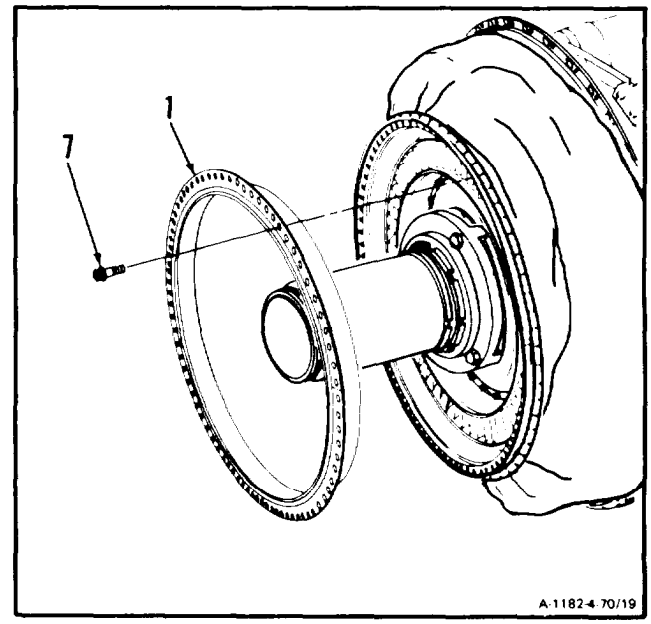
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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

36. Using spanner wrench, part of skimming maintenance kit (T32), remove two nuts (17) and washer (16). Using helper, **remove milling machine (15).**



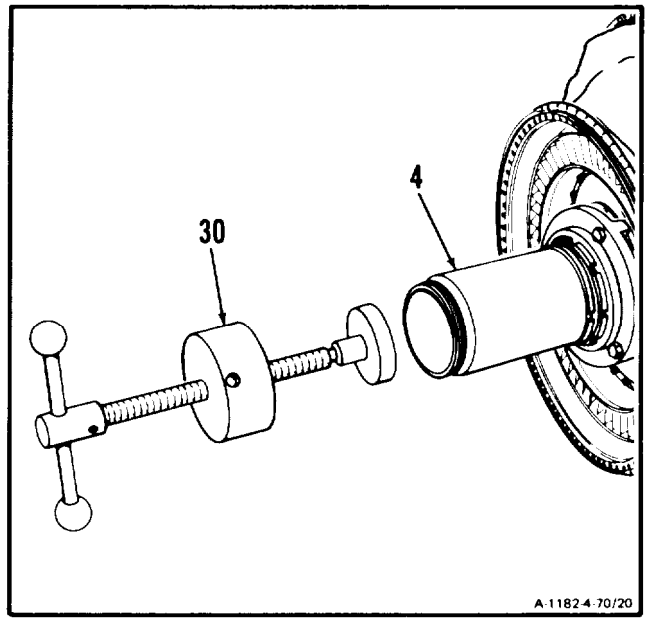
37. **Remove** 24 bolts (7) and **first turbine rotor case (1).**



GO TO NEXT PAGE

4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

38. **Install mechanical puller (30),** part of skimming maintenance kit (T32) on adapter (4). Tighten puller until it bottoms on adapter (4).

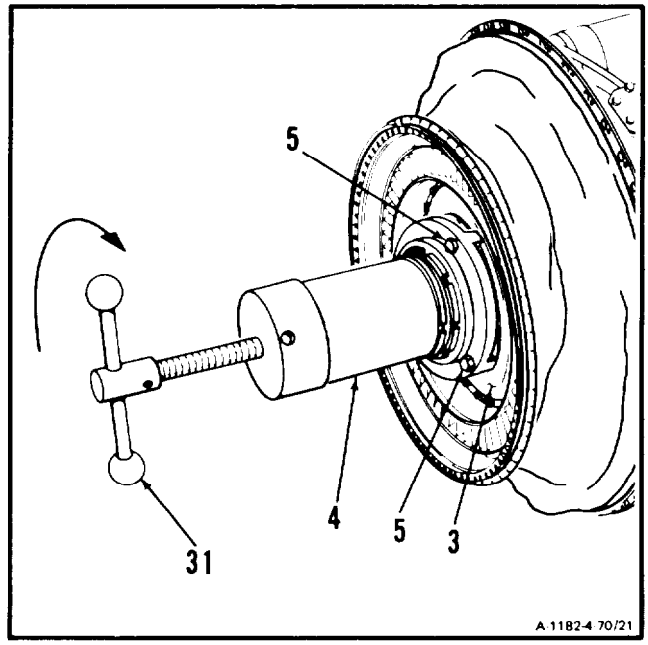


39. Loosen three bolts (5) until they are free of baffle retainer (3).

CAUTION

In following step, support adapter while it is being removed. Failure to comply will cause damage to first turbine nozzle.

40. **Turn handle (31) clockwise until adapter (4) is removed.**



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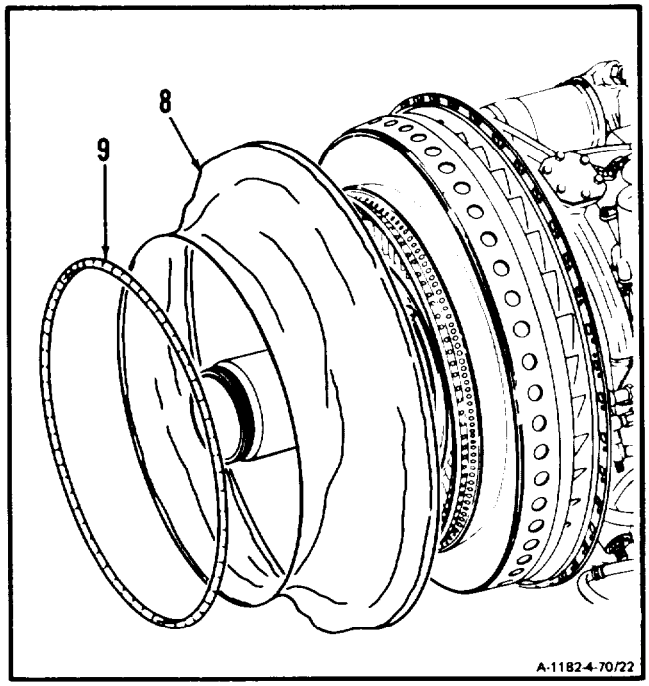
4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued)

NOTE

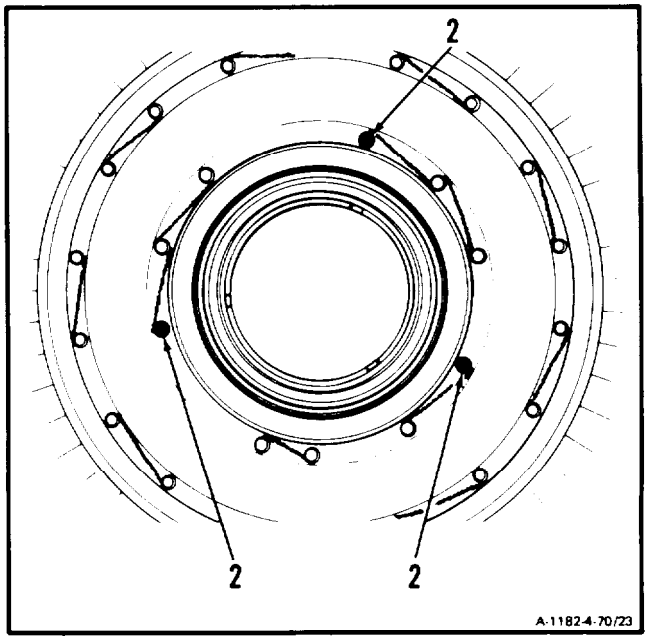
In following step 41., difficulty may be encountered when removing cover due to tight fit of cover around air diffuser assembly. The tight fit is necessary to ensure that machining chips do not enter air diffuser assembly.

41. **Remove spring (9) and cover (8).**

42. Use vacuum cleaner to **remove metal particles.**



43. Install three bolts (2). Lockwire bolts (2). Use lockwire (E29).



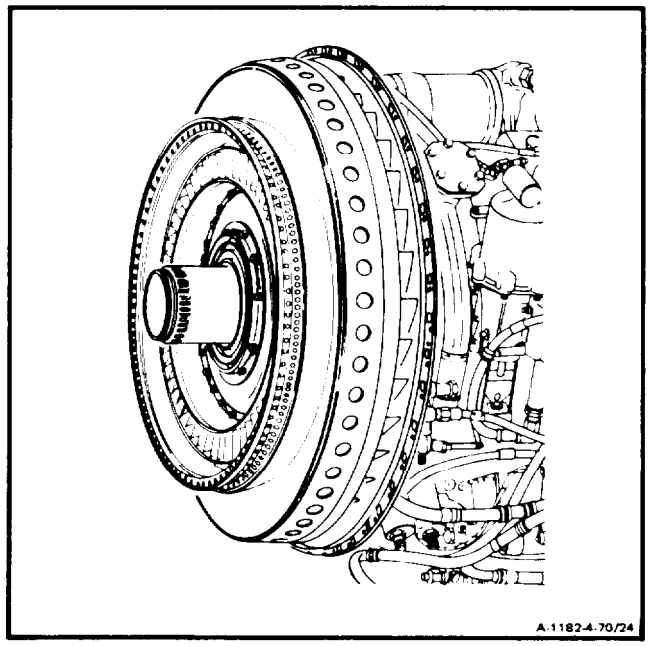
INSPECT

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4-70 REPAIR FIRST TURBINE ROTOR CASE (AVIM) (Continued) 4-70

FOLLOW-ON MAINTENANCE:

Install First Turbine Disc Assembly (Task 4-66).
Install Second Turbine Nozzle, Spacer, and Case (Task 4-61).
Install Second Turbine Disc Assembly (Task 4-56)
Install Combustion Section and Power Turbine (Task 3-8).
Service Engine Oil System (Task 1-74).



END OF TASK

4-71 INSTALL FIRST TURBINE NOZZLE (AVIM)

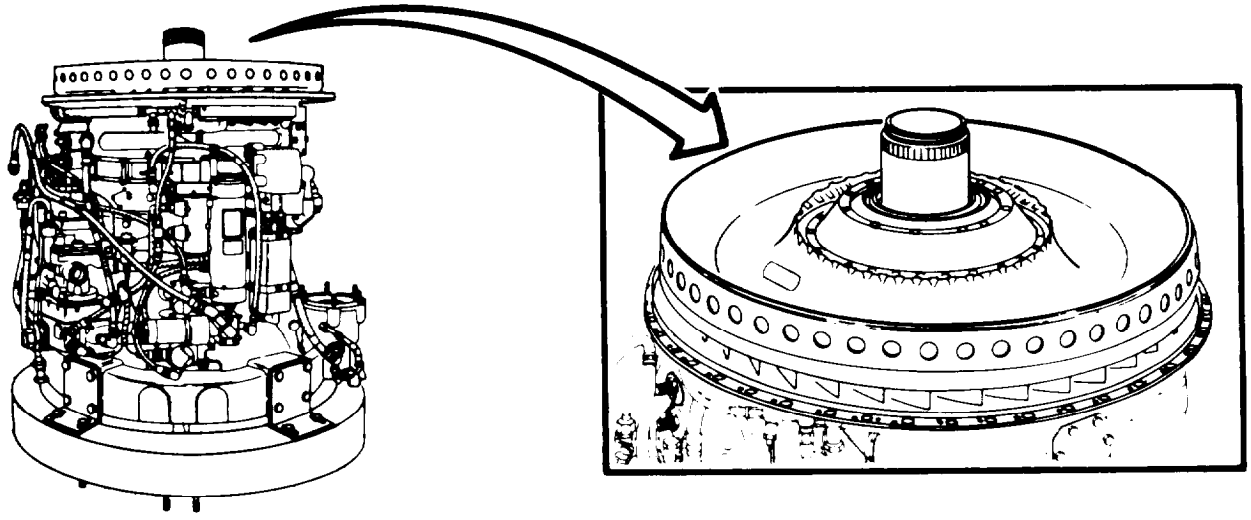
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Anti-Seize Compound (E5)
Lockwire (E29)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

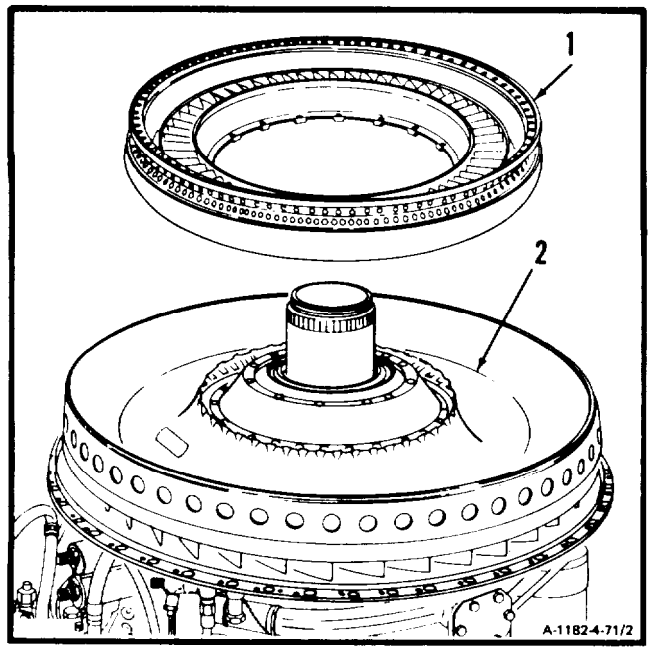


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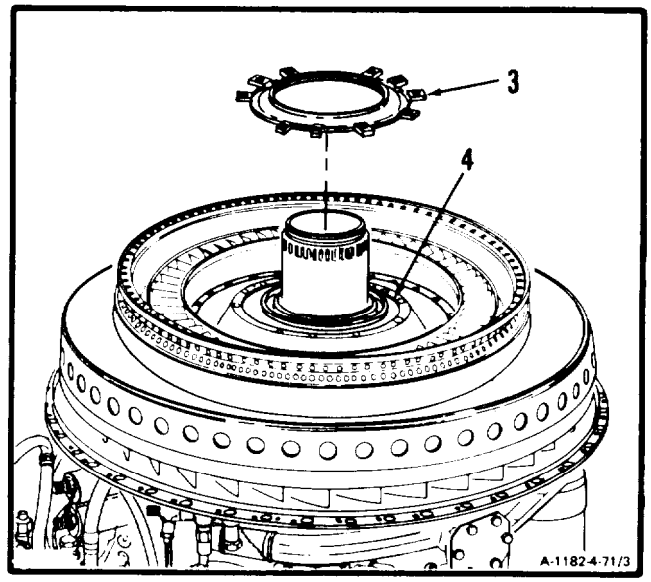
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4-71 INSTALL FIRST TURBINE NOZZLE (AVIM) (Continued) 4-71

1. **Install first turbine nozzle (1)** on diffuser curl (2).



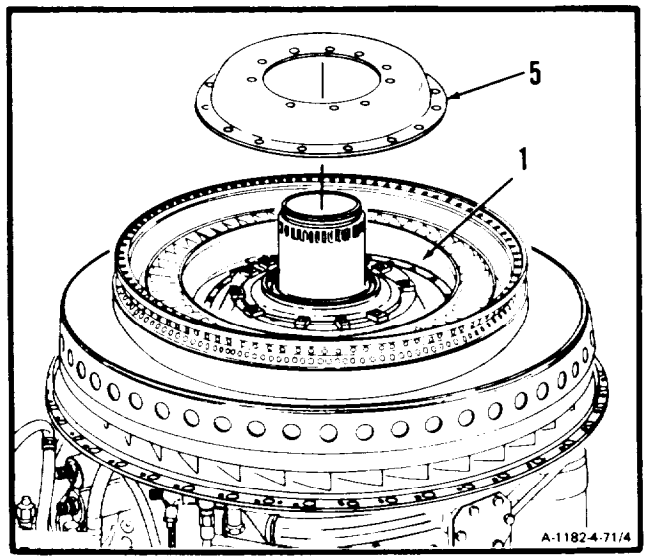
2. **Install seal ring (3)** on air diffuser assembly inner flange (4).



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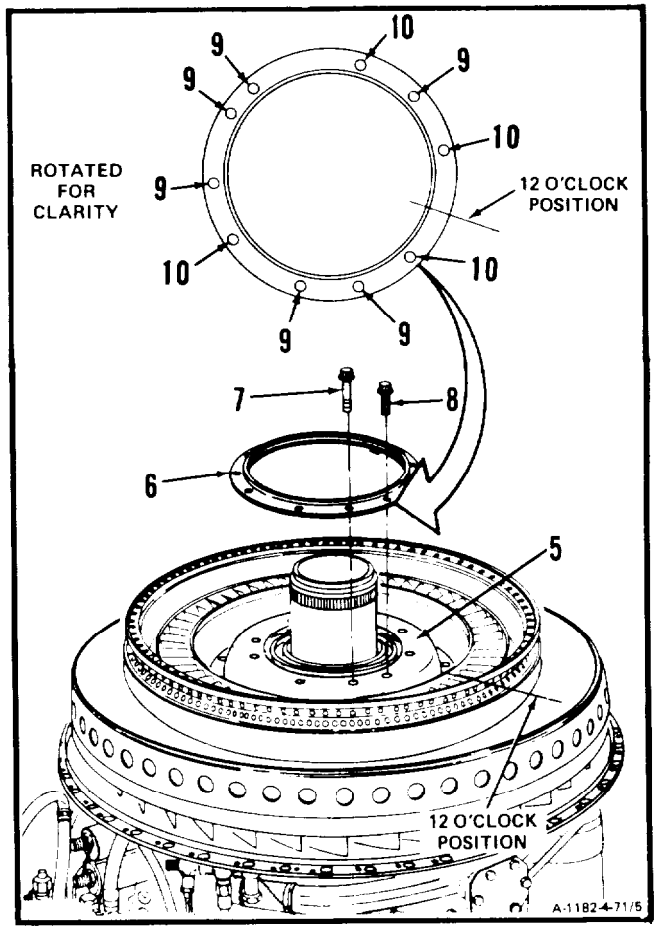
4-71 INSTALL FIRST TURBINE NOZZLE (AVIM) (Continued)

3. **Install baffle (5)** on first turbine nozzle (1).



4. **Install seal (6)** on baffle (5). Apply anti-seize compound (E5) on six bolts (7) and four bolts (8).

5. Install six bolts (7) in bolt holes (9). Install four bolts (8) in bolt holes (10). Lockwire bolts (7 and 8). Use lockwire (E29).

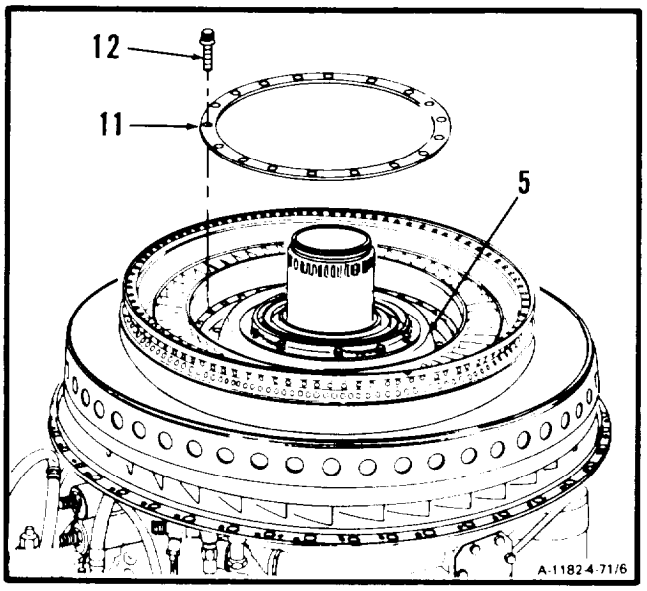


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4-71 INSTALL FIRST TURBINE NOZZLE (AVIM) (Continued) 4-71

6. **Install baffle retainer (11)** on baffle (5). Apply anti-seize compound (E5) on 18 bolts (12).

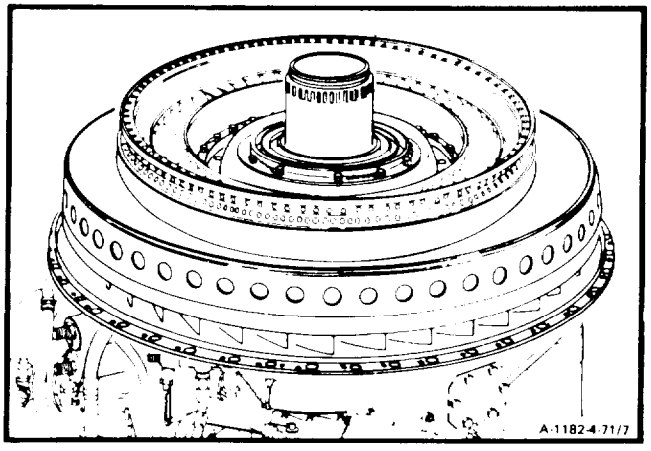
7. Install 18 bolts (12). Lockwire bolts 112). Use lockwire (E29).



INSPECT

FOLLOW-ON MAINTENANCE

Install First Turbine Disc Assembly (Task 4-66).
Install Second Turbine Nozzle, Spacer, and Case (Task 4-61).
Install Second Turbine Disc Assembly (Task 4-56).
Install Combustion Section and Power Turbine (Task 3-8)
Service Engine Oil System (Task 1-74).



END OF TASK

4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) 4-72

INITIAL SETUP

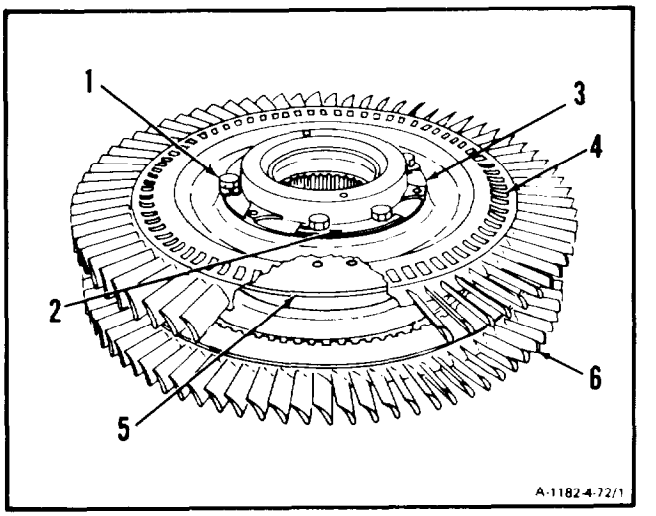
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Turbine Disc Separating Plate (T36)
Mechanical Puller (T61)
Turbine Disc Puller (T62)

Materials:
Marking Pencil (E34)

Personnel Required:
68B10 Aircraft Powerplant Repairer (2)

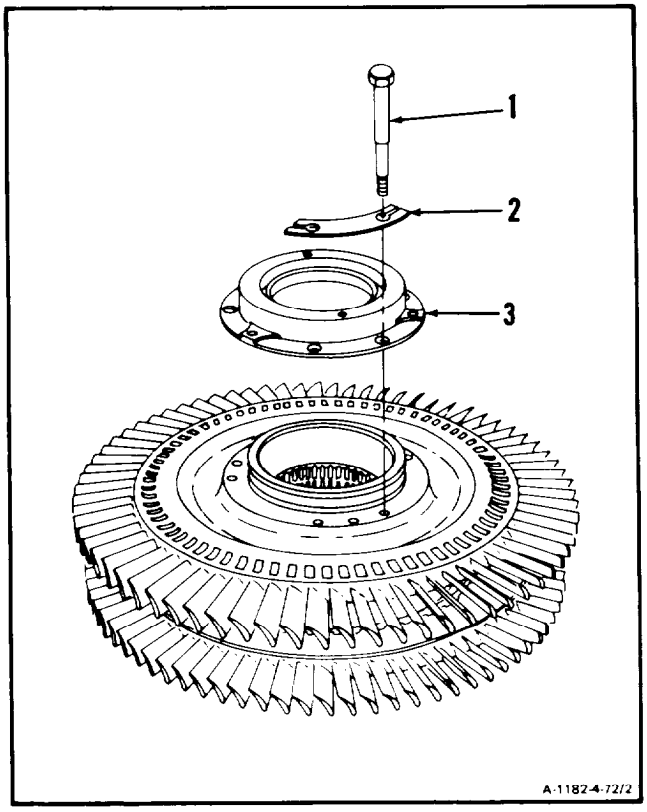
1. **Index six bolts (1), to second turbine disc assembly (4). Matchmark three locking plates (2), seal (3), second turbine disc assembly (4), turbine spacer (5), and first turbine disc assembly (6).** Use marking pencil (E34).



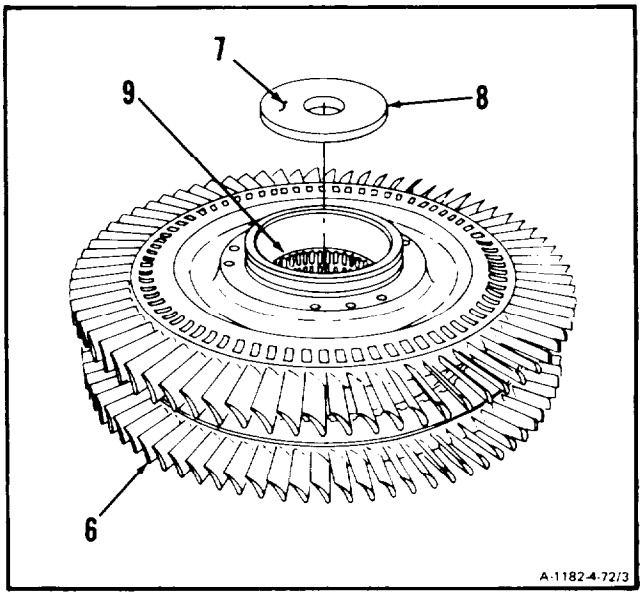
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

2. **Remove** six bolts (1), three locking plates (2), and **seal (3).**



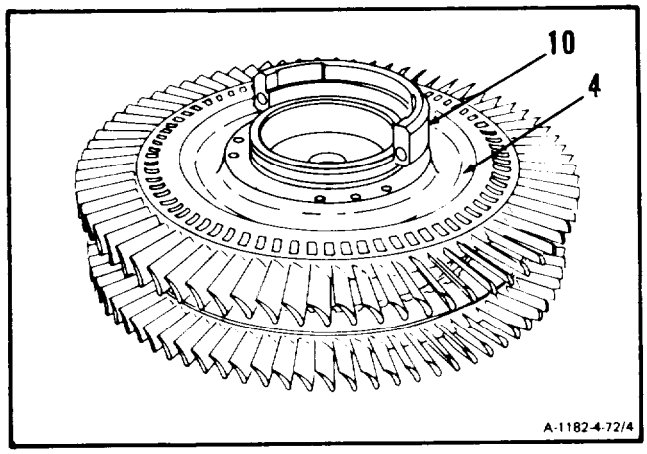
3. **Install turbine disc separating plate (T36) (7),** with large diameter (8) facing up, on hub (9) of first turbine disc assembly (6).



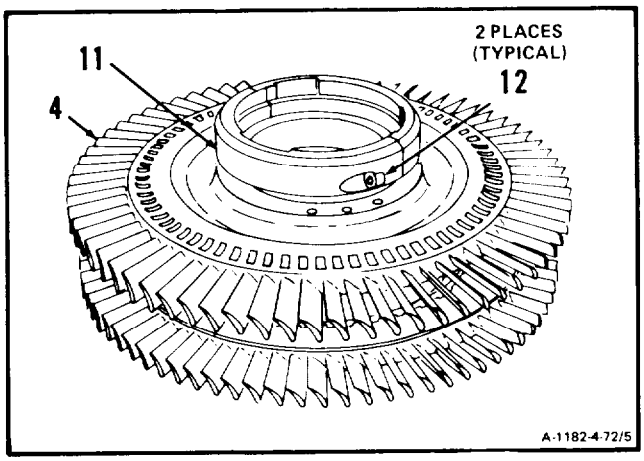
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

4. Disassemble turbine disc puller (T62) and **install one-half (10) of turbine disc puller (T62)** on second turbine disc assembly (4).



5. **Install other half (11) of turbine disc puller (T62)** on second turbine disc assembly (4), and tighten two setscrews (12).



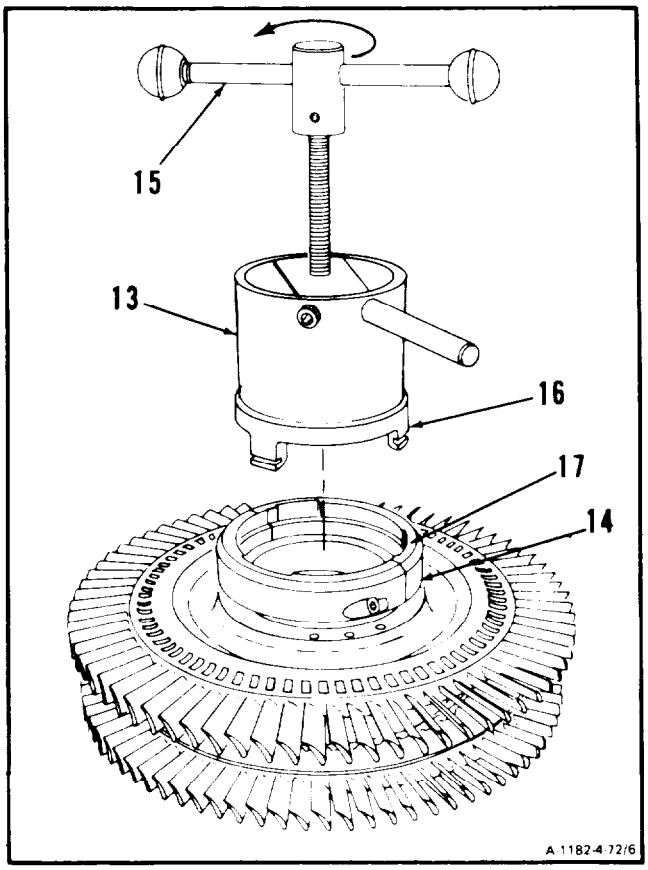
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

6. **Install mechanical puller (T61) (13)** in turbine disc puller (T62) (14) as follows

   a. Back out T-handle (15) counterclockwise all the way.

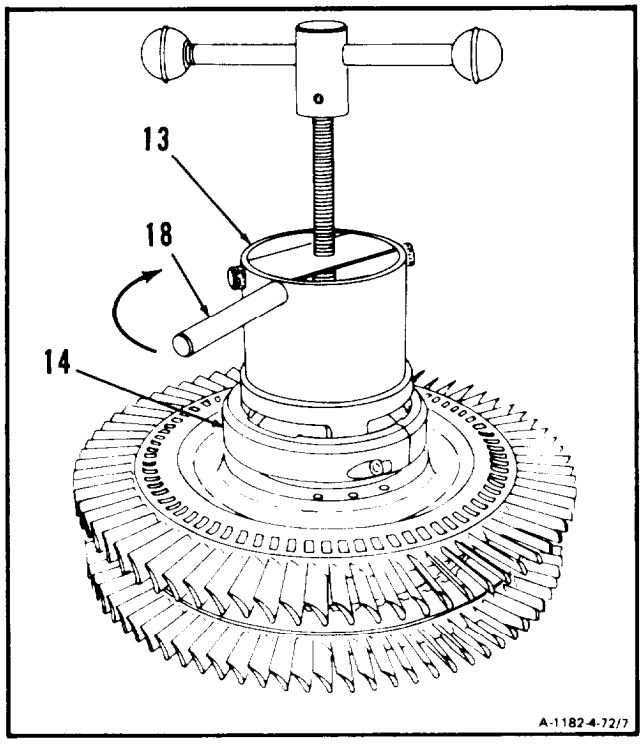
   b. Align three puller lugs (16) with three slots (17) in turbine disc puller (T62) (14).



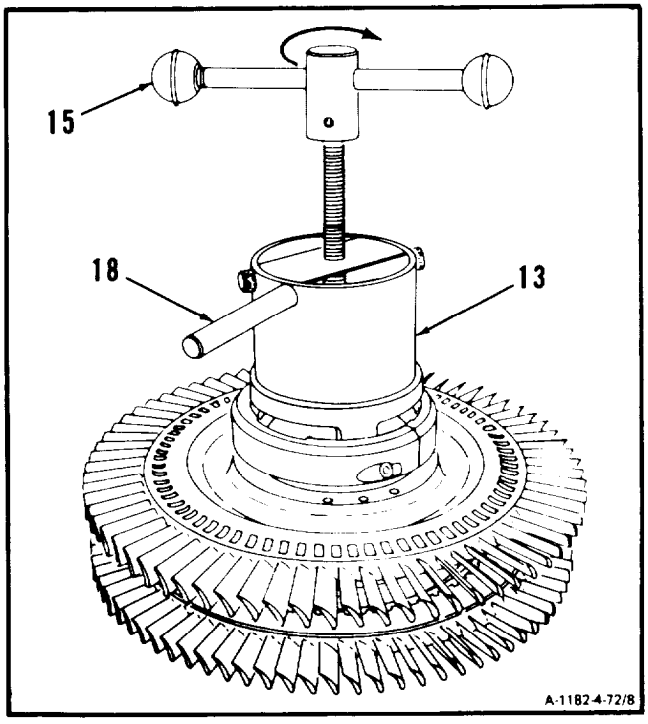
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

c. Install mechanical puller (T61) (13) fully and rotate puller handle (18), 1/3 turn clockwise, to engage puller (T61) (13) in turbine disc puller (T62) (14).



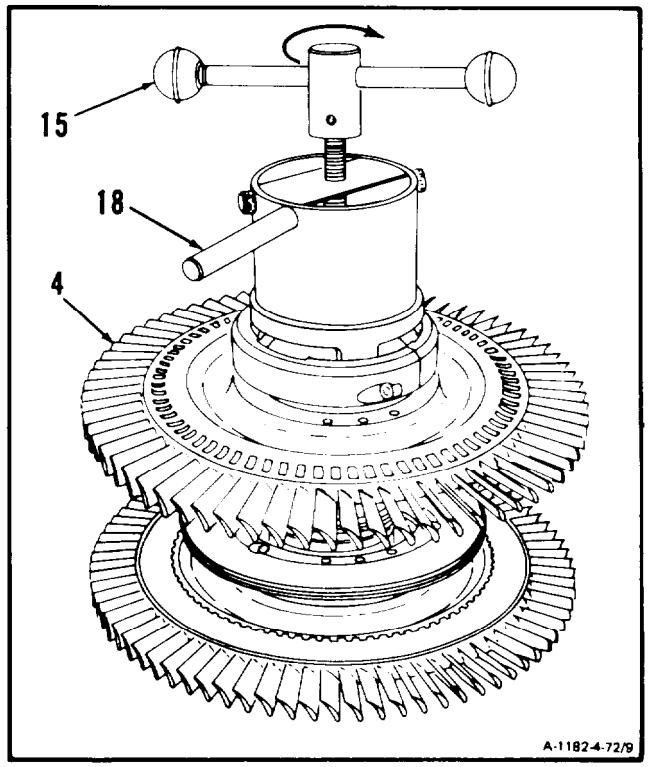
d. Hold puller handle (18) and turn T-handle (15) clockwise until mechanical puller (T61) (13) is locked in position.



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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

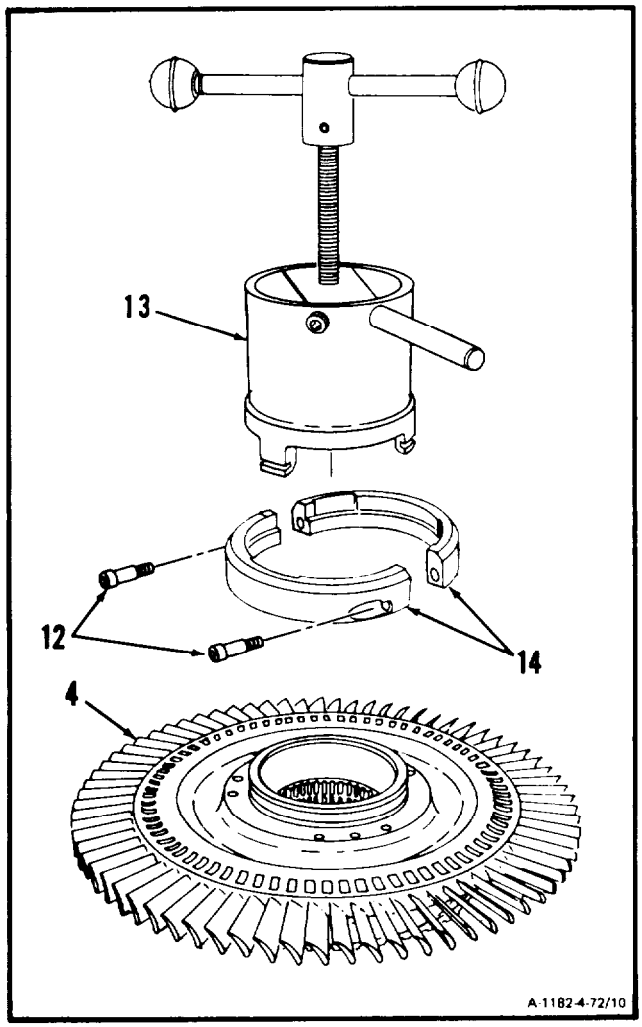
7. Have helper hold puller handle (18). Tighten T-handle (15) and **remove second turbine disc assembly (4).**



GO TO NEXT PAGE

4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

8. Remove mechanical puller (T61) (13), two set-screws (12) and turbine disc puller (T62) (14) from second turbine disc assembly (4).



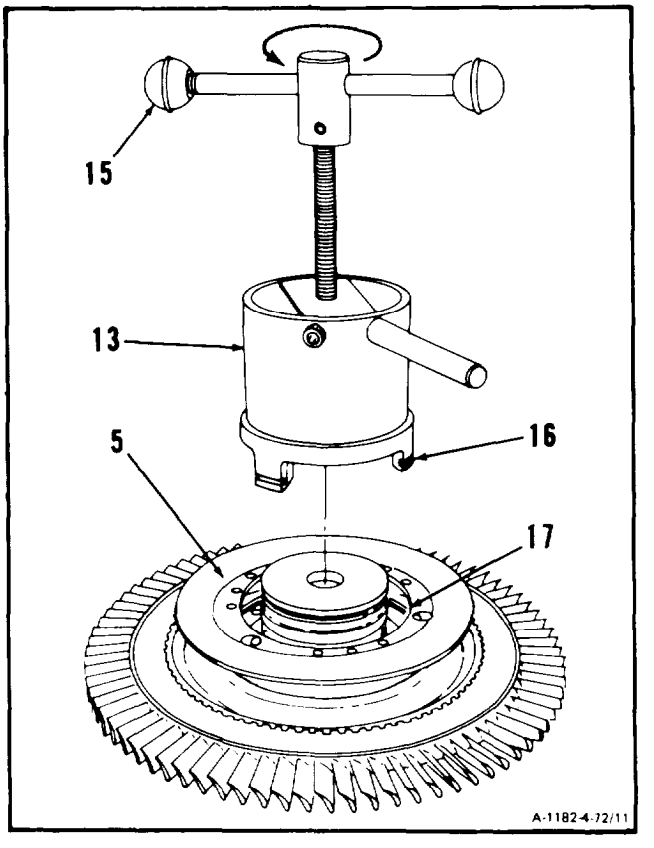
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC 4-72 ASSEMBLY (AVIM) (Continued)

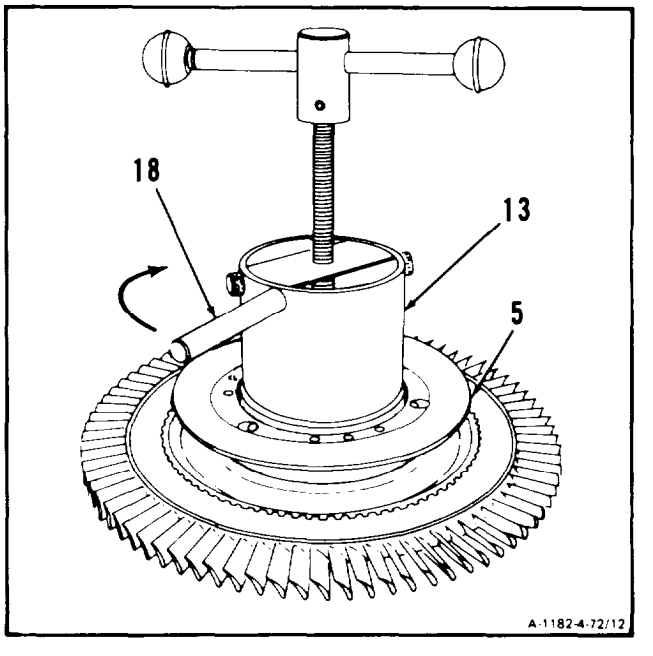
9. **Install mechanical puller (T61) (13)** as follows:

   a. Back out T-handle (15) counterclockwise all the way.

   b. Align three puller lugs (16) with three slots (17) in turbine spacer (5).



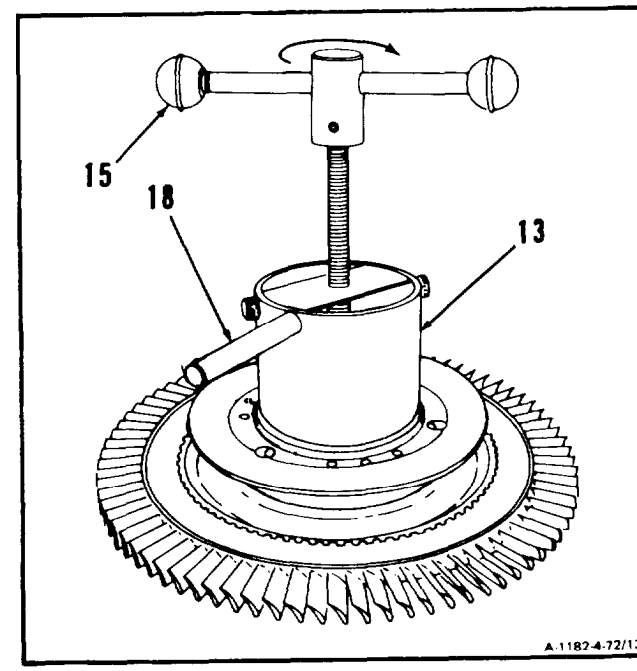
   c. Install mechanical puller (T61) (13) fully and rotate puller handle (18), 1/3 turn clockwise, to engage puller in turbine spacer (5).



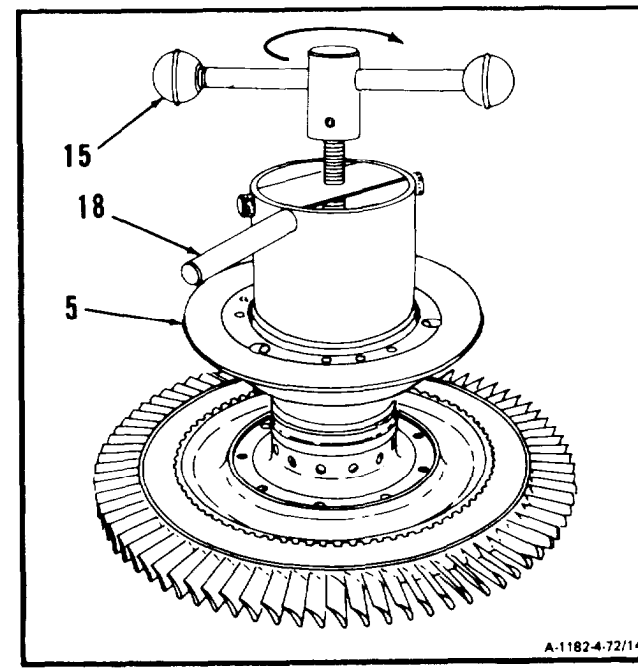
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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

d. Hold puller handle (18) and turn T-handle (15) clockwise until mechanical puller (T61) (13) is locked in position.



10. Hold puller handle (18) and tighten T-handle (15) and **remove turbine spacer (5).**

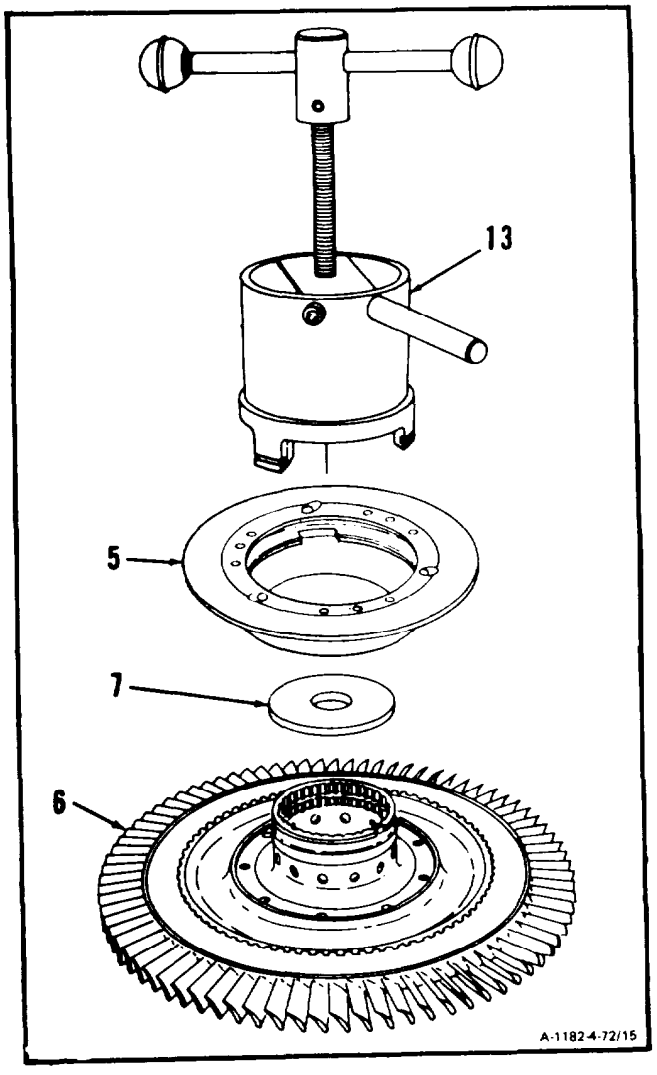


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4-72 PLACE IN SERVICE FIELD REPLACEMENT FIRST AND SECOND TURBINE DISC ASSEMBLY (AVIM) (Continued) 4-72

11. Remove mechanical puller (T61) (13) from spacer (5).

12. Remove plate (T36) (7) from first turbine disc assembly (6).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-73 REMOVE DIFFUSER CURL (AVIM) 4-73

INITIAL SETUP

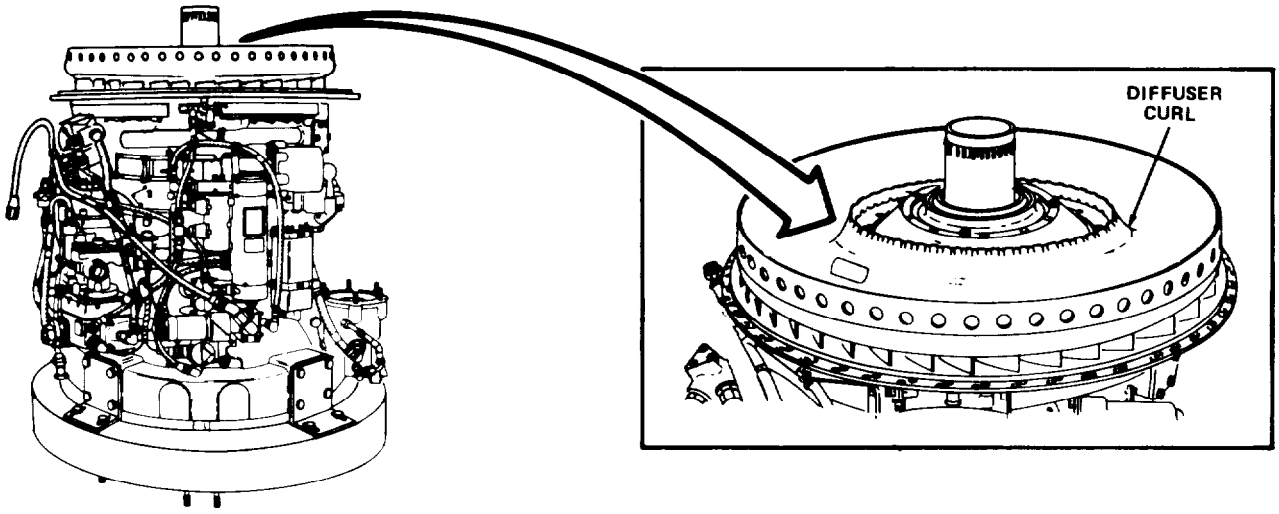
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)
First Turbine Nozzle Removed (Task 4-67)

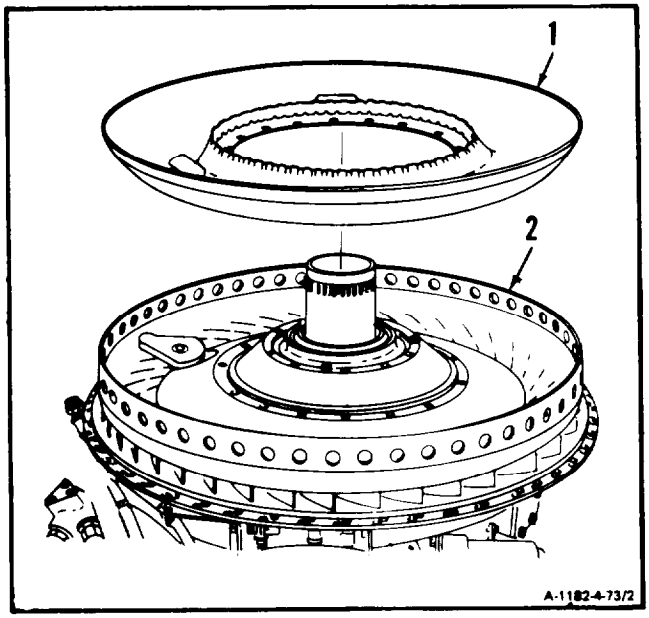


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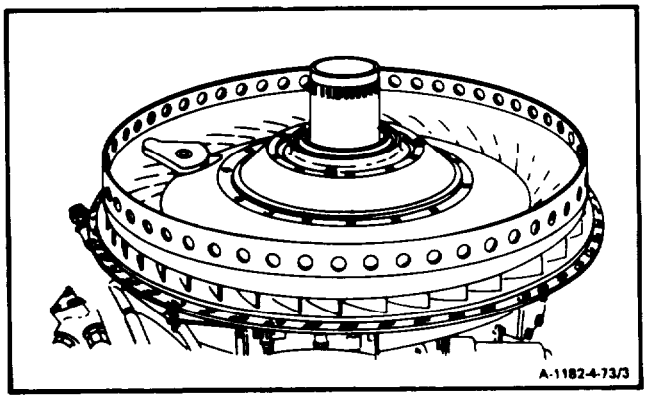
4-73 REMOVE DIFFUSER CURL (AVIM) (Continued) 4-73

1. **Remove diffuser curl (1)** from air diffuser housing (2).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-74 CLEAN DIFFUSER CURL (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Goggles
Compressed Air Source
Fiber Brush

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)

Personnel Required.
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Combustion Section and Power Turbine Removed (Task 3-5)
Second Turbine Disc Assembly Removed (Task 4-53)
Second Turbine Nozzle, Spacer, and Case Removed (Task 4-57)
First Turbine Disc Assembly Removed (Task 4-62)
First Turbine Nozzle Removed (Task 4-67)
Diffuser Curl Removed (Task 4-73)

General Safety Instructions:

WARNING

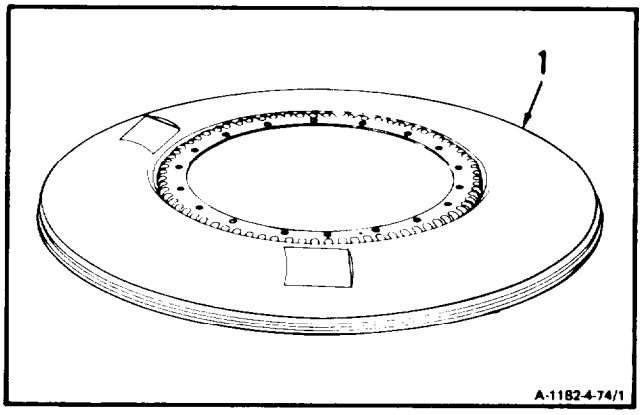
Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean diffuser curl (1)** using dry cleaning solvent (E17) and fiber brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry diffuser curl (1).** Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Diffuser Curl (Task 4-75).

END OF TASK

4-75 INSPECT DIFFUSER CURL (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Micrometer Depth Gage
Outside Micrometer Caliper Set

Materials:
None

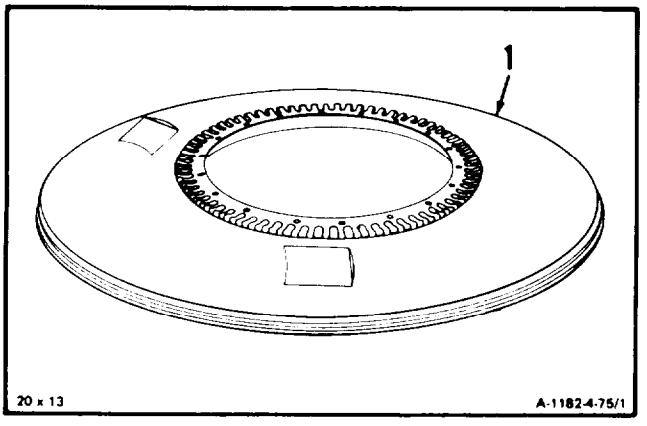
Personnel Required:
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. **Inspect diffuser curl (1)** as follows:

   a. There shall be no burn-through.

   b. There shall be no foreign object damage break-through.



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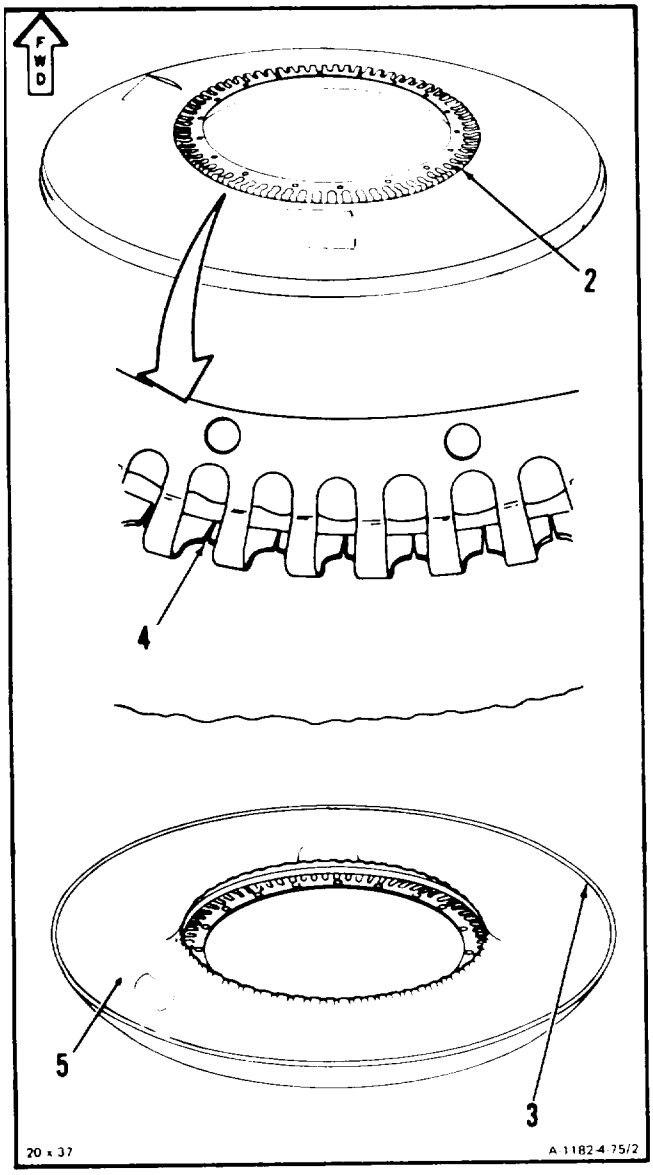
4-75 INSPECT DIFFUSER CURL (AVIM) (Continued)

c. There shall be no cracks on inner flange finger supports (2).

d. The total length of all cracks in area next to outer flange seam weld (3) shall not be more than seven inches.

e. There shall be no more than eight broken spot welds (4). Cracks in spot welds (4) are acceptable.

f. There shall be no metallic material build up on surface of curl (5).



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4-75 INSPECT DIFFUSER CURL (AVIM) (Continued) 4-75

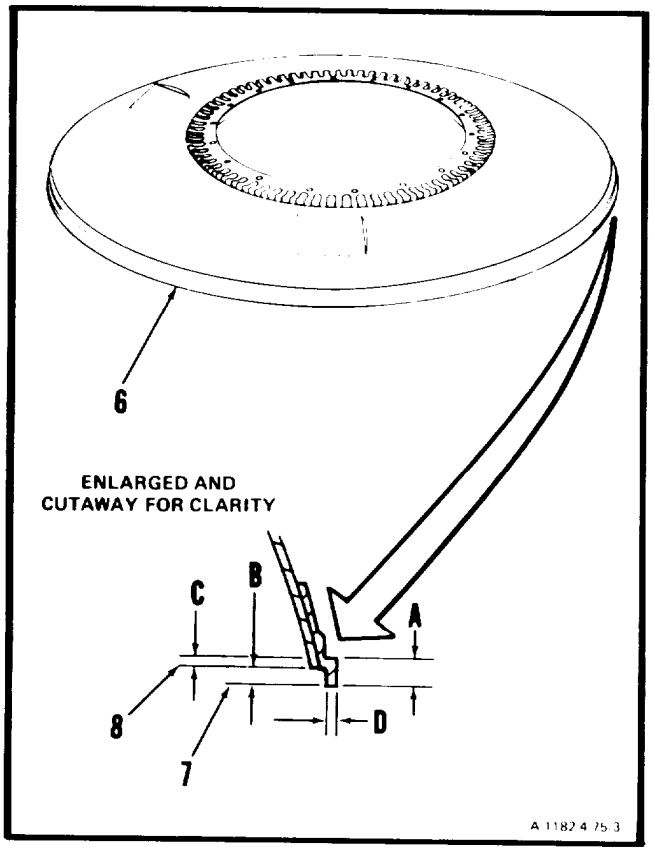
2. Inspect outer flange (6) for wear, at equally spaced places, as follows:

   a. Measure length of outer lip (Dimension A). Use outside micrometer caliper. Length shall be no less than 0.163 inch. Record measured length as Dimension A.

   b. Measure from end surface (7) to lip surface (8) (Dimension B). Use micrometer depth gage. Record as Dimension B.

   c. Subtract Dimension B from Dimension A. Result is Dimension C. Dimension C shall be no less than 0.040 inch.

   d. Measure thickness of outer lip (Dimension D). Use outside micrometer caliper. Thickness shall be no less than 0.040 inch.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-76 REPAIR DIFFUSER CURL (AVIM) 4-76

INITIAL SETUP

Applicable Configurations:
All

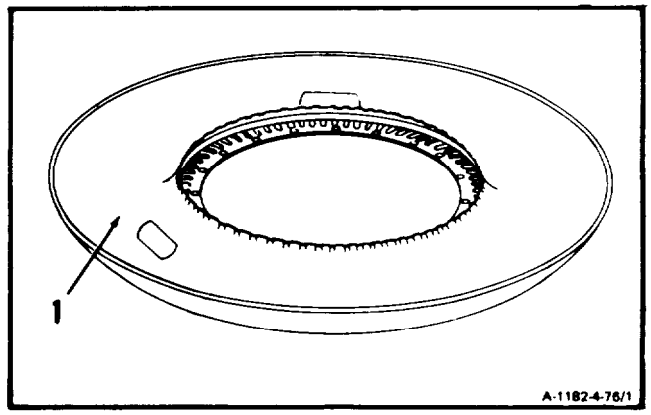
Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Aluminum Oxide Cloth (E4)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

Equipment Condition:
Off Engine Task

1. Remove metallic material build up from surface of curl (1) by sanding. Use aluminum oxide cloth (E4).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

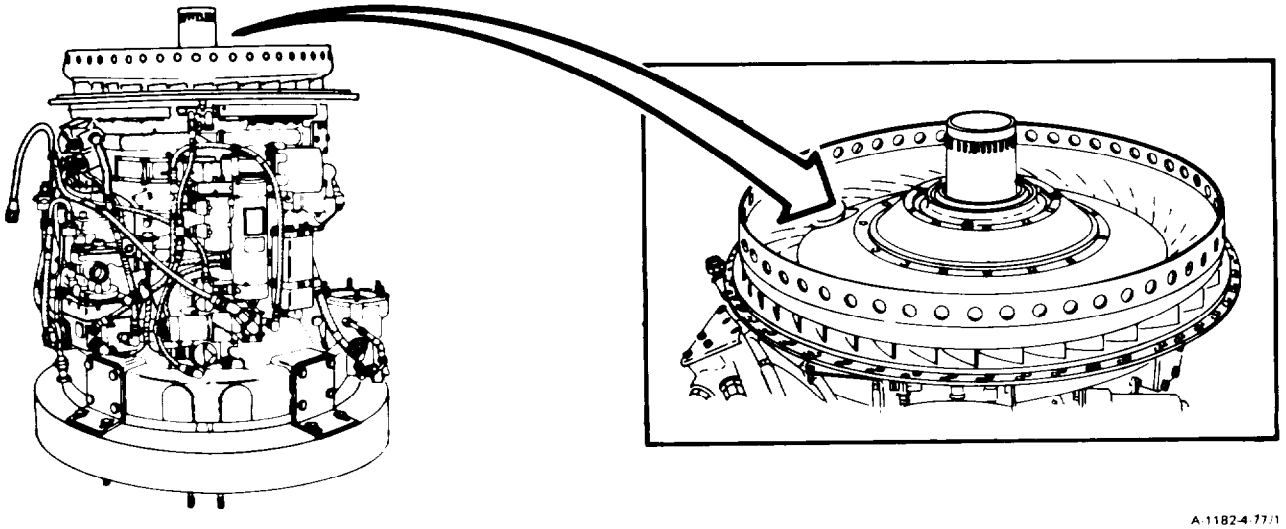
4-77 INSTALL DIFFUSER CURL (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

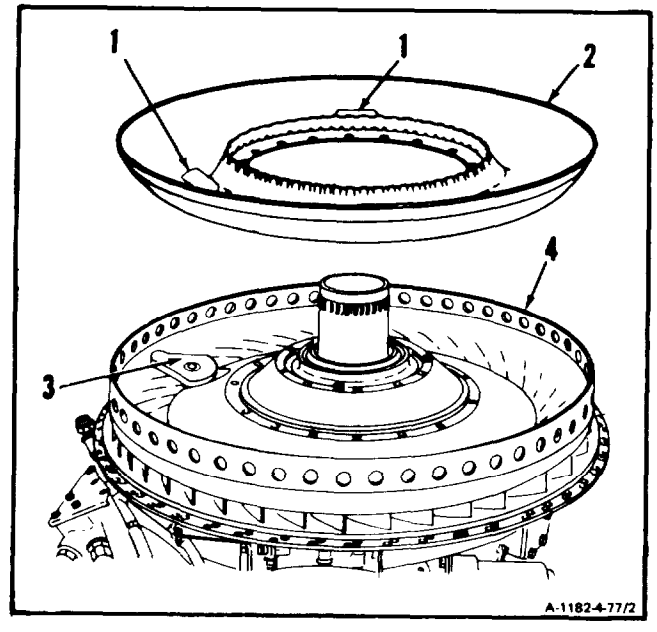


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4-77 INSTALL DIFFUSER CURL (AVIM) (Continued) 4-77

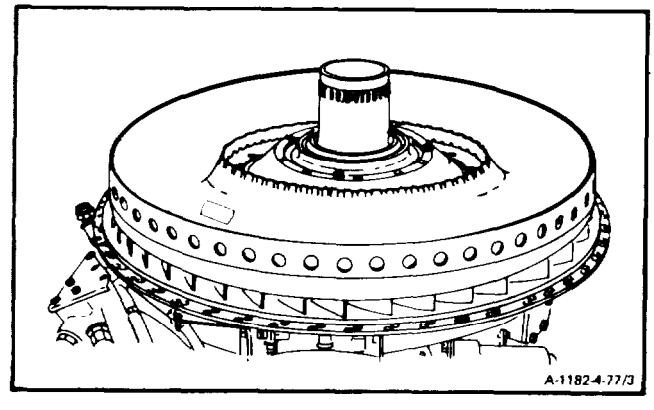
1. Align indentions (1) in curl (2) with pans (3) in air diffuser (4).
2. **Install diffuser curl (2)** in air diffuser assembly (4).



INSPECT

FOLLOW-ON MAINTENANCE

Install First Turbine Nozzle (Task 4-71).
Install First Turbine Disc Assembly (Task 4-66)
Install Second Turbine Nozzle, Spacer, and Case (Task 4-61).
Install Second Turbine Disc Assembly (Task 4-56).
Install Combustion Section and Power Turbine (Task 3-8)
Service Engine Oil System (Task 1-74).



END OF TASK

4-78 REMOVE EXIT VANE ASSEMBLY

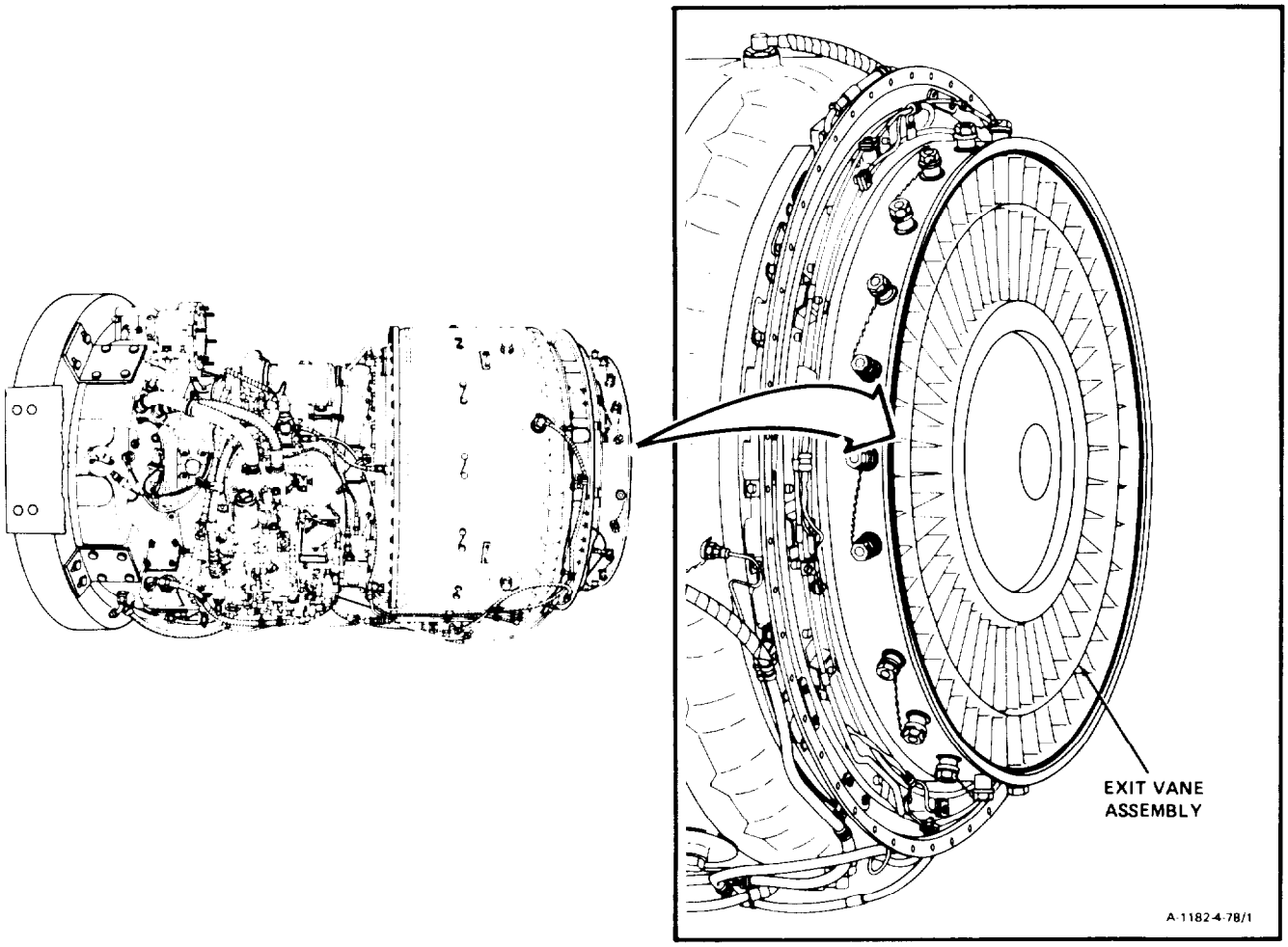
INITIAL SETUP

Applicable Configurations:
All

Tools.
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Mechanical Puller (T47) (3)

Materials:
None

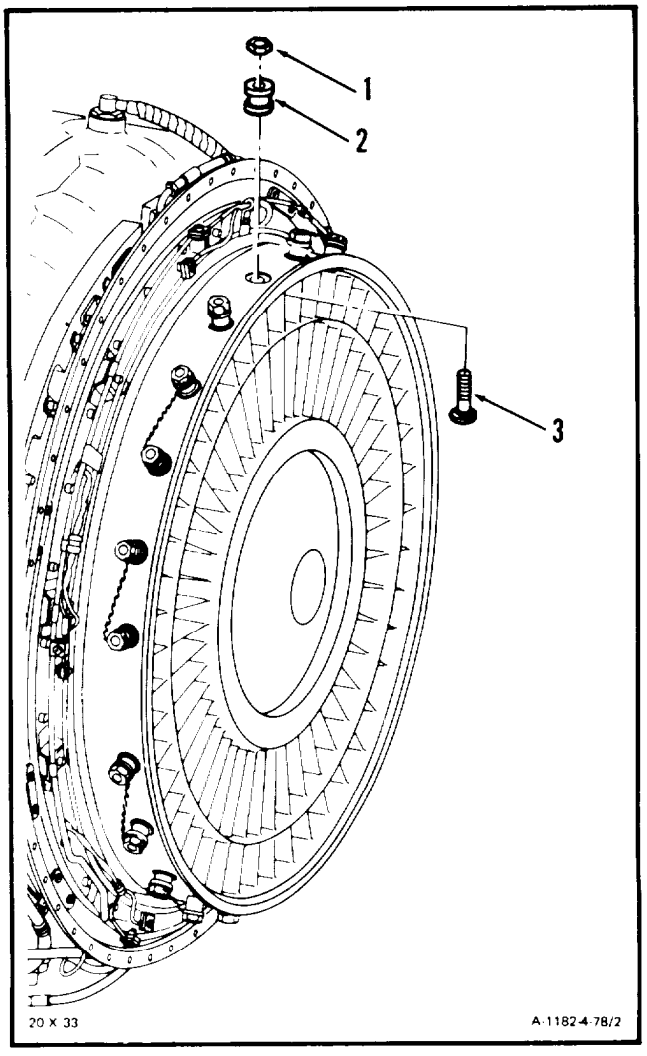
Personnel Required:
68B10 Aircraft Powerplant Repairer



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4-78 REMOVE EXIT VANE ASSEMBLY (Continued) 4-78

1. **Remove lockwire** and **22 nuts (1), spacers (2), and bolts (3).**



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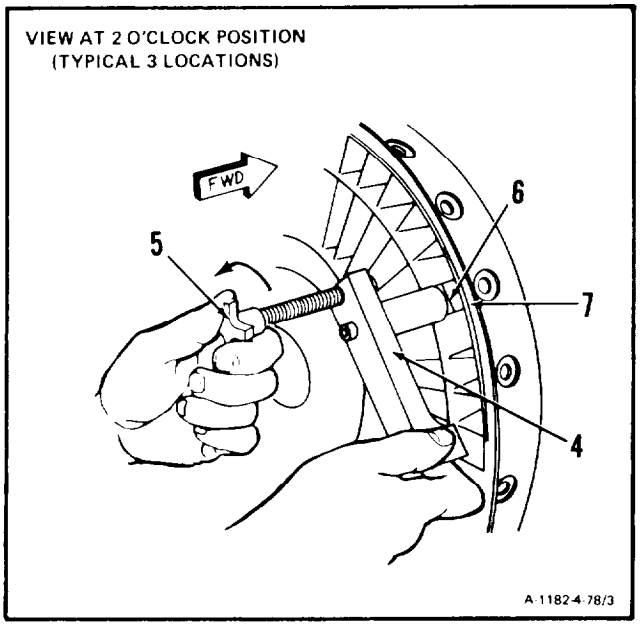
4-78 REMOVE EXIT VANE ASSEMBLY (Continued)

2. **Install mechanical puller (T47) (4)** as follows:

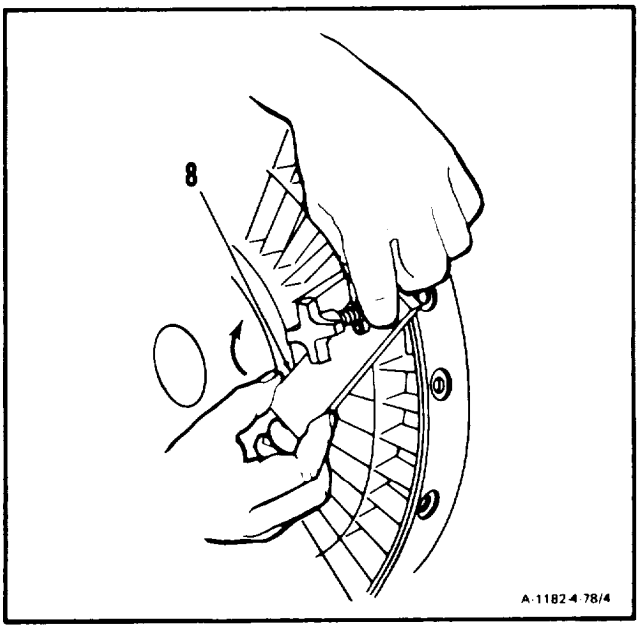
NOTE

The following steps a. thru c. apply to three pullers installed at the 2-o'clock, 6-o'clock, and 10-o'clock positions. Only 2-o'clock position is shown.

a. Back knob (5) counterclockwise, all the way out, and guide plate (6) through upper vane slot (7).



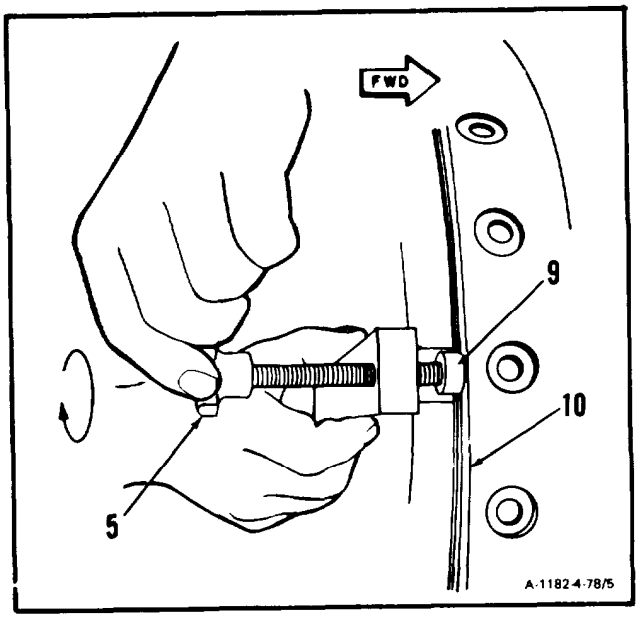
b. Rotate arm (8) 90 degrees clockwise.



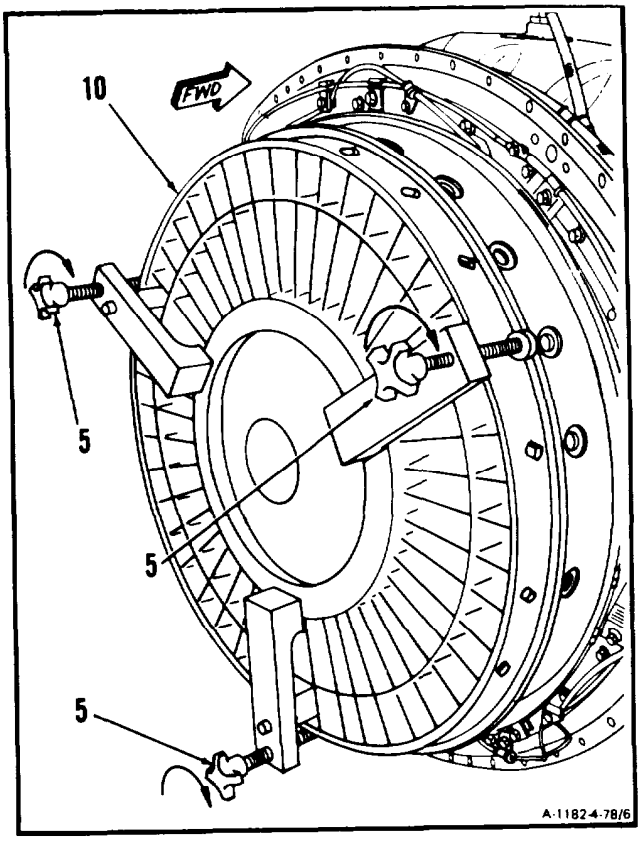
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4-78 REMOVE EXIT VANE ASSEMBLY (Continued) 4-78

c. Turn knob (5) clockwise until bumper (9) fits snugly against fourth turbine nozzle flange (10).



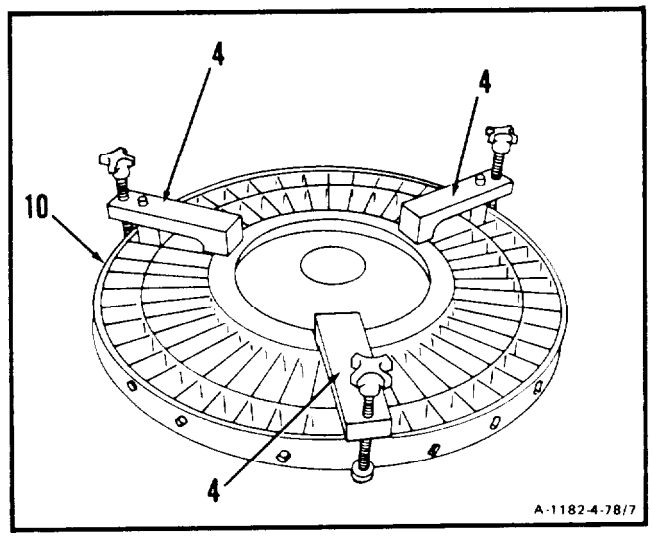
3. Turn knobs (5) evenly clockwise and **remove exit vane assembly (10).**



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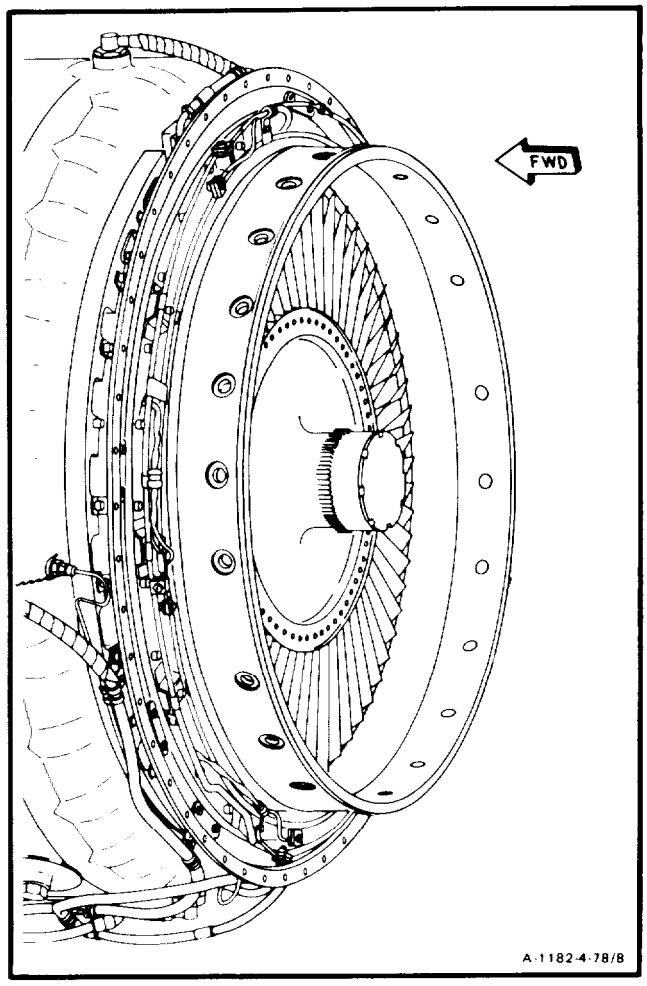
4-78 REMOVE EXIT VANE ASSEMBLY (Continued)

4. Remove three mechanical pullers (T47) (4) from exit vane assembly (10).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

4-79 CLEAN EXIT VANE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Gloves (E20)
Methyl Ethyl Ketone (E36)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Exit Vane Assembly Removed (Task 4-78)

General Safety Instructions:

WARNING

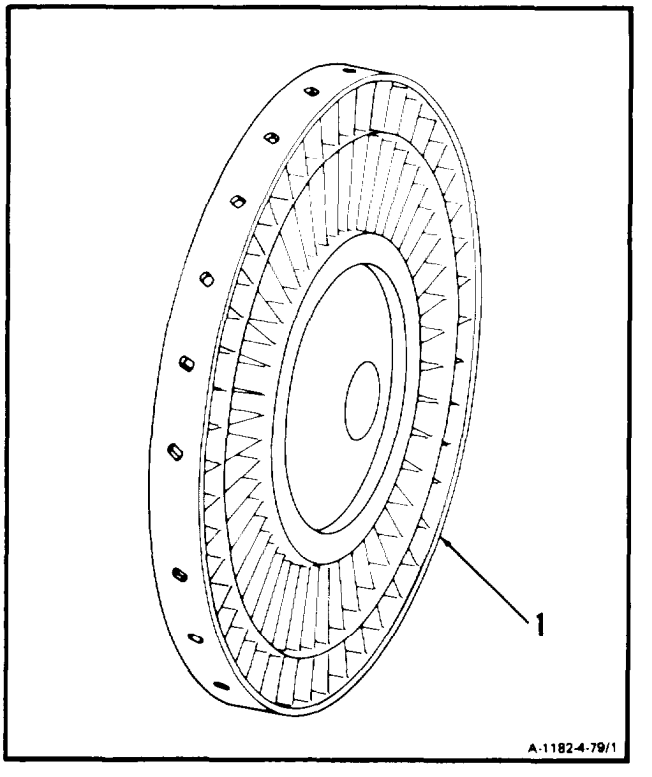
Methyl ethyl ketone (E36) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated areas, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean exit vane assembly (1),** using methyl ethyl ketone (E36) and brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. **Blow dry exit vane assembly (1)** using clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Exit Vane Assembly (Task 4-80).

END OF TASK

4-80 INSPECT EXIT VANE ASSEMBLY 4-80

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

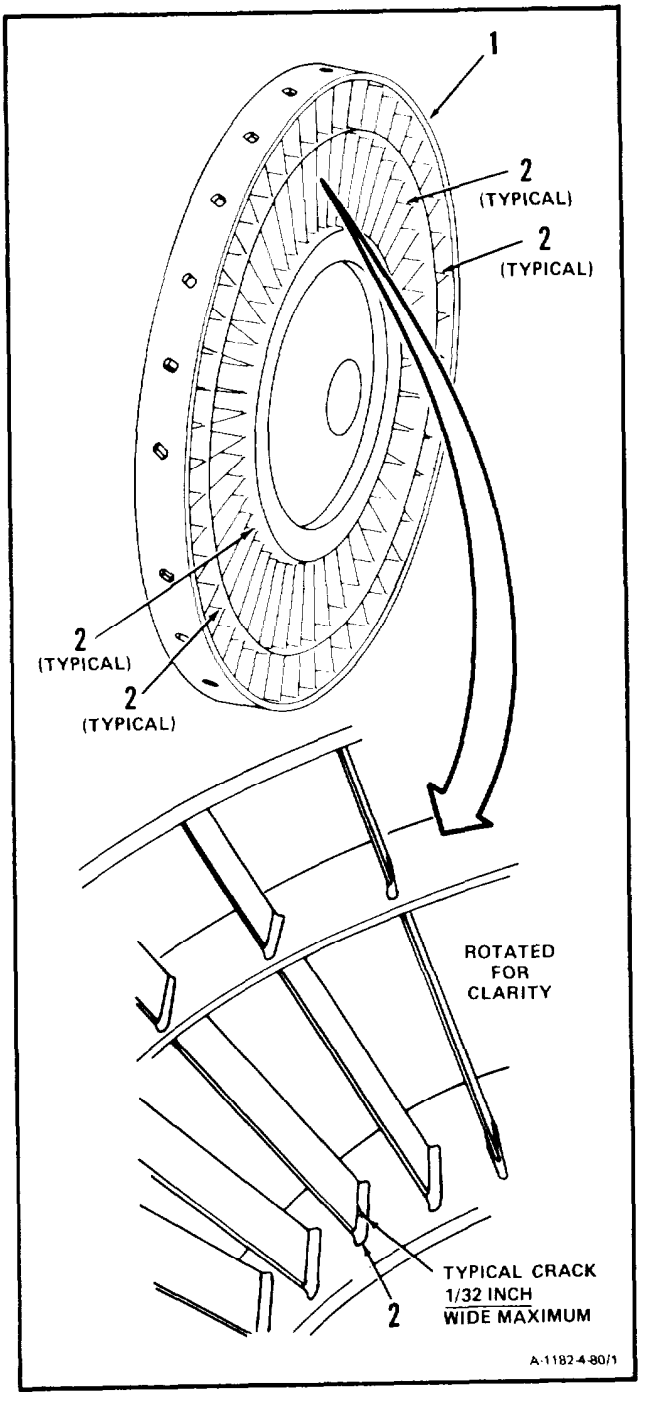
Equipment Condition:
Off Engine Task

GO TO NEXT PAGE

4-80 INSPECT EXIT VANE ASSEMBLY (Continued) 4-80

1. **Inspect exit vane assembly (1)** as follows:

   a. **Inspect brazed areas (2).** There shall be no cracks 1/32-inch or greater in width. Cracks that are 1/32 inch or less can run the whole length around brazed area.



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4-80 INSPECT EXIT VANE ASSEMBLY (Continued) 4-80

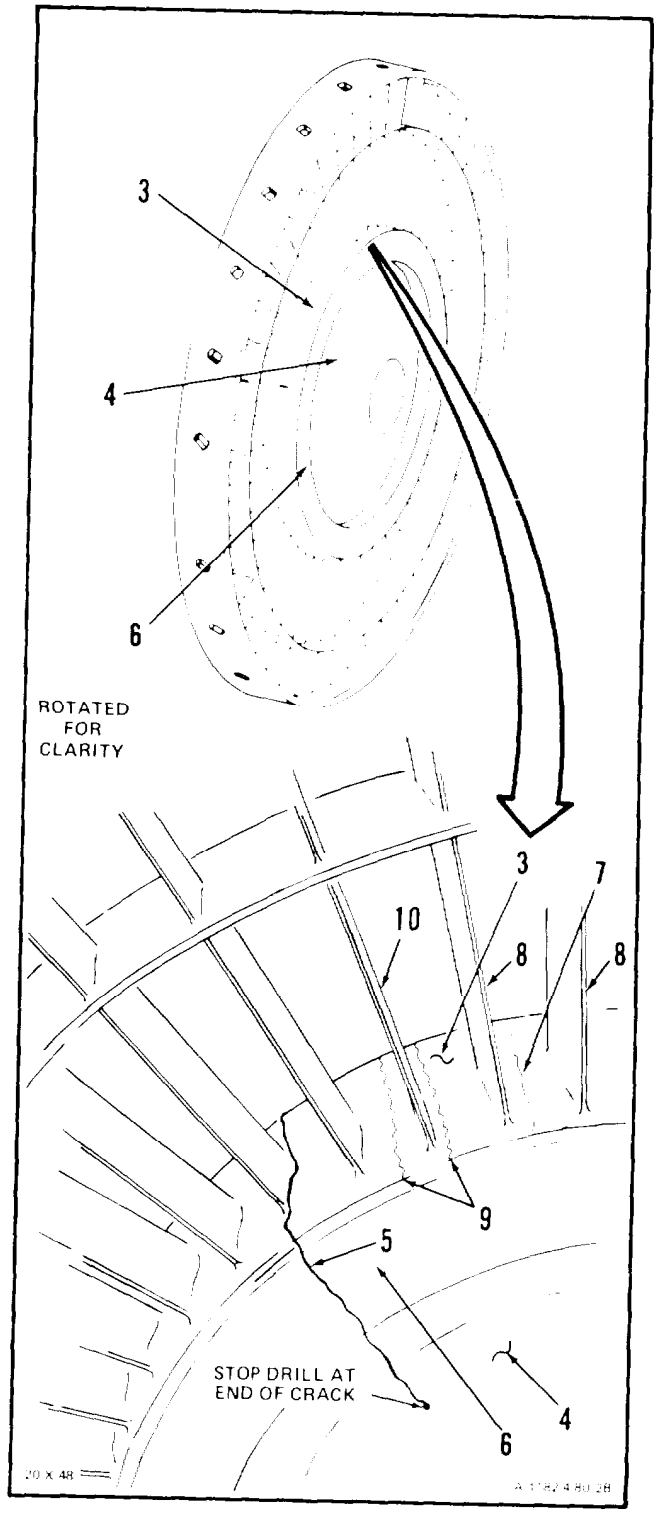
b. Inspect inner shroud (3) and inner plate (4). There shall be no cracks beyond the following limits:

(1) There shall be no more than three cracks which extend from inner shroud (3), adjacent to vanes, down into inner plate (4) or from aft radial section (6) down into inner plate (4) with stop drill repairs.

(2) Cracks (5) which end at stop drill holes (those drilled as repairs or those at the ends of sawcuts in modified exit guide vanes) shall not Intersect.

(3) There shall be no more than eight cracks (7) between vanes (8) extending from one of inner shroud (3) to other end.

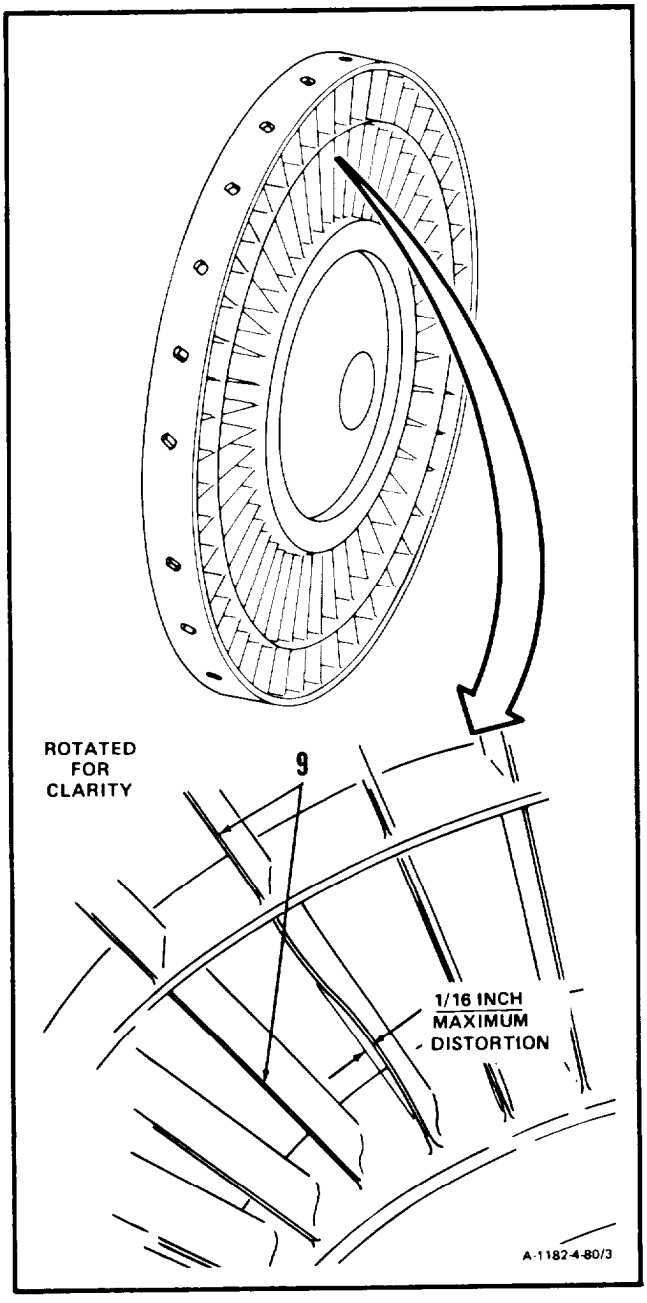
(4) There shall be no cracks (9) that progress from the forward edge and continue to the rear edge and pass on both sides of a single vane (10).



GO TO NEXT PAGE

4-80 INSPECT EXIT VANE ASSEMBLY (Continued)

c. **Inspect rear edges of vanes (9).** Edges shall not be distorted more than 1/16 inch measured from unaffected portion of vane.



GO TO NEXT PAGE

4-80 INSPECT EXIT VANE ASSEMBLY (Continued) 4-80

NOTE

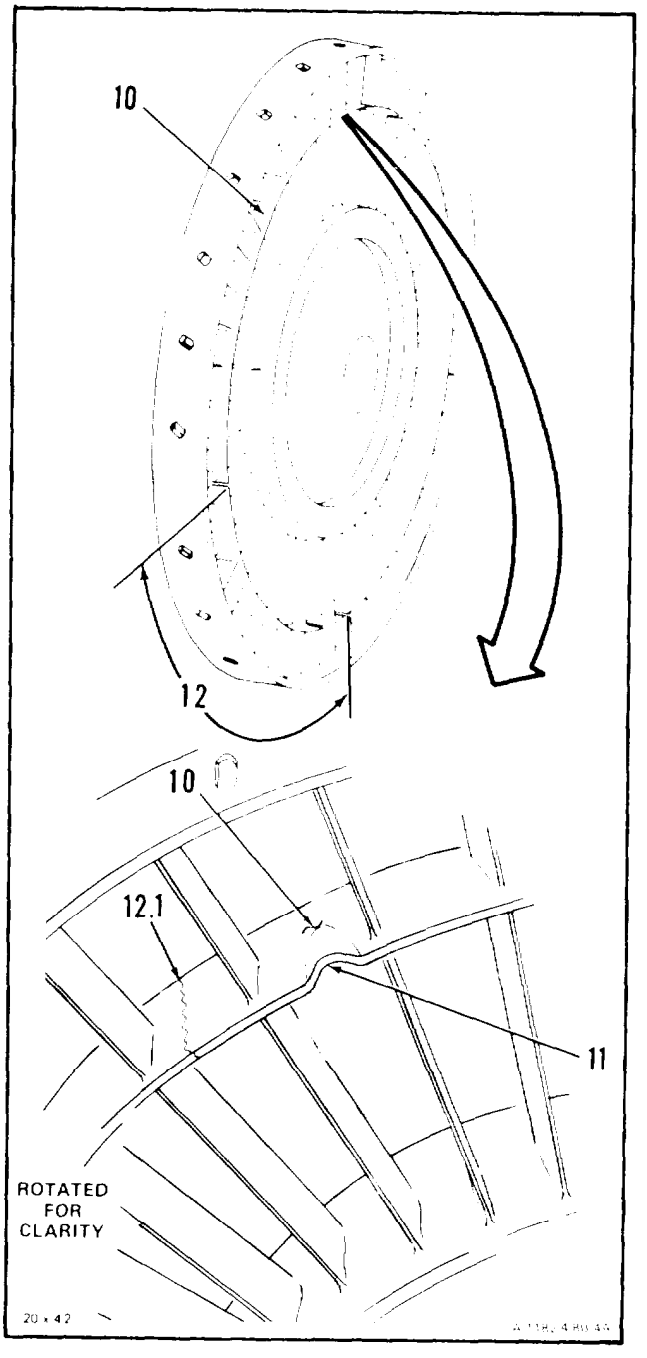
There are four segments in midspan shroud.

d **Inspect midspan shroud (10) for:**

(1) Minor damage, dents, and nicks are acceptable (11).

(2) Midspan shroud (10) distortion is acceptable to the extent that both ends in each segment (12) are allowed to be bent.

(3) One midspan shroud crack (12.1) that extends completely through in one place IS acceptable per segment (12) provided the crack IS separated by at least three vanes from the ends of the segment (12).



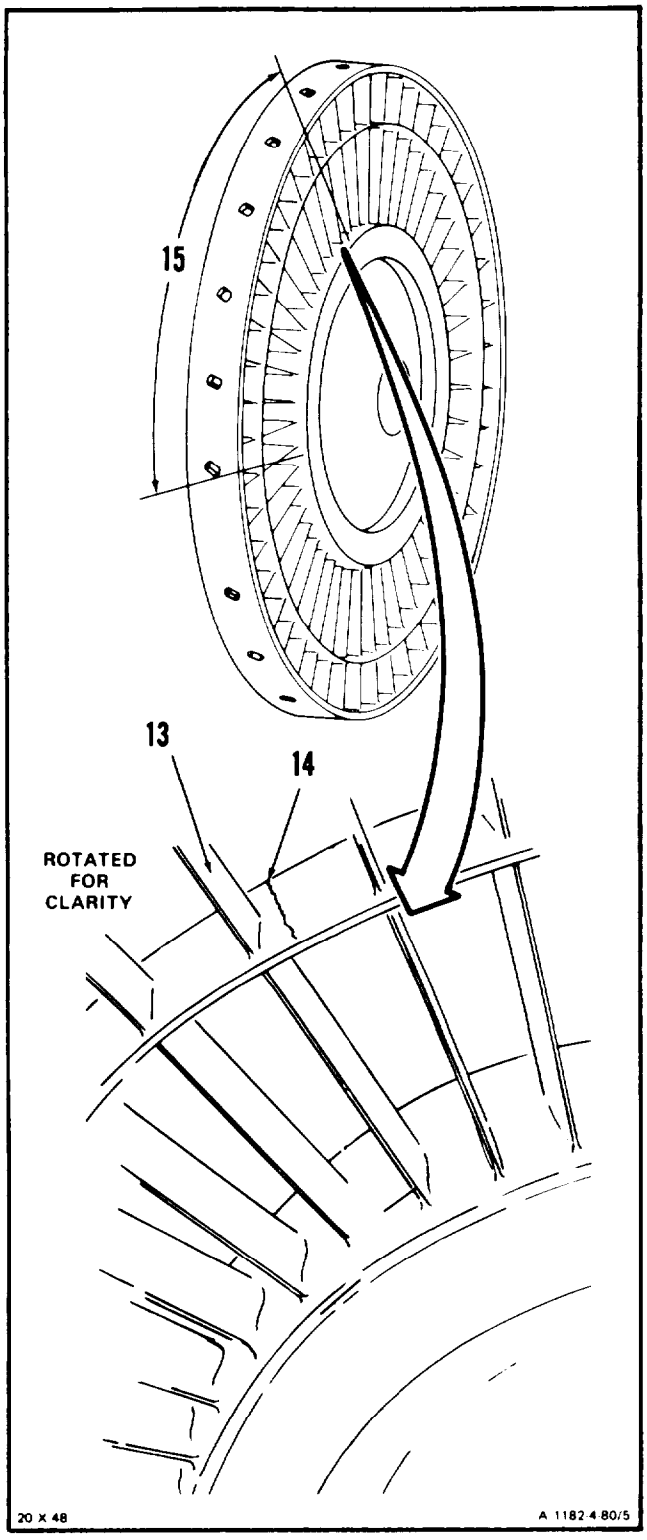
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4-80 INSPECT EXIT VANE ASSEMBLY (Continued) 4-80

e. **Inspect exit guide vane (13) for cracks (14)** in midspan support (15).

(1) There shall be no more than one place cracked completely through in each midspan segment (15).

(2) Cracks completely through support shall be separated by at least three vanes from end of segment.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-81 REPAIR EXIT VANE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
General Support Welding Aircraft
Maintenance Shop Set
NSN 4920-00-621-2043
Portable Electric Drill
Twist Drill, 3/32-Inch
Carbide Burr, Ball Shape,
1/8-Inch Diameter Shank
Goggles

Materials:
Carborundum Stone (E10)
Crocus Cloth (E15)
Fluorescent-Penetrant Materials (E19)
Welding Wire (E61)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 44-0103
TM 55-1500-204-25/1
Task 4-79
Task 4-80

Equipment Condition:
Off Engine Task

General Safety Instructions:

WARNING

Welding operations are hazardous. Harmful light rays may injury eyes and burn skin. Poisonous fumes may cause illness. Burns and fires may result from hot sparks. Wear protective clothing and equipment. Perform welding operations in well ventilated areas away from flammable liquids and gases. If fire occurs, call for assistance and use proper extinguishing procedures. If injury or illness occurs, get medical attention.

GO TO NEXT PAGE

4-81 REPAIR EXIT VANE ASSEMBLY (Continued)

1. **Repair** inner shroud cracks (1) that run **into aft radial section (2)** or inner plate (3)

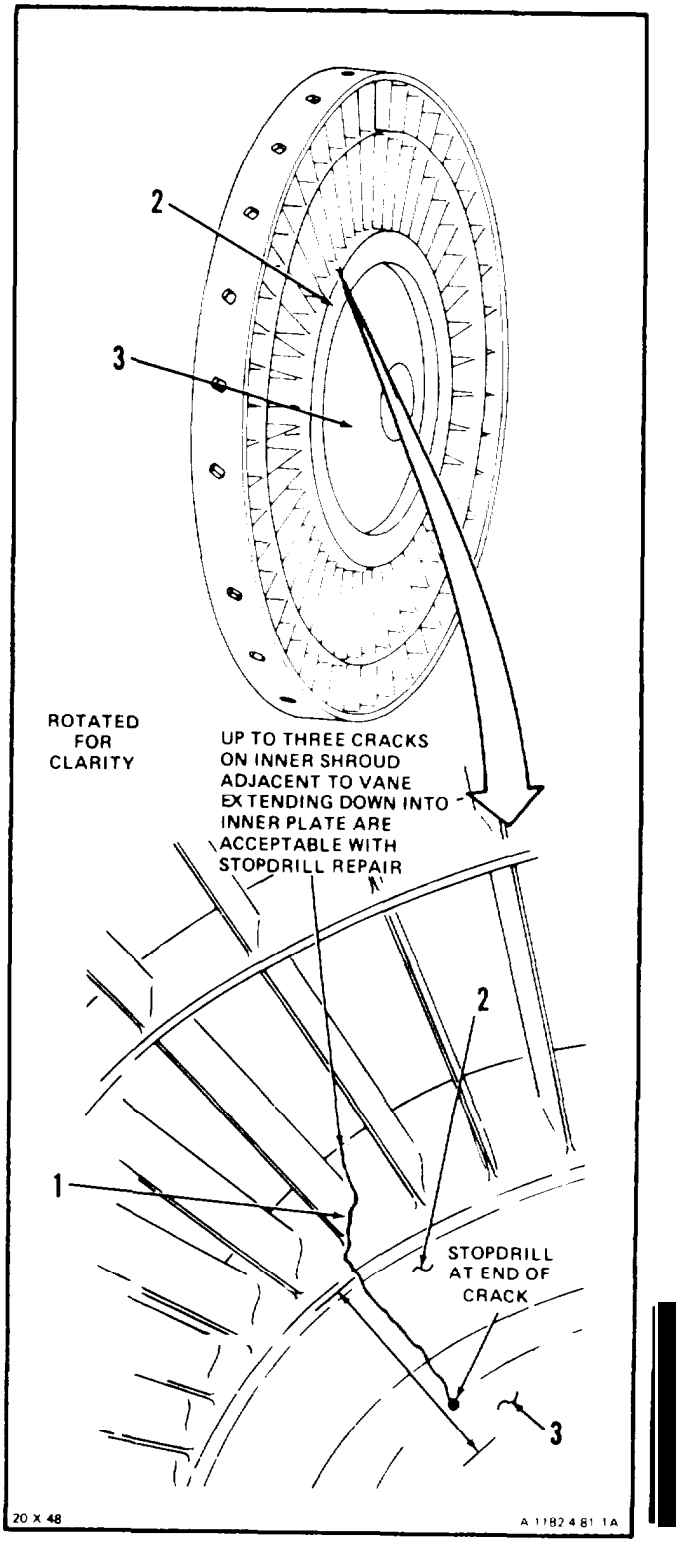
CAUTION

Stop drill repair is limited to cracks ending in inner plate and aft radial section of inner shroud only. Attempts to stop drill in other areas may weaken vane assembly.

a. Fluorescent-penetrant inspect inner shroud aft radial section (2) or inner plate (3) to determine end of crack (1). (Ref TM 43-0103).

b. Stop drill crack (1), using portable electric drill and a 3/32 inch twist drill.

c. Converging cracks are not acceptable



GO TO NEXT PAGE

4-81 REPAIR EXIT VANE ASSEMBLY (Continued)

NOTE

In following step 2., use proper welding procedure at all times (Ref. TM 55-1500-204-25/1).

2. Using tungsten inert gas method, **weld-repair all cracks (4)** in inner plate (3) if any cracks in inner plate exceeds inspection limits (Ref. Task 4-80).

WARNING

Power grinding is hazardous to personnel. Sparks and metal chips may injure eyes. If injury occurs, get medical attention.

a. Wear goggles and rout cracks (4) to expose clean, sound base metal. Use portable eletric drill and carbide burr.

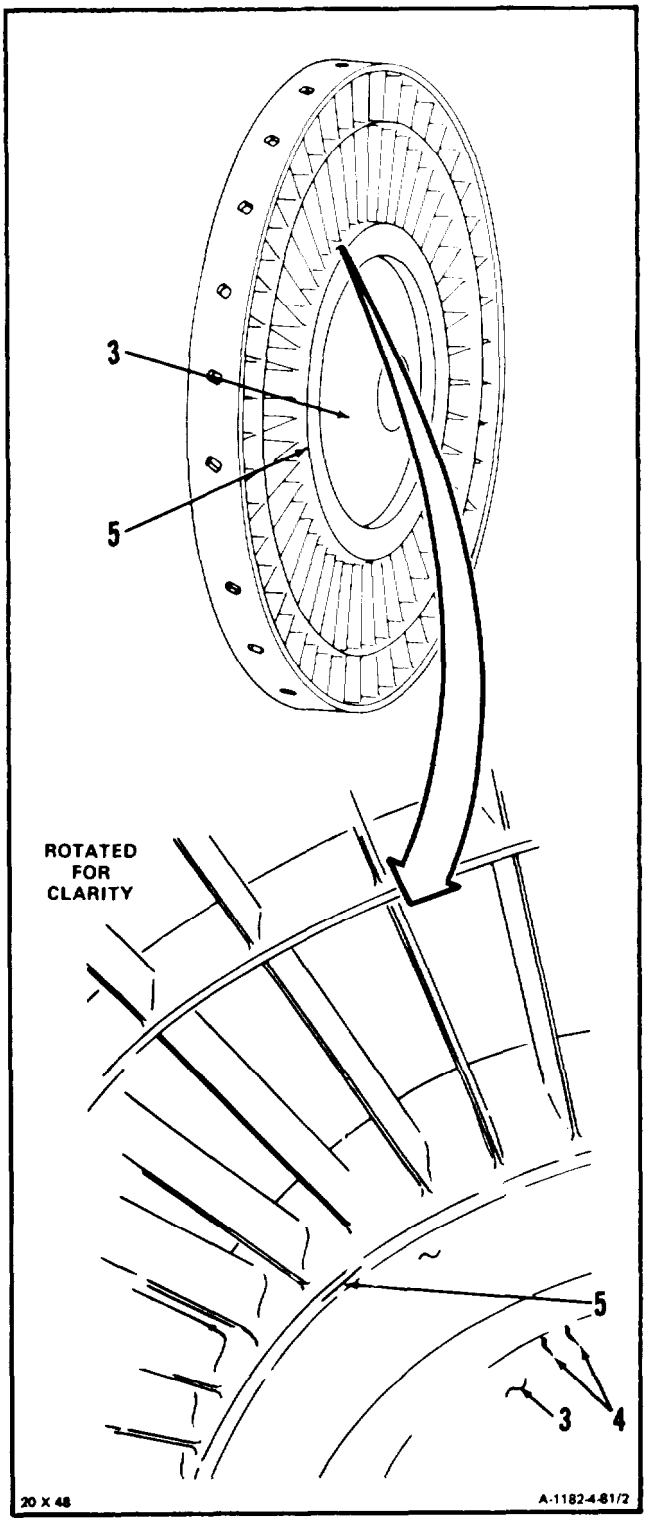
b. Clean chips, dirt, and oil from area to be welded (Ref. Task 4-79).

NOTE

Weld-repair shall be only in inner plate and shall not progress beyond inner shroud aft radius.

c. Weld-repair. Use welding wire (E61). Do not weld beyond inner shroud aft radius (5).

d. Fluorescent-penetrant inspect weld-repair area (Ref. TM 43-0103). There shall be no cracks. If cracks are found, repeat steps a. through c.



GO TO NEXT PAGE

4-81 REPAIR EXIT VANE ASSEMBLY (Continued)

NOTE

In following step 3., use proper welding procedure at all times. (Ref. TM 55-1-1500-204-25/1).

3. Use tungsten inert gas method, **weld-repair all cracks (6)** in midspan shroud (7) if any cracks in midspan shroud (7) exceeds inspectron limits. (Ref. Task 4-80).

WARNING

Power grinding is hazardous to personnel. Sparks and metal chips may injure eyes. If injury occurs, get medical attention.

a. Wear goggles and rout cracks (6) to expose clean, sound base metal. Use portable electric drill and carbide burr.

b. Clean chips, dirt, and oil from area to be welded (Ref. Task 4-79).

NOTE

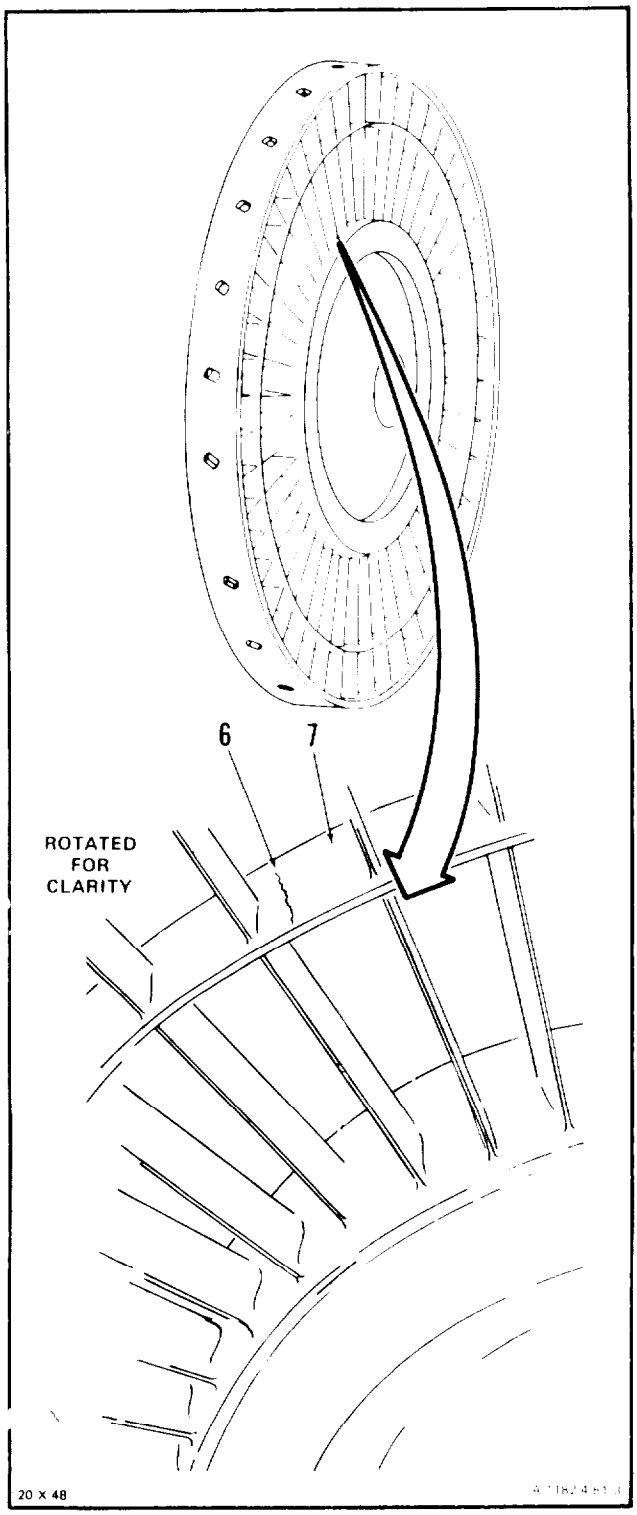
All welds in air flow path must be blended smooth.

c. Weld-repair. Use welding wire (E61). Do not weld beyond inner shroud aft radius (5).

d. Blend excess weld-repair with surrounding parent metal. Use Carborundum stone (E10).

e. Polish repaired area Use crocus cloth (E15).

f. Fluorescent-penetrant Inspect weld-repair area (Ref. TM 43-0103). There shall be no cracks. If cracks are found, repeat steps a. through e.



GO TO NEXT PAGE

4-81 REPAIR EXIT VANE ASSEMBLY (Continued) 4-81

NOTE

In following step 4., use proper **welding procedures** at all times (Ref. TM 55-1500-204-25/1).

4. Use tungsten inert gas method, **weld-repair all cracks (8)** in inner shroud (9) that pass on both sides of a single vane (10) and exceed Inspection limits (Ref. Task 4-80).

WARNING

Power grinding is hazardous to personnel. Sparks and metal chips may injure eyes. If injury occurs, get medical attention.

a. Wear goggles and rout cracks (4) to expose clean, sound base metal. Use portable electric drill and carbide burr.

b. Clean chips, dirt, and oil from area to be welded (Ref. Task 4-79).

NOTE

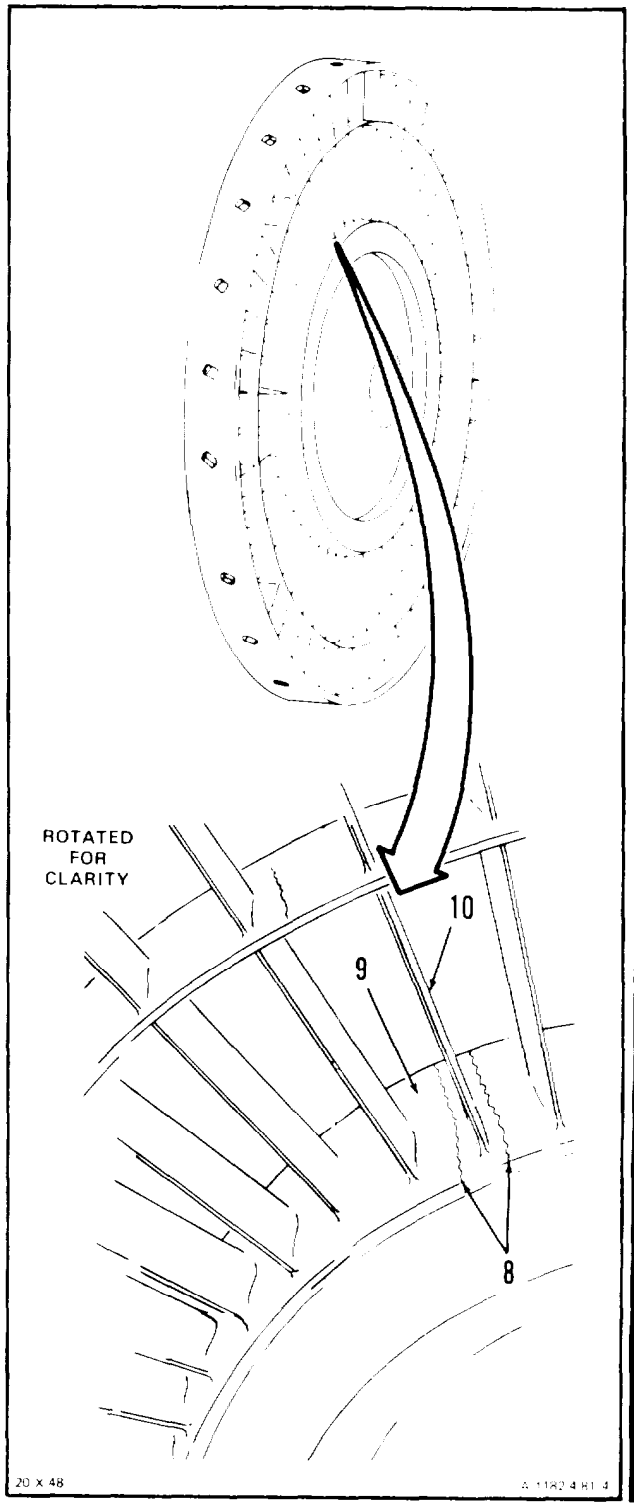
All welds in air flow path must be blended smooth.

c. Weld-repair. Use welding wire (E61). Weld any cracks (8) that progress around both sides of a single vane (10).

d. Blend excess weld-repair with surrounding parent metal. Use Carborundum stone (E10).

e. Polish repaired area. Use crocus cloth (E15).

f. Fluorescent-penetrant Inspect weld-repair area (Ref. Task 43-0103). There shall be no cracks. If cracks are found, repeat steps a. through e.



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-82 INSTALL EXIT VANE ASSEMBLY

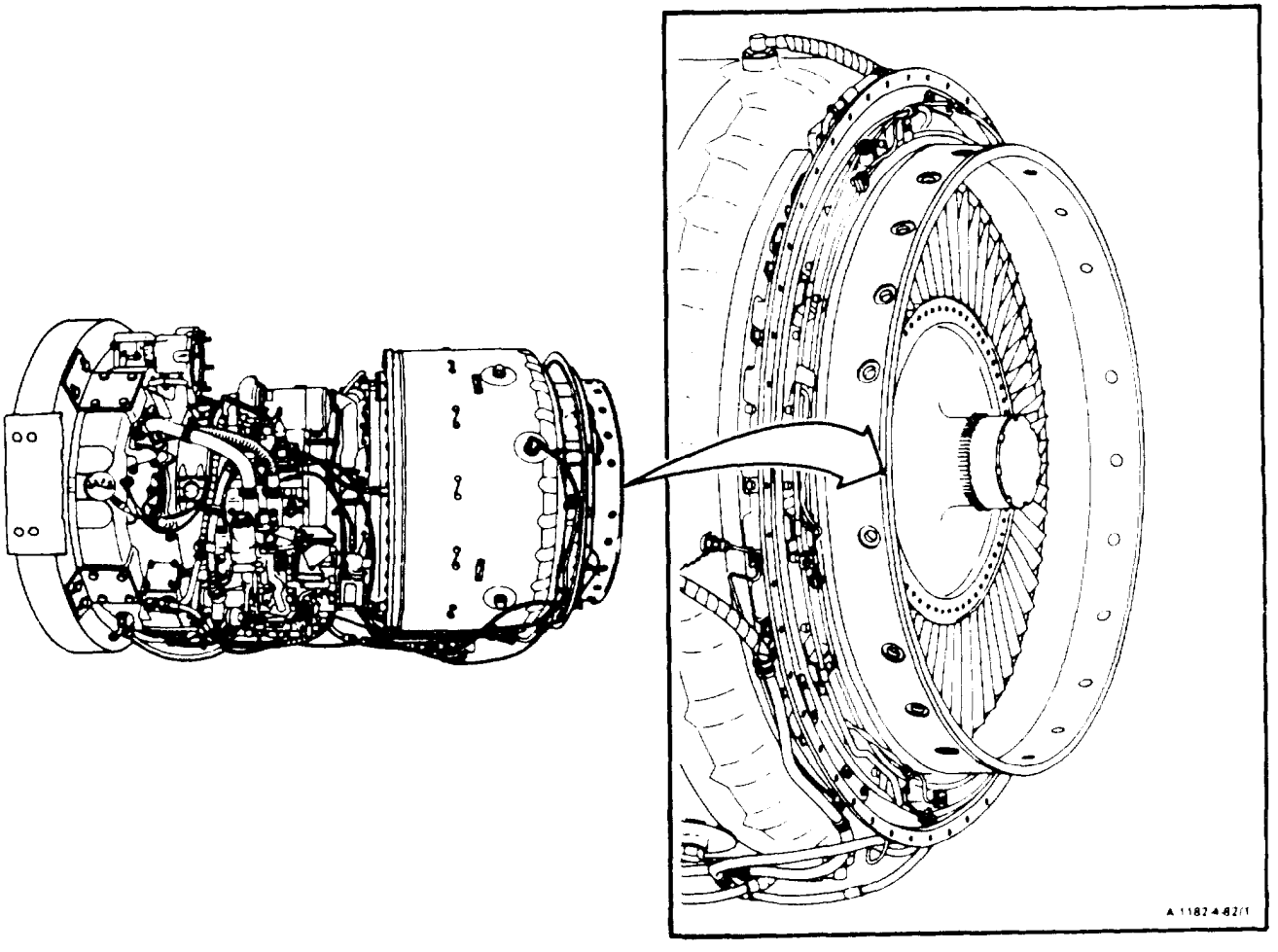
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspector's Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Crocus Cloth (E15)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector



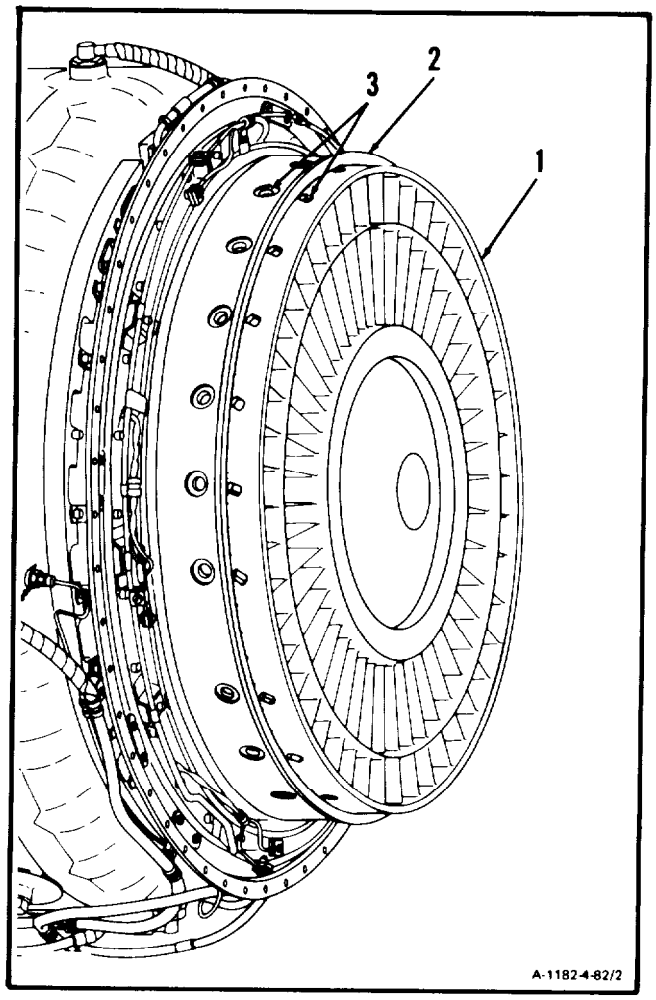
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4-82 INSTALL EXIT VANE ASSEMBLY (Continued)

NOTE

If necessary, use a soft faced mallet to align bolt holes.

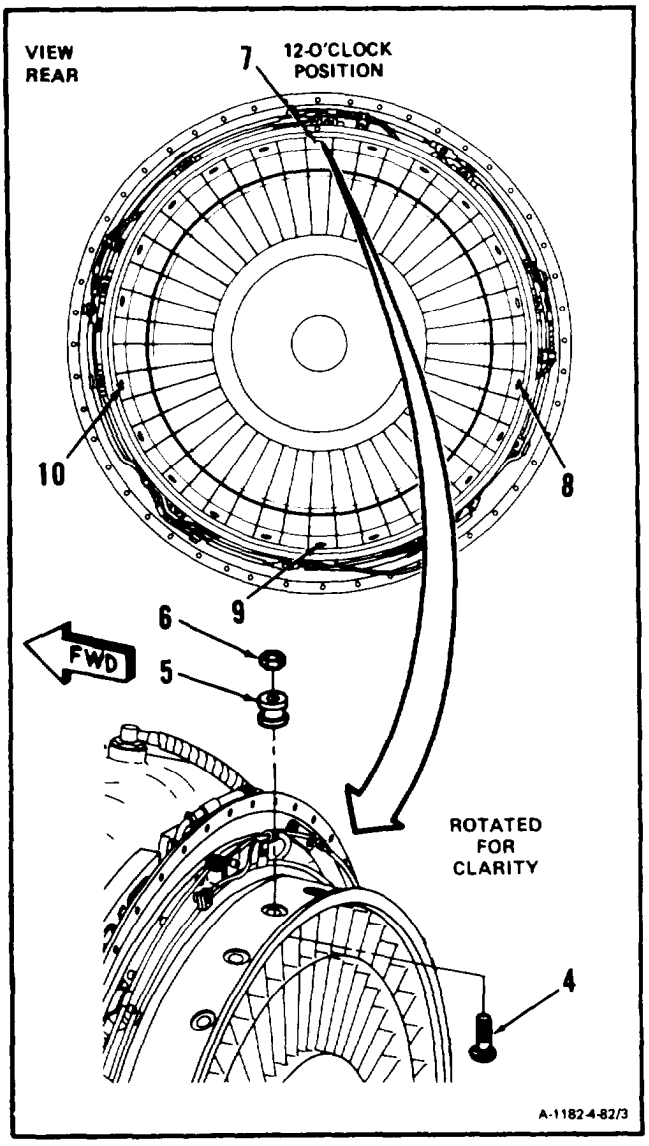
1. Position exit vane assembly (1) in fourth turbine nozzle (2). **Align bolt holes (3).**



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4-82 INSTALL EXIT VANE ASSEMBLY (Continued) 4-82

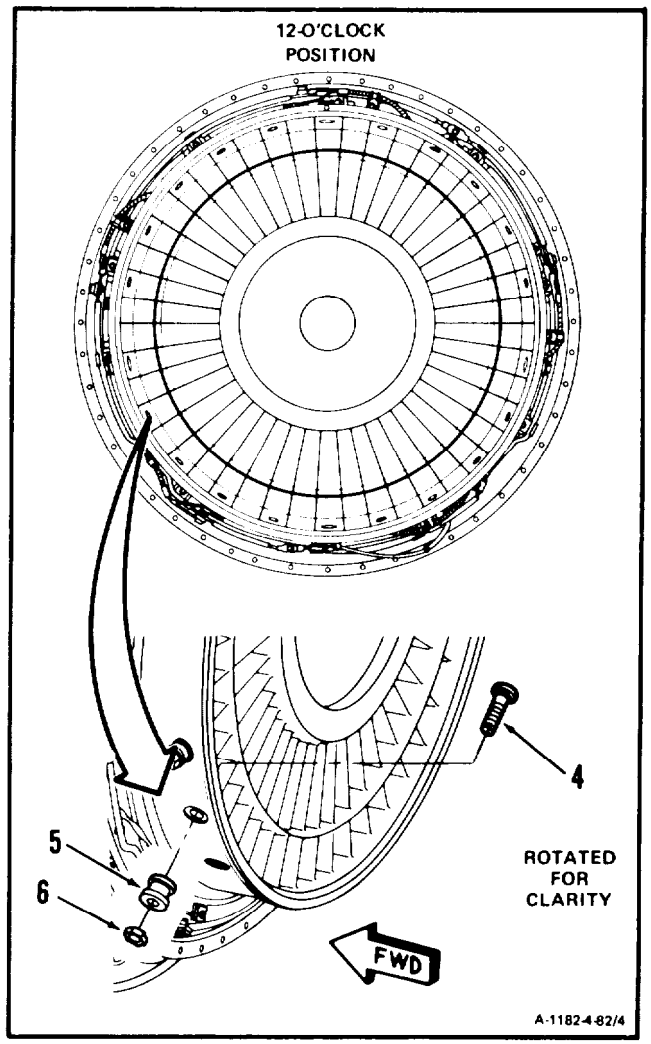
2. **Install four bolts (4), spacers (5), and nuts (6)** in bolt hole positions (7,8, 9, and 10). **Torque nuts (6) to 125 inch-pounds.**



GO TO NEXT PAGE

4-82 INSTALL EXIT VANE ASSEMBLY (Continued)

3. **Install remaining 18 bolts (4), spacers (5) and nuts (6). Torque nuts (6) to 125 inch-pounds.** Lockwire nuts (6). Use lockwire (E29).



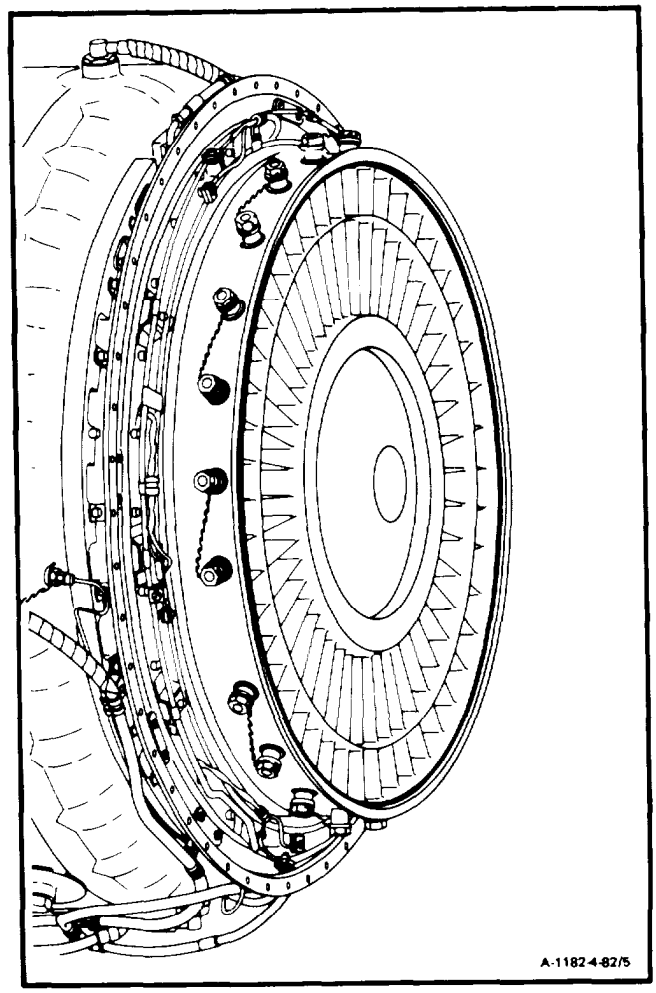
INSPECT

GO TO NEXT PAGE

4-82 INSTALL EXIT VANE ASSEMBLY (Continued)

FOLLOW-ON MAINTENANCE:

None



END OF TASK

CHAPTER 5

ACCESSORY GEAR SECTION - MAINTENANCE INSTRUCTIONS

CHAPTER OVERVIEW

This chapter contains maintenance procedures for the accessory gear section. It is divided into the following sections and tasks.

SECTION	TASK NO.	TITLE	PAGE
I		ACCESSORY GEARBOX ASSEMBLY MAINTENANCE PROCEDURES	
	5-1	Remove Accessory Gearbox Assembly	5-3
	5-2	Disassemble Accessory Gearbox Assembly	5-13
	5-3	Clean Accessory Gearbox Assembly	5-19
	5-4	Inspect Accessory Gearbox Assembly	5-22
	5-5	Repair Accessory Gearbox Assembly	5-24
	5-5.1	Remove Seal and Liner Assembly	5-24.1
	5-5.2	Remove Seal	5-24.2
	5-5.3	Install Seal	5-24.3
	5-5.4	Install Seal and Liner Assembly	5-24.4
	5-5.5	Remove Seal Assembly	5-24.5
	5-5.6	Install Seal Assembly	5-24.7
	5-6	Assemble Accessory Gearbox Assembly	5-25
	5-7	Install Accessory Gearbox Assembly	5-32
II		ACCESSORY GEAR ASSEMBLY MAINTENANCE PROCEDURES	
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	5-9	Clean Accessory Gear Assembly (AVIM)	5-53
	5-10	Inspect Accessory Gear Assembly (AVIM)	5-54
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III		STARTER DRIVE ASSEMBLY MAINTENANCE PROCEDURES	
	5-12	Remove Starter Drive Assembly	5-81
	5-13	Clean Starter Drive Assembly	5-85
	5-14	Inspect Starter Drive Assembly	5-86
	5-15	Repair Starter Drive Assembly	5-87
	5-16	Install Starter Drive Assembly	5-95

SECTION	TASK NO.	TITLE	PAGE
IV		OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY MAINTENANCE PROCEDURES	
	5-17	Remove Overspeed Drive and Outlet Cover Assembly	5-99
	5-18	Disassemble Overspeed Drive and Outlet Cover Assembly	5-101
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	5-20	Inspect Overspeed Drive and Outlet Cover Assembly	5-107
	5-21	Repair Overspeed Drive and Outlet cover Assembly	5-109
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	5-23.1	Backlash Check - Overspeed Drive and Outlet Cover Assembly	5-116

5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY 5-1

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Gear Holding Fixture (T12)
Handling Tool (T16)
Hex Drive Socket Head Screw Key Set
Container, 1 Quart

Materials:
Wiping Rag (E58)

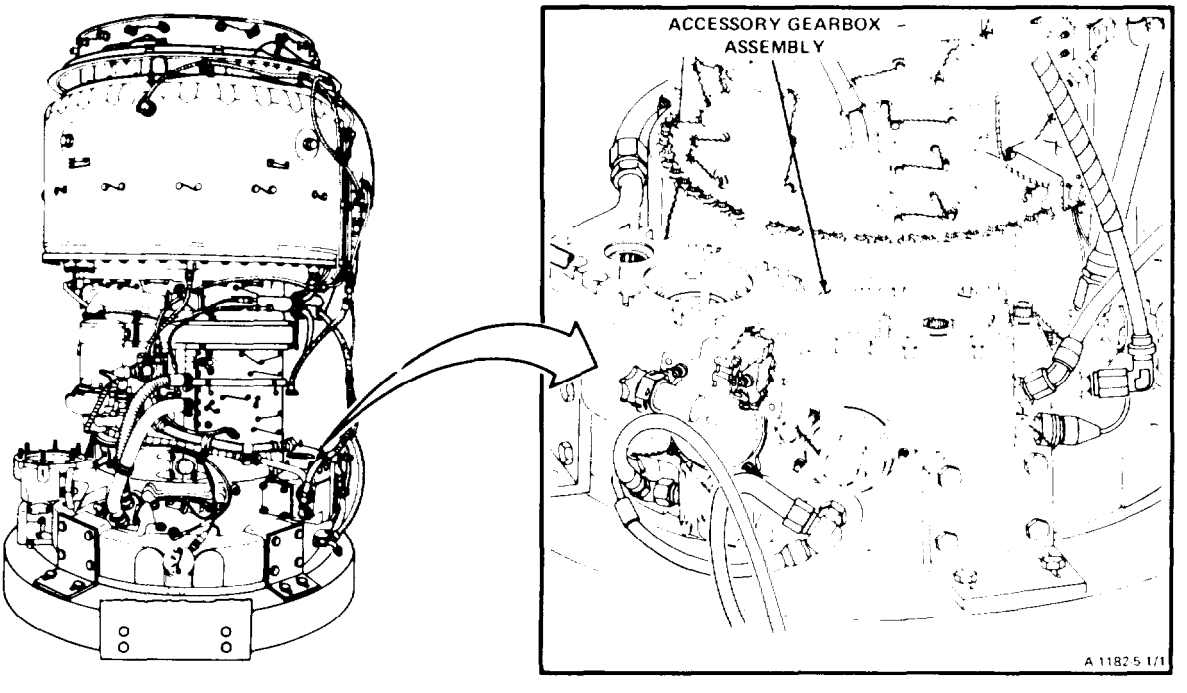
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Enqne Oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)
Fuel Control Removed (Task 6-1)
Main Oil Pump Removed and Scavenge Oil Screen (Task 8-1)

General Safety Instructions:

WARNING

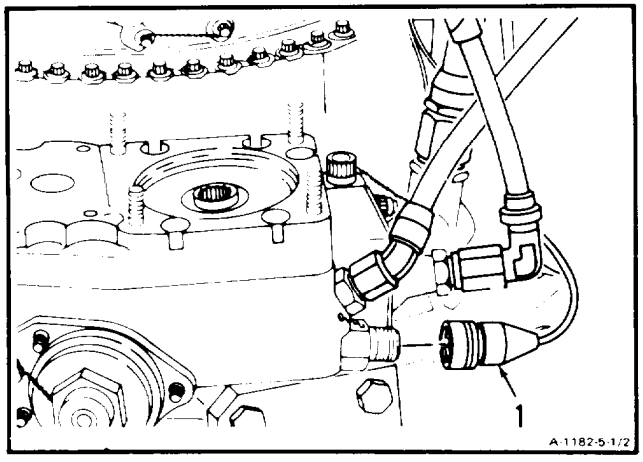
Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.



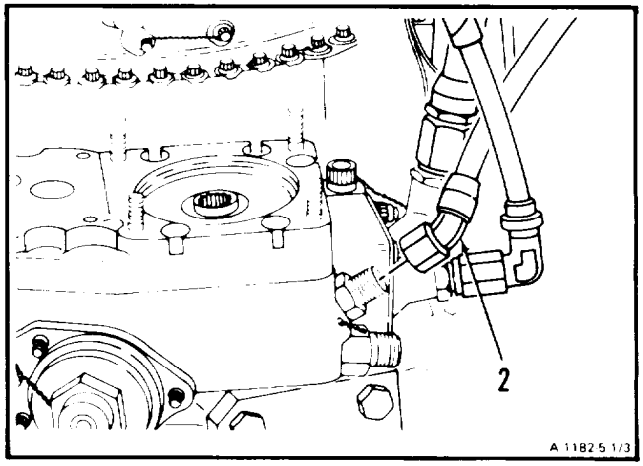
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued)

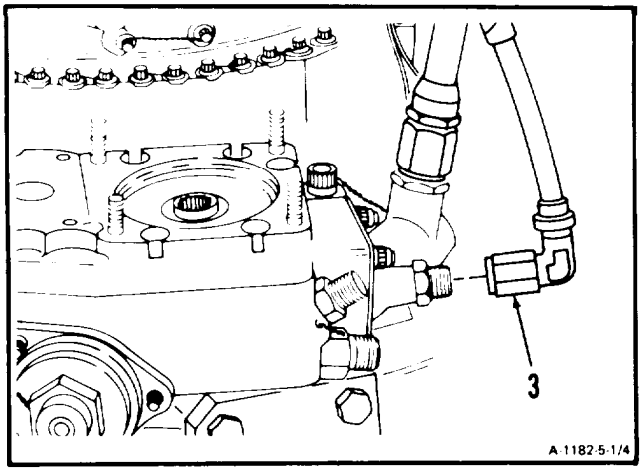
1. Remove lockwire and **disconnect electrical connector (1).**



2. **Disconnect hose assembly (2).**



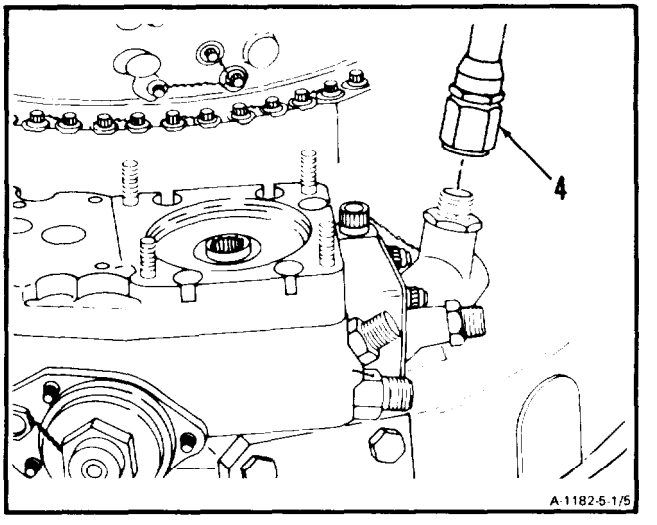
3. **Disconnect hose assembly (3).**



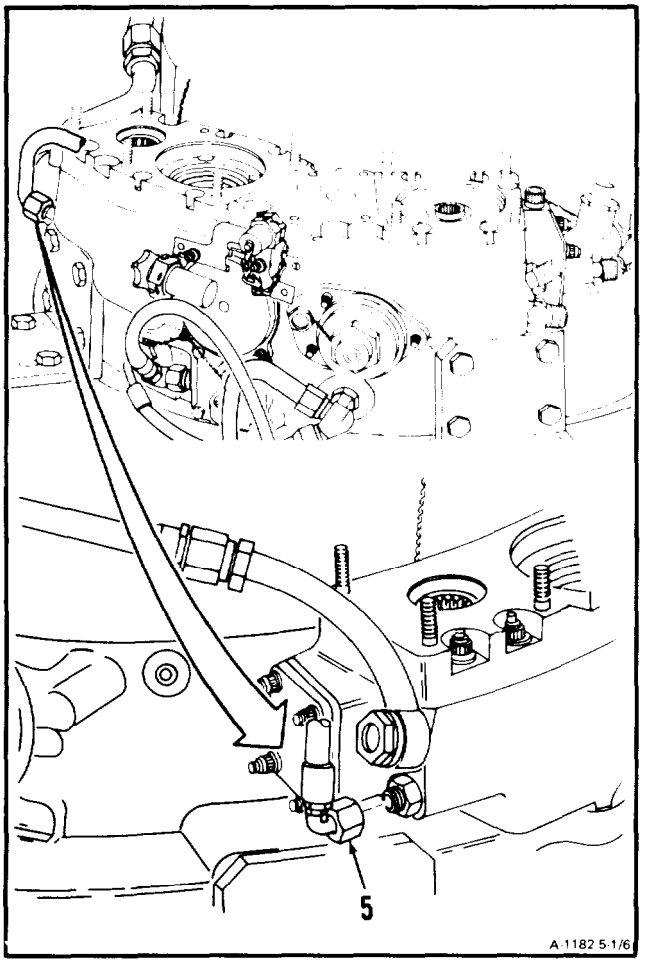
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-1

4. **Disconnect tube and hose assembly (4).**



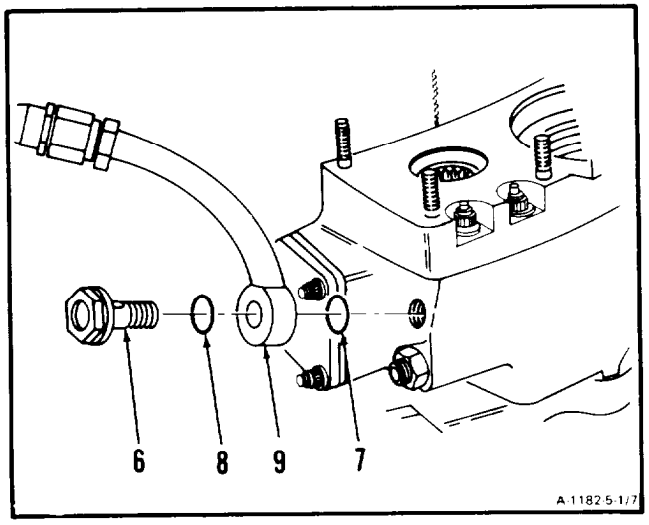
5. **Disconnect hose assembly (5).**



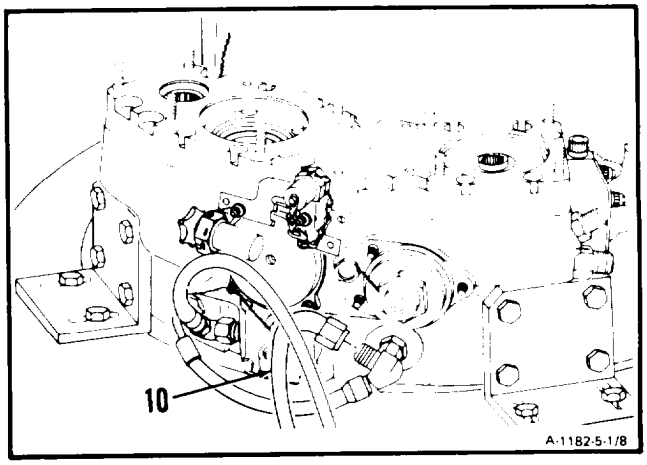
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued)

6. **Remove** lockwire, **bolt (6),** and packings (7 and 8). Set tube assembly (9) to one side.



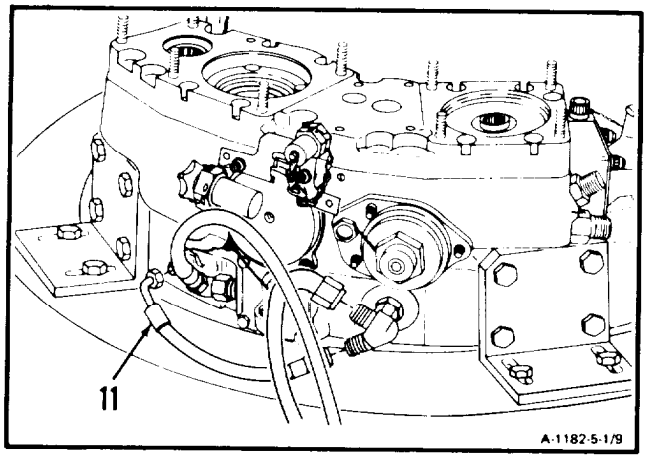
7. **Disconnect hose assembly (10).**



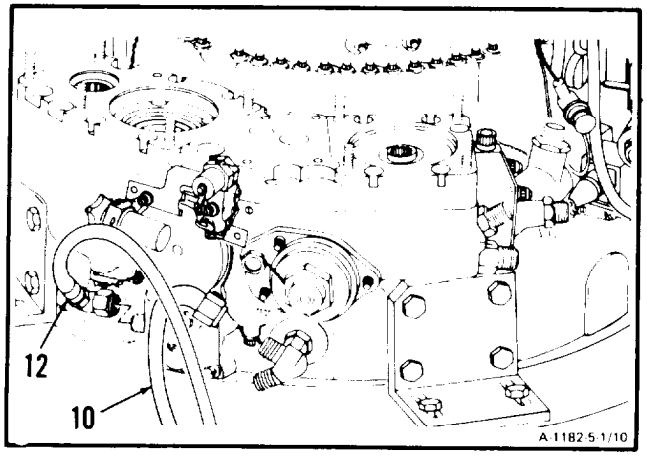
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-1

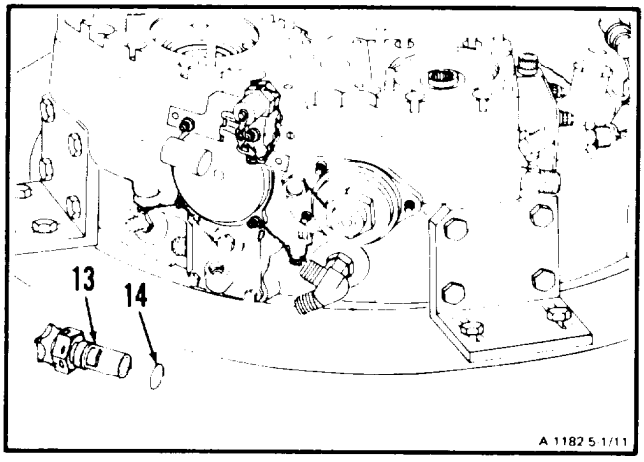
8. **Disconnect and remove hose assembly (11).**



9. **Disconnect hose assembly (12)** and remove hose assemblies (10 and 12).



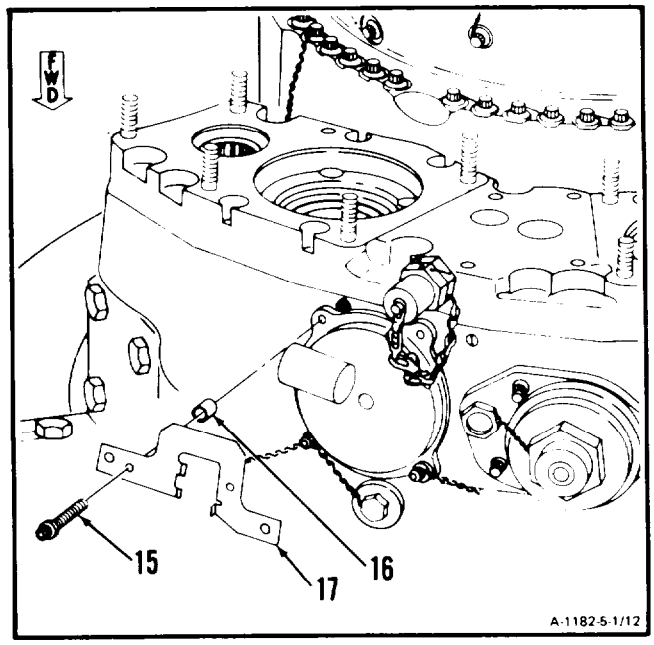
10. **Remove** lockwire, **chip detector (13),** and packing (14).



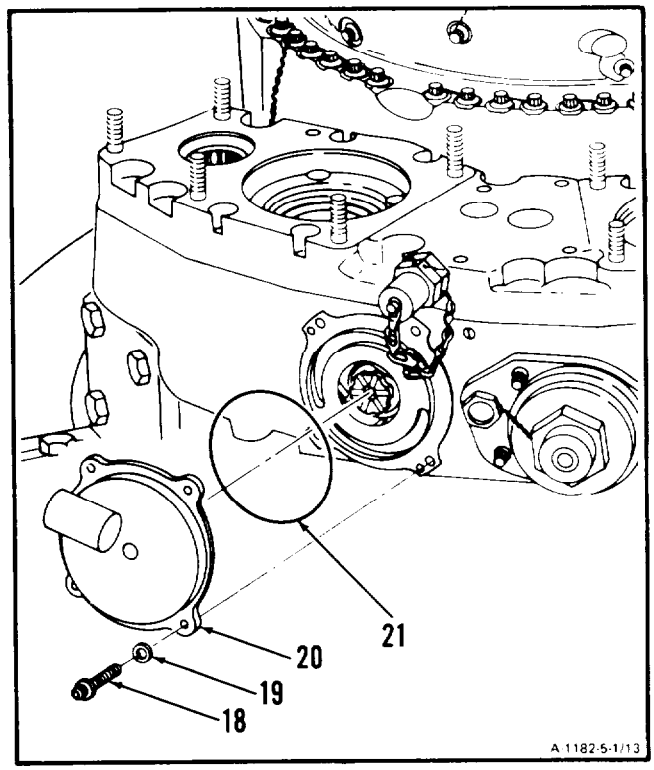
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-1

11. **Remove** lockwire, two bolts (15), spacers (16), and **bracket (17).**



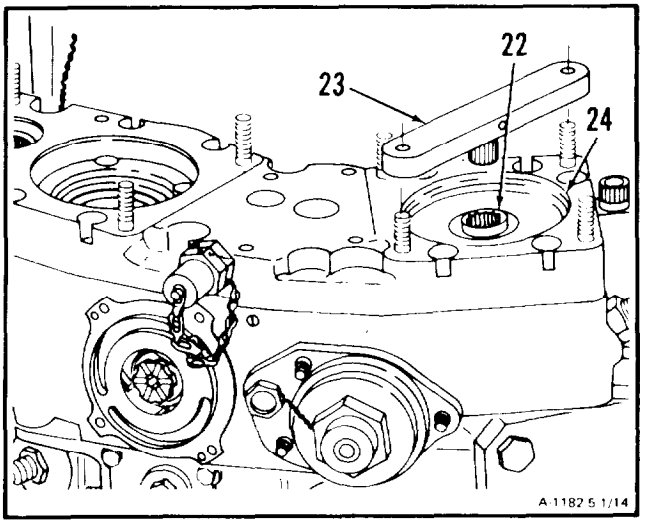
12. **Remove** lockwire, two bolts (18), washers (19), **housing (20),** and packing (21).



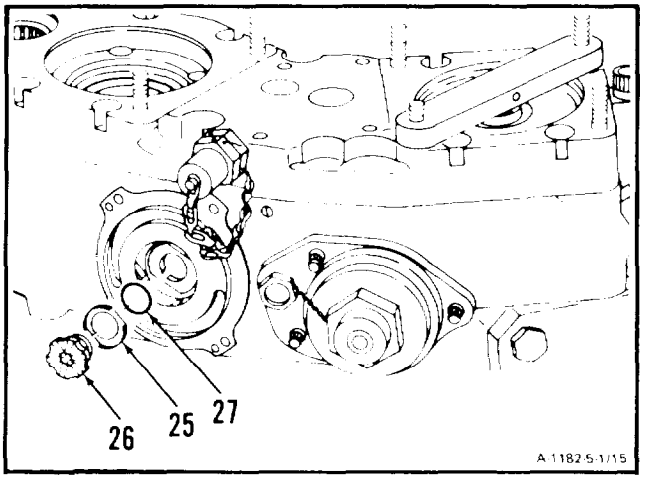
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-1

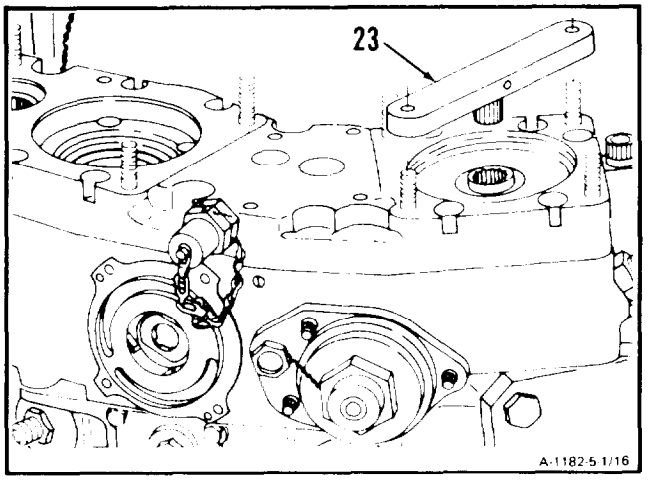
13. Turn spline (22) to align with gear holding fix ture (T12) (23). **Install gear holding fixture (T12) (23)** on fuel boost pump mounting pad (24).



14. Unlock locking plate (25). **Remove plug (26),** locking plate (25), and packing (27). Use 1/4-inch hex drive socket head screw key.



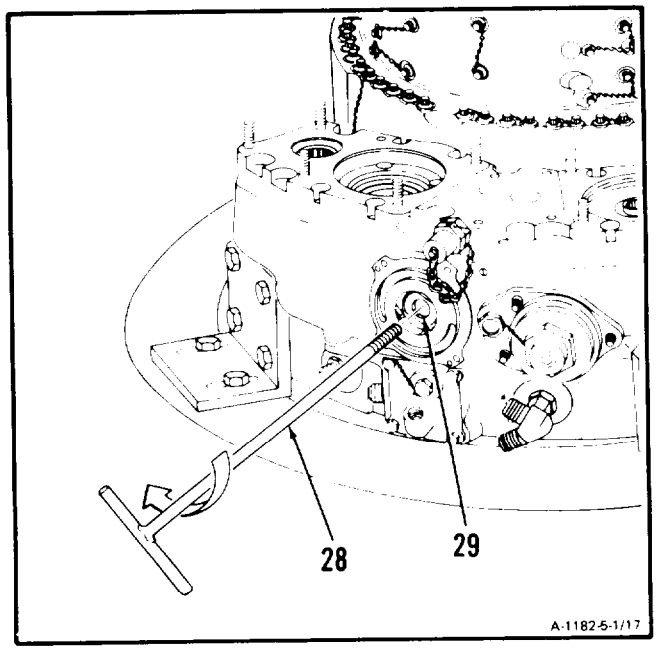
15. Remove gear holding fixture (T12) (23).



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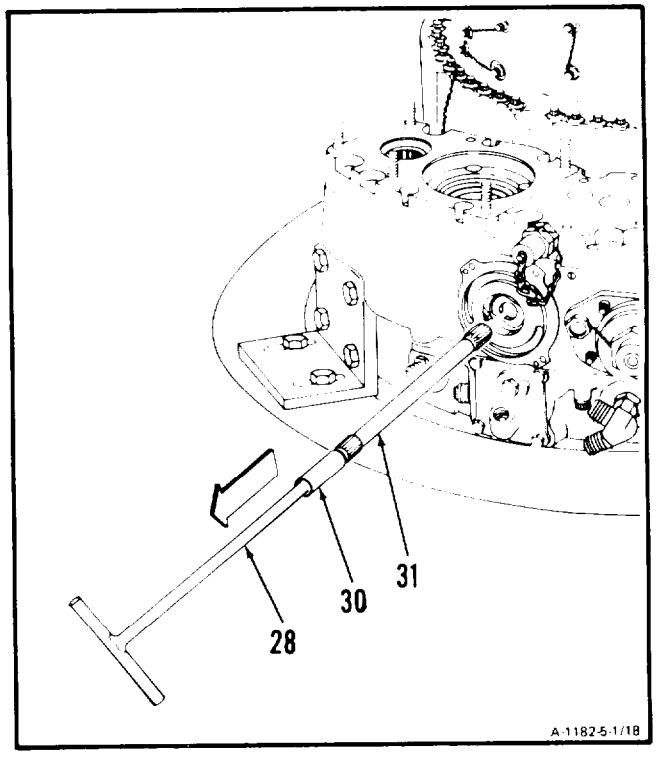
5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued)

16. Insert handling tool (T16) (28) in hole (29). Screw handling tool (T16) (28) into end of gearshaft (not shown).



17. Using handling tool (T16) (28), **remove spacer (30) and gearshaft (31).**

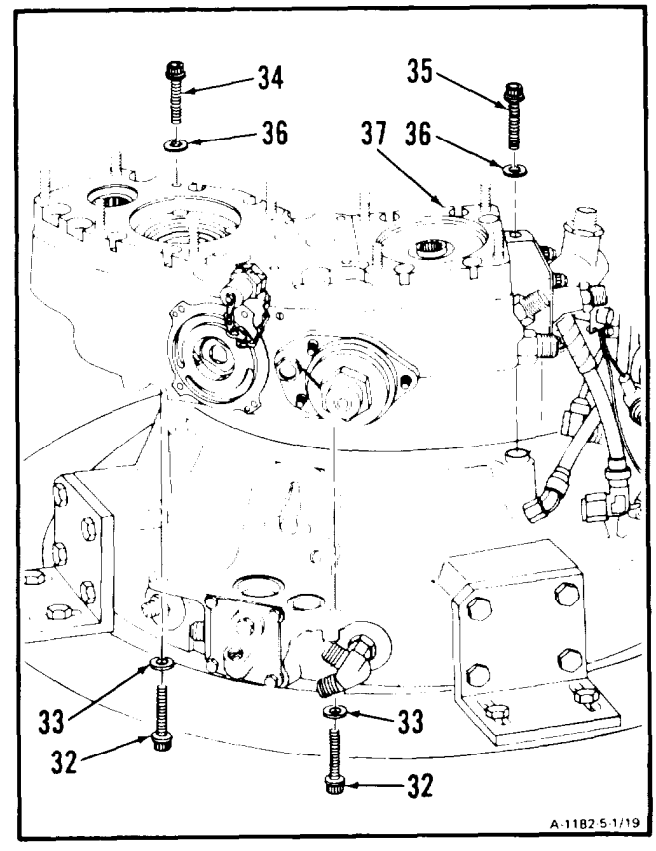
18. Remove gearshaft (31) and spacer (30) from handling tool (T16) (28).



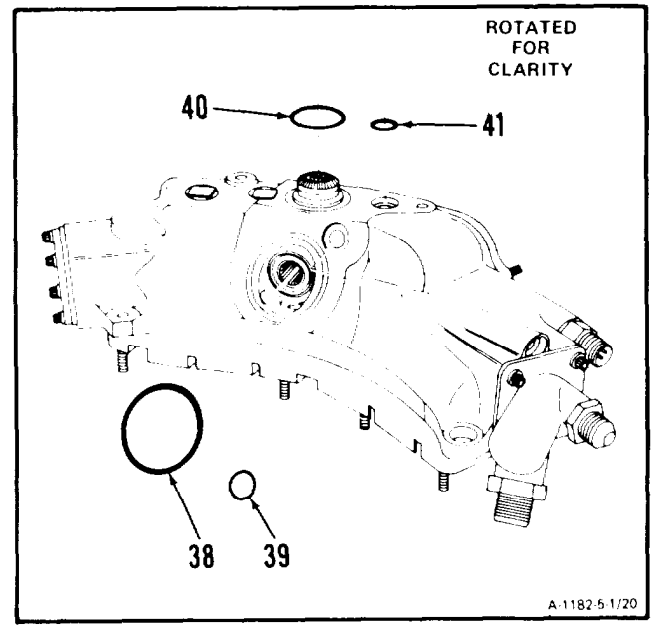
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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-1

19. Remove two bolts (32), and washers (33). **Remove** lockwire, bolts (34 and 35), two washers (36), and **accessory gearbox assembly (37).**



20. Remove packings (38, 39, 40, and 41).

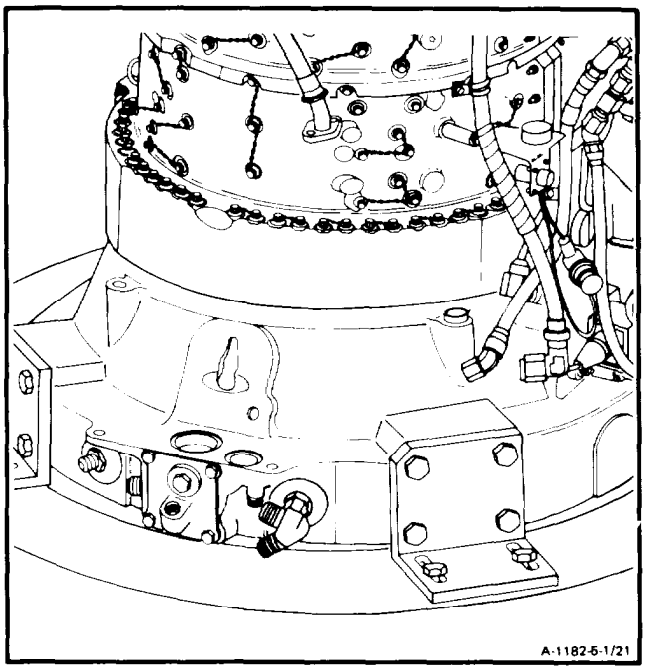


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5-1 REMOVE ACCESSORY GEARBOX ASSEMBLY (Continued)

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY 5-2

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Socket, 1-5/16 Inch
Retaining Ring Pliers

Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Main Oil Pump and Scavenge Oil Screen Removed (Task 8-1)
Fuel Control Removed (Task 6-1)
Accessory Gearbox Assembly Removed (Task 5-1)

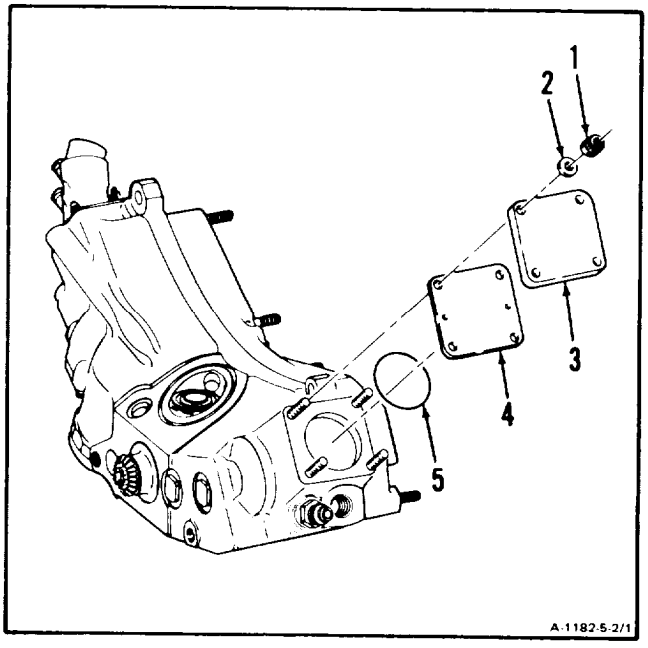
General Safety Instructions:

WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

1. **Remove** four nuts (1), washers (2), and **cover (3).**

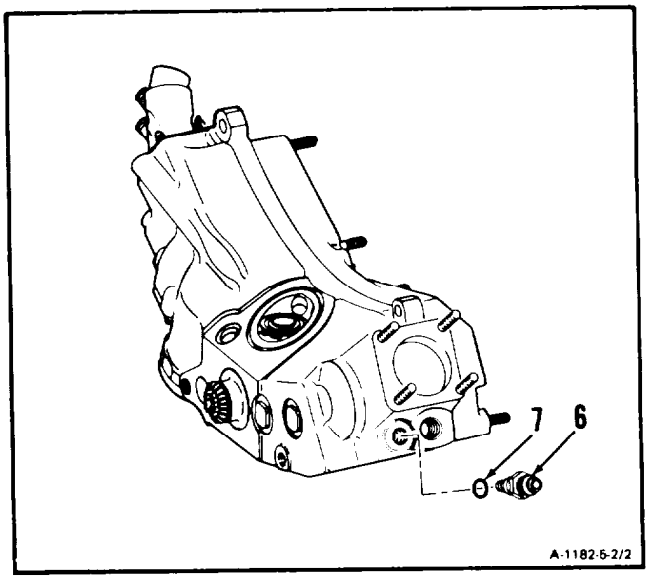
2. **Remove cover (4)** and packing (5).



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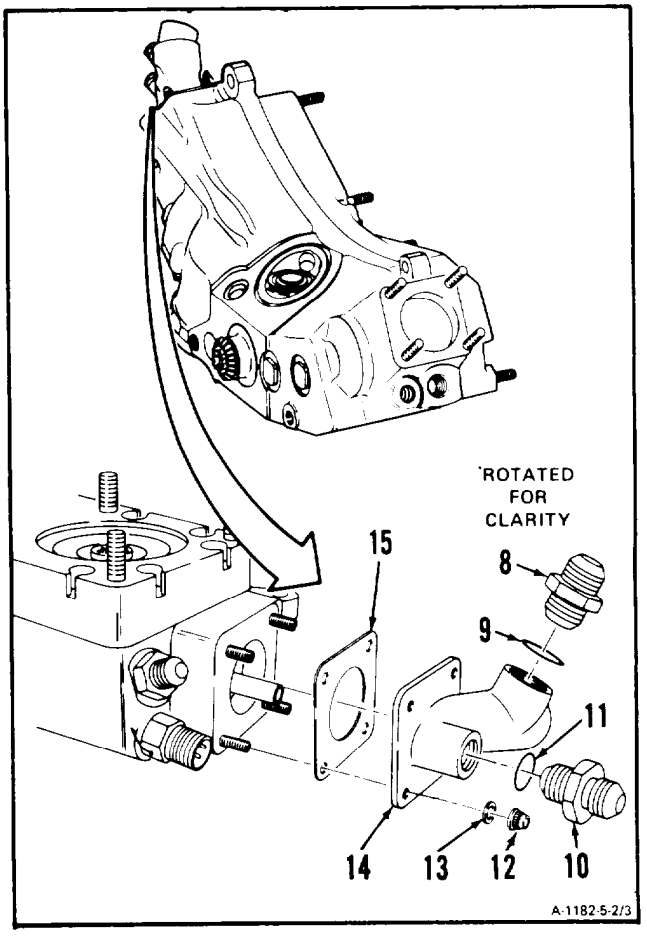
5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-2

3. **Remove adapter (6)** and packing (7).



4. **Remove nipples (8 and 10)** and packings (9 and 11).

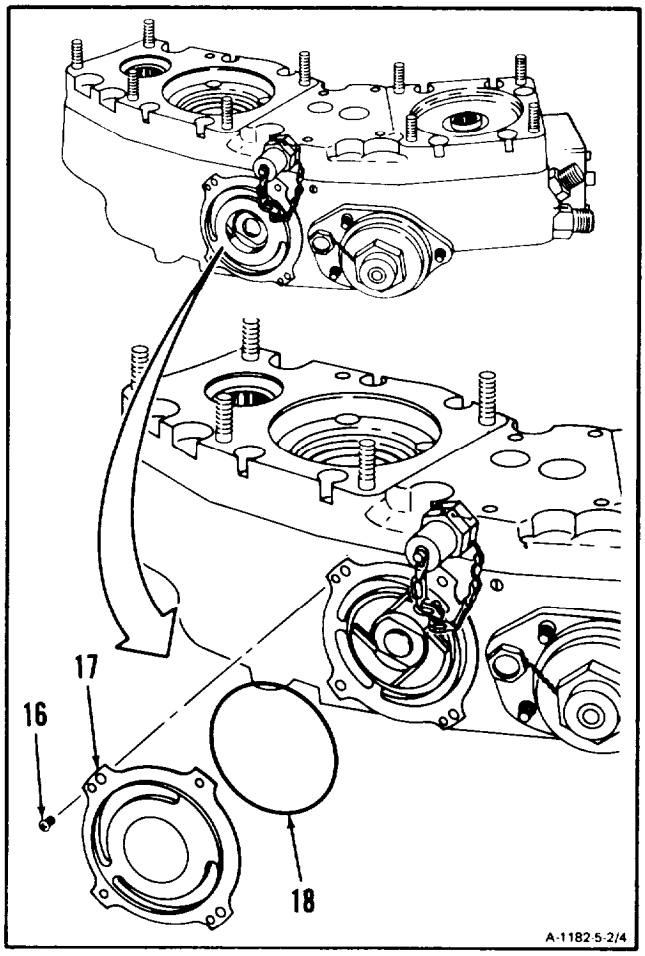
5. **Remove** four nuts (12), washers (13), **collector assembly (14),** and gasket (15).



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5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-2

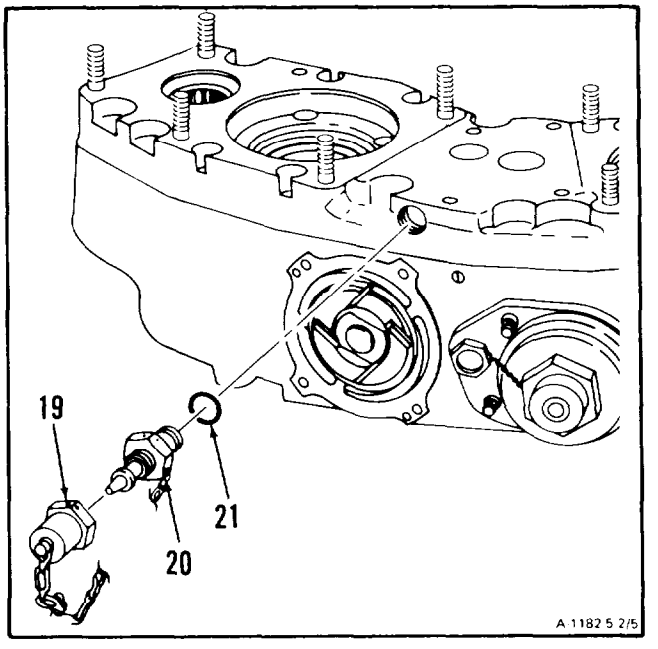
6. **Remove** two screws (16), **housing (17),** and packing (18).



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5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-2

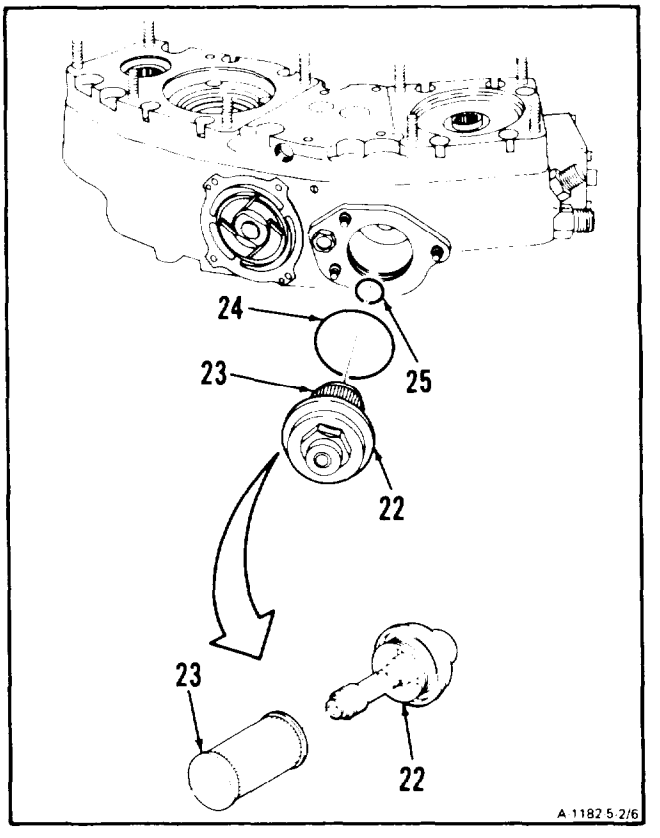
7. Remove lockwire and cap (19) from oil sampling drain cock (20). **Remove oil sampling drain cock (20)** and packing (21).



8. **Remove lockwire and oil filter cap and stem assembly (22) with oil filter element (23).** Use 1-5/16 inch socket.

9. Remove packings (24 and 25).

10. **Remove oil filter element (23)** from oil filter cap and stem assembly (22).

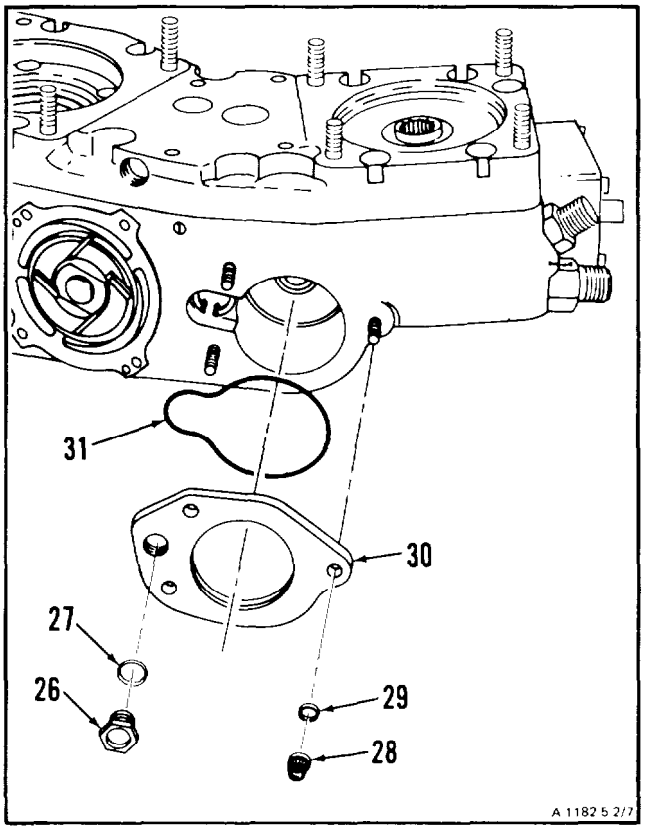


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5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-2

11. **Remove plug (26)** and packing (27).

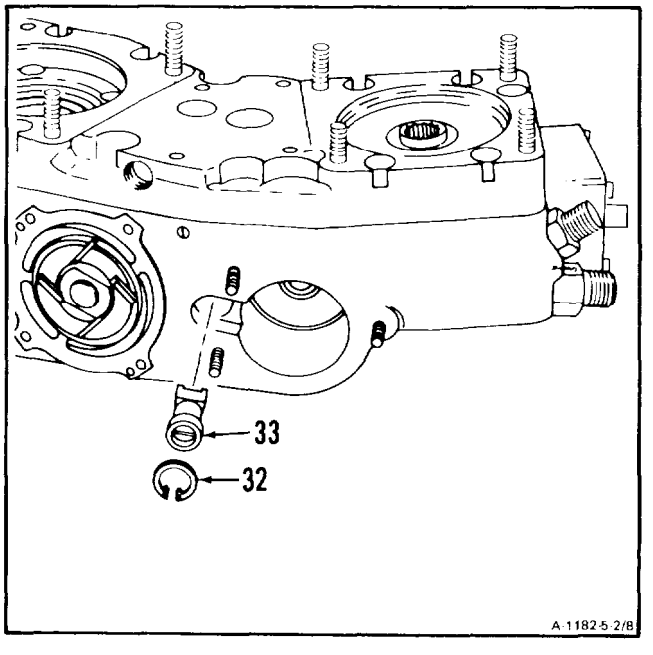
12. **Remove** three nuts (28), washers (29), **cover (30),** and packing (31).



WARNING

In following step, be careful when removing ring. Ring may spring loose and cause injury. If injury occurs, get medical attention.

13. **Remove** ring (32) and relief **valve (33).** Use retaining ring pliers.

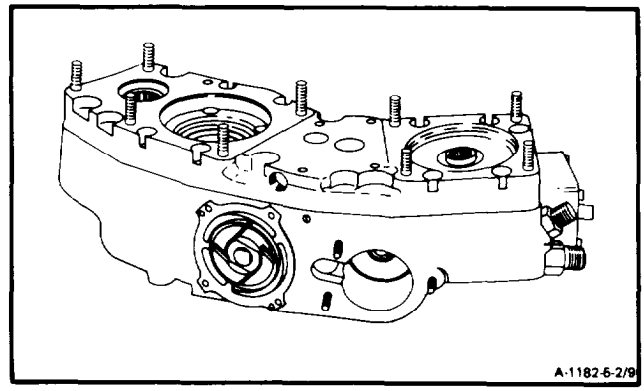


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5-2 DISASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-2

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-3 CLEAN ACCESSORY GEARBOX ASSEMBLY 5-3

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Free Cloth (E26)

Personnel Required:
68B10 Aircraft Powerplant Repairer

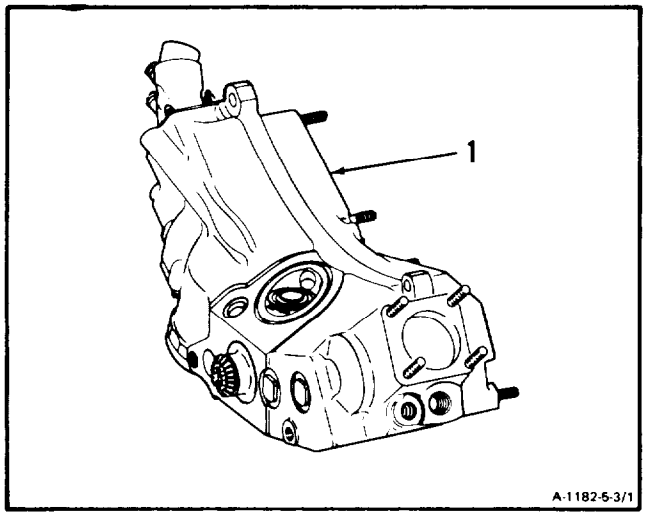
Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Main Oil Pump and Scavenge Oil Screen Removed (Task 8-1)
Fuel Control Removed (Task 6-1)
Accessory Gearbox Assembly Removed (Task 5-1)
Accessory Gearbox Assembly Disassembled (Task 5-2)

General Safety Instructions:

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean accessory gearbox assembly (1)** with lint-free cloth (E26) dampened in dry cleaning solvent (E17).



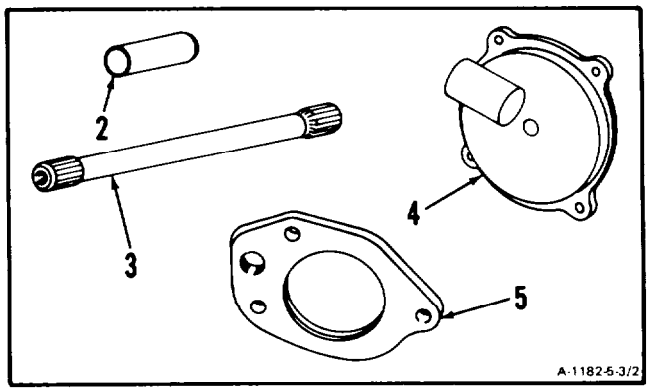
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5-3 CLEAN ACCESSORY GEARBOX ASSEMBLY (Continued) 5-3

2. **Clean spacer (2), gearshaft (3), housing (4), and cover (5)** as follows:

   a. Immerse and agitate in dry cleaning solvent (E17).

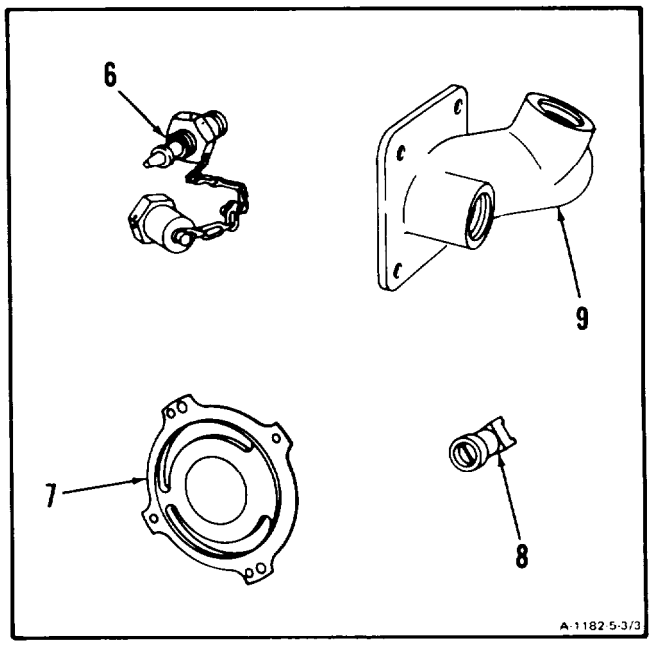
   b. Wipe dry using clean lint-free cloth (E26).



3. **Clean oil sampling drain cock (6), oil scavenge housing (7), relief valve (8), and collector (9).**

   a. immerse and agitate in dry cleaning solvent (E17).

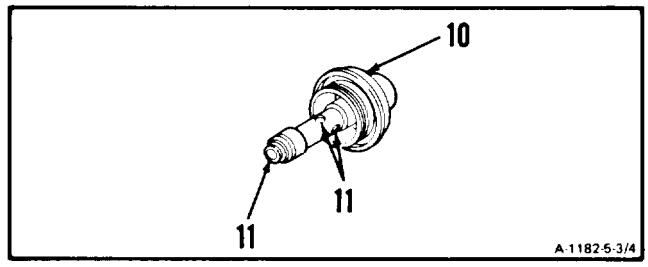
   b. Wipe dry using clean lint-free cloth (E26).



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5-3 CLEAN ACCESSORY GEARBOX ASSEMBLY (Continued) 5-3

4. **Clean oil filter cap and stem assembly (10)** as follows:



a. Immerse and agitate cap and stem assembly (10) in dry cleaning solvent (E17). Use brush on outside surfaces.

b. Wipe outside surfaces dry with clean lint-free cloth (E26).

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

c. Wear goggles. Blow dry internal passages (11) using clean, dry compressed air.

FOLLOW-ON MAINTENANCE:

Inspect Accessory Gearbox Assembly (Task 5-4).

END OF TASK

5-4 INSPECT ACCESSORY GEARBOX ASSEMBLY 5-4

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Fluorescent-Penetrant Materials (E19)

Personnel Required:
68B30 Aircraft Powerplant Inspector

References:
TM 43-0103
Task 1-86
Task 1-118

Equipment Condition:
Off Engine Task

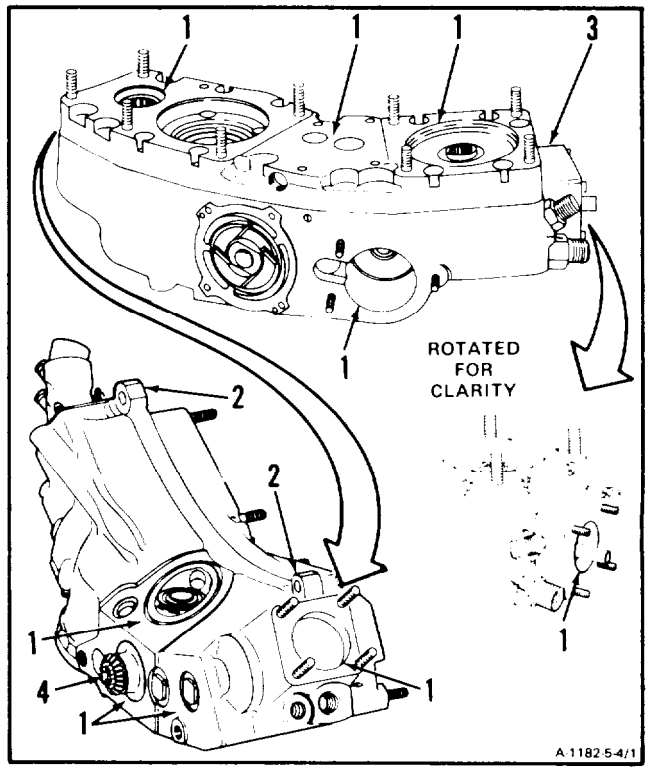
1. **Inspect** mounting surfaces (1) and flanges (2) of **accessory gearbox assembly (3).** There shall be no cracks.

2. Inspect accessory gearbox assembly (3) as follows:

   a. There shall be no cracks.

   b. There shall be no breakthrough of material caused by chafing.

3. **Inspect drive gear (4)** (Ref. Task 1-118). There shall be no wear allowed.

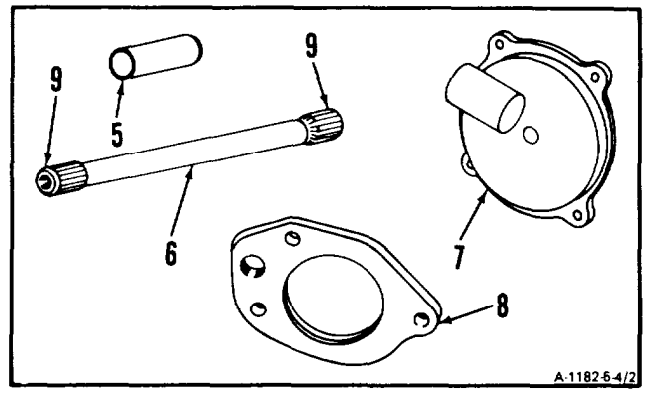


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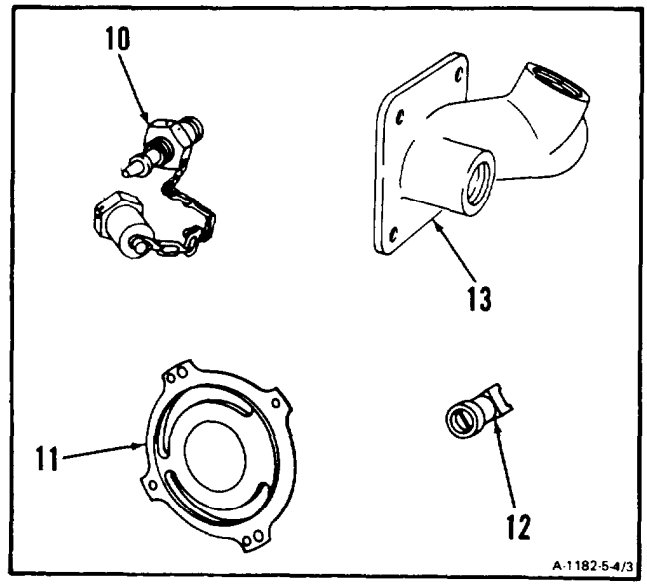
5-4 INSPECT ACCESSORY GEARBOX ASSEMBLY (Continued) 5-4

4. **Inspect spacer (5), gearshaft (6), housing (7), and cover (8) using fluorescent-penetrant.** (Ref. TM 43-0103). There shall be no cracks.

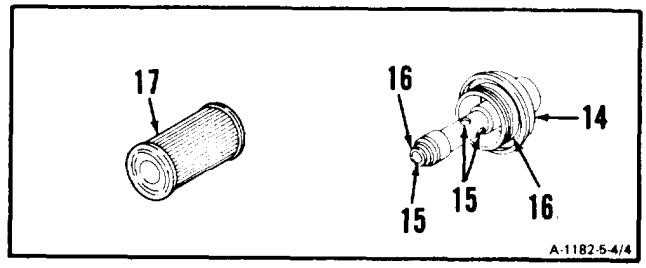
5. **Inspect gearshaft (6). Inspect splines (9).** (Ref. Task 1-118). There shall be no wear deeper than 0.007 inch on splines (9).



6. **Inspect oil sampling drain cock (10), oil scavenge housing (11), relief valve (12), and collector (13).** There shall be no cracks.



7. **Inspect oil filter cap and stem assembly (14).**
   a. There shall be no clogging of internal passages (15).
   b. There shall be no cracks.
   c. There shall be no nicks, dents or scratches deeper than 0.010 inch on two packing grooves (16).



8. **Inspect filter element (17).** There shall be no contamination. If contamination is found, inspect contaminated oil system (Ref. Task 1-86).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-5 REPAIR ACCESSORY GEARBOX ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

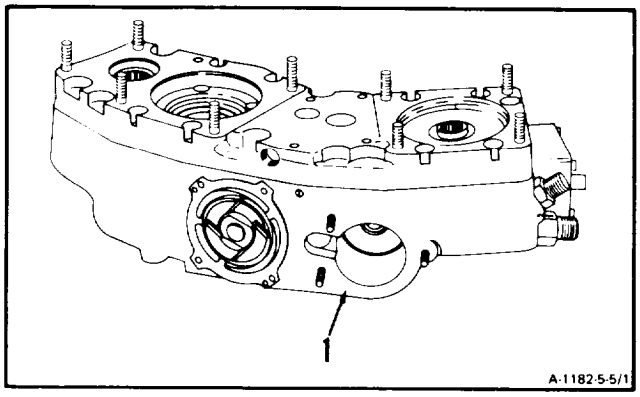
Materials:
Acid Swabbing Brush (E2)
Gray Enamel (E22)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
Task 1-119

Equipment Condition:
Off Engine Task

1. **Repair damaged paint on accessory gearbox assembly (1).** Apply a coat of Gray Enamel (E22). Use procedures for touch-up of magnesium and magnesium alloys (Ref. Task 1-119).



INSPECT

FOLLOW-ON MAINTENANCE.

None

END OF TASK

5-5.1 REMOVE SEAL AND LINER ASSEMBLY 5-5.1

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
Wiping Rag (E58)

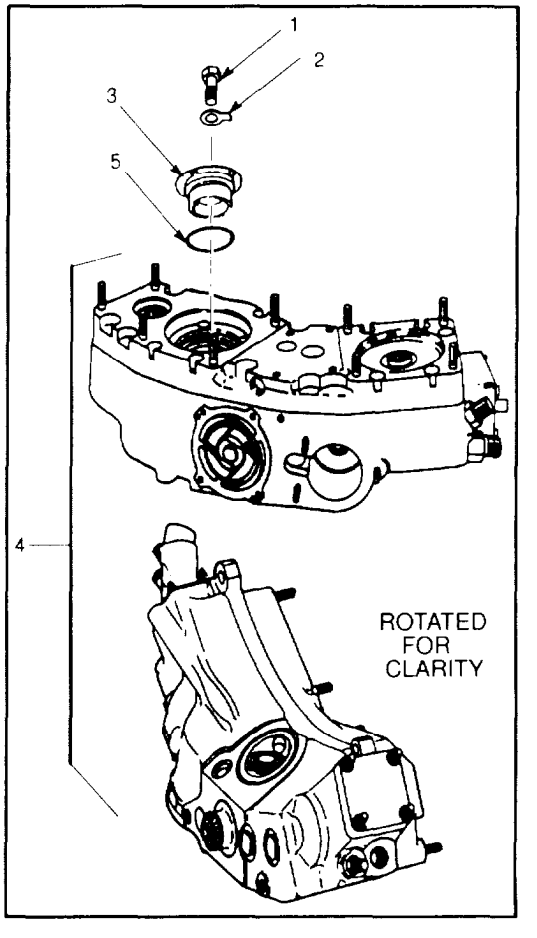
Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Engine Oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Fuel Control Removed (Task 6-1)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)
Main Oil Pump Removed and Scavenge Oil Screen (Task 8-1)

NOTE

This task can be performed with the engine installed or uninstalled on the aircraft and when the gearbox is removed from the engine.

1. Remove four bolts (1) and four tab washers (2).
2. Remove seal and liner assembly (3) from accessory gearbox (4).
3. Remove packing (5).



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-5.2 REMOVE SEAL 5-5.2

INITIAL SETUP

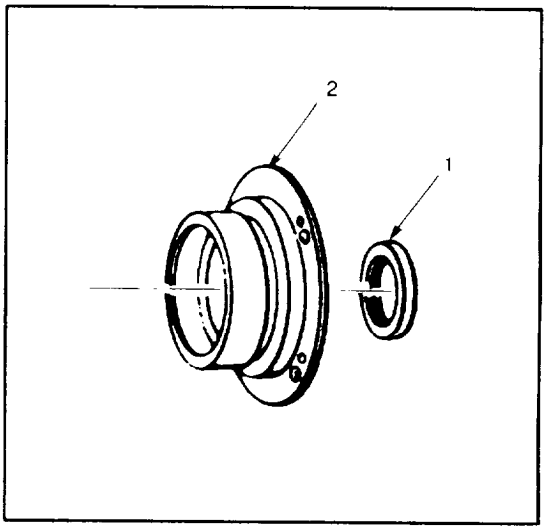
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Using a suitable sleeve and arbor press (E36), press seal assembly (1) from bearing liner (2).



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-5.3 INSTALL SEAL 5-5.3

INITIAL SETUP

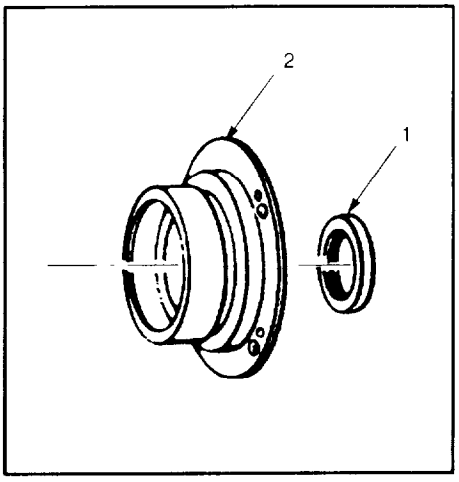
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Installation Tool (E38)

Materials:
Wiping Rag (E58)
Sealing Compound (E64)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Coat outside of seal assembly (1) with sealing and retaining compound (E64). Using installation tool (E38), install seal assembly into liner (2).



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-5.4 INSTALL SEAL AND LINER ASSEMBLY 5-5.4

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit
NSN 5180-00-323-5114
Torque Wrench, 30 - 150 Inch-Pounds

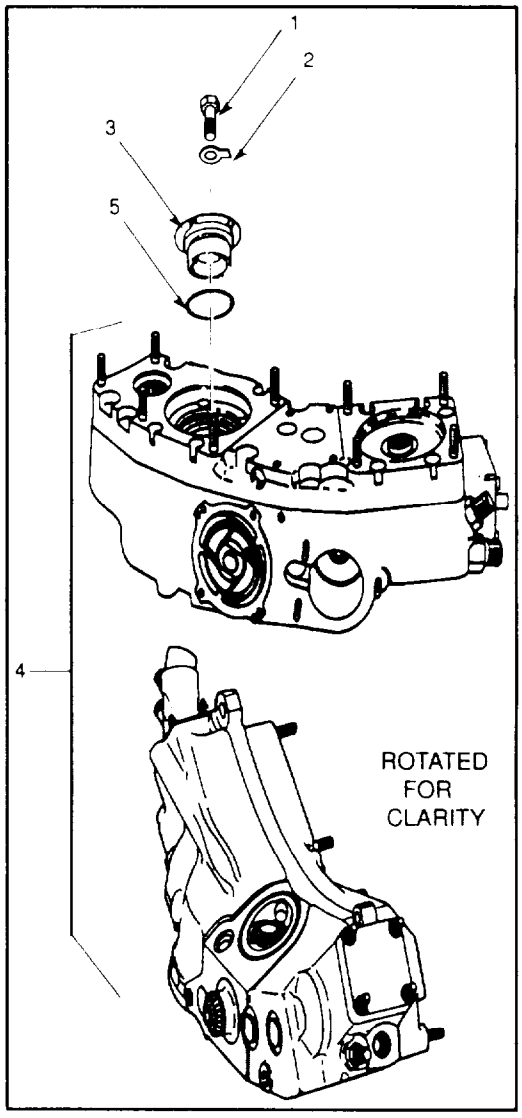
Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

NOTE

This task can be performed with the engine installed or uninstalled on the aircraft and when the gearbox is removed from the engine.

1. Install packing (5) on seal and liner assembly (3).
2. Install seal and liner assembly (3) into accessory gearbox (4). Install four tab washers (2) and four bolts (1). Tighten bolts to 35 to 40 pounds inches (4.2 - 4.6 Newton-meter) torque.



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-5.5 REMOVE SEAL ASSEMBLY 5-5.5

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

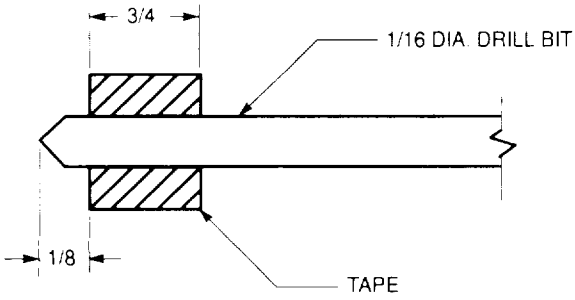
Equipment Condition:

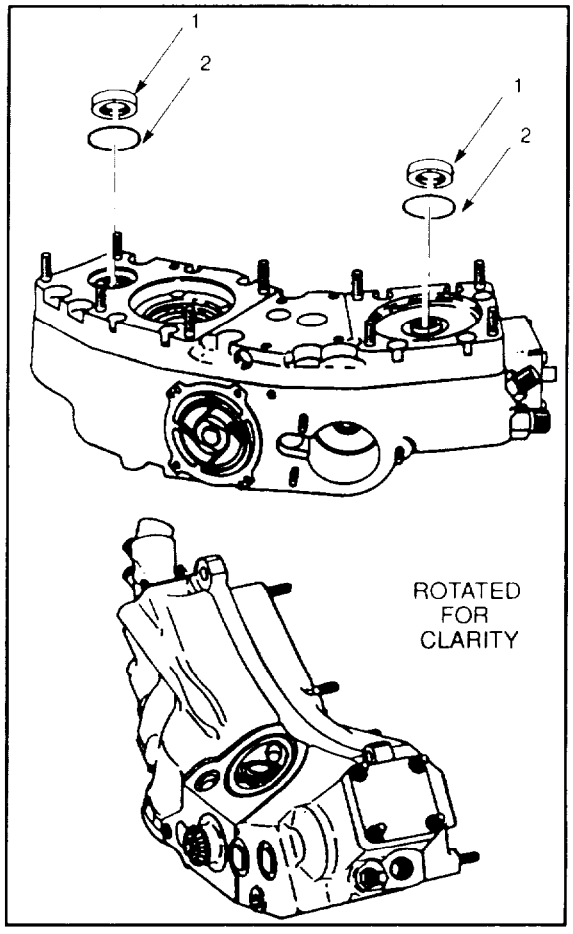
Engine Oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Fuel Control Removed (Task 6-1)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)
Main Oil Pump Removed and Scavenge Oil Screen (Task 8-1)

NOTE

This task can be performed with the engine installed or uninstalled in the aircraft and when the gearbox is removed from the engine.

1. Remove seal (1) as follows:
   a. Drill two 1/16 inch diameter holes through seal (1) face.



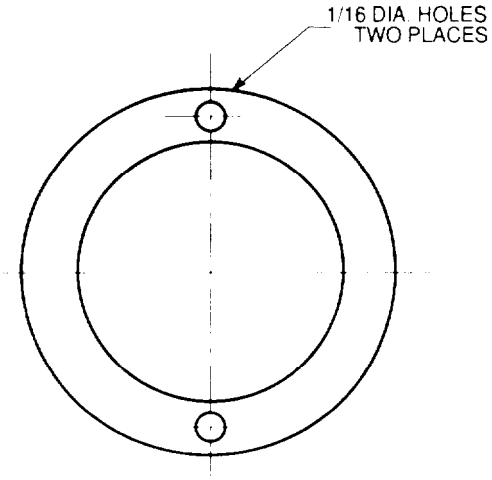


CAUTION

Drill must be taped to prevent damage to other components.

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5-5.5 REMOVE SEAL ASSEMBLY (Continued) 5-5.5



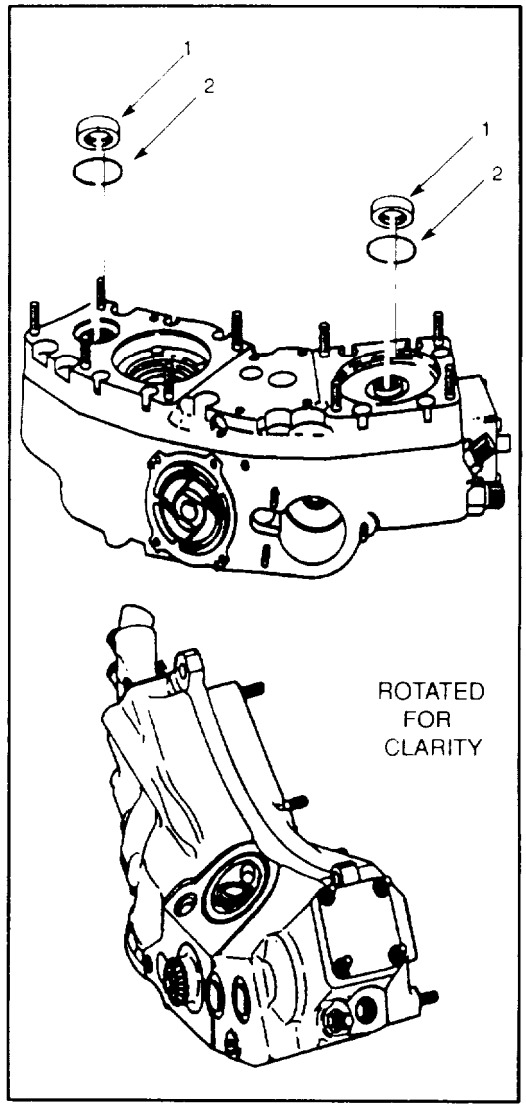
Holes can be in any location on seal face but must be 180 degrees apart.

b. Install metal screw in each hole and using suitable pliers, grab screw and pry out seal (1) by alternating from screw to screw.

CAUTION

Protect accessory gearbox surface by using protective material between AGB and pliers.

c. Remove packing (2).



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-5.6 INSTALL SEAL ASSEMBLY 5-5-6

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit
NSN 5180-00-323-5114

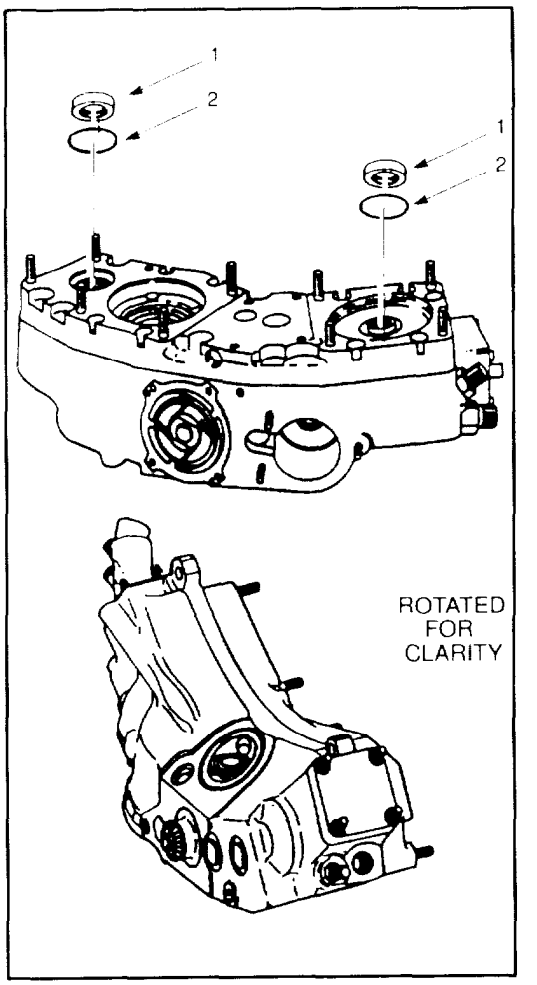
Materials:
Wiping Rag (E58)
Sealing Compound (E64)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

NOTE

This task can be performed with the engine installed or uninstalled on the aircraft, and when the gearbox is removed from the engine.

1. Install packing (2) into gearbox seal housing.
2. Coat seal assembly (1) with sealing and retaining compound (E64).
3. Using installation tool (E39) and soft mallet, install seal into gearbox seal housing until fully seated.



FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY 5-6

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 30-150 Inch-Pounds
Socket, 1-5/16 Inch
Retaining Ring Pliers

Materials:
Lockwire (E29)

Parts:
Packings
Gasket

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

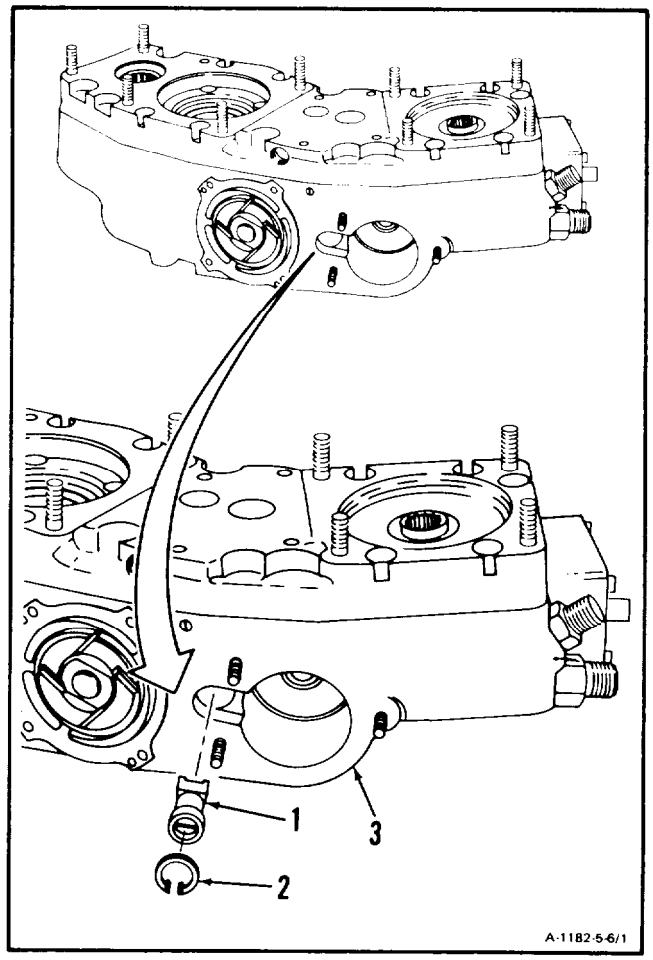
References:
TM 55-2840-254-23P

Engine Equipment Condition:
Off Engine Task

WARNING

In following step, be careful when installing ring. Ring may spring loose and cause injury. If injury occurs get medical attention.

1. **Install relief valve (1)** and ring (2) in accessory gearbox assembly (3). Ensure retaining ring (2) is properly seated in groove.

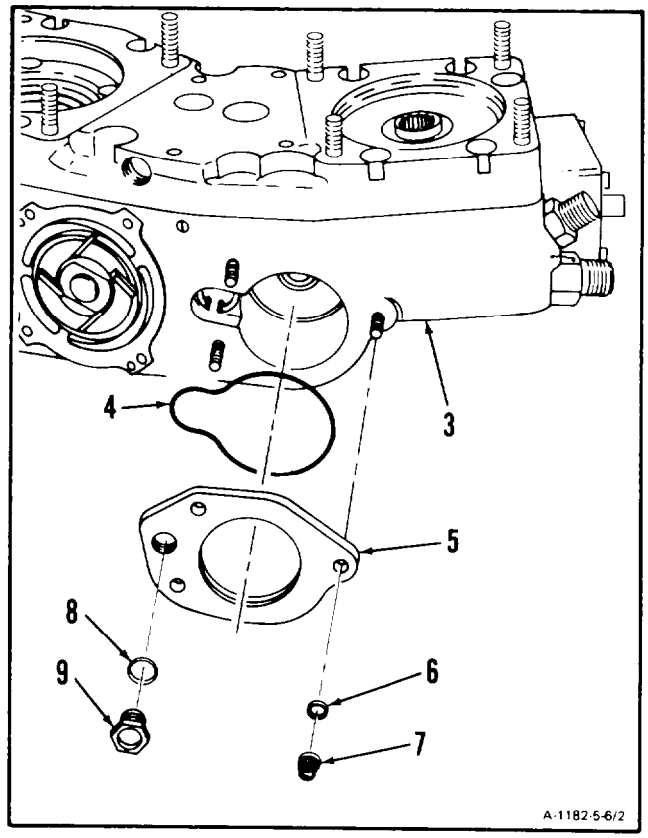


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5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

2. Install packing (4) on cover (5). **Install cover (5),** three washers (6), and nuts (7) on accessory gearbox assembly (3).

3. **Install** packing (8) and **plug (9)** in cover (5).



4. **Install oil filter element (10)** on oil filter cap and stem assembly (11).

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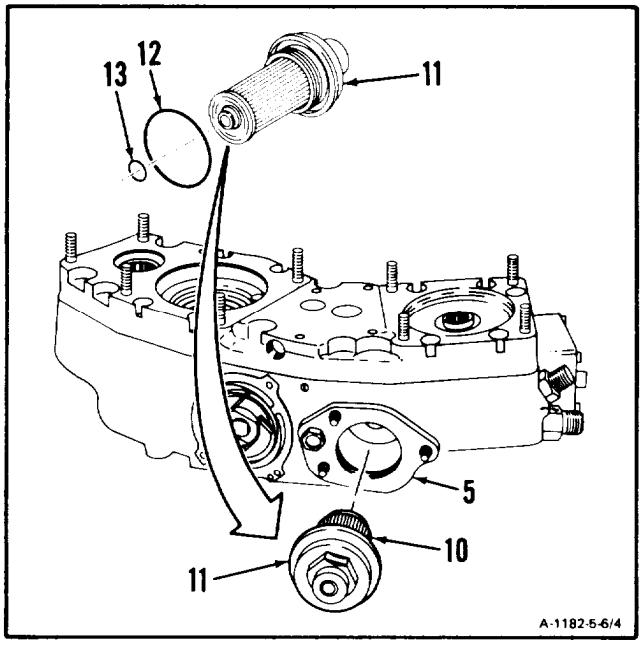
5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

5. Install packings (12 and 13) on cap and stem assembly (11).

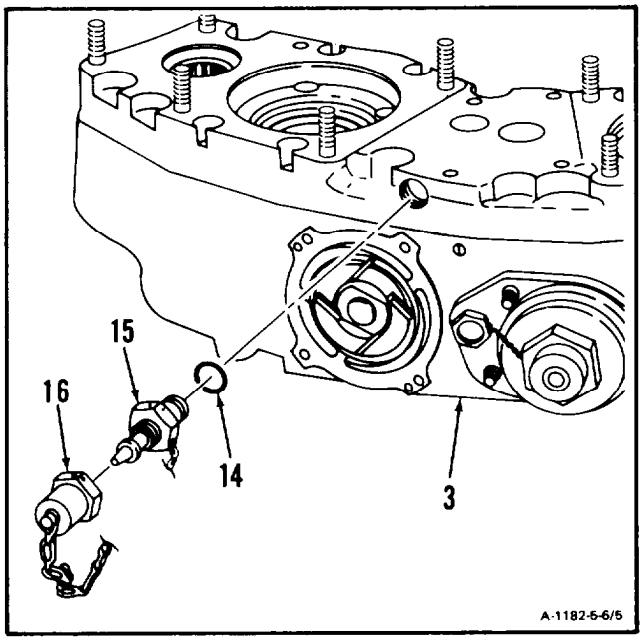
CAUTION

Do not torque cap and stem assembly more than 50 inch-pounds. Failure to comply may cause damage to oil filter cover.

6. **Install cap and stem assembly (11),** with filter element (10), on oil filter cover (5). **Torque cap and stem assembly (11) to 50 inch-pounds.** Use socket. Lockwire cap and stem assembly (11). Use lockwire (E29).



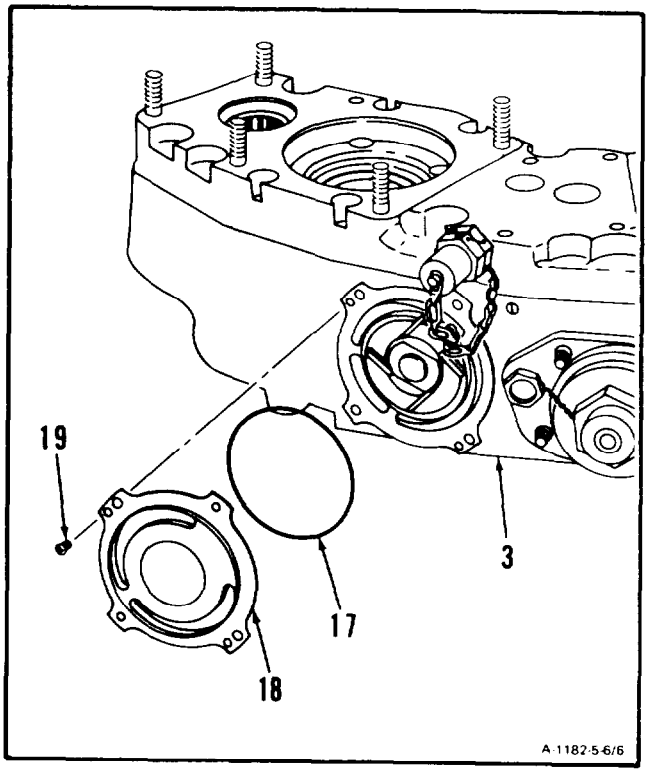
7. Install packing (14) and oil sampling drain cock housing (15) in accessory gearbox assembly (3). **Install oil sampling drain cock cap (16)** on housing (15). Lockwire drain cock cap (16). Use lockwire (E29).



GO TO NEXT PAGE

5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

8. **Install** packing (17), **housing (18)** and two screws (19) on accessory gearbox assembly (3).

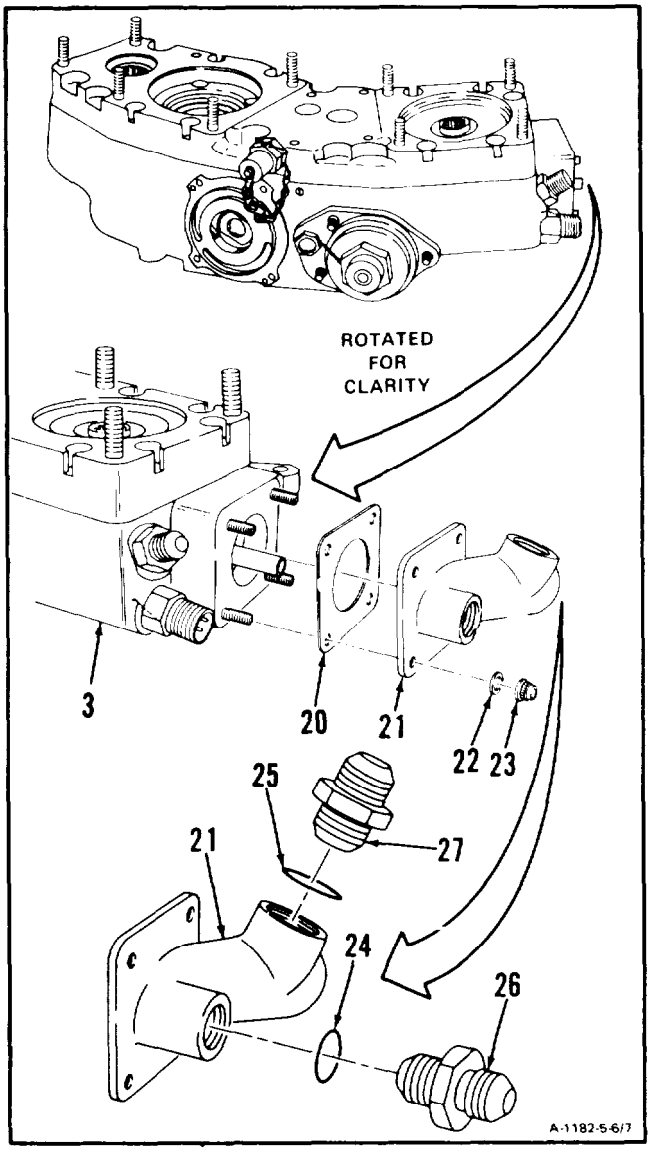


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5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

9. **Install** gasket (20), **collector (21),** four washers (22), and nuts (23) on accessory gearbox assembly (3).

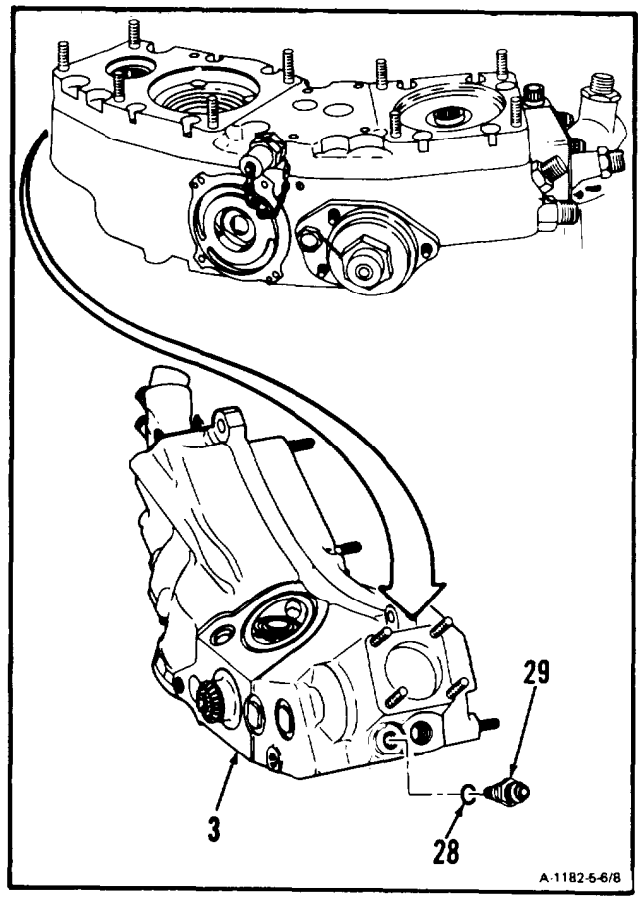
10. Install packings (24 and 25) and nipples (26 and 27) in collector (21).



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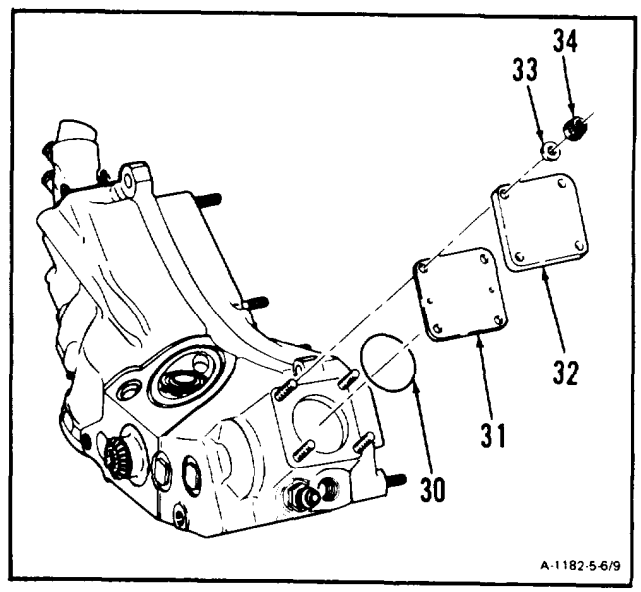
5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

11. **Install** packing (28) and **adapter (29)** in accessory gearbox assembly (3).



12. Install packing (30) on cover (31).

13. **Install cover (31),** cover (32), four washers (33), and nuts (34). **Torque nuts (34) to 80 inch-pounds.**

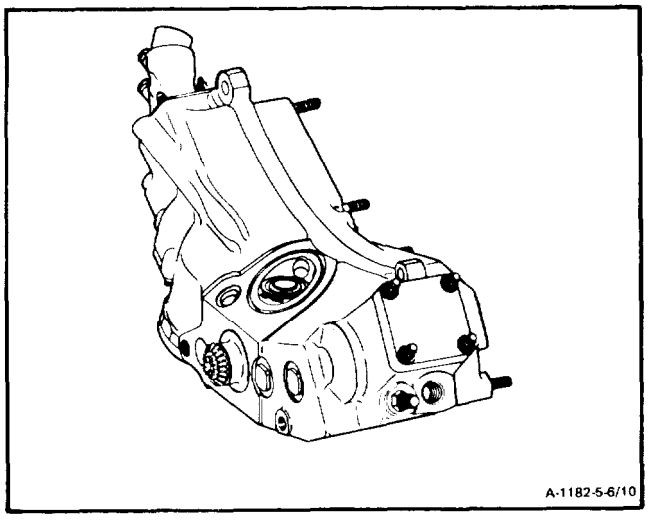


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5-6 ASSEMBLE ACCESSORY GEARBOX ASSEMBLY (Continued) 5-6

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

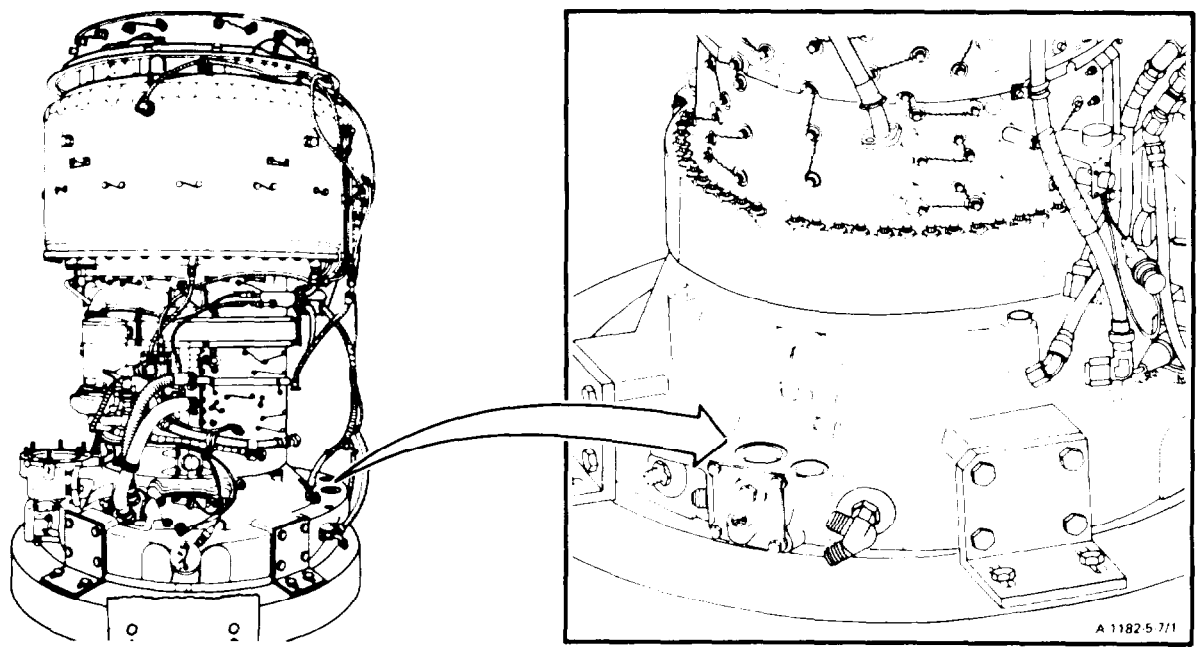
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Gear Holding Fixture (T12)
Handling Tool (T16)
Hex Drive Socket Head Screw Key Set
Torque Wrench 100-750 Inch-Pounds

Materials:
Lockwire (E29)

Parts.
Packings
Locking Plate

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P



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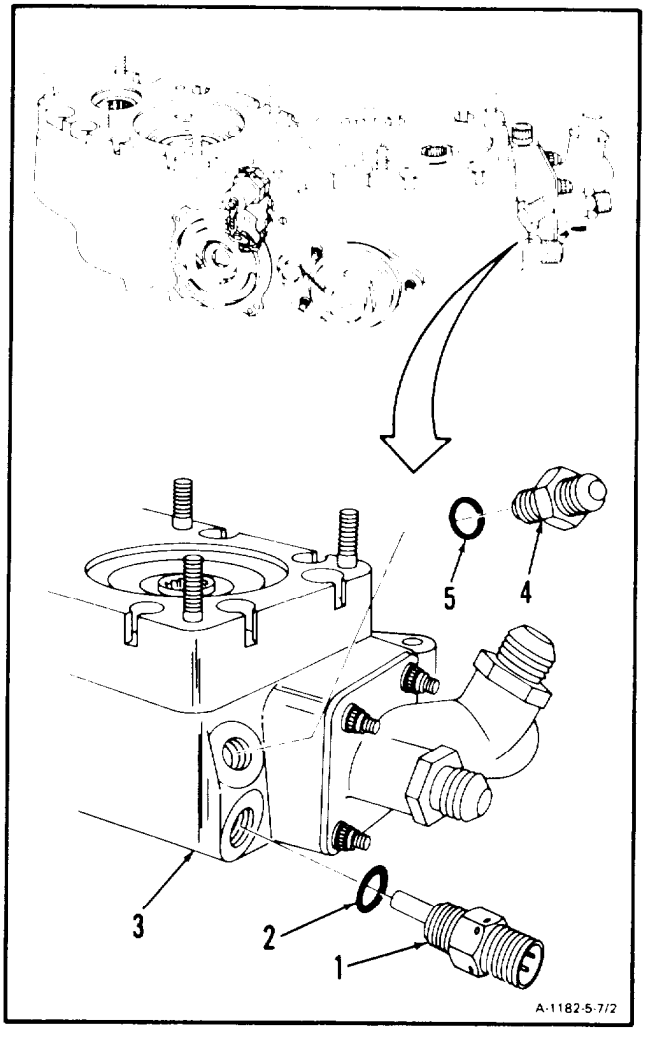
5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

NOTE

If accessory gearbox assembly is a replacement, do steps 1 thru 4. If same accessory gearbox assembly that was removed is to be installed omit steps 1. thru 4.

1. **Remove** lockwire, **oil temperature transmitter (1),** and gasket (2) from removed accessory gearbox assembly (3).

2. **Remove nipple (4)** and packing (5) from removed accessory gearbox assembly (3).



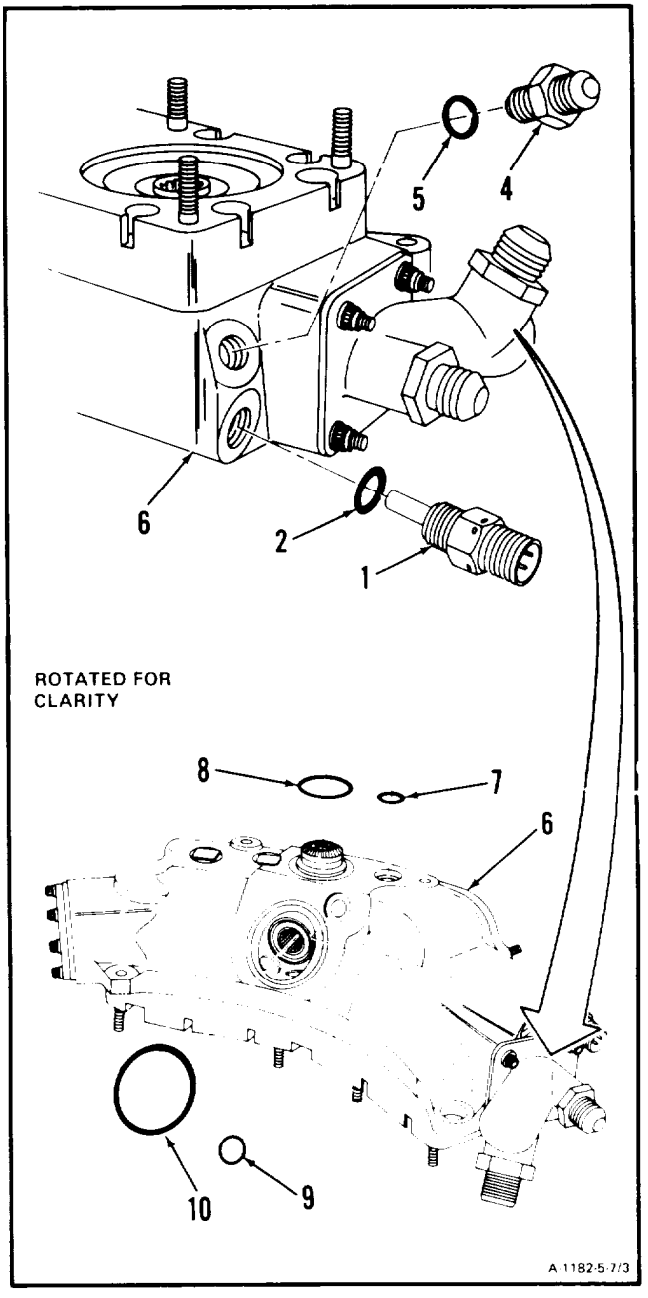
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

3. **Install** gasket (2) and **oil temperature transmitter (1) in serviceable accessory gearbox assembly (6).** Lockwire oil temperature transmitter (1). Use lockwire (E29).

4. **Install** packing (5) and **nipple (4) in serviceable accessory gearbox assembly (6).**

5. Install packings (7,8,9, and 10) in accessory gearbox assembly (6).

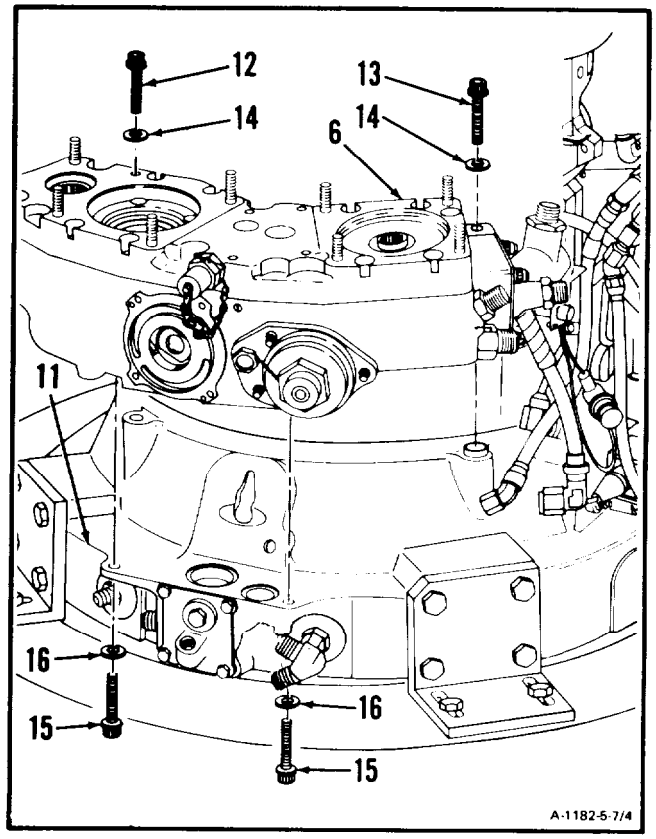


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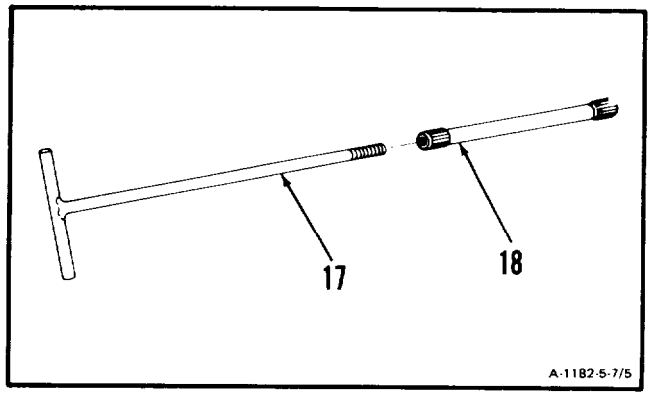
5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued)

6. **Install accessory gearbox assembly (6),** on inlet housing assembly (11).

7. Install bolts (12 and 13), two washers (14), two bolts (15), and washers (16). **Torque bolts (12 and 13) to 195 inch-pounds. Torque bolts (15) to 145 inch-pounds.** Lockwire bolts (12 and 13). Use lockwire (E29).



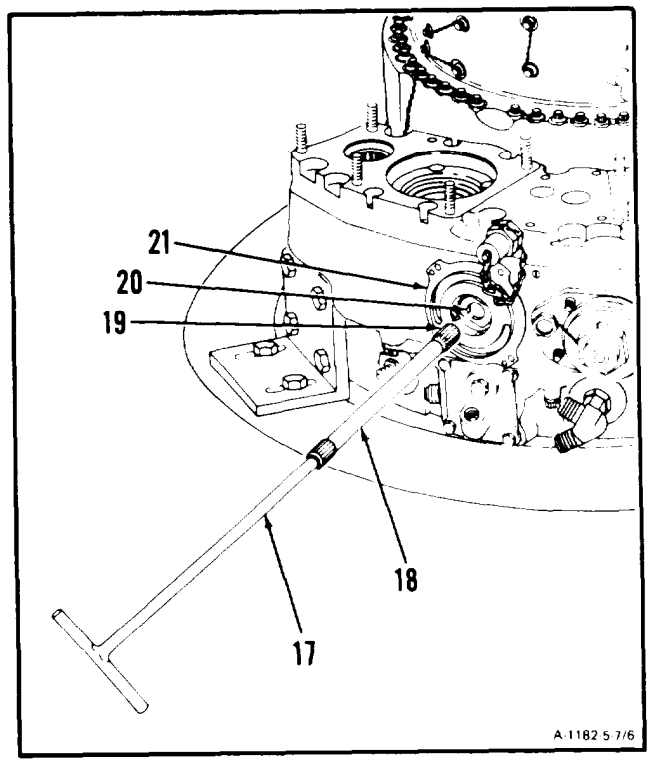
8.. Thread handling tool (T16) (17) into end of gearshaft (18).



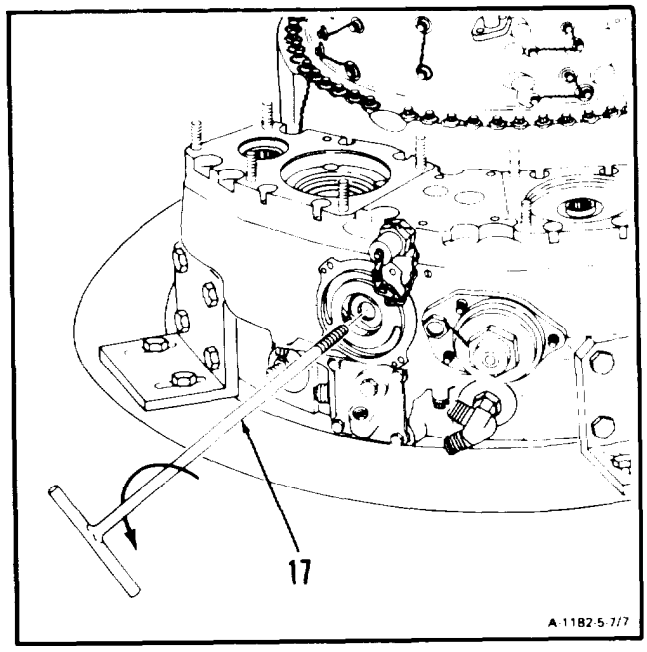
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued)

9. Align splines (19) and (20). Using handling tool (T16) (17). **install gearshaft (18)** in scavenge pump housing (21).



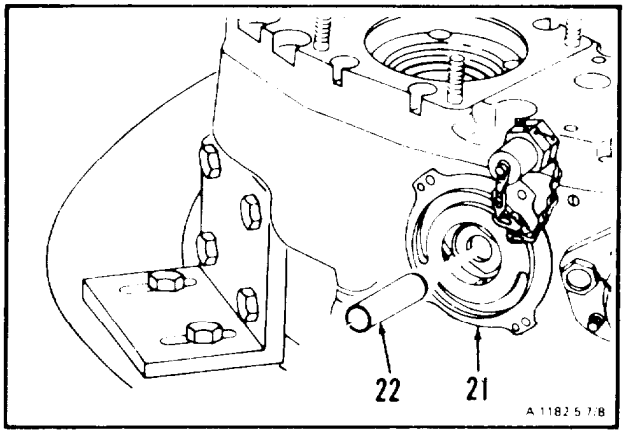
10. Remove handling tool (T16) (17).



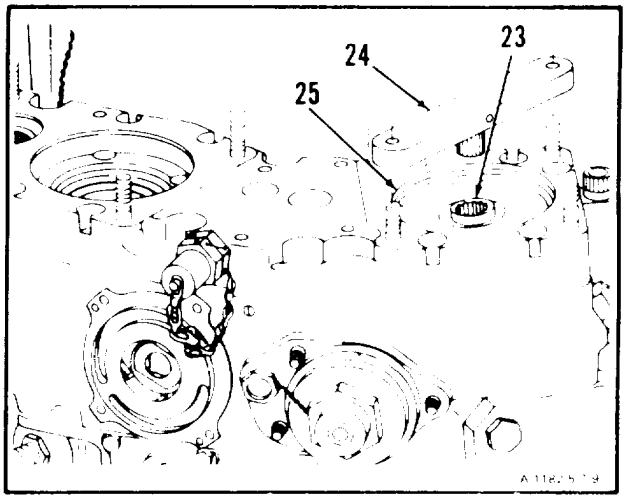
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

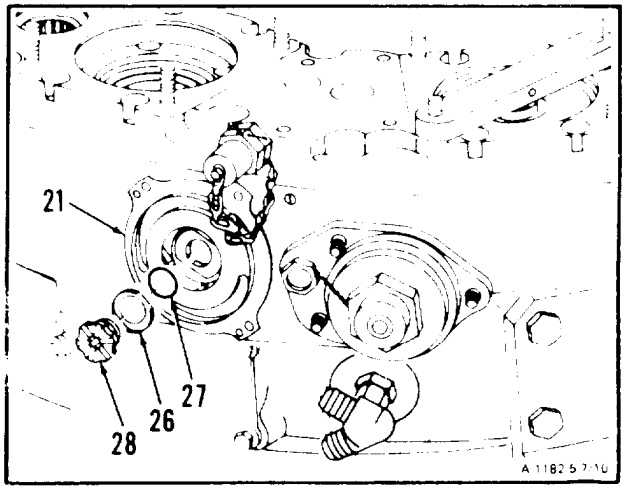
11. **Install spacer (22)** through scavenge pump housing (21).



12. Turn spline (23) to align with gear holding fixture (T12) (24). install gear holding fixture (T12) (24) on fuel boost pump mounting pad (25).



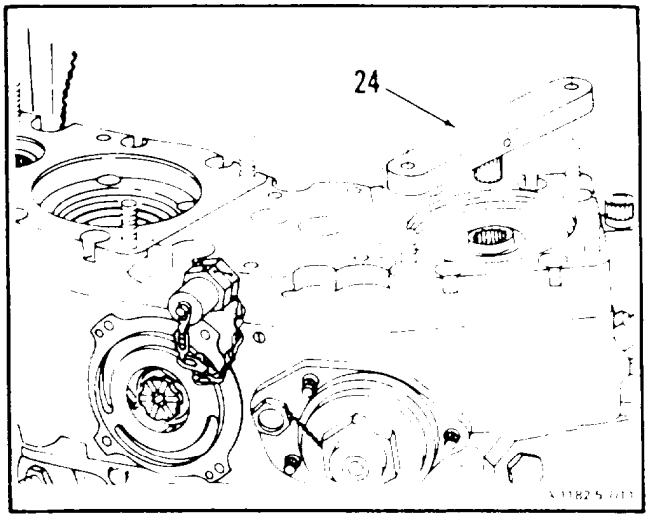
13. Install locking plate (26) and packing (27) on plug (28).
14. **Install plug (28)** in scavenge pump housing (21). **Torque plug (28)** to **125 - 150 inch-pounds.** Use 1/4 -inch hex drive socket head screw key. Bend tangs on locking plate (26).



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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

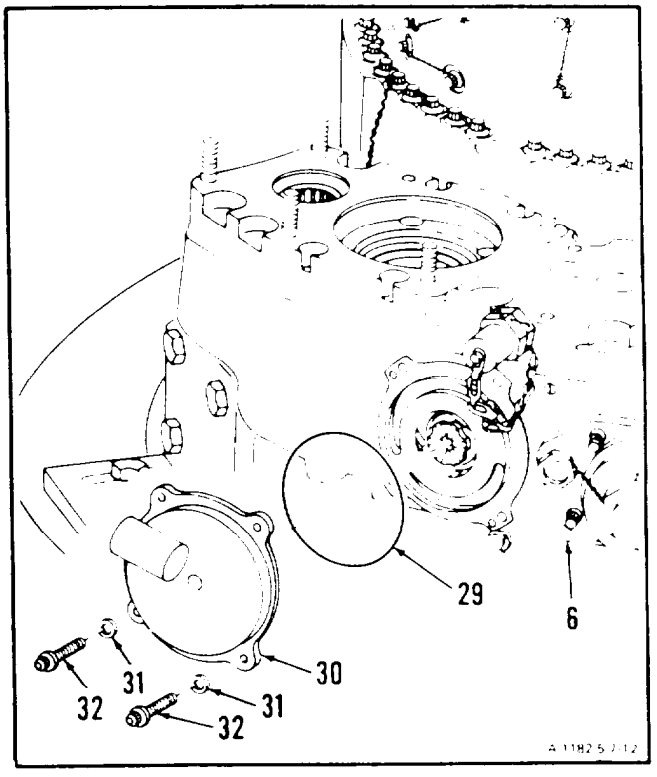
15. Remove gear holding fixture (T2)(24).



NOTE

If either accessory gearbox assembly or overspeed drive qear assembly have been changed, N, gear backlash shall be taken Refer to task 5.23.1.

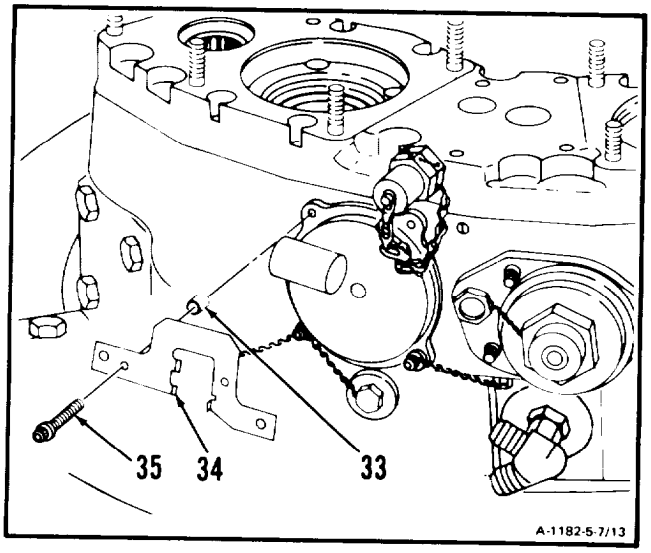
16. Install packing (29) on housing (30) **Install housing (30),** two washers (31), and bolts (32) on accessory gearbox assembly (6) lockwire bolts (32). Use lockwire (E29)



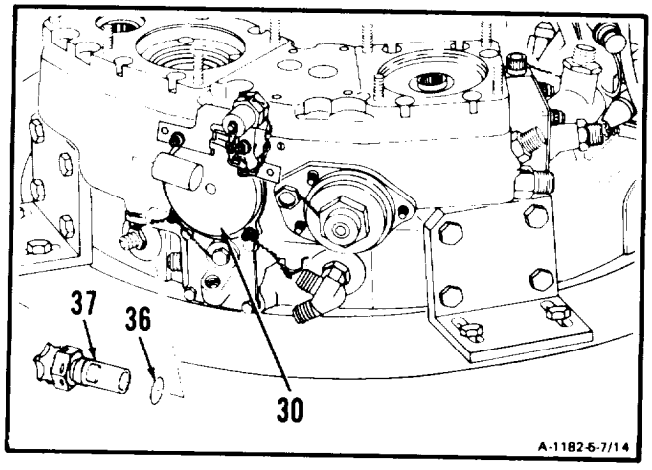
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued)

17. **Install** two spacers (33), **bracket (34),** and two bolts (35). Lockwire bolts (35). Use lockwire (E29).



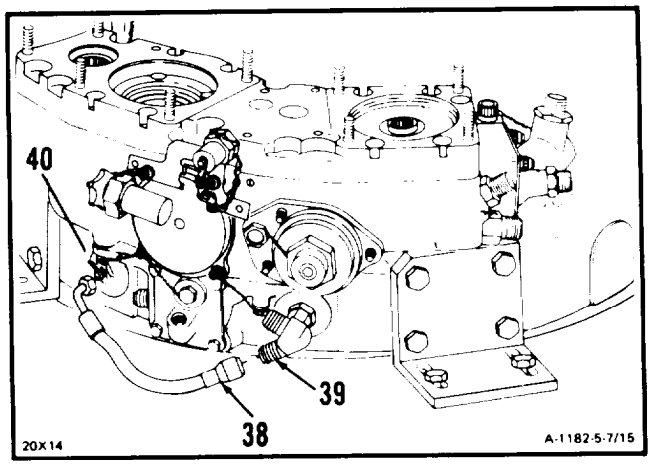
18. **Install** packing (36) and **chip detector (37)** in housing (30). Lockwire chip detector (37). Use lockwire (E29).



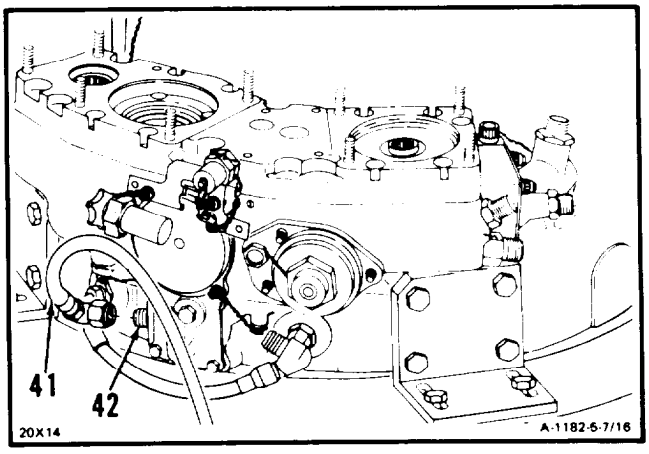
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued)

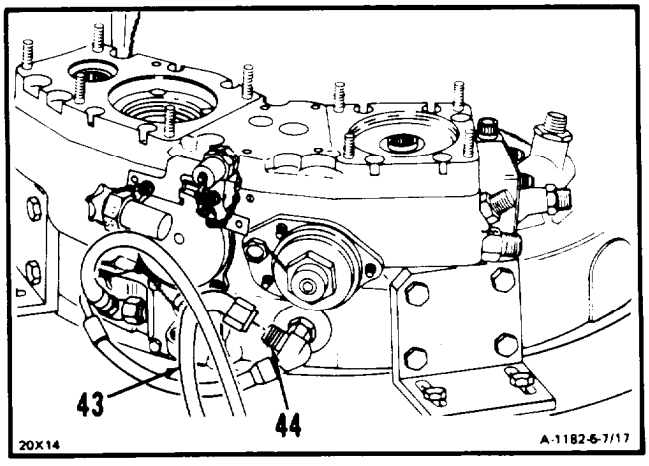
19. **Connect hose assembly (38)** to oil scavenge tee (39) and fluid passage bolt (40).



20. **Connect hose assembly (41)** to nipple (42).



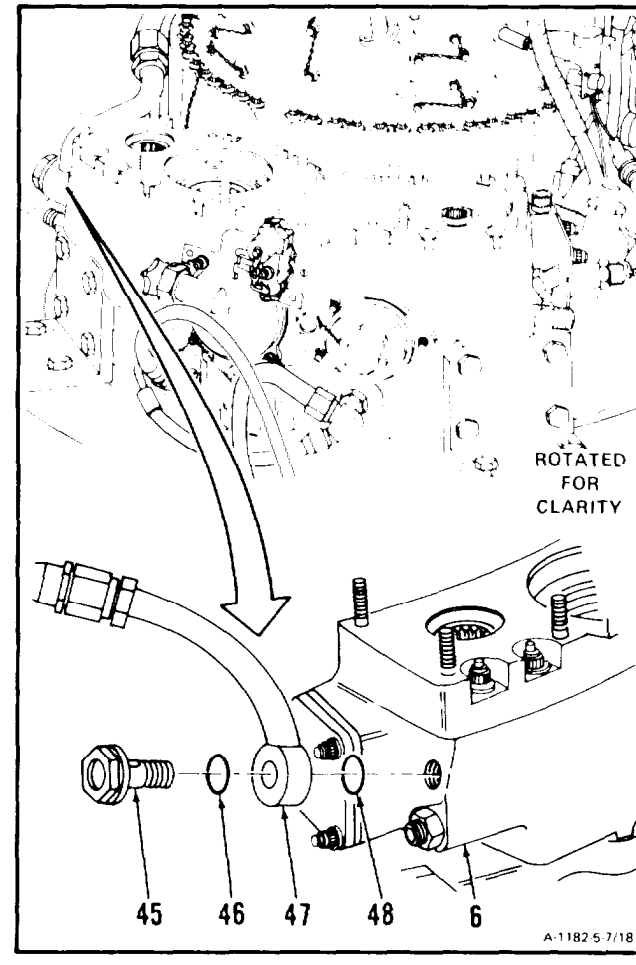
21. **Connect hose assembly (43)** to oil scavenge tee (44).



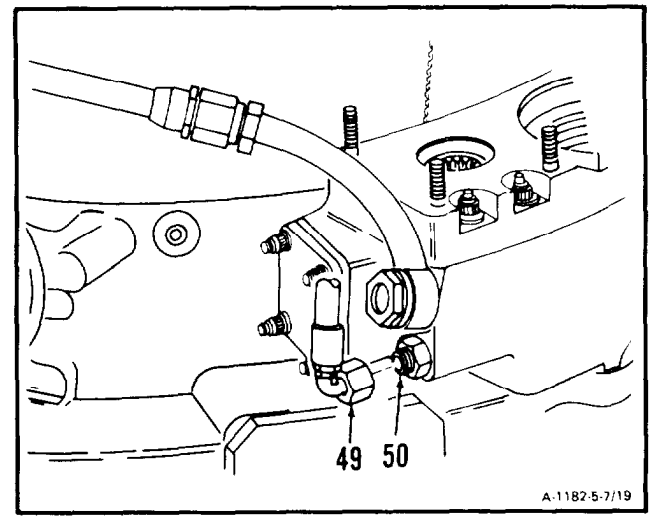
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

22. **Install** bolt (45), packing (46), **tube assembly (47),** and packing (48) on gearbox assembly (6). Lockwire bolt (45). Use lockwire (E29).



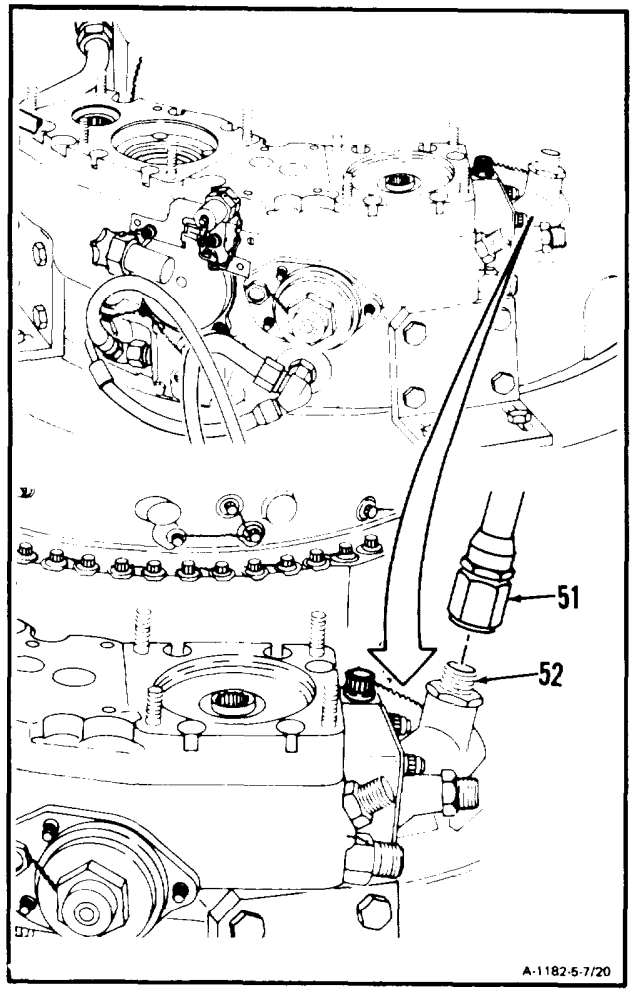
23. **Connect hose assembly (49)** to adapter (50).



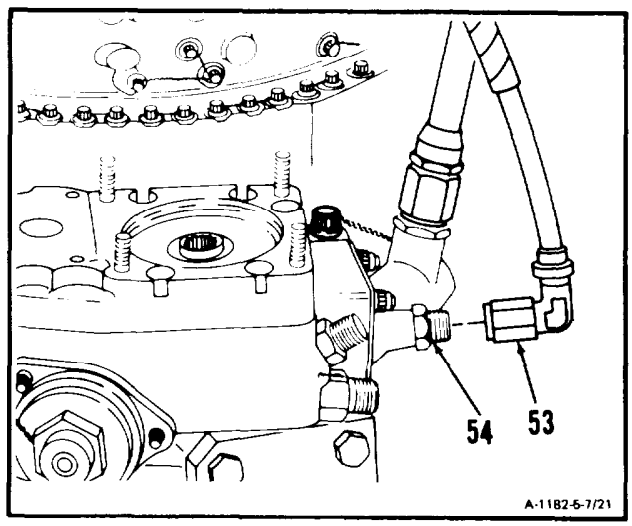
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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued)

24. Connect tube and hose assembly (51) to nipple (52).

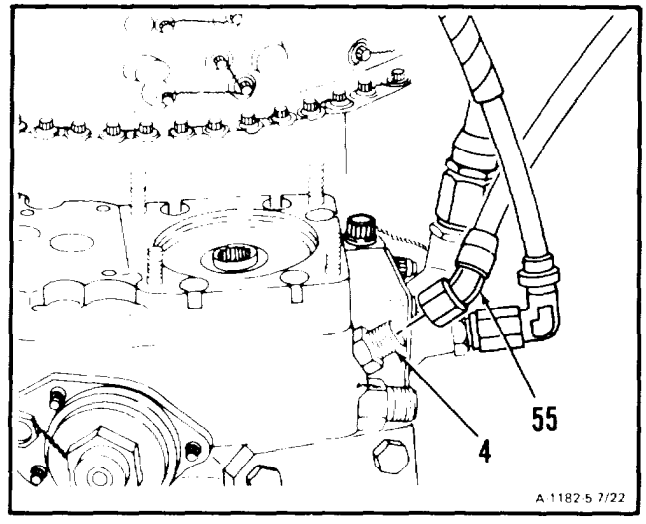


25. Connect hose assembly (53) to nipple (54).

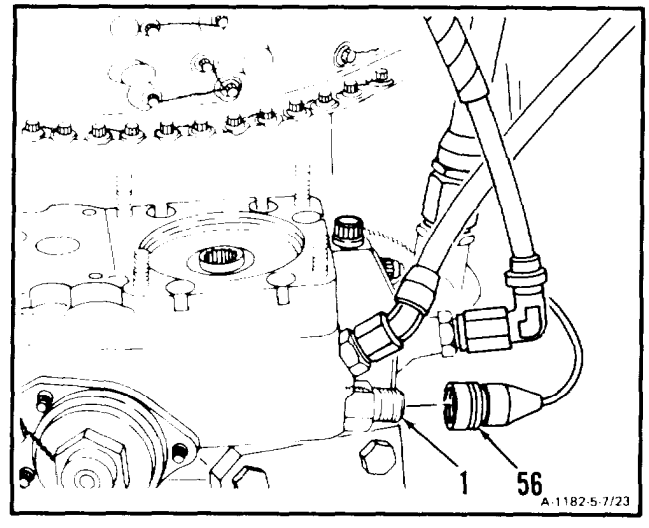


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26. **Connect hose assembly (55)** to nipple (4).



27. **Connect electrical connector (56)** to oil temperature transmitter (1). Lockwire electrical connector (56). Use lockwire (E29).



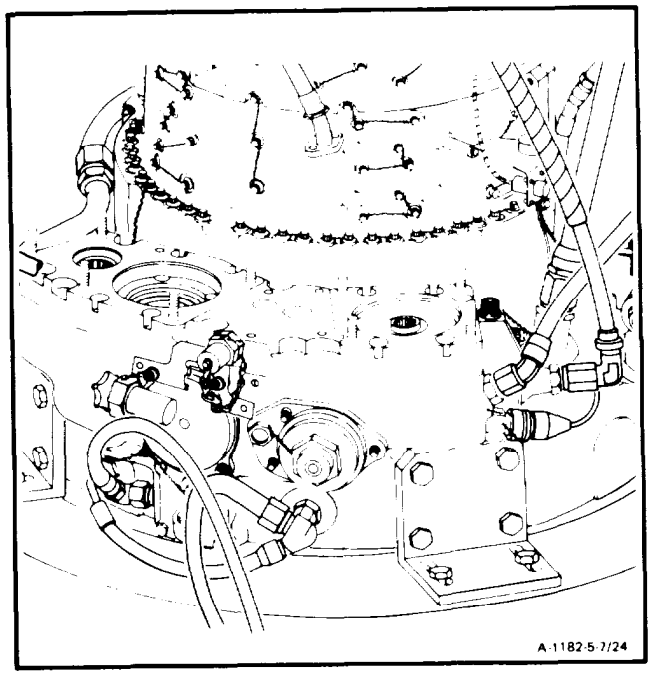
INSPECT

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5-7 INSTALL ACCESSORY GEARBOX ASSEMBLY (Continued) 5-7

FOLLOW-ON MAINTENANCE:

install Fuel Control (Task 6-6).
Install Main Oil Pump and Scavenge Oil Screen (Task 8-4).
Install Tube Assembly (Inlet Housing to Main Oil Pump) (Task 8-51).
Install Fuel Boost Pump Assembly (Task 6-13).
Service Engine Oil System (Task 1-74).



END OF TASK

5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) 5-8

INITIAL SETUP

Applicable Configurations:
All

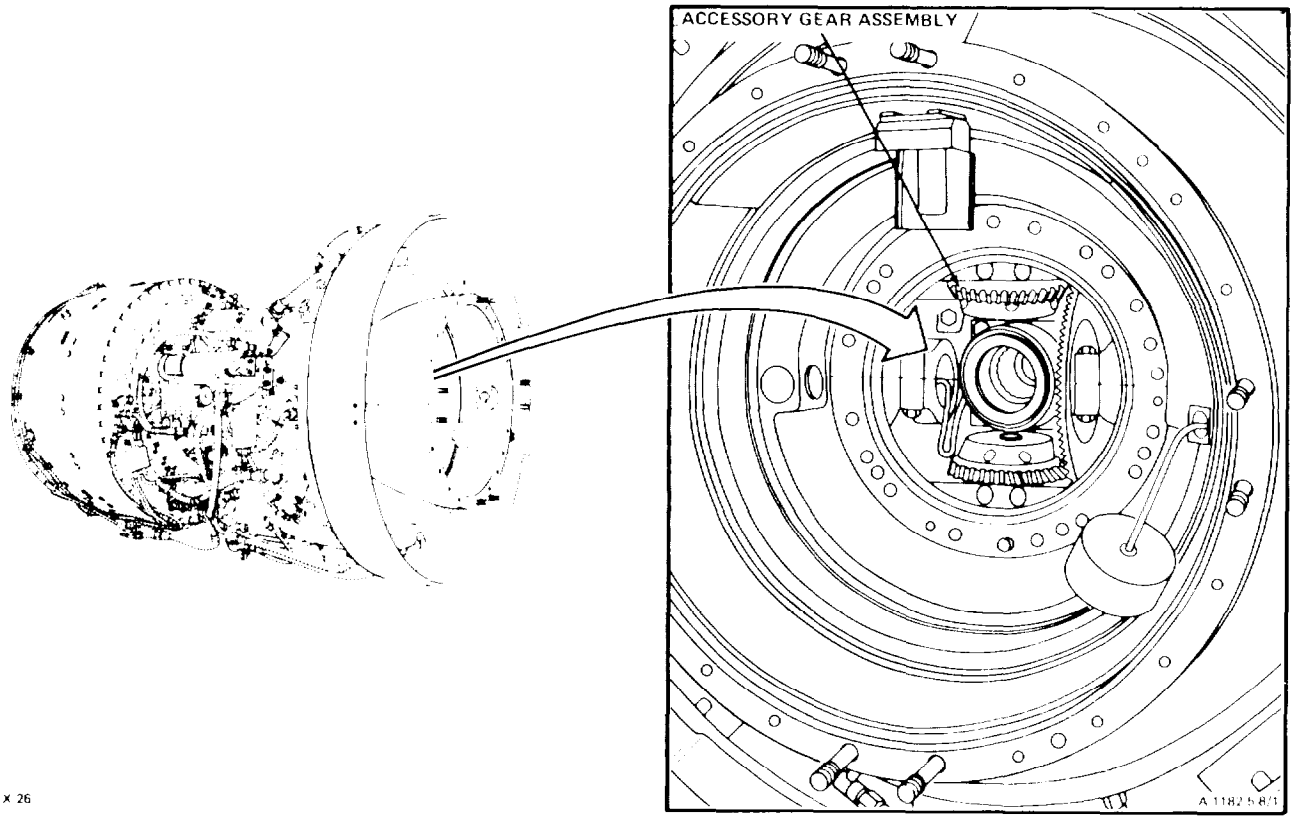
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Handling Tool (T18) (3)
Retaining Ring Pliers

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

References:
Task 5-1

Equipment Condition:
Engine oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Starter Drive Removed (Task 5-12)
Output Shaft Seal and Housing Assembly Removed (Task 2-48)
Output Shaft Removed (Task 9-6)
Inlet Housing Cover Assembly Removed (Task 2-53)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)
Overspeed Drive and Outlet Cover Assembly Removed (Task 5-17)
Output Shaft Support Housing Removed (Task 2-58)
Torquemeter Junction Box Removed (Task 9-1)
Accessory Gearbox Assembly Removed (Task 5-1)



42 X 26

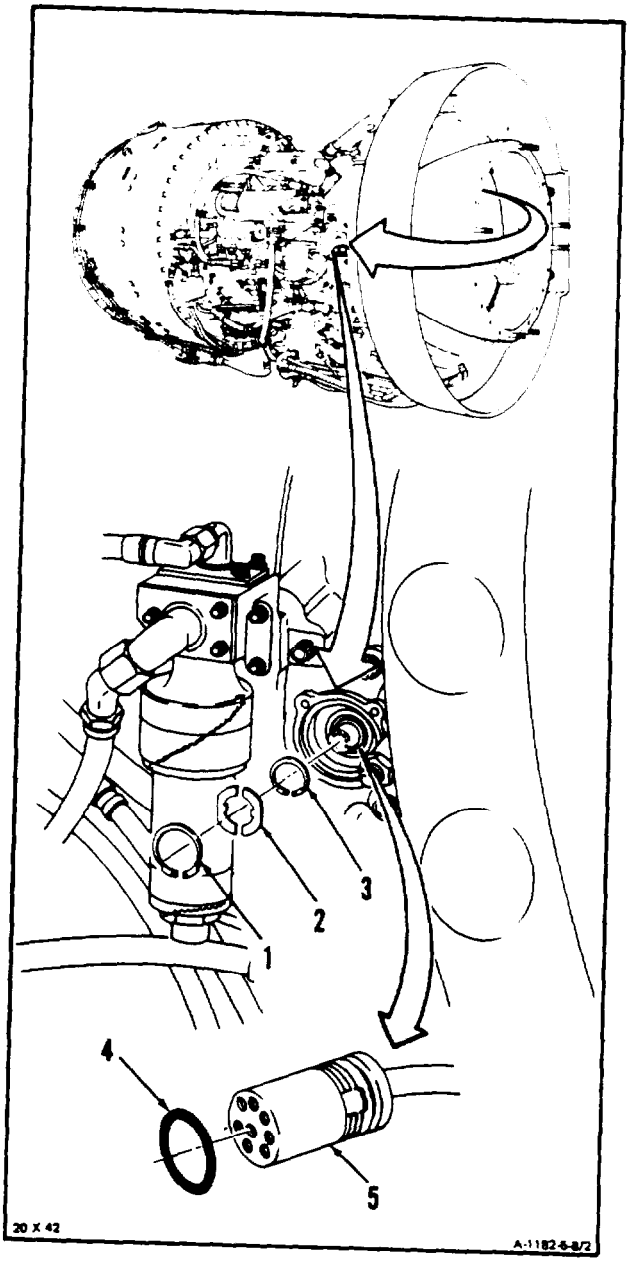
GO TO NEXT PAGE

5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-8

NOTE

Prior to removal of accessory gear assembly, the gearshaft must be removed from the accessory gearbox assembly. (Refer to Task 5-1, steps 8 through 18).

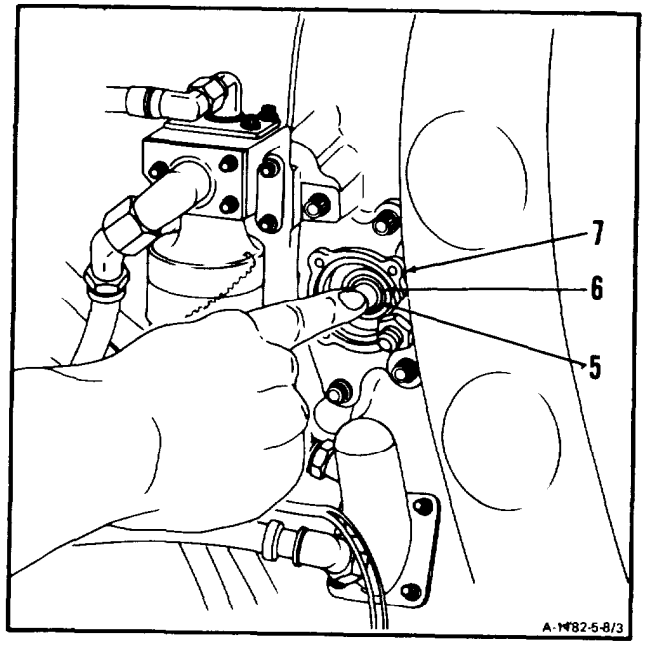
1. **Remove retaining ring (1), two spacers (2), and retaining ring (3).**
2. Remove packing (4) from electrical connector (5).



GO TO NEXT PAGE

5-6 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

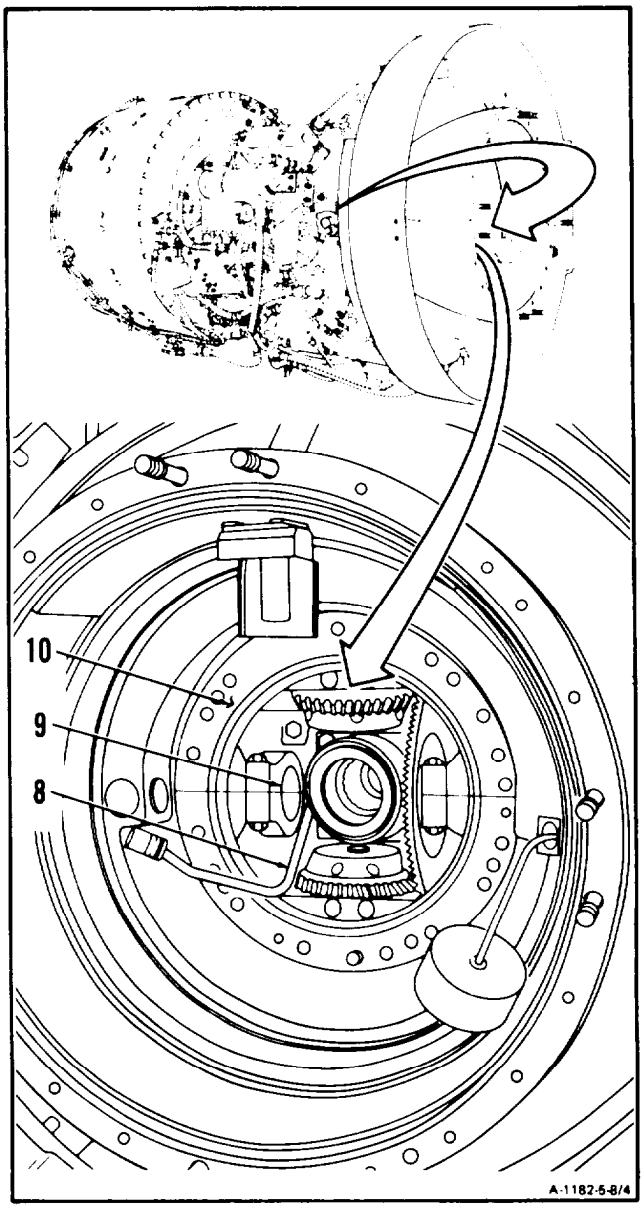
3. **Push electrical connector (5) through hole (6)** in flange (7).



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5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-8

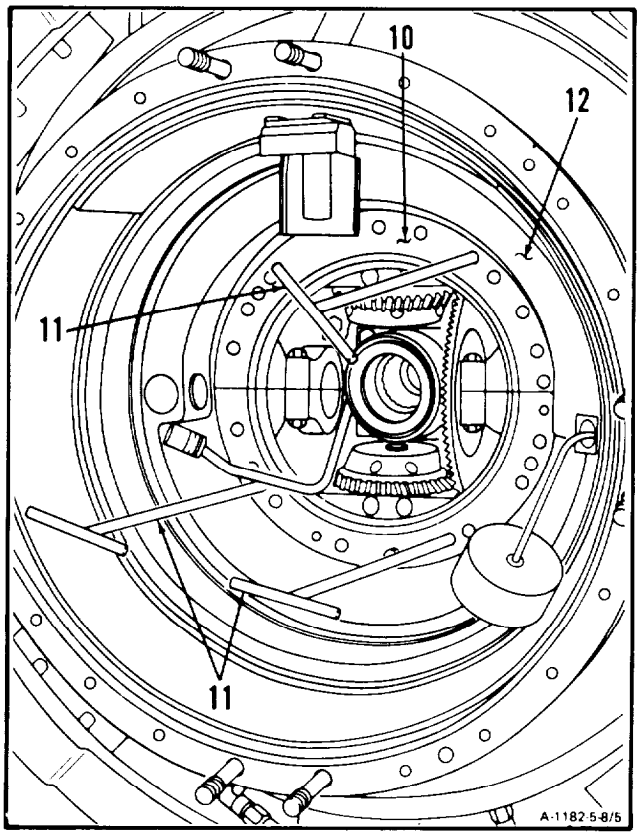
4. **Pull electrical cable (8) through carrier (9).**
   Position electrical cable (8) away from accessory gear assembly (10).



GO TO NEXT PAGE

5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-8

5. Install three handling tools (T18) (11) into threaded holes of gear assembly (10). Tighten handling tools (11) evenly until accessory gear assembly (10) is free from housing (12).



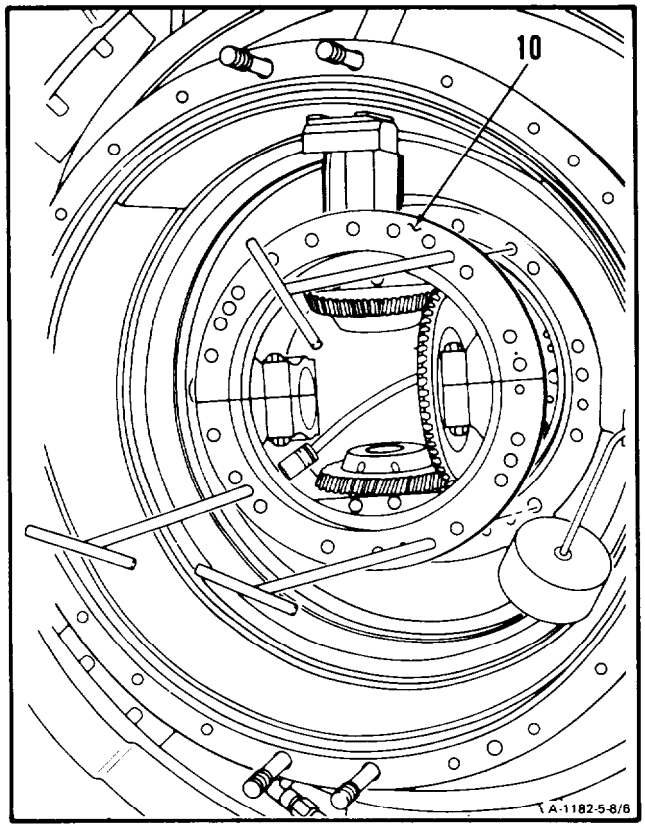
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5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-8

CAUTION

In following step 6., be sure electrical cable does not get caught as accessory gear assembly is removed. Failure to comply could cause damage to wiring which would result in improper indication of engine operation.

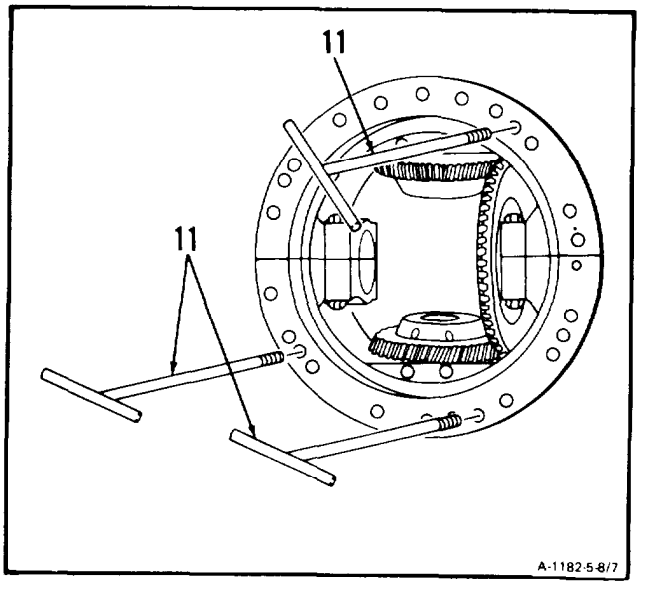
6. Remove accessory gear assembly (10).



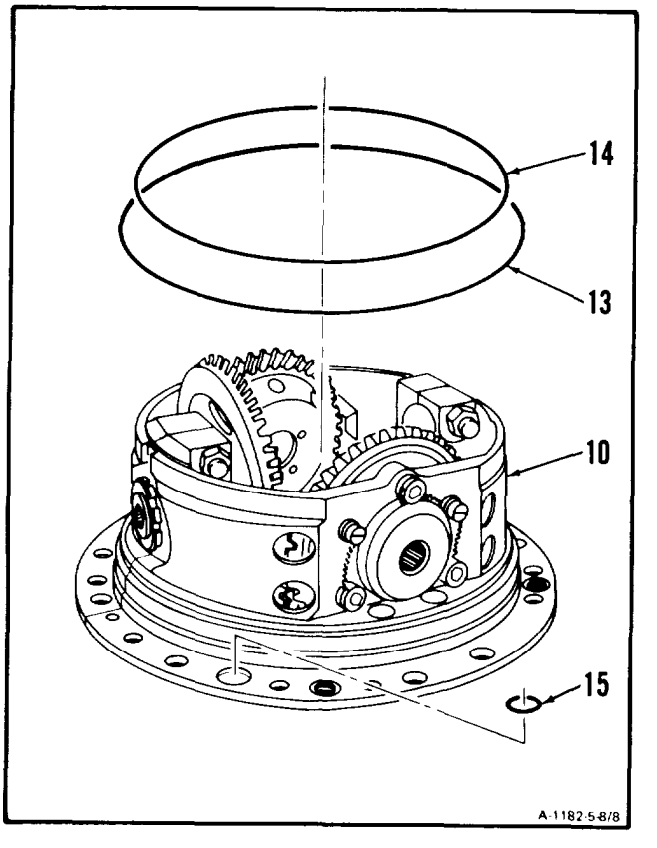
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5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

7. Remove three handling tools (11).



8. **Remove packings (13, 14 and 15)** from accessory gear assembly (10).

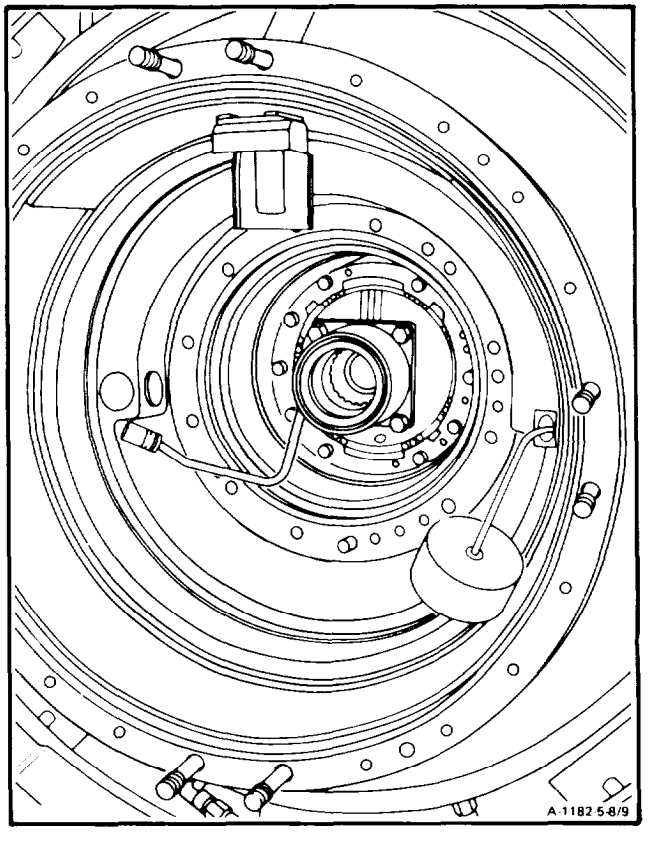


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5-8 REMOVE ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-8

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-9 CLEAN ACCESSORY GEAR ASSEMBLY (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Goggles
Compressed Air Source

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil System Drained (Task 1-75)
Fuel Boost Pump Assembly Removed (Task 6-9)
Starter Drive Removed (Task 5-12)
Output Shaft Seal and Housing Assembly Removed (Task 2-48)
Output Shaft Removed (Task 9-6)
Inlet Housing Cover Assembly Removed (Task 2-53)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)
Overspeed Drive and Outlet Cover Assembly Removed (Task 5-17)
Output Shaft Support Housing Removed (Task 2-58)
Torquemeter Junction Box Removed (Task 9-1)
Accessory Gear Assembly Removed (Task 5-8)

General Safety Instructions:

WARNING

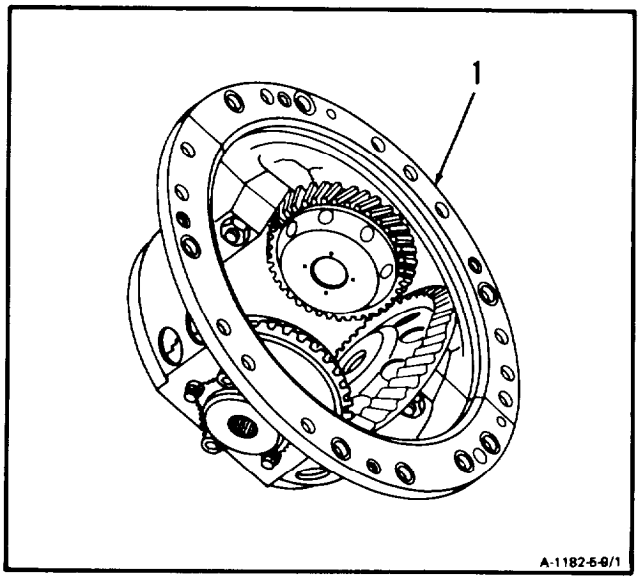
Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Wear gloves (E20). **Clean accessory gear assembly (1)** with wiping rag (E58) dampened in dry cleaning solvent (E17). Use brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. Blow dry. Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect Accessory Gear Assembly (Task 5-10).

END OF TASK

5-10 INSPECT ACCESSORY GEAR ASSEMBLY (AVIM) 5-10

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

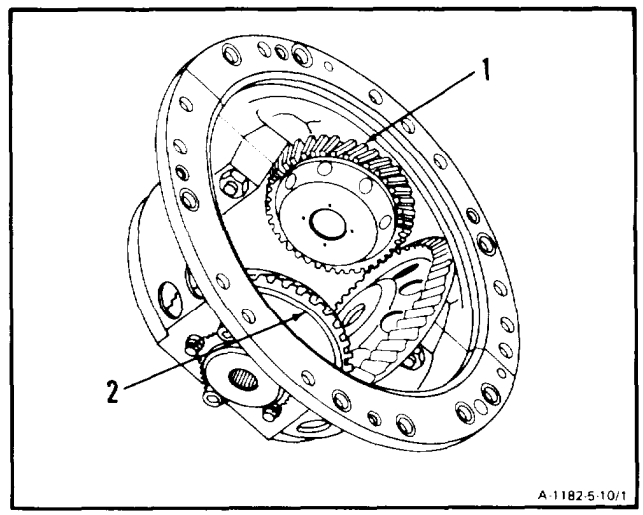
Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

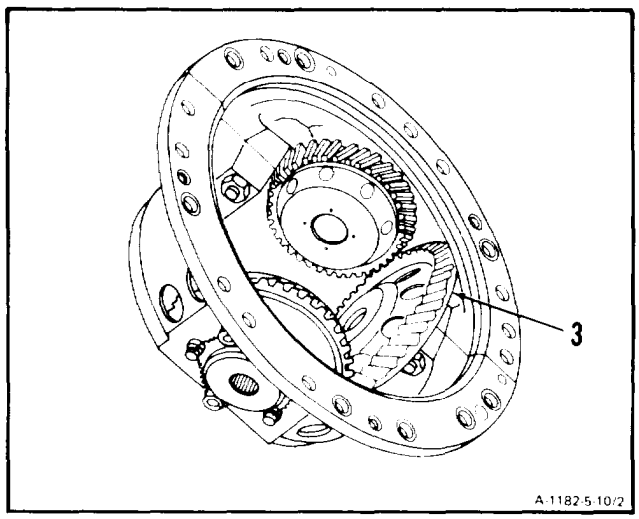
References:
Task 1-118

Equipment Condition:
Off Engine Task

1. **Inspect pinion gears (1 and 2)** (Ref. Task 1-118). If gears are not acceptable according to Task 1-118, replace accessory gear assembly.



2. **Inspect gear (3)** (Ref. Task l-l 18). If gear is not acceptable according to Task 1-118, replace accessory gear assembly.

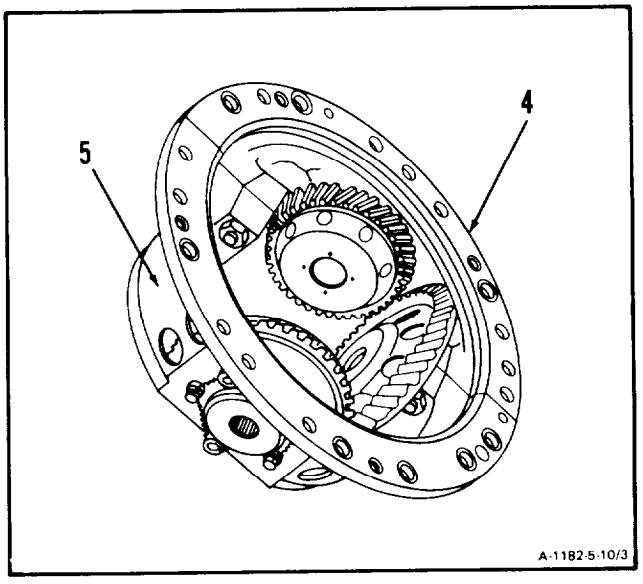


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5-10 INSPECT ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

3. **Inspect carrier (4) for binding of gears and bearings.** There shall be no binding.

4. **Inspect housing (5).** There shall be no cracks.



FOLLOW-ON MAINTENANCE.

None

END OF TASK

5-11 INSTALL ACCESSORY GEARBOX ASSEMBLY (AVIM) 5-11

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Locating Bar (T1)
Alignment Pin (T2)
Wrench Pin Plate (T9)
Handling Tool (T18)
Torque Fixture (T46)
Torque Multiplier (T63)
Retaining Ring Pliers
Dial Indicator
Outside Micrometer Caliper Set
Mechanical Puller (T3)

Materials:

Acid Swabbing Brush (E2) (2)
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Fee Cloth (E26)
Gear Marking Compound (E38.1)

Parts:

Packings
Lockring
Shim

Personnel Required:

68B10 Aircraft Powerplant Repairer (2)
68B30 Aircraft Powerplant Inspector

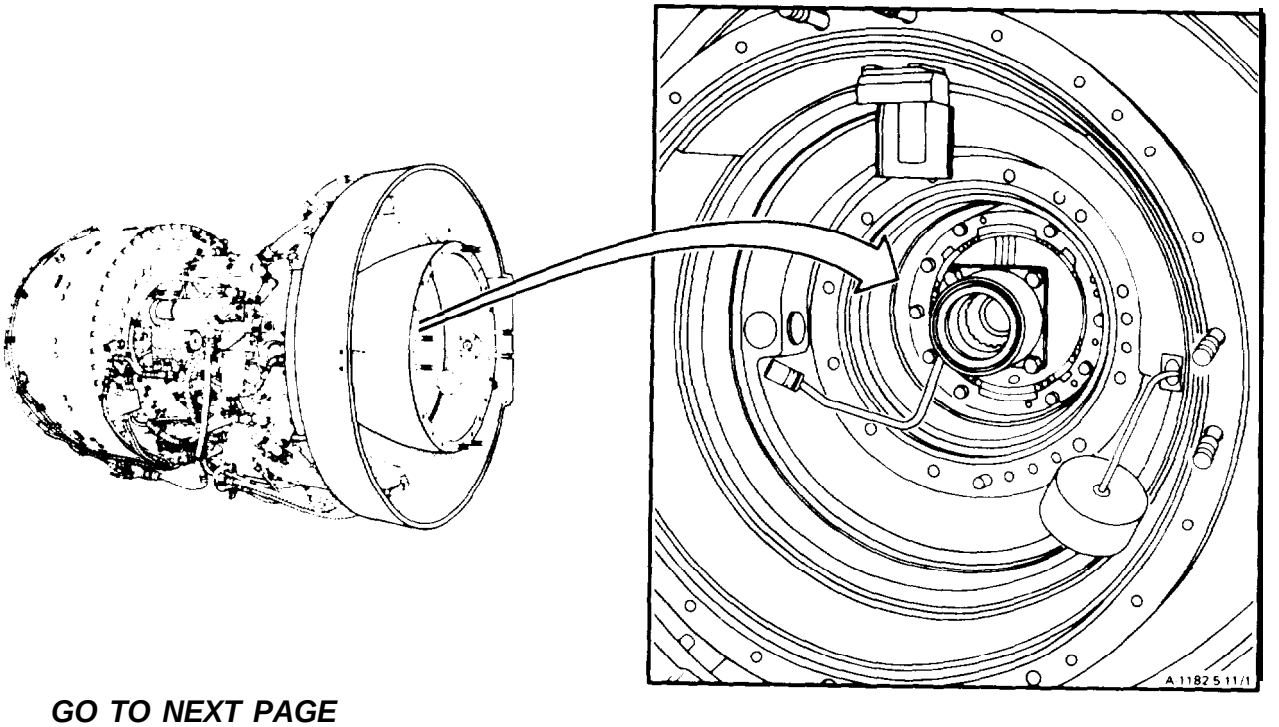
References:

TM 55-2840-254-23P
Task 2-67
Task 2-72
Task 5-7
Task 9-11
Task 9-14

General Safety Instructions:

WARNING

Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or with water for at least 15 minutes. Get medical attention for eyes.



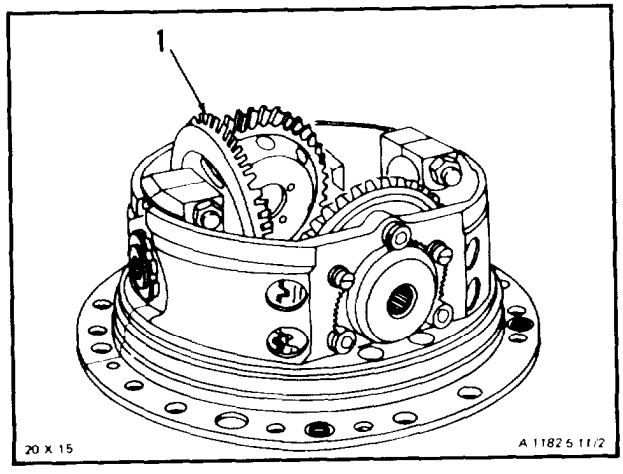
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5-11 INSTALL ACCESSORY GEARBOX ASSEMBLY (AVIM) (Continued) 5-11

NOTE

If original accessory gear is being installed omit following steps 1 thru 18 and go to step 19.

1. Paint accessory inner bevel gear teeth (1) with gear marking compound (38.1).

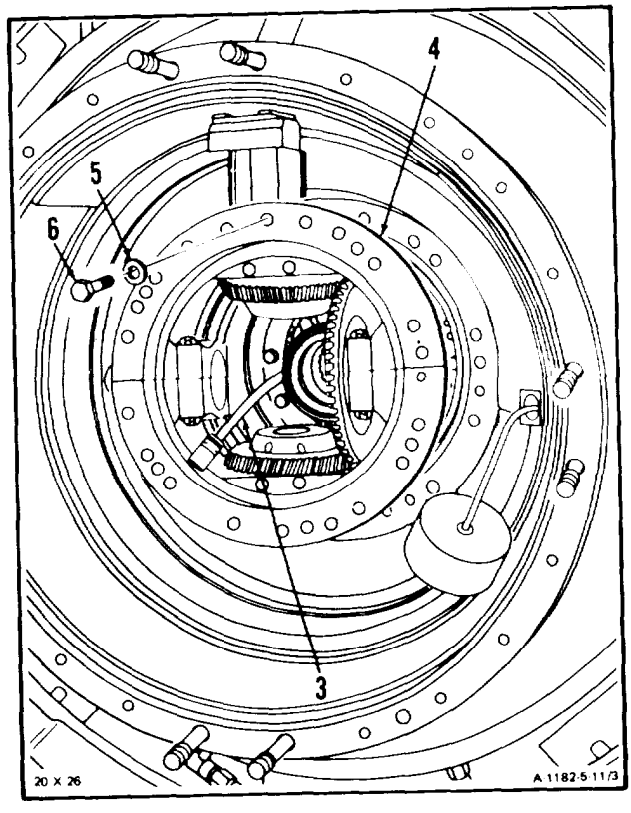


CAUTION

In following step, be sure electrical cable does not get caught as accessory gear assembly is installed. Failure to comply could cause damage to wiring which would result in improper indication of engine operation.

2. Position electrical cable (3) through accessory gear assembly (4) **and install accessory gear assembly (4).** Use four washers (5) and four bolts (6) to temporarily hold accessory gear assembly (4).

3. Turn engine to vertical position with inlet housing facing down.



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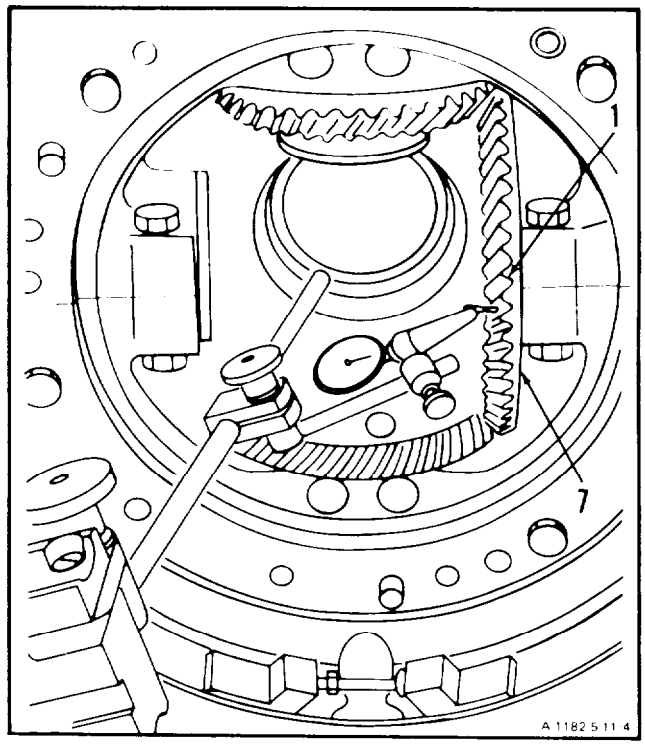
5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

4. Have helper hold locating bar (T1) steadily across inlet housing.

5. Place dial indicator on locating bar (T1). Place pointer on center of bevel gear tooth (1).

6. Check backlash of bevel gear (7) and compressor rotor pinion gear. Backlash shall not be less than 0.007 inch or greather than 0.013 inch. Record backlash.

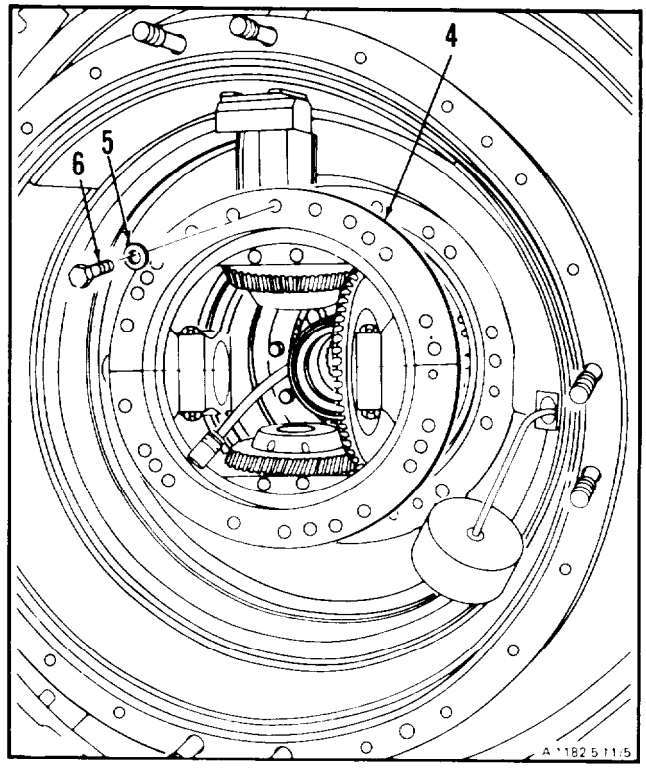
7. Remove dial indicator and locating bar (T1) from inlet housing.



8. Rotate compressor shaft counterclockwise three complete revolutions.

9. Turn engine to horizontal position.

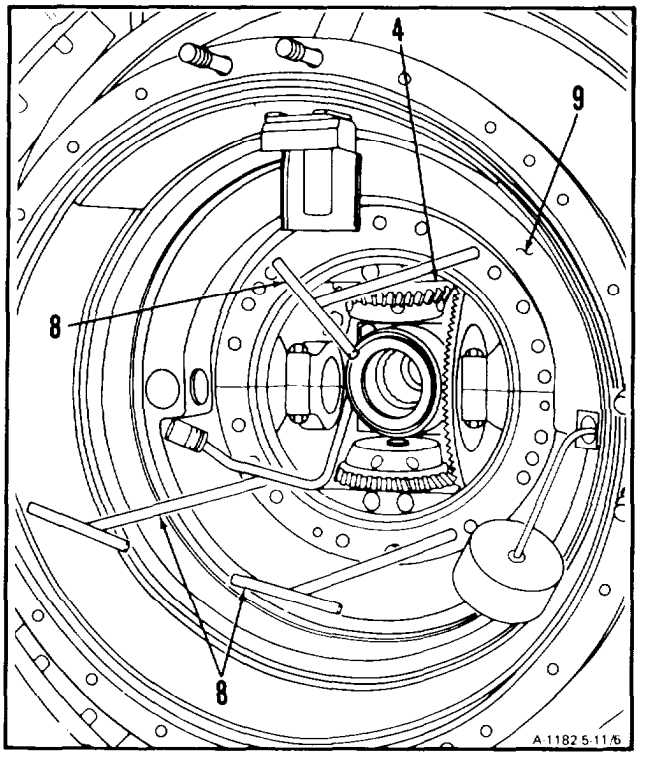
10. Remove four bolts (6) and four washers (5) from accessory gear assembly (4).



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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

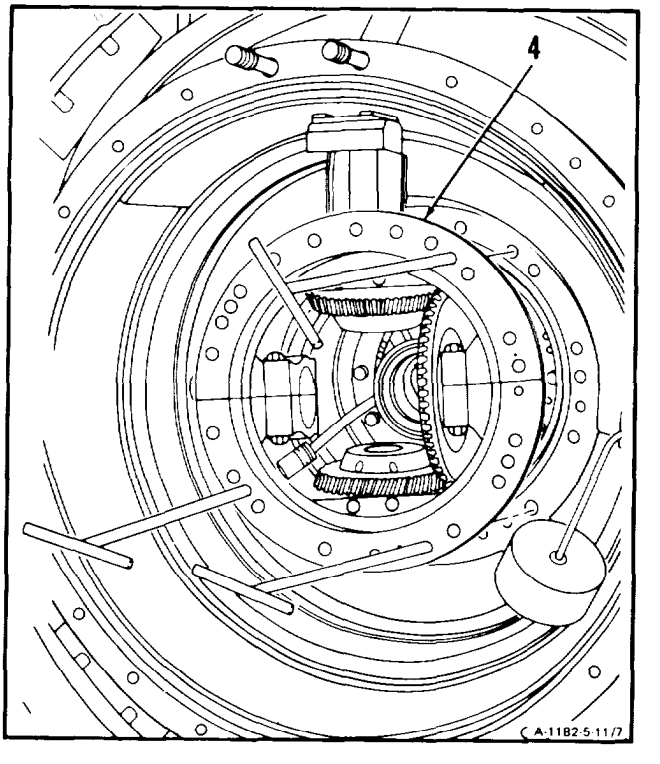
11. Install three handling tools (T18) (8). Tighten handling tools (8) evenly until accessory gear assembly (4) is free from housing (9).



CAUTION

In following step, be sure electrical cable does not get caught as accessory gear assembly is removed. Failure to comply could cause damage to wiring which would result in improper indication of engine operation.

12. **Remove accessory gear assembly (4).**



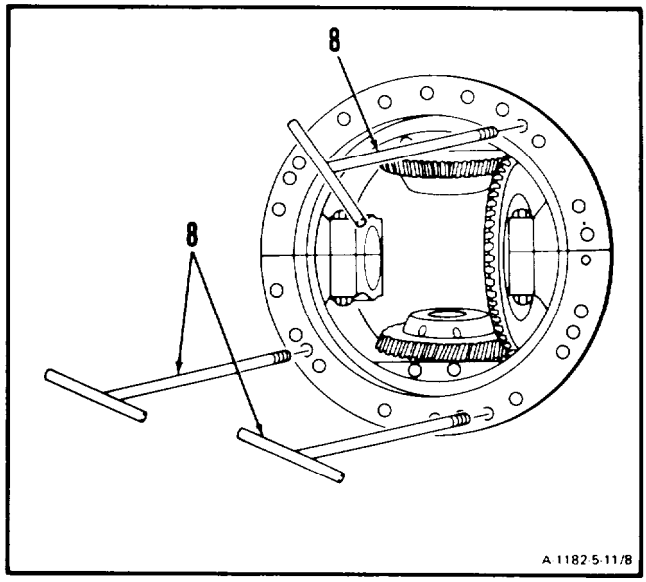
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

13. Remove three handling tools (T18) (8).

14. Remove torquemeter head assembly (Ref. Task 9-11).

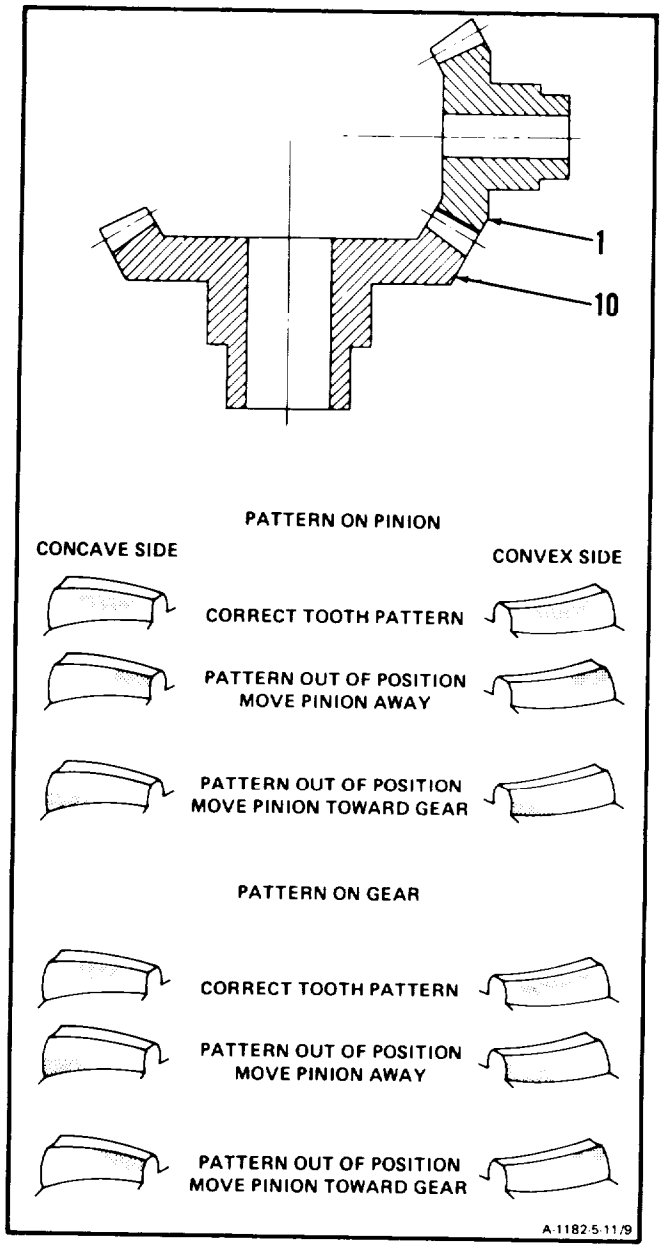
15. Remove No. 3 bearing package (Ref. Task 2-67).



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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

16. Inspect pattern between bevel gear (1) and compressor rotor pinion gear (10).



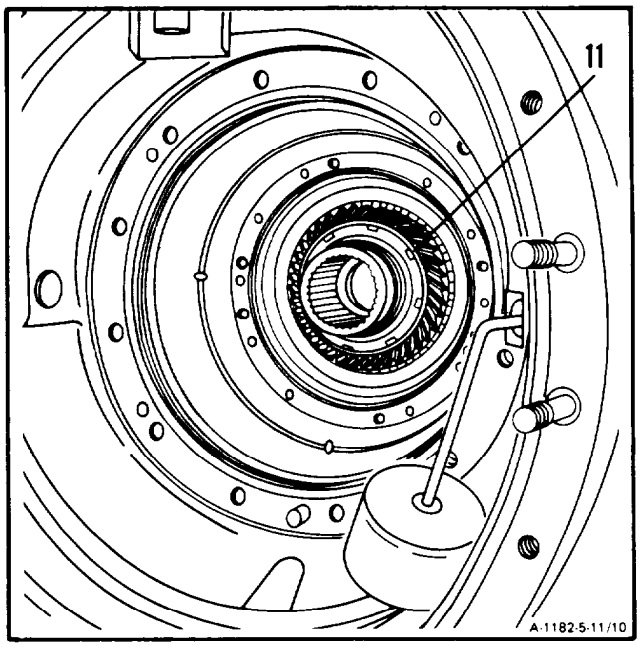
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

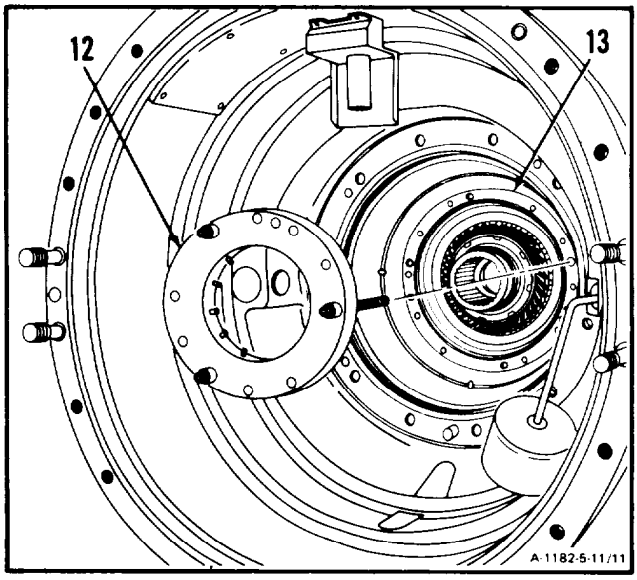
17. If backlash and pattern are within limits, do steps 18u. and v. and proceed to step 19.

18. If backlash and pattern is not within limits, proceed as follows:

a. Straighten lockring tabs (11).



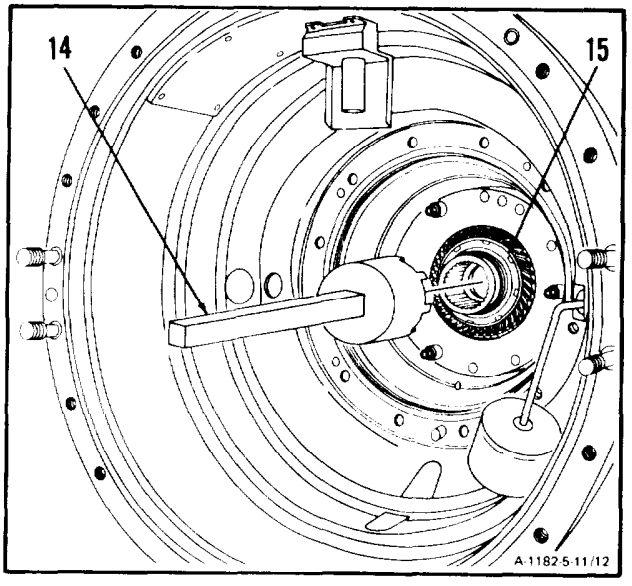
b. Install wrench pin plate (T9) (12) on housing (13).



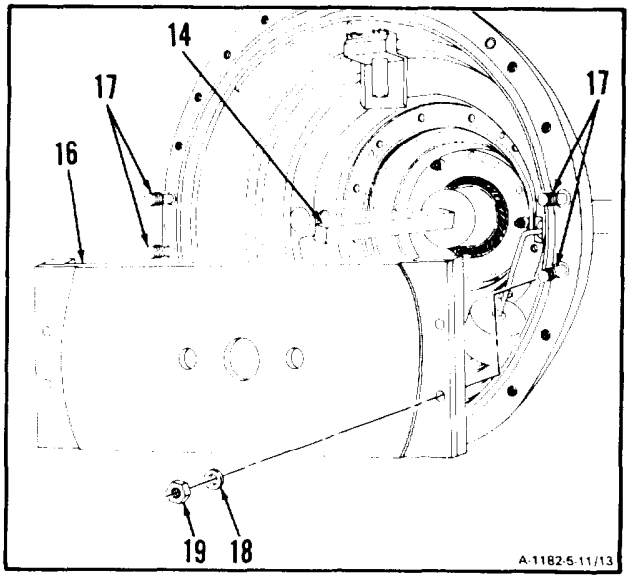
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

c. Install wrench (14), detail of torque fixture (T46) onto nut (15).



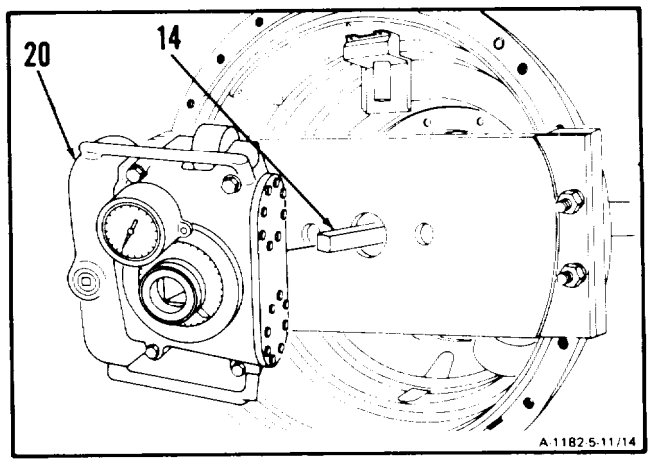
d. Install plate (16), detail of torque fixture (T46) over wrench (14) and inlet housing studs (17). Secure with four washers (18) and four nuts (19).



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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

e. Using helper, install torque multiplier (T63) (20) over wrench (14).



WARNING

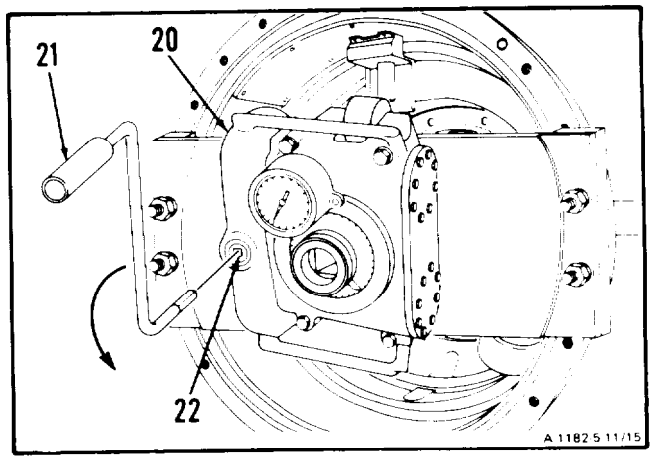
Make sure handle is fully seated and ratchet selector on torque multiplier is properly set before applying torque. Rotating ratchet selector with load on torque pack can damage unit and injure personnel.

WARNING

Do not change ratchet selector when torque load is on torque multiplier. Damage to equipment or injury to personnel can result.

f. Install handle (21), detail of torque multiplier (T63) (20), into slot (22).

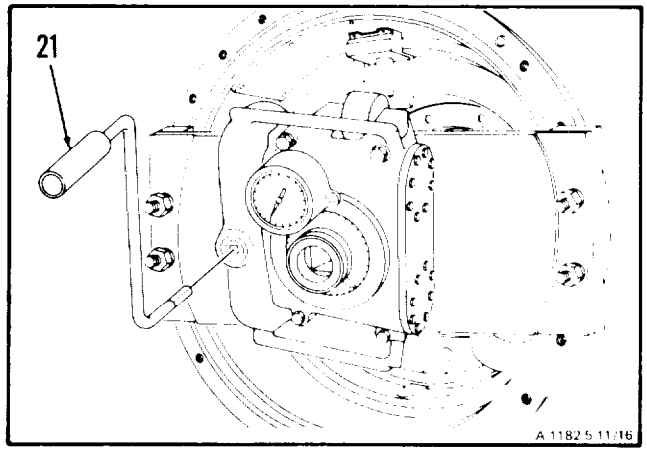
g. Turn handle (21) counterclockwise to loosen nut.



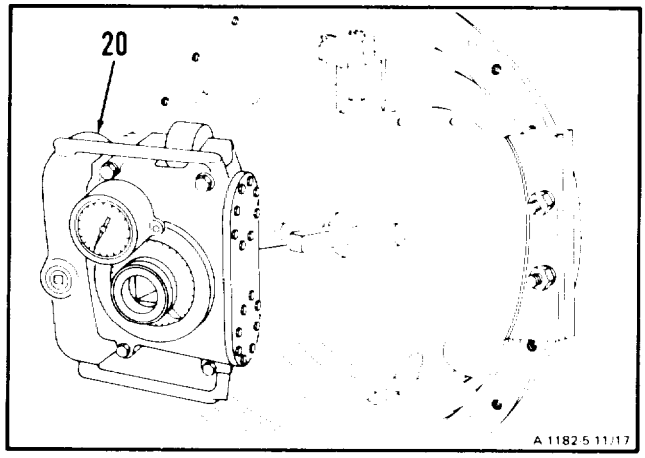
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

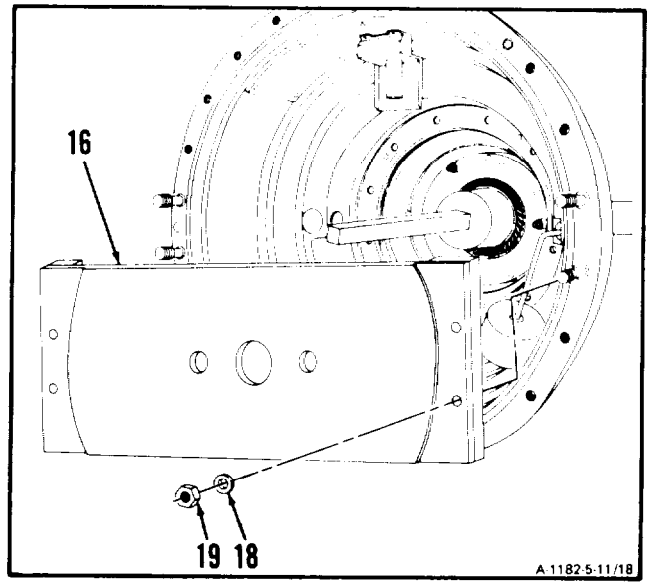
h. Remove handle (21)



i. Remove torque multiplier (T63) (20)



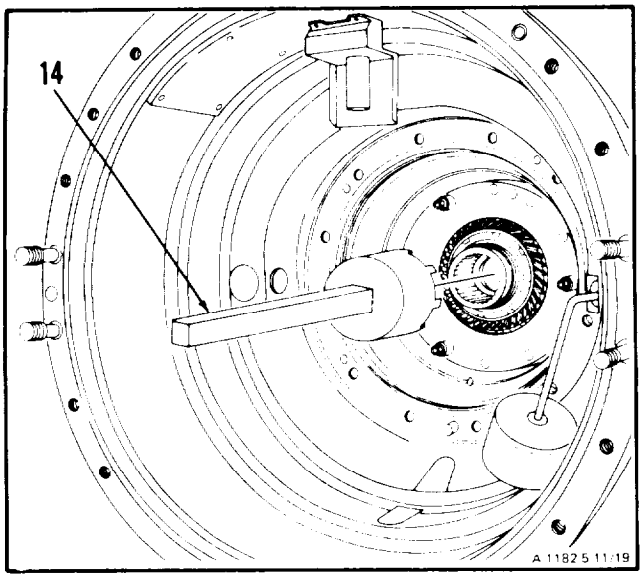
j. Remove four nuts (19), four washers (18), and plate (16).



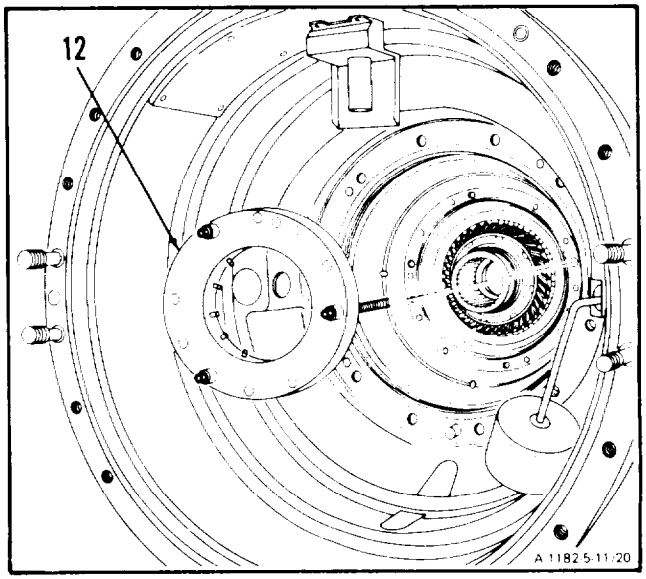
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

k. Remove wrench (14).



l. Remove wrench pin plate (T9) (12)

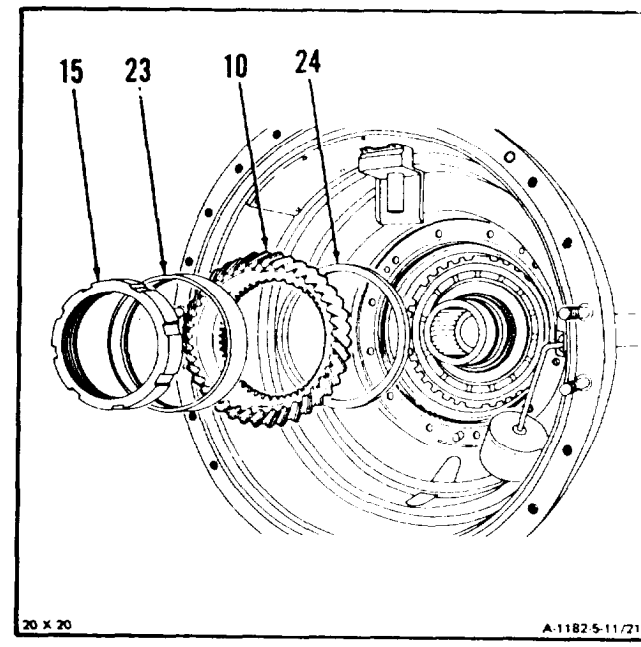


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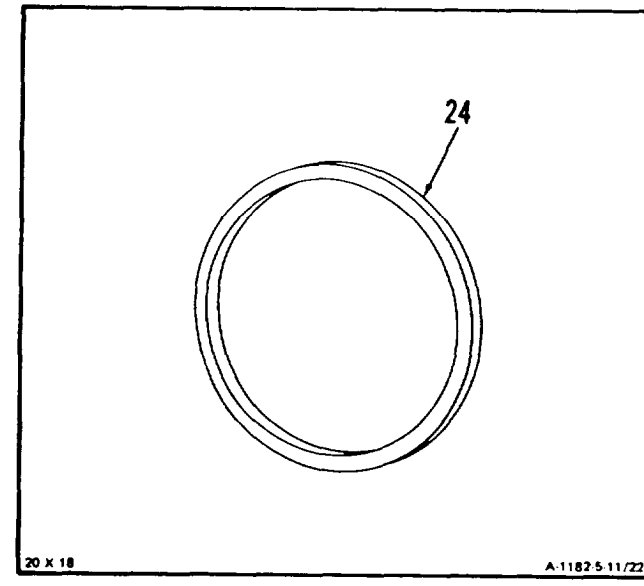
NOTE

In following step, if pressure/ force is required to remove pinion gear (10), use mechanical puller (T3).

m. Remove nut (15), lockring (23), pinion gear (10) and shim (24).



n. Measure thickness of shim (24). Use outside micrometer caliper. Record thickness of shim (24).



GO TO NEXT PAGE

5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

NOTE

If backlash is less than 0.007 inch, a thinner shim must be installed. If backlash is greater than 0.013 inch, a thicker shim must be installed. Increasing or decreasing shim thickness by 0.002 inch will change backlash approximately 0.001 inch.

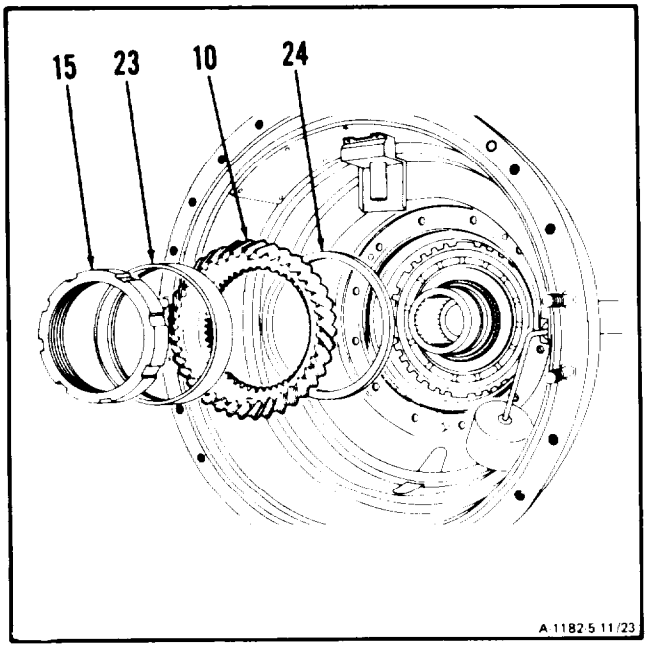
o. Select shim (24) from shim selection table.

SHIM SELECTION TABLE

SHIM PART NUMBER	SIZE
2-100-065-01	0.0025-0.0035 inch
2-100-065-02	0.0035-0.0053 inch
2-100-065-03	0.0053-0.0075 inch
2-100-065-04	0.009-0.012 inch
2-100-065-05	0.014-0.017 inch
2-100-065-06	0.0295-0.0340 inch

p. Install shim (24), pinion gear (10), lockring (23) and nut (15). Hand tighten nut (15).

q. Repeat steps 18b. through e.

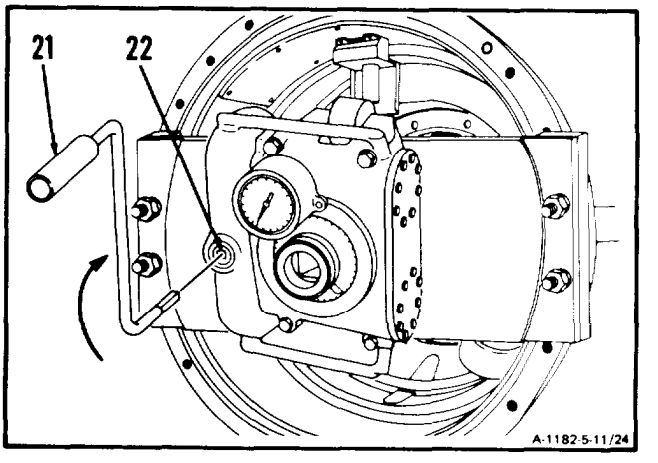


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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

WARNING

Make sure handle is fully seated and ratchet selector on torque multiplier is properly set before applying torque. Rotating ratchet selector with load on torque pack can damage unit and injure personnel.



WARNING

Do not change ratchet selector when torque load is on torque multiplier. Damage to equipment or injury to personnel can result.

r. Install handle (21) in slot (22). Turn handle clockwise to torque nut. **Torque nut to 385 foot pounds.**

s. Repeat steps h. through i.

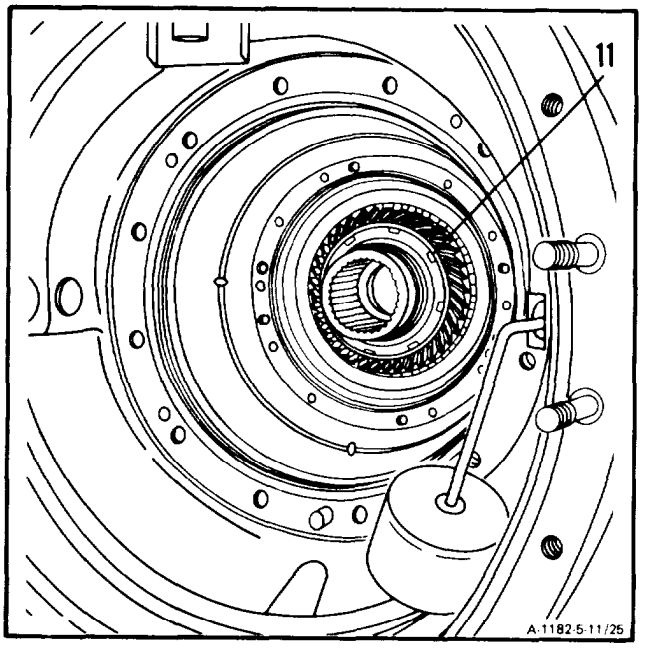
t. Bend lockring tabs (11) 180 degrees apart.

u. Clean compressor rotor pinion gear (step 23). Install No. 3 bearing package (Ref. Task 2-72).

v. install torquemeter head assembly (Ref. Task 9-14).

w. Repeat steps 1. thru 18. If pattern and back lash still cannot be met, replace pinion gear (steps 18a. thru t.).

x. Repeat steps 1. thru 18. If pattern and back lash still cannot be met, replace engine.



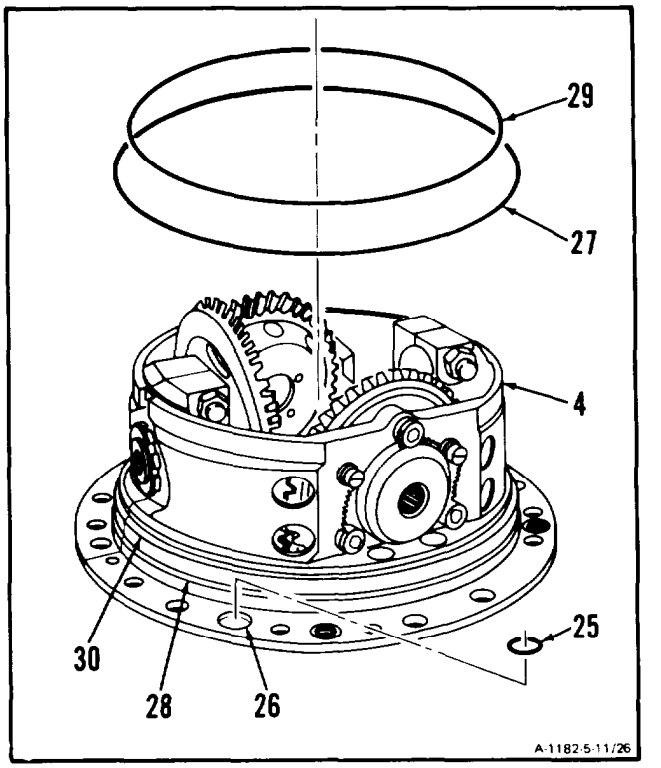
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

19. Install new packing (25) in-hole (26) on accessory gear assembly (4).

20. Install new packing (27) on groove (28).

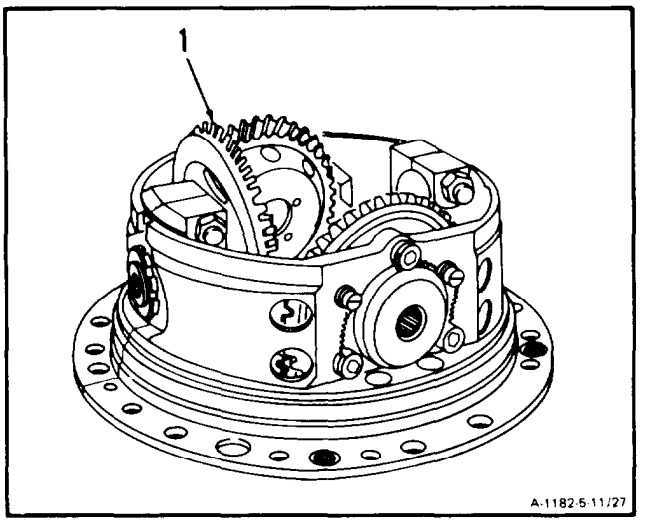
21. Install new packing (29) on groove (30).



22. Clean accessory inner bevel gear teeth (1) as follows:

    a. Wear gloves (E20). Use lint-free cloth (E26) dampened in dry cleaning solvent (E17).

    b. Wipe dry, using clean, dry lint-free cloth (E26).



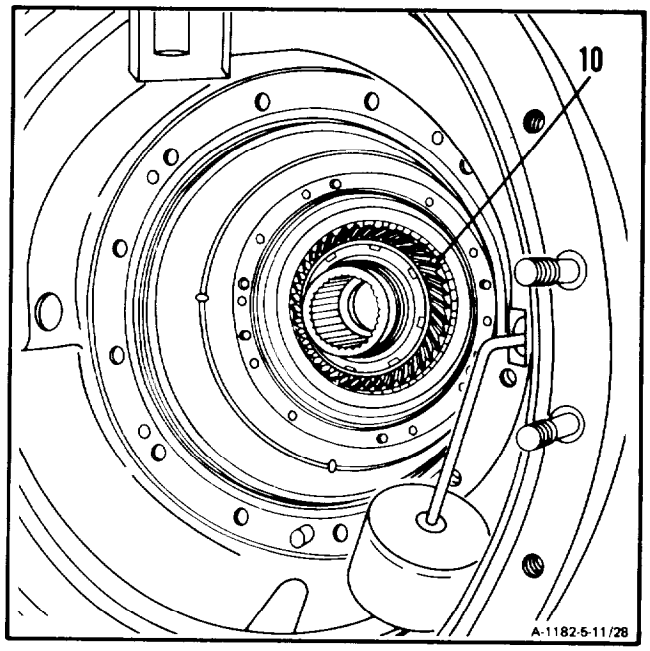
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

23. If not previously cleaned, clean compressor rotor pinion gear (10) as follows:

    a. Wear gloves (E20). Use lint-free cloth (E26) dampened in dry cleaning solvent (E17).

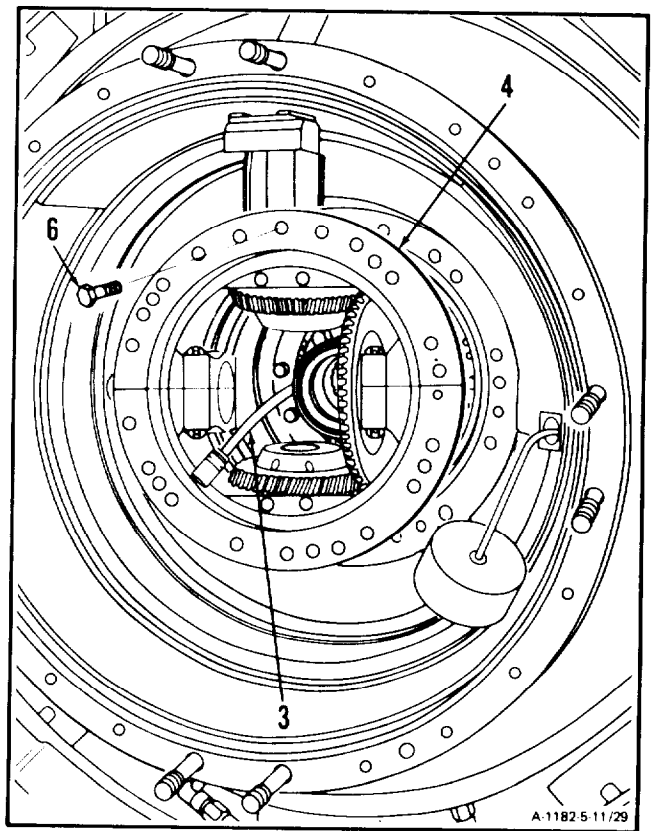
    b. Wipe dry, using clean, dry lint-free cloth (E26).



CAUTION

In following step, be sure electrical cable does not get caught as accessory gear assembly is installed. Failure to comply could cause damage to wiring which would result in improper indication of engine operation.

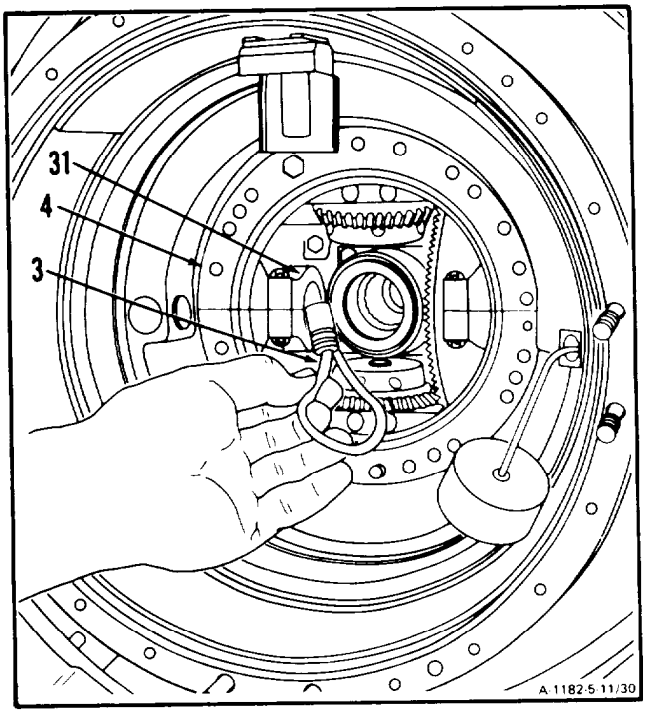
24. **Position electrical cable (3) through accessory gear assembly (4), and install accessory gear assembly (4).** Use one bolt (6) to temporarily hold accessory gear assembly (4).



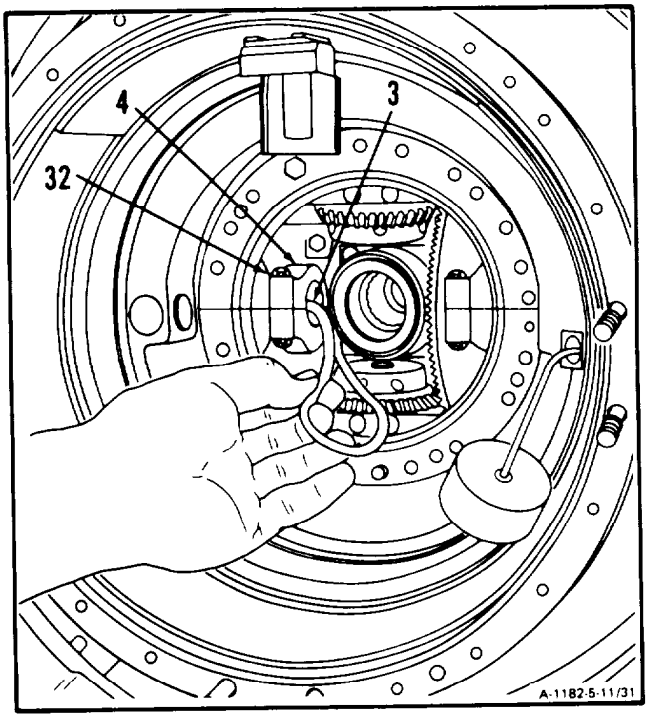
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

25. **Thread electrical cable (3) through carrier (31)** in accessory gear assembly (4).



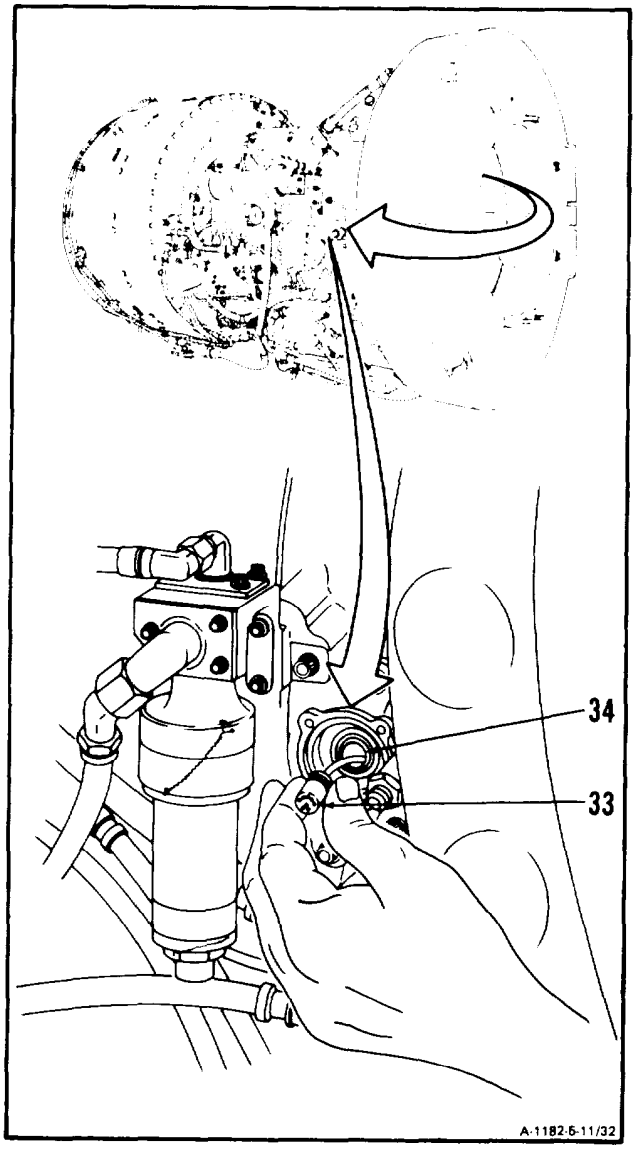
26. **Feed electrical cable (3)** through accessory gear assembly (4) **into inlet housing hollow strut (32).**



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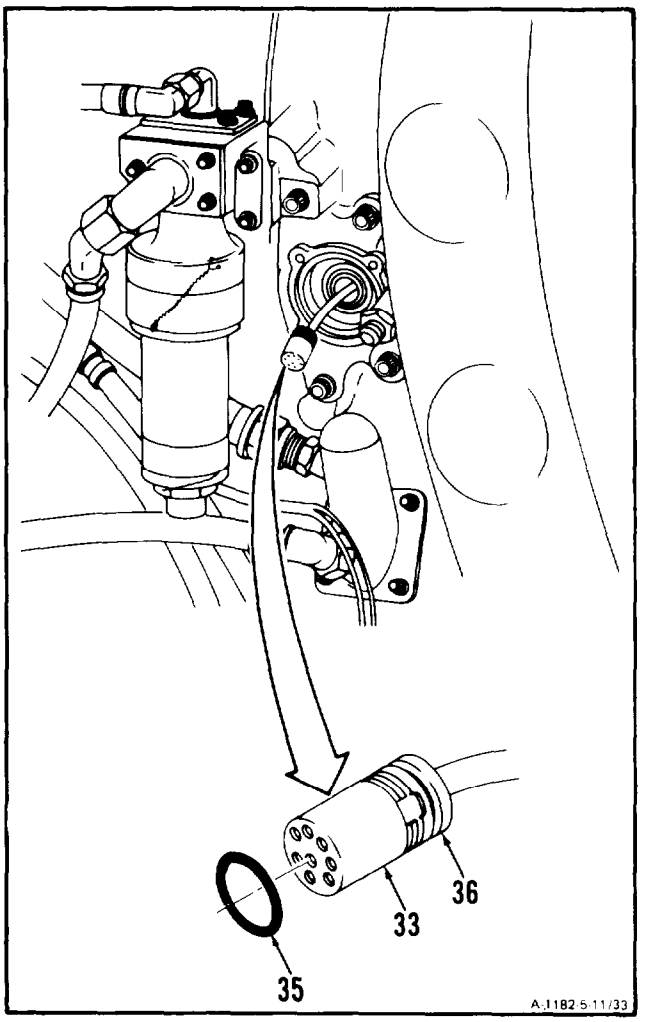
5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

27. **Pull electrical connector (33) through hole (34).**



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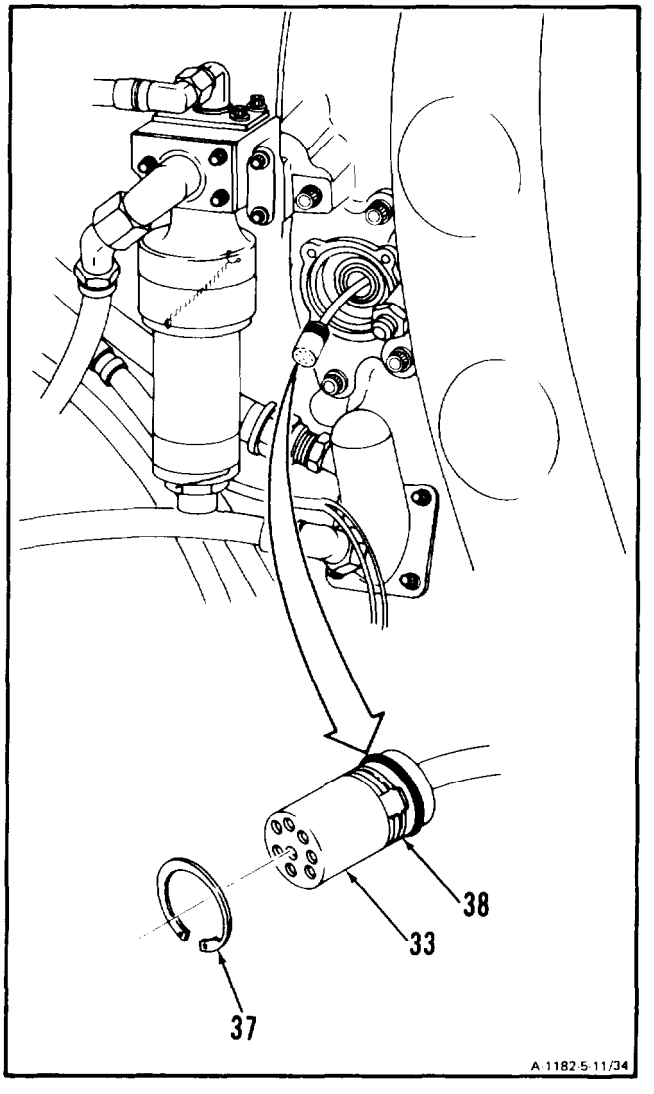
28. **Install packing (35)** in groove (36) on electrical connector (33).



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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

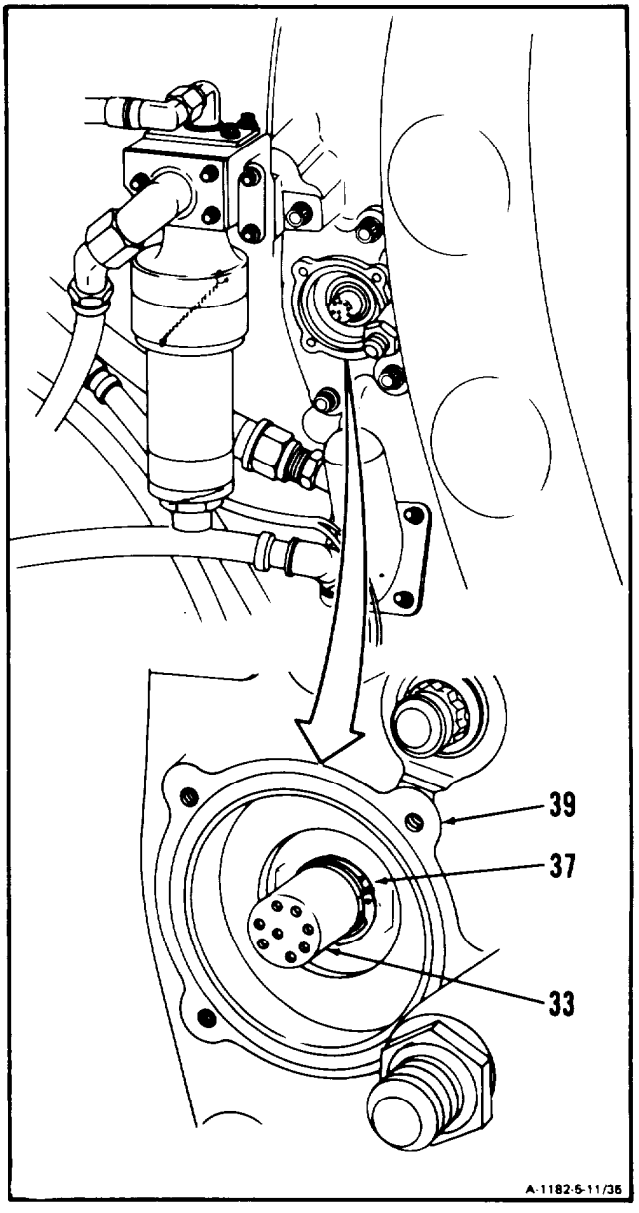
29. **Install retaining ring (37)** in groove (38) on electrical connector (33).



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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

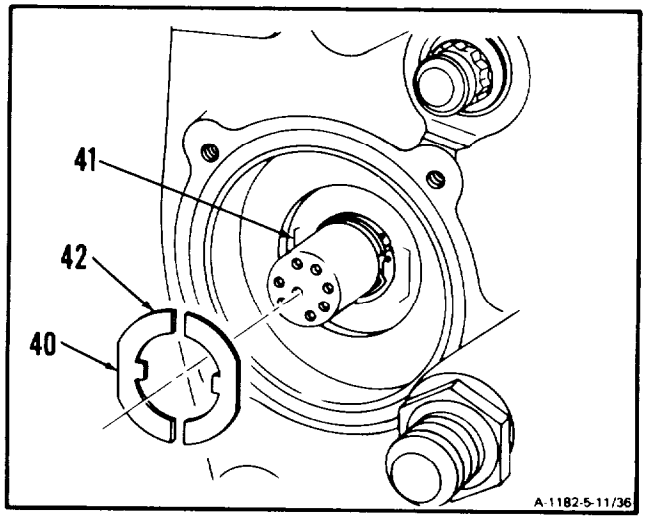
30. **Carefully push electrical connector (33) back into housing (39)** until retaining ring (37) is fully seated.



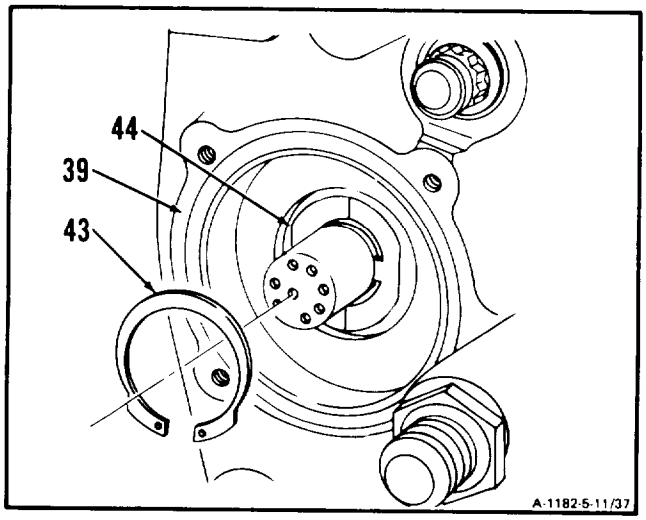
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued)

31. Align spacer flats (40) with housing flats (41). install two spacers (42).



32. **Install retaining ring (43)** in groove (44) in housing (39).



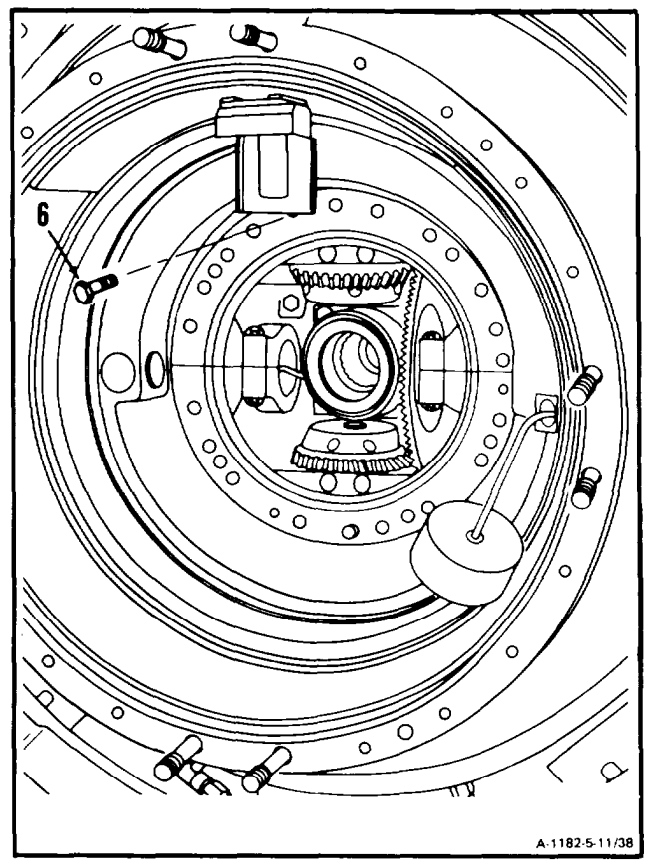
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5-11 INSTALL ACCESSORY GEAR ASSEMBLY (AVIM) (Continued) 5-11

33. Remove temporary bolt (6).

NOTE

After installation of accessory gear assembly, the gear shaft must be installed in theaccessory gearbox assembly (Ref. Task 5-7 steps 8 thru 18).



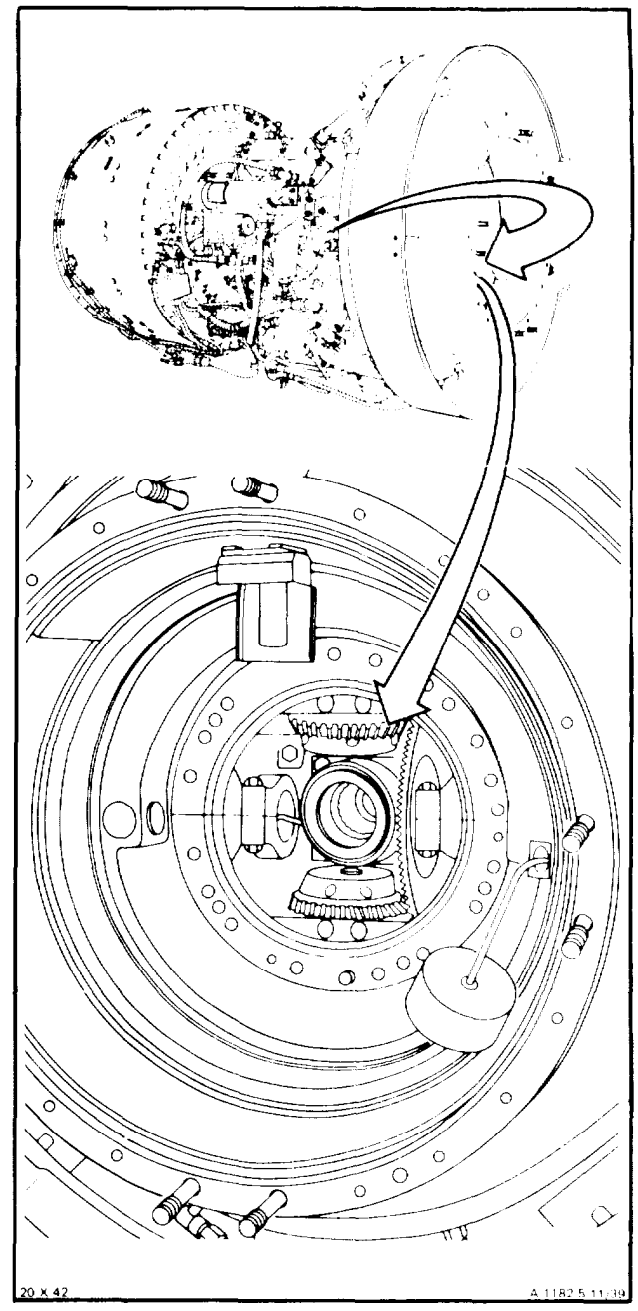
INSPECT

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5-11 INSTALL ACCESSORY GEARBOX ASSEMBLY (AVIM) (Continued) 5-11

FOLLOW-ON MAINTENANCE:

Install Torquemeter Junction Box (Task 9-5).
Install Output Shaft Support Housing (Task 2-63).
Install Overspeed Drive and Outlet Cover Assembly (Task 5-23).
Install Tube Assembly (Inlet Housing to Main Oil Pump) (Task 8-51).
Install Inlet Housing Cover Assembly (Task 2-57).
Install Output Shaft (Task 9-10).
Install Output Shaft Seal and Housing Assembly (Task 2-52).
Install Starter Drive Assembly (Task 5-16).
Install Fuel Boost Pump Assembly (Task 6-13).
Service Engine oil System (Task 1-74).
Install Accessory Gearbox Assembly (Task 5-7).



END OF TASK

5-12 REMOVE STARTER DRIVE ASSEMBLY

5-12

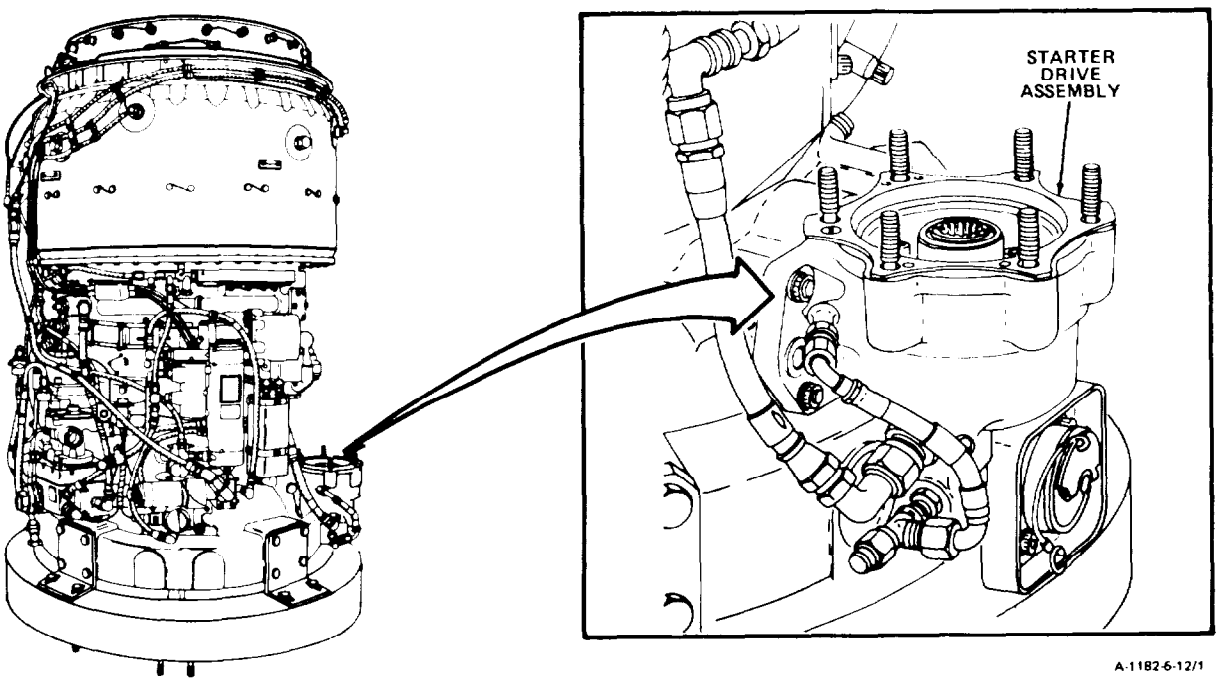
INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-3234944

Materials:
Wiping Rag (E58)

Personnel Required:
68B10 Aircraft Powerplant Repairer

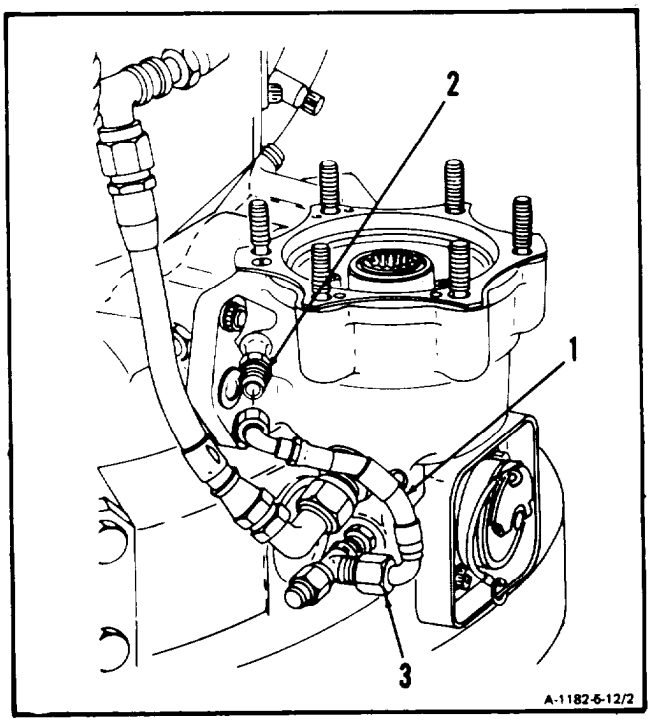


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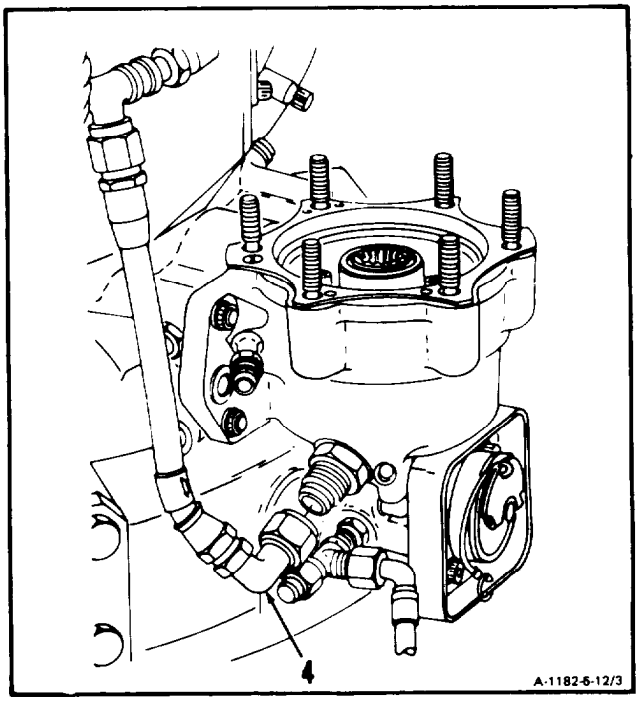
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5-12 REMOVE STARTER DRIVE ASSEMBLY (Continued)

1. **Disconnect hose assembly (1)** from fitting (2). Loosen connector (3).



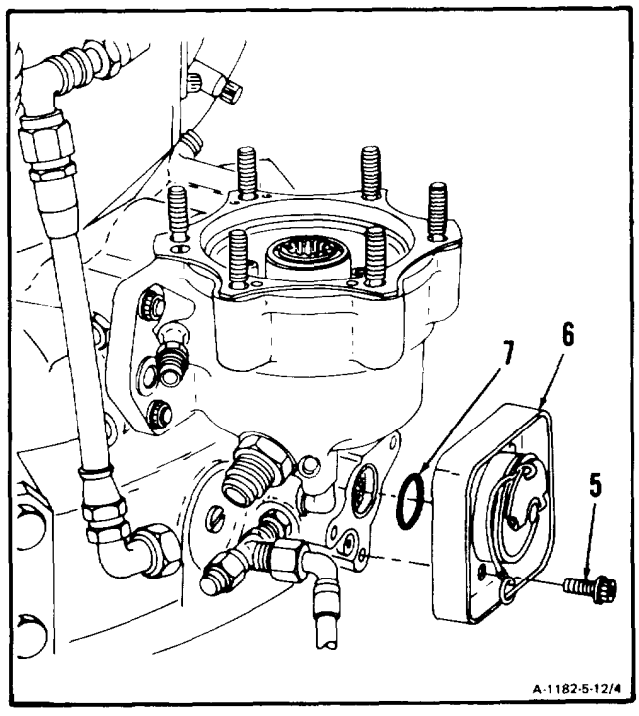
2. **Disconnect hose assembly (4).**



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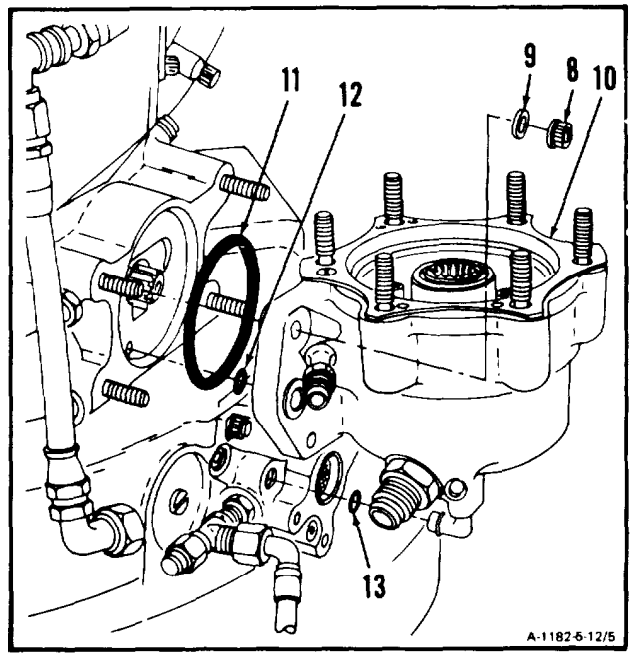
5-12 REMOVE STARTER DRIVE ASSEMBLY (Continued) 5-12

3. **Remove** lockwire, three screws (5), and **oil filler assembly (6).** Remove packing (7).



4. **Remove** four nuts (8), washers (9), and **starter drive assembly (10).** Remove packings (11 and 12).

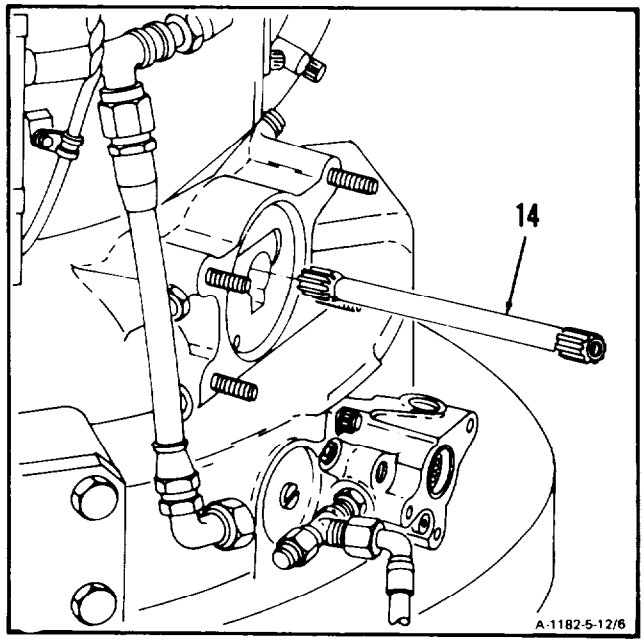
5. Remove packing (13).



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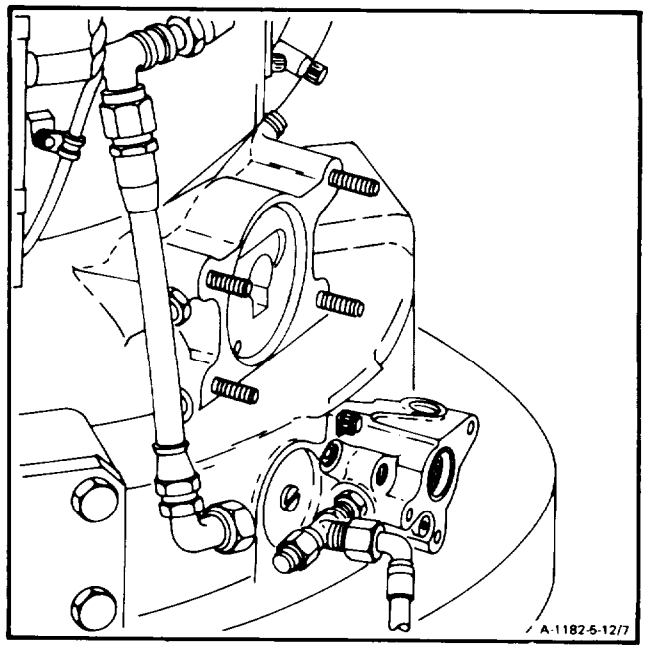
5-12 REMOVE STARTER DRIVE ASSEMBLY (Continued) 5-12

6. **Remove gearshaft (14).**



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-13 CLEAN STARTER DRIVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944

Materials:
Dry Cleaning Solvent (El 7)
Gloves (E20)
Lint-Free Cloth (E26)

Personnel Required:
68B10 Aircraft Powerplant Repairer

References:
Task 5-14

Equipment Condition:
Off Engine Task
Starter Drive Assembly Removed (Task 5-12)

General Safety Instructions:

WARNING

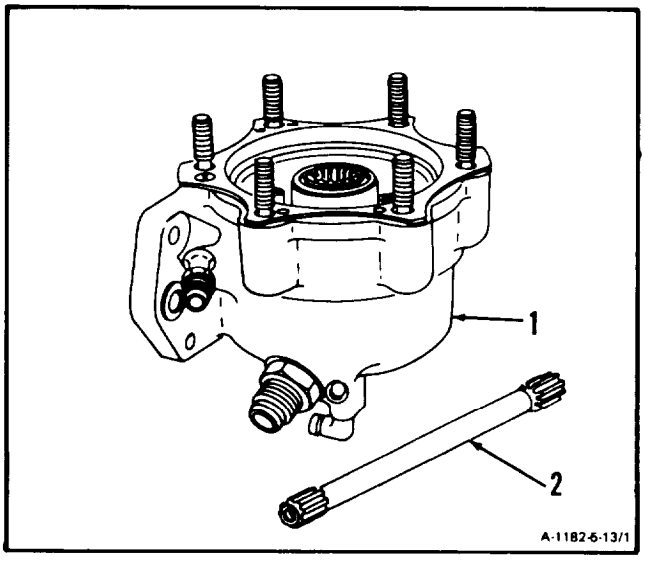
Dry cleaning solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Before cleaning starter drive assembly, check for evidence of oil leakage at seals. If evidence of leakage is found, have aircraft powerplant inspector inspect assembly (Ref. Task 5-14).

1. Wear gloves (E20) and **clean starter drive assembly (1)** and gearshaft (2). Use dry cleaning solvent (E17) and brush.

2. **Remove any remaining solvent** with clean lint-free cloth (E26).



FOLLOW-ON MAINTENANCE:

Inspect Starter Drive Assembly (Ref. Task 5-14).

END OF TASK

5-14 INSPECT STARTER DRIVE ASSEMBLY 5-14

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
68B30 Aircraft Powerplant Inspector

References:
Task 1-118

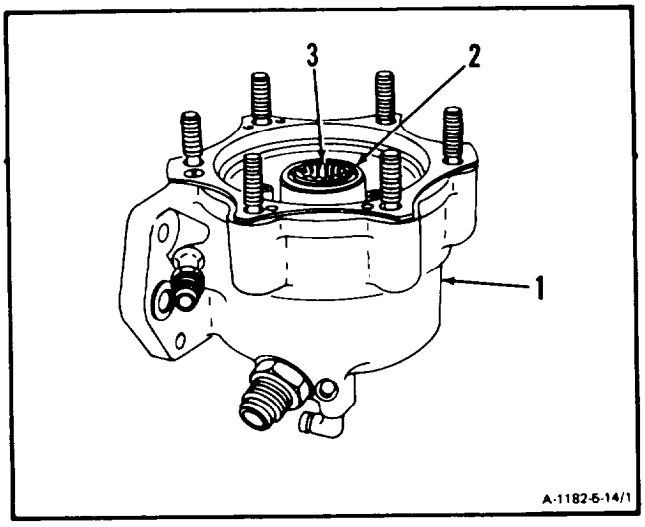
Equipment Condition:
Off Engine Task

1. **Inspect starter drive assembly (1).**

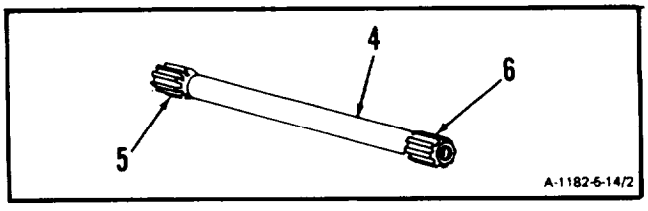
   a. There shall be no cracks.

   b. There shall be no evidence of leakage in area of seal (2).

   c. There shall be no wear deeper than 0.012 inch on splines (3).



2. Inspect gearshaft (4). There shall be no wear deeper than 0.007 inch splines (5 and 6) (Ref. Task 1-118).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-15 REPAIR STARTER DRIVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Locating Bar (T1)
Handling Tool (T16) (3)
Sleeve Bushing (Appendix E)
Oil Seal Removal Tool (Appendix E)
Oil Seal Installation Tool (Appendix E)
Arbor Press
Micrometer Depth Gage
Outside Micrometer Caliper Set

Materials:
Lockwire (E29)
Lubricating Oil (E32 or E33)
Wiping Rag (E58)

Parts:
Seal
Packing
Shim

Personnel Required:
68B10 Aircraft Powerplant Repairer
69B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P

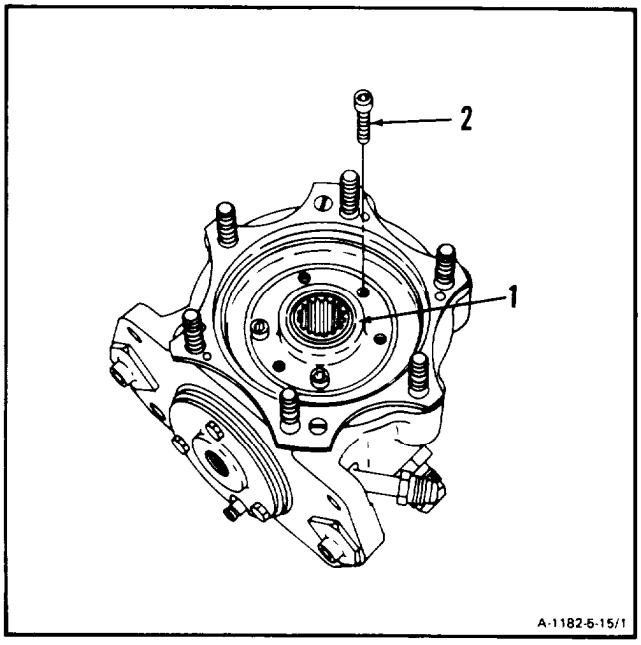
Equipment Condition:
Off Engine Task

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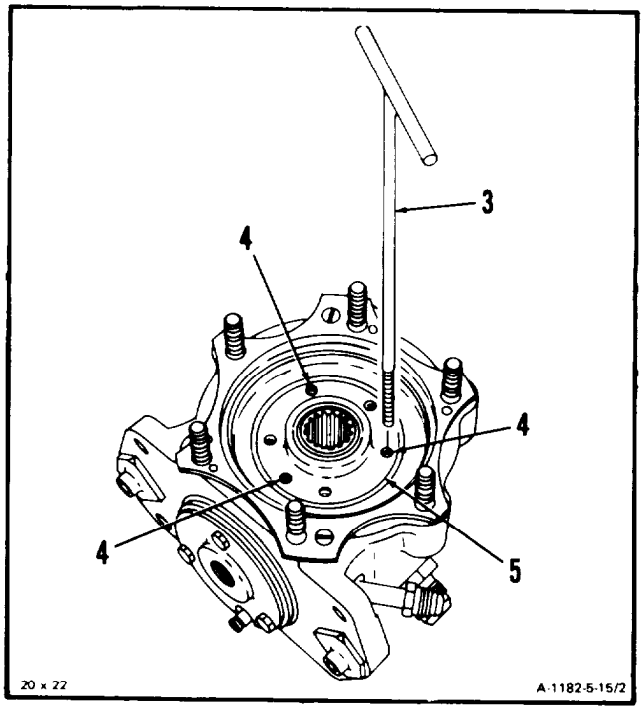
5-15 REPAIR STARTER DRIVE ASSEMBLY (Continued) 5-15

1. Repair leaks in area of seal (1).

a. **Remove** lockwire and **three bolts (2).**



b. **Install three handling tools (T16)** (3) in threaded holes (4) of seal retainer (5).

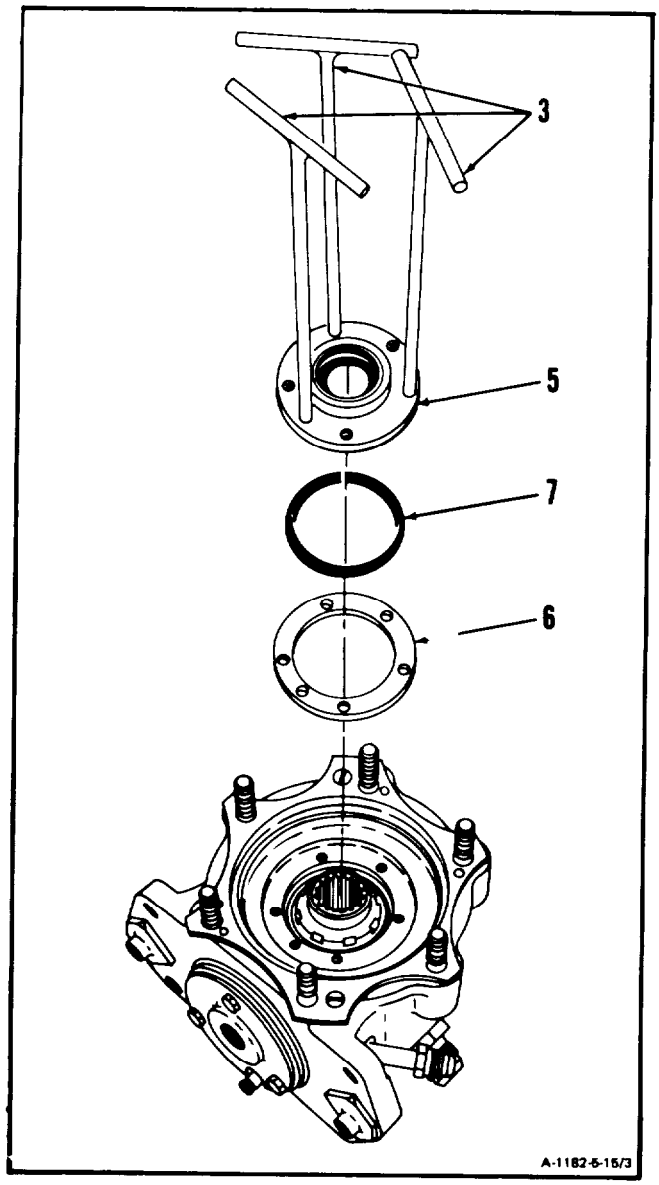


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5-15 REPAIR STARTER DRIVE ASSEMBLY (Continued) 5-15

c. Turn three handling tools (3) evenly clockwise and **remove seal retainer (5).** Remove shim (6) and packing (7).

d. Remove handling tools (3).



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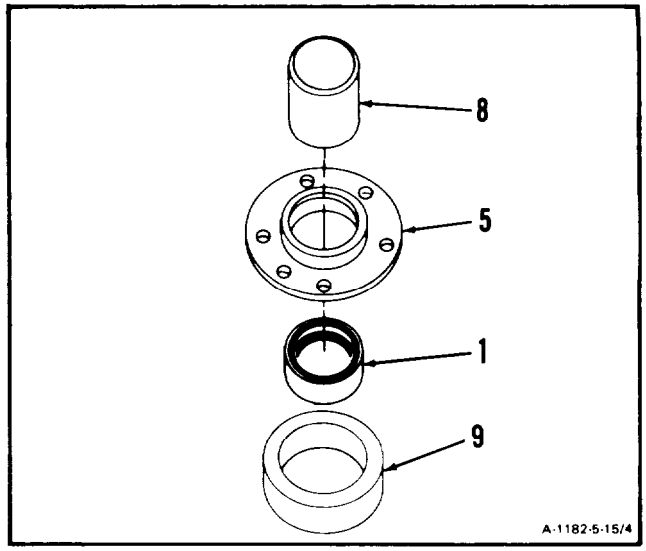
5-15 REPAIR STARTER DRIVE ASSEMBLY (Continued)

e. **Remove seal (1)** from seal retainer (5).

(1) Place sleeve bushing (Appendix E) (9) under seal retainer (5).

(2) Use oil seal removal tool (Appendix E) (8) and arbor press.

(3) Remove seal (1).



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5-15 REPAIR STARTER DRIVE ASSEMBLY (Continued) 5-15

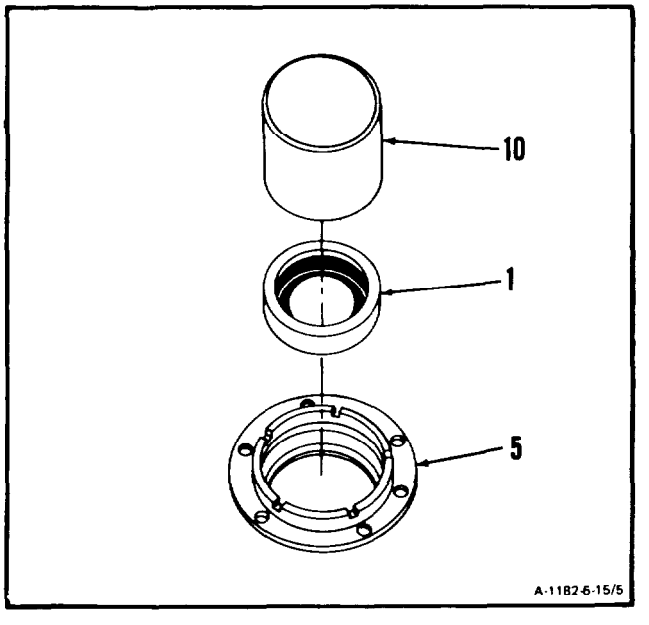
WARNING

Lubricating oils (E32 and E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

CAUTION

Seal must be dipped in lubricating oil (E32 or E33) before installation. Failure to comply will cause damage to seal during dry running period of initial engine starts.

f. Dip serviceable seal (1) in lubricating oil (E32 or E33). **Install seal (1)** in seal retainer (5). Use oil seal installation tool (Appendix E) (10) and arbor press.



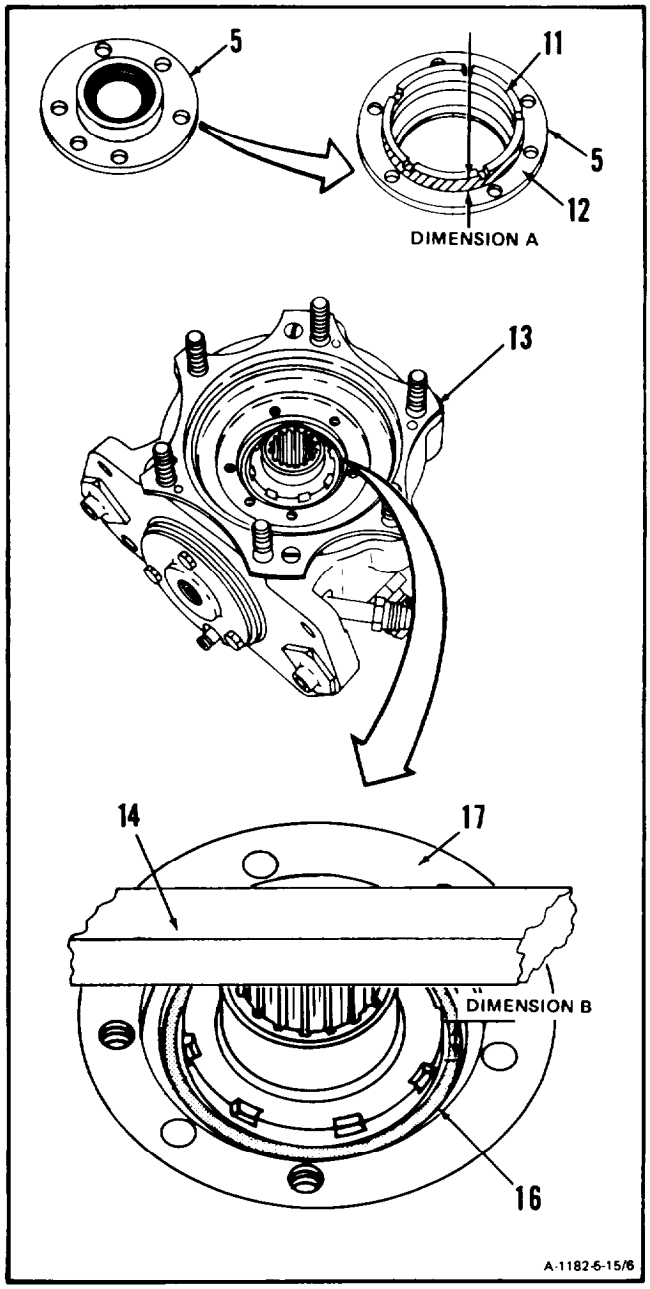
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g. **Determine shim thickness needed to** maintain proper bearing pinch as follows:

(1) On seal retainer flange (5), measure from inner flange surface (11) to retainer flange (12). Record as Dimension A.

(2) On starter drive assembly (13), place locating bar (T1) (14) on starter drive mount flange (13). Use micrometer depth gage. Measure to bearing surface (16). Record as Dimension D. Measure to support outer surface (17). Record as Dimension E. Subtract Dimension E from Dimension D. Record result as Dimension B.

(3) Subtract Dimension B from Dimension A. Record as Dimension C.



GO TO NEXT PAGE

(4) Find Dimension C in shim selection table. Read across and find needed thickness.

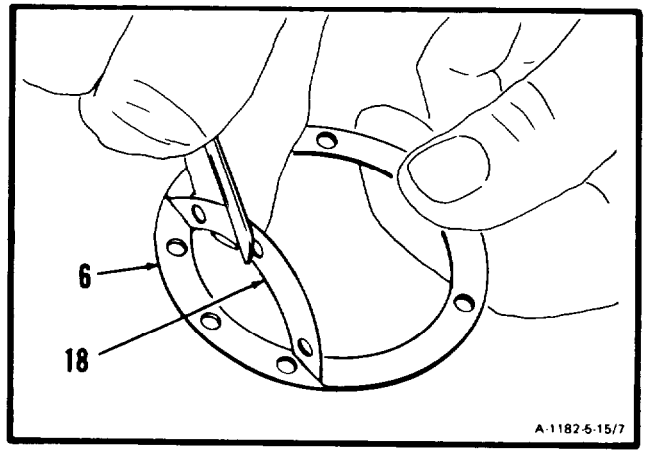
SHIM SELECTION TABLE

DIMENSION C (INCHES)	SHIM THICKNESS (INCHES)
0.003	0.000
0.004	0.000
0.005	0.000
0.006	0.000
0.007	0.002
0.008	0.004
0.009	0.004
0.010	0.006
0.011	0.006
0.012	0.008
0.013	0.008
0.014	0.010
0.015	0.010
0.016	0.012
0.017	0.012

h. Prepare shim (6) as follows:

(1) Peel off layers (18) required to obtain shim thickness needed.

(2) Measure thickness of shim (6) and check against shim selection table. Use outside micrometer caliper set.

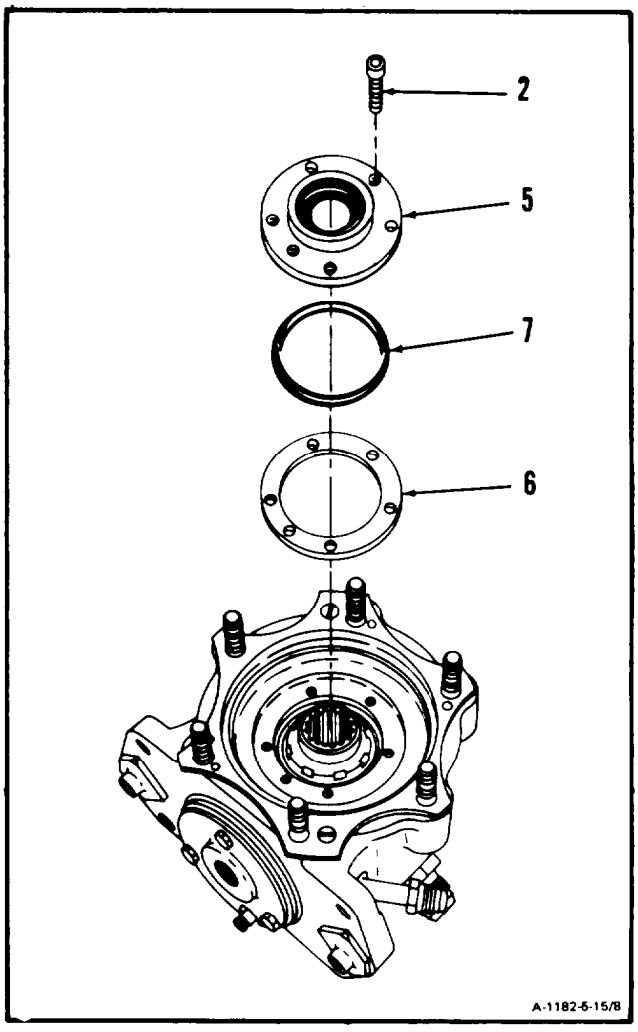


INSPECT

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5-15 REPAIR STARTER DRIVE ASSEMBLY (Continued) 5-15

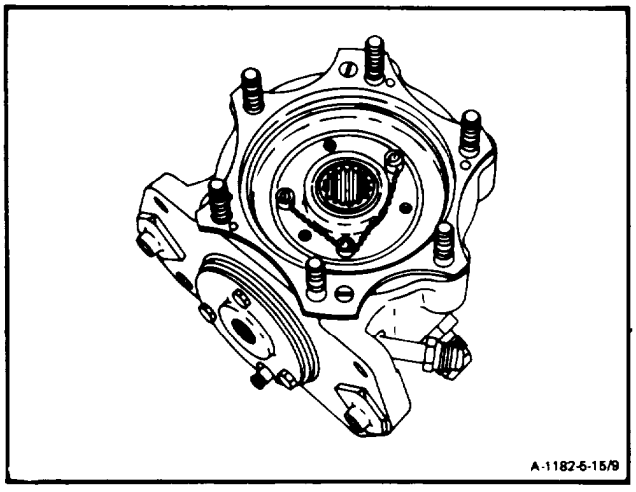
i. Install packing (7) on seal retainer (5). **Install** shim (6), **seal retainer (5),** three bolts (2) and lockwire. Use lockwire (E29).



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-16 INSTALL STARTER DRIVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

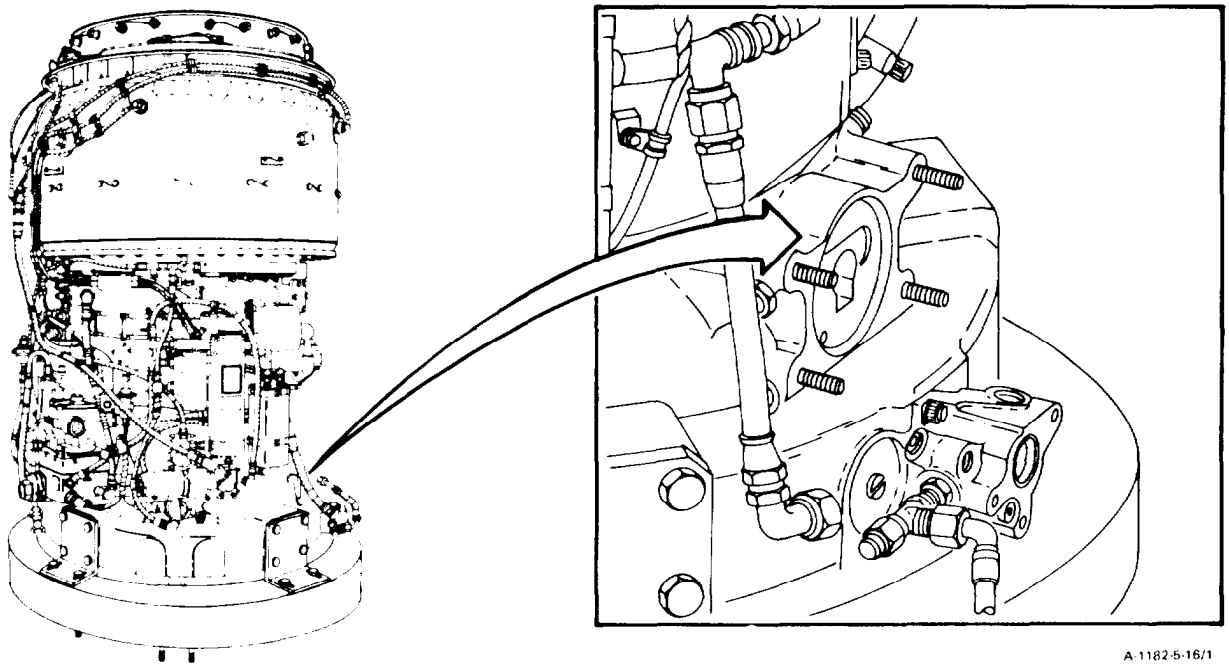
Tools.
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials.
Lockwire (E29)

Parts:
Packings

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P



A-1182-5-16/1

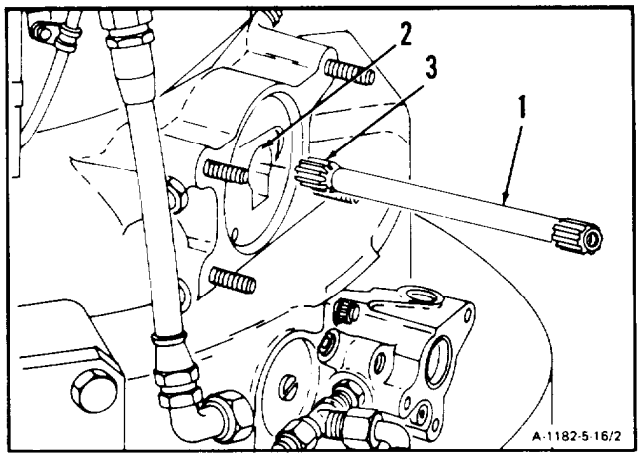
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5-16 INSTALL STARTER DRIVE ASSEMBLY (Continued)

NOTE

In following step, gearshaft may have to be rotated slightly to engage splines.

1. **Install gearshaft (1)** into widest portion of hole (2). Guide straight in until splines (3) engage with internal accessory drive gear splines.



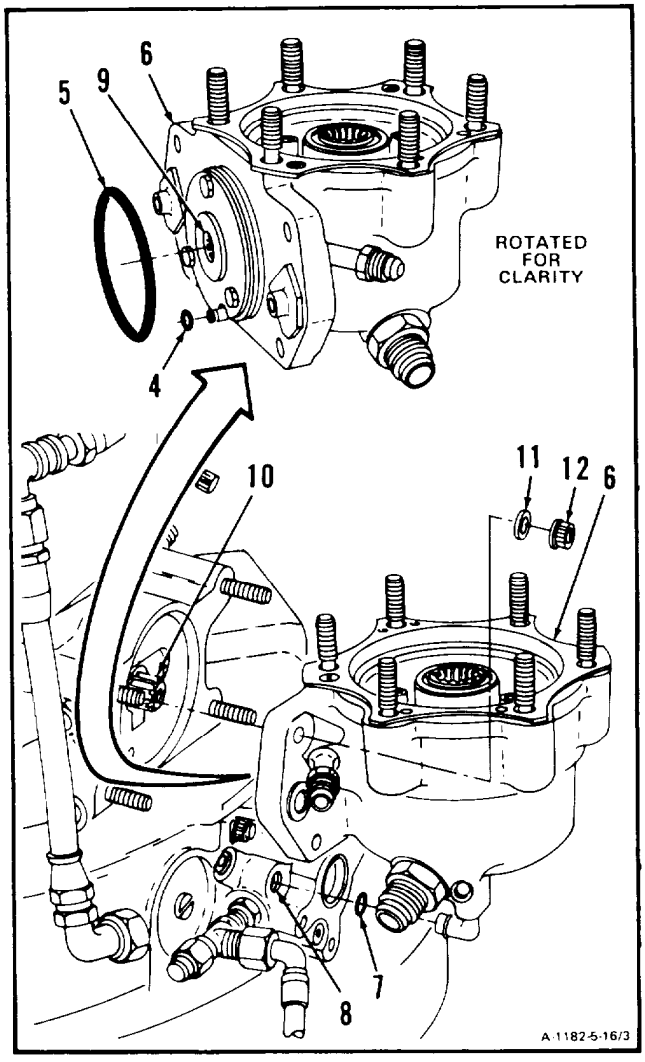
2. Install packings (4 and 5) on starter gearbox assembly (6).

3. Install packing (7) in housing assembly (8).

NOTE

In following step, splines may have to be rotated slightly to engage properly.

4. Engage splines (9) with splines (10). **Install starter drive assembly (6),** four washers (11), and nuts (12).

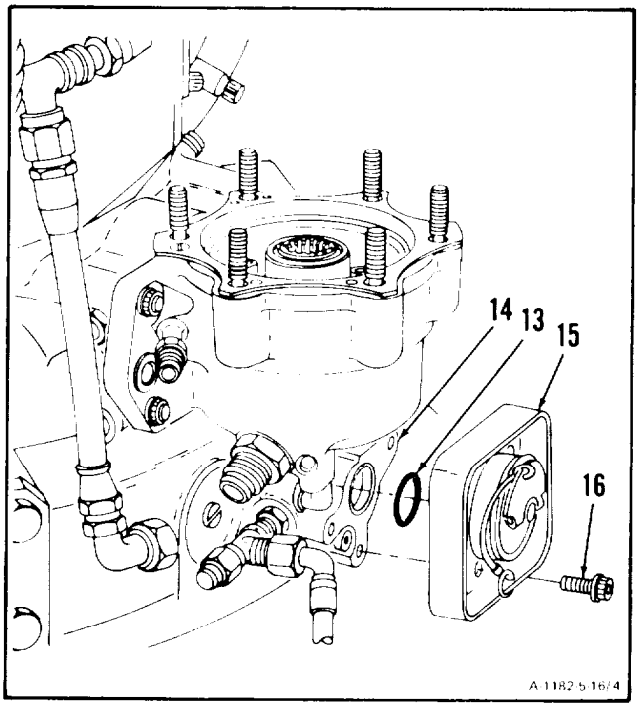


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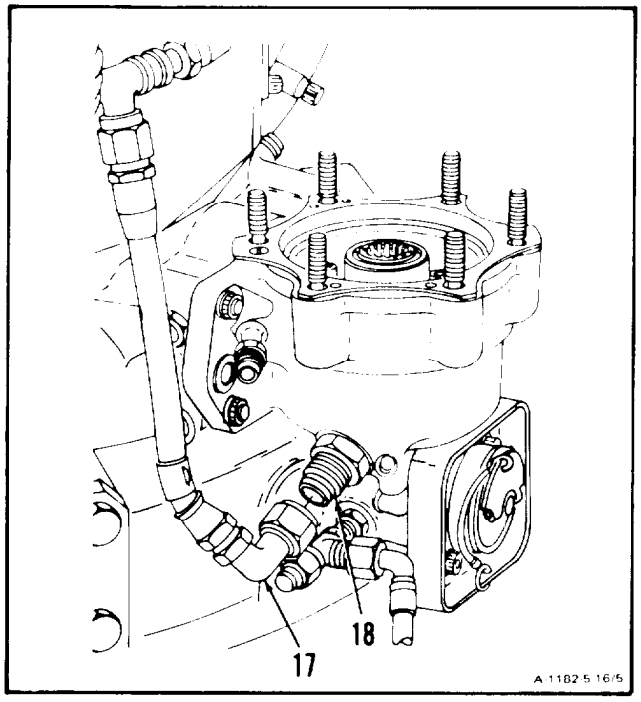
5-16 INSTALL STARTER DRIVE ASSEMBLY (Continued) 5-16

5. Install packing (13) on filler housing (14).

6. **Install oil filler assembly (15)** on oil filler housing (14). Install three bolts (16) and lockwire. Use lockwire (E29).



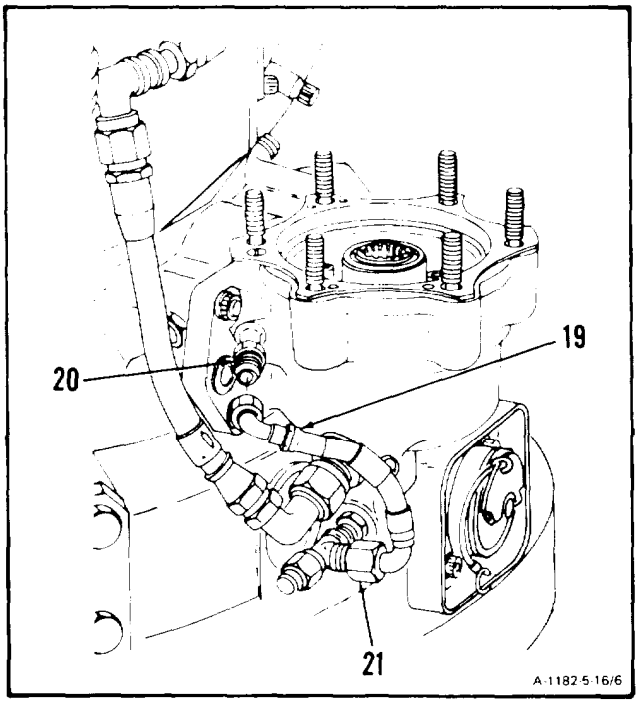
7. **Connect hose assembly (17)** to reducer (18).



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5-16 INSTALL STARTER DRIVE ASSEMBLY (Continued)

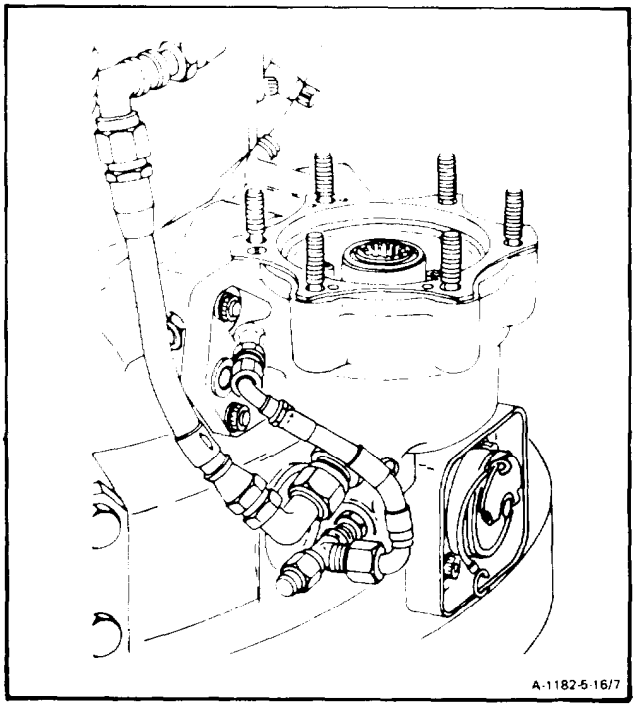
8. **Connect hose assembly (19)** to reducer (20). Tighten connector (21).



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

Section IV. OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY - MAINTENANCE PROCEDURES

5-17 REMOVE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY

INITIAL SETUP

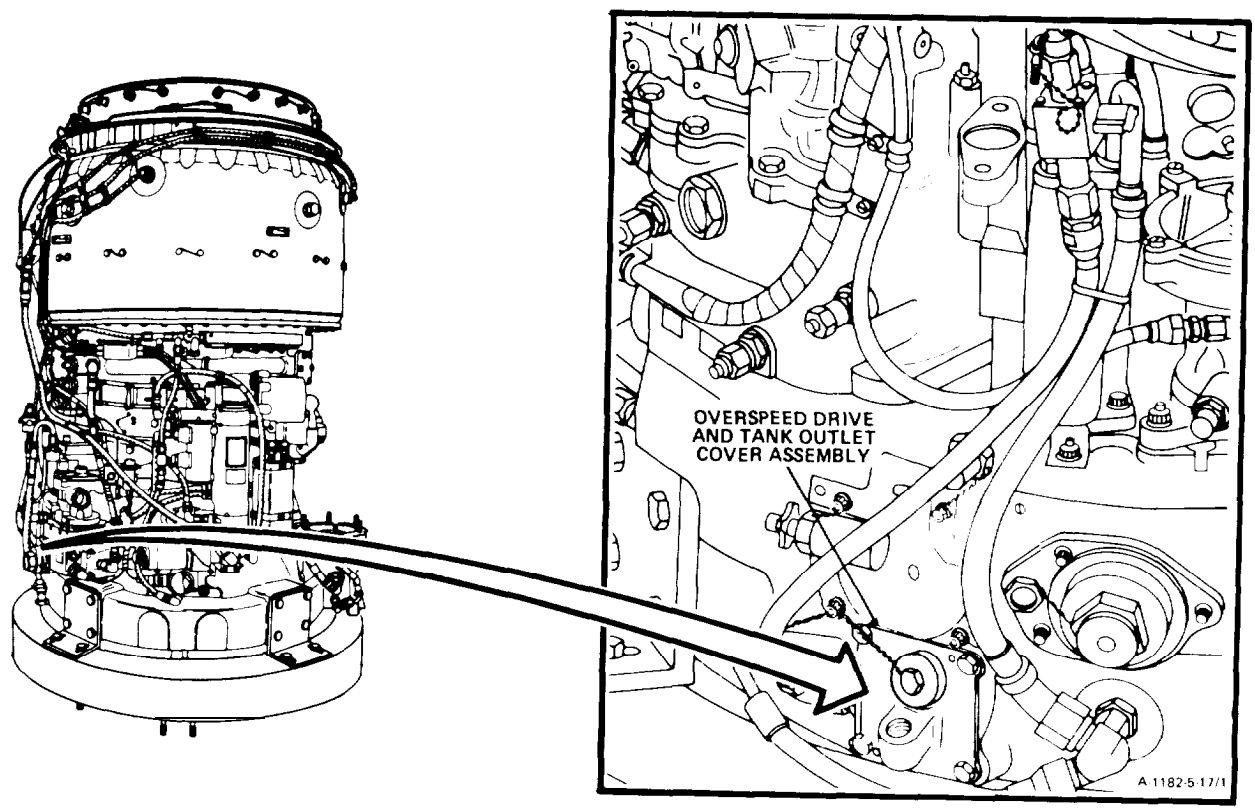
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944

Materials :
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

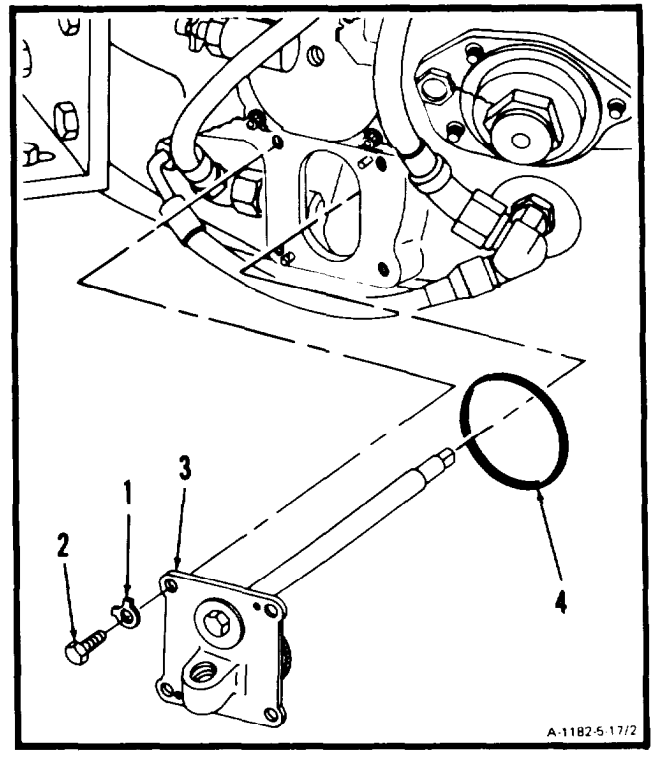
Equipment Condition:
Engine Oil System Drained (Task 1-75)
Tube Assembly Removed (Inlet Housing to Main Oil Pump) (Task 8-50)



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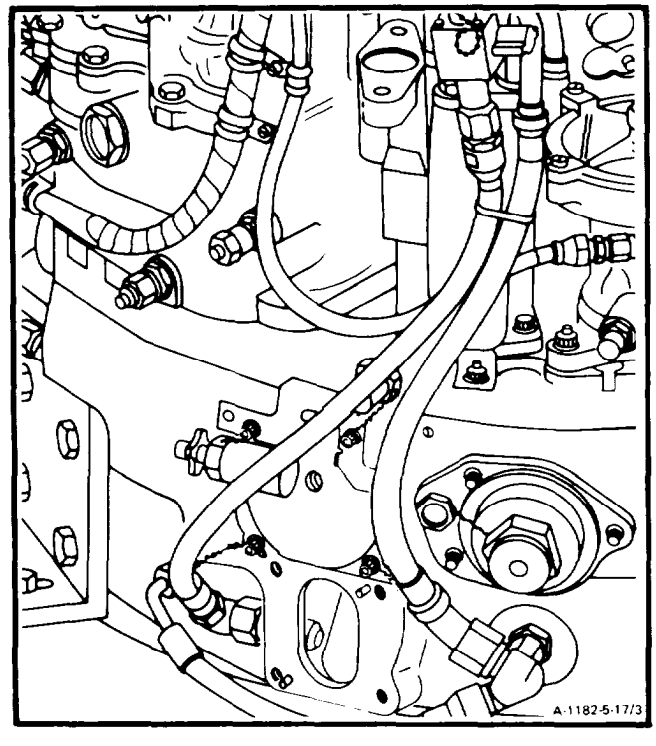
5-17 REMOVE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-17

1. Remove lockwire and straighten tabs of four washers (1). Remove four bolts (2) and washers (1). **Remove overspeed drive cover (3)** and packing (4).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-18 DISASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-18

INITIAL SETUP

Applicable Configurations:
All

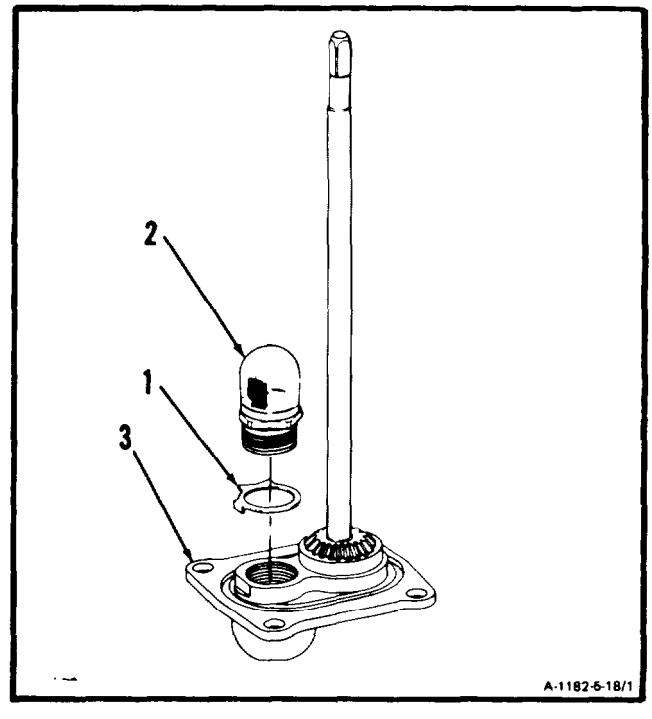
Tools:
Powerplant Mechanic's Tool Kit, NSN 5180-00-323-4944
Mechanical Puller Attachment, NSN 5120-00-711-6753
Wrench (Appendix E)
Vise

Materials:
None

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil Drained (Task 1-75)
Overspeed Drive and Outlet Cover Assembly Removed (Task 5-17)

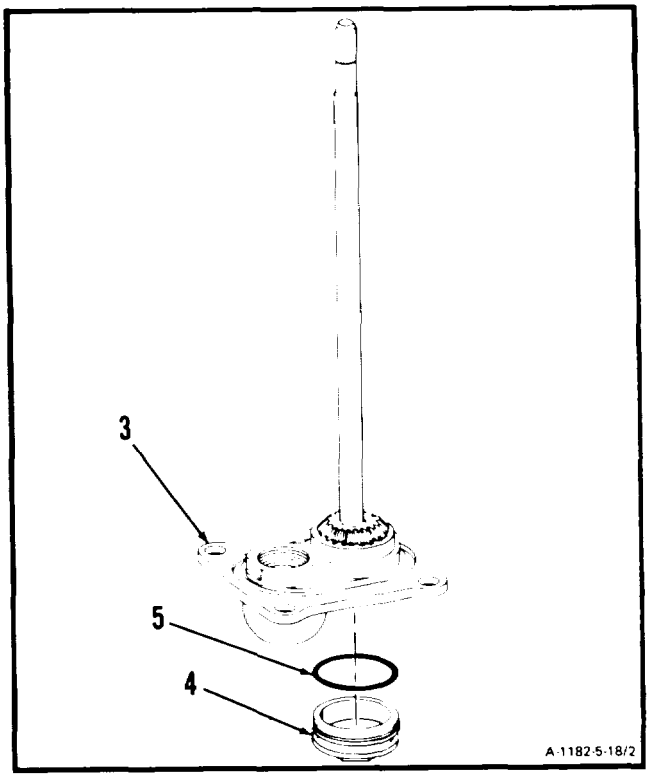
1. Straighten washer (1). **Remove strainer (2)** and washer (1) from cover (3). Use wrench (Appendix E).



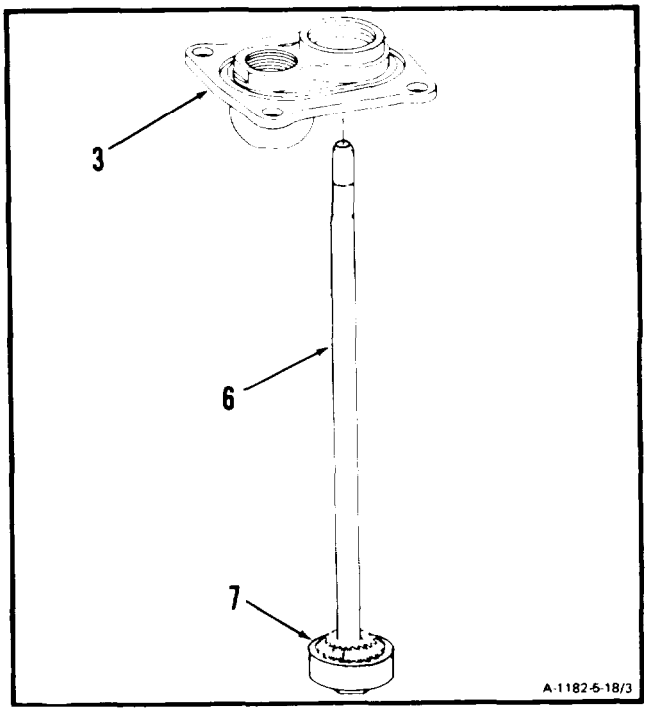
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5-18 DISASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-18

2. **Remove bearing retaining plug (4)** and packing (5) from cover (3).

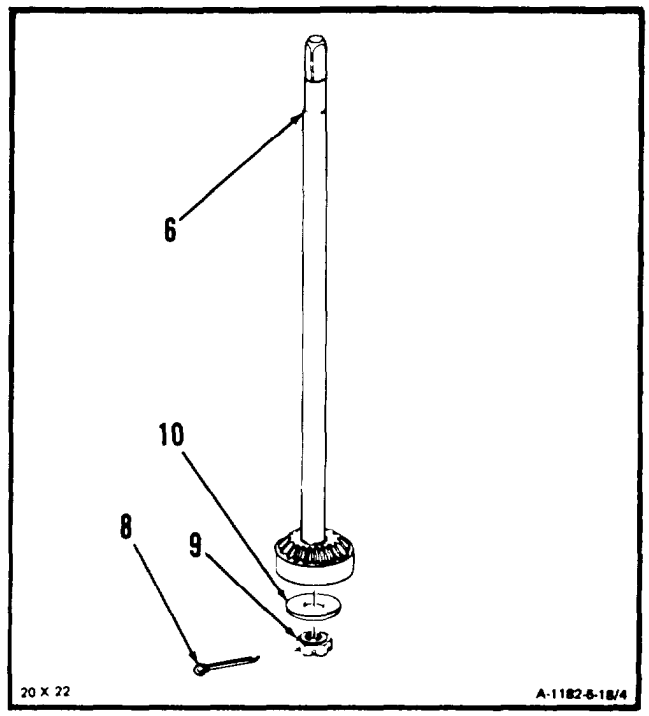


3. **Tap and remove gear assembly (6) and bearing (7)** as a unit from cover (3).



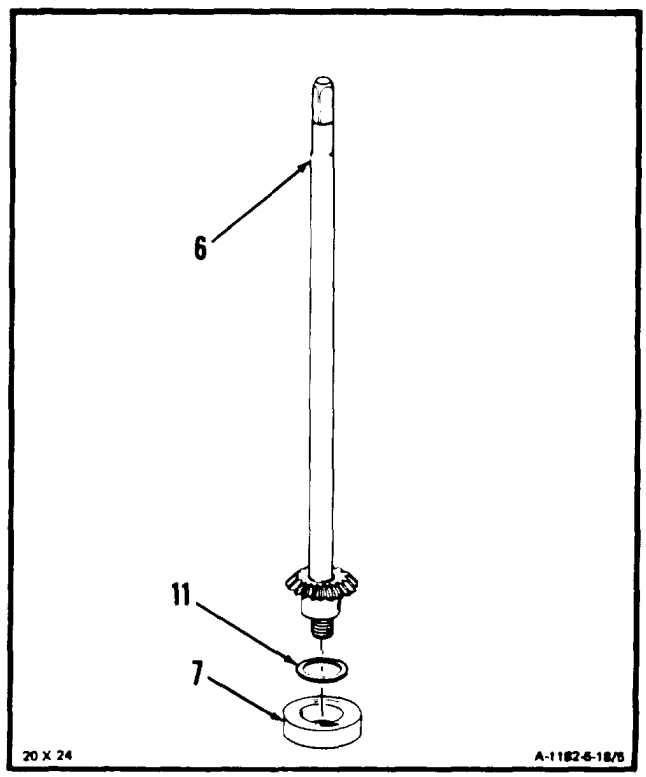
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4. **Remove** cotter pin (8), **nut (9),** and washer (10) from gear assembly (6).



5. **Remove bearing (7)** from gear assembly (6). Use mechanical puller attachment.

6. Remove shim (11). If shim is a laminated shim, record measurement and discard. Replace with solid shim (Ref. Task 5-23.1).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-19 CLEAN OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-19

INITIAL SETUP

Applicable Configurations:
All

Tools:
Goggles
Compressed Air Source
Fiber Brush

Materials:
Dry Cleaning Solvent (E17)
Gloves (E20)
Lint-Free Cloth (E26)

Personnel Required:
68B10 Aircraft Powerplant Repairer

Equipment Condition:
Off Engine Task
Engine Oil Drained (Task 1-75)
Overspeed Drive and Outlet Cover Removed (Task 5-17)
Overspeed Drive and Outlet Cover Disassembled (Task 5-18)

General Safety Instructions:

WARNING

Dry cleaning solvent solvent (E17) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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5-19 CLEAN OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-19

CAUTION

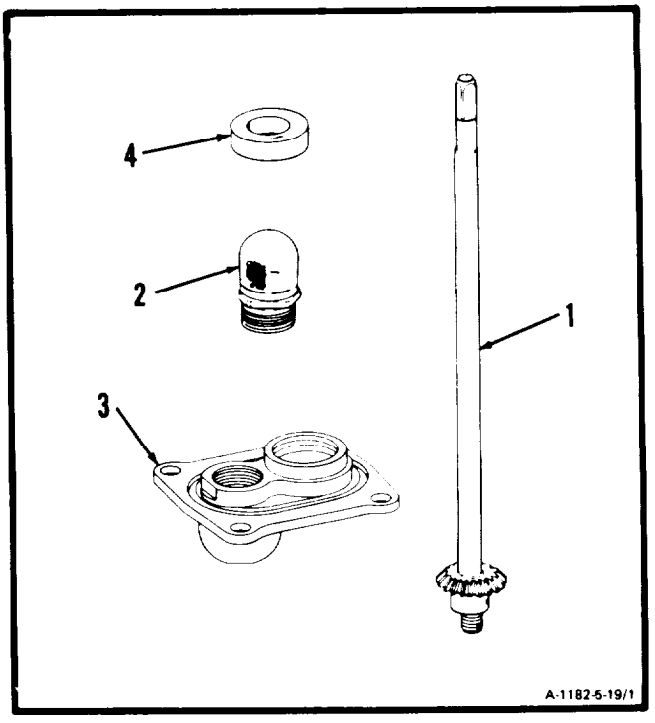
Protect bearings from damage. Handle only in clean area. Use clean, lint-free cloth (E26). Damaged bearings can cause engine failure.

1. Wear gloves (E20). **Clean gear assembly (1), strainer (2), cover (3), and bearing (4)** by immersing in dry cleaning solvent (El 7). Scrub with a fiber brush.

WARNING

When using compressed air for cleaning, use approved protective equipment for eyes and face. Do not use more than 30 psig air pressure. Do not direct air toward yourself or another person. Failure to comply could result in injury to eyes or skin. In case of injury, get medical attention.

2. Wear goggles. Blow dry. Use clean, dry compressed air.



FOLLOW-ON MAINTENANCE:

Inspect (Task 5-20).

END OF TASK

5-20 INSPECT OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-20

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Lint-Free Cloth (E26)
Lubricating Oil (E32 or E33)

Personnel Required:
68B30 Aircraft Powerplant Inspector

References:
Task 1-118

Equipment Condition:
Off Engine Task

1. Inspect gear assembly (1).

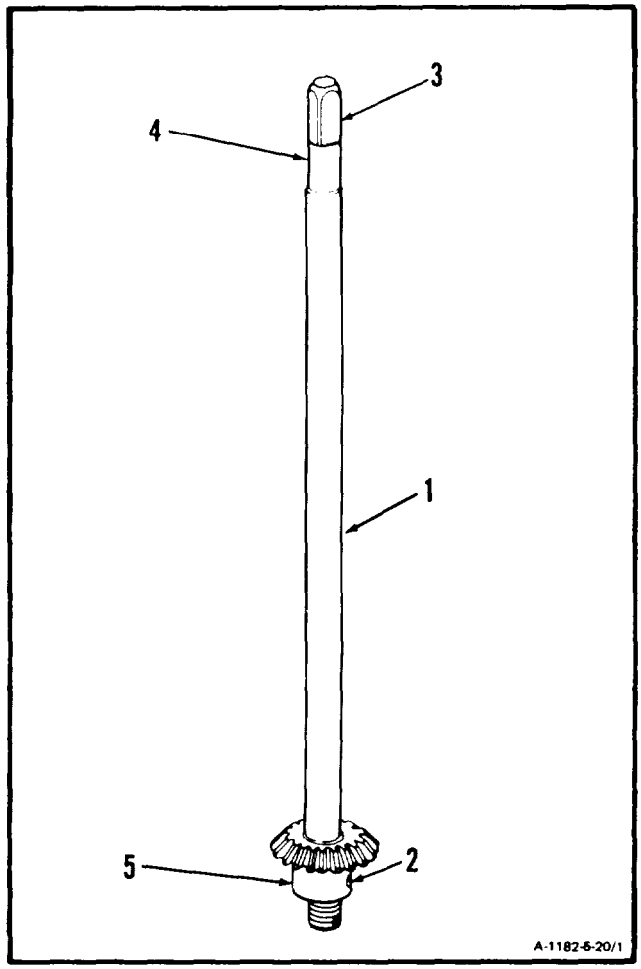
a. There shall be no cracked or chipped teeth.

b. There shall be no bends in shaft.

c. Pin (2) shall not be missing, broken or loose.

d. Spline (3) shall not be worn deeper than 0.007 inch (Ref. Task 1-118).

e. There shall be no wear or scoring on machined area (4) and journal (5) deeper than 0.009 inch.



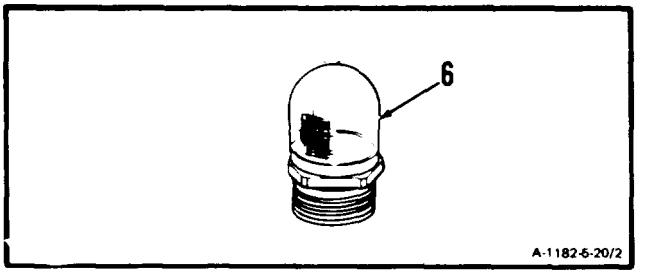
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5-20 INSPECT OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-20

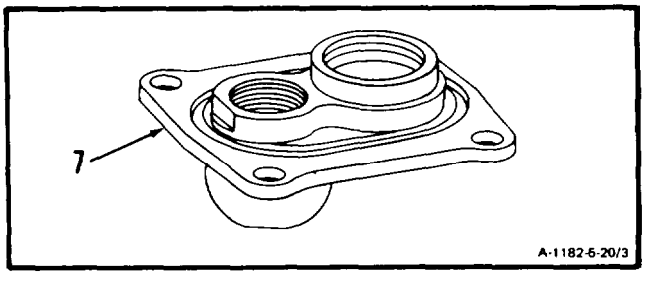
2. **Inspect strainer (6).**

   a. There shall be no contamination.

   b. There shall be no tears in wire mesh.



3. **Inspect cover (7)** for cracks. There shall be no cracks.

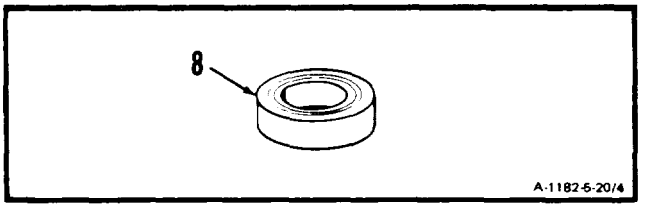


4. **Inspect bearing (8).**

   a. There shall be no rust or broken parts,

   b. There shall be no pitting.

   c. There shall be no red-purple, purple or blue discoloration.



WARNING

Lubricating oils (E32 or E33) cause paralysis if swallowed. Prolonged contact with them may irritate the skin. Handle only in well-ventilated areas away from heat and flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention.

5. Immerse bearing (8) in lubricating oils (E32 or E33) and wrap in lint-free cloth (E26).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-21 REPAIR OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-21

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

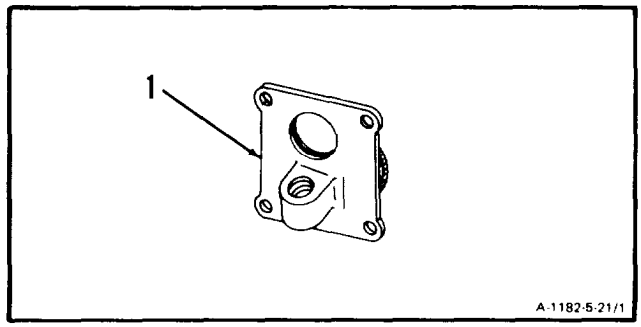
Materials:
Acid Swabbing Brush (E2)
Crocus Cloth (E15)
Gray Enamel (E22)

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

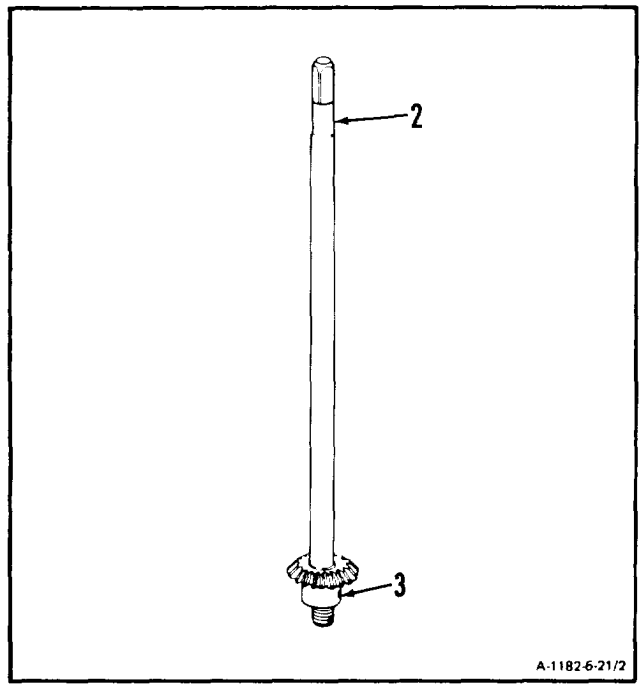
References:
Task 1-119

Equipment Condition:
Off Engine Task

1. **Repair damaged paint on cover (1).** Use procedures for touch-up of magnesium and magnesium alloys (Ref. Task 1-119).



2. Polish machined area (2) and journal (3) that have wear or scoring less than 0.009 inch. Use crocus cloth (E15).



INSPECT

FOLLOW-ON MAINTENANCE

None

END OF TASK

5-22 ASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-22

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Sleeve (Appendix E)
Wrench (Appendix E)
Torque Wrench, 30-150 Inch-Pounds
Machinist's Vise
Jaw Caps
Arbor Press

Materials:
None

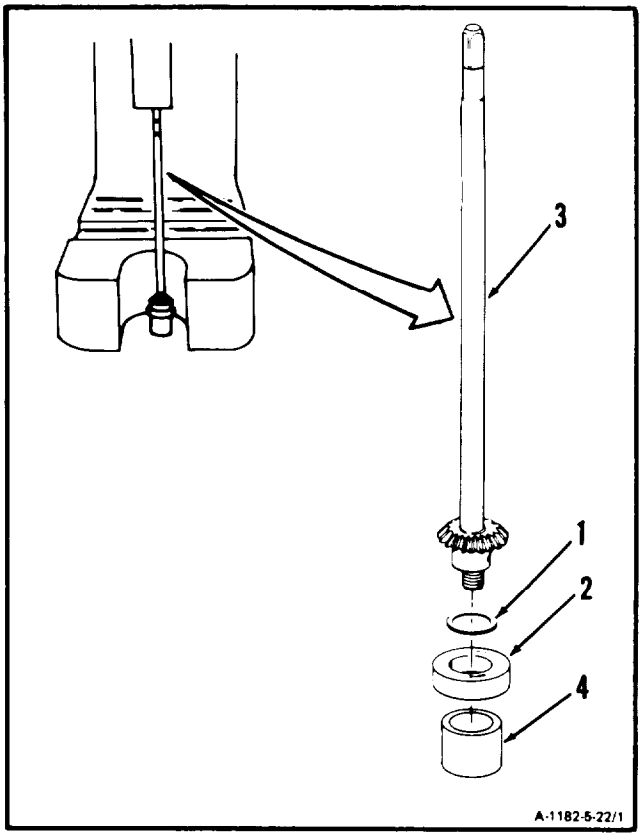
Parts:
Packings
Shim
Cotter Pin

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P

Equipment Condition:
Off Engine Task

1. **Install shim (1) and bearing (2)** on gear assembly (3). Use sleeve (Appendix E) (4).



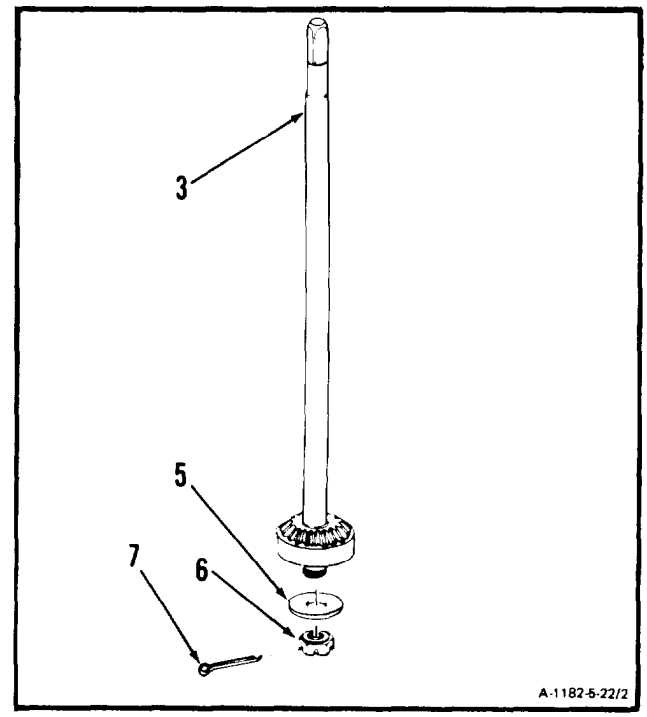
INSPECT

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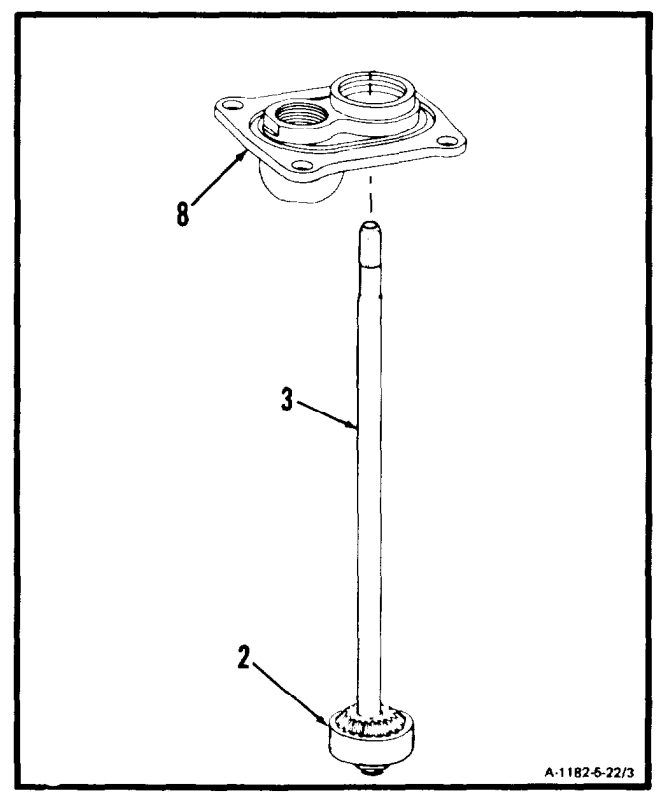
5-22 ASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-22

2. **Install** washer (5) and **nut (6)** on gear assembly (3). **Torque nut (6) to 40 to 50 inch-pounds.**

3. Install cotter pin (7).



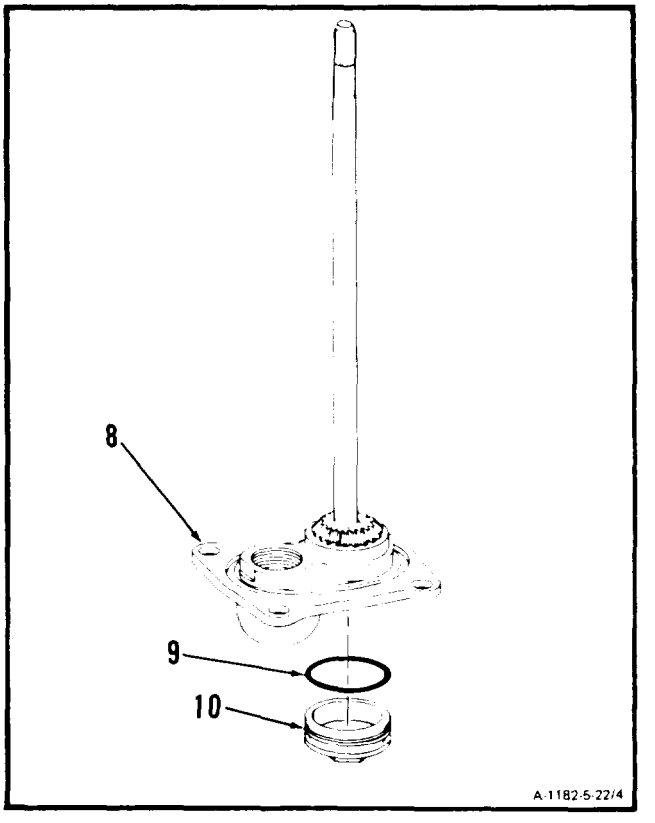
4. **Install gear assembly (3) and bearing (2)** into cover (8).



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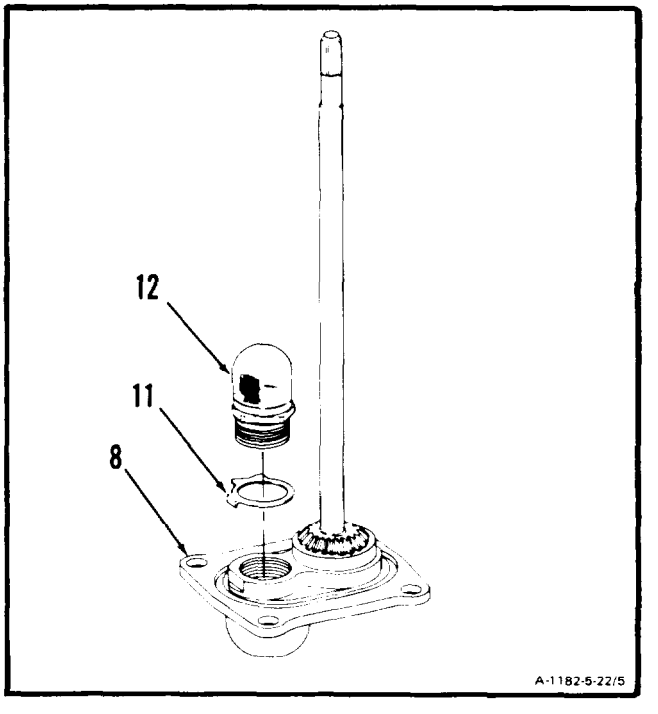
5-22 ASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-22

5. **Install** packing (9) and **bearing retaining plug (10)** in cover (8). **Torque plug (10) to 45 inch-pounds.**



6. **Install** washer (11) and **strainer** (12) into cover (8). Torque strainer to **25 inch-pounds.** Use wrench (Appendix E).

7. **Bend washer (11)** against strainer (12).



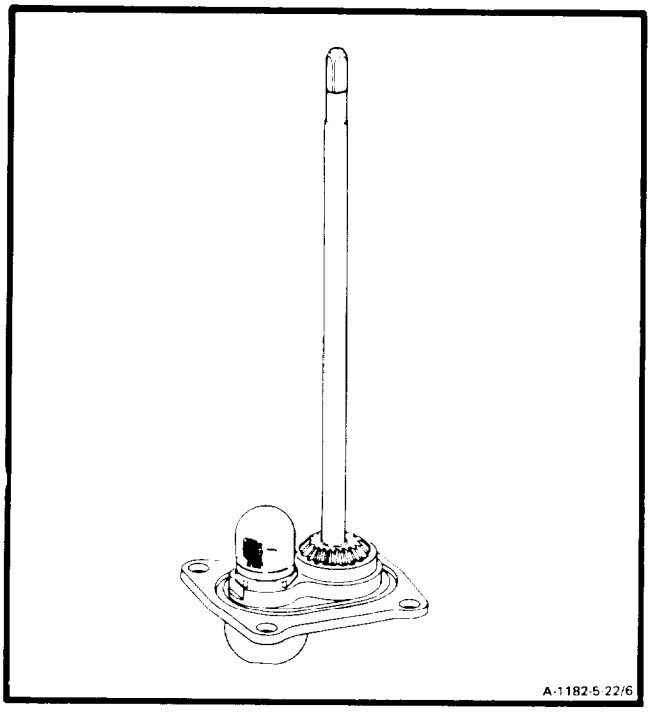
INSPECT

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5-22 ASSEMBLE OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-22

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-23 INSTALL OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23

INITIAL SETUP

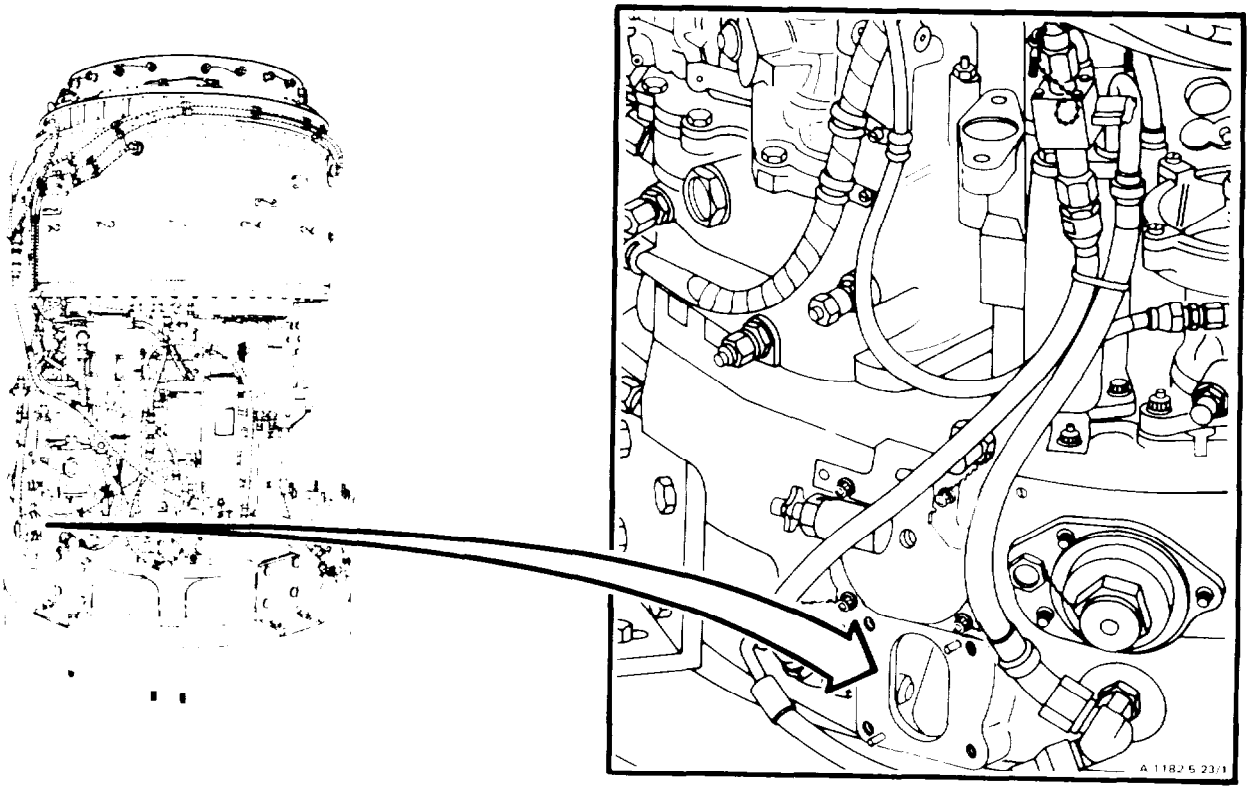
Applicable Configurations:
All

Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspecton Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 30-150 Inch-Pounds

Materials:
Lockwire (E29)
Lubricating oil (E32 or E33)
Shortening Compound (E46)

Personnel Required:
68B10 Aircraft Powerplant Repairer(2)
68B30 Aircraft Powerplant Inspector

References:
TM 55-2840-254-23P



4.2 x 25

A 1182 5 23/1

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5-23 INSTALL OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY (Continued) 5-23

NOTE

(Task No. 2-53) Remove inlet housing cover assembly (AVIM) may have to be performed to avoid possible damage to the garter spring in garter seal P/N 2-300-143-01. This wiII allow visual inspection of garter seal during and after installation of over speed drive and outlet cover assembly.

NOTE

If either accessory gearbox assembly or overspeed drive gear assembly have been changed, N2 gear backlash shall be taken. Refer to Task 5-23.1.

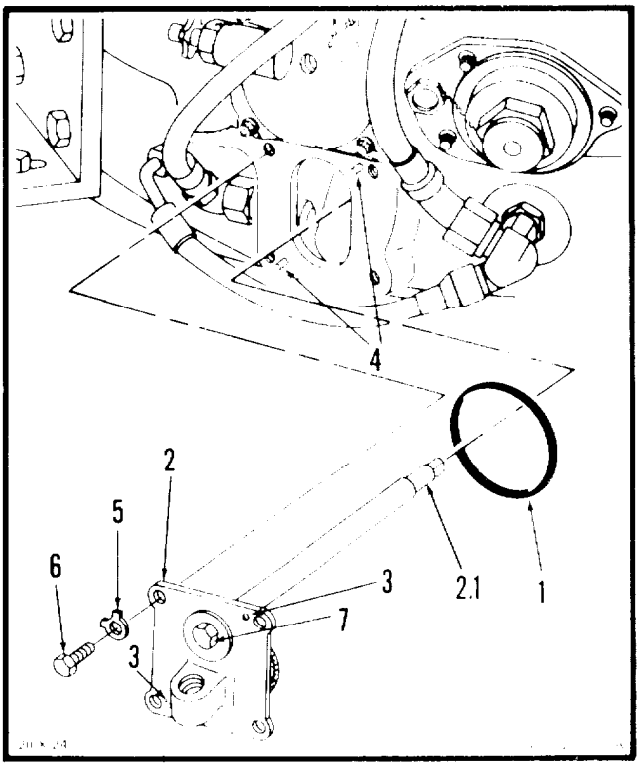
1. Install packing (1) on overspeed drive and outlet cover assembly (2).

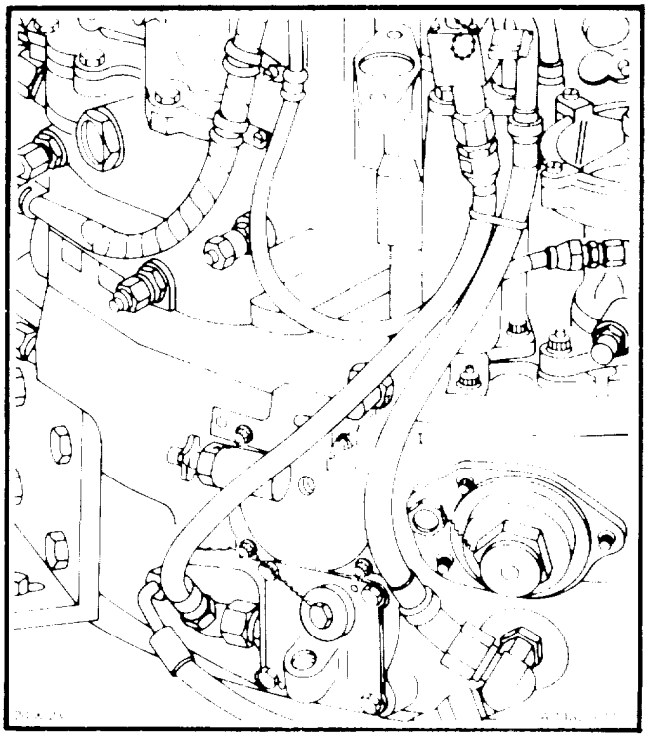
2. Coat upper end of gearshaft (2.1) with shortening compound (E46) or lubricating oil (E32 or E33).

2.1. Align holes (3) in cover (2) with pins (4) and install cover assembly (2) taking care to hand guide the shaft through garter seal to prevent dislocation of garter spring. Secure with four washers (5) and bolts (6).

3. Bend tabs of washers (5)

4. Lockwire Plug (7). Use lockwire (E29)





FOLLOW-ON MAINTENANCE:

Install Tube Assembly (Inlet Housing to Main oil Pump (Task 8-51).
Service Engine oil System (Task 1-74).

INSPECT

END OF TASK

5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23.1

INITIAL SETUP

Applicable Configurations:
All

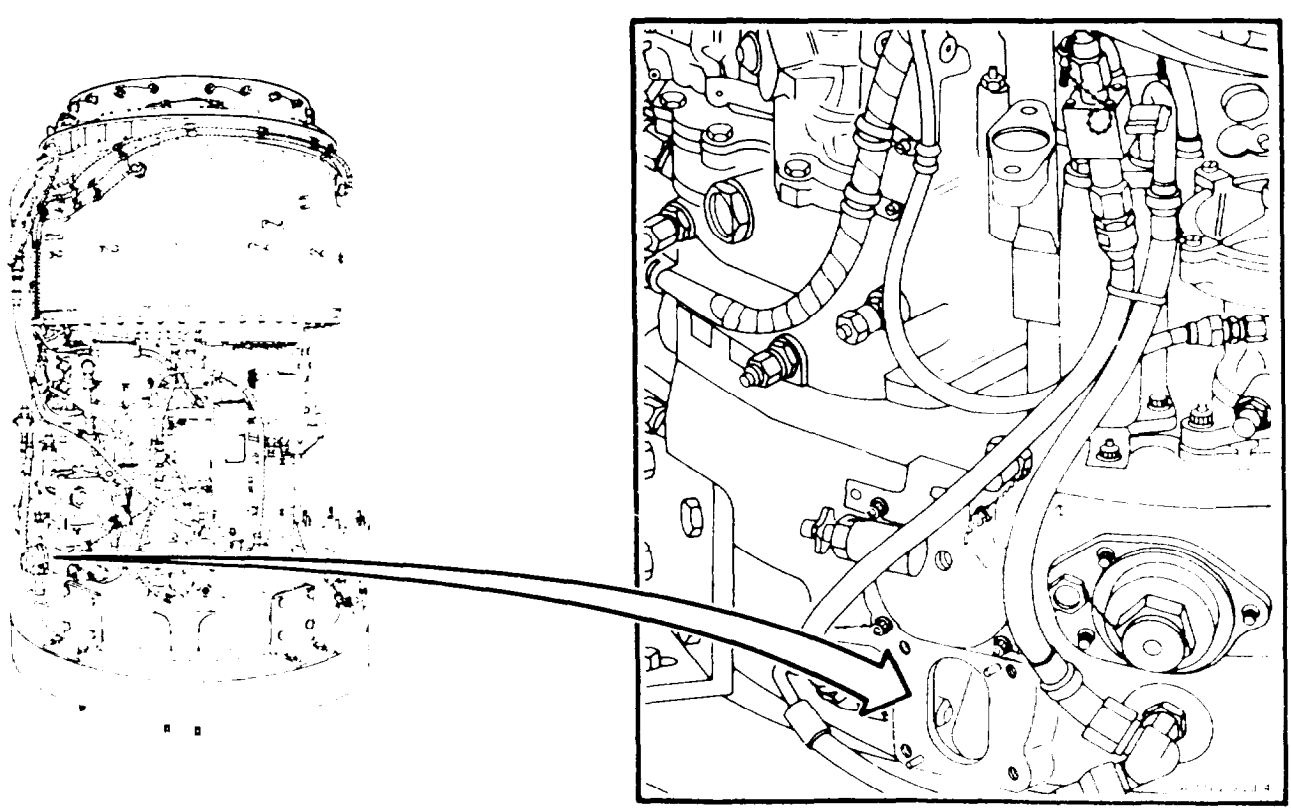
Tools:
Powerplant Mechanic's Tool Kit,
NSN 5180-00-323-4944
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Sleeve (Appendix E)
Wrench (Appendix E)
Torque Wrench, 30-150 Inch-Pounds
Machinist's Vise
Jaw Caps
Arbor Press
Dial Indicator
Backlash Gage (T7.1)
Ourside Micrometer Caliper Set
Gear Holding Fixture (T5.1)

Materials:
None

Parts:
Packings
Shim
Cotter Pin

Personnel Required:
68B10 Aircraft Powerplant Repairer
68B30 Aircraft Powerplant Inspector

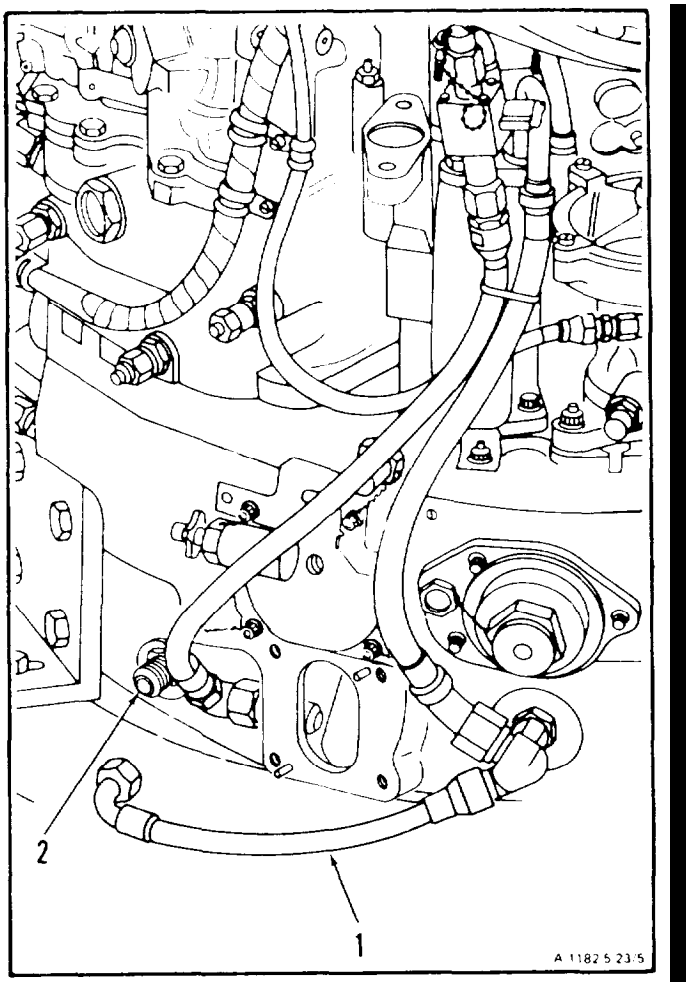
References:
TM 55-2840-254-23P



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5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23.1

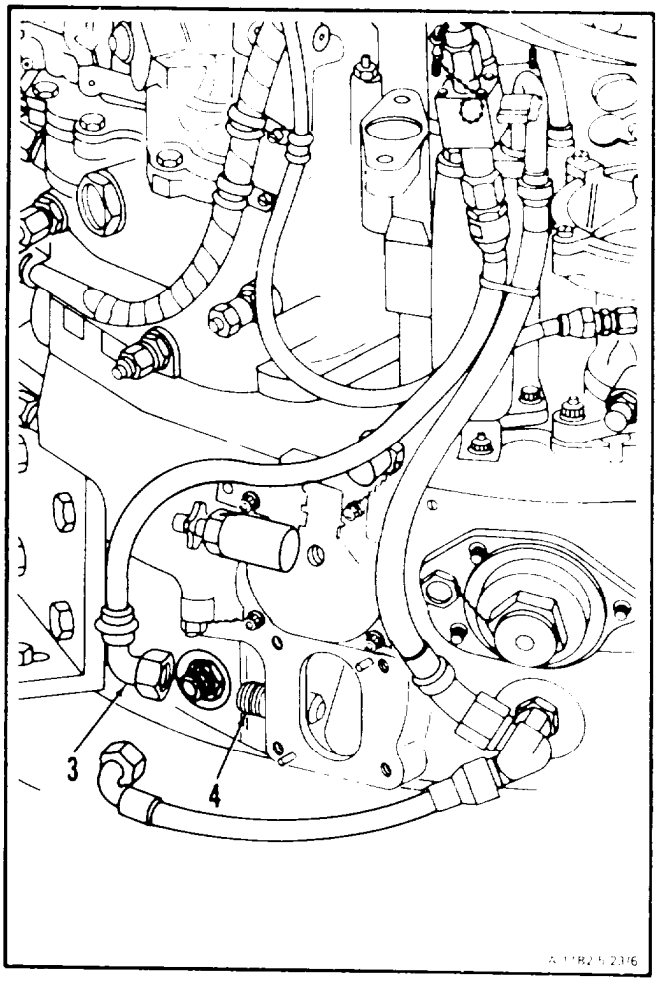
1. Disconnect hose assembly (1) from fluid passage bolt (2).



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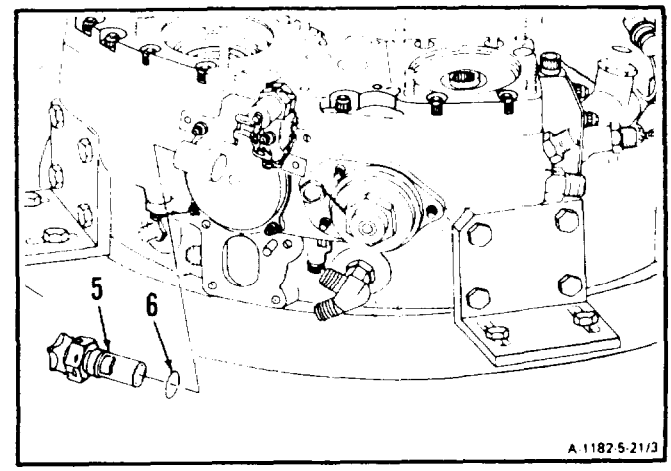
5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23.1

2. Disconnect hose assembly (3) from nipple (4).



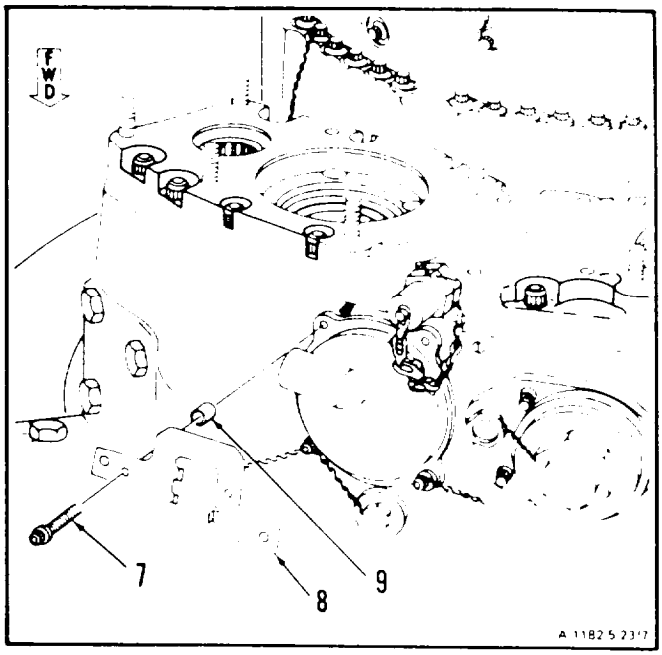
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3. **Remove** lockwire, **chip detector (5),** and packing (6).



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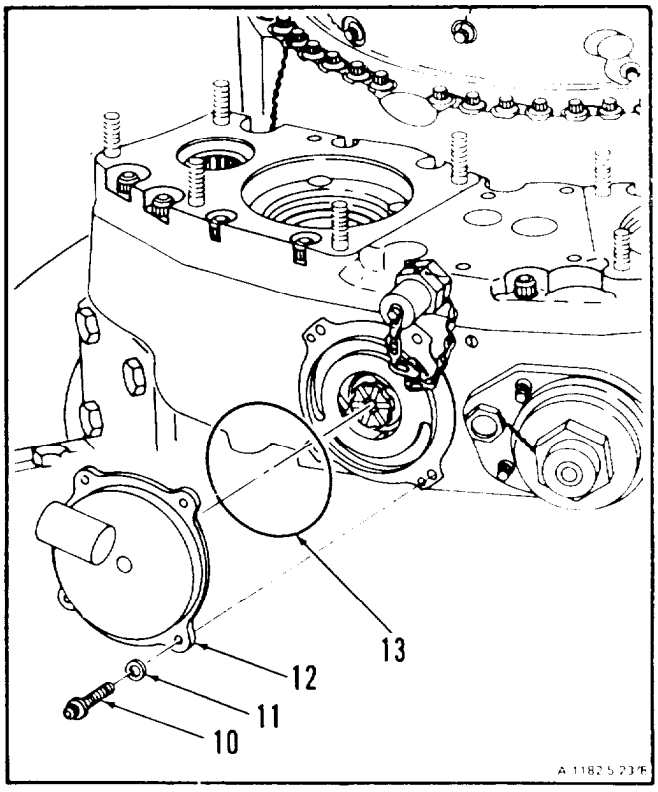
4. **Remove** lockwire, two bolts (7), spacers (9), and **bracket (8).**



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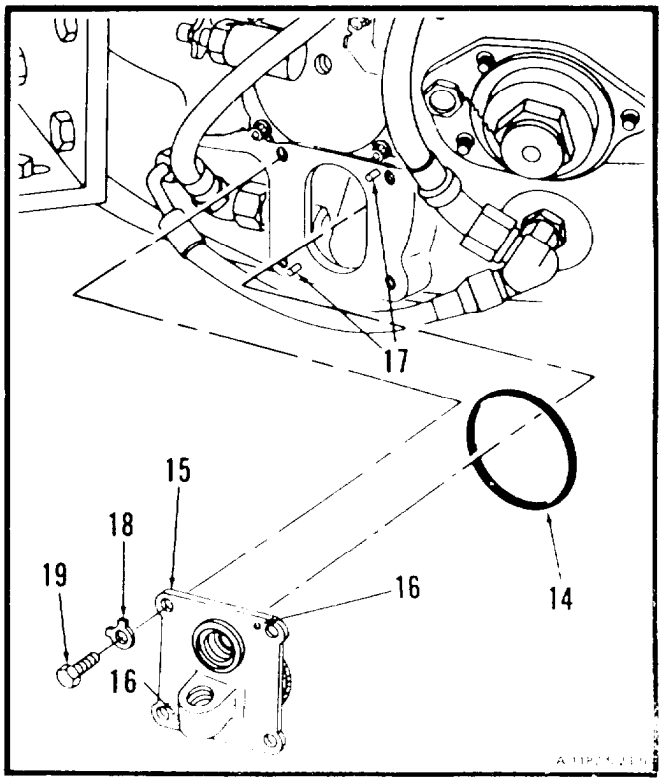
5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23.1

5. **Remove** lockwire, two bolts (10), washers (11), **housing (12),** and packing (13).



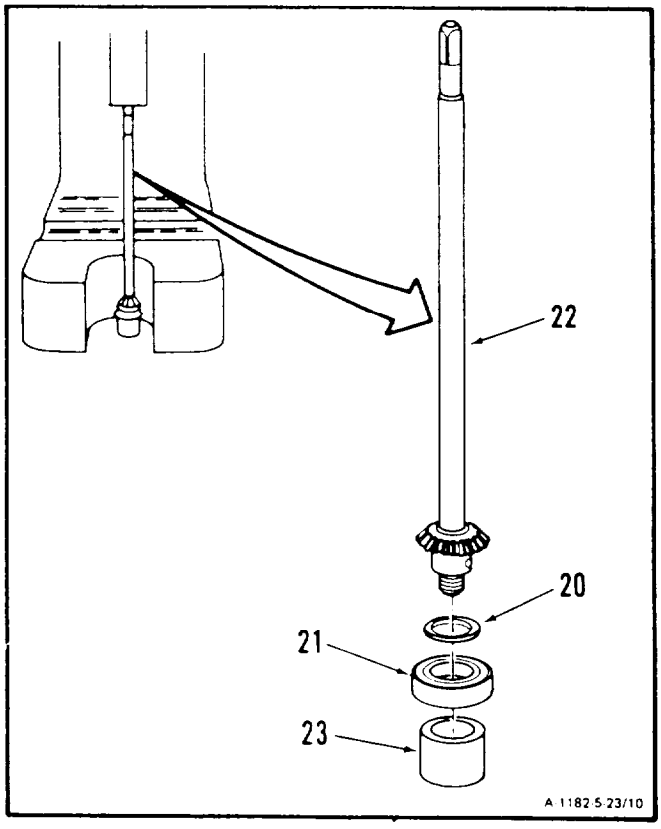
6. Install packing (14) on overspeed drive and outlet cover assembly (15).

7. Align holes (16) in cover (15) with pins (17) and **install cover assembly (15),** tour washers (18), and bolts (19).

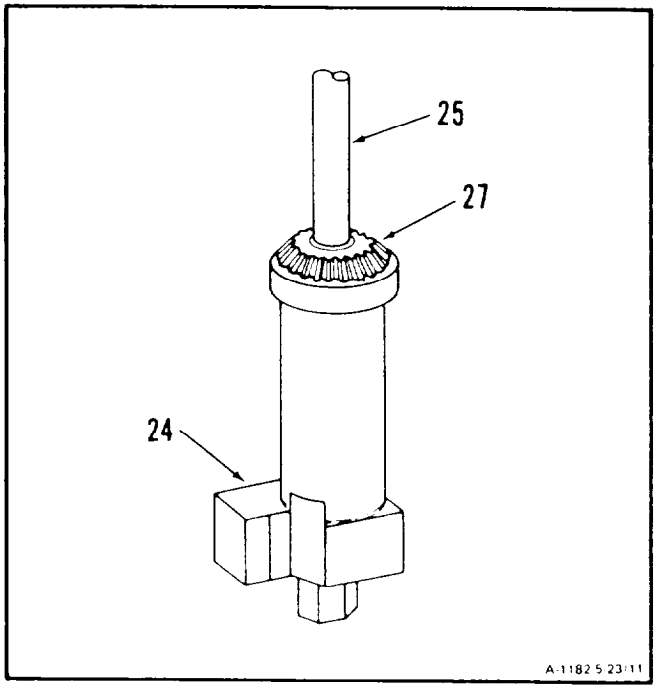


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8. **Install shim (20) and bearing (21)** on gear assembly (22). Use sleeve (Appendix E) (23).



9. **Install backlash gage (T7.1) (24) on threaded end of gear and bearing assembly (25).**



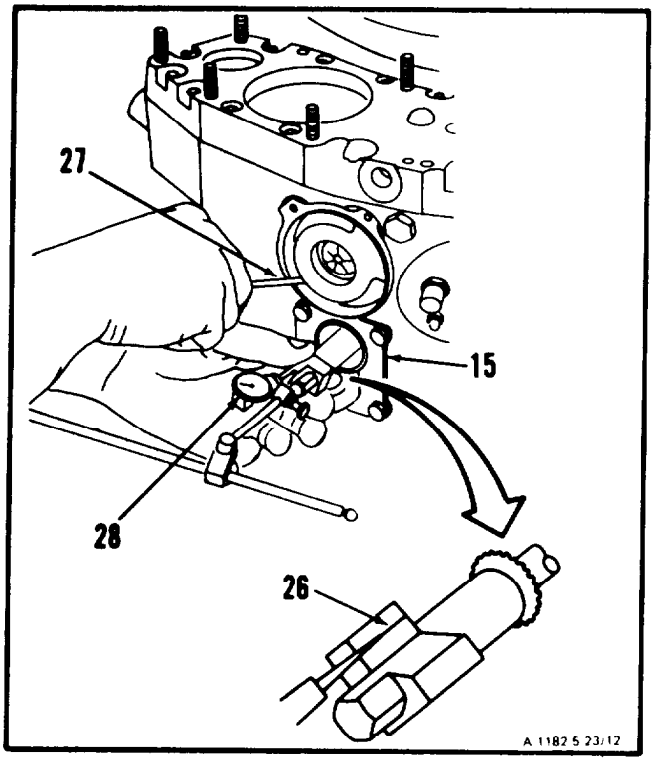
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5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLETCOVER ASSEMBLY 5-23.1

10. Install bevel gear assembly and backlash gage (26) through overspeed drive cover assembly (15).

11. Insert gear holding fixture (T5.1) (27) into gearbox and lock bevel gear.

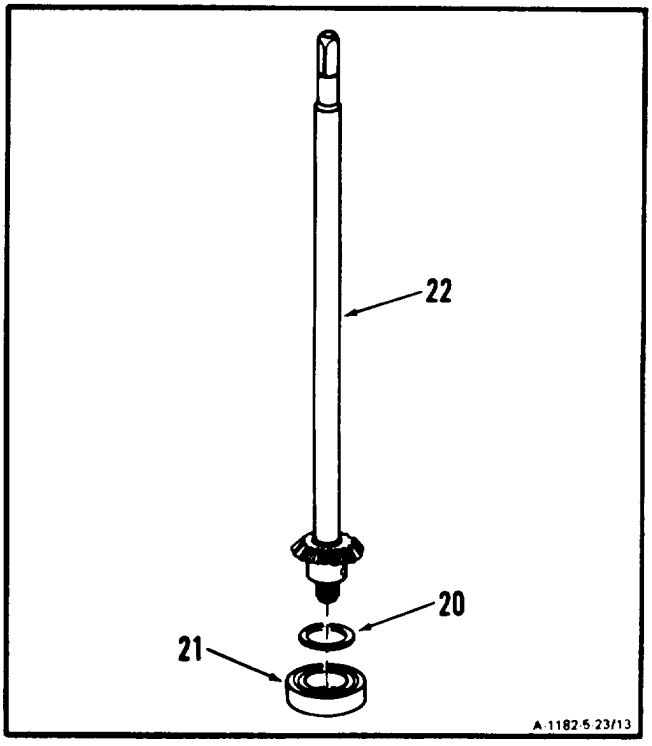
12. Using backlash gage dial indicator (28) with indicator tip on scribed line on backlash gage, check backlash of bevel gear. Backlash shall be 0.007 inch to 0.013 inch.



13. If backlash is within limits go to step 16.

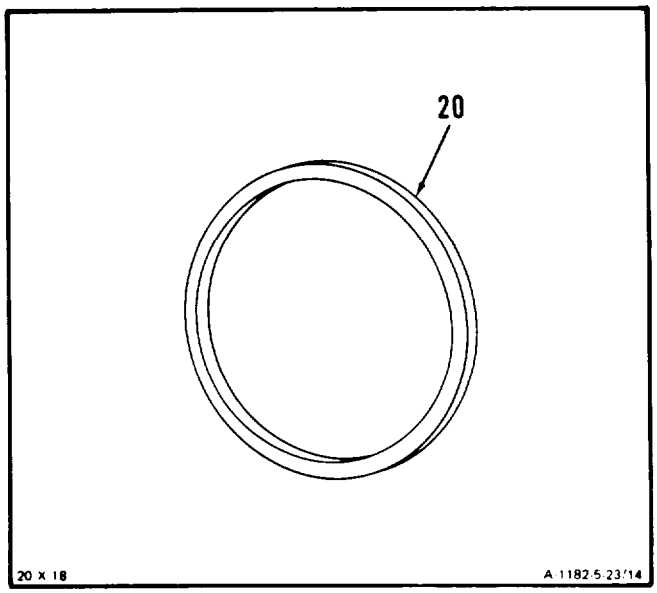
14. If backlash is not within limits proceed as follows:

    a. Remove bearing (21) and shim (20) from gear assembly (22).



GO TO NEXT PAGE

b. Measure thickness of shim (20) in three locations 120 degrees apart. Use outside micrometer caliper. Record average thickness of shim (20).



NOTE

If backlash is less than 0.007 inch, a thinner shim must be installed. If backlash is greater than 0.013 inch, a thicker shim must be installed. Increasing or decreasing shim thickness bv 0.002 inch will change backlash approximately 0.001 inch.

c. Select shim (20) from shim selection table

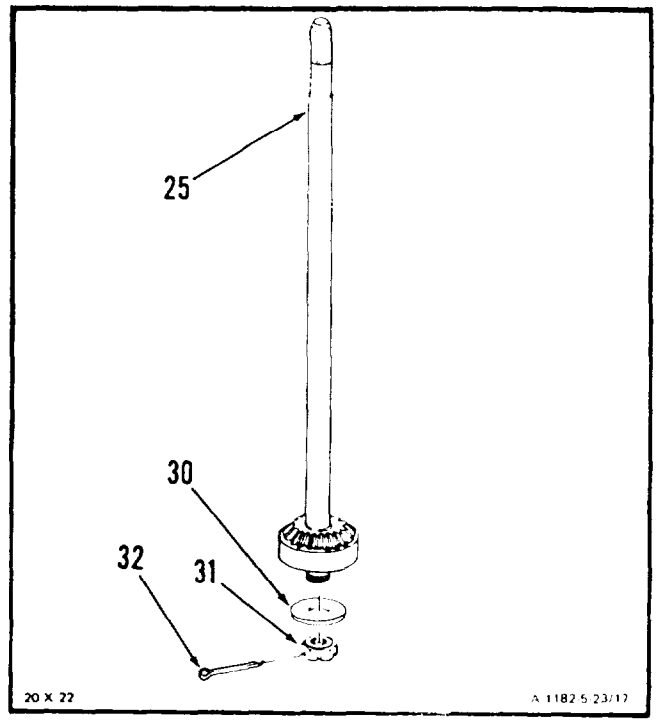
15. Repeat steps 8. through 14.

SHIM SELECTION TABLE

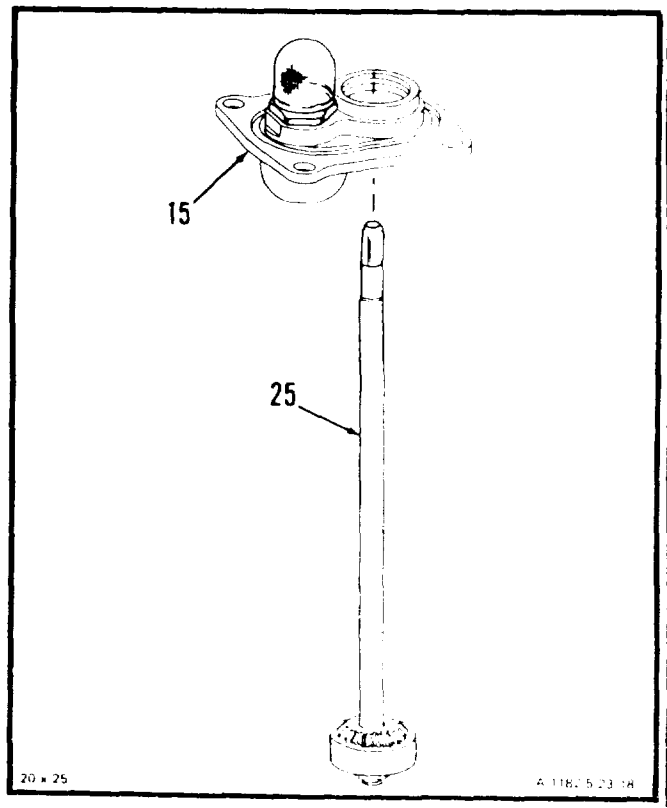
SHIM PART NUMBER	SIZE
2-080-229-01	0.0015-0.0035 inch
2-080-229-02	0.004-0.006 inch
2-080-229-03	0.007-0.009 inch
2-080-229-04	0.010-0.012 inch
2-080-229-05	0.013-0.015 inch
2-080-229-06	0.016-0.018 inch
2-080-229-07	0.019-0.021 inch
2-080-229-08	0.022-0.024 inch
2-080-229-09	0.025-0.027 inch
2-080-229-10	0.028-0.030 inch
2-080-229-11	0.031-0.033 inch
2-080-229-12	0.034-0.036 inch
2-080-229-13	0.037-0.039 inch
2-080-229-14	0.040-0.042 inch
2-080-229-15	0.043-0.045 inch
2-080-229-16	0.046-0.048 inch

GO TO NEXT PAGE

16. **Install** washer (30) and **nut (31)** on gear and bearing assembly (25). **Torque nut (31) to 40 to 50 inch-pounds.** Align cotter pin (32) with hole in nut (31). install cotter pin (32). Bend cotter pin.

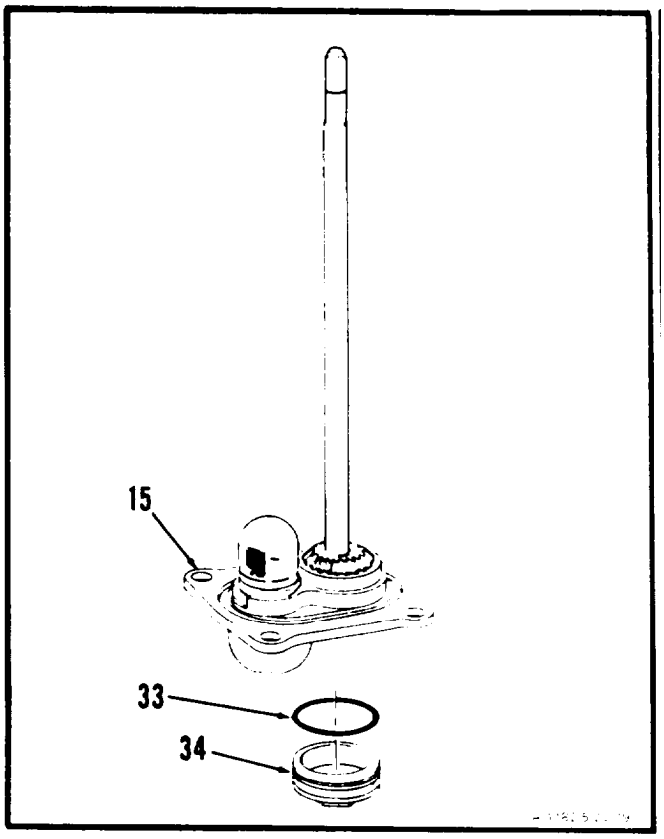


17. **Install gear and bearing assembly (25)** into cover assembly (15).



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18. **Install** packing (33) and **bearing retaining plug (34)** in cover assembly (15). **Torque plug (34) to 45 inch-pounds.**



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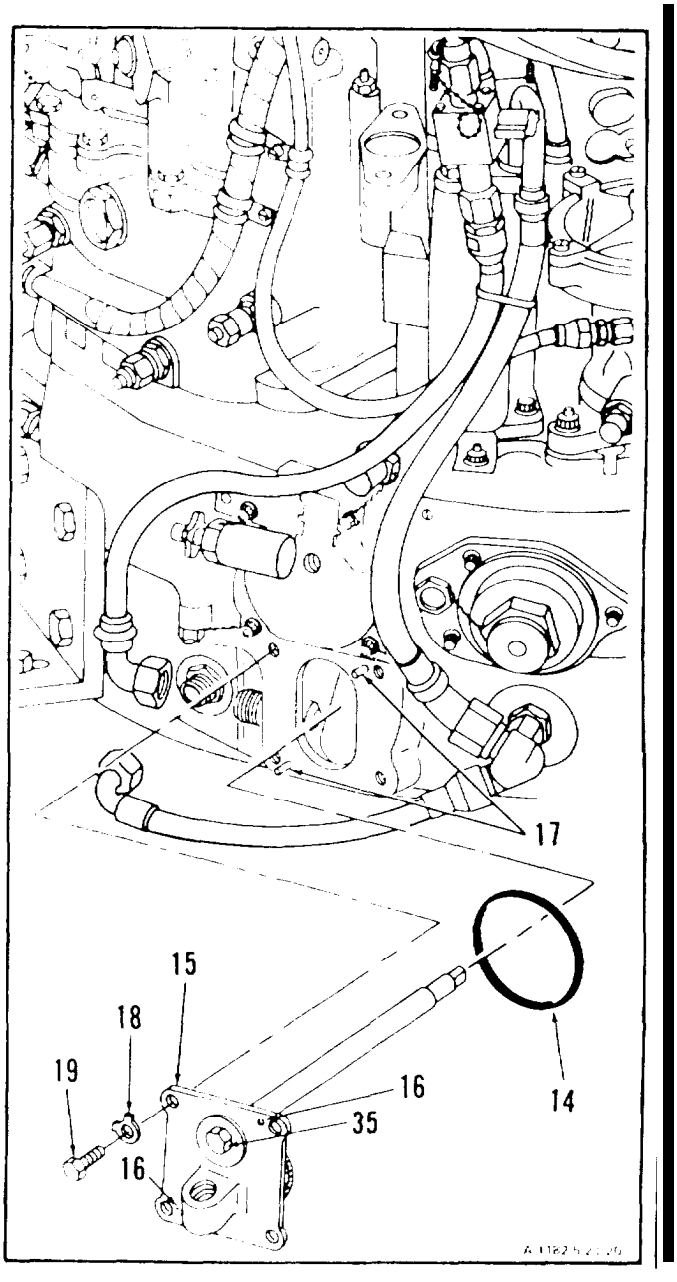
5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY

19. Install packing (14) on overspeed drive and outlet cover assembly (15).

20. Align hole (16) in cover assembly (15) with pins (17) and **install cover assembly (15),** four washers (18), and bolts (19).

21. Bend tabs of washers (18).

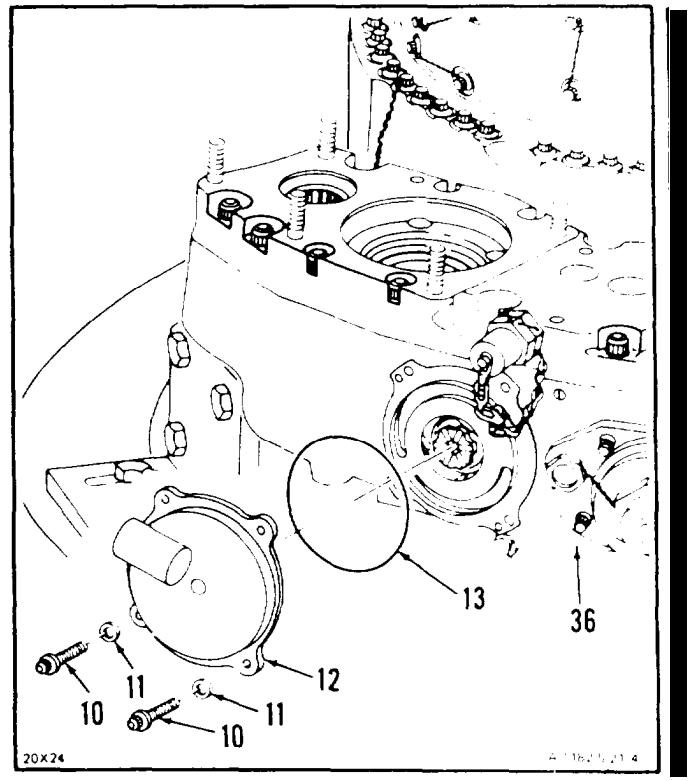
22. Lockwire plug (35). Use lockwire (E29).



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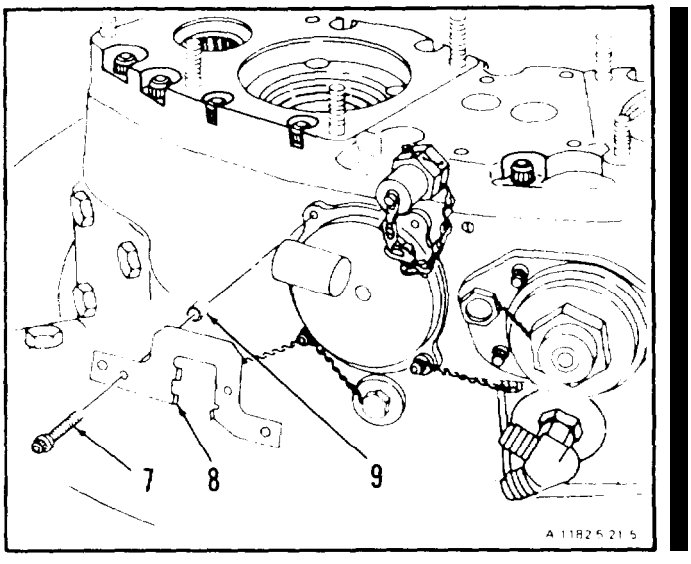
5-23.1 BACKLASH CHECK-OVERSPEED DRIVE AND OUTLET COVER ASSEMBLY 5-23.1

23. Install packing (13) on housing (12). **Install housing (12),** two washers (11), and bolts (10) on accessory gearbox assembly (36). Lockwire bolts (10). Use lockwire (E29).

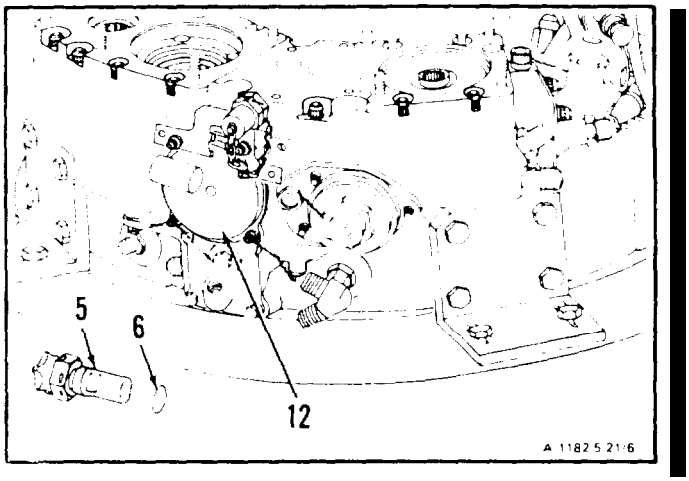


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24. **Install** two spacers (9), **bracket (8),** and two bolts (7). Lockwire bolts (7). Use lockwire (E29).

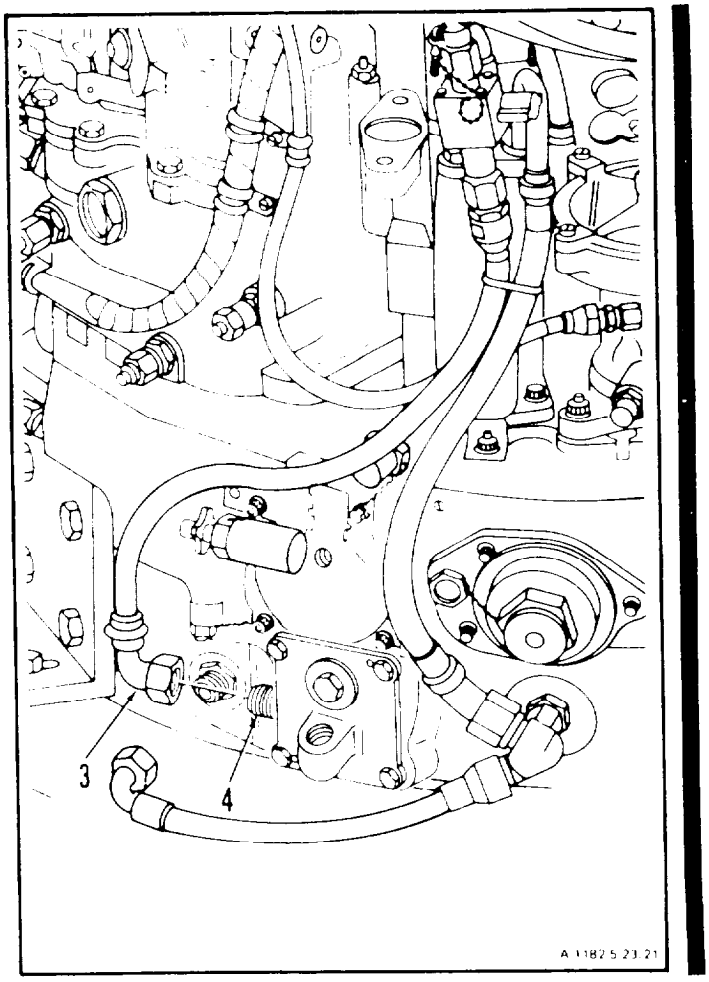


25. **Install** packing (6) and **chip detector (5)** in housing (12). Lockwire chip detector (5). Use lockwire (E29).



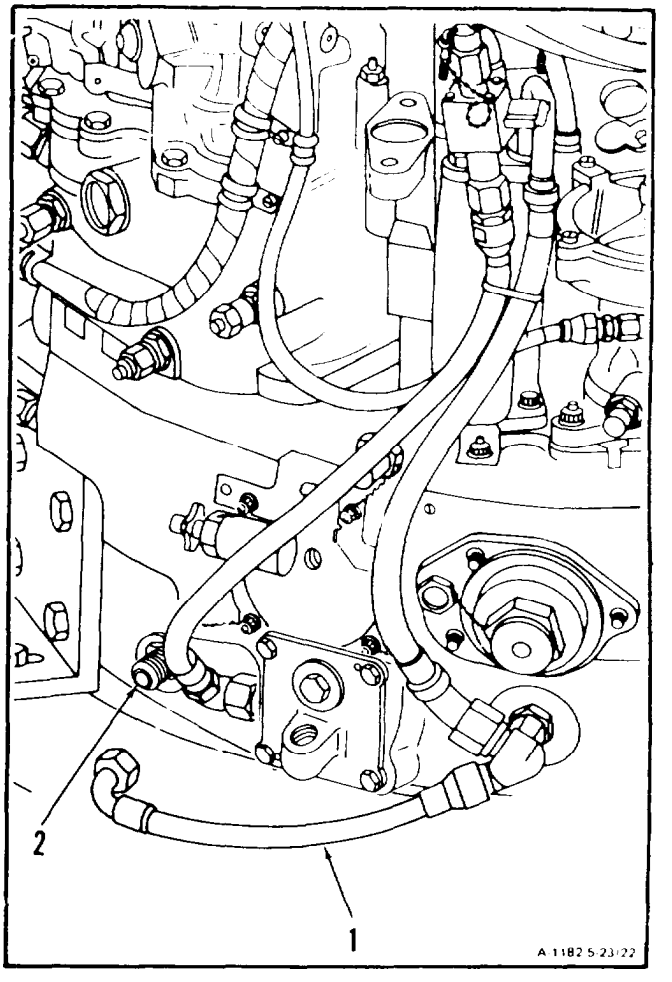
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26. Install hose assembly (3) on nipple (4).



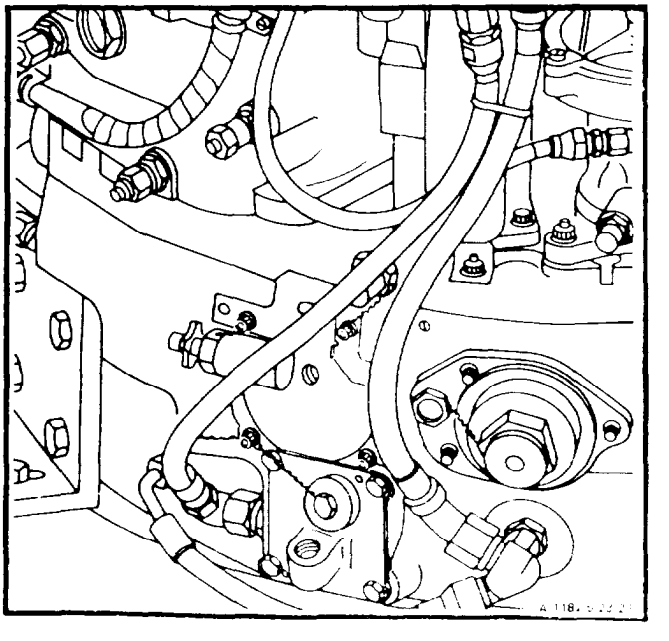
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27. Install hose assembly (1) on fluid passage bolt (2).



INSPECT

FOLLOW-ON MAINTENANCE,
Install Tube Assembly (Inlet Housing to Main Oil Pump (Task 8-51).
Service Engine Oil System (Task 1-74)



END OF TASK

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☆ U.S. GOVERNMENT PRINTING OFFICE 1998 O - 432-785 (80656)

By Order of the Secretary *of* the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT *M.* JOYCE
Major* General, *United States Army
***The Adjutant* General**

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, Organizational Maintenance requirements for CH-47 B/C & D Aircraft.

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The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

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To: mpmt%avma28@st-louis-emh7.army.mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** *77777*
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. *Page: 2*
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-2840-254-23-3	26 April 1983	ENGINE GAS TURBINE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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DRSTS-M Overprint 1, 1 Nov 80

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OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND TROOP COMMAND
ATTN: AMSAT-I-MP
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

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FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-2840-254-23-3	26 April 1983	ENGINE, GAS TURBINE

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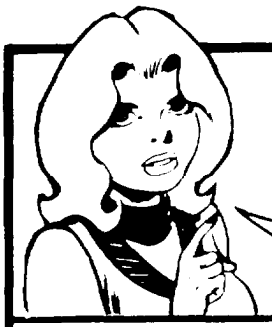
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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3.280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. sq. mile

Cubic Measure

l cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*TO*	*Multiply by*	*To change*	*TO*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic met&s	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN : 053084-005