TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

ENGINE ASSEMBLY GAS TURBINE (GTCP36-55[H])

PN 3800102-2 (NSN 2835-01-172-6200)

HEADQUARTERS, DEPARTMENT OF THE ARMY

29 FEBRUARY 1996

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 October 2000

TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

ENGINE ASSEMBLY
GAS TURBINE (GTCP36-55(H))
PN 3800102-2
(NSN 2835-01-172-6200)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1-2835-213-23, dated 29 February 1996 , is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a vertical bar next to the figure title.

Remove pages	Insert pages
--	A and B
i and ii	i and ii
I-I and I-2	I-I and I-2
I-33 and I-34	I-33 and I-34
3-11 thru 3-14	3-11 thru 3-14
3-23 and 3-24	3-23 and 3-24
5-9 amd 5-10	5-9 amd 5- 10
7-5 and 7-6	7-5 and 7-6
- -	7-13 and 7-14
A-.1/A-2 blank)	A-1/A-2 b l a n k)
D-I and D-2	D-I and D-2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0025605

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 313574, requirements for TM 1-2840-213-23.

WARNING AND FIRST AID DATA PAGE

For artificial respiration and other first aid data, refer to FM 21 -11.

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, illness, death, or an aborted mission.

HAZARDOUS MATERIAL WARNINGS

Warnings for hazardous materials in this manual are designed to warn personnel of hazards associated with such items when they come in contact with them during actual use. Detailed explanations of each symbol follow:

Chemical
The symbol of a liquid dripping onto a hand shows that the material will cause burns or irritation to human skin or tissue.

Eye Protection
The symbol of a person wearing goggles shows that the materials will injure the eyes.

Fire
The symbol of a fire shows that the material may ignite and cause burns.

Cyrogenic
The symbol of a hand on a frozen surface shows that the material is extremely cold and can injure human skin or tissue.

Poison
The symbol of skull and crossbones shows that the material is poisonous or is a danger to life.

Vapor
The symbol of a human figure in a cloud shows that material vapors present a danger to life or health.

Electrical
The symbol of electrical wire to arm and electricity running through human body shows that shock hazard is present.

Heavy Parts
The symbol of heavy object on human figure shows that heavy parts present a danger to life or limb.

Lubricating Oil

Lubricating oil may contain tricresyl phosphate. This additive is poisonous and can be readily absorbed through the skin. Ensure oil does not remain on skin. Oil may burn if exposed to heat or flames. Neoprene gloves and faceshield/safety goggles will be worn.

Compressed Air

Use approved personal protective equipment (goggles/faceshield) when using compressed air. Provide protection from flying particles. Do not direct airstream towards self or other personnel. Air pressure is restricted to 30 psig.

Hydraulic Fluid

Hydraulic fluid is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Good general ventilation is normally adequate.

Antiseize Compound

Antiseize compound is flammable and toxic. Avoid prolonged breathing of vapors. Avoid repeated skin contact. Keep anti-seize compounds away from sparks and flames.

Fuel

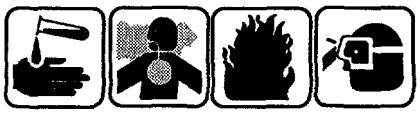
Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Good general ventilation is normally adequate.

Hoisting APU

Do not stand under APU while it is being moved on a hoist. To prevent injury to personnel and damage to equipment during handling of APU, periodically check lifting sling. If there are any signs of abuse or excessive wear, notify local safety representative.

Ignition

Ignition system contains high voltage electricity and can cause injury or death. Extreme caution must be used when handling igniter plug electrical lead. If an injury occurs, seek medical aid.



Dry Cleaning Solvent

Use dry cleaning solvent in a well-ventilated area. Avoid excessive skin contact or prolonged inhalation of vapors. Do not use near open flame or in areas where high temperatures prevail. Use approved personal protective equipment (goggles/faceshield) when using dry cleaning solvent.

TECHNICAL MANUAL
NO. 1-2835-213-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 February 1996

Technical Manual
Aviation Unit
and
Aviation Intermediate
Maintenance Manual

Engine Assembly
Gas Turbine (GTCP36-55[H])
PN 3800102-2
(NSN 2835-01-l 72-6200)

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 Missile Command, ATTN: AMSAM-MMC-LS-LP, Redstone Arsenal, AL 358986000. You may also submit your recommended changes by E-mail directly to <ls-lp@redstone.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.

Distribution Statement A: Approved for public release; distribution is unlimited.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT)

TABLE OF CONTENTS (CONT)

HOW TO USE THIS MANUAL

1. DESCRIPTION OF MANUAL.

This manual has several chapters and appendices. Each chapter is divided into sections. Each section in Chapter 1 is divided into paragraphs. The paragraphs have specific information you will need to know. Chapter 2 on is divided into tasks. The tasks tell you what you need and how to do any job. The appendices have general information you will need to know. They list references, maintenance allocation chart, expendable supplies and materials, wiring diagrams and manufactured items.

2. HOW TO FIND WHAT YOU ARE LOOKING FOR.

There are three ways to find what you are looking for: (a) the block access index on the cover: (b) the table of contents: and (c) alphabetical index.

a. Block Access Index. The most important and frequently used areas of the manual are identified in the manual cover. The black boxes on the cover line up with corresponding black marks on the edge of the manual to identify location to text.

b. Table of Contents. All chapters, sections and appendices are identified.

(1) Chapter 1 provides general descriptive information and principles of operation of the engine.

(2) Chapter 2 provides maintenance stands and containers information.

(3) Chapters 3 through 8 provides instructions for the major modules and systems that comprise the engine. Each chapter is divide into sections by its major components.

3. USING THE MANUAL.

a. Unscheduled Maintenance Procedures. Unscheduled maintenance procedures consist of inspection, adjust, remove, repair and install procedures. These procedures are referred to as tasks. The instructions to perform these tasks are given in a format that provides INITIAL SETUP followed by step-by-step procedures.

(1) Initial Setup. Initial setup is the first part of every task in the manual. It lists what tools, materials and parts you will need before you can do the task. The following headings are used when they apply.
(2) Task Title. The task title after the paragraph number describes the job to be done in the task.
(3) Tools. Tools, tool kits or shop sets needed to do the task are listed here. If tools from your repairman's kit are needed, the kit is listed. Tools you need that are not in the kit or set, are listed by name, type and size. Special tools and test support equipment are listed by a T-number. Find these items in Appendix B.

Example: Shim Checking Gage (T57)

(4) Materials. Expendable items and support materials are listed under this heading. These are items like rags, antiseize compound, non-electrical wire, etc. They are listed by a D-number. Find these items in Appendix D.

Example: Cleaning Cloth (D5)
Find these items in Appendix C.

(5) Parts. All mandatory replacement parts are listed. These are items like gaskets, packings, cotter pins, lockwashers, etc. They are listed by the Repair Parts and Special Tools List (RPSTL) name.
(6) Personnel Required. The people needed to do the task are listed under this heading. They are identified by their MOS. When more than one of any MOS is needed, the number needed is shown in parentheses. The text will tell you when a helper is needed.
(7) References. Related tasks and TM's you will need to do the task are listed under this heading. The task steps tell you when these tasks and TM's are needed.
(8) Equipment Condition. All the items to be done before you start the task are listed under this heading. To help, the number of the task tells you how to do them is given when applicable.

NOTE

If a task is other than an on helicopter task, it will be brought to your attention under "Equipment Condition". Example: "APU on Maintenance Stand".

(9) General Safety Instructions. Safety precautions and warnings that must be observed when you are doing the job are described under this heading.

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

4. HOW TO PREPARE FOR A TASK.

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

You know what is needed
You have the items you need
You understand what to do

a. If a tool has a T-code after it, go to Appendix B. Read down the far left-hand column to your T-code. This is the tool you need for your task.

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

c. If parts are listed, they can be drawn from tech supply. Before you start the task, check and make sure you can get the needed parts; National Stock Numbers (NSN) and part numbers are listed in TM 1-2835-213-23P

d. Check for personnel required.

e. If preliminary procedures are listed under "Equipment Conditions:, BE SURE THE LISTED TASKS ARE DONE"; then do this task.

5. HOW TO DO THE TASK.

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. When values are in bold type or followed by the word INSPECT, an inspector must OK the completed step.

c. Key procedural steps are underlined for ease of task completion for those familiar with the manual.

d. A GLOSSARY is provided. It lists the special words and unusual terms used in this manual and gives their meaning. Check it out. It may help you understand the instructions.

e. The following are considered standard maintenance practices. Instructions about these practices will not normally be included in task steps. Task steps will tell you when standard maintenance practices do not apply.

(1) Lines will be tagged before they are disconnected. Tubes and parts will be capped or plugged when they are disconnected.
(2) Used packings, retainers, gaskets, cotter pins, lockwashers, etc are discarded. New parts shall be installed.
(3) Packings are coated before installation in accordance with the task.
(4) Tubes and related parts will be tied out of the way with twine, not lockwire.
(5) In disassembly tasks, components are removed and wires disconnected.
(6) Disassembly procedures reflect disassembly needed to support total authorized repair. You may not need to disassemble a part as far as described in the task. Follow the steps to disassemble as far as needed to repair/replace worn or damaged parts.
(7) Before a components or the disassembled parts of a components are inspected, they are cleaned as required.

(8) Components and mating surface area will be inspected for serviceable condition before installation.

(9) Guidelines will be used when any item is hoisted overhead.

(10) When a nut is tightened or loosened on a bolt, the bolt head will be held with a wrench.

(11) A special torque will be cited when the words TORQUE TO are used. A standard torque is required when the word INSTALL is used.

(12) When torquing hardware, observe compliance with drag torque as required. To determine drag torque, thread nut onto screw or bolt until at least two threads protrude. The nut shall not contact the mating part. The torque necessary to begin turning the nut is -the drag torque.

(13) Appendix F provides standard torque limits for general type screws, nuts, bolts, fittings and coupling nuts. These standard torque values apply only when special torque values are not specified in procedures. Included in the torque tables are the applicable torque wrenches.

(14) If additional setup tools are required such as crowfoot wrenches, they will be listed in the task INITIAL SETUP.

(15) When cotter pin is required, cotter pin holes will be aligned within allowable torque range.

(16) Following installation, paint will be touched up as required.

(17) Following maintenance, inspect for foreign objects.

f. General maintenance procedures (e.g. "replace studs and inserts") are not included in the maintenance instructions. A reference is made to General Aircraft Maintenance Manual (TM 1-1500-204-23, Volumes 1 through 9) for these procedures.

6. APPENDICES.

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

b. 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. Numbers in parenthesis identify the corresponding numbered remarks in Section IV.
- Column 5 - Tools and Equipment. This column lists the reference code identifying the tools or test equipment required, as listed in Section III.
- Column 6 - Remarks. Remarks identified by an alphabetical code, where applicable and listed in Section IV and identified in column 6.

Section III - Tool and Test Equipment Requirements. This section consists of five columns, containing the following 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 Stock Number. This column lists the stock number applicable to each tools 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.
Reference 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 as referenced by the reference codes to the MAC.

c. Appendix C - Repair Parts and Special Tools List. This appendix contains a reference to TM 1-2835-213-23P.

d. Appendix D - Expendable Supplies and Materials List. This appendix consists of two sections as follows:

Section I - Introduction. This section is a summary of what is in the Expendable Supplies and Materials List.
Section II - This section is the Expendable Supplies and Materials List and has four columns, containing the following information:
Column 1 - Item Number. This is the D-number assigned to the expendable item. It is referred to in the detail procedures.
Example: "With lockwire (D15)."
Column 2 - National Stock Number. This is the National Stock Number (NSN) assigned to item. Use it to request or requisition the item.
Column 3 - Description. This column lists the name and if required, a description to identify the item. The last line for each item shows the part number followed by the Commercial and Government Entity Codes (CAGEC) in parentheses, if there is no NSN in column 2.
Column 4 - U/M. This column lists the measure used in performing the maintenance function, expressed as a two-character alphabetical abbreviation (e.g., ea, in., pr).

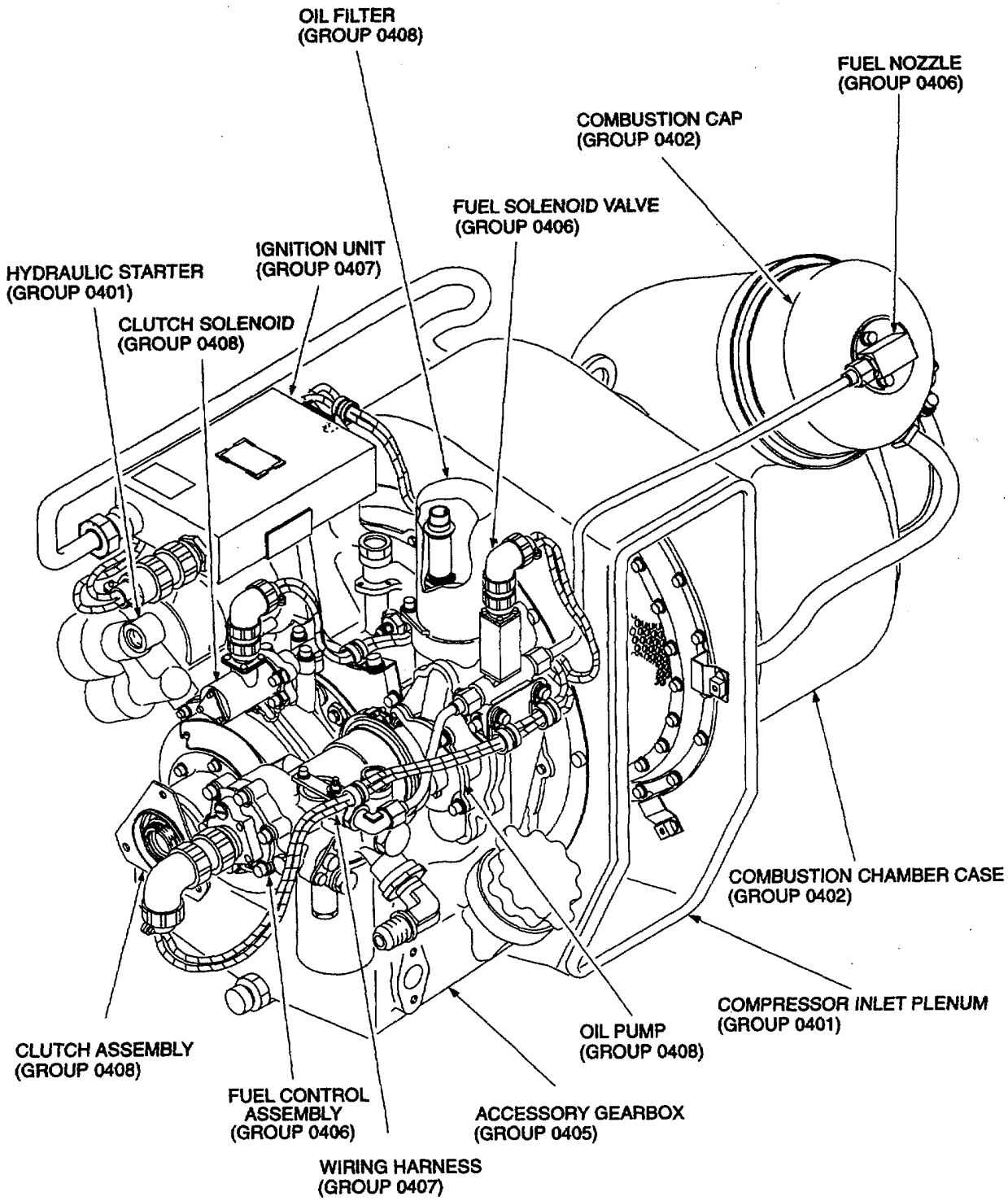
e. Appendix E - Manufactured Items List. This appendix lists and illustrates any parts you may have to locally manufacture to do a task.
f. Appendix F - Torque Limits. This appendix provides standard torque limits for general type screws, nuts, bolts, fitting and coupling nuts.

7. GLOSSARY.

Definitions of abbreviations and unusual terms you find in the manual are listed here to help you.

8. INDEX.

This appears at the end of the manual. It lists all subjects in the manual by alphabetical order and the entries are in everyday language of the user. This index contains many possible ways of locating the subject, i.e., pressure fluid filter; fuel inlet filter; filter, fuel; filter, pressure fluid. This is necessary since the official nomenclature is not always readily recognized by the user.



(Group numbers identify the parts to their Functional Code as stated in the Maintenance Allocation Chart (Appendix B)

CHAPTER 1

INTRODUCTION AND ENGINE - GENERAL

SECTION I GENERAL INFORMATION

1-1 SCOPE

Type of Manual: Aviation Unit and intermediate Maintenance

Model Number and Equipment Name: GTCP36-55(H) Shaft Power Gas Turbine Engine Assembly

The GTCP36-55(H) auxiliary power unit (APU) is designed to provide shaft power. The APU is coupled through a dry friction output clutch to the aircraft accessory gearbox.

1-2 MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751. The Army Maintenance Management System - Aviation (TAMMS-A).

1-3 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

NOTE

Decision to destroy an APU shall be made by appropriate authority.

Destroy APU to prevent use by enemy when evacuating to safety is not possible. Refer to TM 750-244-l -5.

1-4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Refer to FM 1-511.

1-5 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your auxiliary power unit (APU) needs improvement, let us know. Send us a SF 368 Product Quality Deficiency Report (QDR). You, the user, are the only one ' who can tell us what you don' t like about our equipment. Let us know why you don' t like the design or performance. Mail it to this address:

Commander
USAAMCOM
ATTN: AMSAM-MMC-RE-FD
Redstone Arsenal, AL 358986000

1-6 OFFICIAL NOMENCLATURE NAMES AND DESIGNATIONS

This listing includes nomenclature cross-references used in this manual.

Common Name	Official Nomenclature
APU	Auxiliary Power Unit
Compressor Housing	Gas Turbine Engine Compressor Housing
Fuel Solenoid Valve	Normally Closed Solenoid Valve
ID Plate	Identification Plate
Igniter Plug	High Voltage, Air Gap Igniter Plug
Igniter Plug Lead	Electrical Igniter Plug Lead
Ignition Unit	High Voltage Capacitor Discharge Ignition Unit
Lockwire	Non-Electrical Wire
LOP Switch	Low Oil Pressure Switch
Monopole	Motional Pickup Transducer
Oil Pump	Rotary Pump Assembly
Plenum Assembly	Compressor Inlet Plenum Assembly
Relief Valve	Pressure Relief Valve Assembly
Thermocouple	Immersion Thermocouple

1-7 WARRANTY INFORMATION

There is no manufacturers warranty provided on this gas turbine engine assembly or its components. Report all defects in material or workmanship to your supervisor who will take appropriate action.

SECTION II EQUIPMENT DESCRIPTION AND DATA

I-8 ARMY FLIGHT SAFETY PARTS PROGRAM

Parts, assemblies or installations identified under the flight safety parts program require special handling during time at AVUM/AVIM maintenance. Throughout the TM procedures, warnings appear emphasizing critical instructions to be followed. These warnings are identified as FLIGHT SAFETY PARTS warnings and are inserted whenever and wherever necessary.

a. A flight safety part is defined as a part, assembly or installation procedure with one or more critical characteristics that, if not conforming to the design data or quality requirements, could result in serious injury or death or crew members and/or serious damage to the aircraft.

b. A critical characteristic is any dimension, tolerance, finish, material, manufacturing, assembly process, inspection process or any other feature which, if nonconforming or missing, could cause failure or malfunction of the critical item.

I-9 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

CHARACTERISTICS

- Supplies shaft power for main engine starting.
- Gas turbine engine.

CAPABILITIES AND FEATURES

- Operational rotor speed at 100 percent is 59,566 rpm.
- Axial pad output shaft speed is 8052 to 8380 rpm for clutch assembly.
- Axial pad output shaft speed is 32,000 rpm for starter.

1-10 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. TURBINE ASSEMBLY Air enters air inlet. Air is compressed by compressor rotor and supplied to combustor assembly. Diffuser directs exhaust gas to turbine wheel to generate rotational power.

2. COMBUSTION CHAMBER: Area where fuel and compressed air are burned to drive turbine wheel in turbine assembly.

3. OIL SUMP: Part of gearbox assembly (2.6 U.S. quart capacity).

4. FUEL CONTROL SYSTEM: (Fuel control assembly, fuel solenoid valve and fuel nozzle) Supplies and controls fuel flow to combustion chamber.

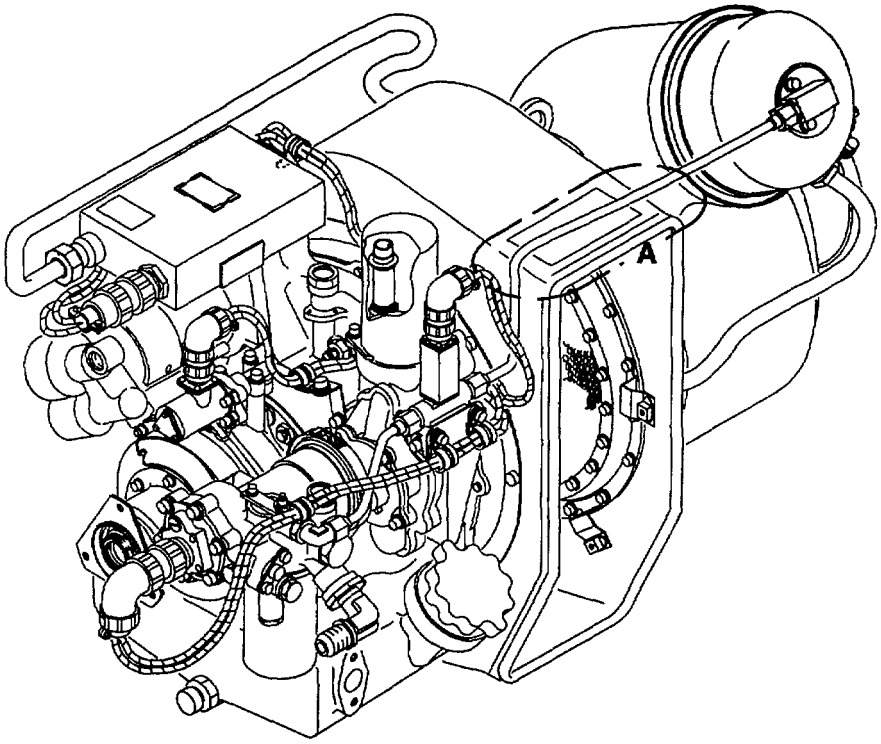
5. GEARBOX ASSEMBLY Driven by turbine assembly. Reduces turbine speed to accessory drive pad (clutch assembly) and transmits drive to the accessory mounting pads.

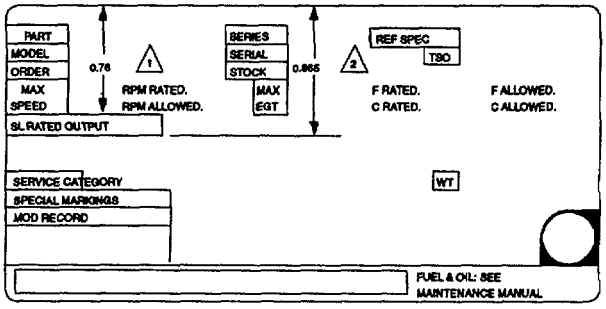
6. IGNITION UNIT: Provides high voltage to igniter plug.

7. CLUTCH ASSEMBLY: Clutch engagement controlled by ECU in response to aircraft main transmission monopole. Used as backup for aircraft accessory gearbox load.

8. HYDRAULIC STARTER: Starter engagement and disengagement is controlled by an overrunning clutch mounted in gearbox assembly.

1-11 IDENTIFICATION PLATE





DETAIL A

1-12 EQUIPMENT DATA

Length .....31.48 in. (77.4 cm)
Weight (Wet) ..... 103.1 lb (43.7 Kg)
Height.....19.48in.(42.9cm)
Width..... 31.22 to 31.28 in. (79.30 to 79.45 cm)
Lubricating Oils.....MIL-L-23699 at or above -25°F (-32°C)
MIL-L-7808 below -25° F (-32° C)
Power Output..... 125 shp at 59°F (15° C) at Sea Level Conditions
100 shp at -65°F (540C) at 10,000 ft Altitude Condition
Acceleration Time..... 0 to 95% speed in 30 sec. maximum
Rotor Speed .....58,970 rpm Full-Load governed speed
60,162 rpm No-Load speed
64,331 rpm Maximum Overspeed
Exhaust Gas Temperature (EGT) ..... 1300° F (704 C) maximum
Oil Temperature ..... 300° F (1480C) maximum
Inlet Air Temperature..... 130° F (540C) maximum
Starter Motor Duty Cycle .....The unit may be immediately restarted after roll down provided the clutch assembly duty cycle is not exceeded
Clutch Assembly Duty Cycle..... Minimum 12 minutes between clutch assembly engagements
Clutch Engagement at 60 ±2% speed

Fuel Specifications

Fuel	Minimum °F	Maximum °F
MIL-T-5624		
Grade JP-4	-65 (-54° C)	+135 (+57° C)
Grade JP-5	-40 (-40° C)	+135 (+57° C)
MIL-T-83133		
Grade JP-8	-40 (-40° C)	+135 (+57° C)
ASTM-D-1655		
Jet A, Jet Al or Jet B	-40 (-40° C)	+135 (+57° C)

Or at a temperature corresponding to a maximum kinematic viscosity of 0.12 cm squared/sec (12 centistokes)

1-13 SAFETY, CARE AND HANDLING

Observe all general precaution and safety regulations when handling APU.

SECTION III PRINCIPLES OF OPERATION

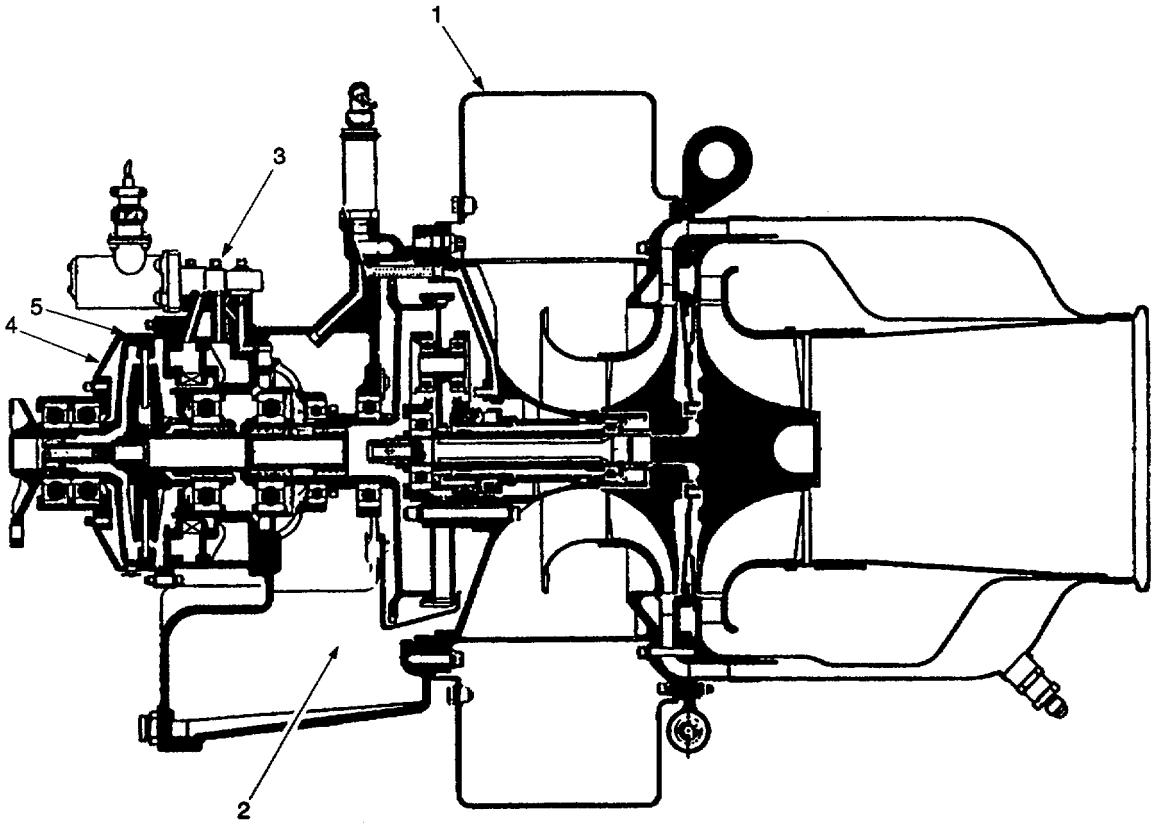
1-14 GENERAL POWERPLANT ASSEMBLY

1. The GTCP36-55(H) APU is a single-stage gas turbine engine employing a single-stage centrifugal compressor, a single can-type combustor and a single-stage radial inflow turbine.

2. The gas turbine engine consists of five major components: Power Section (1), Gearbox (2), Controls (3), Clutch Assembly (4) and Hydraulic Starter (5).

3. The compressor draws in a large quantity of air and forces it through the combustor and turbine. Heat energy is added to the air in the combustor causing it to expand. The turbine converts the energy in the air to shaft power which is used to turn the compressor and the accessory drive.

4. The gearbox section provides planetary gear reductions from main rotor speed to the clutch assembly output pad. Additional gear reduction is provided to drive APU accessories and the hydraulic starter. The components necessary for APU operation are identified in Figure 1-1.



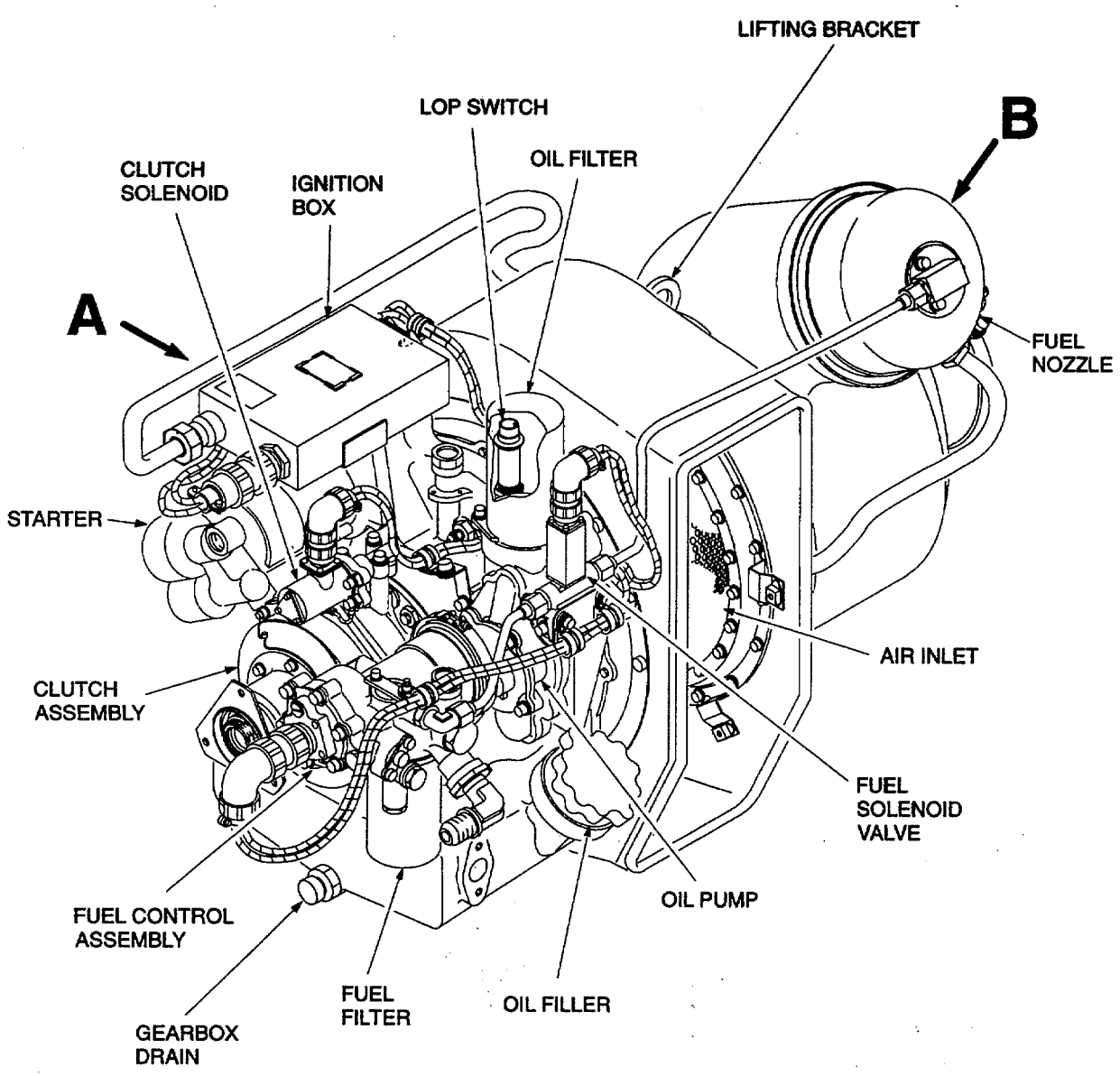


Figure 1-1. Component Locations (Sheet 1 of 2)

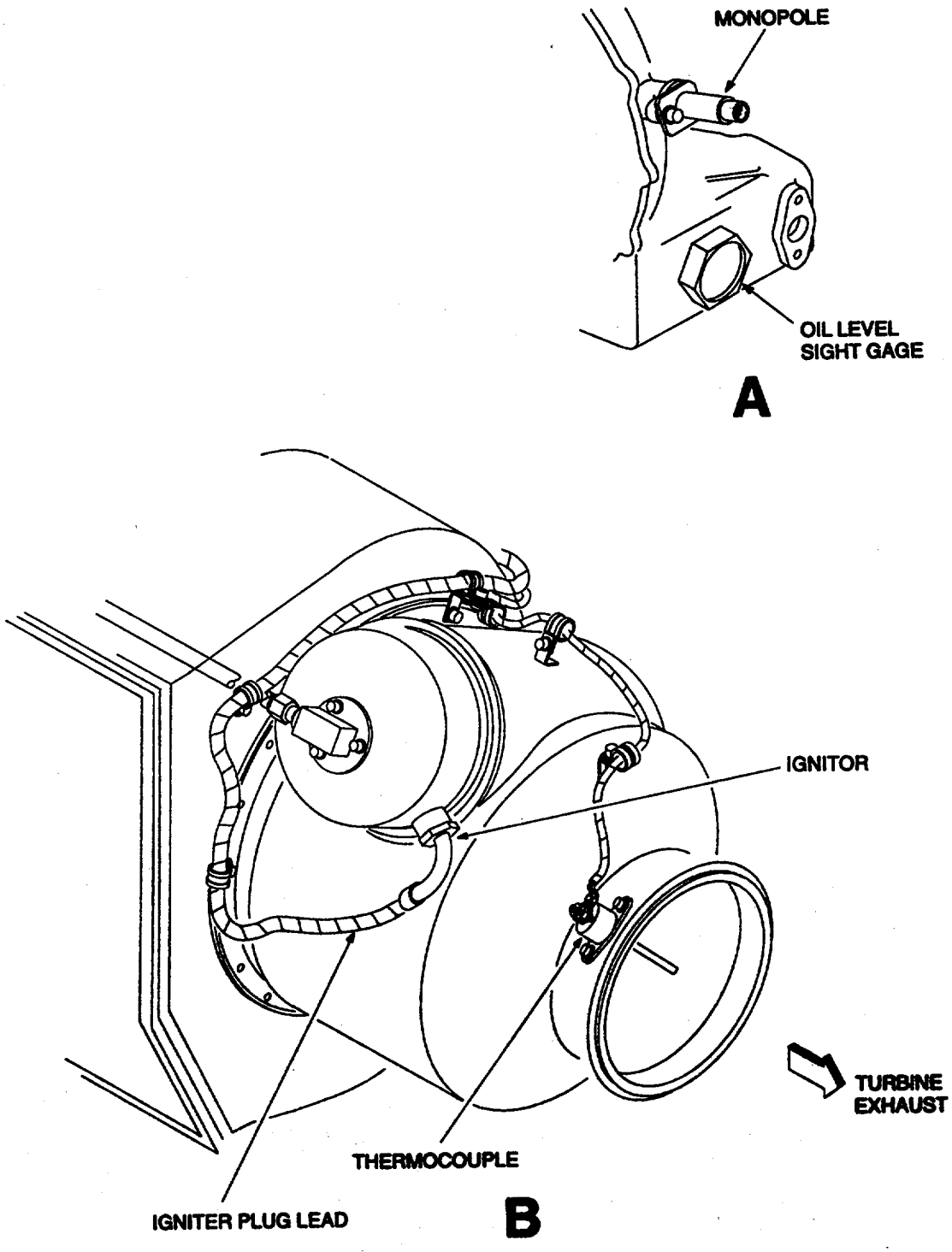
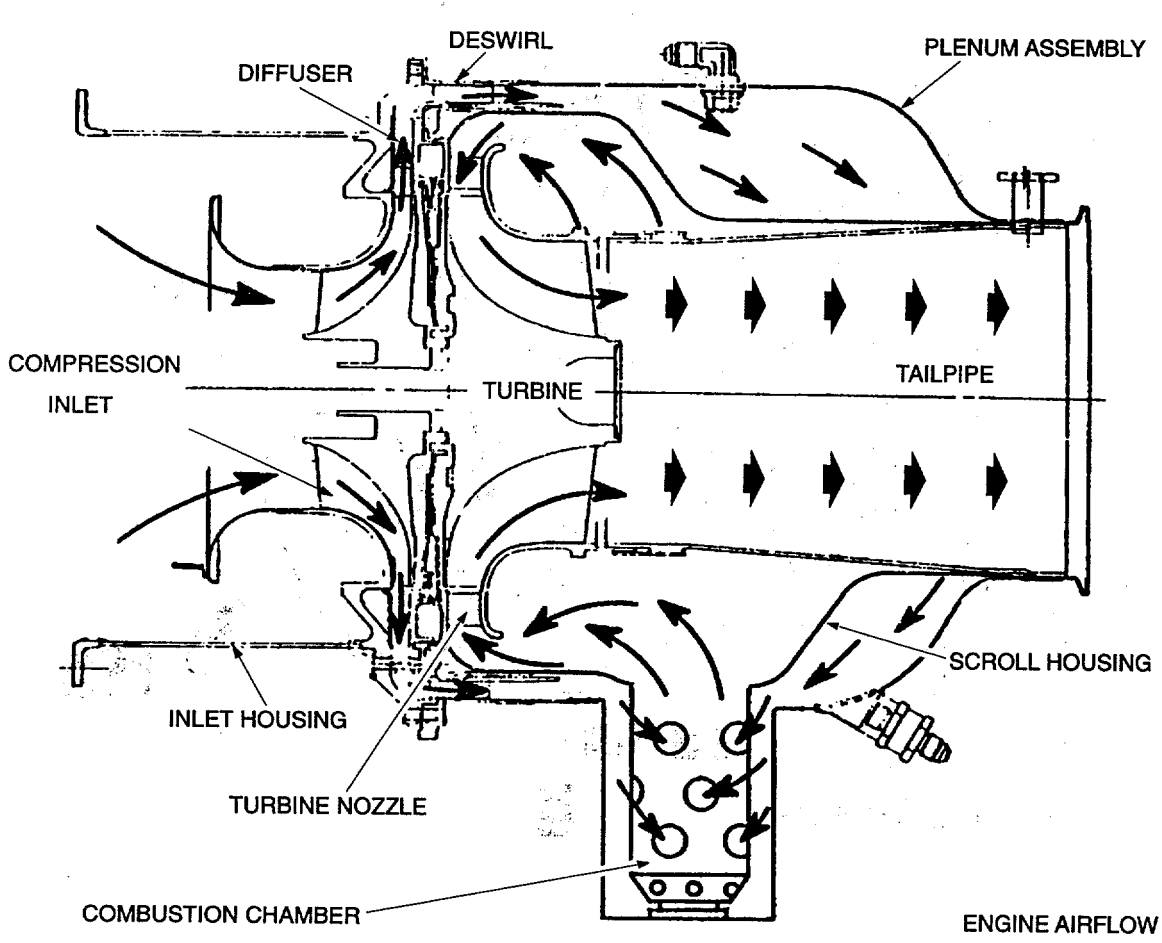


Figure 1-1. Component Locations (Sheet 2 of 2)

1-15 POWER SECTION ASSEMBLY

1. The power section assembly is comprised of the integrated compressor, combustion and turbine section. The integrated compressor utilized a centrifugal impeller and diffuser to provide the compressed air for combustion. Compressed air is contained by the compressor assembly housing and is directed into the combustion chamber. Fuel is introduced into the combustion chamber by a single fuel nozzle mounted on the combustor cap, and combined with compressed air, then is ignited by the igniter plug creating the hot gas flow that drives the turbine.

2. The turbine section utilizes a turbine nozzle to increase the hot gas flow velocity and direct it against the blades of the turbine wheel. The hot gases transmit energy into the turbine wheel and are discharged rearward through the turbine wheel which in turn, drives the compressor and gearbox assembly shaft.



1-16 GEARBOX ASSEMBLY

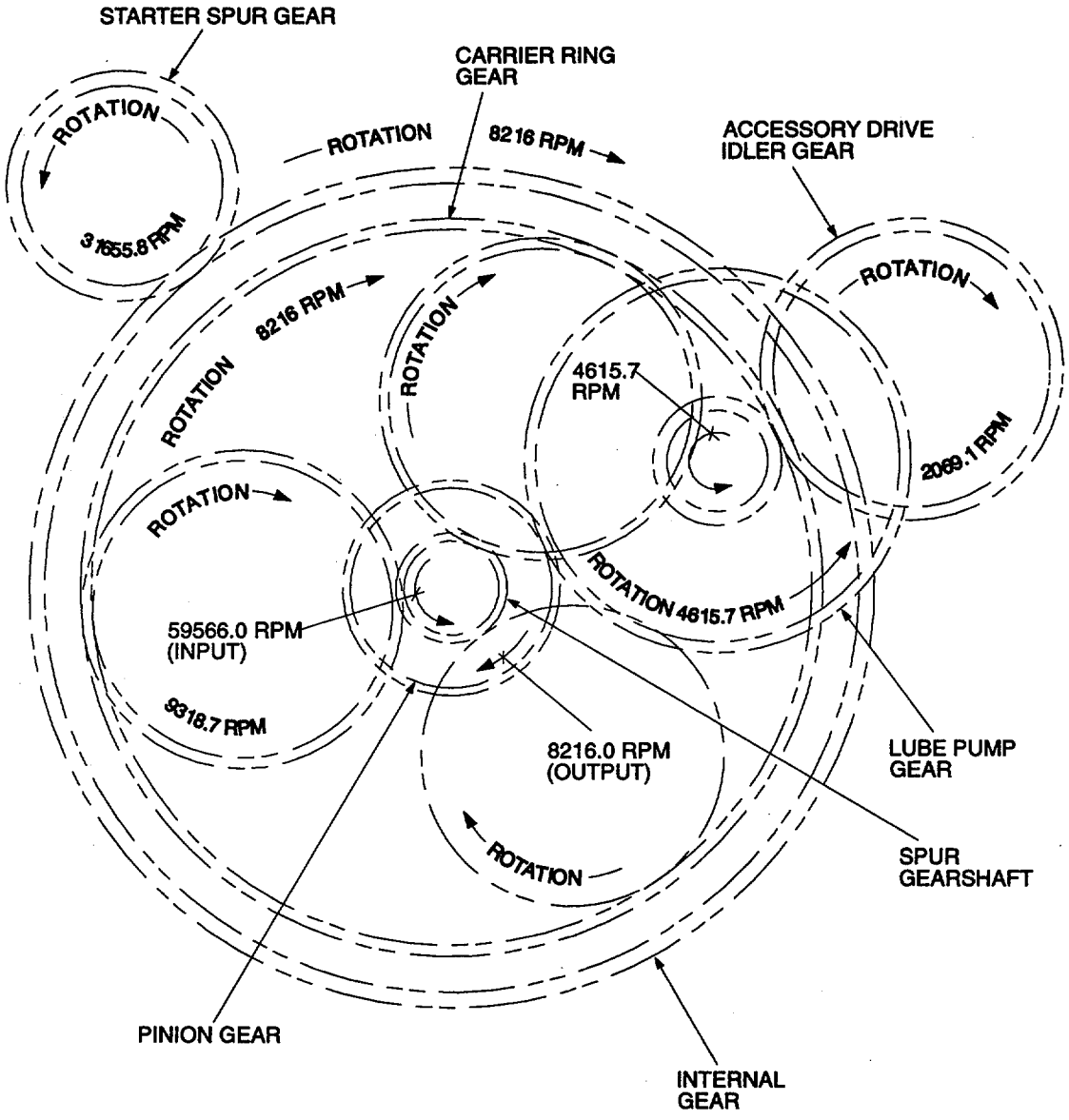
1. The gearbox assembly houses the reduction geartrain that reduces the output rotational speed of the power section assembly to the speeds necessary for operation of accessories. Output pads are provided for mounting a clutch assembly, oil pump/fuel control and starter. The shaft speeds are shown.

2. The spur gearshaft is splined to the rotor shaft and drives three planetary gears of spur gear set.

3. The spur gear set drives the carrier ring gear which is splined to the internal gear.

4. The internal gear drives the accessory drive idler gear and starter spur gear.

5. The pinion gear is mounted on shaft of carrier ring gear and drives the lube pump gear.

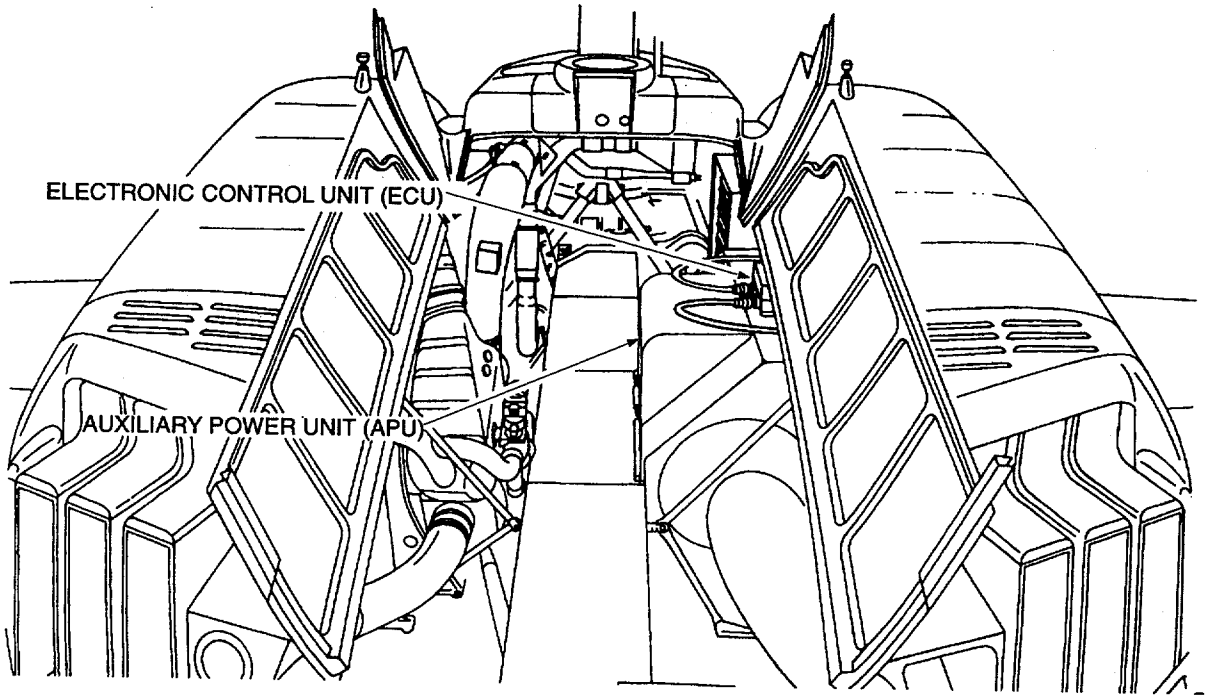


1-17 CONTROLS AND ACCESSORIES

1. Primary controls shall provide completely automatic APU control when used in conjunction with the Electronic Control Unit (ECU).

2. The ECU shall provide remote automatic starting when manually initiated by controlling the variables necessary to assure satisfactory operation.

3. The controls and accessories section includes those elements required for proper APU operation: electronic control unit (ECU), fuel system, lubrication system and electrical system.



1-18 FUEL SYSTEM

1. The fuel system contains components which function automatically to provide proper starting and acceleration to maintain constant APU speed under all operating conditions. See Figure 1-2 for fuel system schematic.

2. Components of the fuel system are: fuel filter assembly, fuel control assembly, fuel solenoid valve, fuel nozzle and relief valve.

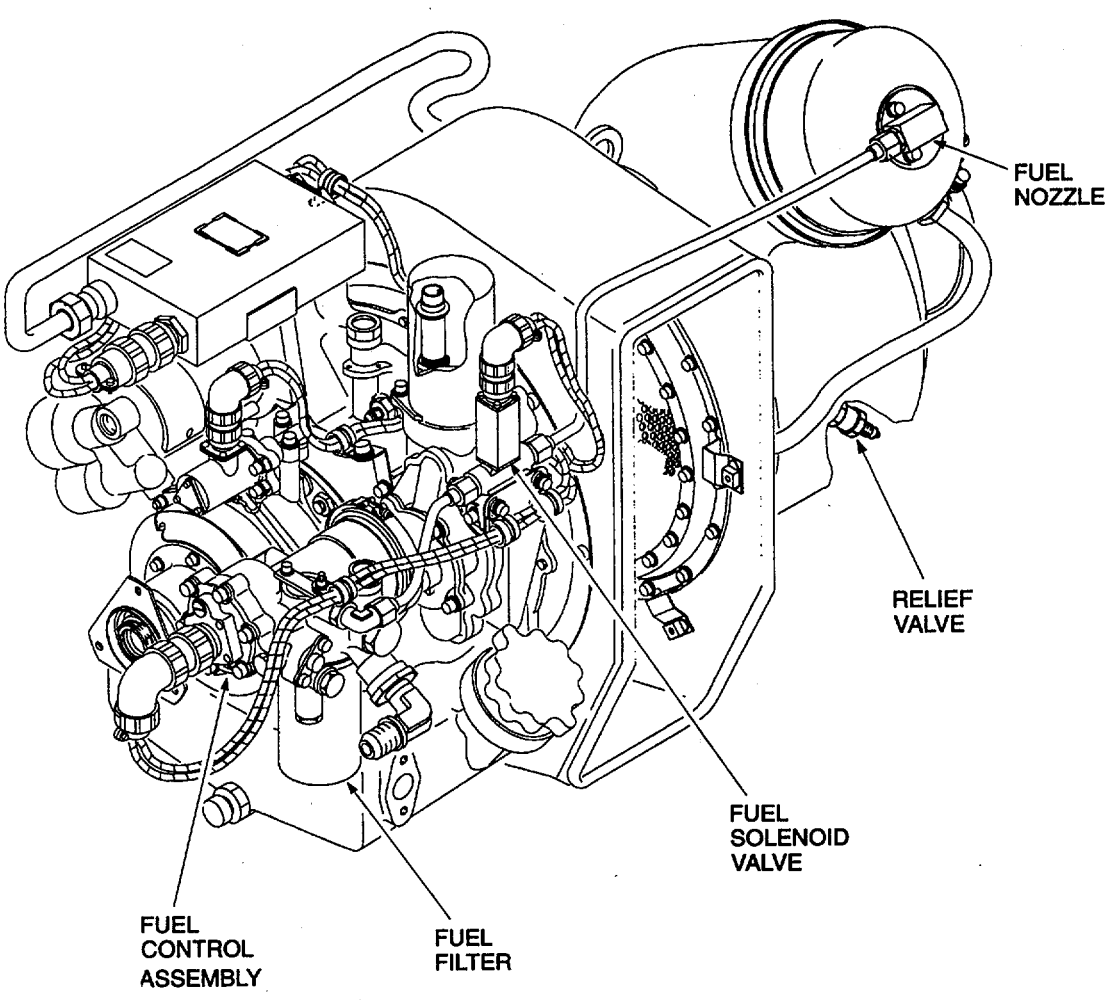
3. The fuel control assembly provides metered fuel for complete engine operation. The fuel control assembly shall completely close without leakage from the minimum operating fuel pressure to 110 percent of maximum operating fuel pressure.

4. A disposable 3 micron filter is installed in fuel control assembly.

5. The solenoid valve will close to shut off fuel to fuel nozzle when power is interrupted.

6. The relief valve is mounted in combustion chamber and utilized to drain fuel from plenum when APU is static. Relief valve closes on an increasing pressure of 9 to 16 psi differential and opens at minimum of 5 psi differential decreasing pressure.

7. The fuel nozzle is mounted in combustor cap and provides fuel atomization within the combustion chamber.



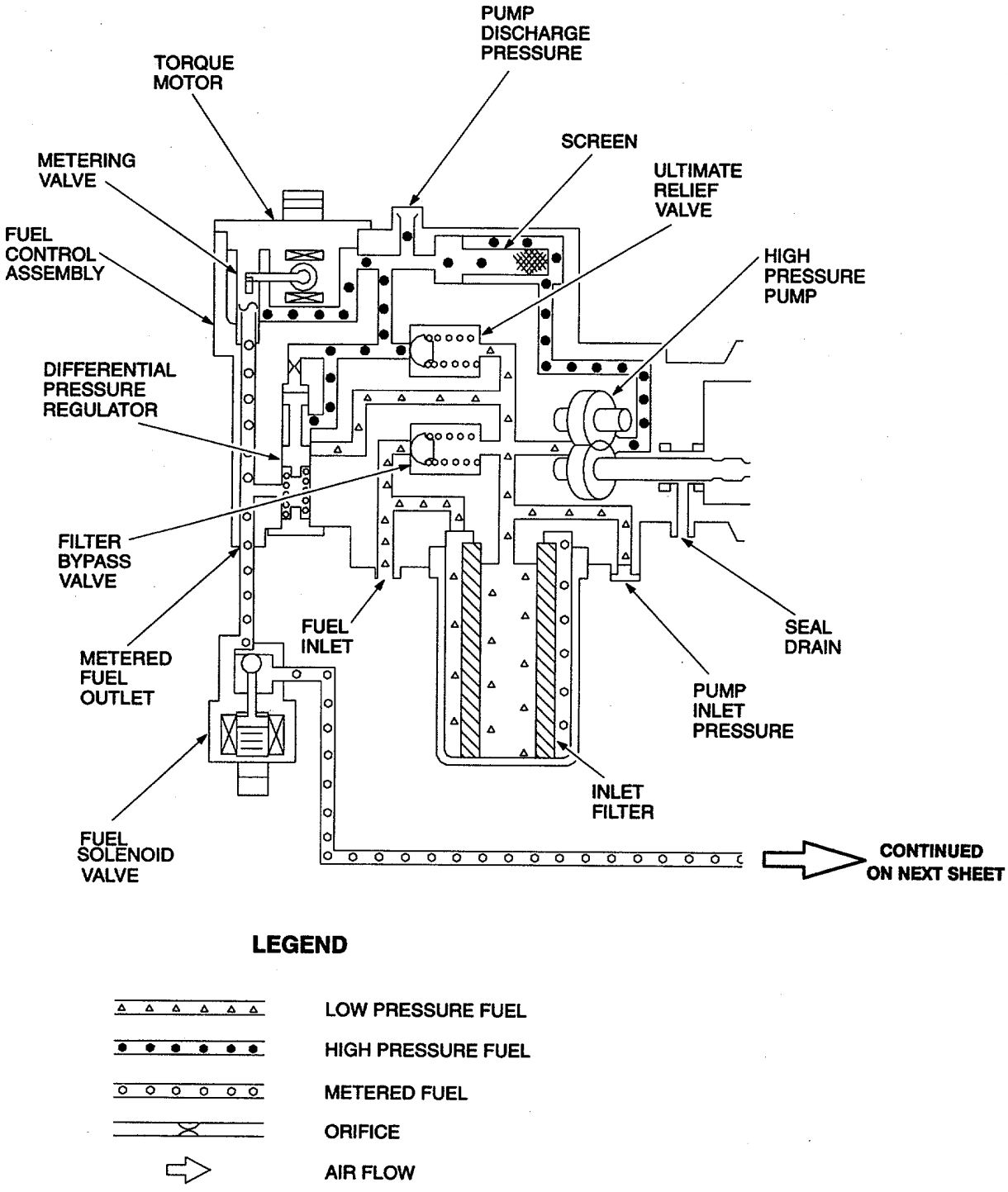


Figure 1-2. Fuel System Schematic (Sheet 1 of 2)

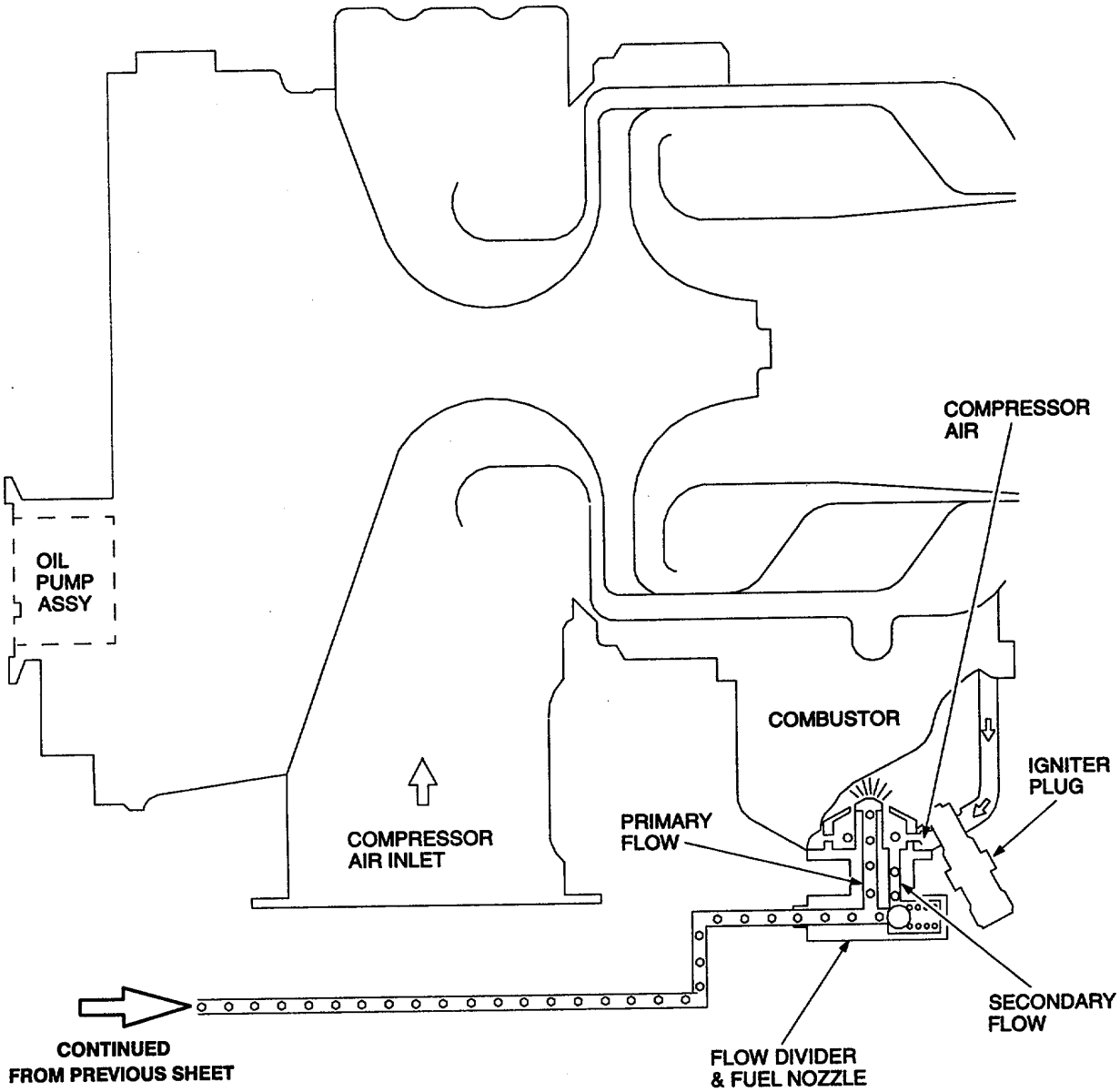


Figure 1-2. Fuel System Schematic (Sheet 2 of 2)

1-19 LUBRICATION SYSTEM

1. The lubrication system provides lubrication for all gears, shafts and bearings within the APU. See Figure 1-3 for oil system schematic.

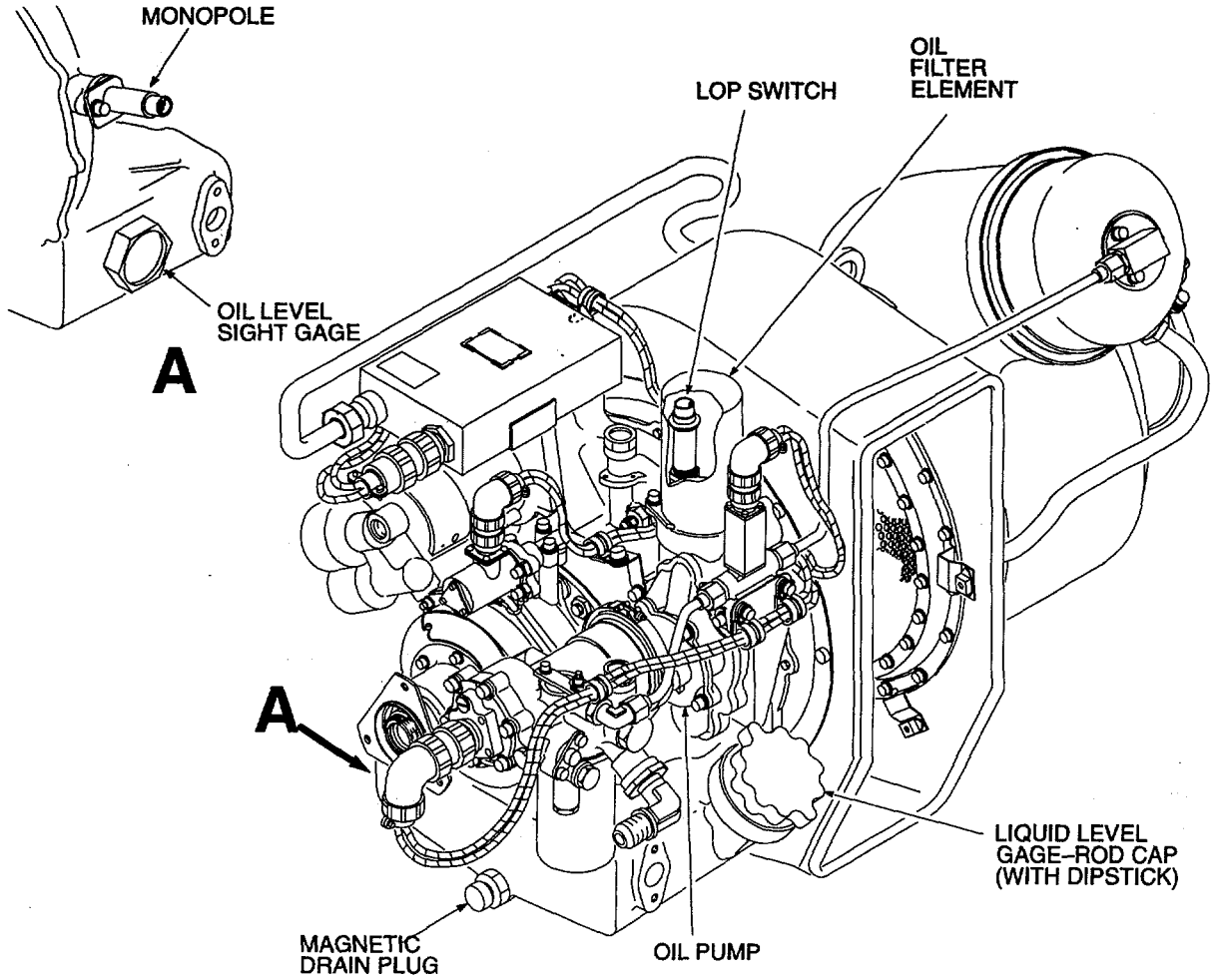
2. The APU shall operate through its complete operating range for any steady-state and transient operating conditions when the oil level is as low as 67 percent of usable quantity.
3. The lubrication system consists of an oil pump, oil filter element, LOP switch, magnetic drain plug assembly, sight gage and liquid level gage-rod cap with dipstick. The system oil pump maintains operating oil pressure.

4. The oil pump maintains 100 +5 psig operating oil pressure for all operating speeds and all altitudes.

5. The oil filter element is a full flow filter with sufficient capacity to permit APU to operate 500 airframe hours without an oil change. The filter element is a 10 micron nominal and 25 microns absolute.

6. The LOP switch shall provide signal for ECU to shut down engine when engine experiences low oil pressure above 95 percent rpm.

7. The magnetic drain plug is located in gearbox assembly to allow identification of metal chips in gearbox. The fitting is self-closing to prevent oil leakage when magnetic drain plug is removed.



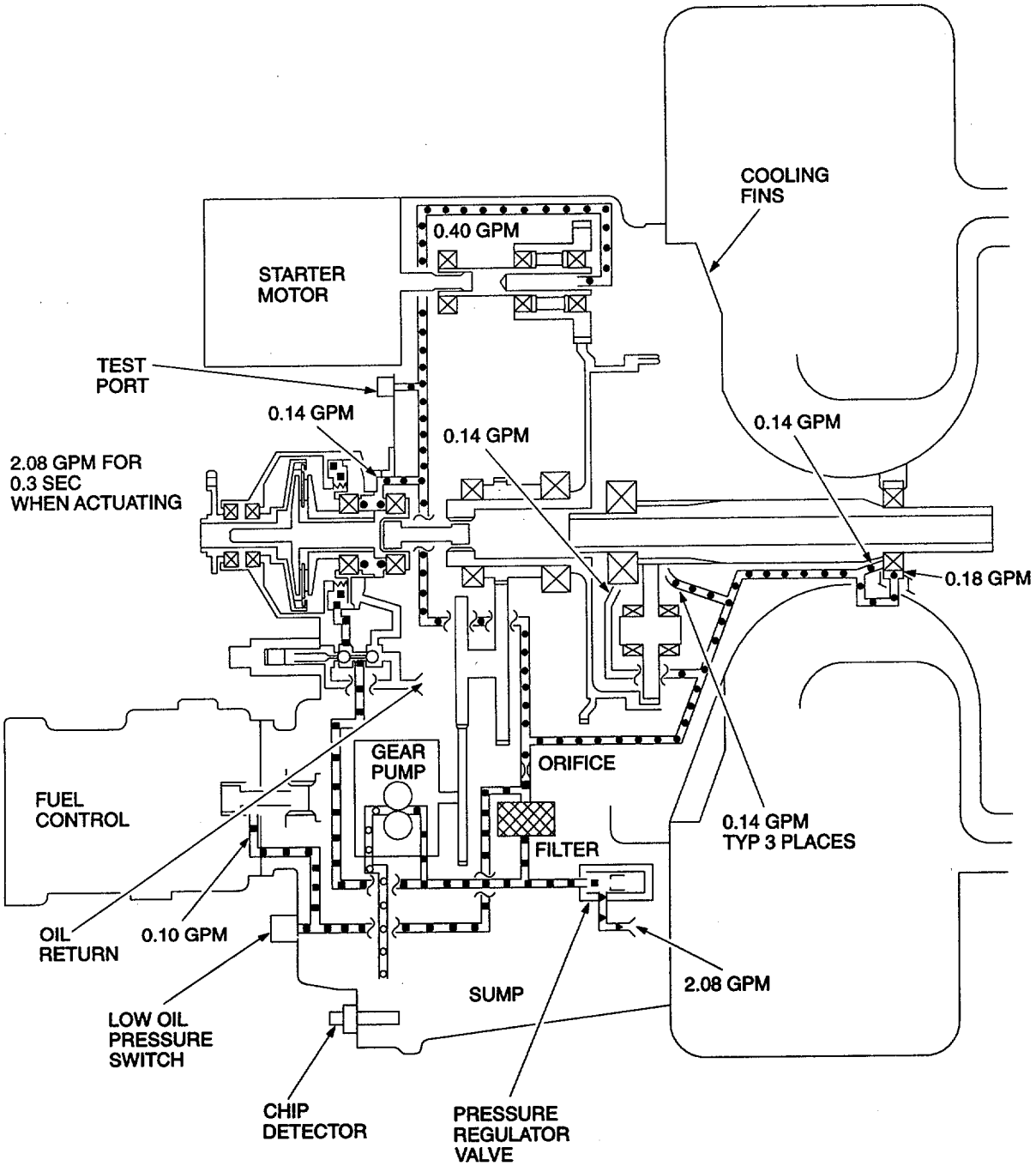


Figure 1-3. Oil System Schematic

1-20 ELECTRIC SYSTEM

1. The electrical system provides automatic actuation in proper sequence of the circuits which control APU starting, ignition, acceleration, fuel flow and monitoring. See Figure 1-4 for electrical system schematic.

2. Components of the electrical system include ignition unit, igniter plug lead, igniter plug assembly, monopole, immersion thermocouple and wiring harness assembly.

3. The ignition unit is a capacitive-discharge type unit that provides high voltage to the igniter plug for engine start.

4. The monopole provides electronic signal to ECU to:

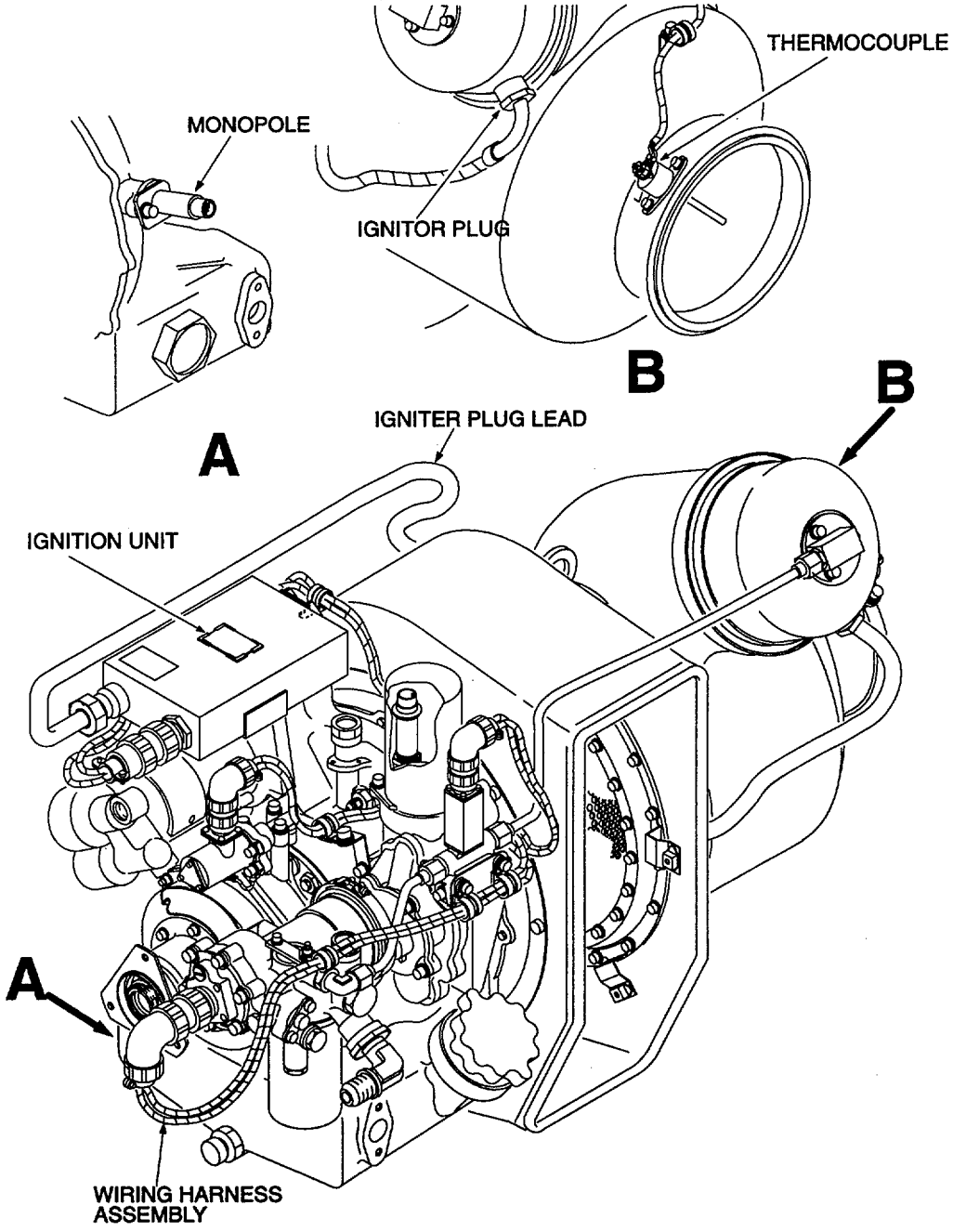
(a) Initiate ignition and fuel flow at 5 percent governed speed.

(b) De-activate hydraulic start valve at 60 percent governed speed.

(c) De-activate ignition, arm the LOP switch and activate APU on signal at 95 percent governed speed.
(d) Actuate overspeed switch at 108 percent speed maximum and initiate emergency shutdown.

5. The thermocouple measures the power turbine exhaust temperature and sends it to the ECU. The ECU will automatically shut down the APU when EGT reaches 1325 ±25°F.

6. The wiring harness assembly provides the electrical interface between aircraft, ECU and engine components.


THERMOCOUPLE
MONOPOLE
IGNITOR PLUG
B
B
IGNITER PLUG LEAD
A
IGNITION UNIT
A
WIRING HARNESS
ASSEMBLY

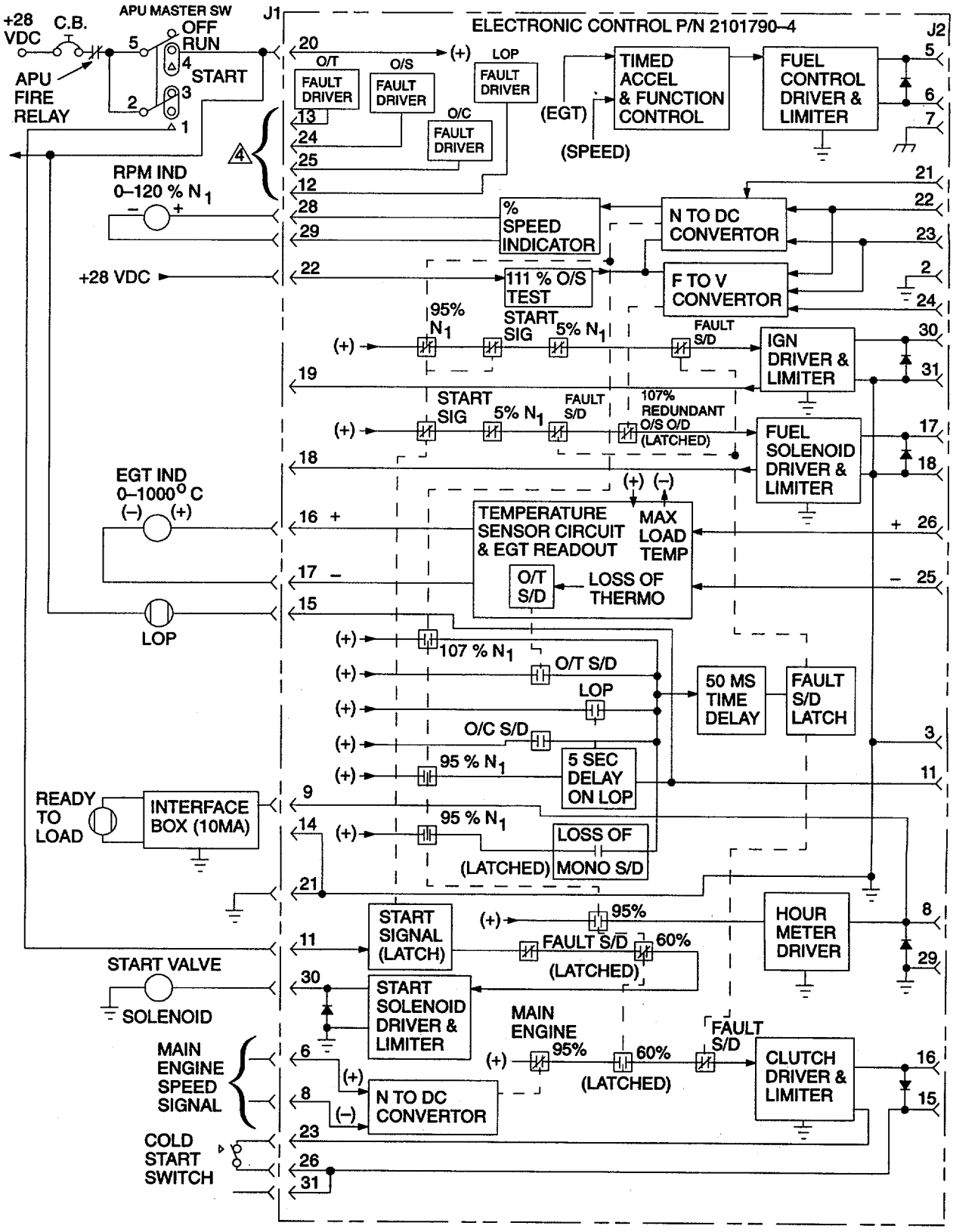


Figure 1-4. Electrical System Schematic (Sheet 1 of 2)

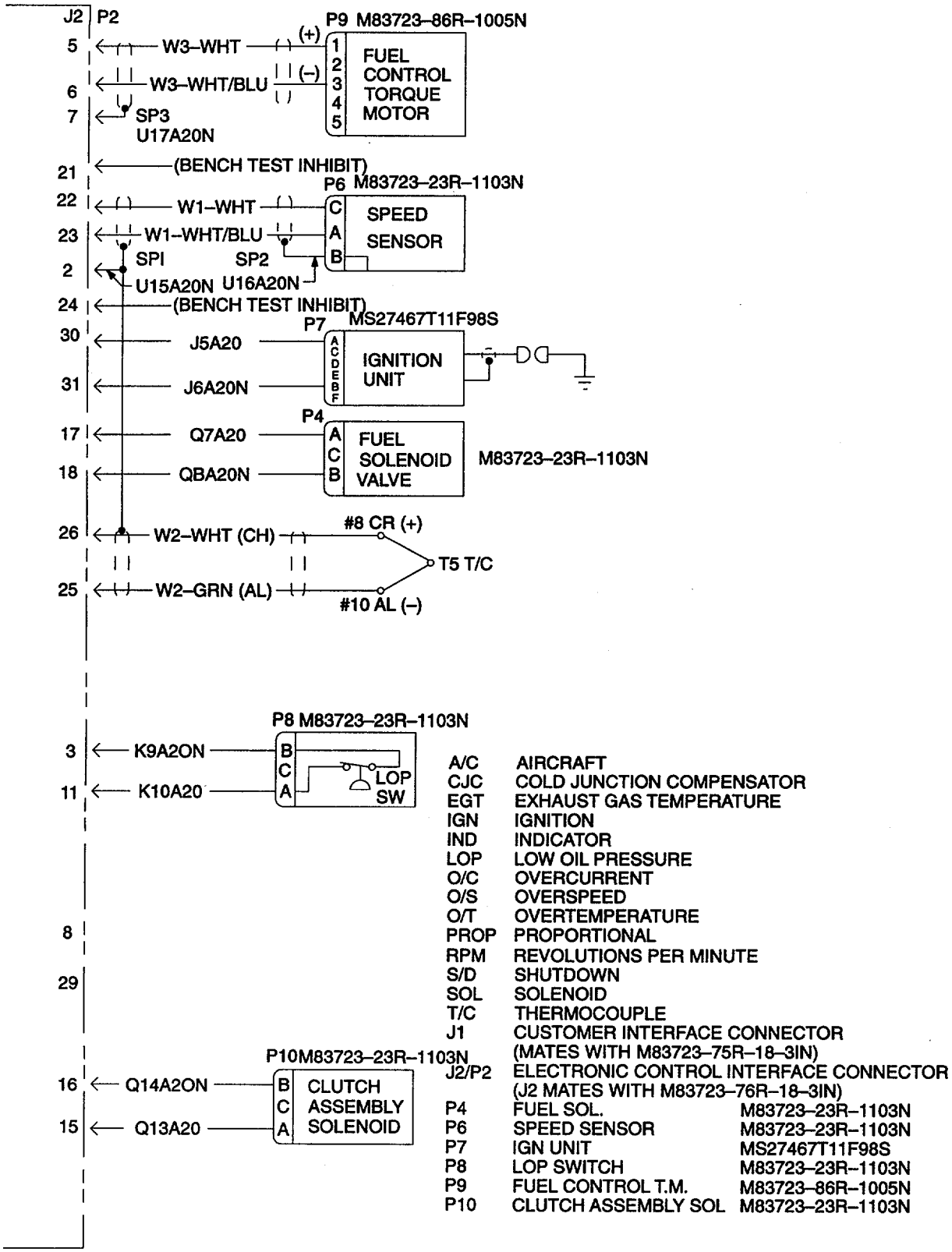


Figure 1-4. Electrical System Schematic (Sheet 2 of 2)

SECTION IV REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

1-21 COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970 or CTA 8-100, as applicable to your unit.

1-22 TOOL AND TEST EQUIPMENT

Refer to Appendix B, Maintenance Allocation Chart; for tool and test equipment. Tools to be fabricated are listed and shown in the illustrated list of manufactured items (Appendix E) (None Required).

1-23 REPAIR PARTS

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL) TM 1-2835-213-23P covering Aviation Unit and Intermediate Maintenance (including Depot Maintenance Re- pair Parts (RPSTL)) for this equipment.

SECTION V SERVICE UPON RECEIPT

1-24 REMOVE APU FROM SHIPPING CONTAINER

INITIAL SETUP:

Tools:
Lifting Sling (T69)
Tool Kit, General Mechanic's (T109)

Equipment Conditions:
Helicopter Safed
APU Removed From Aircraft
Maintenance Crane Installed

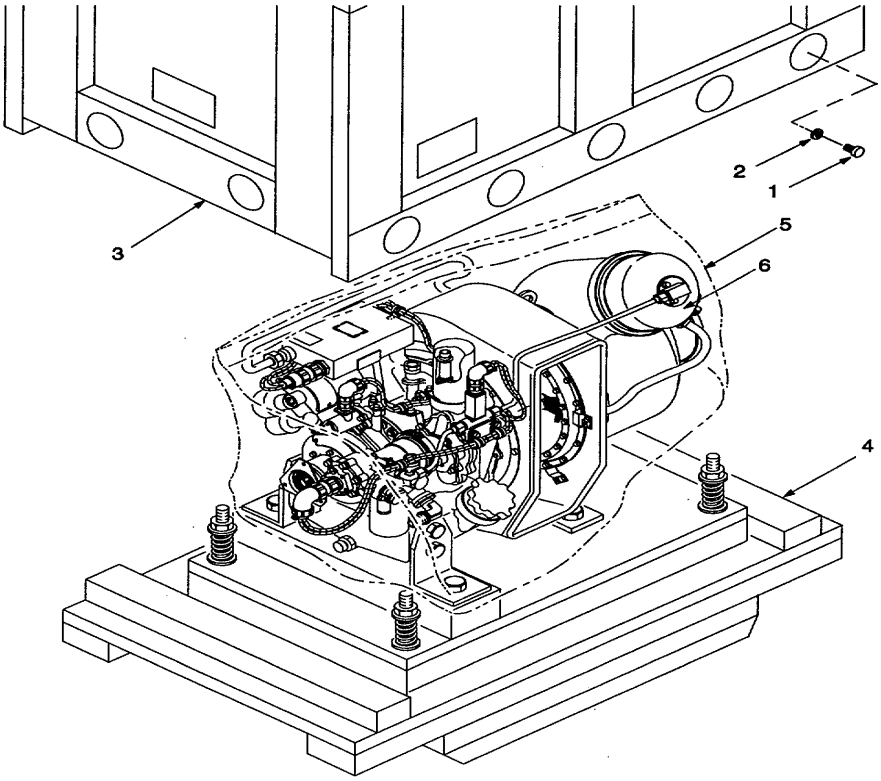
Personnel Required:
67R Attack Helicopter Repairer
Assistant

General Safety Instructions:

Hoisting APU

References:
TM 1-1520-238-23
Task 1-25

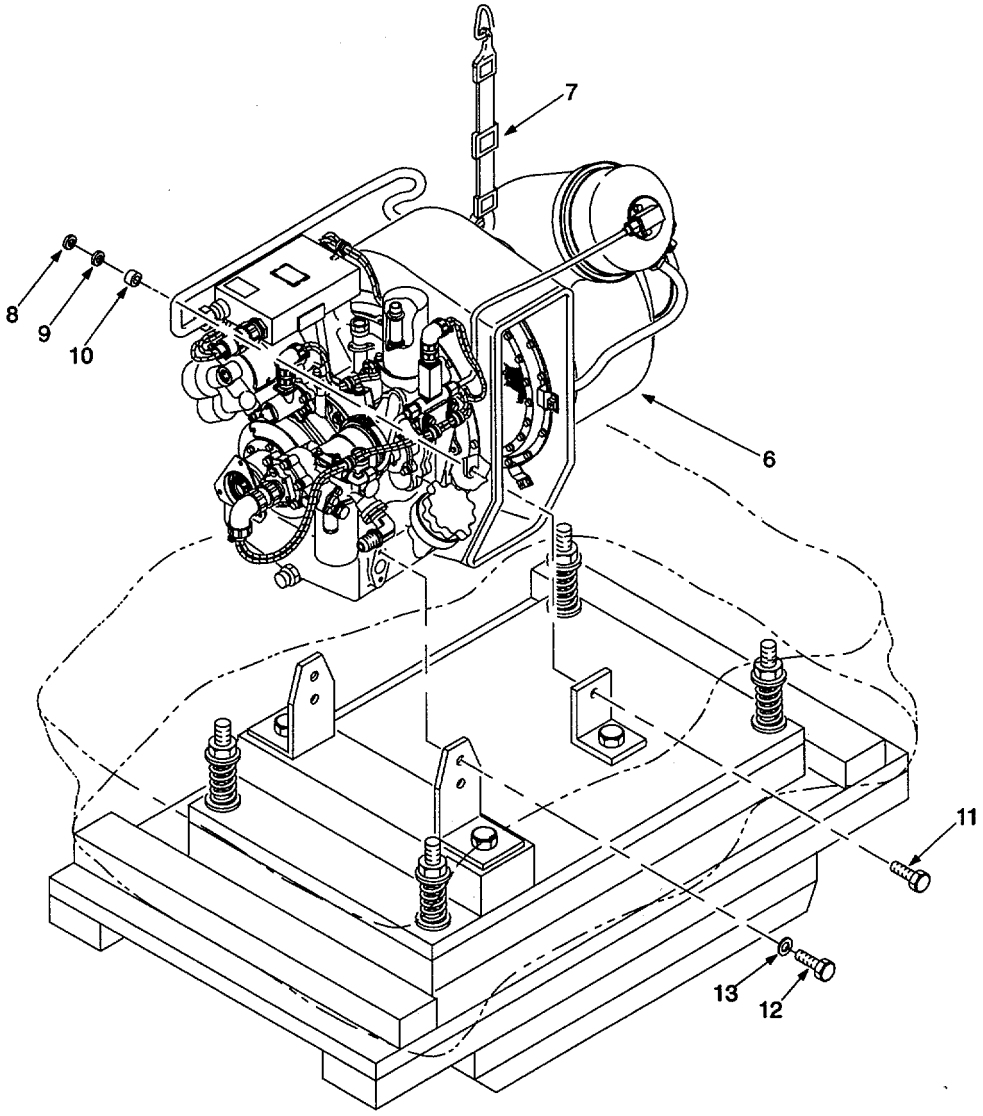
1. **Remove 14 lag bolts** (1) and washers (2).
2. **Remove cover** (3) from base (4).
3. Separate barrier material (5) to **expose APU** (6).



GO TO NEXT PAGE

1-24 REMOVE APU FROM SHIPPING CONTAINER (CONT)

4. **Attach lifting sling** (7) to APU (6) and connect to maintenance crane.
5. Operate maintenance crane to **take up slack in lifting sling** (7).
6. **Remove nut** (8), washer (9), spacer (10) and bolt (11).
7. **Remove two bolts** (12) and washers (13).
8. Man A operates maintenance crane to **lift APU**, while man B guides APU.
9. **Place APU in workstand** (Task 1-25).
10. **Install container cover** on base and **save for APU shipment**.



GO TO NEXT PAGE

1-24 REMOVE APU FROM SHIPPING CONTAINER (CONT)

11. **Inspect the APU for damage** incurred during shipment. If the equipment has been damaged, report the damage on SF 364 (Report of Discrepancy).

12. Check the equipment against the packing slip to see if the shipment is complete. **Report all discrepancies** in accordance with the instructions of DA PAM 738-751.

FOLLOW-ON MAINTENANCE: None.

END OF TASK

1-25 INSTALL APU ON WORKSTAND

INITIAL SETUP:

Tools:
Lifting Sling (T69)
Tool Kit, General Mechanic's (T109)
Workstand (T115)

Personnel Required:
67R Attack Helicopter Repairer
Assistant

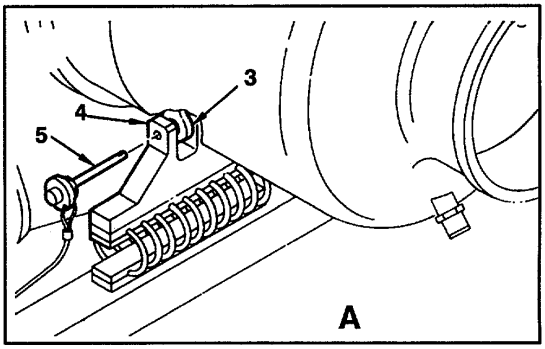
References:
TM 1-1520-238-23

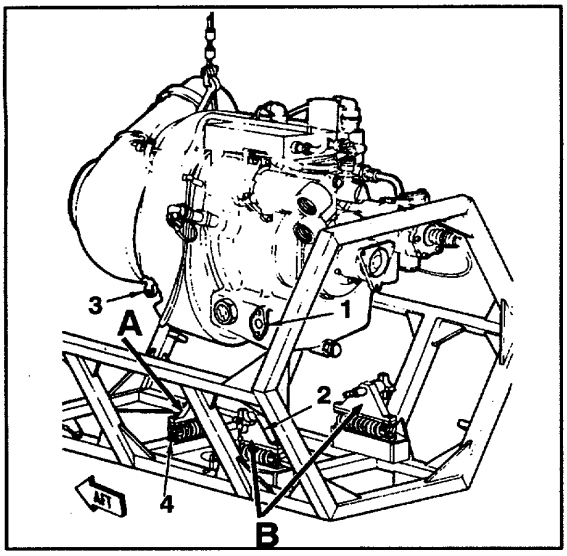
Equipment Conditions:
Helicopter Safed
Maintenance Crane Installed
APU Removed From Aircraft

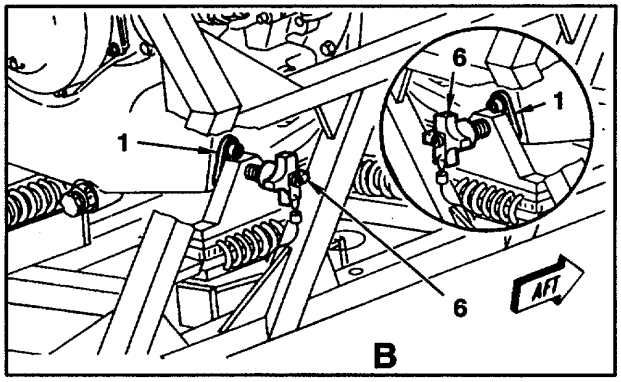
General Safety Instructions:

Hoisting APU

1. **Lower APU** into workstand.
2. **Align mount** (1) with support (2).
3. **Align fitting** (3) with support (4).
4. **Install pin** (5) through support (4) and fitting (3).
5. **Install workstand knobs** (6) in mounts (1).







6. Relieve pressure on lifting lug and **remove lifting sling** from APU.
7. Remove lifting sling from maintenance crane.

FOLLOW-ON MAINTENANCE: None.

1-26 VISUAL INSPECTION OF APU

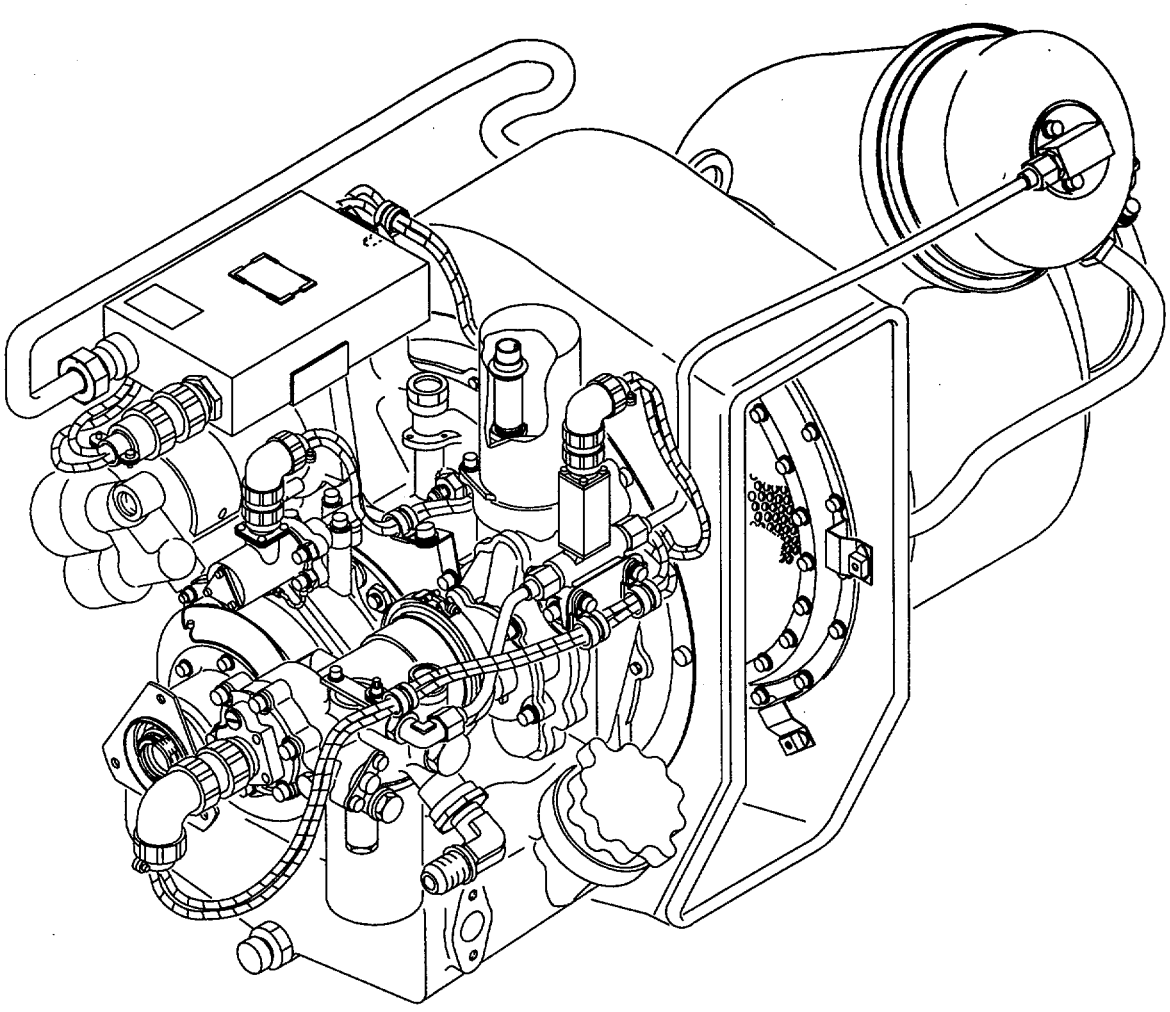
INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)

Equipment Conditions:
APU on Workstand

Personnel Required:
67R Attack Helicopter Repairer

1. **Inspect auxiliary power unit** (APU) for missing hardware. None allowed.
2. Inspect studs and inserts for thread damage. None allowed.
3. Inspect APU wiring harness assembly for damage and loose or broken clamps. None allowed.
4. Inspect APU wiring harness assembly connectors for security or damage. None allowed.



GO TO NEXT PAGE

5-11 REMOVE/INSTALL OIL PUMP

5. Inspect liquid level gage rod-cap (1) for cracks or damaged chain. None allowed.

6. Inspect oil fill neck (2) for cracks. None allowed.

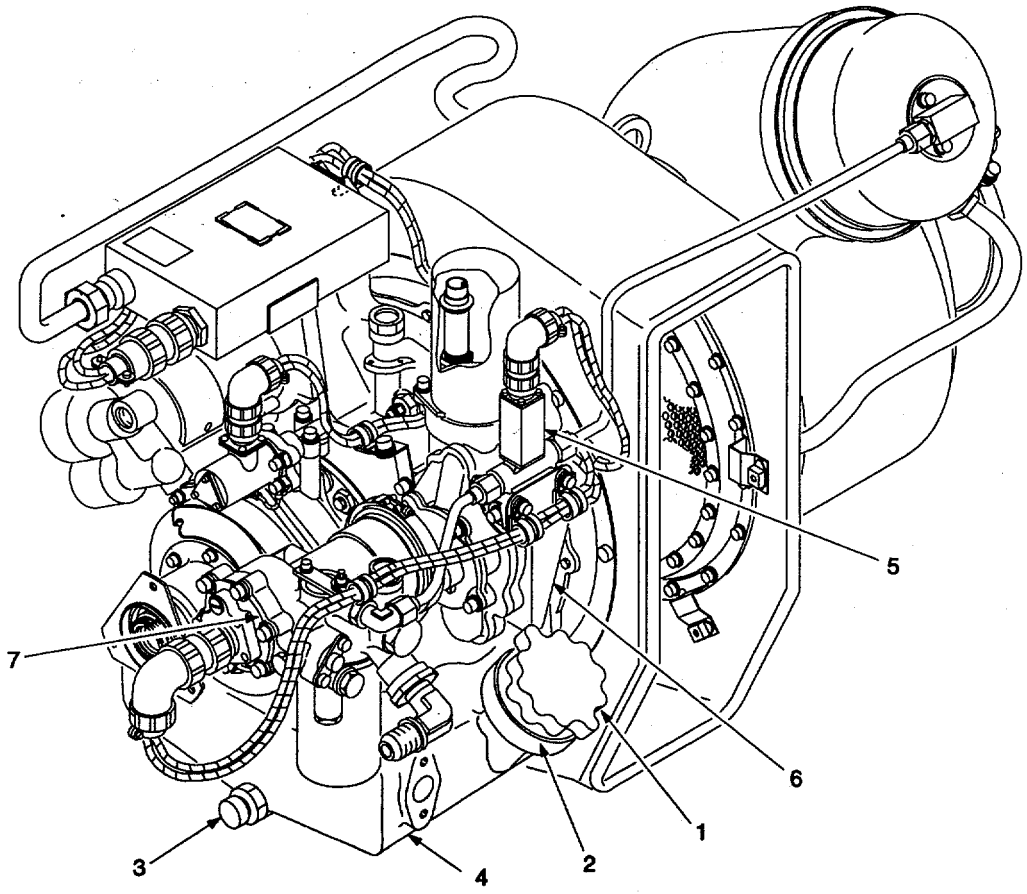
7. Inspect magnetic drain plug (3) for debriloose-. ness and missing chip collecter. None allowed.

8. Inspect accessory gearbox assembly (4) for cracks. None allowed.

9. Inspect fuel solenoid valve (5) for cracks or dents. None allowed.

10. Inspect fuel solenoid valve bracket (6) for cracks. None alowed

11. Inspect fuel control assembly (7) for leaks, security and damaged threads on fittings. None allowed.



GO TO NEXT PAGE

1-26 VISUAL INSPECTION OF APU (CONT)

12. Inspect APU wiring harness assembly (8) for damaged insulation, backshell or exposed wires. None allowed.

13. Inspect oil pump (9) for leaks. None allowed.

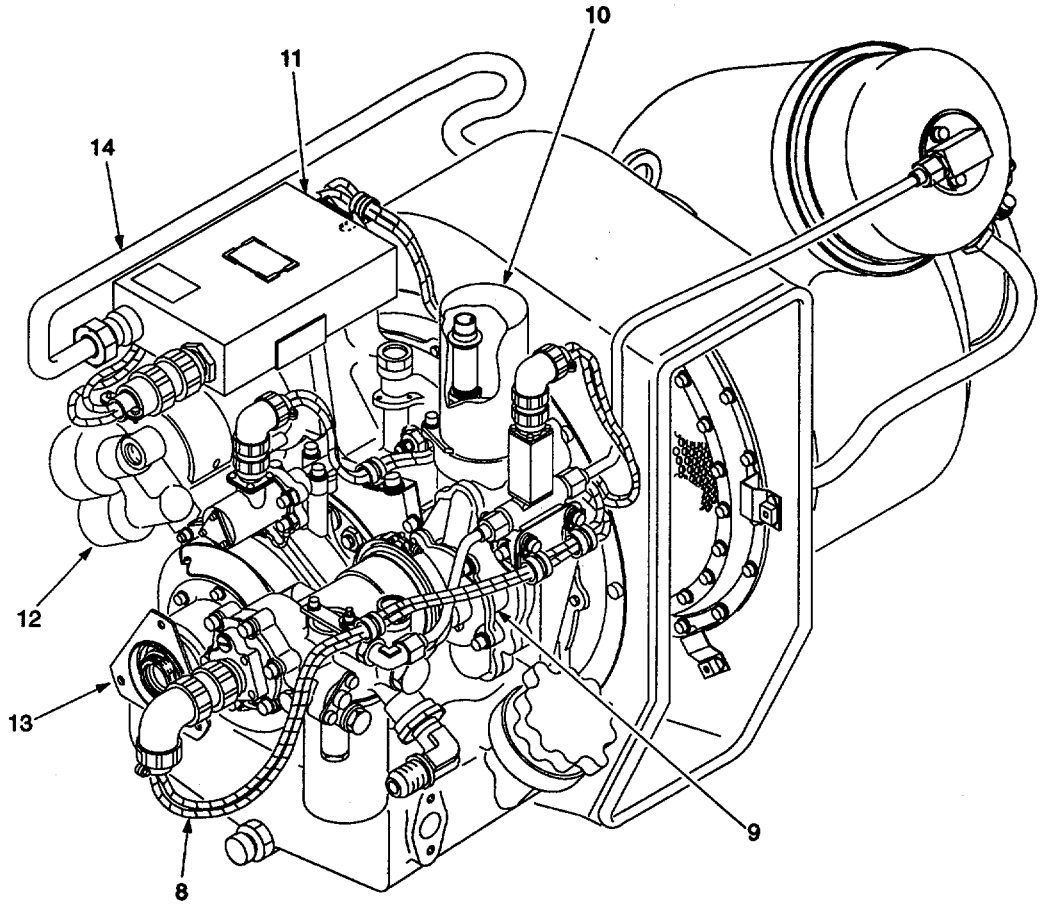
14. Inspect oil filter body (10) for leaks and cracks. No leaks or cracks allowed. None allowed.

15. Inspect ignition unit (11) for cracks, dents and damaged connectors. None allowed.

16. Inspect hydraulic starter (12) for leaks. None allowed.

17. Inspect clutch assembly (13) for leaks and damage to coupling flange. None allowed.

18. Inspect igniter plug lead (14) for frayed cover or pinched areas. None allowed.



GO TO NEXT PAGE

1-26 VISUAL INSPECTION OF APU (CONT)

19. Inspect fuel control to solenoid tube assembly (15) for cracks, dents, bends and leaks. None allowed.

20. Inspect fuel nozzle to solenoid tube assembly (16) for cracks, dents, bends and leaks. None allowed.

21. Inspect fuel nozzle (17) for leaks. None allowed.

22. Inspect igniter plug lead (18) for damage to braided cover. None allowed.

23. Inspect ignition unit support (19) for cracks. None allowed.

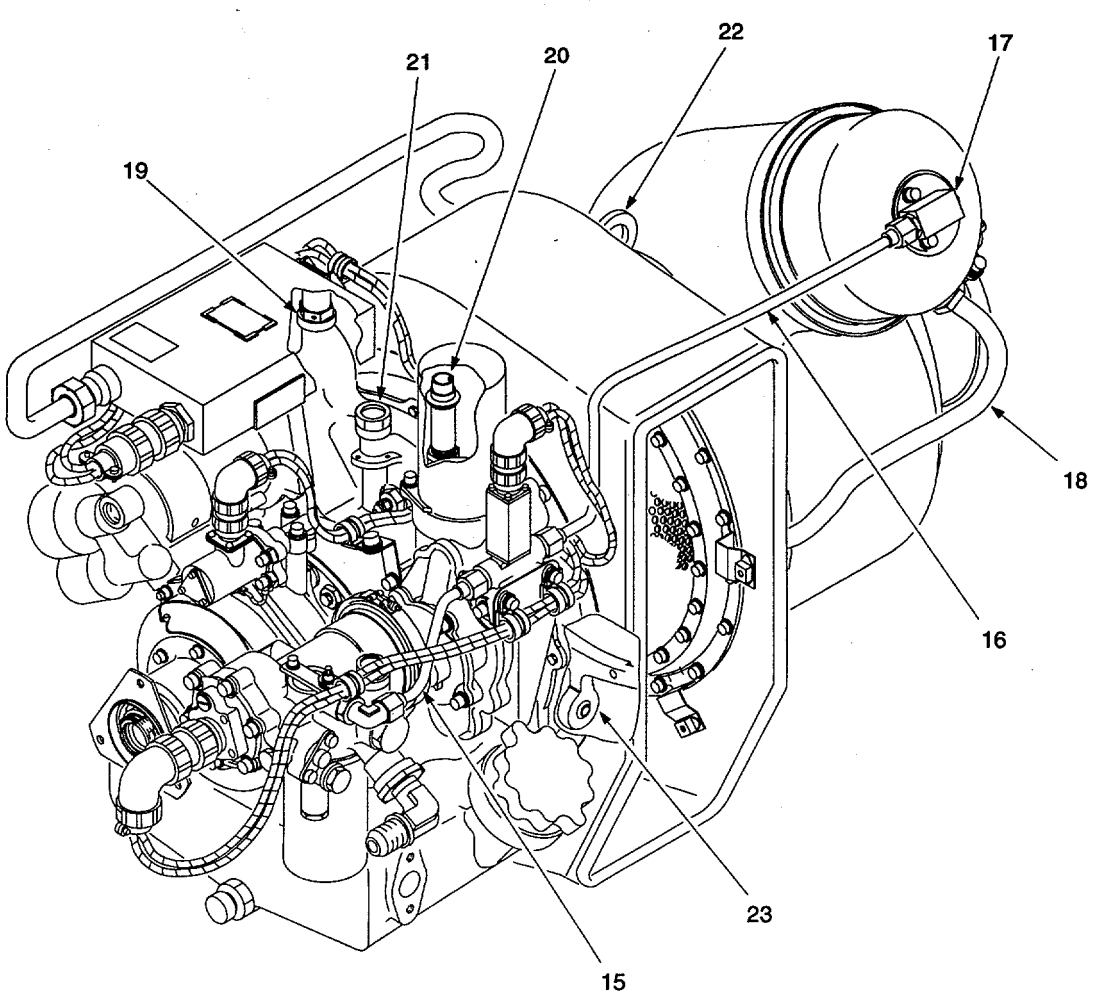
24. Inspect LOP switch (20) for cracks or dents. None allowed.

25. Inspect plug (21) for leaking. None allowed.

26. Inspect lifting lug (22) for security and cracks. None allowed.

27. Inspect aft mount (23) for cracks. None allowed.

FOLLOW-ON MAINTENANCE: None.



END OF TASK

1-27 REMOVE APU FROM WORKSTAND

INITIAL SETUP

Tools:
Lifting Sling (T69)
Tool Kit, General Mechanic's (T109)

Personnel Required:
67R Attack Helicopter Repairer
Assistant

References:
TM 1-1520-238-23

Equipment Conditions:
Helicopter Safed
Maintenance Crane Installed
APU on Workstand (Task 1-25)

General Safety Instructions:

Hoisting APU

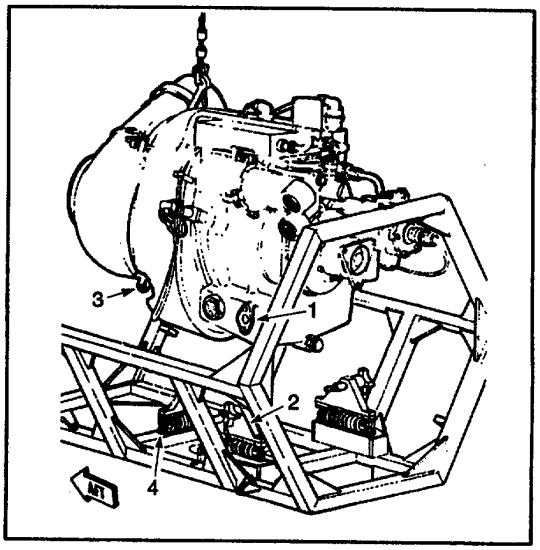
1. **Attach lifting sling** to APU and maintenance crane.

2. Using maintenance crane, **remove slack** from sling.

3. **Remove pin** (5) installed through support (4) and fitting (3).

4. **Remove workstand knobs** (6) from mounts (1).

5. Man A slowly operates maintenance crane to **lift APU**. Man B guides APU from workstand.



FOLLOW-ON MAINTENANCE: None.

END OF TASK

1-28 INSTALL APU IN SHIPPING CONTAINER

INITIAL SET UP

Tools:
Lifting Sling (T69)
Shipping Container
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Barrier Material (D4)
Tape, Pressure Sensitive (D22)

Personnel Required:
67R Attack Helicopter Repairer
Assistant

References:
TB 55-8100-200-24
MIL-STD-129

Equipment Conditions:
Helicopter Safed
Maintenance Crane Installed
APU on Workstand (Task 1-25)
APU Prepared For Shipment (Task 1-44)

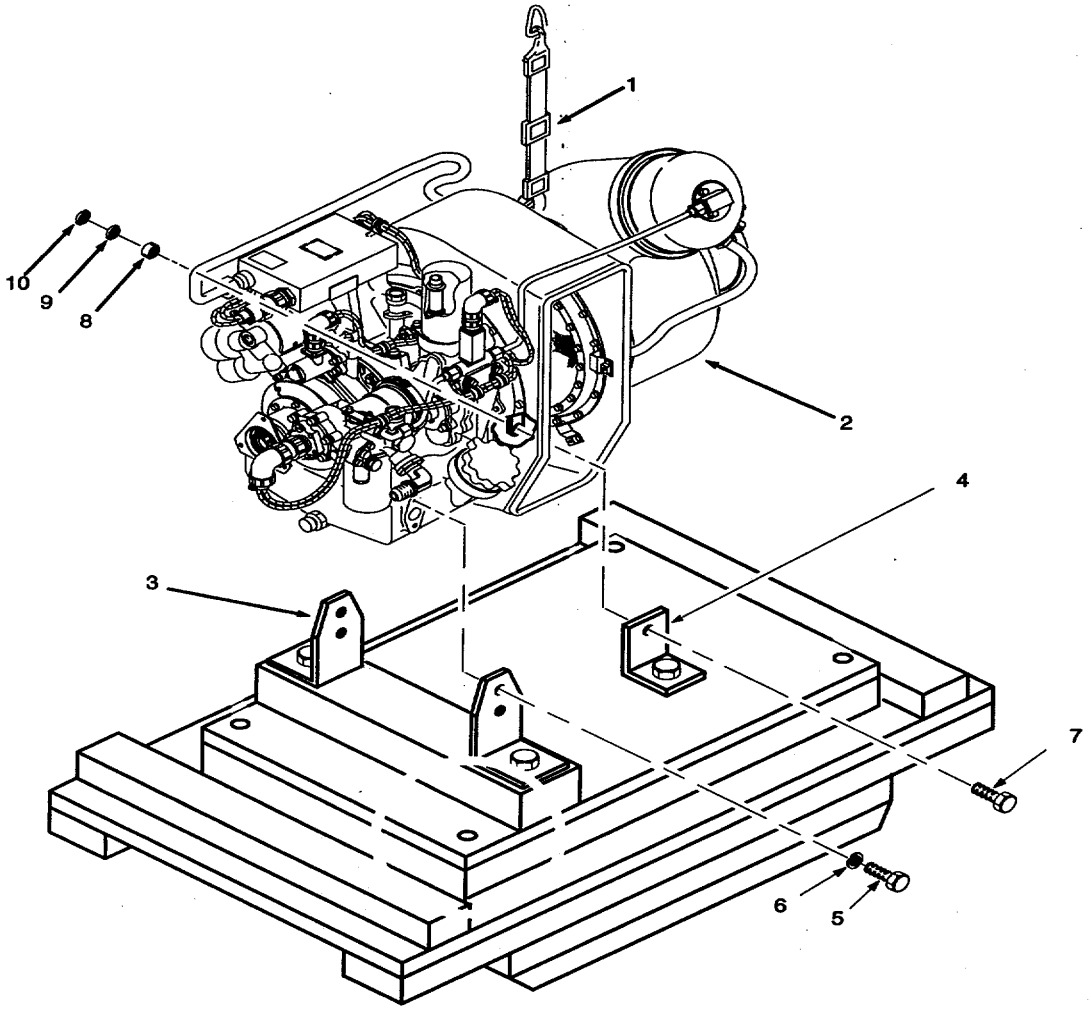
General Safety Instructions:

Hoisting APU

GO TO NEXT PAGE

1-28 INSTALL APU IN SHIPPING CONTAINER (CONT)

1. Using lifting sling (1) and maintenance crane, lower APU (2) into position on brackets (3, 4). While man A operates maintenance crane, man B guides APU on brackets.
2. Secure APU (2) to brackets (3) with bolts (5) and washers (6).
3. Secure APU (2) to bracket (4) with bolt (7), bushing (8), washer (9) and nut (10).
4. Disconnect and remove lifting sling (1) from APU and maintenance crane.
5. Wrap APU (2) with barrier material (D4) and secure with pressure sensitive tape (D22).

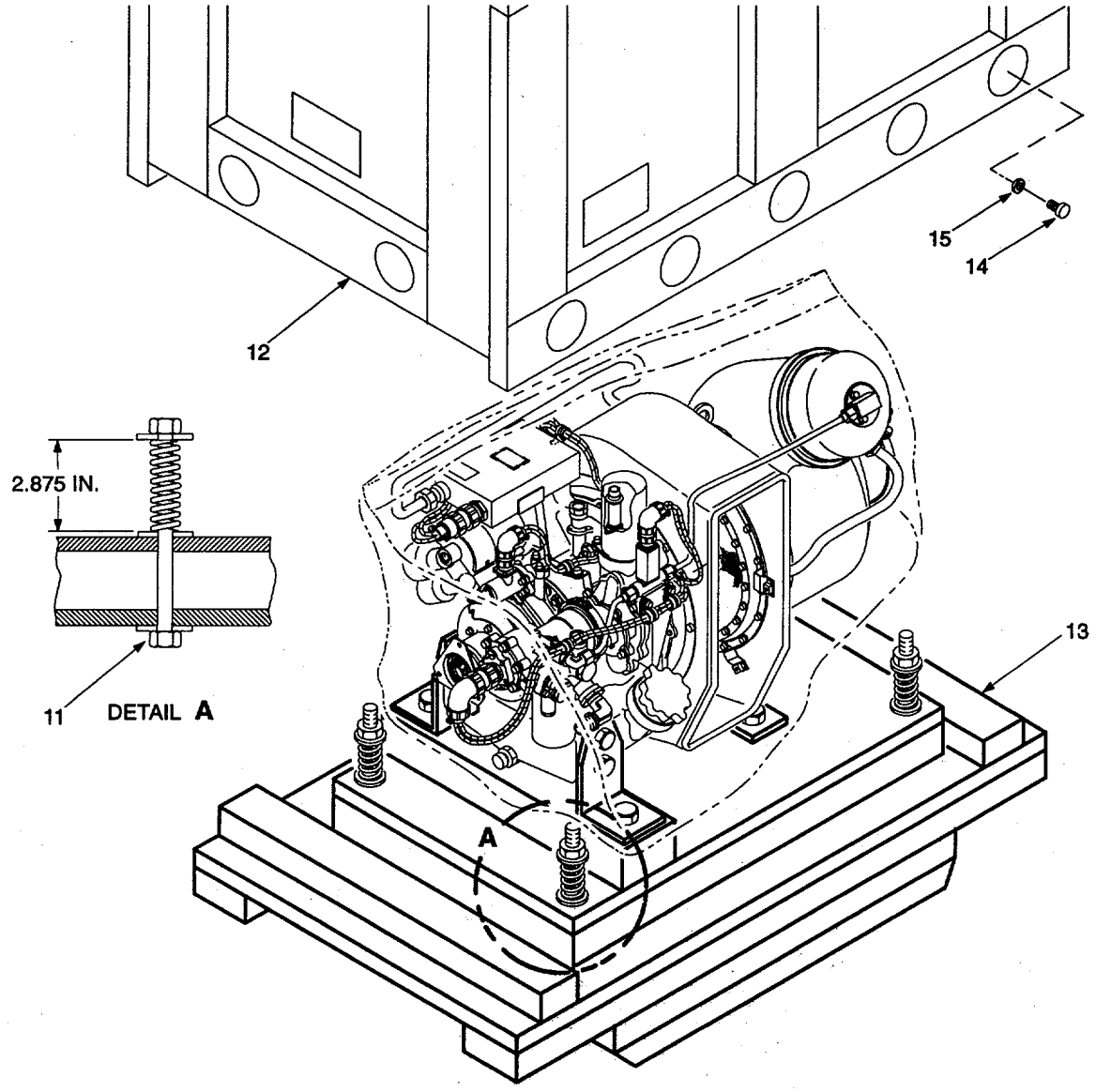


GO TO NEXT PAGE

1-28 INSTALL APU IN SHIPPING CONTAINER (CONT)

6. Adjust bolt (11) to 2.875 inches height, as shown in detail A after APU installed.
7. Install cover (12) onto base (13).
8. Secure cover (12) to base (13) with 14 lag bolts (14) and washers (15).
9. Apply marking to shipping container in accordance with MIL-STD-129.

FOLLOW-ON MAINTENANCE: None.



END OF TASK

SECTION VI PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

1-29 GENERAL DESCRIPTION

This section contains requirements for special inspections and standards of serviceability applicable to the APU and PMCS. The tasks listed in the PMCS table shall be performed at the intervals specified. A description of the PMCS table is given in paragraph I-30.

1-30 PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE

Every 125 flight hours inspect needle bearing per task 7-5.

1-31 DROPPED ENGINE INSPECTION

Technical Inspector shall perform overall inspection of APU if it was dropped. Check for any broken, bent or kinked tube assemblies, cracked air inlet, dented combustor case, damaged APU wiring harness assembly/connectors, damaged fuel nozzle assembly and other damage. Refer to DA PAM 738-751 for applicable forms, records and worksheets.

1-32 FOREIGN OBJECT DAMAGE (FOD) INSPECTION

Inspect APU components during detailed applicable tasks.

SECTION VII TROUBLESHOOTING

1-33 TROUBLESHOOTING GENERAL

Troubleshooting (Fault Isolation) procedures are used to locate and correct faults. For troubleshooting procedures refer to TM l-i 520-238-T.

SECTION VIII PREPARATION FOR STORAGE OR SHIPMENT

I-34 PREPARATION FOR STORAGE OR SHIPMENT

This task covers: a. Preservation b. Remove APU from Workstand c. install APU in Shipping Container

INITIAL SETUP

Tools:

Goggles, Industrial (T59)
Suitable Container (4 Quart Capacity)
Tool Kit, General Mechanic' s (T109)
Wrench, Torque, Click Type, 1/4-inch drive, 30-l 50 inch-pounds (T120)

Materials/Parts:

Barrier Material (D4)
Compound, Corrosive Preventive (D8)
Cloth, Cleaning (D5)
Oil, Lubricating (D12)
Tape, Pressure Sensitive (D22)

personnel Required:

67R Attack Helicopter Repairer

References:

Tasks I-27, 1-28, 3-1, 5-3, 5-5

Equipment Conditions:

APU in Workstand (Task I-25)

GO TO NEXT PAGE

1-34 PREPARATION FOR STORAGE: OR SHIPMENT (CONT)

PRESERVATION

Fuel

1. Place cleaning cloth (D5) and suitable container under area to catch fuel.

2. Hold union (1) and disconnect nut (2).

3. Hold elbow (3) and disconnect nut (4). Remove fuel control to solenoid tube assembly (5).

4. Connect suitable drain tube to elbow (3). Place open end of drain tube in suitable container. Lubricating Oil

5. Connect gravity feed lubricating oil (D12) supply to fuel control assembly inlet port (6).

6. Rotate compressor and turbine rotor (clockwise from rear of APU) by hand until oil flows freely from drain line.

7. Disconnect gravity feed lubricating oil supply from fuel control assembly inlet port.

8. Disconnect drain line from elbow (3).

9. Install fuel control to solenoid tube assembly (5). Connect nut (2) to union (1).

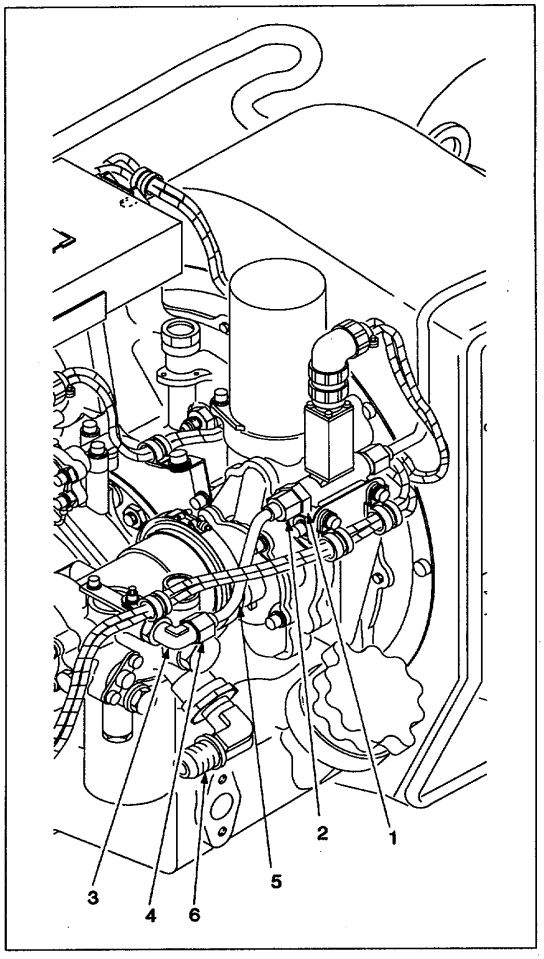
10. Connect nut (4) to elbow (3).

11. Torque nuts (2, 4) to 110 to 120 inch-pounds.

12. Remove fuel filter element and reinstall cover (Task 3-1).

13. Drain lubricating oil from APU (Task 5-3).

14. Remove oil filter element and reinstall cover (Task 5-5).



GO TO NEXT PAGE

1-34 PREPARATION FOR STORAGE OR SHIPMENT (CONT)

15. Place a red tag on APU stating:

    APU FUEL SYSTEM PRESERVED WITH LUBRICATING OIL, MIL-L-6081; FLUSHING REQUIRED BEFORE STARTING. APU OIL HAS BEEN DRAINED. FUEL AND OIL FILTERS REMOVED.

16. Coat all external nuts, bolts, studs and unpainted surfaces with water displacing corrosive preventive compound (D8).

17. Plug or cap pressure taps, ports, unit openings and electrical connectors.

18. For short term storage, install cover and seal APU inlet with barrier material (D4). Secure barrier material with pressure sensitive tape (D22).

REMOVAL

Remove APU from workstand (Task 1-27).

INSTALLATION

Install APU in shipping container (Task 1-28).

FOLLOW-ON MAINTENANCE: None**.**

END OF TASK

CHAPTER 2

COMBUSTOR SECTION MAINTENANCE

SECTION I. REMOVE/INSTALL COMBUSTOR CHAMBER

2-1 REMOVE/INSTALL COMBUSTOR CHAMBER

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Caliper, Vernier, Inside/Outside, 0.300-24/0-24-inch (T28)
Gage, Depth, Micrometer, 0 to 12 inch (T56)
Tool Kit, Aircraft Maintenance (T107)
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4-inch drive, 30-150 inch-pounds (T120)

Personnel Required:
67R Attack Helicopter Repairer
68B Aircraft Powertrain Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-23
TM 1-1520-238-T-8
Tasks 3-6, 3-8, 4-3, 4-4

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed
Fuel Solenoid to Fuel Nozzle Tube Assembly Removed (Task 3-6)
Fuel Nozzle Removed (Task 3-8)
Igniter Plug Lead Removed (Task 4-3)
Igniter Plug Removed (Task 4-4)

General Safety Instructions:

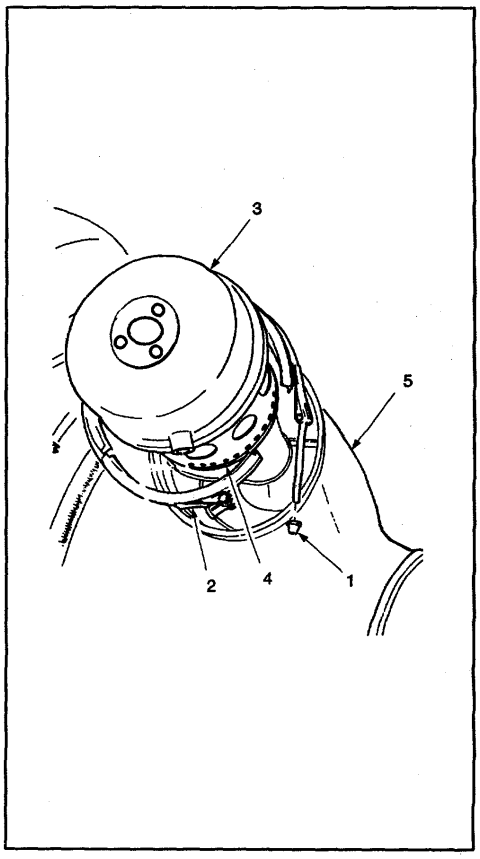
WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

2-1 REMOVE/INSTALL COMBUSTOR CHAMBER (CONT)

1. Remove nut (1) from grooved coupling clamp (2).
2. Remove grooved coupling clamp (2) from combustor cap (3).
3. Removed combustor cap (3) and combustor chamber (4) from combustor case (5).
4. Clean combustor chamber (4) using processes 8-1 in Chapter 8.



GO TO NEXT PAGE

2-1 REMOVE/INSTALL COMBUSTOR CHAMBER (CONT)

INSPECT

1. Visually inspect combustor chamber as follows:

   a. Inspect igniter shield for cracked welds (1).

   b. Inspect body or duct half for cracks (2). Cracks shall not exceed 0.125 inch.

   c. Body for cracks (4). Crack separation shall not exceed 0.250 inch.

   d. Body for cracks that may cause metal breakaway (5). No cracks that could allow metal breakaway allowed.

   e. Cooling ring for distortion, cracked welds and missing material (6). No distortion exceeding one-half of nominal gap, cracked plug welds or missing pieces allowed.

   f. Body for cracks, distortion, burn through spots and hot spot oxidation (pitting) (7). No distortion exceeding 0.125 inch, cracks, burn through spots or hot spot oxidation allowed.

   g. Body for cracks between holes (8). No cracks connecting three holes allowed.

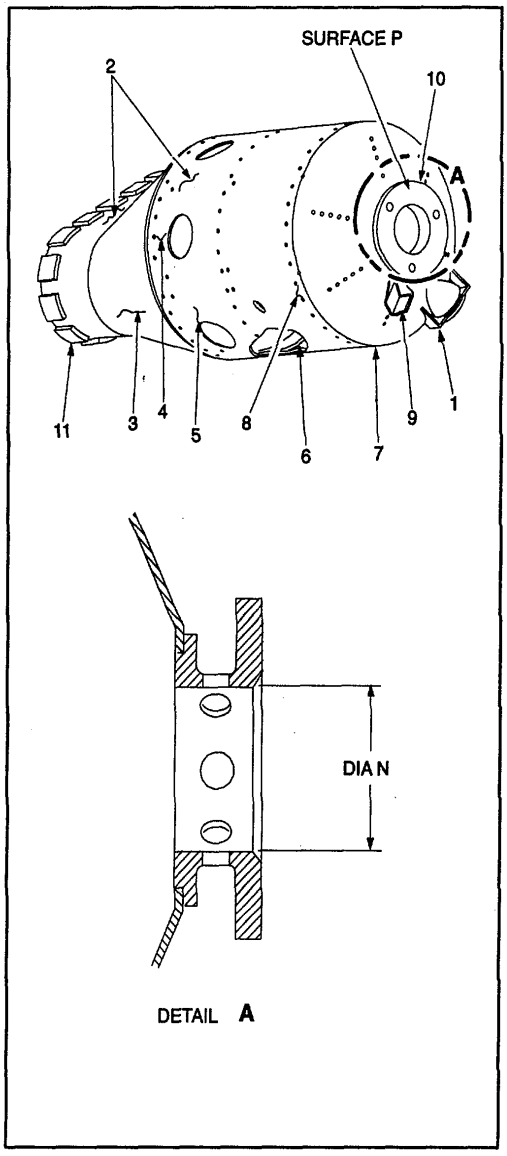
   h. Cooling tabs for cracked plug welds (9). No cracked plug welds allowed.

   i. Tabs (11) for cracked welds and obvious wear. No cracked welds allowed.

   j. Flange for damaged threads (10) or obvious wear to Surface P. No damaged threads allowed.

2. Dimensionally inspect combustor chamber if obvious wear is found as follows:

   a. Thickness of tabs (11). Minimum thickness 0.110 inch.



   b. Dimension N shall be 1.001 to 1.006 inches minimum measured at 3 places.

GO TO NEXT PAGE

2-1 REMOVE/INSTALL COMBUSTOR CHAMBER (CONT)

INSTALLATION

1. **Position combustor chamber** (4) into combustor case (5) **so that the chamber's Igniter shield is positioned to the lower aft of the APU.**

2. **Place combustor cap** (3) on combustor chamber (4) and combustor case (5) **with the cap's ignitor plug port aligned with the combustor chamber's igniter shield.**

3. **Install grooved coupling clamp** (2) over combustor cap (3) and combustor case (5) flanges.

NOTE

When tightening the coupling clamp, tighten to about 40 inch-pounds and tap the clamp lightly around the circumference with a plastic or nonmetallic mallet. Continue alternately tightening and tapping, until the torque indicated on the torque wrench stabilizes at specified value. Exercise caution to avoid overtorquing.

4. **Install nut** (1) on grooved coupling clamp (2). Torque nut (1) to **48 to 52 inch-pounds.**

5. Install igniter plug (Task 4-4).

6. Install igniter plug lead (Task 4-3).

7. Install fuel nozzle (Task 3-8).

8. Install fuel solenoid to fuel nozzle tube assembly (Task 3-6).

9. Perform F.O.D. inspection.

10. Inspect (T.I.).

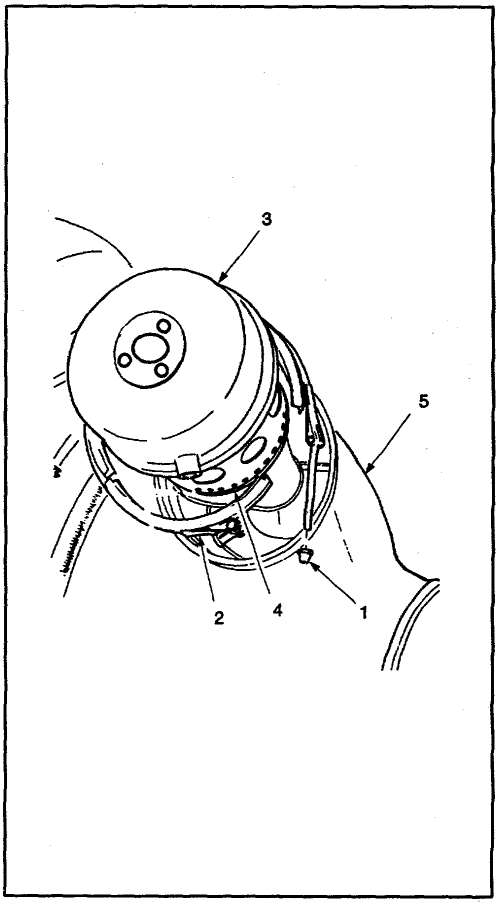
11. Install APU enclosure (Refer to TM 1-1520-238-23).

12. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).

13. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

14. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8)

FOLLOW-ON MAINTENANCE: None.



END OF TASK

CHAPTER 3

FUEL SYSTEM MAINTENANCE

SECTION I. REMOVE/INSTALL FUEL FILTER ASSEMBLY

3-1 REMOVE/INSTALL FUEL FILTER ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4-inch drive, 30-150 inch-pounds (T120)

Materials/Parts:
Bag, Plastic (D3)
Cloth, Cleaning (D5)
Filter Element (NSN 2910-01-179-6007)
Packing (NSN 5330-00-220-5211)
Petrolatum (D15)

Personnel Required:
67R10 Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-1 REMOVE/INSTALL FUEL FILTER ASSEMBLY (CONT)

REMOVAL

Fuel

1. Place cleaning cloth (D5) and suitable container under fuel control assembly (1) to catch fuel.
2. Loosen two bolts (2).
3. Rotate fuel filter cover (3) counterclockwise approximately one-eighth turn and remove.
4. Remove and discard packing (5).
5. Remove filter element (6) and place in plastic' bag (D3), discard bag with filter element.

INSPECTION

1. Inspect fuel filter cover (3) for cracks and dents. None allowed.
2. Inspect fuel filter cover (3) for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

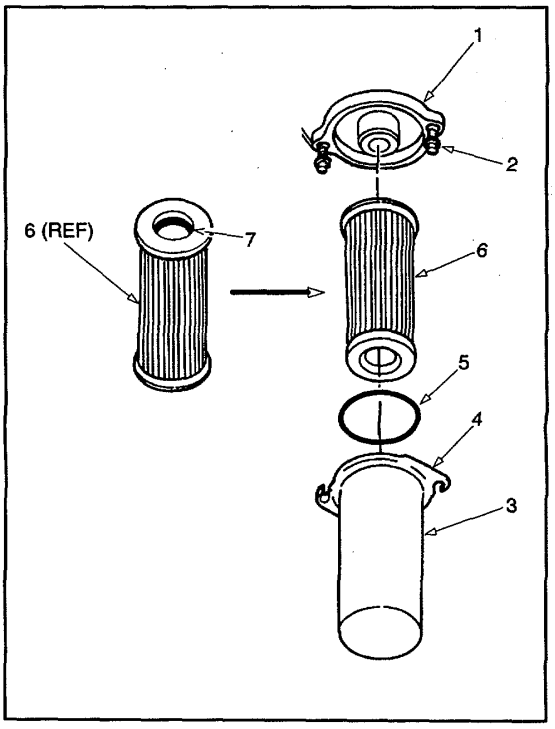
1. Lightly coat packing (7) with petrolatum (D15). Install new filter element (6) over post in fuel control assembly (1).
2. Lightly coat new packing (5) with petrolatum (D1 5).
3. Install packing (5) on fuel filter cover (3).
4. Install fuel filter cover (3) over bolts (2). Turn fuel filter cover clockwise approximately one-eighth turn until tangs are against bolts (2).

CAUTION

To prevent breaking fuel filter cover ears (4), be sure fuel filter cover is fully seated prior to tightening bolts.

5. Torque two bolts (2) to 37 to 43 inch-pounds.
6. Remove cleaning cloth and suitable container and wipe up any excess fuel.
7. Perform F.O.D. inspection.
8. Inspect (T.I.).
9. Install APU enclosure (Refer to TM 1-1520-238-23).
10. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

SECTION II. REMOVE/INSTALL FUEL CONTROL ASSEMBLY

3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Lockwire (D9)
Packing (NSN 5330-00-231-7701)
Packing (NSN 5330-00-253-4969)
Packing (NSN 5330-00-434-1074)
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

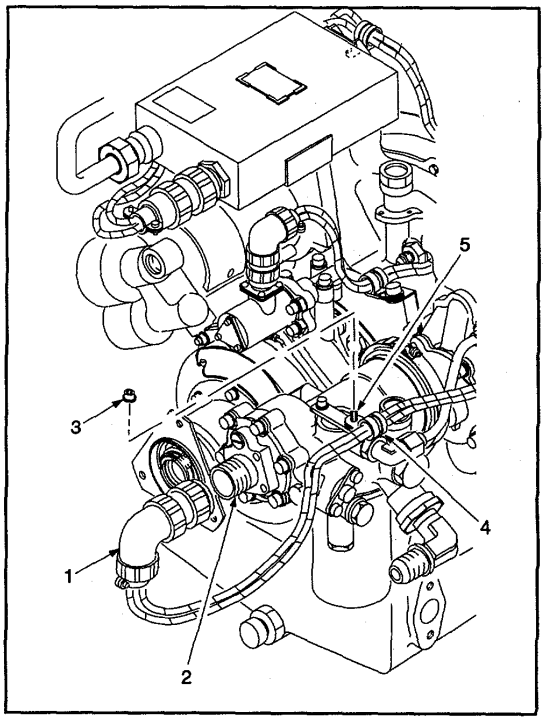
3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY (CONT)

REMOVAL

Fuel

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.



1. Disconnect electrical connector (P9) (1) from receptacle (J9) (2).

2. Place cleaning cloth (D5) and suitable container under area to catch fuel.

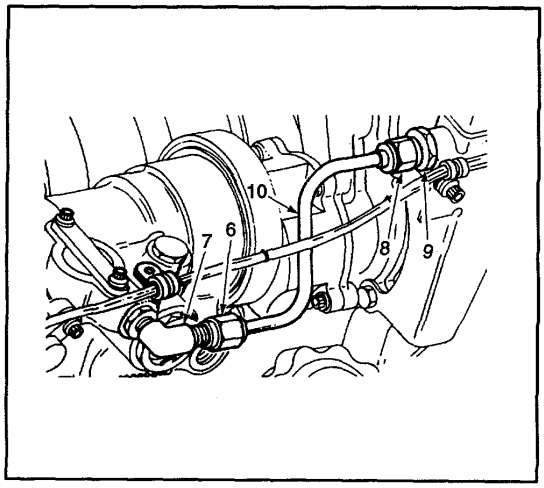
3. Disconnect fuel supply line and fuel drain line from fuel control assembly. Refer to TM 1-1520-238-23.

4. Remove nut (3) and clamp (4) from stud (5).

5. Disconnect "B" nut (6) from elbow (7).

6. Hold union (9) and loosen but do not remove nut (8).

7. Rotate tube assembly (10) away from fuel control.

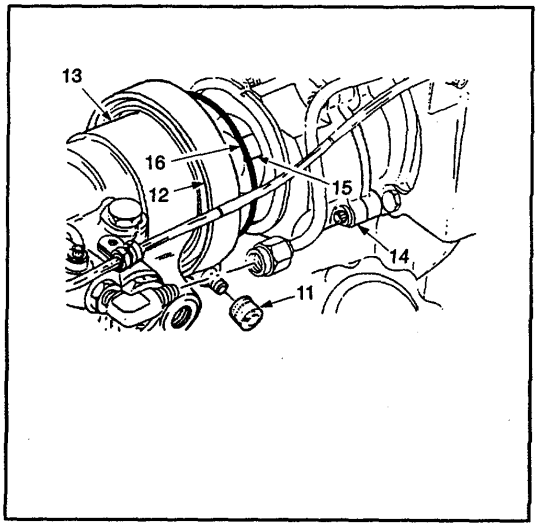


GO TO NEXT PAGE

3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY (CONT)

8. Remove nut (11) from clamp coupling (12).

9. Remove clamp coupling (12) from fuel control assembly (13) and oil pump (14).



CAUTION

Do not let quill shaft (15) drop during fuel control assembly removal.

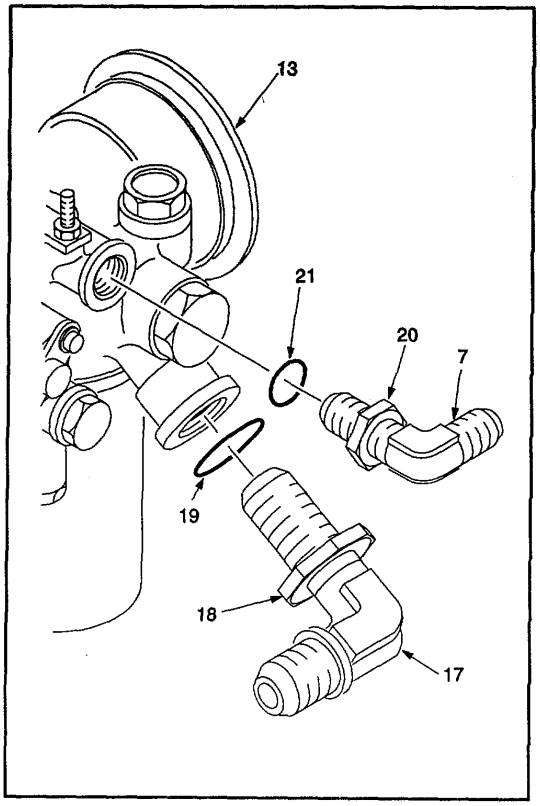
10. Remove fuel control assembly (13) by pulling straight out from oil pump (14).

11. Remove quill shaft (15).

12. Remove and discard packing (16).

NOTE

If fuel control assembly removed for replacement, perform steps 13 and 14.



13. Hold elbow (17) and loosen nut (18). Remove elbow (17) and nut (18). Remove and discard packing (19).

14. Hold elbow (7) and loosen nut (20). Remove elbow (7) and nut (20). Remove and discard packing (21).

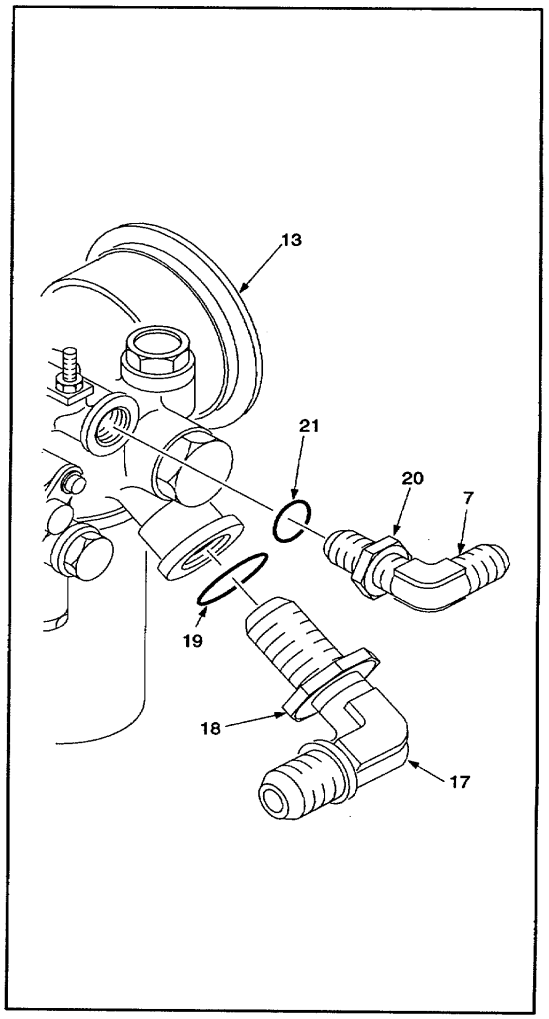
15. Clean fuel control assembly (13) using process 8-1 Chapter 8.

GO TO NEXT PAGE

3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY (CONT)

INSPECTION

1. Inspect for damaged threads. None allowed.
2. Inspect electrical connector for damaged pins. None allowed.
3. Inspect fuel control for leaks or damage. None allowed.
4. Inspect quill shaft for crack or spline damage. None allowed.
5. Inspect fuel control mating surface for cracks, damage and alignment slot for wear. None allowed.
6. Inspect fuel control assembly for corrosion. Refer to TM 55-1500-344-23.



INSTALLATION

1. Lubricate new packings (19, 21) with a light coat of petrolatum (D15).
2. Install packing (21) on elbow (7).
3. Install elbow (7) in fuel control assembly (13).
4. Torque nut (20) to 52 to 58 inch-pounds.
5. Install packing (19) on elbow (17).
6. Install elbow (17) in fuel control assembly (13).
7. Torque nut (18) to 90 to 100 inch-pounds.

GO TO NEXT PAGE

3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY (CONT.)

8. **Install quill shaft (15)** into oil pump (14) splines.

9. Lightly coat packing (16) with petrolatum (D15) and install on fuel control assembly (13).

10. Align index pin (22) of oil pump (14) with slot (23) of fuel control assembly (13). Align splines of quill shaft **and press in fuel control assembly (13).** Ensure fuel control assembly (13) seats on oil pump (14).

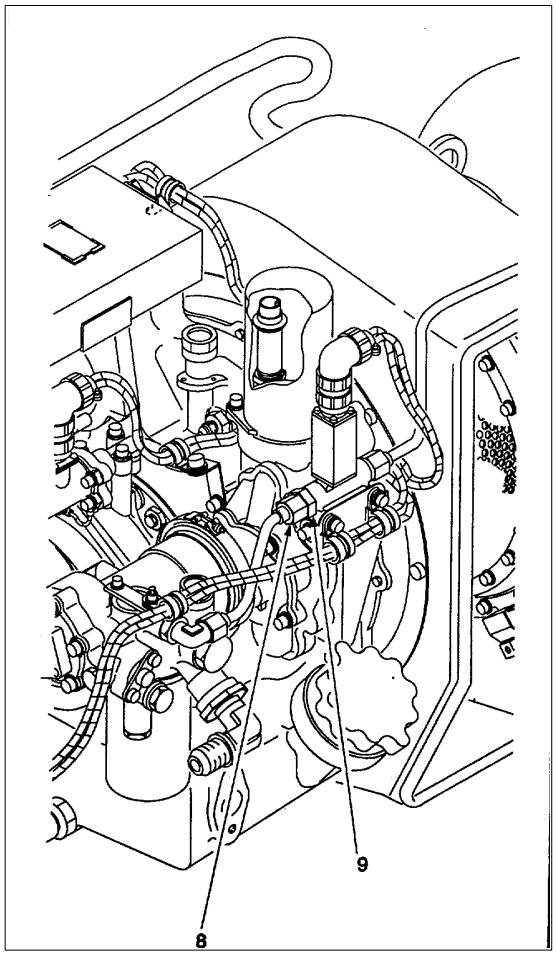
11. Align elbow (7) with tube assembly (10). **Install clamp coupling (12)** over fuel control assembly (13) and oil pump (14).

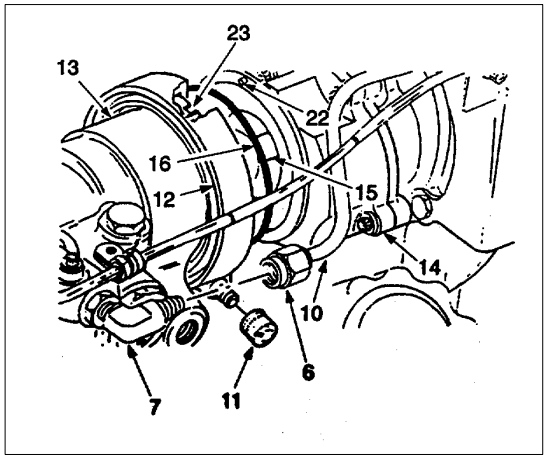
12. **Install nut (11) on clamp coupling (12)** and tighten until clamp coupling (12) is fully seated.

13. Install "B" nut (6) on elbow (7) and tighten.

14. Hold union (9) and tighten "B" nut (8).

15. Remove cleaning cloth (D5) and suitable container and wipe up any excess fuel.





GO TO NEXT PAGE

3-2 REMOVE/INSTALL FUEL CONTROL ASSEMBLY (CONT.)

16. **Connect electrical connector (P9)** (1) to receptacle (J9) (2). Secure electrical connector (1) to receptacle (2) with lockwire (D9).

17. **Install clamp (4)** on stud (5) and secure with nut (3).

18. **Connect fuel supply line and fuel drain line** to fuel control assembly. Refer to TM 1-1520-238-23.

19. Perform F.O.D. inspection.

20. Inspect (T.I.).

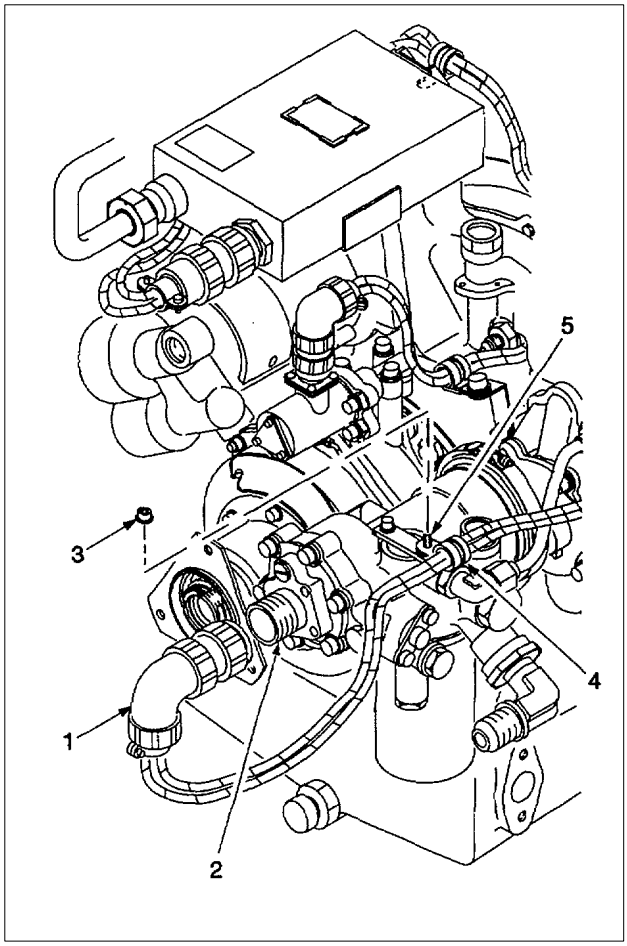
21. Install APU enclosure (Refer to TM 1-1520-238-23).

22. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).

23. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

24. Perform auxiliary power unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

SECTION III REMOVE/INSTALL FUEL SOLENOID VALVE

3-3 REMOVE/INSTALL -FUEL SOLENOID VALVE

This task covers:

a. Removal **b. Inspection** **c. Installation**

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (DS)
Lockwire (D9)
Packing (NSN 5330-00-231-7701) (2 required)
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-343-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-3 REMOVE/INSTALL - FUEL SOLENOID VALVE (CONT.)

REMOVAL

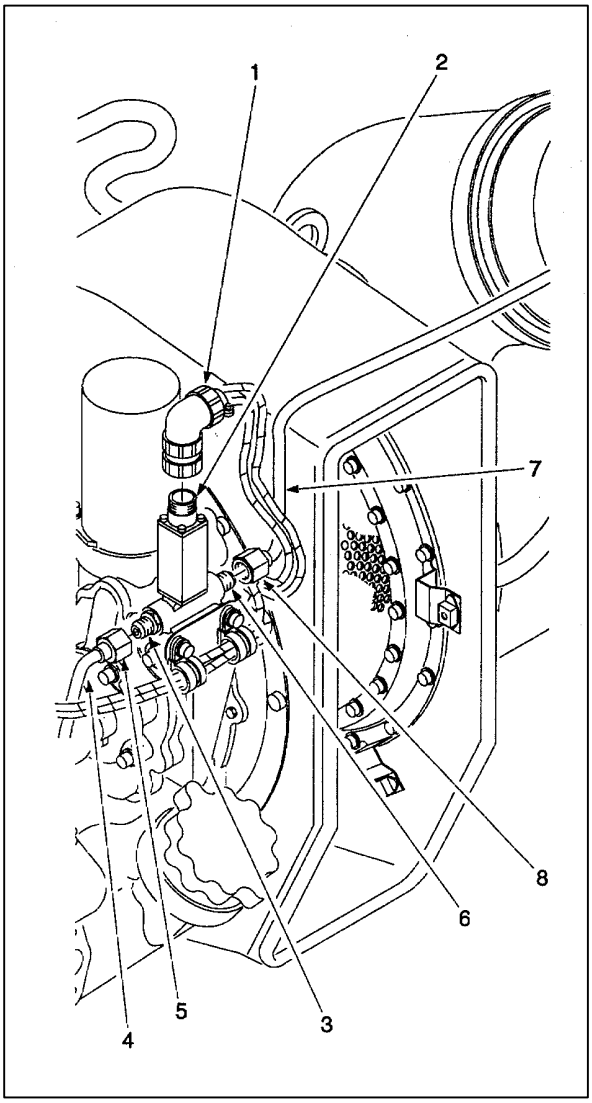
CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

1. Place cleaning cloth (D5) and suitable container under fuel solenoid valve.
2. **Disconnect electrical connector (P4)** (1) from receptacle (J4) (2).

Fuel

3. Hold union (3) and **disconnect tube assembly (4) "B" nut (5).**
4. Hold union (6) and **disconnect tube assembly (7) "B" nut (8).**



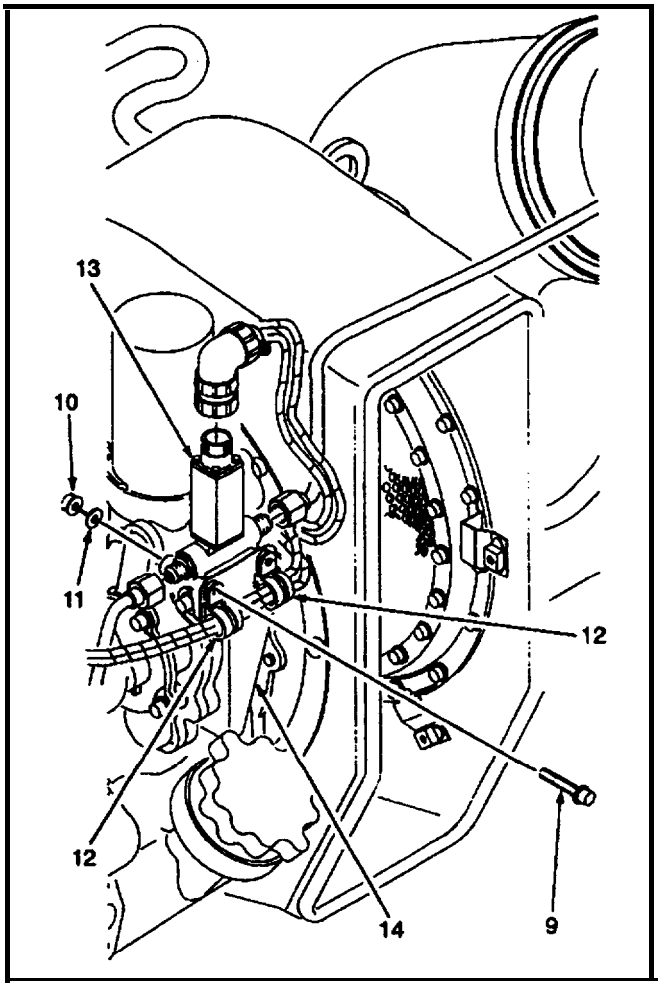
GO TO NEXT PAGE

3-3 REMOVE/INSTALL FUEL SOLENOID VALVE (CONT)

5. Hold two bolts (9) and remove two nuts (10) and two washers (11).

6. Remove bolts (9) and clamps (12).

7. Remove **fuel solenoid valve** (13) from solenoid valve bracket (14).



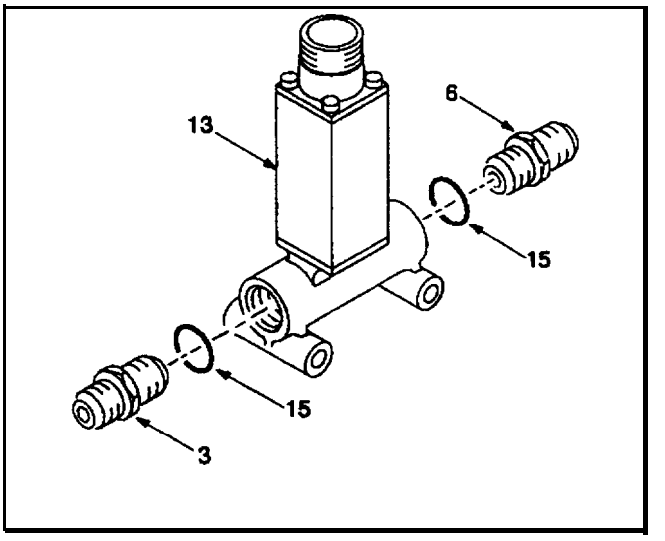
GO TO NEXT PAGE

3-3 REMOVE/INSTALL FUEL SOLENOID VALVE (CONT)

NOTE

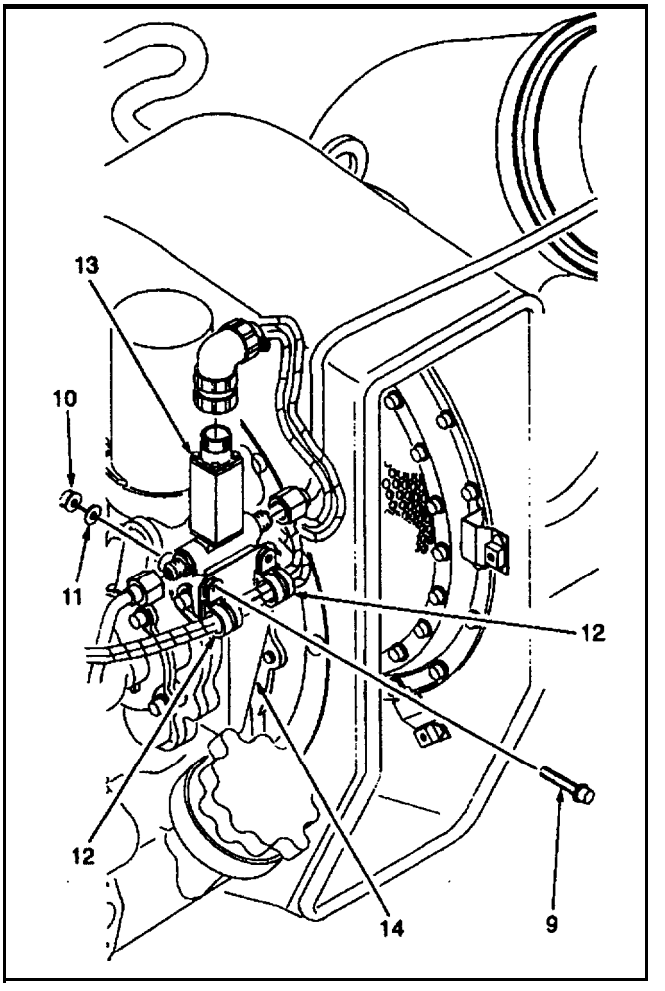
Perform steps 8 and 9, if solenoid valve requires replacement.

8. **Hold fuel solenoid valve (13) and remove union (3, 6).**
9. Remove and discard packings (15).
10. Clean fuel solenoid valve using process 8-2, Chapter 8.



INSPECTION

1. Inspect fuel solenoid valve (13) for damaged threads. None allowed.
2. Inspect valve body for cracks and dents. None allowed.
3. Inspect electrical receptacle for damage and bent or broken pins. None allowed.
4. Inspect fuel solenoid valve for corrosion. Refer to TM 55-1500-343-23.
5. Inspect for gap between the coil assembly and valve body. None allowed.
6. Inspect for yielded of deformed cover assembly especially near the four screw heads. None allowed.



INSTALLATION

1. Lightly coat new packings (15) with petrolatum (D15) and install on unions (3, 6).
2. **Install unions** (3, 6) into fuel solenoid valve (13) and tighten.
3. **install fuel solenoid valve (13).**
   a. Position fuel solenoid valve (13) on solenoid valve bracket (14).
   b. Install two bolts (9) through clamps (12), solenoid valve bracket (14), and fuel solenoid valve (13).
   c. Install two washers (11) and two nuts (10) on bolts (9).
   d. Hold bolts (9) and torque nuts (10) to **50 to 60 inch-pounds.**

GO TO NEXT PAGE

3-3 REMOVE/INSTALL FUEL SOLENOID VALVE (CONT)

4. **Install tube assembly (7)** on union (6).

5. Hold union (7) and install **"B"** nut (6).

6. Install tube assembly (4) on union (3).

7. Hold union (3) and install **"B"** nut (5).

a. Remove deaning cloth and suitable container and wipe up any excess fuel.

9. **Connect electrical connector (P4)** (1) to receptacle (J4) (2).

10. **Secure connector (P4) (1)** to receptacle (J4) (2) with lockwire (D9).

11. Perform F.O.D. inspection.

12. Reset APU fuel circuit breaker (Refer to TM i-i 520-238-23).

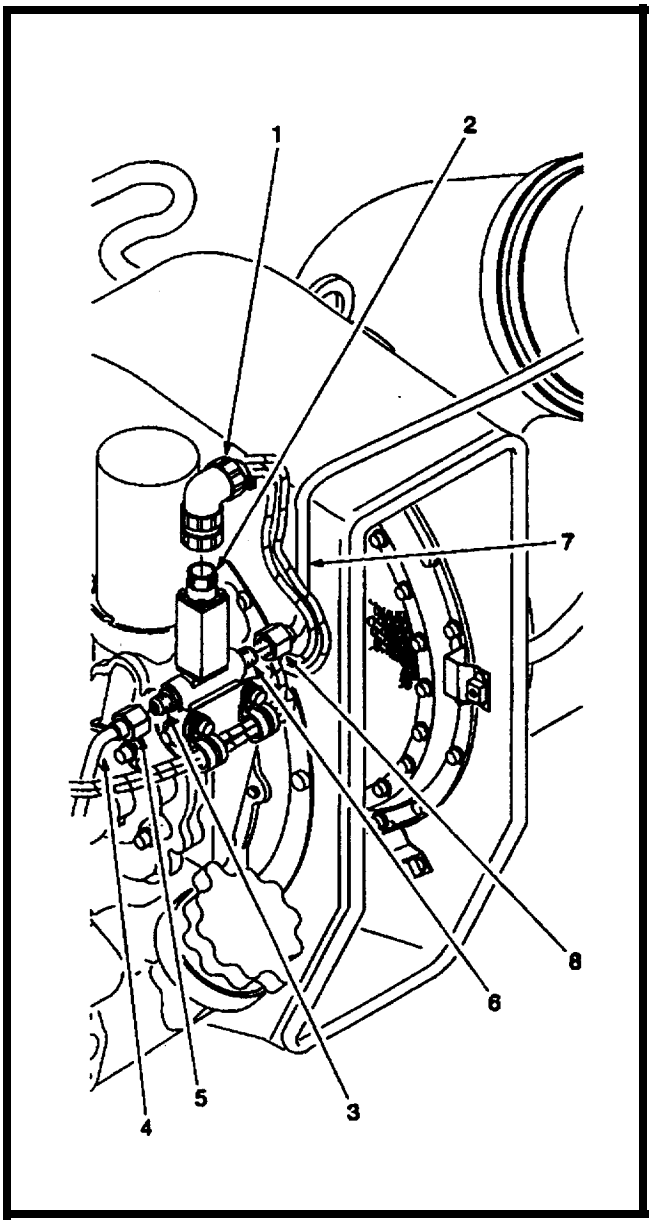
13. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

14. Perform Auxiliary Power Unit maintenance operational check (Refer to TM l-l 520-238-T-8).

15. Check valve body for fuel leaks. No leaks are allowed.

16. Inspect (T.I.).

17. Install APU enclosure (Refer to TM i-i 520-238-23).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION IV REMOVE/INSTALL SOLENOID VALVE BRACKET

3-4 REMOVE/INSTALL SOLENOID VALVE BRACKET

This taskcovers: a. Removal b. Inspection c. Installion

INITIAL SETUP

Tools:
Tool Kit, General Mechanic' s(T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-l 50 inchpounds (T120)

Materials/Parts:
Compound, Antisieze, Liqui-Moly NV (D7)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM l-l 520-238-T-8
TM l-i 520-238-23
TM 55-1500-344-23
Task 3-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed
Fuel Solenoid Valve Removed (Task 3-3)

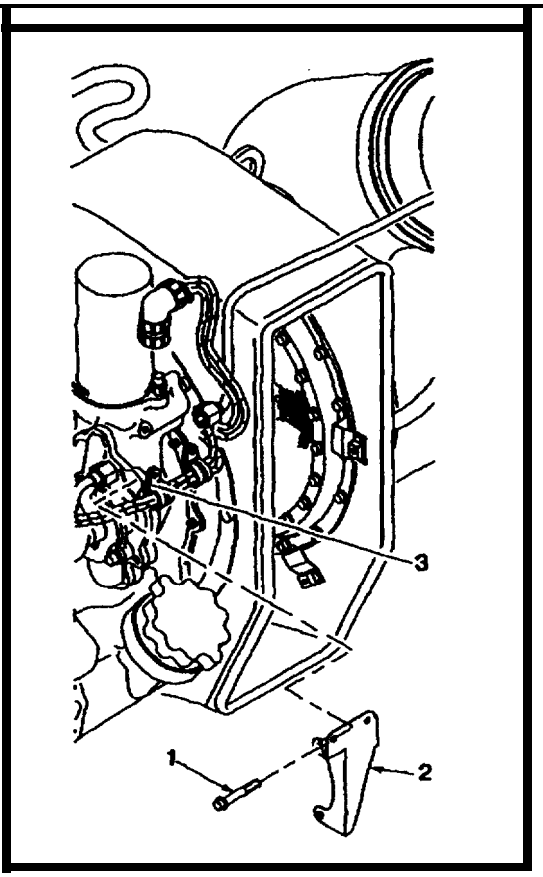
General Safety Instructions:

WARNING

APU Is easy to start. Disconnect battery. Remove all other electrical power before performlng any maintenance In this area. Death or serious Injury could result **If APU starts. If Injury occurs, seek medical aid.**

REMOVAL

1. Remove two bolts (1).
2. Remove solenoid valve bracket (2) from oil pump flange (3).
3. Clean solenoid valve bracket (2) using process 8-1, Chapter 8.



INSPECTION

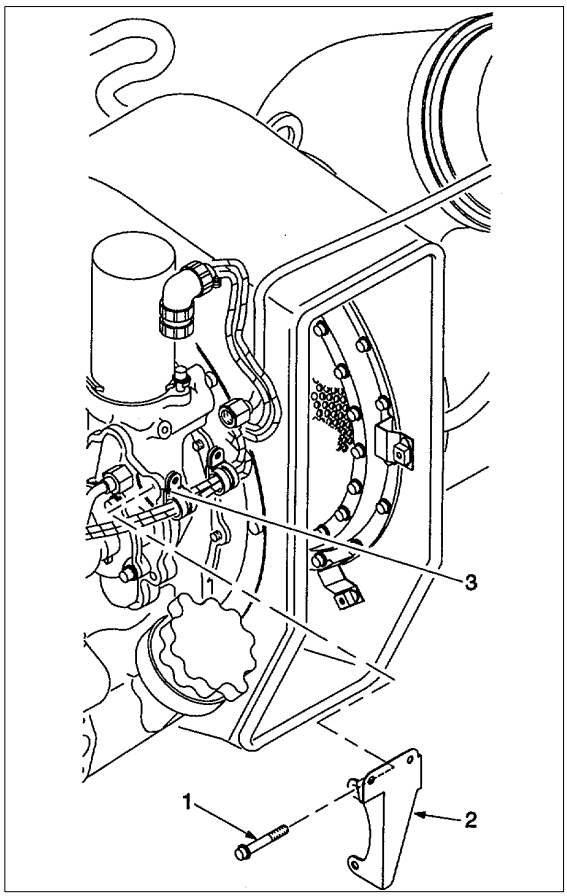
1. Inspect for corrosion. Refer to TM 55-l 500-344-23.
2. Inspect for cracks. None allowed.

GO TO NEXT PAGE

3-4 REMOVE/INSTALL SOLENOID VALVE BRACKET (CONT.)

INSTALLATION

1. Apply a light coat of Liqui-Moly NV antiseize compound (D7) to threads of two bolts (1).
2. **Position solenoid valve bracket** (2) on oil pump flange (3).
3. Install two bolts (1) through solenoid valve bracket (2) and into oil pump flange (3).
4. **Torque bolts** (1) to **76 to 84 inch-pounds**.
5. **Install fuel solenoid valve** (Task 3-3).
6. Perform F.O.D. inspection.
7. Inspect (T.I.).
8. Install APU enclosure (Refer to TM 1-1520-238-23).
9. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
10. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
11. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION V REPLACE FUEL CONTROL TO SOLENOID TUBE ASSEMBLY

3-5 REPLACE FUEL CONTROL TO SOLENOID TUBE ASSEMBLY

This task covers:

a. Removal **b. Inspection** **c. Installation**

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-5 REPLACE FUEL CONTROL TO SOLENOID TUBE ASSEMBLY (CONT.)

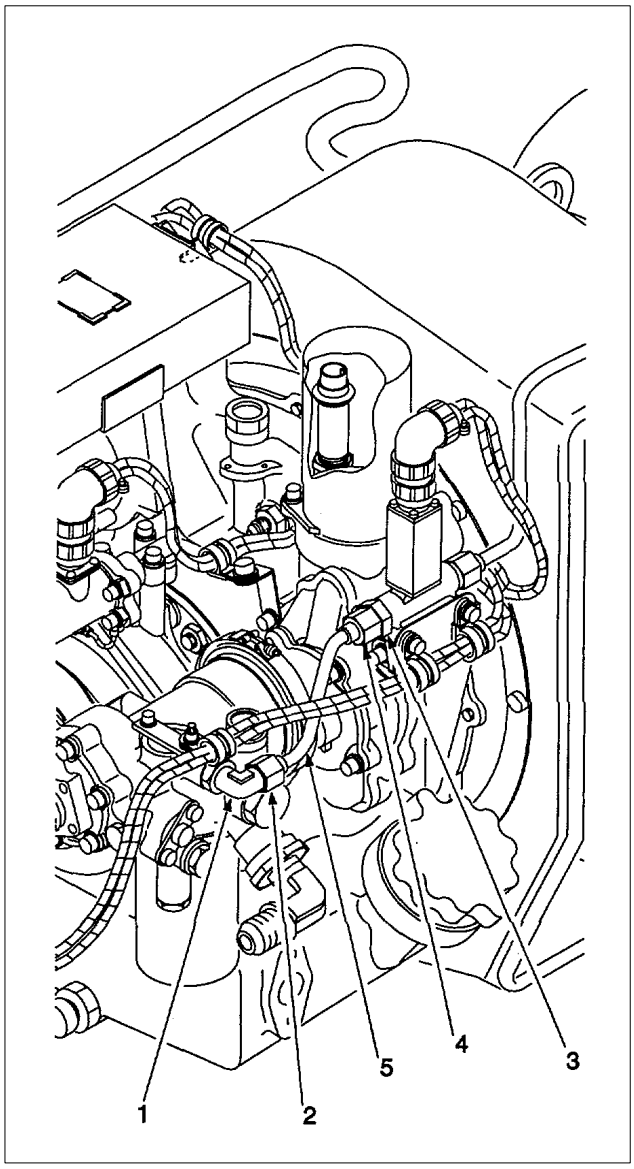
REMOVAL

Fuel

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

1. Place cleaning cloth (D5) and suitable container under tube assembly (5).
2. Hold elbow (1) and disconnect "B" nut (2).
3. Hold union (3) and disconnect "B" nut (4).
4. **Remove tube assembly (5).**



INSPECTION

1. Inspect for corrosion. Refer to TM 55-1500-344-23.
2. Inspect for cracks, dents or damaged threads. None allowed.

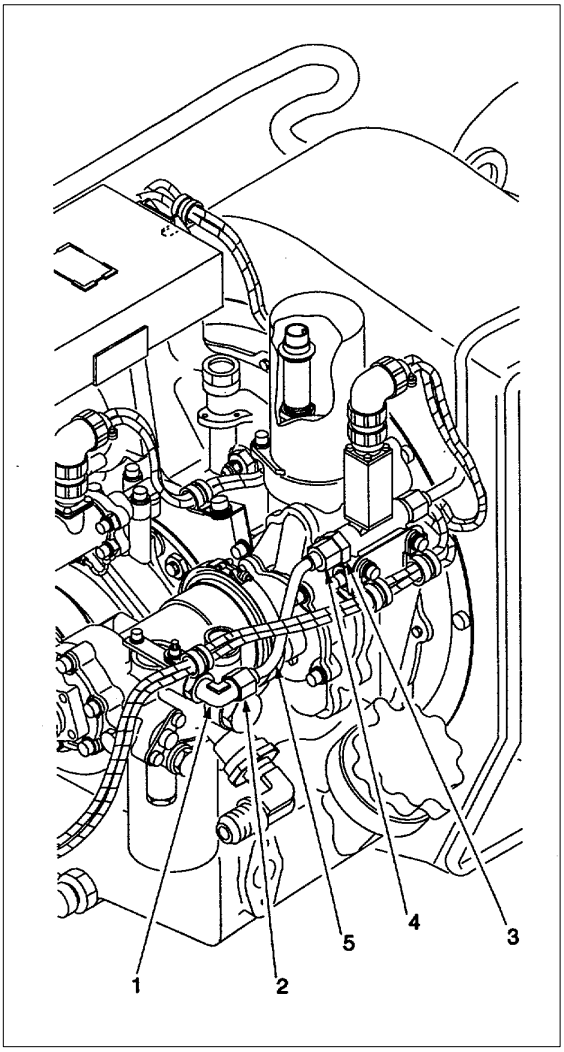
GO TO NEXT PAGE

3-5 REPLACE FUEL CONTROL TO SOLENOID TUBE ASSEMBLY (CONT.)

INSTALLATION

1. **Connect "B" nut (4**) to union (3).
2. **Connect "B" nut (2)** to elbow (1).
3. Remove cleaning cloth and suitable container and wipe up any excess fuel.
4. **Torque "B" nuts (2, 4) to 110 to 120 inch-pounds.**
5. Perform F.O.D. inspection.
6. Inspect (T.I.).
7. Install APU enclosure (Refer to TM 1-1520-238-23).
8. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
9. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
10. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

SECTION VI REPLACE FUEL NOZZLE TO SOLENOID TUBE ASSEMBLY

3-6 REPLACE FUEL NOZZLE TO SOLENOID TUBE ASSEMBLY

This task covers:

a. Removal **b. Inspection** **c. Installation**

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Protective Caps and Plugs
Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-6 REPLACE FUEL NOZZLE IO SOLENOID TUBE ASSEMBLY (CONT.)

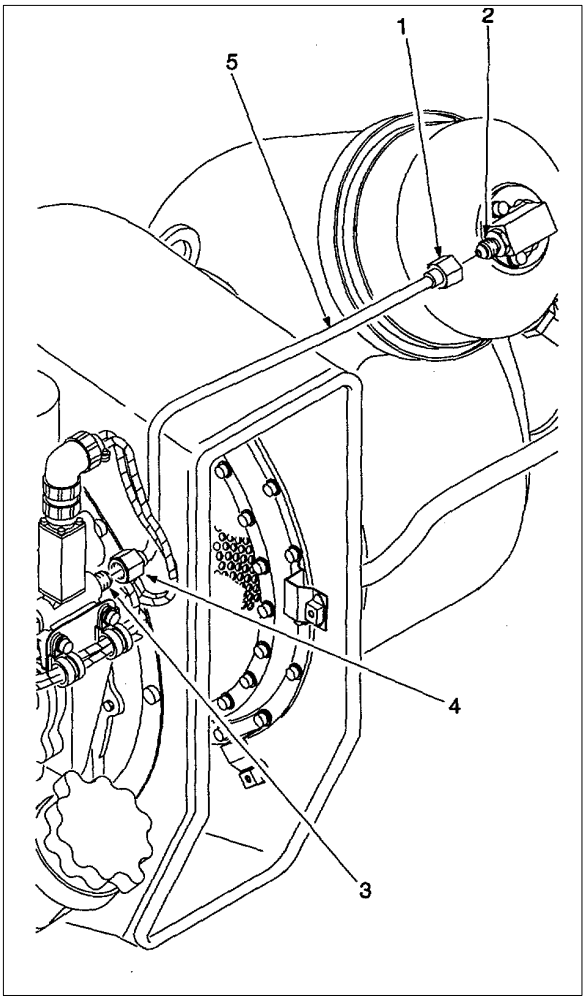
REMOVAL

Fuel

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

1. Place cleaning cloth (D5) and suitable container under tube assembly (5).
2. Disconnect "B" nut (1) from fuel nozzle (2).
3. Hold union (3) and disconnect "B" nut (4).
4. **Remove tube assembly** (5).



INSPECTION

1. Inspect for corrosion. Refer to TM 55-1500-344-23.
2. Inspect for cracks, dents or damaged threads. None allowed.

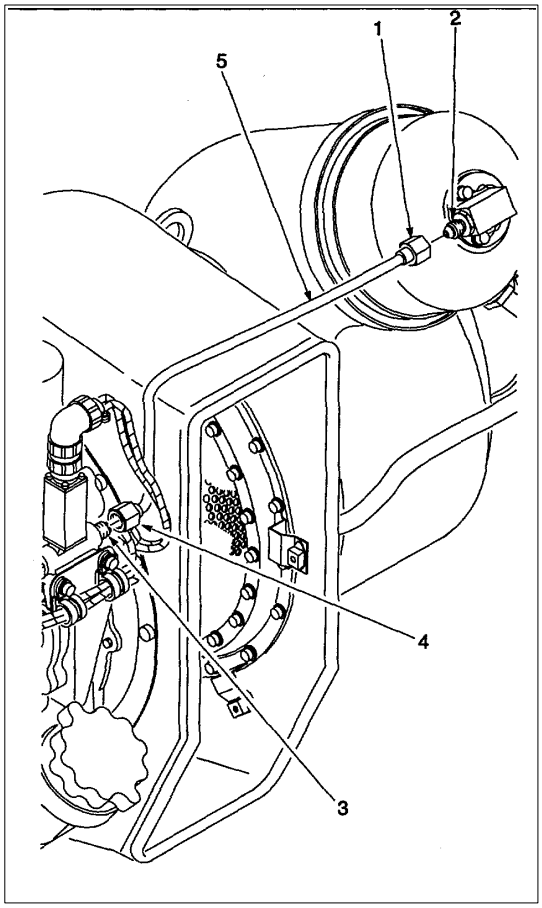
GO TO NEXT PAGE

3-6 REPLACE FUEL NOZZLE TO SOLENOID TUBE ASSEMBLY (CONT.)

INSTALLATION

1. **Connect "B" nut (4)** to union (3).
2. **Connect "B" nut (1)** to fuel nozzle (2).
3. Remove cleaning cloth and suitable container and wipe up any excess fuel.
4. **Torque nuts (1, 4) to 110 to 120 Inch-pounds.**
5. Perform F.O.D. inspection.
6. Inspect (T.I.).
7. Install APU enclosure (Refer to TM 1-1520-238-23).
8. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
9. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
10. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE : None.



END OF TASK

SECTION VII REMOVE/INSTALL RELIEF VALVE

3-7 REMOVE/INSTALL RELIEF VALVE

This task covers:

a. Removal **b. Inspection** **c. Installation**

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)
Aircraft Drain Line Disconnected

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, C5A (D6)
Packing (NSN 5330-00-150-4228)
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-7 REMOVE/INSTALL RELIEF VALVE (CONT)

REMOVAL

Fuel

1. Place cleaning cloth (D5) and suitable container under relief valve (1).
2. **Remove relief valve (1)** from combustion chamber case (2).
3. Remove and discard packing (3).
4. Clean and flush relief valve (1) using process 8-1, Chapter 8.

INSPECTION

1. Inspect for damaged threads. None allowed.
2. Inspect valve body for leaks, cracks and dents. None allowed.
3. Inspect for corrosion. Refer to TM 55-1 500-344-23.

INSTALLATION

1. Lightly coat packing (3) with petrolatum (D15). Install packing (3) on relief valve (1).

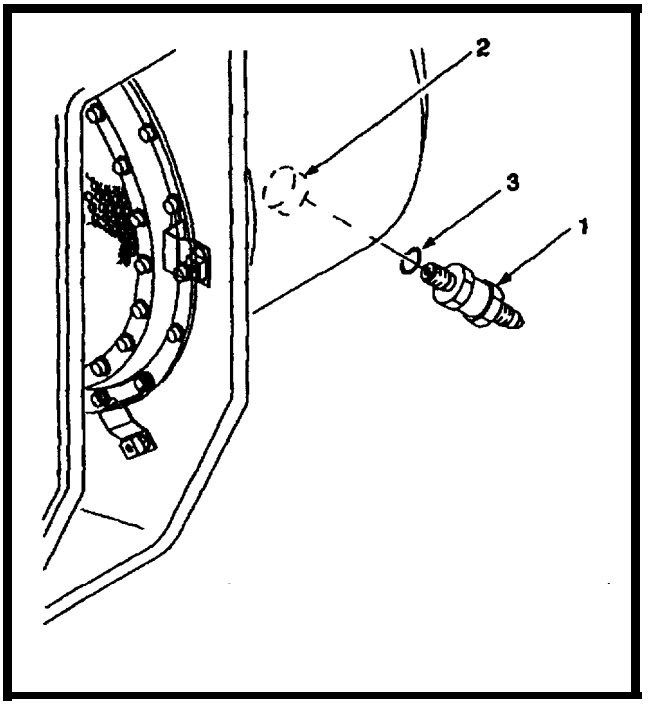
Antlselze Compound

2. Lightly coat threads of relief valve (1) with C5A antiseize compound (D6).
3. **Install relief valve** (1) (arrow pointing outboard) into combustion chamber case (2).
4. **Torque relief valve (1) to 65 to 70 inch-pounds.**

END OF TASK

5. Remove cleaning cloth and suitable container and wipe up any excess fuel.
6. Install aircraft drain line (Refer to TM I-I 520-238-23).
7. Perform F.O.D. inspection.
8. Inspect (T.I.).
9. Install APU enclosure (Refer to TM I-I 520-238-23).
10. Reset APU fuel circuit breaker (Refer to TM I-i 520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM I-i 520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM I-I 520-238-T).

FOLLOW-ON MAINTENANCE: None.



SECTION VIII REMOVE/INSTALL FUEL NOZZLE

3-8 REMOVE/INSTALL FUEL NOZZLE

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:

Suitable Container
Toot Kit, General Mechanic' s (T1 09)
Wrench, Torque, Click Type, 1/4 in. drive, 30-l 50 inch-pounds (T120)

Materials/Parts:

Cloth, Cleaning (D5)
Compound, Antiseize, C5A (D6)
Gasket (NSN 5330-01-433-3337)
Lockwire (Dl 0)
Protective Caps and Plugs

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1 -1520-238-T-8
TM l-l 520-238-23
TM 55-l 500-344-23

Equipment Conditions:

General Safety Instructions:

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in thls area. Death or serious Injury could result If APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

3-8 REMOVE/INSTALL FUEL NOZZLE: (CONT.)

REMOVAL

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

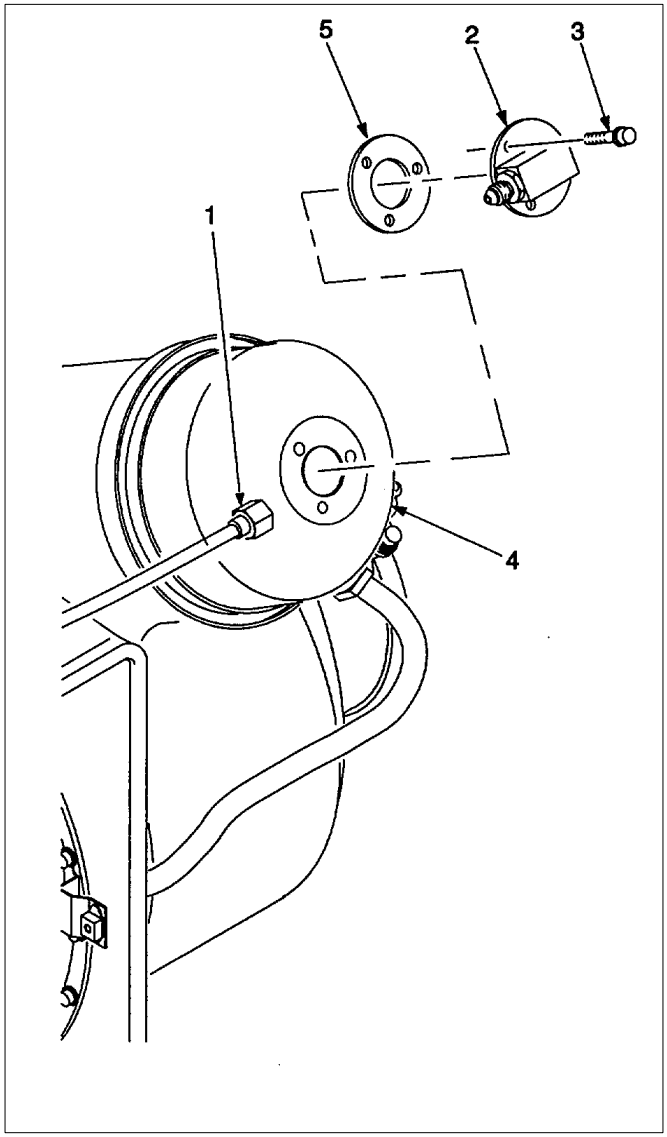
1. Place cleaning cloth (D5) and suitable container under tube assembly (5).

Fuel

2. Disconnect "B" nut (1) from fuel nozzle (2).
3. Remove three bolts (3) securing fuel nozzle (2) to combustor cap (4).
4. **Remove fuel nozzle (2)** and gasket (5). Discard gasket (5).

Compressed Air

5. Clean fuel nozzles by process 8-1, Chapter 8. After cleaning, use 25 psi air, applied to nozzle inlet, to blow cleaning solvent from interior of fuel nozzle.



GO TO NEXT PAGE

3-8 REMOVE/INSTALL FUEL NOZZLE (CONT.)

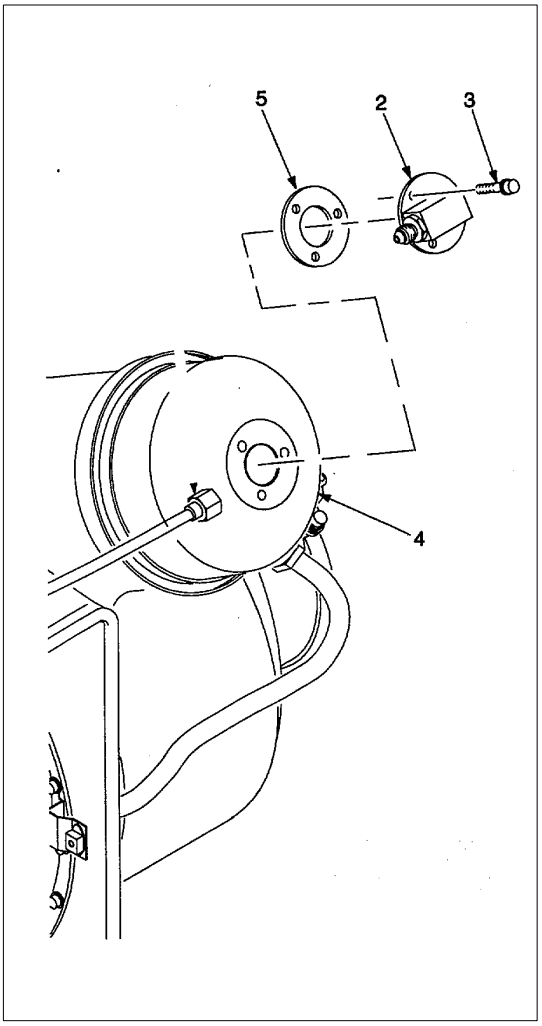
INSPECTION

1. Inspect for damaged threads. None allowed.
2. Inspect fuel nozzle for cracks. None allowed.
3. Inspect fuel nozzle for obstructions. None allowed.
4. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

Antiseize Compound

1. Lightly coat threads of three bolts (3) with C5A antiseize compound (D6).
2. **Position fuel nozzle (2) and new gasket (5) on combustor cap (4).**
3. **Install three bolts (3).** Torque three bolts (3) to **45 inch-pounds.**

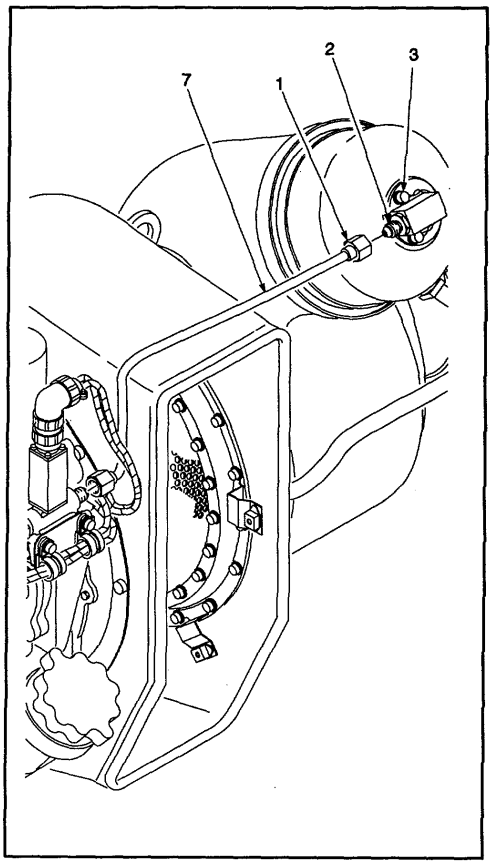


GO TO NEXT PAGE

3-8 REMOVE/INSTALL FUEL NOZZLE (CONT)

4. Secure three bolts (3) with lockwire (D10).
5. **Install tube assembly (7)** on fuel nozzle (2).
6. Connect "B" nut (1) to fuel nozzle (2) and tighten.
7. Remove cleaning cloth and suitable container and wipe up any excess fuel.
8. Perform F.O.D. inspection.
9. Inspect (T.I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
13. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

CHAPTER 4

ELECTRICAL SYSTEM MAINTENANCE

SECTION I REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIALS SETUP

Tools:
Tool Kit, General Mechanic's (109)

Materials/Parts:
Lockwire (D9)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-323-24
TM 55-1500-343-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Aircraft Wiring Harness Connector (P2) Disconnected

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

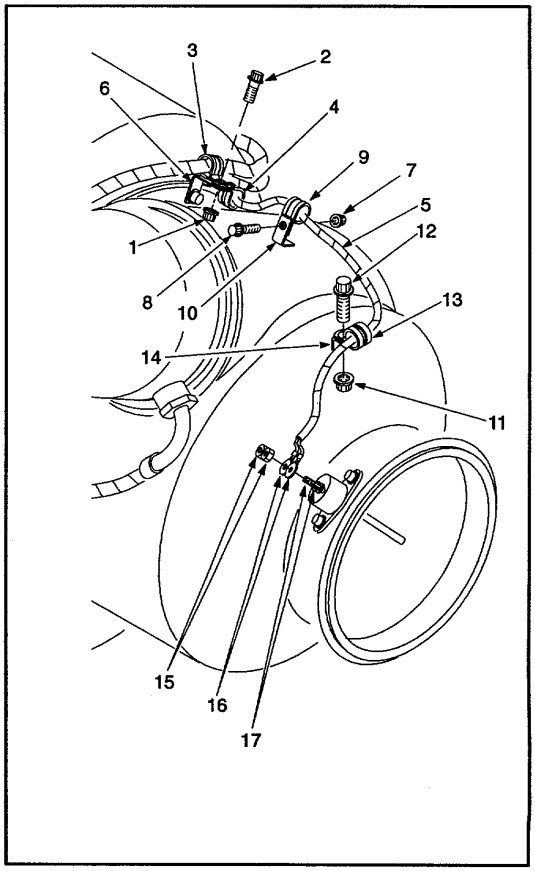
REMOVAL

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

NOTE

To aid in assembly, all leads should be marked prior to removal.



1. Remove nut (1), bolt (2) and clamps (3, 4) from wiring harness assembly (5) and bracket (6).
2. Remove nut (7), bolt (8) and clamp (9) from wiring harness assembly (5) and bracket (10).
3. Remove nut (11), bolt (12) and clamp (13) from wiring harness assembly (5) and bracket (14).
4. Remove nuts (15) and leads (16) from studs (17).

GO TO NEXT PAGE

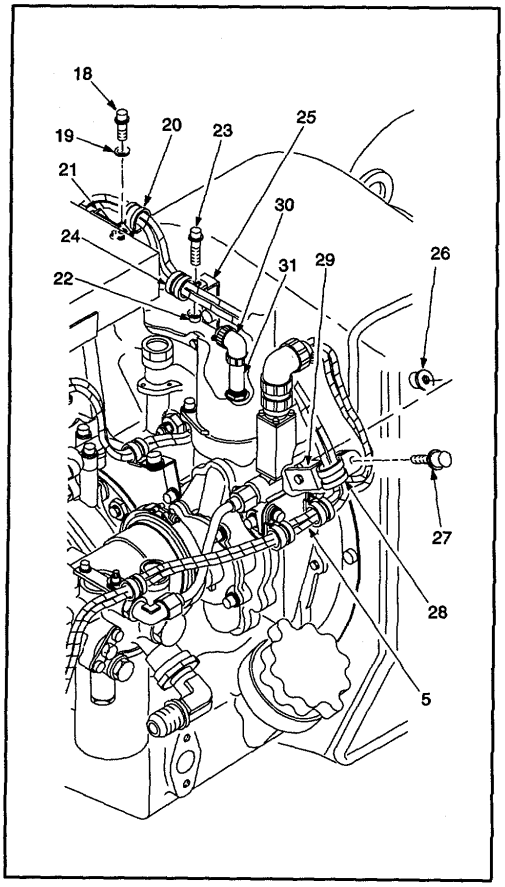
4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

5. Remove bolt (18), washer (19) and clamp (20) from ignition unit (21).

6. Remove nut (22), bolt (23) and clamp (24) from bracket (25).

7. Remove nut (26), bolt (27) and clamp (28) from bracket (29).

8. **Disconnect electrical connector (P8)** (30) from LOP switch (31).



GO TO NEXT PAGE

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

9. Remove nut (32) and clamp (33) from wiring harness assembly (5) and stud (34).

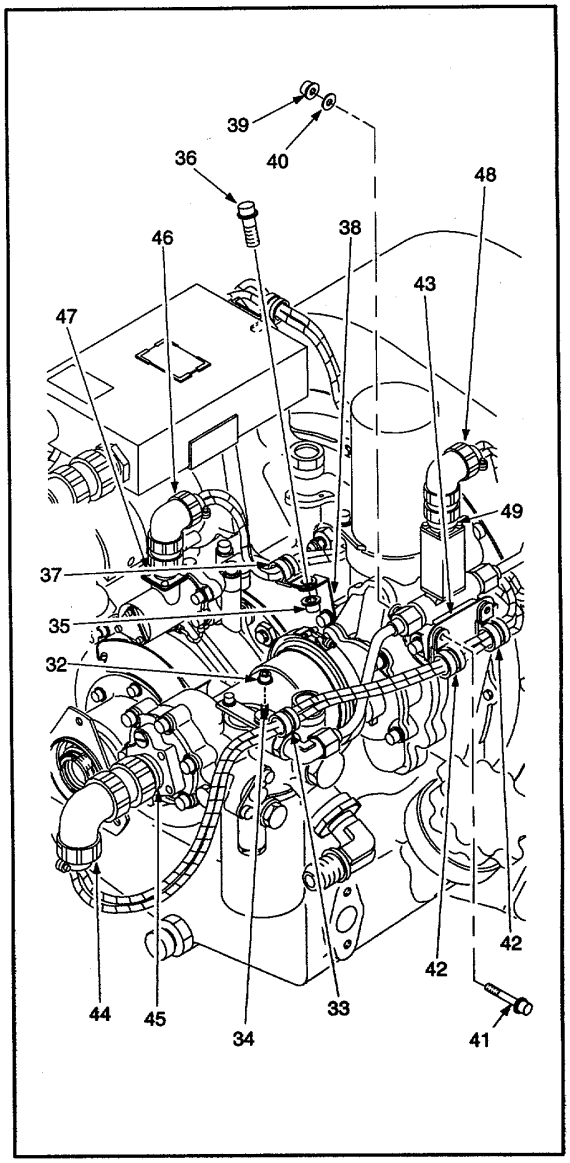
10. Remove nut (35), bolt (36) and clamp (37) from wiring harness assembly (5) and bracket (38).

11. Remove two nuts (39), two washers (40) and two bolts (41). Remove two clamps (42) from wiring harness assembly (5) and fuel solenoid valve bracket (43).

12. **Disconnect electrical connector (P9)** (44) from fuel control assembly receptacle (J9) (45).

13. **Disconnect electrical connector (P10)** (46) from clutch solenoid receptacle (J10) (47).

14. **Disconnect electrical connector (P4)** (48) from fuel solenoid valve receptacle (J4) (49).



GO TO NEXT PAGE

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

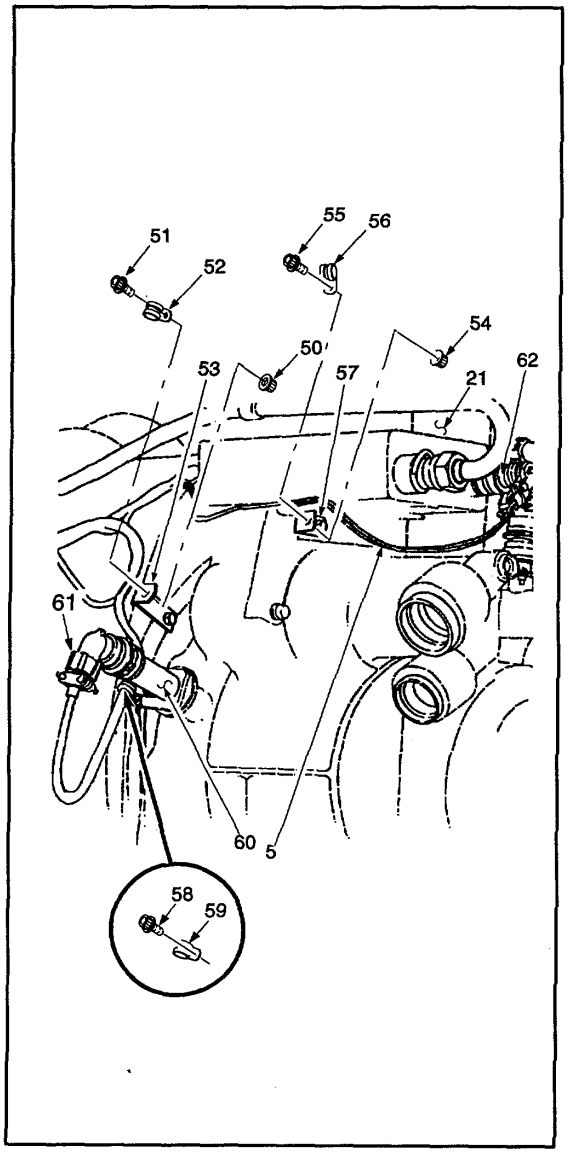
15. Remove nut (50), bolt (51) and clamp (52) from wiring harness assembly (5) and bracket (53).

16. Remove nut (54), bolt (55) and clamp (56) from wiring harness assembly (5) and bracket (57).

17. Remove bolt (58) and clamp (59) from wiring harness assembly (5) and monopole (60).

18. **Disconnect electrical connector (P6)** (61) from monopole (60)

19. **Disconnect electrical connector (P7)** (62) from ignition unit (21).



INSPECTION

1. Inspect wiring harness assembly in accordance with TM 55-1500-323-24.

2. Inspect wiring harness attaching hardware for corrosion. Refer to TM 55-1500-343-23.

INSTALLATION

1. **Connect electrical connector (P7)** (62) to ignition unit (21).

2. **Connect electrical connector (P6)** (61) to monopole (60).

3. **Install clamp (59**) over wiring harness assembly (5) and secure with bolt (58).

4. **Install clamp (56)** over wiring harness assembly (5) and secure to bracket (57) with bolt (55) and nut (54).

5. **Install clamp (52)** over wiring harness assembly (5) and secure to bracket (53) with bolt (51) and nut (50).

GO TO NEXT PAGE

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

6. **Connect electrical connector (P4)** (48) to fuel solenoid valve receptacle (49).

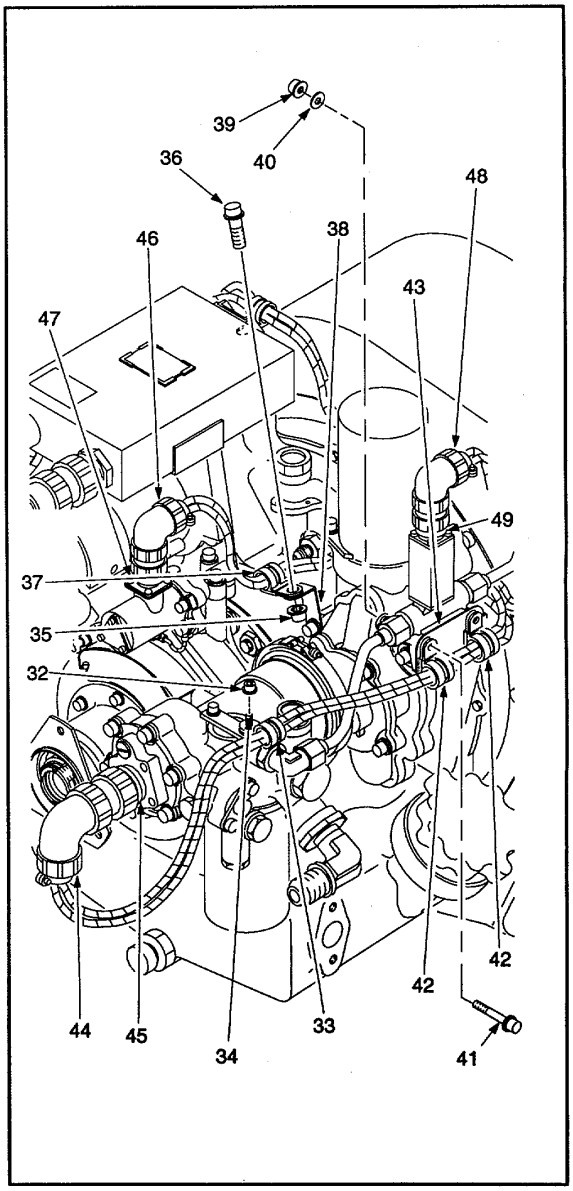
7. **Connect electrical connector (P10)** (46) to clutch solenoid (47).

8. **Connect electrical connector (P9)** (44) to fuel control assembly (45).

9. **Install two clamps (42)** over wiring harness assembly (5) and secure with two bolts (41), two washers (40) and two nuts (39).

10. **Install clamp (37)** over wiring harness assembly (5) and secure to bracket (38) with bolt (36) and nut (35).

11. **Install clamp (33)** over wiring harness assembly (5) and secure to stud (34) with nut (32).



GO TO NEXT PAGE

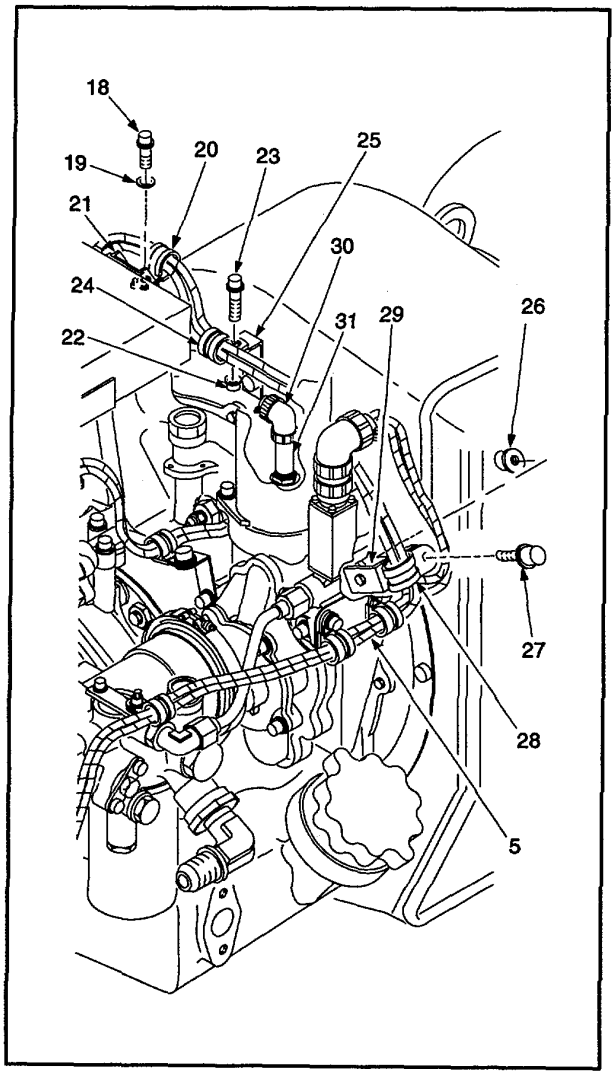
4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

12. **Connect electrical connector (P8)** (30) to LOP switch (31).

13. **Install clamp (28)** over wiring harness assembly (5) and secure to bracket (29) with bolt (27) and nut (26).

14. **Install clamp (24)** over wiring harness assembly (5) and secure to bracket (25) with bolt (23) and nut (22).

15. **Install clamp (20)** over wiring harness assembly (5) and secure to support (21) with bolt (18) and washer (19).



GO TO NEXT PAGE

4-1 REMOVE/INSTALL APU WIRING HARNESS ASSEMBLY (CONT)

16. **Connect leads (16)** to studs (17) and secure with nuts (15).

17. **Install clamp (13)** over wiring harness assembly (5) and secure to bracket (14) with bolt (12) and nut (11).

18. **Install clamp (9)** over wiring harness assembly (5) and secure to bracket (10) with bolt (8) and nut (7).

19. **Install clamps (3, 4)** over wiring harness assembly (5) and secure to bracket (6) with bolt (2) and nut (1).

20. Connect wiring harness connector (P2) to aircraft (Refer to TM 1-1520-238-23).

21. Secure all connectors to their receptacles using lockwire (D9).

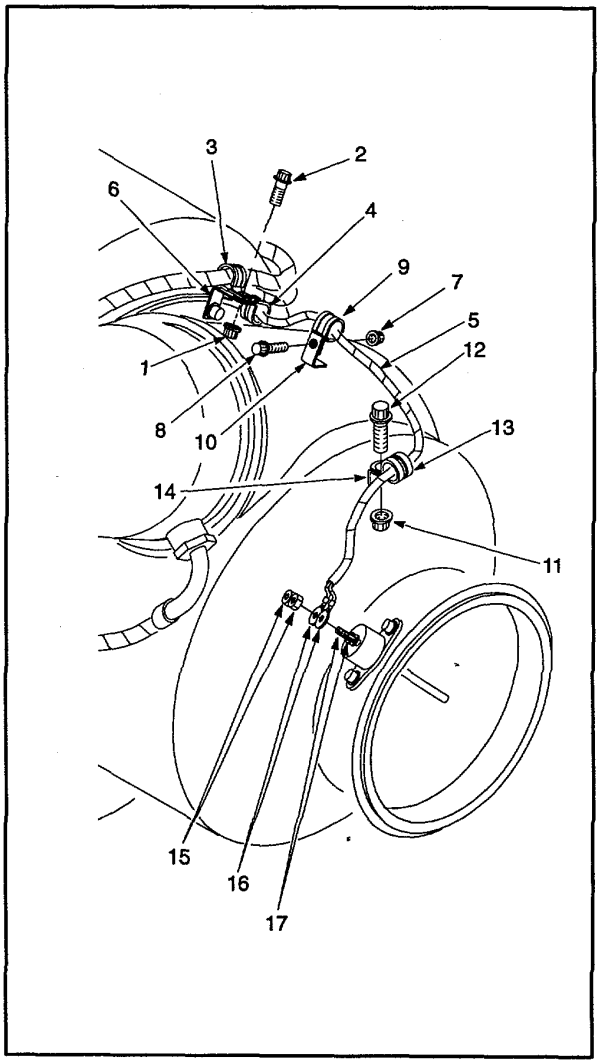
22. Perform F.O.D. inspection.

23. Inspect (T.I.).

24. Install APU enclosure (Refer to TM 1-1520-238-23).

25. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

26. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END TASK

4-2 . REPLACE PLUMBING AND ELECTRICAL BRACKETS

This task covers: a. Removal b. Inspection c. Installation

INITIALS SETUP

Tools:
Tool Kit, General Mechanic's (109)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Wiring Harness Assembly Removed (Task 4-1)

General Safety Instructions:

WARNING

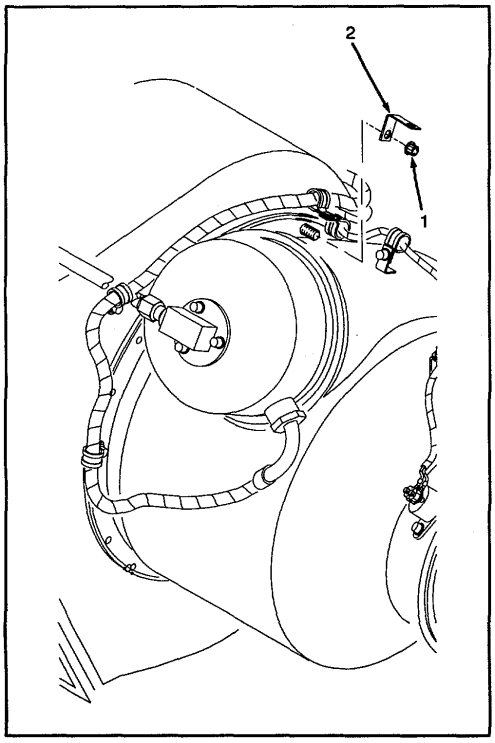
APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

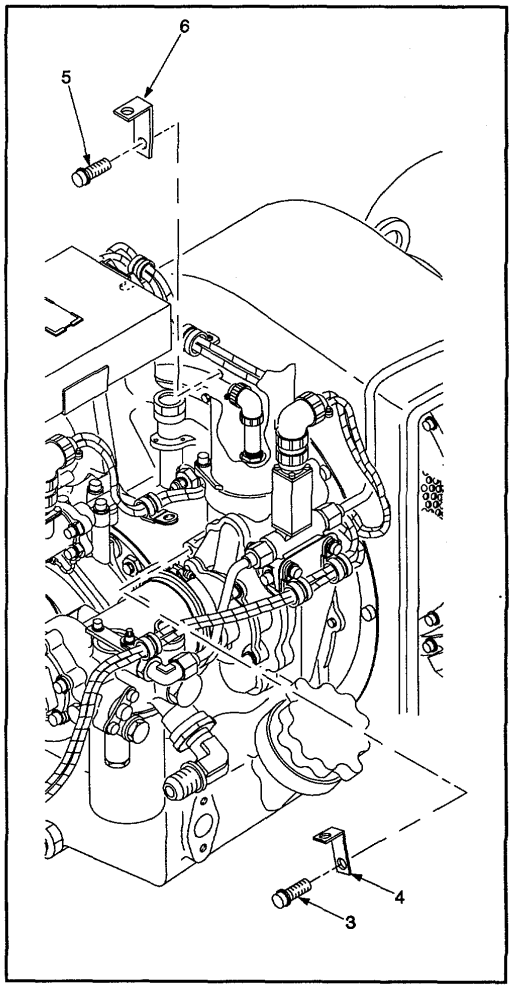
GO TO NEXT PAGE

4-2 REPLACE PLUMBING AND ELECTRICAL BRACKETS (CONT)

REMOVAL

1. Remove nut (1) and bracket (2).
2. Remove bolt (3) and bracket (4).
3. Remove bolt (5) and bracket (6).





GO TO NEXT PAGE

4-2 REPLACE PLUMBING AND ELECTRICAL BRACKETS (CONT)

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

5. Remove bolt (9) and bracket (10).

INSPECTION

1. Inspect brackets for cracks. None allowed.

2. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

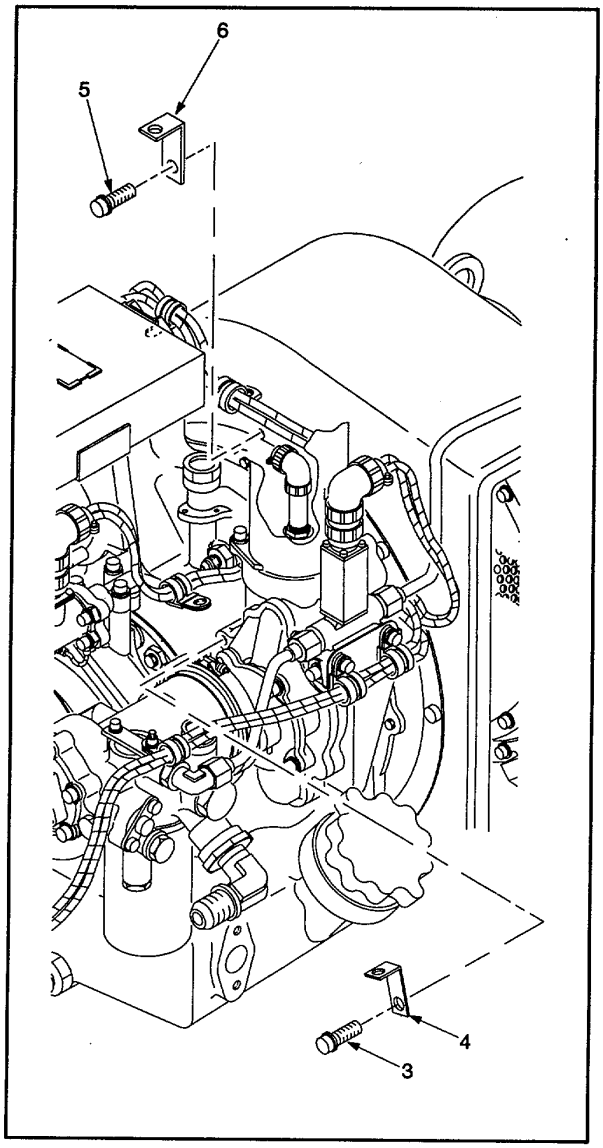
1. Lightly coat threads of bolts (3, 5, 7, 9) with Liqui-Moly NV antiseize compound (D7).

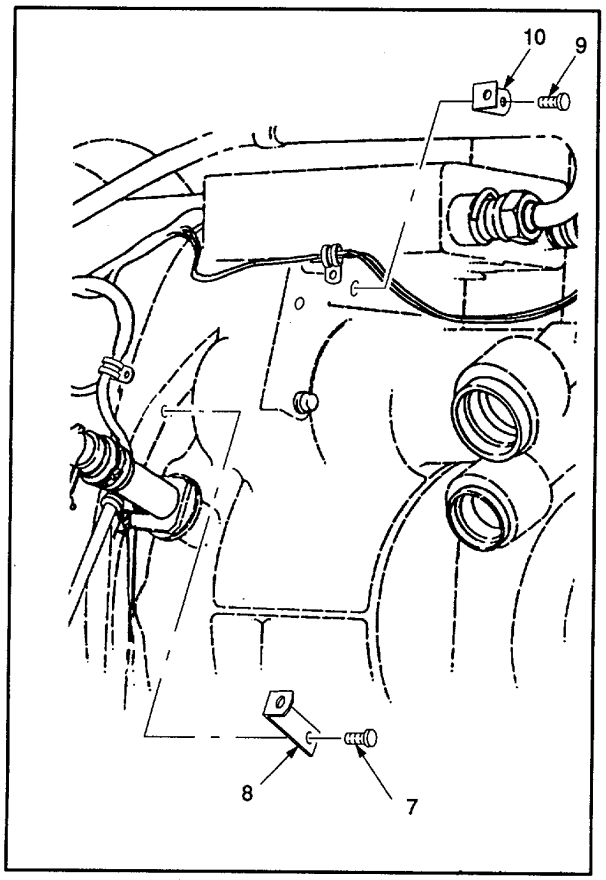
2. Install bracket (10) and secure with bolt (9).

3. Install bracket (8) and secure with bolt (7).

4. Install bracket (6) and secure with bolt (5).

5. Install bracket (4) and secure with bolt (3).



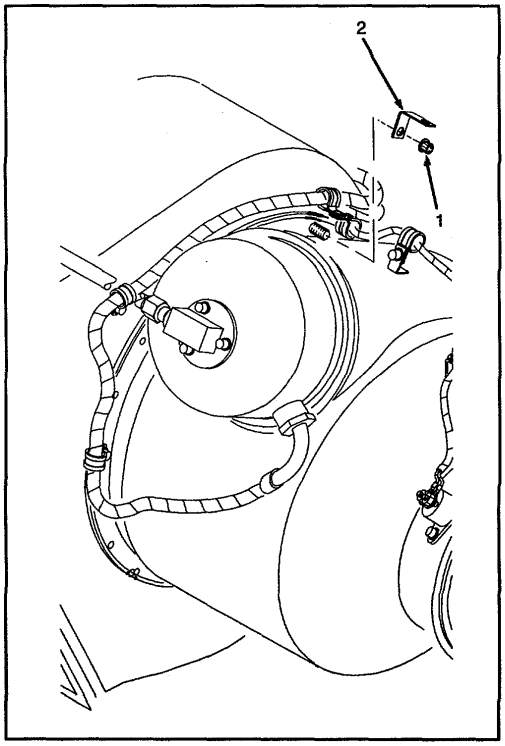


G

GO TO NEXT PAGE

4-2 REPLACE PLUMBING AND ELECTRICAL BRACKETS (CONT)

6. Install bracket (2) and secure with bolt (1).
7. Install wiring harness assembly (Task 4-1).
8. Perform F.O.D. inspection.
9. Inspect (T.I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION III REMOVE/INSTALL IGNITER PLUG LEAD

4-3 REMOVE/INSTALL IGNITER PLUG LEAD

This task covers: a. Removal b. Inspection c. Installation

INITIALS SETUP

Tools:
Tool Kit, General Mechanic's (109)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D9)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-238-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

4-3 REMOVE/INSTALL IGNITER PLUG LEAD (CONT)

REMOVAL

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

1. Remove bolt (1) and clamp (2) from igniter plug lead (3).

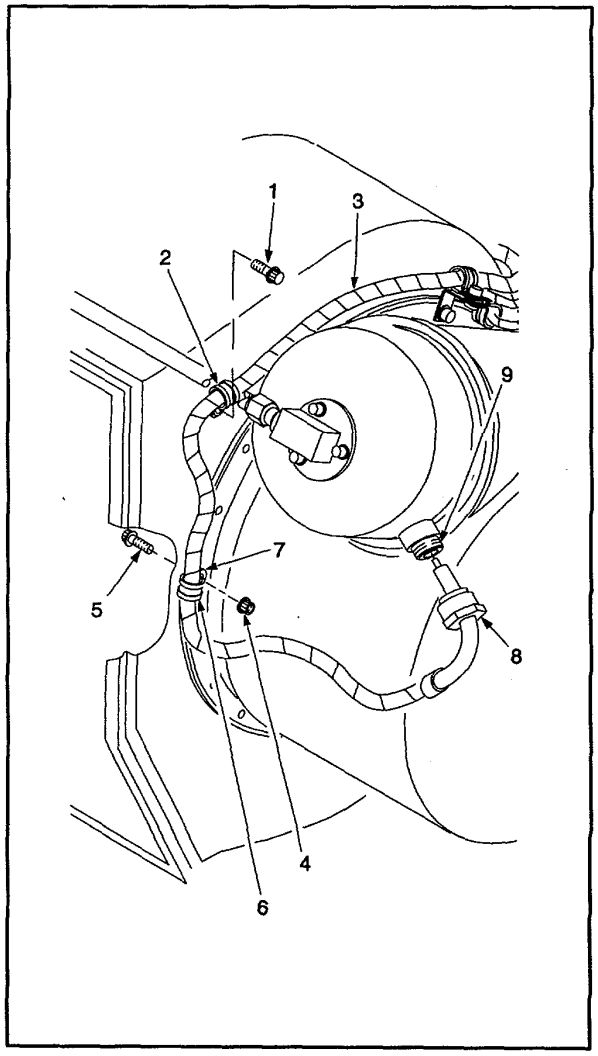
2. Remove nut (4) and bolt (5) securing clamp (6) to scroll flange (7).

3. **Remove clamp (6)** from igniter plug lead (3).

WARNING

Ignition system contains high voltage electricity and can cause injury or death. Extreme caution must be used when handling igniter plug lead. If an injury occurs, seek medical aid.

4. Hold igniter plug (9) and **disconnect Igniter plug lead nut (8).**



GO TO NEXT PAGE

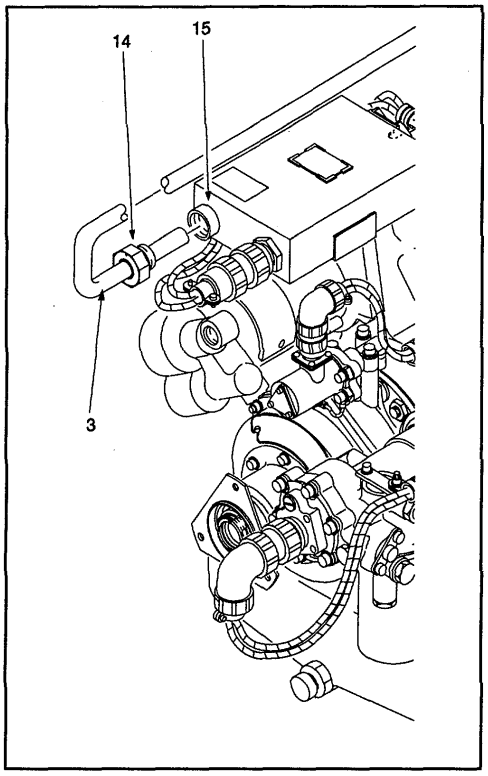
4-3 REMOVE/INSTALL IGNITER PLUG LEAD (CONT)

5. Remove nut (10) and bolt (11) securing clamp (12) to bracket (13).

6. **Remove clamp (12)** from igniter plug lead (3).

7. **Disconnect nut (14)** from ignition unit connector (15).

8. **Remove Igniter plug lead (3)** from engine.

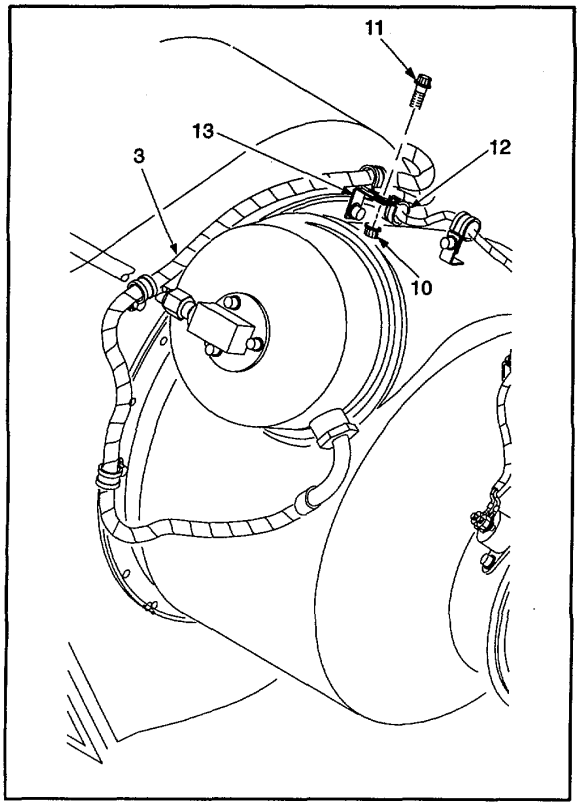


INSPECTION

1. Inspect igniter plug lead for cracks, nicks, dents, damaged threads or damaged wire braid. None allowed.

2. Inspect teflon insulators for cracks or distortion. None allowed.

3. Inspect for corrosion. Refer to TM 55-1500-343-23.



INSTALLATION

1. Place igniter plug lead (3) over engine.

2. **Connect igniter plug lead nut (14)** to ignition unit connector (15).

3. **Secure nut (14) to connector (15)** with lockwire (D10).

4. **Install clamp (12)** over igniter plug lead (3).

5. Secure clamp (12) to bracket (13) with bolt (11) and nut (10).

GO TO NEXT PAGE

4-3 REMOVE/INSTALL IGNITER PLUG LEAD (CONT)

6. **Connect igniter plug lead (3) to igniter plug (9).**
   a. Insert igniter plug lead (3) into igniter plug (9) and secure with nut (8). Torque nut (8) to 65 to 75 inch-pounds.

   b. Secure nut (8) to grooved coupling clamp with lockwire (D10).

7. Lightly coat threads of bolts (1, 5) with Liqui-Moly NV antiseize compound (D7).

8. **Install clamp (6)** over igniter plug lead (3).

9. Secure clamp (6) to scroll flange (7) with bolt (5) and nut (4).

10. **Install clamp (2)** over igniter plug lead (3).

11. Secure clamp (2) to plenum with bolt (1).

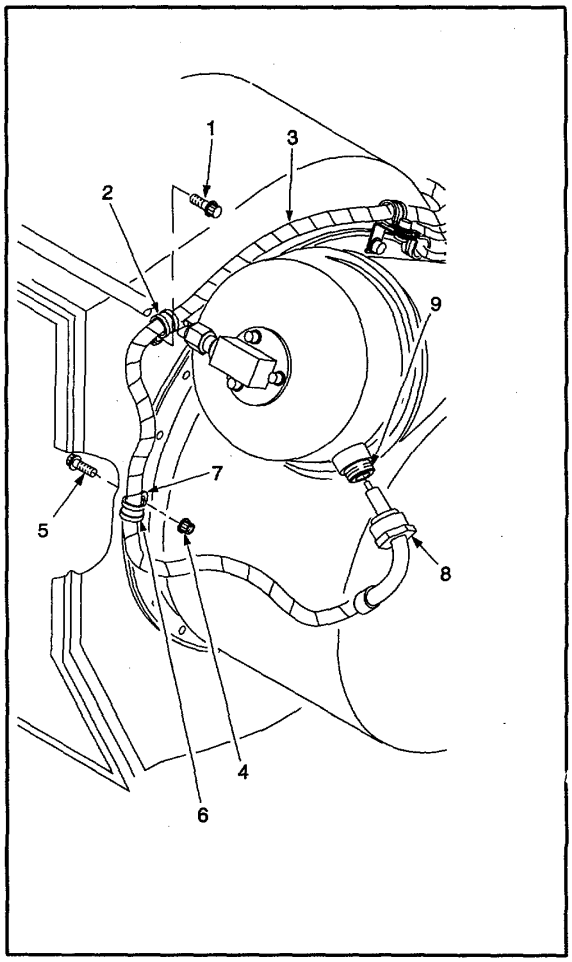
12. Perform F.O.D. inspection.

13. Inspect (T.I.).

14. Install APU enclosure (Refer to TM 1-1520-238-23).

15. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

16. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE : None.

END OF TASK

SECTION IV REMOVE/INSTALL IGNITER PLUG

4-4 REMOVE/INSTALL IGNITER PLUG

This task covers: a. Removal b. Inspection c. Installation

INITIALS SETUP

Tools:
Tool Kit, General Mechanic's (109)
Wrench, Torque, Click Type, ¼ in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, C5A (D6)
Gasket (NSN 5330-01-126-0132)
Lockwire (D9)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

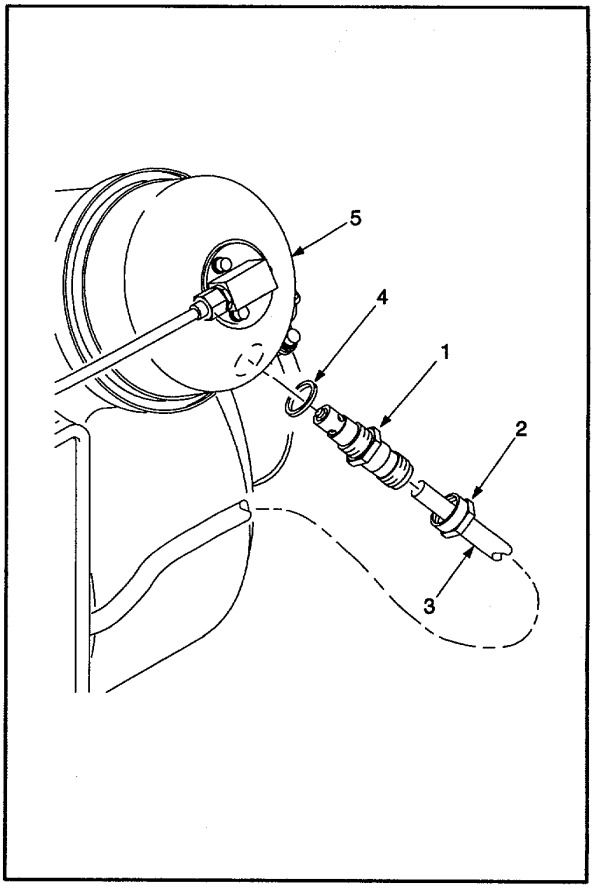
WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

4-4 REMOVE/INSTALL IGNITER PLUG (CONT)

REMOVAL



WARNING

Ignition system contains high voltage electricity and can cause injury or death. Extreme caution must be used when handling igniter plug lead. If an injury occurs, seek medical aid.

1. Hold igniter plug (1) and disconnect igniter plug lead nut (2).
2. Remove igniter plug lead (3) from igniter plug (1).
3. **Remove igniter plug (1) and gasket (4)** from combustor cap (5). Discard gasket (4).
4. Clean igniter plug using process 8-2, Chapter 8.

INSPECTION

1. Inspect igniter plug electrode for damage. None allowed.
2. Inspect igniter plug threads for damage. None allowed.
3. Inspect igniter plug ceramic insert for cracks or damage. None allowed.
4. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

Antiseize Compound

1. Lightly coat threads of igniter plug (1) with C5A antiseize compound (D6).
2. **Install new gasket (4)** on igniter plug (1).

GO TO NEXT PAGE

4-4 REMOVE/INSTALL IGNITER PLUG (CONT

3. **Install Igniter plug (1)** in combustor cap. Torque igniter plug (1) to **95 to 105 inch-pounds.**

4. **Insert Igniter plug lead (3)** into igniter plug (1) and secure with nut (2). Torque nut (2) to 65 to 75 inch-pounds.

5. **Secure nut (2)** to grooved coupling clamp (6) with lockwire (D10).

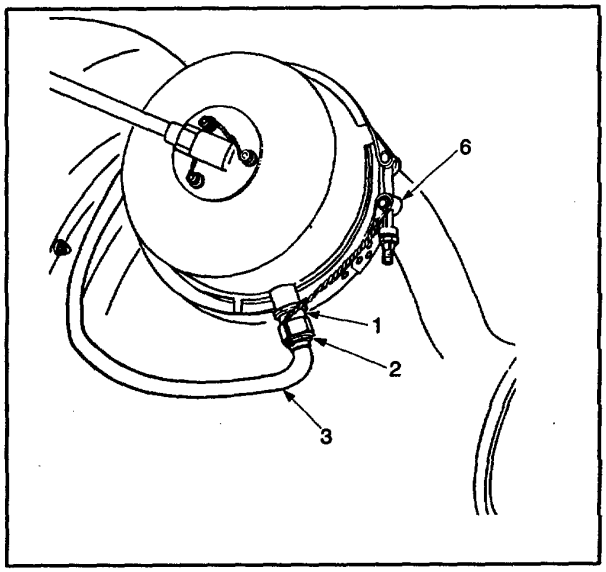
6. Perform F. O. D. inspection.

7. Inspect (TI.).

8. Install APU enclosure (Refer to TM 1-1520-238-23).

9. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

10. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

4-5 REMOVE/INSTALL THERMOCOUPLE

This task covers: a. Removal b. Installation c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, C5A (D6)
Gasket (P/N 3612517-1, CAGEC 99193)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-343-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

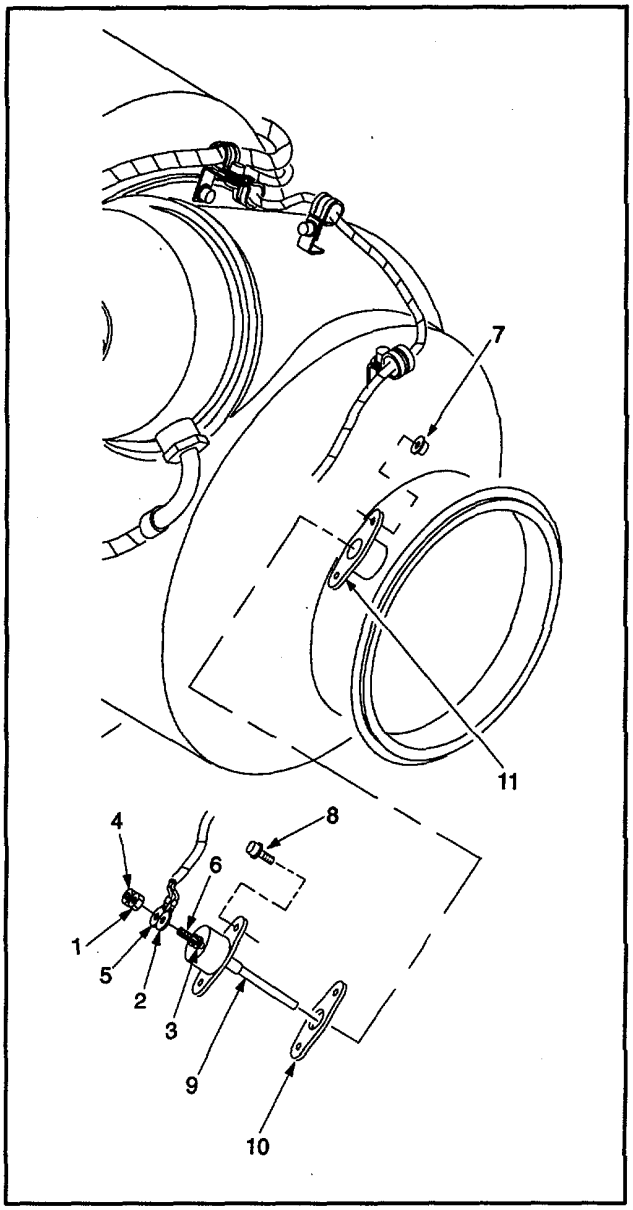
4-5 REMOVE/INSTALL THERMOCOUPLE (CONT)

REMOVAL

NOTE

To aid in assembly, all leads should be marked prior to removal.

1. **Remove nut (1) and electrical lead (2) from terminal AL (3).**
2. **Remove nut (4) and electrical lead (5) from terminal CR (6).**
3. Hold bolts (8) and remove two nuts (7). Remove bolts (8).
4. **Remove thermocouple (9) and gasket** (10) from combustion chamber case (11). Discard gasket (10).
5. Clean thermocouple (9) using process 8-2, Chapter 8.



INSPECTION

1. Inspect thermocouple for cracks, nicks or burned areas. None allowed.
2. Inspect thermocouple threads for damage. None allowed.
3. Inspect thermocouple for missing or damaged nuts. None allowed.
4. Inspect thermocouple tip for damage. None allowed.
5. Inspect thermocouple flange tube for distortion. None allowed.
6. Inspect for corrosion. Refer to TM 55-1500-343-23.

GO TO NEXT PAGE

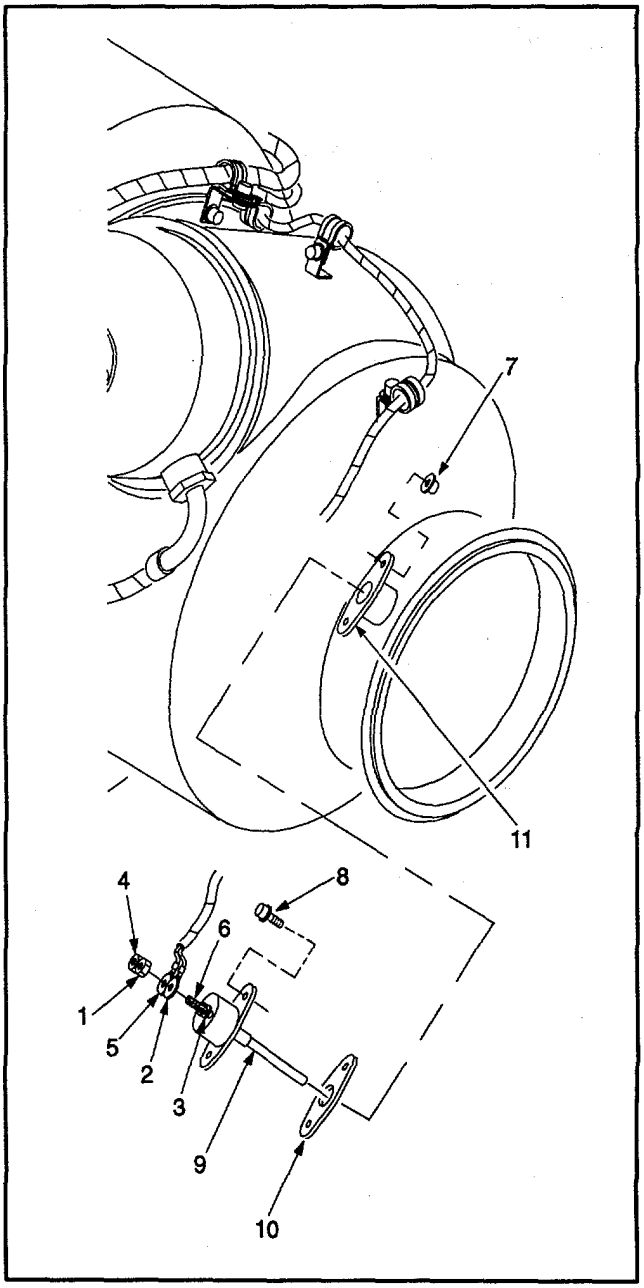
4-5 REMOVE/INSTALL THERMOCOUPLE (CONT)

INSTALLATION

1. **Install gasket (10)** on thermocouple (9).
2. **Install thermocouple (9)** with (CR) facing forward and install in combustion chamber case flange (11).

Antiseize Compound

3. Apply C5A antiseize compound (D6) to threads of bolt (8).
4. **Secure thermocouple (9)** using bolts (8) and nuts (7). Hold nuts (7) and torque bolts (8) to **35 inch-pounds.**
5. Remove nuts (1, 4) from thermocouple terminals (2, 5).
6. **Install small thermocouple lead (5) on terminal (CR) (6)** and secure with nut (4).
7. Install large thermocouple lead (2) on terminal (AL) (3) and secure with nut (1).
8. Perform FO. D. inspection.
9. Inspect (T. I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION VI REMOVE/INSTALL MONOPOLE

4-6 REMOVE/INSTALL MONOPOLE

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Caliper Set, Micrometer, Outside,0-6 inch (T27)
Gage, Depth, Micrometer 0-12 inch (T56)
Gage, Shim Checking, Monopole (T57)
Ohmmeter (T72)
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D9)
Packing (NSN 5330-00-245-7335)
Shim (NSN 5365-01-012-7176)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-343-23

Equipment Conditions:
APU on Workstand (Task 1-25)

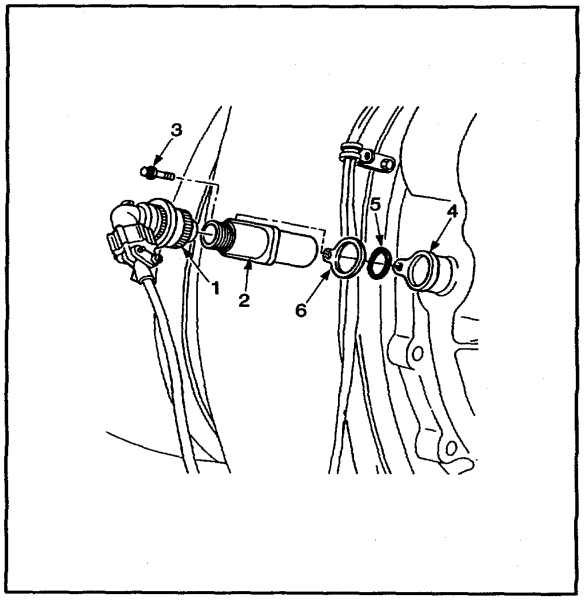
GO TO NEXT PAGE

4-6 REMOVE/INSTALL MONOPOLE (CONT)

This task covers: a. Removal b. Inspection c. Installation

REMOVAL

1. Remove electrical connector (P6) (1) from monopole (2).
2. Remove bolt (3). **Remove monopole (2)** from gearbox (4).
3. Remove packing (5) and shim (6) from monopole (2). Discard packing (5) and shim (6).
4. Clean monopole (2) using process 8-2, Chapter 8.



INSPECTION

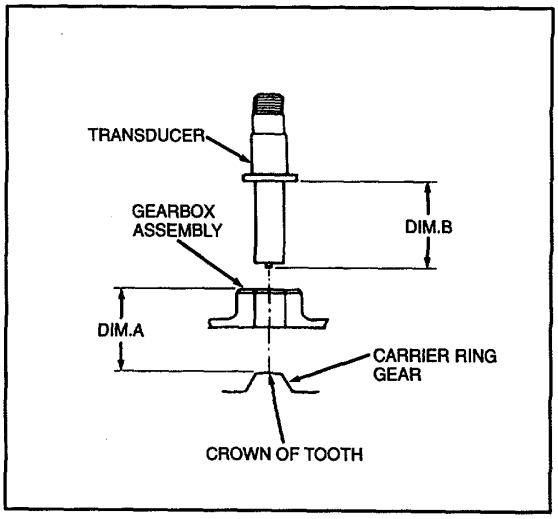
1. Check case and mounting flange for dents, cracks and elongated bolt holes. None allowed.
2. Check electrical connector pins for damage. None allowed.
3. Inspect for corrosion. Refer to TM 55-1500-343-23.

TEST

1. Using ohmmeter, **check resistance between pins A and C**. Maximum resistance **20 OHMS**.
2. Using ohmmeter, **check resistance between pin B and case**. Maximum resistance **0. 010 OHMS**.

ADJUSTMENT

1. **Primary method** for obtaining monopole tip clearance.
   a. Using depth micrometer, **measure from gearbox assembly surface to crown of gear tooth** of gearbox carrier ring gear. Record as dimension A.
   b. Using micrometer, **measure monopole from tip of face to mount**. Record as dimension B.



c. **Calculate required shim (6)** by using this formula:

B - A + 0.015 inch = Required shim ± 0.0023

GO TO NEXT PAGE

4-6 REMOVE/INSTALL MONOPOLE (CONT)

This task covers: a. Removal b. Inspection c. Installation

2. **Alternate method** for obtaining monopole tip clearance.

   a. Using monopole shim checking gage (T62), **measure from gearbox assembly surface to crown of gear tooth** of carrier ring gear. Record as dimension A.

   b. Using micrometer, **measure monopole from tip of face to mount**. Record as dimension B.

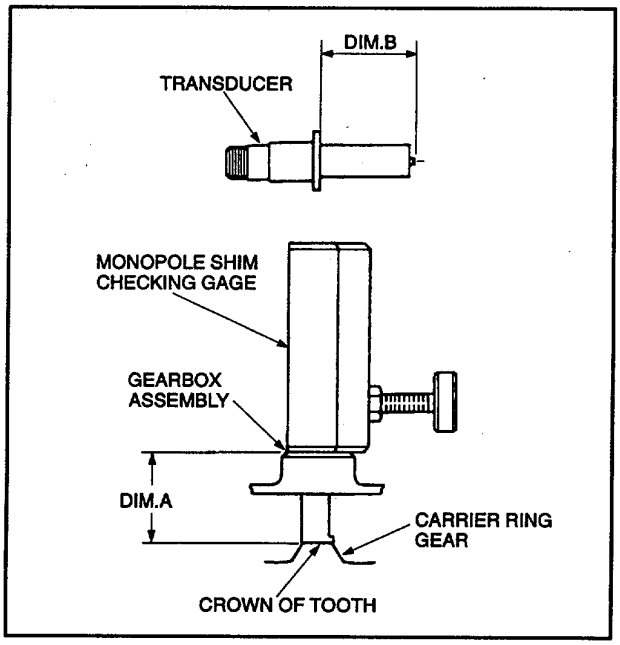
   c. **Calculate required shims** by using this formula:

      B - A + 0.015 inch = Required shim +0. 003

      NOTE

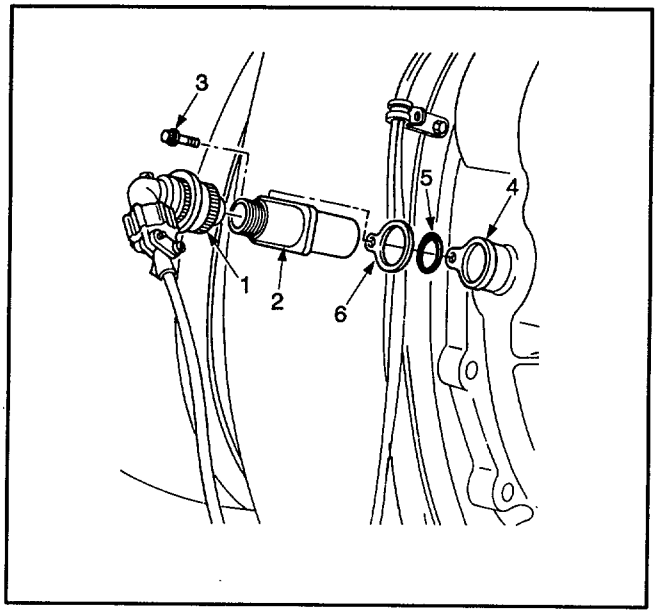
      Each lamination is 0. 002 inch thick.

3. Peel lamination pieces from shim (6) to achieve required thickness of step 1 . c or 2. c.



INSTALLATION

1. Install shim (6) on monopole (2).
2. Install packing (5) on monopole.
3. Apply Liqui-Moly NV antiseize compound (D7) to bolt (3).
4. **Install monopole (2)** in gearbox (4).
5. **Secure monopole (2)** with bolt (3). Torque bolt (3) to **33 to 37 inch-pounds.**
6. **Connect electrical connector (1)** and secure with lockwire (D9).
7. Perform FO. D. inspection.
8. Inspect (T. I.).
9. Install APU (Refer to TM 1-1520-238-23).
10. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION VII REMOVE/INSTALL IGNITION UNIT

4-7 REMOVE/INSTALL IGNITION UNIT

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)
Igniter Plug Lead Removed (Task 4-3)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D10)
Lockwire (Dl0)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-343-23
Task 4-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

4-7 REMOVE/INSTALL IGNITION UNIT (CONT)

WARNING

Ignition system contains high voltage electricity and can cause injury or death. Extreme caution must be used when handling igniter plug lead. If an injury occurs, seek medical aid.

REMOVAL

1. **Disconnect APU wiring harness connector P7 (1)** from receptacle (A2) J1 (2) on ignition unit (3).
2. Remove two nuts (4), two washers (5) and two bolts (6) from bracket (7) and clamp bracket(8).
3. Remove bolt (9) and washer (10) from clamp (11) and rear mount (12).
4. **Remove Ignition unit (3).**
5. Clean ignition unit (3) using process 8-2, Chapter 8.

INSPECTION

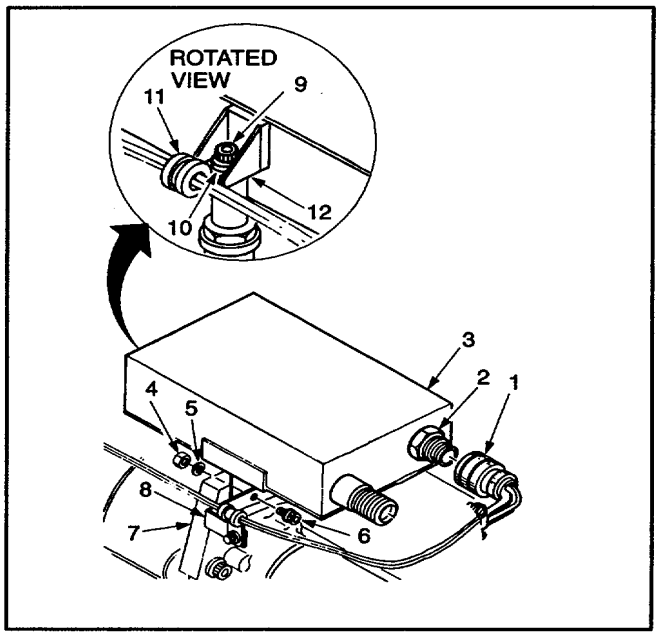
1. Inspect ignition unit for dents and cracks. None allowed.
2. Inspect receptacles for damaged pins. None allowed.
3. Inspect for corrosion. Refer to TM 55-1500-343-23.

INSTALLATION

1. Place ignition unit (3) on mount.
2. Apply Liqui-Moly NV antiseize compound (D7) to bolts (6,9).
3. Install bolt (9) with washer (10) through clamp (11) and into rear mount (12).
4. Install two bolts (6) through bracket (7) and into clamp bracket (8). Secure with two washers (5) and two nuts (4).
5. Torque bolt (9) and two bolts (6) to **48 to 52 Inch-pounds.**
6. Connect electrical connector P7 (1) to receptacle (2) and secure with lockwire (D9).
7. Install igniter plug lead (Task 4-3).
8. Perform F. O. D. inspection.
9. Inspect (T. I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

END TASK

FOLLOW-ON MAINTENANCE : None.



SECTION VIII REMOVE/INSTALL IGNITION UNIT BRACKET

4-8 REMOVE/INSTALL IGNITION UNIT BRACKET'

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)

Personnel Required:
67R Attack Helicopter Repairer

67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 4-3, 4-7

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Igniter Plug Lead Removed (Task 4-3)
Ignition Unit Removed (Task 4-7)

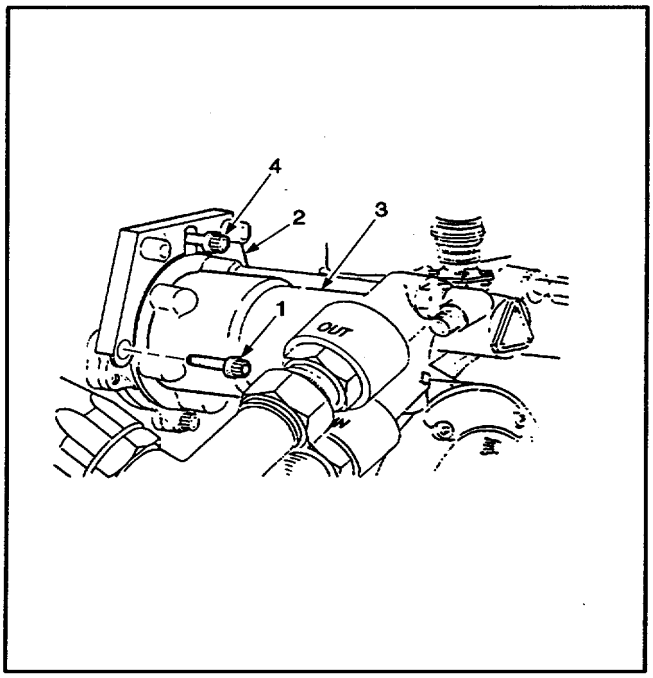
General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

REMOVAL



1. Remove two lower bolts (1) from securing ignition unit bracket (2) to hydraulic starter (3).
2. Loosen upper bolt (4).
3. **Remove Ignition unit bracket (2).**
4. Clean ignition unit bracket (2) using process 8-1, Chapter 8.

INSPECTION

1. Inspect ignition unit bracket (2) for cracks, nicks, dents and deformation. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat threads of two bolts (1) with Liqui-Moly NV antiseize compound (D7).
2. **Position Ignition unit bracket (2) on hydraulic starter (3)** and bolt (4).
3. Secure ignition unit bracket (2) with two bolts (1).
4. Torque bolts (1, 4) to 95 to 105 inch-pounds.
5. Install ignition unit (Task 4-7).
6. Install igniter plug lead (Task 4-3).
7. Perform F. O. D. inspection.
8. Inspect (T. I.).
9. Install APU enclosure (Refer to TM 1-1520-238-23).
10. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
11. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION IX REMOVE/INSTALL IGNITION UNIT SUPPORT ASSEMBLY

4-9 REMOVE/INSTALL IGNITION UNIT SUPPORT ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D10)
Packing (NSN 5330-00-150-4228)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 4-3, 4-7

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Igniter Plug Lead Removed (Task 4-3)
Ignition Unit Removed (Task 4-7)

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

4-9 REMOVE/INSTALL IGNTION UNIT SUPPORT ASSEMBLY(CONT)

REMOVAL:

1. **Remove Ignition unit support assembly (1)** with packing (3) from gearbox port (2).
2. Remove and discard packing (3).

INSPECT

1. Inspect for crossed, stripped and galled threads. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.

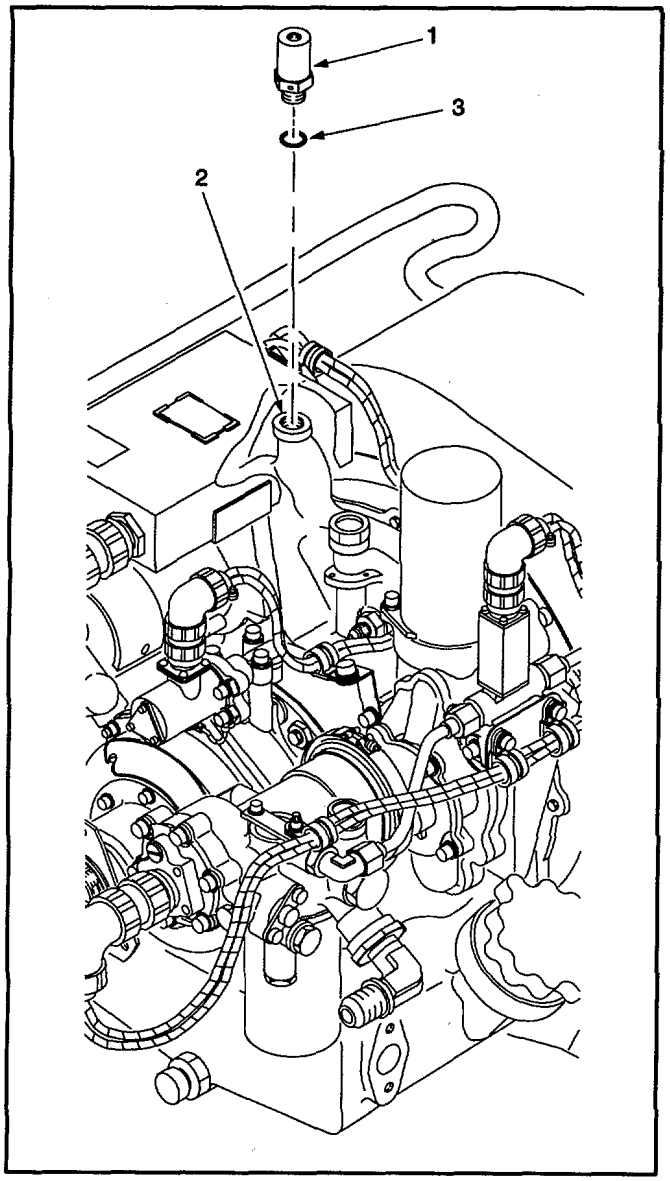
INSTALLATION

1. Lightly coat packing (3) with petrolatum (D15).
2. **Install packing (3)** on ignition unit support assembly (1).
3. Lightly coat threads of ignition unit support assembly (1) with Liqui-Moly NV antiseize compound (D7).
4. **Install ignition unit support assembly (1)** in gearbox port (2).
5. **Torque ignition unit support assembly (1)** to **58 to 62 inch-pounds.**
6. **Secure ignition unit support assembly (1)** to gearbox assembly **with lockwire (D10).**
7. Install ignition unit (Task 4-7).
8. Install igniter plug lead (Task 4-3).
9. Perform F. O. D. inspection.
10. Inspect (T. I.).
11. Install APU enclosure (Refer to TM 1-1520-238-23).

END OF TASK

12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
13. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None



SECTION X REPAIR WIRING HARNESS ASSEMBLY

4-10 REPAIR WIRING HARNESS ASSEMBLY

INITIAL SETUP:

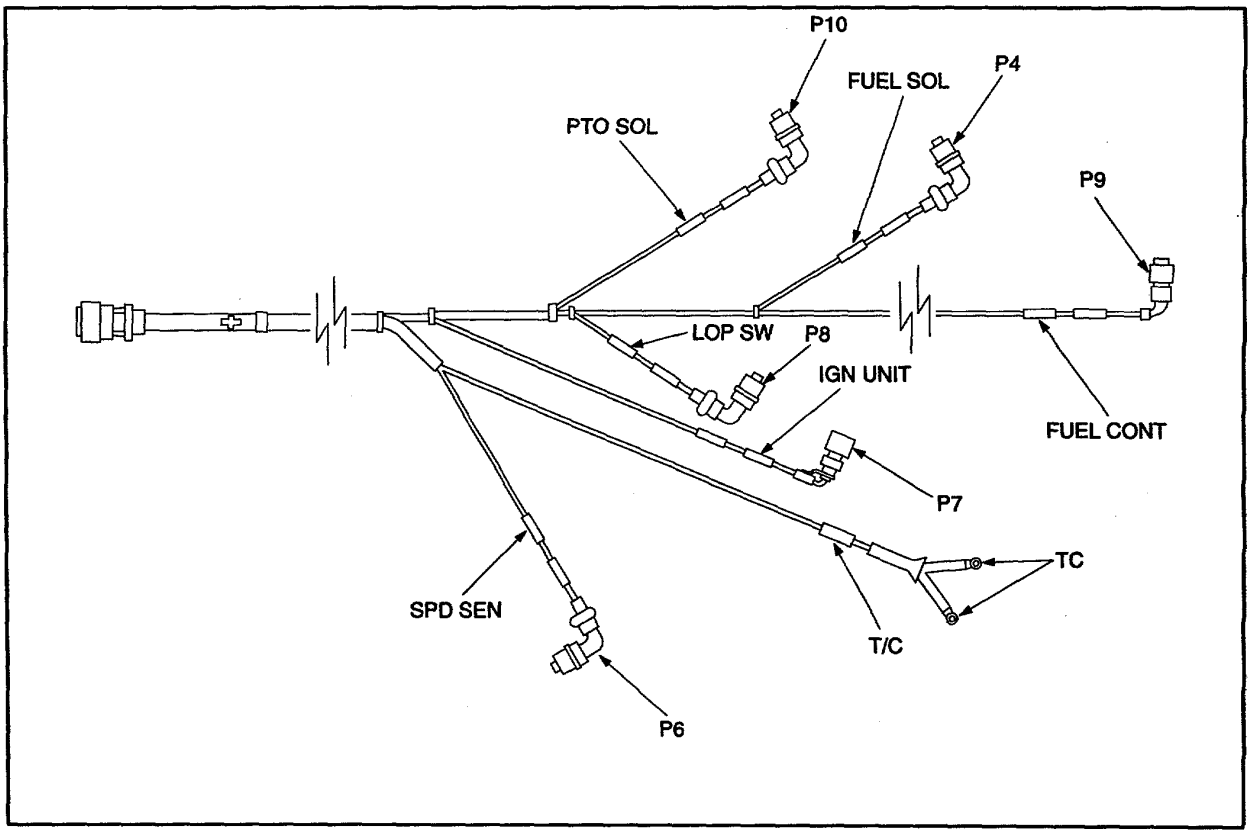
Tools:
Ohmmeter (T72)
Tool Kit, Electrical (T108)

Materials/Parts:
Seal Plugs (D17, D18)
Teflon strip (D21)

Personnel Required:
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 55-1500-323-24
Task 4-1

Equipment Conditions:
Helicopter Safed
APU Enclosure Removed
Wiring Harness Assembly Removed From Aircraft (Task 4-1)



GO TO NEXT PAGE

4-10 REPAIR WIRING HARNESS ASSEMBLY (CONT)

1. Repair wiring harness assembly in accordance with TM 55-1500-323-24 and by replacing components.

2. Use teflon strip (D21) to fill space inside connector and clamp as required.

3. Replace backshell (1) and plug connector (2) in accordance with Table 4-1. Orient connector locating slot as shown within + 10 degrees.

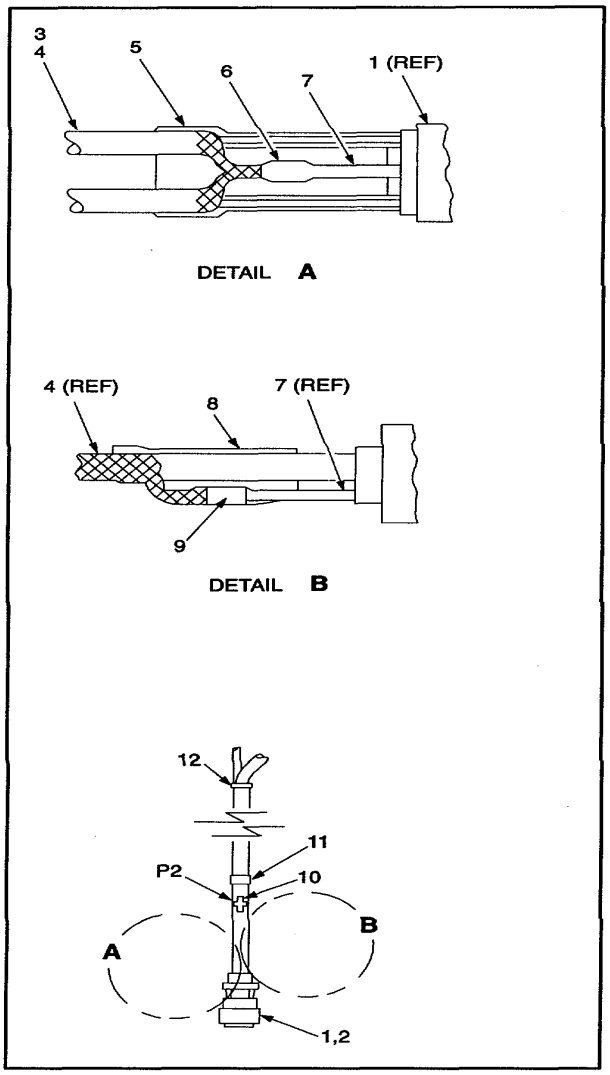
4. Replace cables (3, 4) in accordance with Table 4-1.

5. Terminate shield to contact pins using sleeving (5), splice (6) and electrical wire (7). See detail A.

6. Terminate shield to contact pin using electrical wire (7), sleeving (8) and splice (9). See detail B.

7. Replace identification straps (10, 11) and retaining strap (12).

GO TO NEXT PAGE



4-10 REPAIR WIRING HARNESS ASSEMBLY (CONT)

This task covers: a. Removal b. Inspection c. Installation

8. Replace plug connector (13) and backshell (14) in accordance with Table 4-1. Orient connector locating slot as shown within±10 degrees.

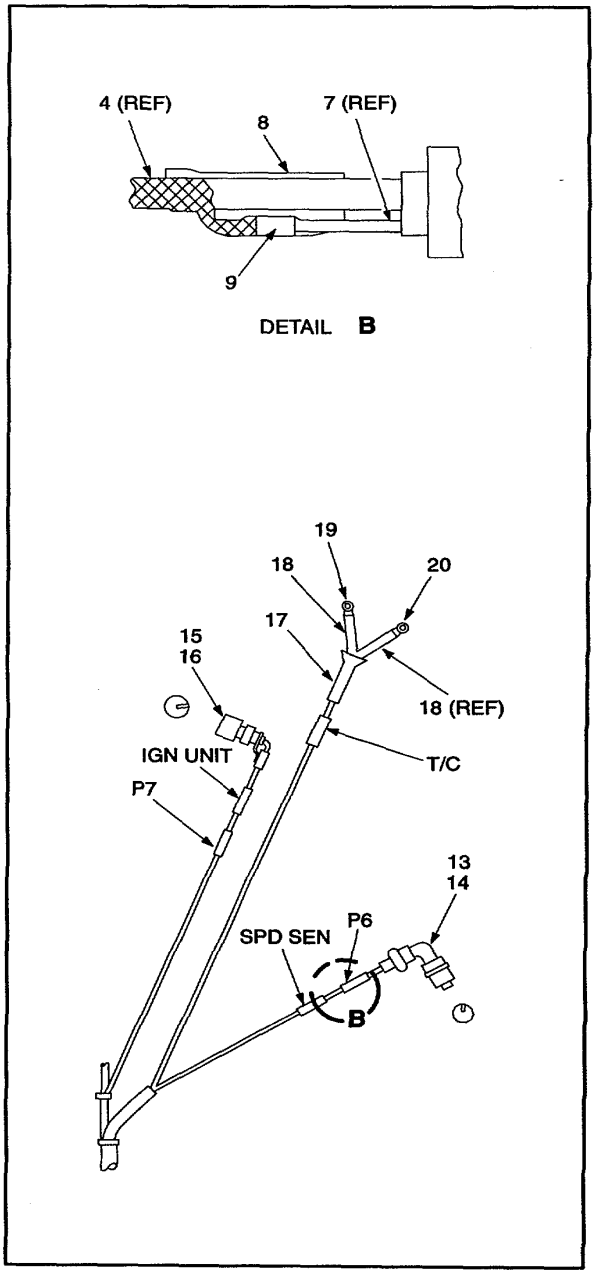
9. Replace connector (15) and backshell (16) in accordance with Table 4-1. Orient connector locating slot as shown within ± 10 degrees.

NOTE

If terminals (19, 20) are damaged, replace wiring harness assembly. Any change in thermocouple wire' length or terminal material will alter thermocouple readings.

10. Replace sleeving (17, 18) as required.

GO TO NEXT PAGE



4-10 REPAIR WIRING HARNESS ASSEMBLY (CONT)

This task covers: a. Removal b. Inspection c. Installation

11. Replace plug connector (13) and backshell (14) in accordance with Table 4-1. Orient connector locating slot as shown within + 10 degrees.

12. Replace backshell (21) and plug connector (22) in accordance with Table 4-1. Orient connector locating slot as shown within + 10 degrees.

13. Replace sleeving (23).

14. Fill all unused grommet holes with seal plugs (D17, D18).

15. Perform continuity check on all repaired wires and connectors in accordance with TM 55-1500-323-24 and Table 4-1.

16. Install wiring harness assembly (Task 4-1)

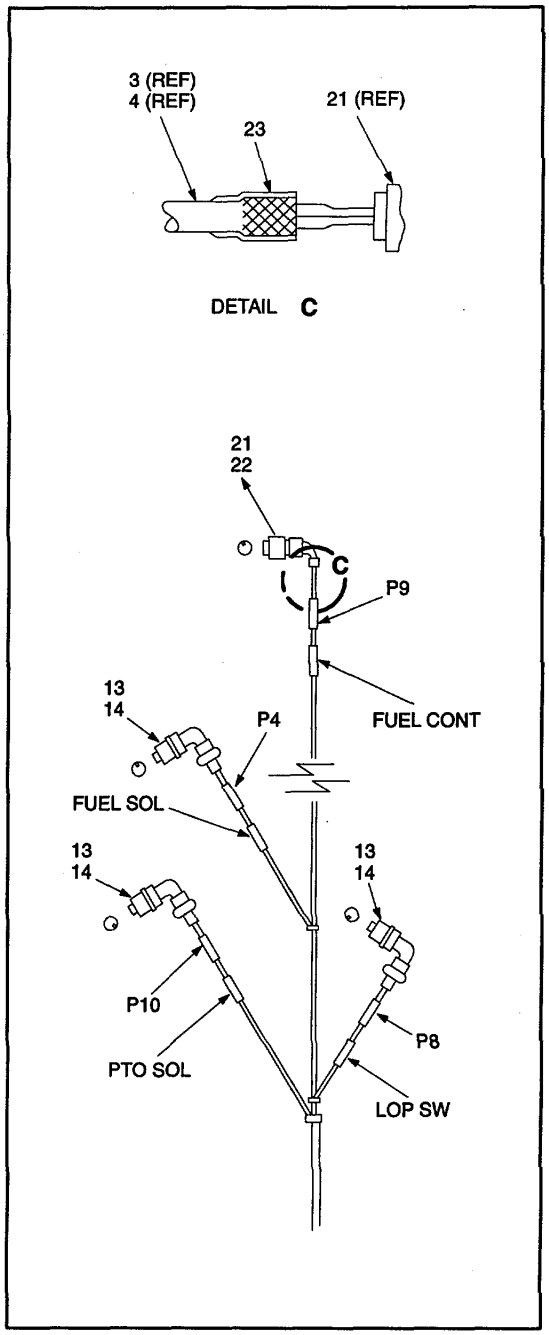
17. Perform F.O.D. inspection.

18. Inspect (T.I.).

19. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

GO TO NEXT PAGE



4-10 REPAIR WIRING HARNESS ASSEMBLY (CONT)

Table 4-1. Pin to Pin Wire Chart

Number	Wire Code No	From		To		Wire Length (Inches)
		Location	Pin	Location	Pin	
WI-WHT	1	P2	22	P6	C	45. 65
W1-BLU	1	P2	23	P6	A	45. 65
W1 SHIELD	1	-	-	SP-1	-	-
W1 SHIELD	1	-	-	SP-2	-	-
W2 SHIELD	3	-	-	SP-1	-	-
W2 WHT	3	P2	26	T/C	ITEM 19	54. 00
W2 GRN	3	P2	25	T/C	ITEM 20	54. 00
Q7A20	2	P2	17	P4	A	53. 75
Q8A20N	2	P2	18	P4	B	53. 75
W3-WHT	1	P2	5	P9	1	64. 75
W3-BLU	1	P2	6	P9	3	64. 75
W3 SHIELD	1	-	-	SP-3	-	-
Q13A20	2	P2	15	P10	A	46. 95
Q14A20N	2	P2	16	910	B	46. 95
U15A20	2	SP-1	-	P2	2	2. 00
U16A20	2	SP-2	-	P6	B	2. 00
U17A20	2	SP-3	-	P2	7	2. 00
J5A20	2	P2	30	P7	A	46. 25
J6A20N	2	P2	31	P7	B	46. 25
K9A20N	2	P2	3	P8	B	46. 25
K10A20N	2	P2	11	P8	A	46. 25

Wire Code No. = Wire Part No. and Item No. Listed in Appendix C.

Code No.	Part No	Item No. in Appendix D
1	M27500-20RE-2-N06	25
2	M22759-12-20-9	24
3	192-505-9003	26

END OF TASK

CHAPTER 5
LUBRICATION SYSTEM MAINTENANCE
SECTION I REMOVE/INSTALL LIQUID LEVEL GAGE ROD-CAP

5-1 REMOVE/INSTALL LIQUID LEVEL GAGE ROD-CAP

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

General Safety Instructions:

WARNING

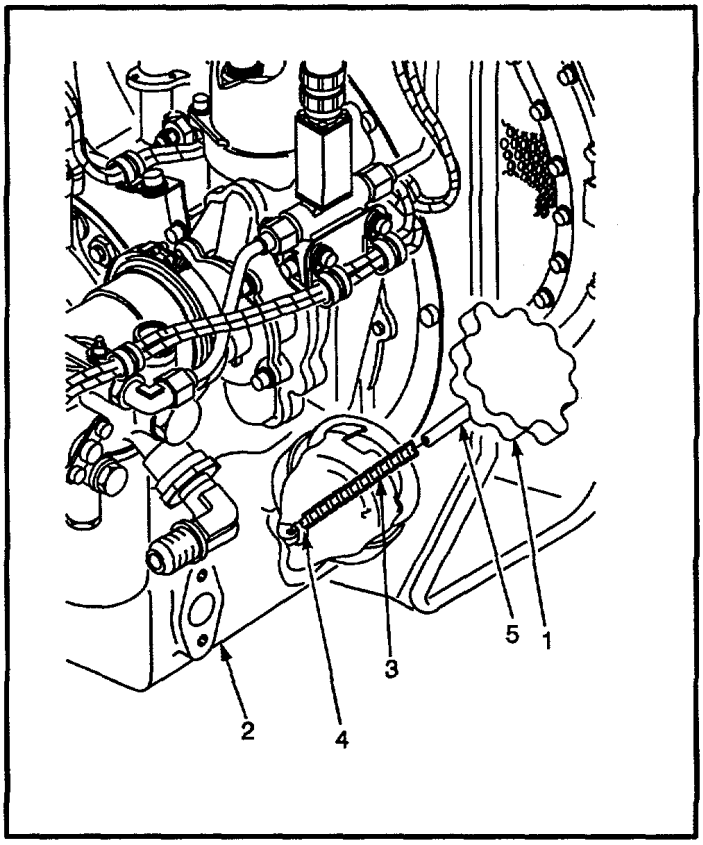
APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

GO TO NEXT PAGE

5-1 REMOVE/INSTALL LIQUID LEVEL GAGE ROD-CAP (CONT)

Lubricating Oil



REMOVAL

1. **Turn liquid level gage rod-cap (1) counter-clockwise and lift to remove from gearbox assembly (2).**

2. Detatch split ring (4) on chain (3) from gearbox assembly (2) filler neck.

3. Clean liquid level gage rod-cap (1) using process 8-1, Chapter 8.

INSPECTION

1. Inspect liquid level gage rod-cap for cracks, bent gage and deteriorated gasket. None allowed.

2. Inspect for broken chain. None allowed.

3. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Install chain (3) onto gearbox assembly (2) filler neck using split ring (4).

2. **Install liquid level gage rod-cap (1)** into gear-box (2).

3. Press down on liquid level gage rod-cap (1) and rotate clockwise until seated.

4. Perform FO. D. inspection.
5. Inspect (T. I.).
6. Install APU enclosure (Refer to TM 1-1520-238-23).

7. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION II COLLECT APU OIL SAMPLE

5-2 COLLECT APU OIL SAMPLE

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Cloth, Cleaning (D5)
Kit, Oil Sample (D14)
Oil, Lubricating (D11 or D13)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-23
TM 55-6650-300-15
Task 5-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

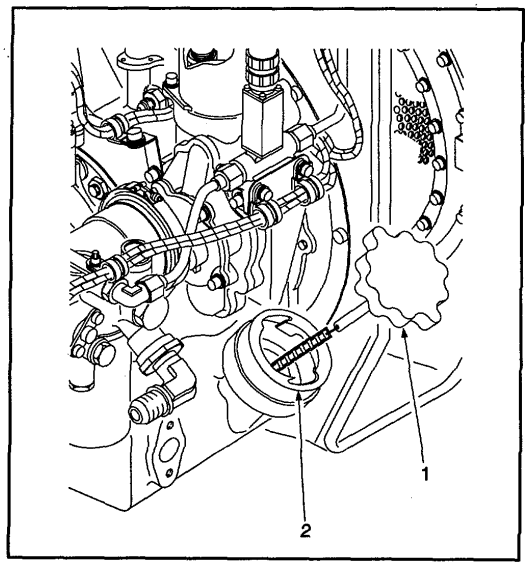
General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

1. Turn liquid level gage rod-cap (1) counterclockwise and lift to remove from gearbox (2).

2. Place finger/thumb over end of tube from oil sample kit (D14) and put open end inside gearbox opening.



Lubricating Oil

3. Remove finger/thumb to allow lubricating oil to enter tube. Place finger/thumb back over tube and remove tube.

4. Fill oil sample bottle with lubricating oil from tube.

GO TO NEXT PAGE

5-2 COLLECT APU OIL SAMPLE (CONT)

5. Install liquid level gage rod-cap (1) into gearbox (2).

6. Press down on liquid level gage rod-cap (1) and rotate clockwise until seated.

7. Wipe up any residual oil with cleaning cloth (D5).

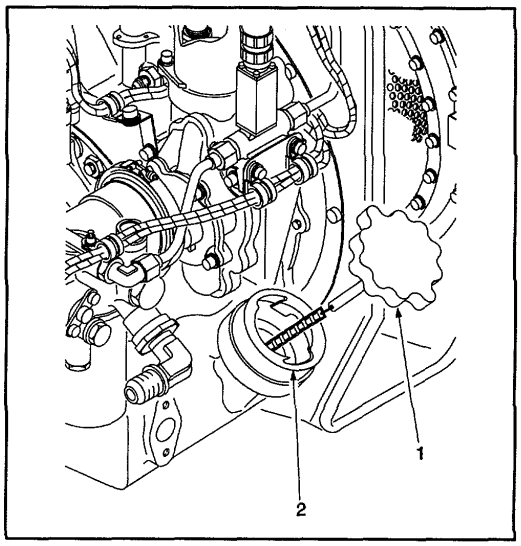
8. Service APU with lubricating oil (D11 or D13) (Task 5-3).

9. Perform FO.D. inspection.

10. Inspect (T.I.).

11. Install APU enclosure (Refer to TM 1-1520-238-23).

12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION III SERVICE APU OIL

5-3 SERVICE APU OIL

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Cloth, Cleaning (D5)
Oil, Lubricating (D11 or D13)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-23
TM 55-6650-300-15
Task 5-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-3 SERVICE APU OIL (CONT)

Lubricating Oil

1.Turn liquid level gage rod-cap (1) counterclockwise and lift to remove from gearbox (2).

2.Using cleaning cloth, remove any oil on dipstick of liquid level gage rod-cap (1).

CAUTION

Do not exceed full line on liquid level gage rod-cap (1) to avoid potential overheat damage to APU.

3. Fill gearbox assembly through filler neck with lubricating oil (D11 or D13) until lubricating oil shows full on oil level sight gage (approximately 2.0 U.S. quarts).

4. Check liquid level gage rod-cap (1) to verify normal oil level is obtained.

5. Install liquid level gage rod-cap (1) into gearbox (2).

6. Press down on liquid level gage rod-cap (1) and rotate clockwise until seated.

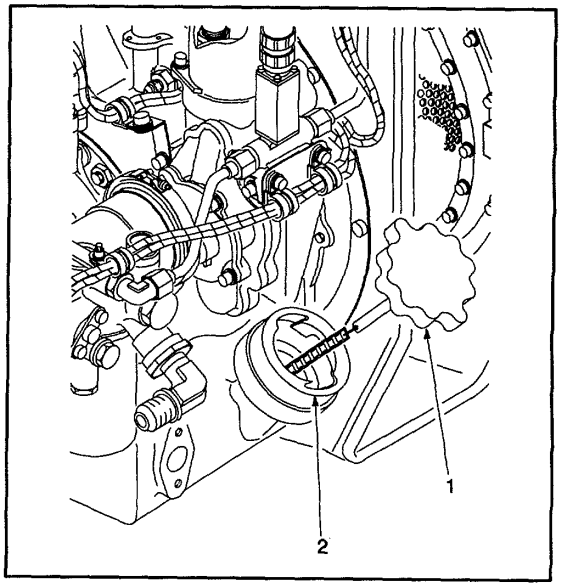
7. Wipe up any residual oil using cleaning cloth (D5).

8. Perform F.O.D. inspection.

9. Inspect (T.I.).

10. Install APU enclosure (Refer to TM 1-1520-238-23).

11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION IV REPLACE APU OIL

5-4 REPLACE APU OIL

INITIAL SETUP

Tools:
Adapter, Drain (T33)
Suitable Container
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Cloth, Cleaning (D5)
Oil, Lubricating (D11 or D13)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23

GO TO NEXT PAGE

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

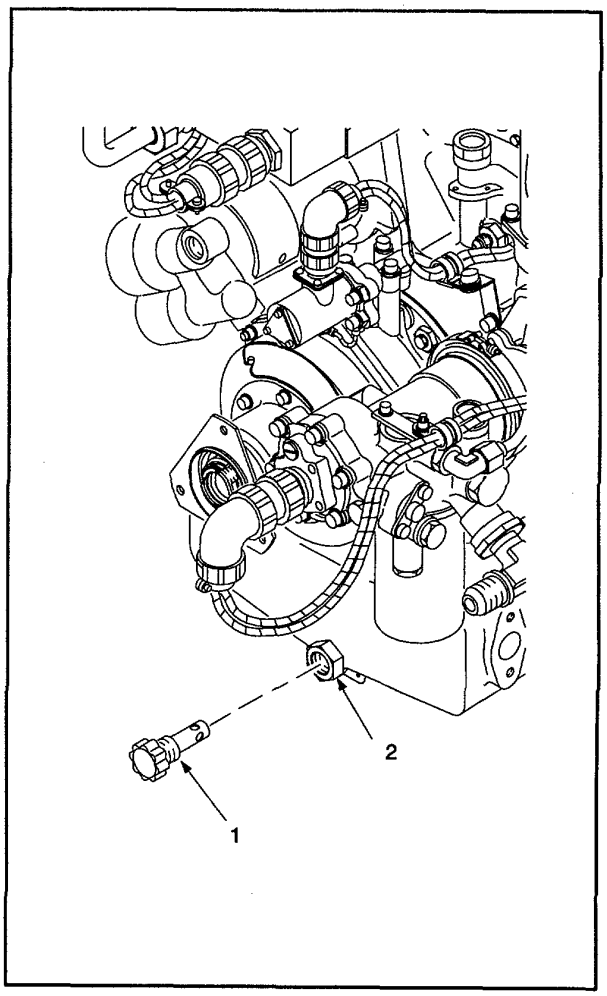
WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

5-4 REPLACE APU OIL (CONT)

Lubricating Oil

1. Remove magnetic drain plug chip collector (1) by pushing in, turning counterclockwise and removing from plug (2).
2. Inspect magnetic drain plug chip collector (1) for metal particles. If contamination is present, refer to Task 5-5.
3. Install drain adapter into plug (2) and rotate clockwise. Drain lubricating oil into suitable bladder type container.
4. Remove drain adapter.
5. Using cleaning cloth (D5), wipe up any residual oil.
6. Install magnetic drain plug chip collector (1), by pushing in and turning clockwise.
7. Service APU with lubricating oil (D11 or D13) (Task 5-3).
8. Perform F.O.D. inspection.
9. Inspect (T.I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE : None.

END OF TASK

SECTION V MAGNETIC DRAIN PLUG CHIP COLLECTOR INSPECTION

5-5 MAGNETIC DRAIN PLUG CHIP COLLECTOR INSPECTION

INITIAL SETUP

Tools:
Tool Kii, General Mechanic' s (T109)

Materials/Parts:
Cloth, Cleaning (D5)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM I-I 520-236-T-6
TM I-I 520-238-23
Tasks 5-2, 5-3, 5-4, 5-7

Equipment Condltlons:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructlons:

WARNING

APU Is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance In thls area. Death or serious Injury could result If APU starts. If Injury occurs, seek medical ald.

GO TO NEXT PAGE

5-5 MAGENTIC DRAIN PLUG CHIP COLLECTOR INSPECTION (CONT)

Lubricating Oil

1. **Remove magnetic drain plug chip collector (1)** by pushing in, turning counterclockwise and removing from plug (2).
2. Inspect magnetic drain plug chip collector (1) for metal particles. If collector is contaminated, complete this task. If collector is not contaminated, perform steps 3, 4, & 15 through 18.

NOTE

The 0 ring on the mag plug (1) does not have to be replaced everytime you pull the mag plug. Only replace it if a leak is noticed. Then replace it with part number M83248/1-008, NSN 5331-00-I 66-0967.

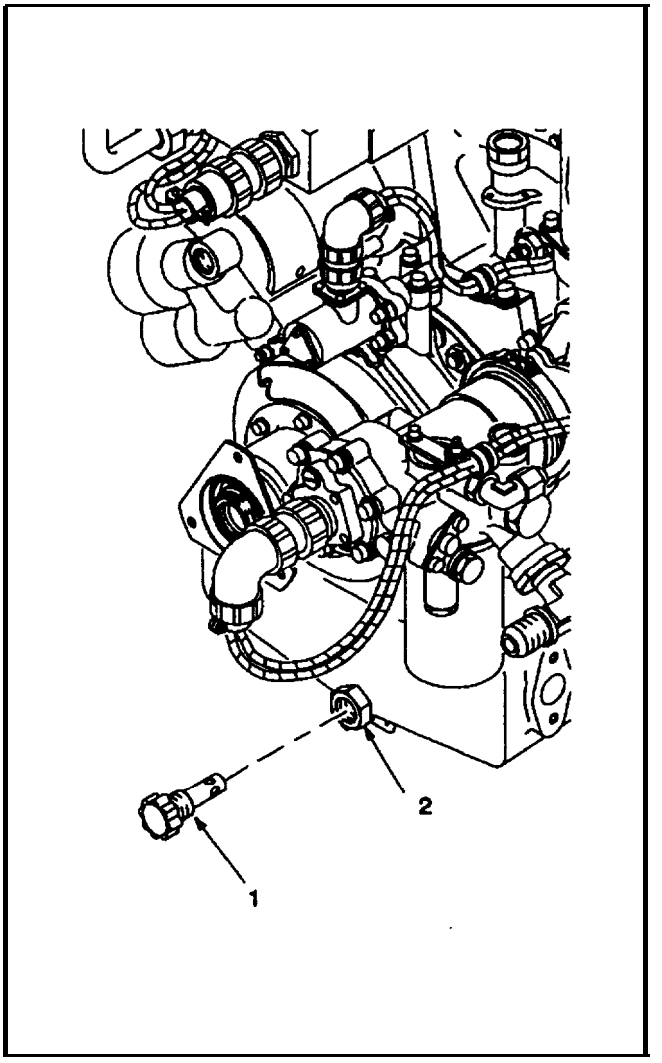
3. Using cleaning cloth (D5), clean magnetic drain plug chip collector.
4. **Install magnetic drain plug chip collector (1),** by pushing in and turning clockwise.
5. Collect APU oil sample (Task 5-2).
6. Service APU with lubricating oil (Dll or D13) (Task 5-3).
7. Perform F.O.D. inspection.
8. Inspect (T.I.).
9. Reset APU HOLD circuit breaker (Refer to TM I-I 520-238-23).
10. Operate APU in accordance with TM I-I 520-238-T-8 for 5 to 10 minutes to bring oil temperature up to operating limits.
11. Pull APU HOLD circuit breaker (Refer to TM I-I 520-238-23).

Lubricating Oil

12. Collect APU oil sample (Task 5-2) while APU oil is still hot.
13. Replace APU oil (Task 5-4).
14. Replace oil filter element (Task 5-7).
15. Perform F.O.D. inspection.
16. Inspect (T.I.).
17. Install APU enclosure (Refer to TM I-I 520-238-23).
18. Reset APU HOLD circuit breaker (Refer to TM I-I 520-238-23).

END OF TASK

FOLLOW-ON MAINTENANCE: None.



SECTION VI REMOVE/INSTALL MAGNETIC DRAIN PLUG ASSEMBLY

5-6 REMOVE/INSTALL MAGNETIC DRAIN PLUG ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D10)
Packing (NSN 5330-00-146-2519)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 5-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Oil Drained From Gearbox (Task 5-3)

General Safety Instructions:

WARNING

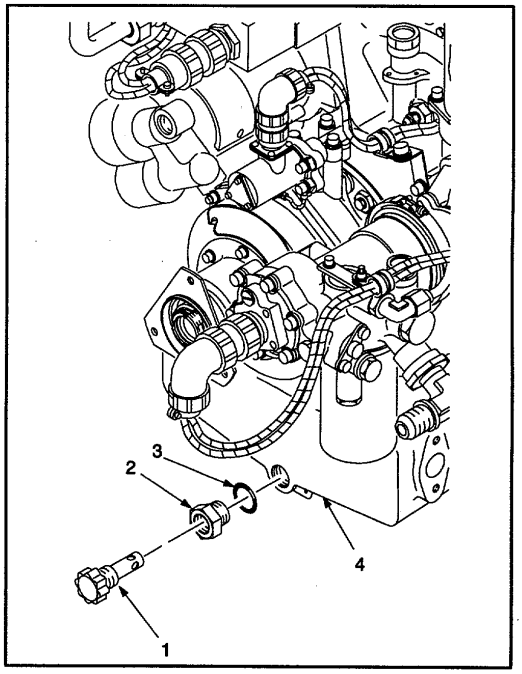
APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-6 REMOVE/INSTALL MAGNETIC DRAIN PLUG ASSEMBLY (CONT)

REMOVAL

1. Remove magnetic drain plug chip collector (1) from plug (2) by pushing in and turning counter-clockwise.
2. Remove plug (2) and packing (3) from gearbox assembly (4). Discard packing (3).



INSPECTION

1. Inspect for crossed, stripped and galled threads. None allowed.
2. Inspect magnetic drain plug assembly for damage. None allowed.
3. Inspect plastic material in plug (2) for damage. None allowed.
4. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat new packing (3) with petrolatum (D15).
2. Install packing (3) on plug (2).
3. Apply Liqui-Moly NV antiseize compound (D7) to threads of plug (2).
4. Install plug (2) in gearbox (4).
5. Secure plug with lockwire (D10).
6. Install magnetic drain plug chip collector (1) into plug (2) by pushing in and turning clockwise.
7. Service APU oil (Task 5-3).
8. Using cleaning cloth (D5), wipe up any residual oil.
9. Perform F.O.D. inspection.
10. Inspect (T.I.).
11. Install APU enclosure (Refer to TM 1-1520-238-23).
12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
13. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION VII REMOVE/INSTALL OIL FILTER ELEMENT

5-7 REMOVE/INSTALL OIL FILTER ELEMENT

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Bag, Plastic (D3)
Cloth, Cleaning (D5)
Lockwire (D1 0)
Oil Filter Element (NSN 4330-01-074-9502)
Packing (NSN 5330-00-008-5858)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 5-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-7 REMOVE/INSTALL OIL FILTER ELEMENT (CONT)

Lubricating Oil

REMOVAL

1. Place cleaning cloth (D5) under work area to catch lubricating oil.
2. Loosen but do not remove two bolts (1) from oil filter housing (2). Rotate oil filter housing counterclockwise and remove from gearbox (3).
3. Remove and discard packing (4).
4. Remove oil filter element (5) and place in plastic bag (D3), discard bag with filter element.
5. Clean oil filter housing (2) using processes 8-1 and 8-2, Chapter 8.

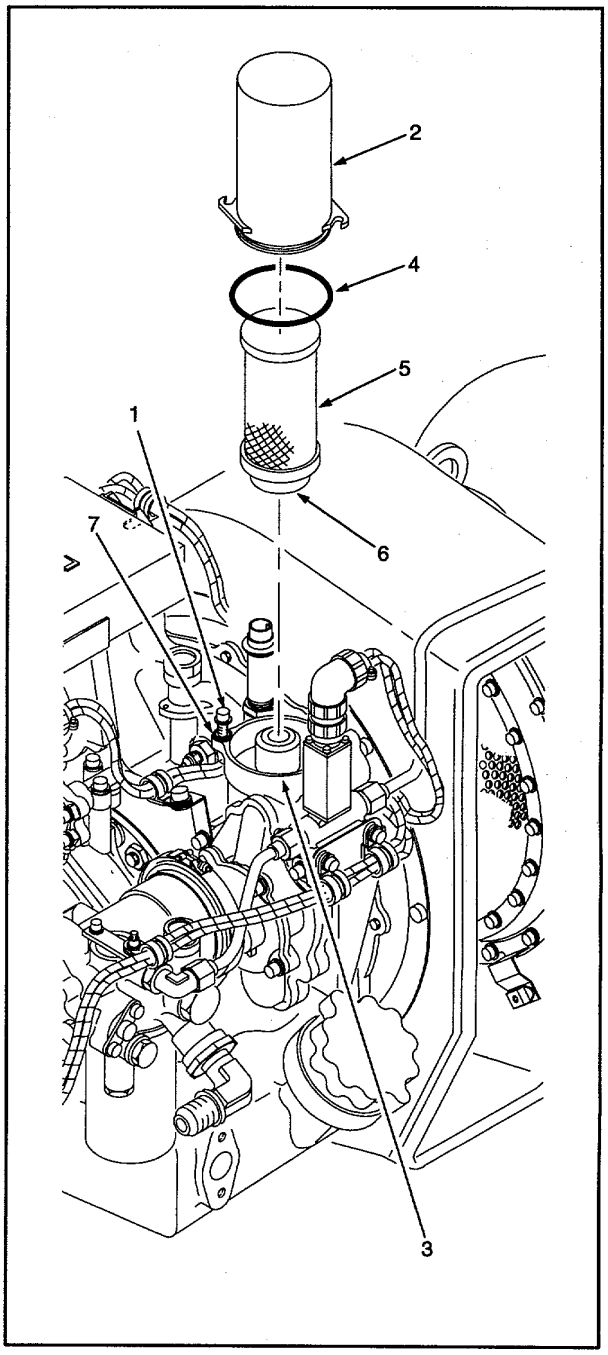
INSPECTION

1. Inspect oil filter housing (2) for cracks. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat installed packing (6) (part of filter element) with petrolatum (D15).
2. Install new oil filter element (5) on gearbox (3).
3. Lightly coat new packing (4) with petrolatum (D15). Install packing (4) on oil filter housing (2).
4. Install oil filter housing (2) on gearbox (3).
5. Hold two washers (7) up under head of bolts (1) and rotate oil filter housing (2) clockwise to seat against bolts (1). Torque bolts (1) to 38 to 42 inch-pounds.

GO TO NEXT PAGE

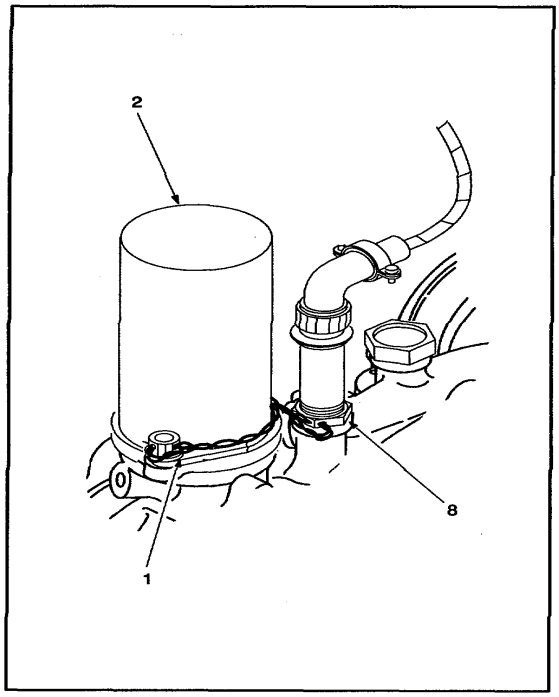


5-7 REMOVE/INSTALL OIL FILTER ELEMENT (CONT)

6. Secure two bolts (1), holding oil filter housing (2) to LOP switch (8), with lockwire (D10).
7. Wipe up any residual oil using cleaning cloth (D5).
8. Service APU oil (Task 5-3).
9. Perform F.O.D. inspection.
10. Inspect (T.I.).
11. Install APU enclosure (Refer to TM 1-1520-238-23).
12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
13. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK



SECTION VIII REMOVE/INSTALL LOP SWITCH

5-8 REMOVE/INSTALL LOP SWITCH

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Crowfoot Attachment, Socket Wrench, Open End, 1 1/8 X 3/8-inch Drive (T32)
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D9)
Lockwire (D10)
Packing (NSN 5330-00-150-4228
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-343-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-8 REMOVE/INSTALL LOP SWITCH (CONT)

Lubricating Oil

REMOVAL

CAUTION

To prevent clogging or contamination, all exposed openings in fuel, oil, air lines and electrical connectors will be capped immediately. Be sure caps and plugs are clean.

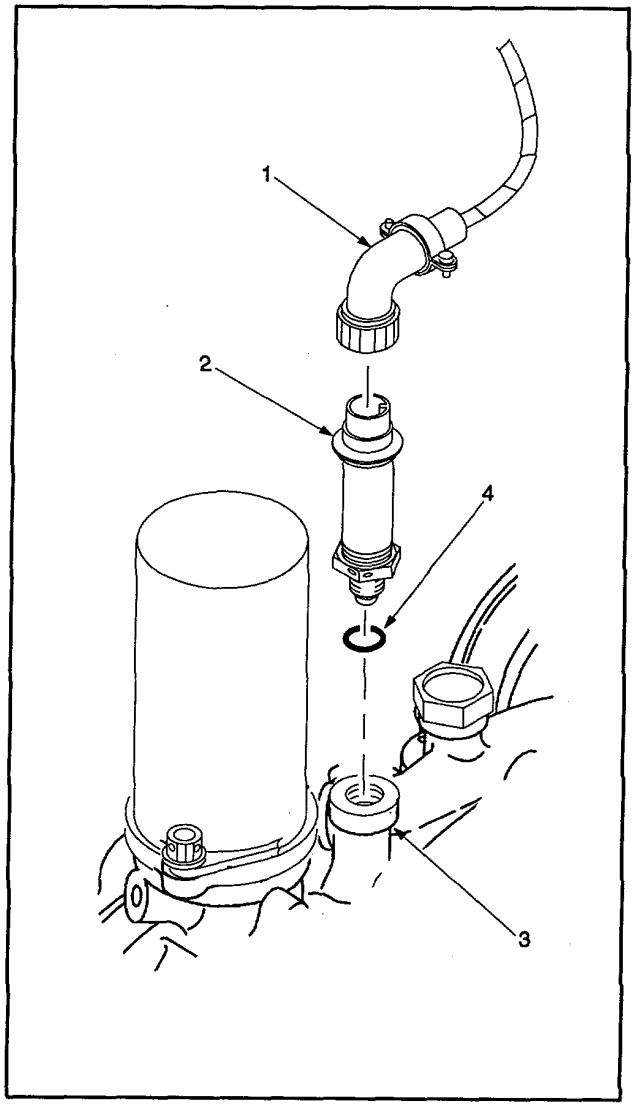
1. Disconnect electrical connector (1) from LOP switch (2).
2. Remove LOP switch (2) from gearbox (3). Remove and discard packing (4).
3. Clean LOP switch (2) using process 8-2, Chapter 8.

INSPECTION

1. Inspect LOP switch for crossed, stripped and galled threads. None allowed.
2. Inspect LOP switch for cracks or leaks. None allowed.
3. Inspect LOP switch for damaged contacts. None allowed.
4. Inspect for corrosion. Refer to TM 55-1500-343-23.

INSTALLATION

1. Lightly coat new packing (4) with petrolatum (D15). Install packing (4) on LOP switch (2).
2. Lightly coat threads of LOP switch (2) with Liqui-Moly NV antiseize compound (D7).
3. Install LOP switch (2) with packing (4) into gearbox (3). Torque to 95 to 105 Inch-pounds.



GO TO NEXT PAGE

5-8 REMOVE/INSTALL LOP SWITCH (CONT)

4. Wipe up any residual oil using cleaning cloth (D5).

5. Connect electrical connector (1) to LOP switch (2). Secure connector with lockwire (D9).

6. Lockwire LOP switch (2) with lockwire (D10).

7. Perform F.O.D. inspection.

8. Inspect (T.I.).

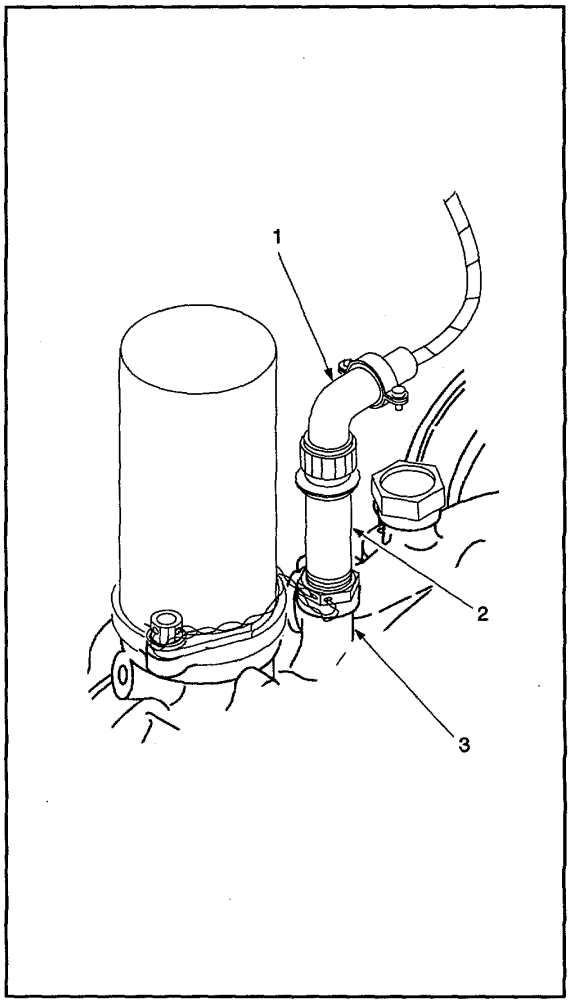
9. Install APU enclosure (Refer to TM 1-1520-238-23).

10. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

11. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK



SECTION IX REMOVE/INSTALL OIL PLUG

5-9 REMOVE/INSTALL OIL PLUG

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (Dl 0)
Packing (NSN 5330-00-150-4228)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

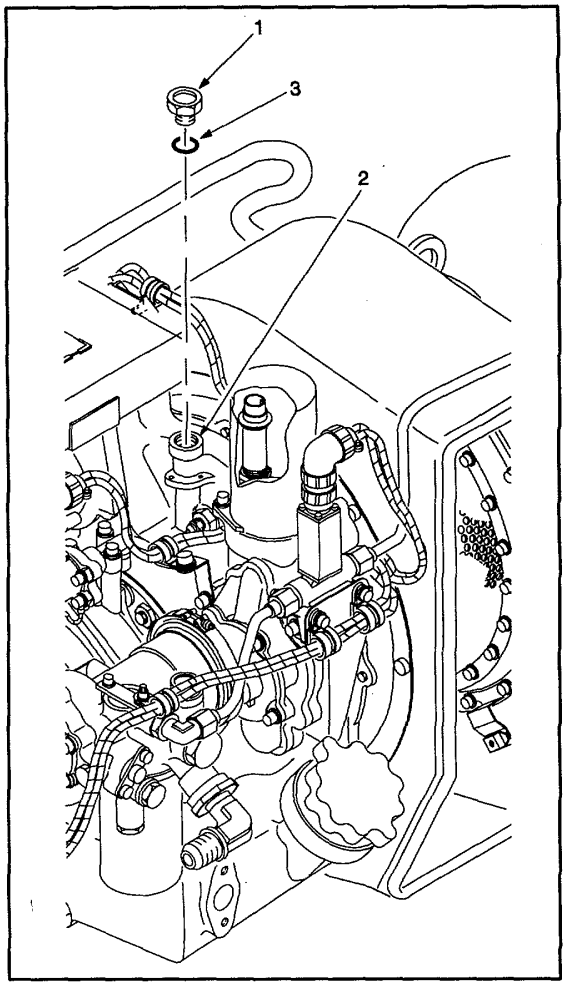
WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-9 REMOVE/INSTALL OIL PLUG (CONT)

Lubricating Oil



REMOVAL

1. Remove oil plug (1) from gearbox (2).
2. Remove and discard packing (3).

INSPECTION

1. Inspect oil plug for crossed, stripped and galled threads. None allowed.
2. Inspect oil plug for cracks or leaks. None allowed.
3. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat new packing (3) with petrolatum (D15).
2. Install packing (3) on serviceable oil plug (1).
3. Apply Liqui-Moly NV antiseize compound (D7) to threads of oil plug (1).
4. Install oil plug (1) in top of gearbox (2).
5. Torque oil plug to 63 to 68 inch-pounds.
6. Wipe up any residual oil using cleaning cloth (D5).
7. Secure oil plug (1) with lockwire (D10).
8. Perform F.O.D. inspection.
9. Inspect (T.I.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION X REMOVE/INSTALL OIL LEVEL SIGHT GAGE

5-10 REMOVE/INSTALL OIL LEVEL SIGHT GAGE

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Open End, 1 1/2 & 1 5/8-inch (T116)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D10)
Packing (NSN 5330-00-342-0528)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Task 5-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Oil Drained From Gearbox (Task 5-3)

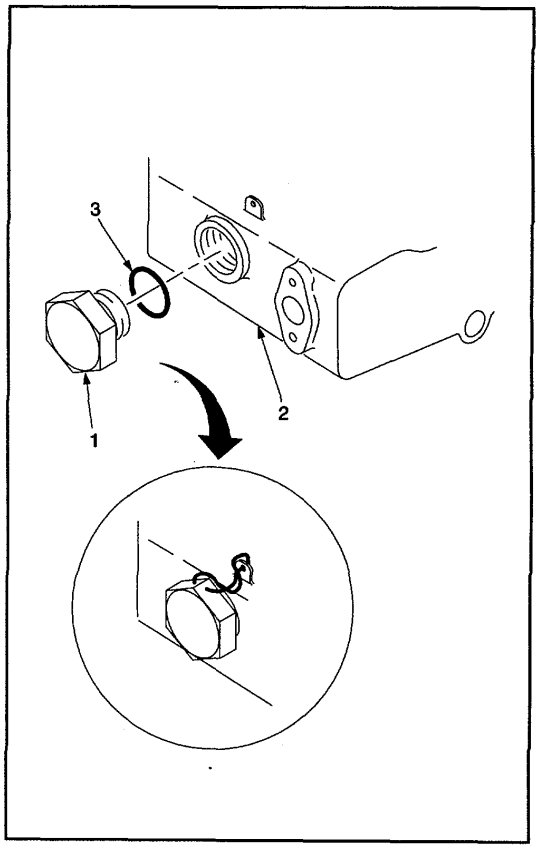
General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-10 REMOVE/INSTALL OIL LEVEL SIGHT GAGE (CONT)



Lubricating Oil

REMOVAL

1. Place cleaning cloth (D5) and suitable container under work area to catch lubricating oil.
2. Remove oil level sight gage (1) from gearbox (2).
3. Remove and discard packing (3).

INSPECTION

1. Inspect oil level sight gage for crossed, stripped and galled threads. None allowed.
2. Inspect oil level sight gage for cracks or leaks. None allowed.
3. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat new packing (3) with petrolatum (D1 5).
2. Install packing (3) on oil level sight gage (1).
3. Apply Liqui-Moly NV antiseize compound (D7) to threads of oil level sight gage (1).
4. Install oil level sight gage (1) in gearbox (2).
5. Remove cleaning cloth and suitable container from under work area.
6. Wipe up any residual oil using cleaning cloth (D5).
7. Secure oil level sight gage (1) to gearbox (2) with lockwire (D10).
8. Service APU oil (Task 5-3).
9. Perform F.O.D. inspection.
10. Inspect (T.I.).
11. Install APU enclosure (Refer to TM 1-1520-238-23).
12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
13. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION XI REMOVE/INSTALL OIL PUMP

5-11 REMOVE/INSTALL OIL PUMP

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Packing (NSN 5330-00-166-1072)
Packing (NSN 5330-01-345-4354)
Packing (NSN 5330-01-361-0855)
Packing (P/N S9413-150, CAGEC 99193)
Petrolatum (D15)
Petrolatum (Di5)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 3-2, 3-4, 3-5, 3-6, 5-12

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed
Fuel Control Assembly Removed (Task 3-2)
Solenoid Valve Bracket Removed (Task 3-4)
Fuel Control to Solenoid Tube Assembly Removed (Task 3-5)
Fuel Nozzle to Solenoid Tube Assembly Removed (Task 3-6)

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

5-11 REMOVE/INSTALL OIL PUMP (CONT)

Lubricating Oil

REMOVE

1. Place cleaning cloth (D5) and suitable container under work area to catch lubricating oil.

NOTE

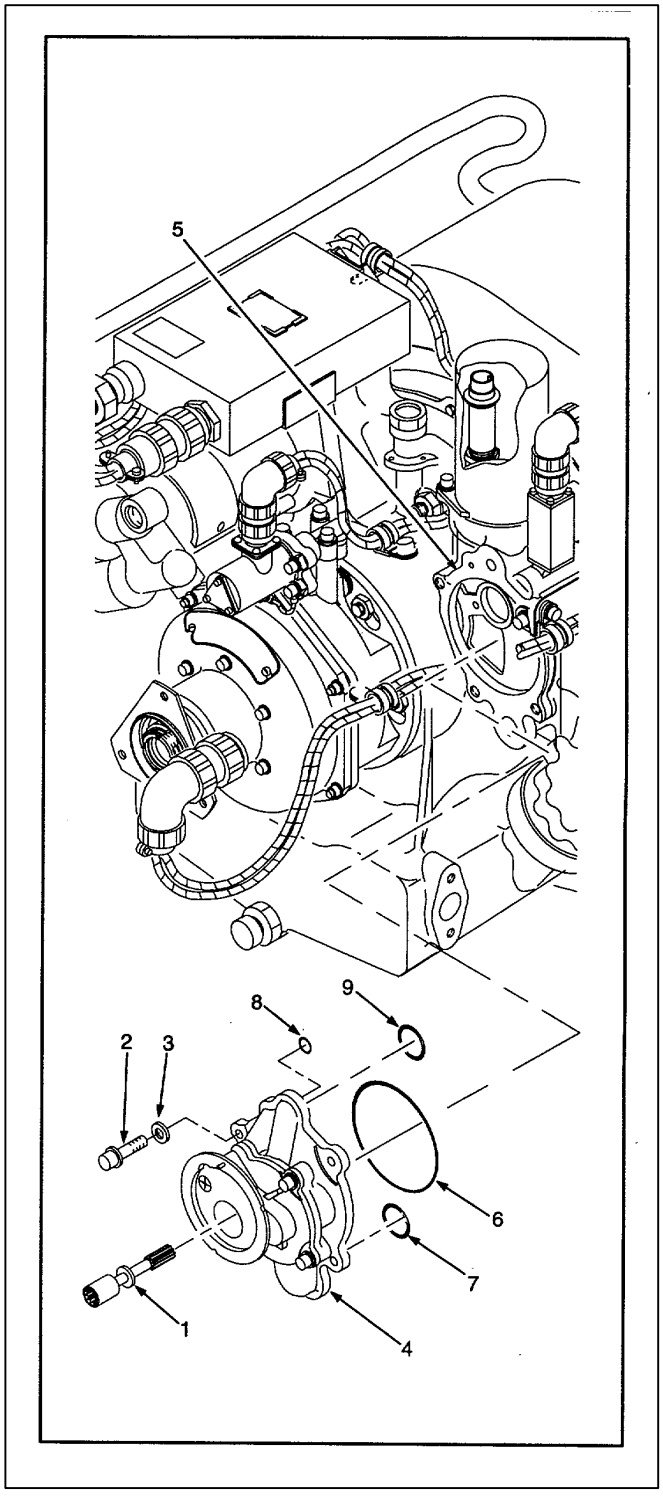
It is possible that the splined shaft may stay in the fuel control assembly when it is removed from the oil pump. If this happens, remove splined shaft from the fuel control assembly and install it during the installation portion of this task.

2. Remove splined shaft (1) from oil pump (4).
3. Remove bolts (2) and washers (3) securing oil pump (4) to gearbox (5).
4. Remove oil pump (4).
5. Remove packings (6 through 9) from oil pump (4) and discard.
6. Remove oil pump drive gear (Task 5-12).

INSPECT

1. Inspect splined shaft splines for chips, missing or other damage. None allowed.
2. Inspect exterior of pump housing for cracks and missing hardware. None allowed.
3. Inspect for leaks. None allowed.
4. Inspect for corrosion. Refer to TM 55-1500-344-23.

GO TO NEXT PAGE



5-11 REMOVE/INSTALL OIL PUMP (CONT)

INSTALLATION

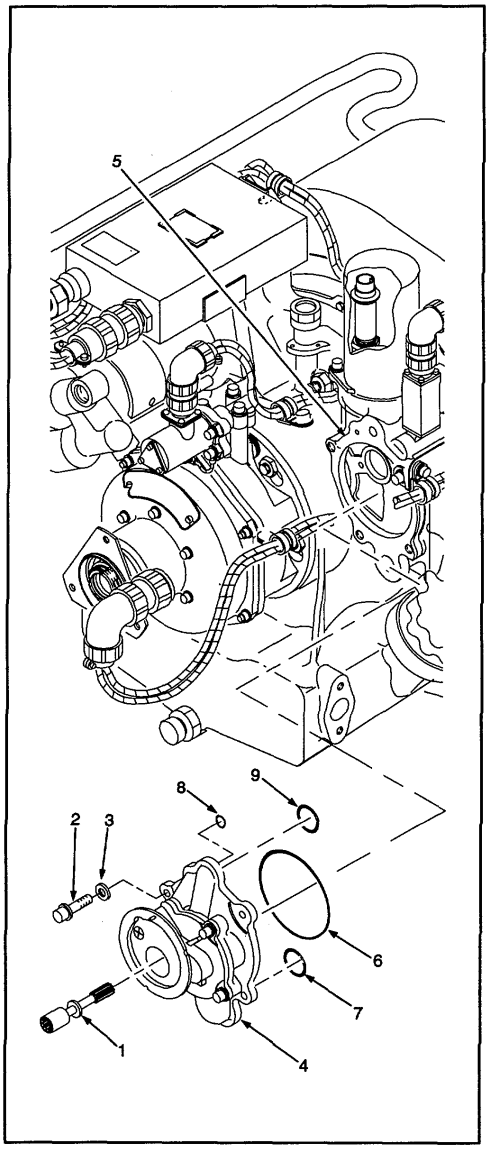
1. Install oil pump gear (Task 5-12).
2. Lightly coat packings (6 through 9) with petrolatum (D15) and install on oil pump (4).
3. Apply Liqui-Moly NV antiseize compound (D7) to threads of bolts (2).
4. Install oil pump (4) on gearbox (5) and secure, at inboard bolt holes, with two bolts (2) and washers (3).

5. Torque bolts (2) to 76 to 84 inch-pounds.
6. Insert splined shaft (1) in oil pump (4) with splines aligned.

7. Remove cleaning cloth and suitable container from under work area.

8. Wipe up any residual oil using cleaning cloth (D5).
9. Install fuel control assembly (Task 3-2).

10. Install solenoid valve bracket (Task 3-4).
11. Install fuel control to solenoid tube assembly (Task 3-5).
12. Install fuel nozzle to solenoid tube assembly (Task 3-6).
13. Perform F.O.D. inspection.
14. Inspect (T.I.).
15. Install APU enclosure (Refer to TM 1-1520-238-23).
16. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).
17. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
18. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).



FOLLOW-ON MAINTENANCE: None.

END OF:TASK

SECTION XII REMOVE/INSTALL OIL PUMP

5-11 REMOVE/INSTALL OIL PUMP

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 3-2, 3-4, 3-5, 3-6, 5-11

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Fuel Circuit Breaker Pulled
APU Enclosure Removed
Fuel Control Assembly Removed (Task 3-2)
Solenoid Valve Bracket Removed (Task 3-4)
Fuel Control to Solenoid Tube Assembly Removed (Task 3-5)
Fuel Nozzle to Solenoid Tube Assembly Removed (Task 3-6)
Oil Pump Removed (Task 5-11)

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

5-12 REMOVE/INSTALL OIL PUMP(CONT)

Lubricating Oil

REMOVE

1. Remove bolt (1), washer (2) and oil pump gear (3) from oil pump (4).

INSPECT

2. Inspect oil pump gear for cracks, missing teeth and damage. None allowed.

3. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Apply Liqui-Moly NV antiseize compound (D7) to threads of bolt (1).

2. Place oil pump gear (3) into oil pump (4) and secure with washer (2) and bolt (1).

3. Torque bolt (1) to 38 to 42 inch-pounds.

4. Wipe up any residual oil using cleaning cloth (D5).

5. Install fuel control assembly (Task 3-2).

6. Install oil pump (Task 5-11).

7. Install solenoid valve bracket (Task 3-4).

8. Install fuel control to solenoid tube assembly (Task 3-5).

9. Install fuel nozzle to solenoid tube assembly (Task 3-6).

10. Perform FO.D. inspection.

11. Inspect (T.I.).

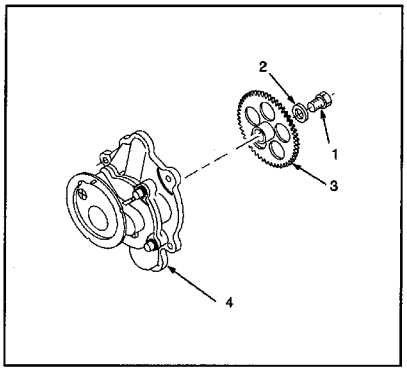
12. Install APU enclosure (Refer to TM 1-1520-238-23).

13. Reset APU fuel circuit breaker (Refer to TM 1-1520-238-23).

14. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

15. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

CHAPTER 6

GEARBOX ASSEMBLY MAINTENANCE

SECTION I REMOVE/INSTALL LIFTING LUG

6-1 REMOVE/INSTALL LIFTING LUG

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

Materials/Parts:
Compound, Antiseize, C5A (D6)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

General Safety Instructions:

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

6-1 REMOVE/INSTALL LIFTING LUG (CONT)

REMOVAL

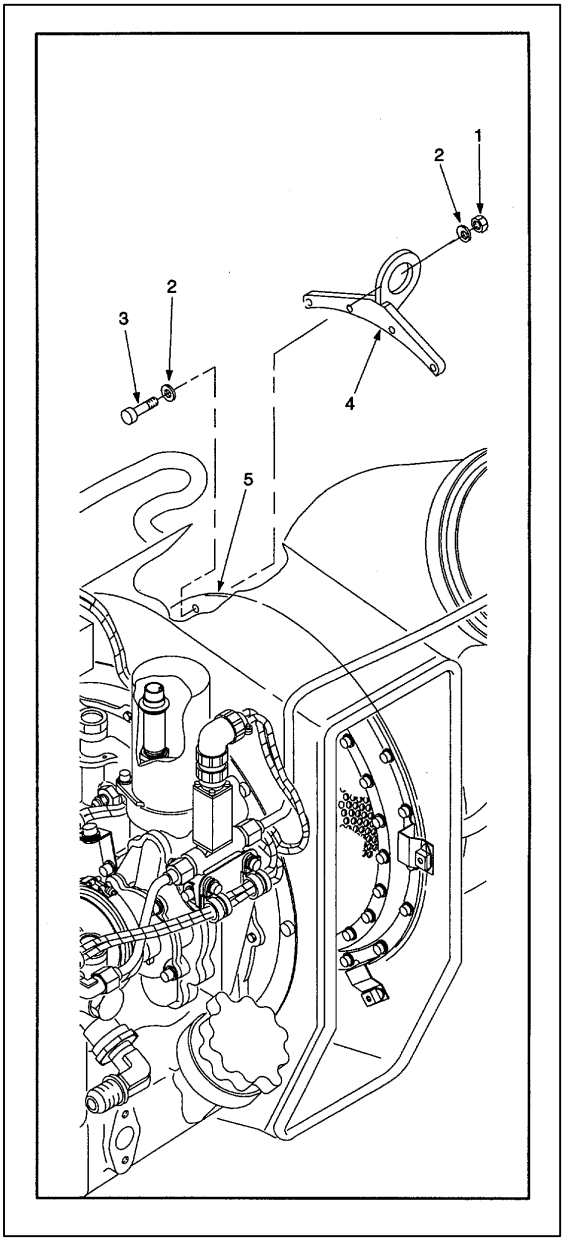
1. Remove four nuts (1), four bolts (3) and seven washers (2).
2. Remove lifting lug (4) from wiring harness bracket and flange (5).
3. Clean lifting lug (4) using process 8-1, Chapter 8.

INSPECTION

1. Inspect lifting lug for cracks. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Apply C5A antiseize compound (D6) to threads of bolts (3).
2. Align lifting lug (4) to flange (5).
3. Secure lifting lug (4) and wiring harness bracket with bolts (3), washers (2) and nuts (1).
4. Torque nuts (1) to 50 to 60 inch-pounds.
5. Perform F.O.D. inspection.
6. Inspect (T.I.).
7. Install APU enclosure (Refer to TM 1-1520-238-23).
8. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).



FOLLOW-ON MAINTENANCE: None.

END OF TASK

6-2 REMOVE/INSTALL AFT MOUNT ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Lifting Sling (T69)
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, C5A (D6)
Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector
Assistant

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Task

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Aircraft No. 7 Drive Shaft Removed
APU Exhaust Nozzle Removed
Maintenance Crane Installed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

6-2 REMOVE/INSTALL AFT MOUNT ASSEMBLY (CONT)

REMOVE

1. Using lifting sling and maintenance crane, relieve pressure on aft mount assembly (4).
2. Remove support strut from aft mount assembly (4) in accordance with TM 1-1520-238-23.
3. Remove four nuts (1), four bolts (3) and seven washers (2).
4. Remove aft mount assembly (4) from flange (5).
5. Clean aft mount assembly (4) using process 8-1, Chapter 8.

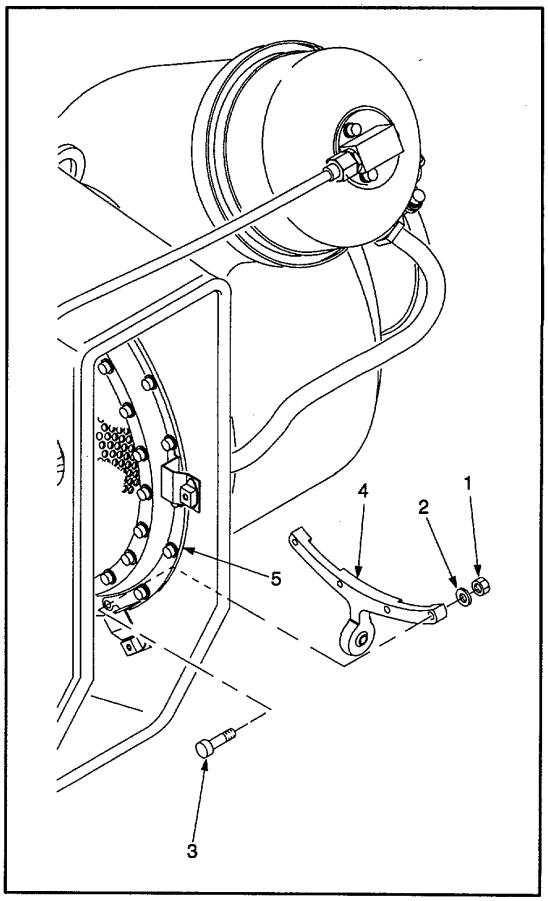
INSPECTION

1. Inspect aft mount assembly for cracks. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.
3. Inspect mount ball bearing for looseness. Ball shall be stiff to move and ball bearing case shall show no signs of movement within the mount assembly.

INSTALLATION

1. Apply C5A antiseize compound (D6) to threads of bolts (3).
2. Align aft mount assembly (4) to flange (5).
3. Secure aft mount assembly (4) with bolts (3), washers (2) and nuts (1).
4. Torque nuts (1) to 50 to 60 inch-pounds.
5. Attach aft mount assembly (4) to support strut in accordance with TM 1-1520-238-23.
6. Release pressure on lifting sling and remove from APU and maintenance crane.
7. Remove maintenance crane from aircraft (Refer to TM 1-1520-238-23).
8. Install APU Exhaust Nozzle (Refer to TM 1-1520-238-23).
9. Install Aircraft No. 7 Drive Shaft (Refer to TM 1-1520-238-23).
10. Perform FO.D. inspection.
11. Inspect (T.I.).
12. Install APU enclosure (Refer to TM 1-1520-238-23).
13. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

SECTION III REMOVE/INSTALL VENT FITTING

6-3 REMOVE/INSTALL VENT FITTING

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Compound, Antiseize, Liqui-Moly NV (D7)
Lockwire (D10)
Packing (NSN 5330-00-165-1972)
Petrolatum (D15)
Safetywire Seal (D19)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector
APU is easy to start. Disconnect battery.

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

6-3 REMOVE/INSTALL VENT FITTING (CONT)

REMOVE

1. **Remove gearbox vent hose** from vent fitting (1) in accordance with TM 1-1520-238-23.

2. **Remove vent fitting** (1) from boss on gearbox (2).

3. Remove and discard packing (3).

INSPECTION

1. Inspect vent fitting (1) for crossed, stripped and galled threads. None allowed.

2. Inspect vent fitting for obstructions. Remove obstructions.

3. Inspect for corrosion. Refer to TM 55-1500-344-23.

INSTALLATION

1. Lightly coat packing (3) with petrolatum (D15).
2. **Install packing (3)** on vent fitting (1).
3. Lightly coat threads on vent fitting with Liqui-Moly NV antiseize compound (D7).
4. **Install vent fitting** in gearbox (2) boss.

5. Torque vent fitting (1) to 60 inch-pounds.

6. **Install gearbox vent hose** onto vent fitting (1) in accordance with TM 1-1520-238-23.

7. Perform FO.D. inspection.

8. Inspect (T.I.).

9. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

10. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T).

11. Check vent fitting for excess leakage. If vent leakage is in excess of limits (13.5 cc/hr maximum), reposition vent fitting by loosening vent fitting and retorquing to 62 inch-pounds.

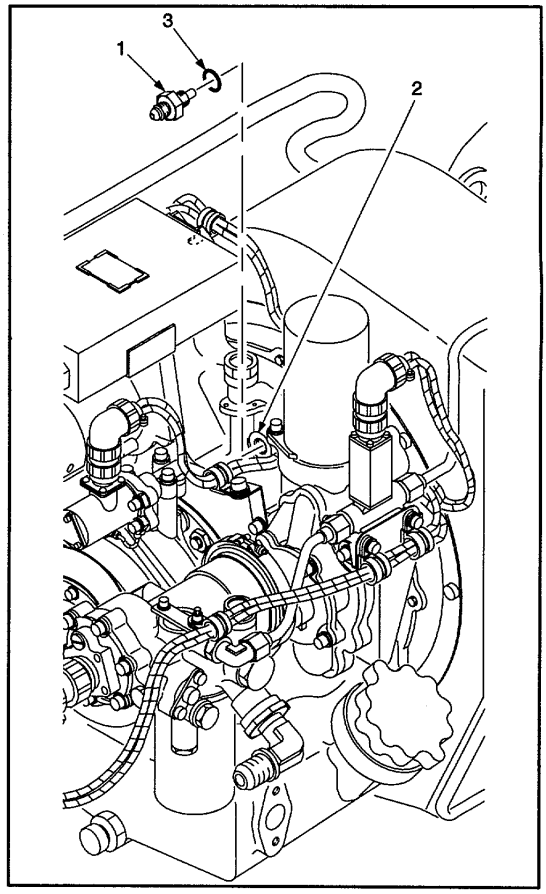
12. Run APU for 5 minutes and recheck vent fitting for leakage. If leakage continues, torque vent fitting in increments of 2 pounds more and run again. It may take more than one adjustment to bring leakage into limits.

13. Torque to a maximum of 70 inch-pounds. If vent fitting still leaks, replace vent fitting and repeat steps 10 & 11.

14. **Secure** vent fitting (1) **with lockwire** (D10) and safetywire seal (D19).

15. Install APU enclosure (Refer to TM 1-1520-238-23).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

CHAPTER 7
ACCESSORY MAINTENANCE
SECTION I REMOVE/INSTALL HYDRAULIC STARTER

7-1 REMOVE/INSTALL HYDRAULIC STARTER

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)
Ignition Unit Bracket Removed (Task 4-8)

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Ignition Unit Removed (Task 4-7)

Materials/Parts:
Cloth, Cleaning (D5)
Compound, Antiseize, Liqui-Moly NV (D7)
Packing (NSN 5330-00-008-5858)
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 4-7, 4-8

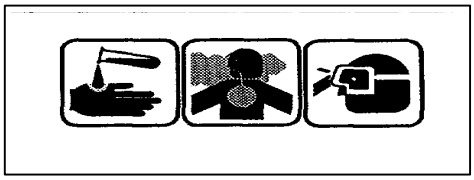
GENERAL SAFETY INSTRUCTIONS

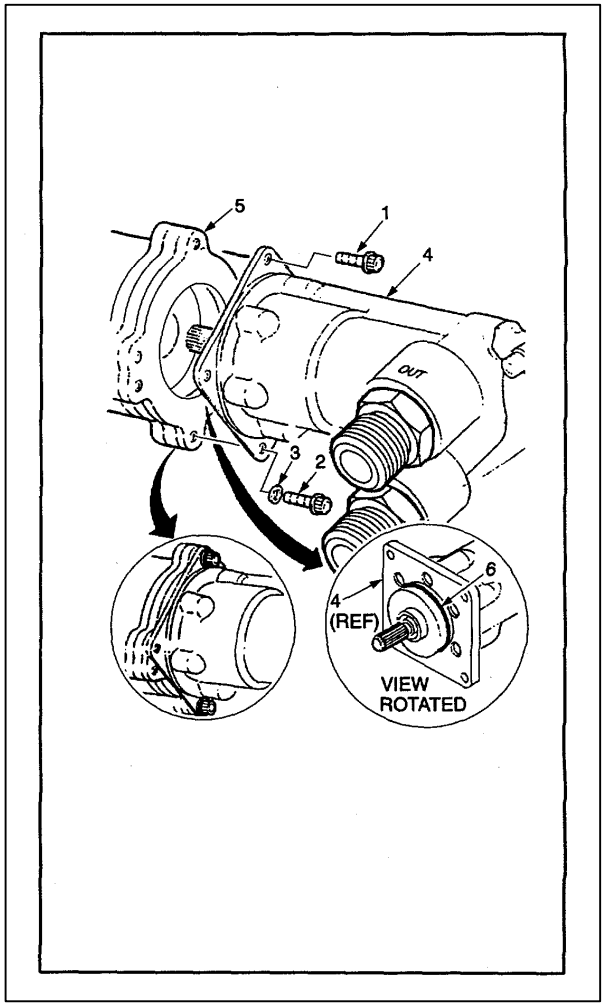
WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

7-1 REMOVE/INSTALL HYDRAULIC STARTER (CONT)





REMOVAL

1. Place cleaning cloth (D5) and suitable container under work area to catch fluid.
2. Disconnect aircraft hydraulic lines from hydraulic starter (4) (Refer to TM 1-1520-238-23).
3. Remove bolt (1), bolt (2) and washer (3).
4. Remove hydraulic starter (4) from gearbox (5).
5. Remove packing (6) from hydraulic starter (4) and discard.
6. Clean hydraulic starter (4) using process 8-2, Chapter 8.

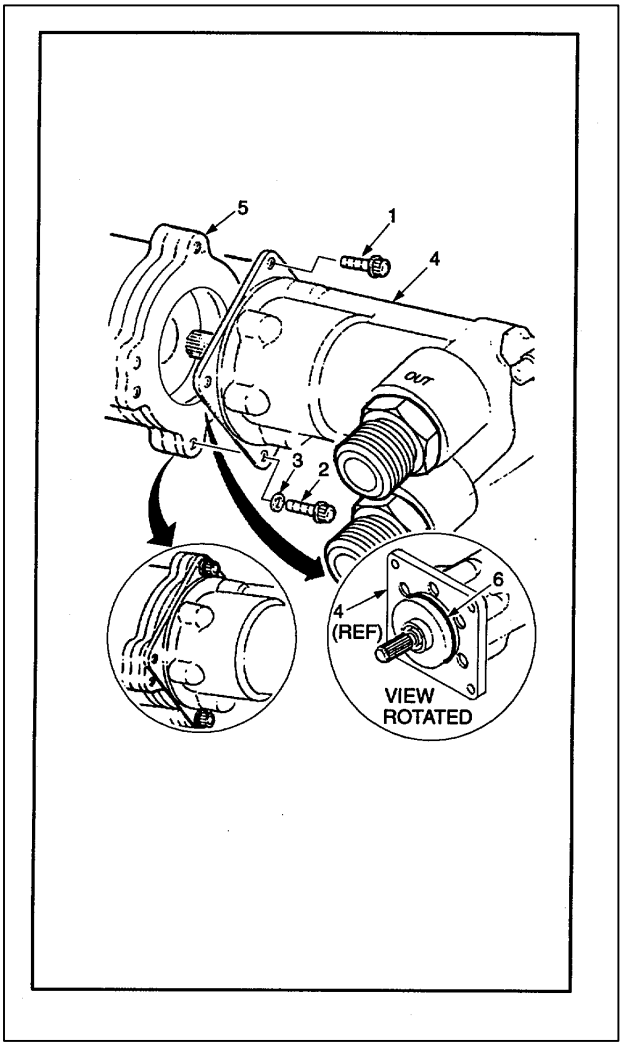
INSPECTION

1. Inspect starter mounting flange for nicks, scratches and cracks. None allowed.
2. Inspect starter for leaks. None allowed.
3. Inspect starter for damaged threads. None allowed.
4. Inspect sheer shaft for damaged or cracked splines, and shaft for cracks. None allowed.
5. Inspect for corrosion. Refer to TM 55-1 500-344-23.

GO TO NEXT PAGE

7-1 REMOVAL/INSTALL HYDRAULIC STARTER (CONT)

INSTALLATION



1. Lightly coat new packing (6) with petrolatum (D15).
2. Install packing (6) on hydraulic starter (4).
3. Lightly coat threads of bolts (1, 2) with Liqui-Moly NV antiseize compound (D7).
4. Position hydraulic starter (4) under head of bolt (1).
5. Install bolt (2) and washer (3) in bottom mount of hydraulic starter (4).

NOTE

Bolt (1) will be torqued when ignition unit bracket is installed.

6. Torque bolt (2) to 95 to 105 inch-pounds.
7. Connect aircraft hydraulic lines to hydraulic starter (4) (Refer to TM 1-1520-238-23).
8. Install ignition unit bracket (Task 4-8).
9. Install ignition unit (Task 4-7).
10. Remove cleaning cloth and suitable container from under work area.
11. Wipe up any residual oil using cleaning cloth (D5).
12. Perform F.O.D. inspection.
13. Inspect (T.I.).
14. Install APU enclosure (Refer to TM 1-1520-238-23).
15. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
16. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T-8).

FOLLOW-ON MAINTENANCE: None.

END OF TASK

SECTION II REMOVE/INSTALL CLUTCH ASSEMBLY

7-2 REMOVE/INSTALL CLUTCH ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Suitable Container
Tool Kit, General Mechanic's (T109)
Wrench, Torque, Click Type, 1/4 in. drive, 30-150 inch-pounds (T120)

Materials/Parts:
Cloth, Cleaning (D5)
Packing (NSN 5330-01-182-5114)
Petrolatum (D15)
Protective Caps and Plugs

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23
Tasks 5-4, 5-5. 5-7, 7-3

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed
Aircraft No. 7 Drive Shaft Removed
Solenoid Valve Assembly Removed

General Safety Instructions:

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

7-2 REMOVE/INSTALL CLUTCH ASSEMBLY (CONT)

REMOVAL

1. Place cleaning cloth (D5) and suitable container under clutch assembly.
2. **Loosen six nuts** (1).
3. **Rotate clutch** assembly (2) to align large opening in slots (3) with nuts (1).

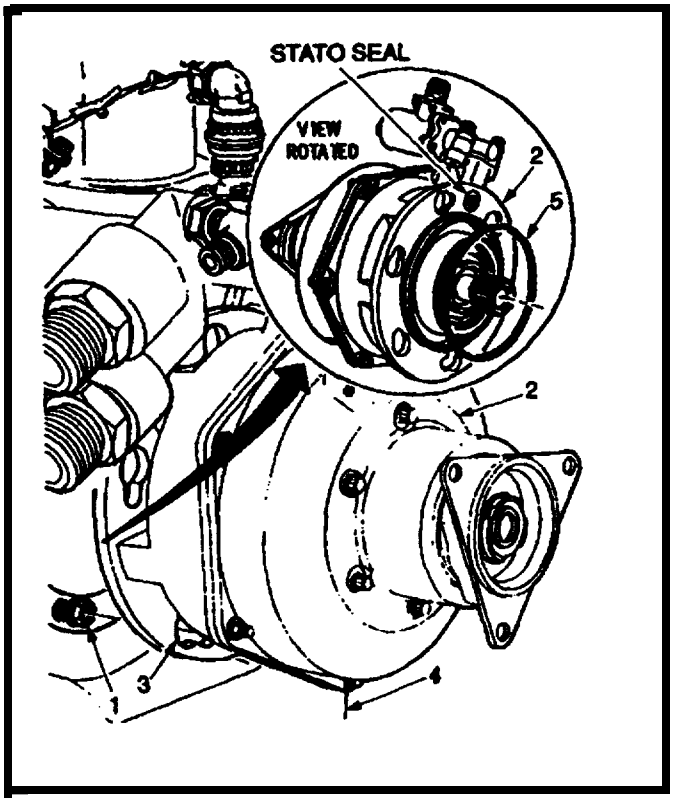
CAUTION

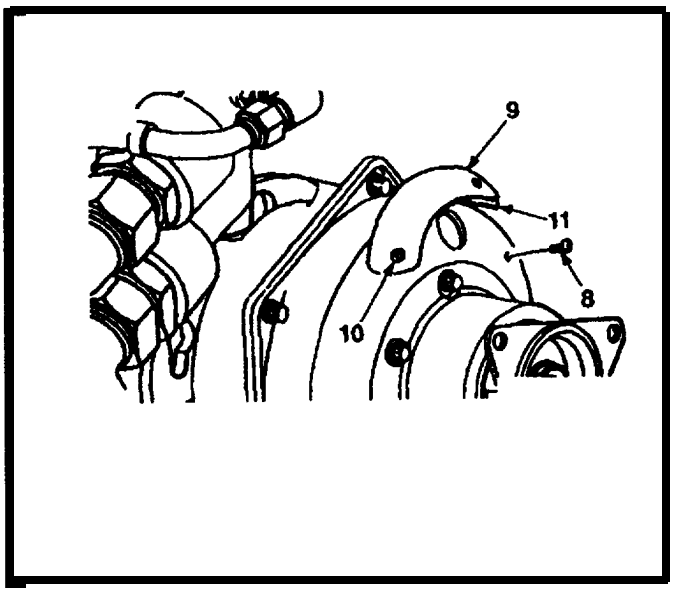
Do not attempt to remove rubber from stato seal on back of clutch assembly (4). This is not a packing and does not require replacement. Any damage to stato seal is cause for replacement of clutch assembly.

4. **Remove clutch assembly (2)** from gearbox (4).
5. Remove and **discard packing (5).**

INSPECTION

1. Inspect for external oil or grease leaks. None allowed.
2. Inspect mounting flange for cracked or elongated bolt holes. None allowed.
3. Inspect stato seal for abrasions, cuts, tears and deterioration. None allowed.
4. Check for internal oil or grease leaks as follows:
   a. Remove one screw (8) from nameplate (9).
   b. Loosen remaining screw (10).
   c. Carefully rotate nameplate (9) and gasket (11) upward. Secure screw (10).
   d. Inspect cavity for any sign of oil or grease. None allowed.
   e. Loosen screw (10). Carefully rotate nameplate (9) and gasket (11) back into position.
   f. Install screw (8). Tighten screws (8, 10).
5. Inspect for corrosion. Refer to TM 55-1 500-344-23.





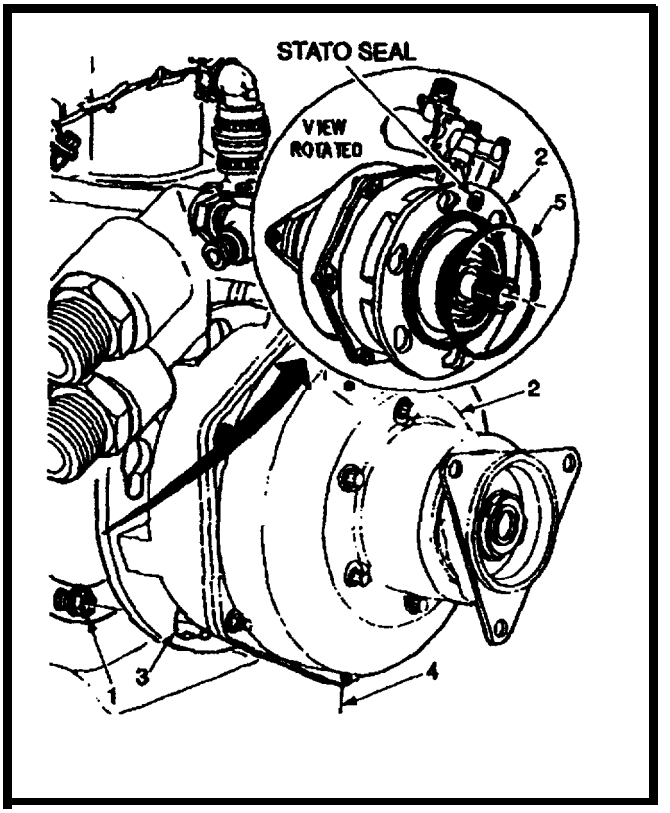
GO TO NEXT PAGE

7-2 REMOVE/INSTALL CLUTCH ASSEMBLY (CONT)

INSTALLATION

1. Lightly coat new packing (5) with petroiatum (D15).
2. **Install packing** (5) on clutch assembly (2).
3. **Install clutch assembly (2)** on gearbox (4). Rotate clutch assembly (2) clockwise until nuts (1) are sealed in small openings of slots (3).
4. **Torque** six nuts (1) to 95 **to 105 inch-pounds.**
5. Install aircraft No. 7 drive shaft (Refer to TM I-I 520-238-23).
6. Install solenoid valve assembly (Task 7-3).
7. **Replace APU oil** (Task 5-4).
8. **Replace oil filter element** (Task 5-7).
9. **Inspect magnetic drain plug chip collector** (Task 5-5).
10. Remove cleaning cloth and suitable container from under work area.
11. Wipe up any residual oil using cleaning cloth (D5).
12. Perform F.O.D. inspection.
13. Inspect (T.I.).
14. Install APU enclosure (Refer to TM I-I 520-238-23).
15. Reset APU HOLD circuit breaker (Refer to TM I-I 520-238-23).
16. Perform Auxiliary Power Unit maintenance operational check (TM I-I 520-238-T-8).

FOLLOW-ON MAINTENANCE: None.



END OF TASK

7-3 REMOVE/INSTALL CLUTCH ASSEMBLY SOLENOID VALVE ASSEMBLY

This task covers: a. Removal b. Inspection c. Installation

INITIAL SETUP:

Tools:
Tool Kit, General Mechanic's (T109)

Materials/Parts
Cloth, Cleaning (D5)
Gasket (P/N 3614899-1, CAGEC 99193)
Lockwire (D9)
Petrolatum (D15)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM 1-1520-238-23
TM 55-1500-344-23

GO TO NEXT PAGE

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

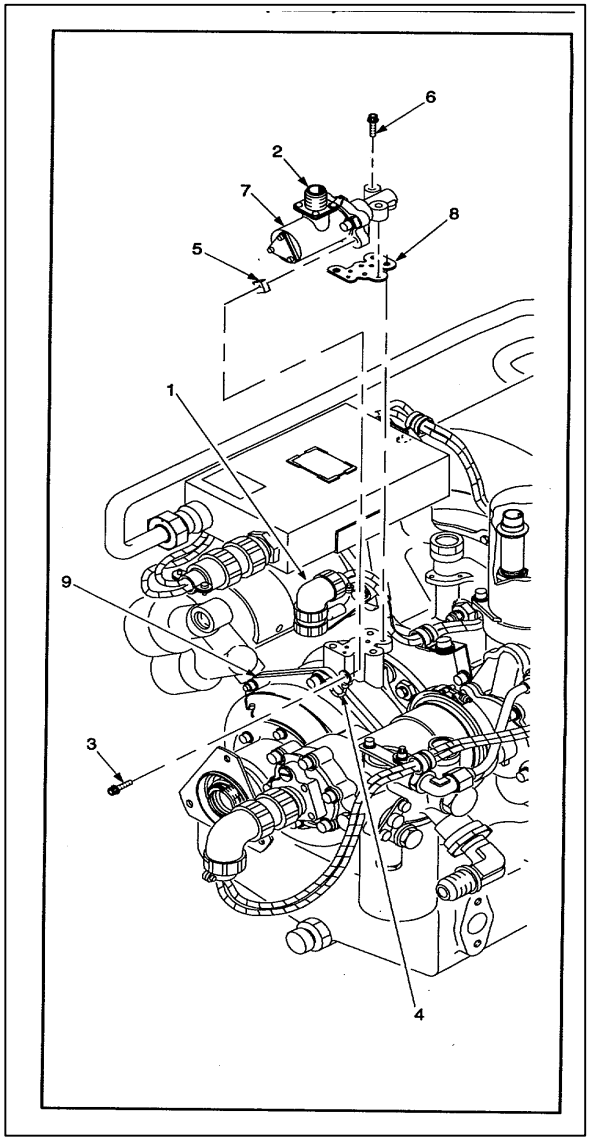
General Safety Instructions:

APU is easy to start. Disconnect battery Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

7-3 REMOVAL/INSTALL HYDRAULIC STARTER (CONT)

REMOVAL

1. Disconnect connector P10 (1) from solenoid valve receptacle J10 (2).
2. Remove screw (3), ground lead (4) and retainer clip (5) from solenoid valve assembly (7).
3. Remove three bolts (6).
4. Remove solenoid valve assembly (7) from clutch (9).
5. Remove and discard gasket (8).
6. Clean solenoid valve assembly (7) using process 8-2, Chapter 8.



INSPECTION

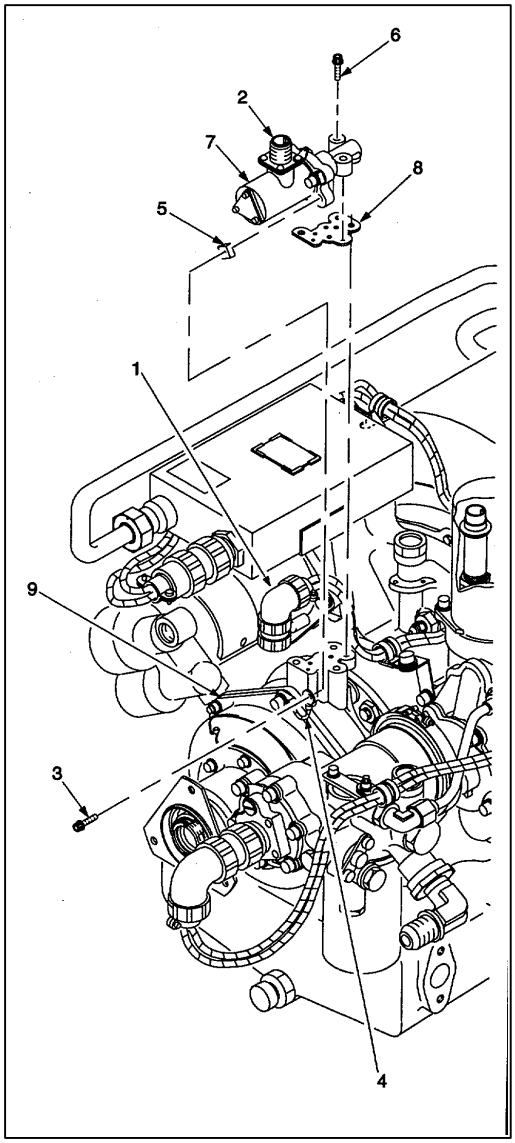
1. Inspect for cracks. None allowed.
2. Inspect for corrosion. Refer to TM 55-1500-344-23.
3. Check solenoid valve mounting pad for elongated bolt holes. None allowed.
4. Inspect connector P10 and receptacle J10 for damaged contacts. None allowed.
5. Check connector P10 and receptacle J10 for crossed, stripped or flattened threads. None allowed.

GO TO NEXT PAGE

7-3 REMOVE/INSTALL CLUTCH ASSEMBLY SOLENOID VALVE ASSEMBLY (CONT)

INSTALLATION

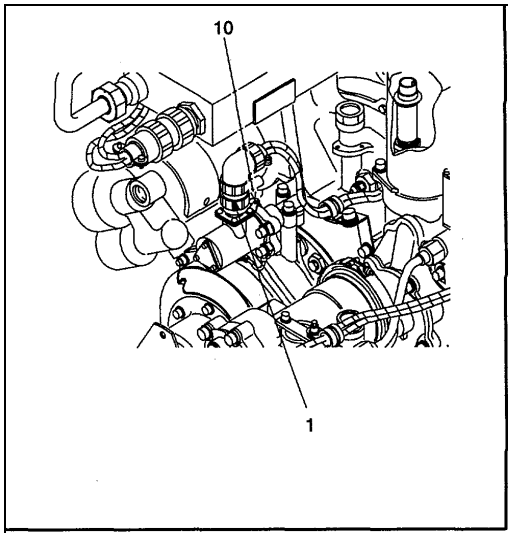
1. **Install gasket** (8) on clutch (9).
2. **Install solenoid valve assembly (7)** on clutch (9).
3. **Secure** solenoid valve assembly (7) to clutch (9) **with three bolts** (6).
4. Install screw (3) through ground lead (4) and retainer clip (5) into solenoid valve assembly (7).
5. **Install connector P10** (1) to receptacle J10 (2).



GO TO NEXT PAGE

7-3 REMOVE/INSTALL CLUTCH ASSEMBLY SOLENOID VALVE ASSEMBLY (CONT)

6. **Secure connector P10** (1) to lug (10) **with lockwire** (D9).
7. Wipe up any residual oil using cleaning cloth (D5).
8. Perform F.O.D. inspection.
9. Inspect (T.i.).
10. Install APU enclosure (Refer to TM 1-1520-238-23).
11. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).
12. Perform Auxiliary Power Unit maintenance operational check (TM 1-1520-238-T).



FOLLOW-ON MAINTENANCE : None.

END OF TASK

SECTION IV REPLACE PLENUM ASSEMBLY SEAL

7-4 REPLACE PLENUM ASSEMBLY SEAL

INITIAL SETUP

Tools:
Tool Kit, General Mechanic's (T109)

Materials/Parts:
Alcohol (D1)
Cloth, Cleaning (D5)
Seal (P/N S9082-8K0416, CAGEC 99193)
Sealant, RTV (D16)

Personnel Required:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Enclosure Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove all other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

GO TO NEXT PAGE

7-4 REPLACE PLENUM ASSEMBLY SEAL (CONT)

1. Remove seal (1) from plenum assembly (2).

WARNING

Use alcohol in a well-ventilated area. Avoid excess skin contact or prolonged inhalation of vapors. Do not use near open flame or in area where high temperature prevails. If injury occurs, seek medical aid.

2. Clean as required to remove old sealant from plenum assembly (2) using cleaning cloth (D5) moistened with alcohol (D1).

3. Dry the cleaned area of plenum assembly thoroughly with cleaning cloth (D5).

NOTE

Surfaces that will be contacted by sealant must be clean, dry, free from grease, dirt, soap, fingerprints, soil and any other foreign matter.

Ensure sealant does not enter bulb of seal. Ensure no sealant remains on outside of seal bulb.

4. Apply RTV sealant (D16) to inside sealing area of seal (1).

5. Install seal (1) onto plenum assembly (2).

6. Edges of seal (1) may be notched at corners of plenum assembly (2) to ensure a snug fit.

7. Remove excess sealant from plenum assembly (2).

8. Allow sealant to cure at ambient temperature for 12 hours.

9. Perform FO.D. inspection.

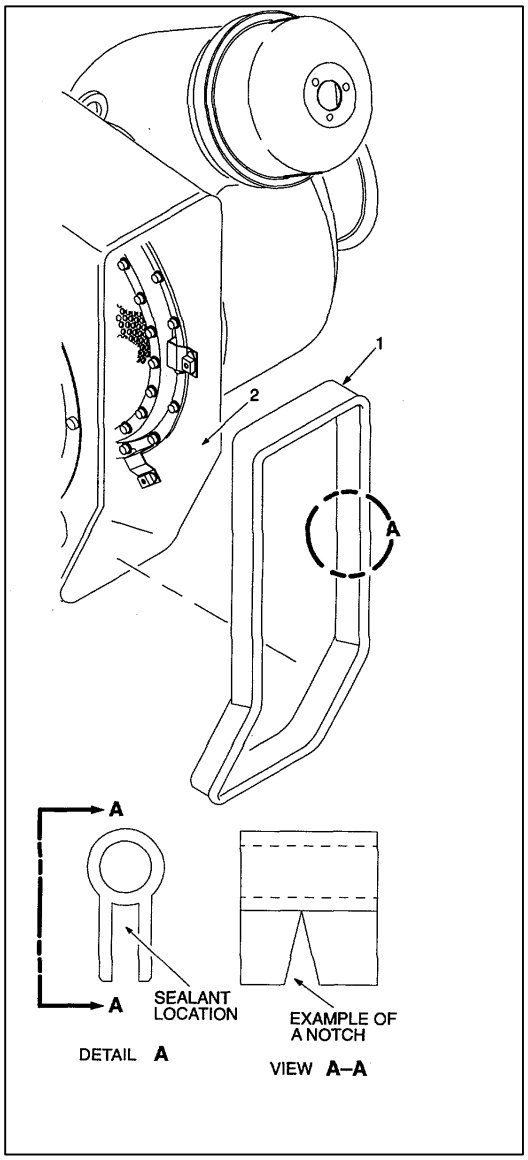
10. Inspect (T.I.).

11. Install APU enclosure (Refer to TM 1-1520-238-23).

END OF TASK

12. Reset APU HOLD circuit breaker (Refer to TM 1-1520-238-23).

FOLLOW-ON MAINTENANCE : None.



7-5 INSPECT/LUBRICATE NEEDLE BEARING

This task covers: a. Inspection b. Lubrication

INITIAL SETUP

Tools:
Tool Kit, General Mechanic' s (T109)
Suitable Container

Materials/Parts:
Cloth, Cleaning (D5)
Ring, Retaining, PN M27426-3112D
(NSN 5305-01-l 99-8257)
Packing, Preformed, PN S9413-133
(NSN 5331-00-l 66-l 062)
Grease, Aircraft
(NSN 9150-00-944-8953) (D27)

Personnel Reauired:
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:
TM 1-1520-238-T-8
TM I-l 520-238-23
TM 55-l 500-344-23

Equipment Conditions:
Helicopter Safed
APU HOLD Circuit Breaker Pulled
APU Endosure Removed
Aircraft, No. 7 Drive Shaft Removed

General Safety Instructions:

WARNING

APU is easy to start. Disconnect battery. Remove ail other electrical power before performing any maintenance in this area. Death or serious injury could result if APU starts. If injury occurs, seek medical aid.

REMOVAL

NOTE

With the drive shaft removed, manual rotation of the clutch output drive shaft and rotation of the flange in both directions, should result in a smooth motion with no roughness or binding. A light amount of drag caused by the shaft seal is to be expected. Oil stains or wetness appearing on the cover port at the bottom of the PTO clutch housing is acceptable. Duplex bearing output seal should show no evidence of damage or metal contamination.

1. Remove the spiral retaining ring (1) from the inside diameter of the clutch output drive shaft.
2. Remove the aluminum plug (2) from the output shaft (6) by inserting a suitable tool (allen wrench) into the inner grove of the plug.
3. Pull plug (2) straight out Discard packing (3).

NOTE

Ensure plug (2) is not damaged during removal or lost when removed.

7-5 INSPECT/LUBRICATE NEEDLE BEARING (CONT)

INSPECTION

1. Inspect the inside of the output shaft (6) for burnt, dry or blackened grease. None allowed.
2. Inspect the needle bearing cavity for the presence of metal particles or other contamination. None allowed.
3. Remove sufficient amount of old grease to perform the inspection below.
4. Inspect for damage to the visible portion of the needle bearing and/or shaft. None allowed.
5. Rotate the output drive on the clutch while observing the needle bearing with a flashlight.
6. If the output shaft (6) does not rotate smoothly or the needle bearing (7) and/or pilot shaft (8) do not remain centered during rotation, replace the clutch assembly (5).
7. Inspect for signs of overheating, characterized by bluing or yellowing of the metal surface. None allowed.

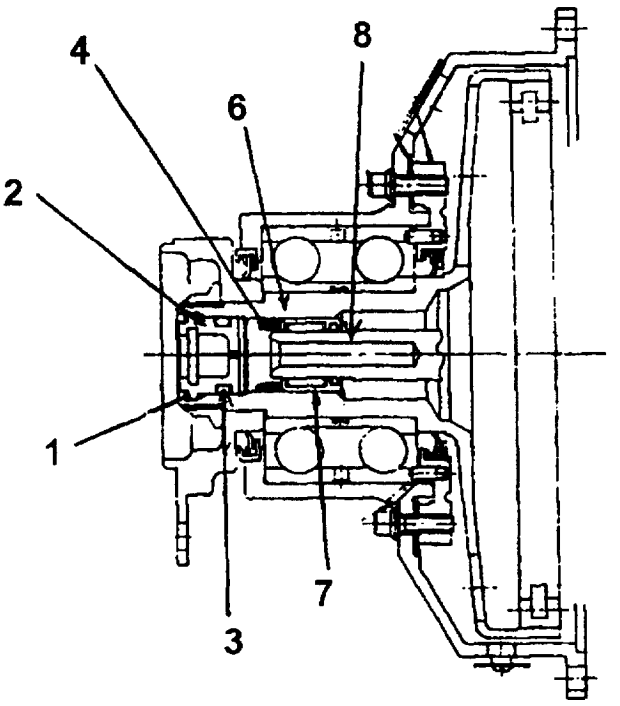
ASSEMBLY

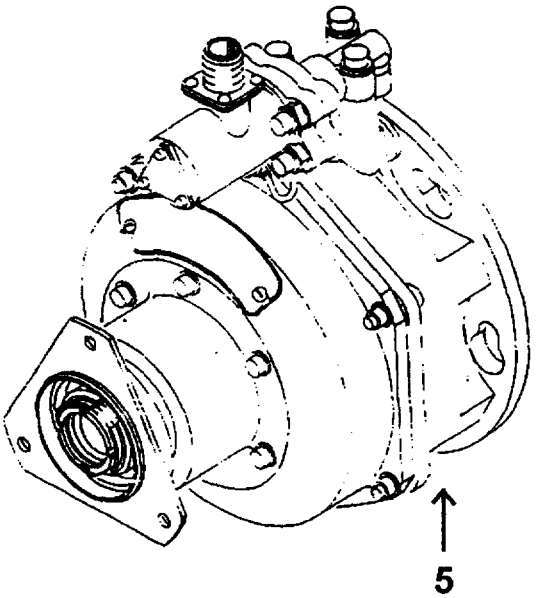
CAUTION

Contamination of the bearing or failure to follow the prescribed procedure will cause premature failure of the needle bearing.

1. Pack lubricate the needle bearing (4) with Mobilgrease28 about .042 to .056 inch around the inside diameter as shown.
2. Lightly lubricate new packing (3) with grease (MIL-G-81322) and install on bearing cavity aluminum plug (2).
3. Install plug (2) into the output drive shaft (6).
4. Install the spiral lock ring (1), ensure that the plug has a good positive engagement.
5. Install anti-flair bracket and APU drive shaft. Check circumferential dearance. (Refer to TM I-I 520-238-23, para 6.16.)
6. Perform an APU maintenance operational check (Refer to TM I-I 520-238-T).
7. Oil dripping or flowing in excess of 1 drop per minute from the covered port is cause for rejection of the clutch.

END OF TASK





CHAPTER 8

CLEANING ENGINE COMPONENTS

SECTION I CLEANING PROCESS #1 (SOLVENT)

8-2 CLEANING PROCESS #1 (SOLVENT)

INITIAL SETUP

Tools:
Apron, Laboratory (T121)
Brush, Scrub (T26)
Gloves, Chemical Protective (T58)
Goggles, Industrial (T59)
Gun, Air Blow (T64)
Hose, Compressed Air (T66)
Respirator, Air Filtering (T122)
Suitable Container

Materials/Parts:
Solvent, Dry Cleaning (D20)

Personnel Required:
67R Attack Helicopter Repairer

Equipment Conditions:
Off APU Maintenance

Dry Cleaning Solvent

1. **Fill cleaning tank with dry cleaning solvent (D20).**

2. **Dip, soak and agitate parts to be cleaned until oil and grease have been removed**. Remove remaining deposits using scrub brush.

3. Remove and allow to dry for 10 minutes.

Compressed Air

4. **Remove any residue dry cleaning solvent by drying part thoroughly with clean, filtered compressed air.**

FOLLOW-ON MAINTENANCE : None.

END OF TASK

8-2 CLEANING PROCESS #2 (ELECTRICAL COMPONENTS)

INITIAL SETUP

Tools:
Apron, Laboratory (T121)
Brush, Scrub (T26)
Gloves, Chemical Protective (T58)
Goggles, Industrial (T59)
Gun, Air Blow (T64)
Hose, Compressed Air (T66)

Materials/Parts:
Alcohol (D1)
Wipe, Lint-Free (D23)

Personnel Required:
67R Attack Helicopter Repairer

Equipment Conditions:
Off APU Maintenance

Dry Cleaning Solvent

1. Wipe external surfaces of electrical components with lint-free wipe (D23) dipped in alcohol (D1).
2. Clean electrical connector pins/sockets with a fiber brush dipped in alcohol (D1).

Compressed Air

3. Dry connectors thoroughly with clean, filtered compressed air. Be sure they are dry and free of foreign matter.

FOLLOW-ON MAINTENANCE: None.

END OF TASK

APPENDIXA
REFERENCES

AR 710-2	Modified Table of Organization and Equipment (MTOE)
CTA 50-970	Expendable Items (Except Medical, Class V, Repair Parts and Heraldic Items)
CTA 8-I 00	Expendable Items (Except Medical, Class V, Repair Parts and Heraldic Items)
DA PAM 738-751	Functional Users Manual for the Army Maintenance Management System Aviation (TAMMS-A)
DA PAM 71 O-2-2	Modified Table of Organization and Equipment (MTOE)
FM I-511	Maintenance, Quality Control and Technical Inspection Guide for Army Aircraft
FM 21-11	First Aid
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Components
TB 55-8100-200-24	Maintenance of Specialized Reusable Containers for Aircraft Equipment
TM I-I 500-204-23	General Aircraft Maintenance Manual
TM I-I 520-238-T	Troubleshooting
TM I-I 520-238-23	Aviation Unit and Intermediate Maintenance Manual
TM I-I 500-343-23	Corrosion Manual Electrical Components
TM I-I 500-344-23	Corrosion Manaul Mechanical Components
TM 1-2835-213-23P	Repair Parts and Special Tools List (RPSTL)
TM 55-I 500-323-24	Aircraft Electric and Electronic Wiring
TM 55-6650-300-I 5	Spectrometric Oil Analysis
TM 750-244-I -5	Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B

MAINTENANCE ALLOCATION CHART (MAC)

SECTION I INTRODUCTION

B-1 Aviation Maintenance Allocation Chart.

B-1.1 This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the Aviation Maintenance concept for Army aviation. These maintenance levels Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM) and Depot Maintenance are depicted on the MAC as follows:

AVUM - corresponds to an O code in the Repair Parts and Special Tools List (RPSTL).

AVIM - corresponds to an F code in the RPSTL.

DEPOT - corresponds to a D code in the RPSTL.

B-1.2 The maintenance to be performed below depot and in the field is described as follows:

B-1.2.1 AVUM activities will be staffed and equipped to perform high frequency "on-aircraft" maintenance tasks required to retain or return aircraft systems to a serviceable condition. The maintenance capability of the AVUM will be governed by the Maintenance Allocation Chart (MAC) and limited by the amount and complexity of ground support equipment (GSE), facilities required, authorized manning strength and critical skills available. The range and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignments of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources and air mobility requirements.)

B-1.2.1.1 Company Size Aviation Units: Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of aircraft operational readiness. Perform maintenance inspections and servicing to include preflight, daily, intermediate, periodic (or phased) and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, built-in test equipment (BITE), installed aircraft instruments, or test, measurement and diagnostic equipment (TMDE). Replace worn or damaged modules/components that do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools and ground support equipment. Perform operational and continuity checks and make minor repairs to the electrical system. Inspect, service and make operational, capacity and pressure checks to hydraulic systems. Perform servicing functional adjustments and minor repair/replacement to the flight control, propulsion, power train and fuel systems. Accomplish air frame repair that does not require extensive disassembly, jigging or alignment. The manufacture of air frame parts will be limited to those items which can be fabricated with tools and equipment found in current air mobile tools and shop sets. Evacuate unserviceable modules/components and end items beyond the repair capability of AVUM to the supporting AVIM.

B-1.2.1.2 Less than Company Size Aviation Units: Aviation elements organic to brigade, group, battalion headquarters and detachment size units are normally small and have less than ten aircraft assigned. Maintenance tasks performed by these units will be those which can be accomplished by the aircraft crew chief or assigned aircraft repairmen and will normally be limited to preventive maintenance, inspections, servicing, spot painting, stop drilling, application of nonstress patches, minor adjustments, module/component fault diagnosis

and replacement of selected modules/components. Repair functions will normally be accomplished by the supporting AVIM unit.

B-1.2.2 Aviation Intermediate Maintenance (AVIM)

B-1.2.2.1 Provides mobile, responsible "one-stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance.)

B-1.2.2.2 May perform all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair of modules/components and end items which can be accomplished efficiently with available skills, tools and equipment.

B-1.2.2.3 Establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level.

B-1.2.2.4 Inspects, troubleshoots, performs diagnostic tests, repairs, adjusts, calibrates and aligns aircraft systems modules/components. AVIM units will have capability to determine the serviceability of specified modules/ components removed prior to the expiration of the Time Between Overhaul (TBO) or finite life. Component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings and items of common hardware. Airframe repair and fabrication of parts will be limited to those maintenance tasks which can be performed with available tools and test equipment. Unserviceable repairable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance.

B-1.2.2.5 Performs aircraft weight and balance inspections and other special inspections which exceed AVUM capability.

B-1.2.2.6 Provides quick response maintenance support, including aircraft recovery and air evacuation, on-the-job training and technical assistance through the use of mobile maintenance contact teams.

B-1.2.2.7 Maintains authorized operational readiness float aircraft.

B-1.2.2.8 Provides collection and classification services for serviceable/unserviceable material.

B-1.2.2.9 Operates a cannibalization activity in accordance with AR 710-2 and DA PAM 710-2-2. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with air mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting nondivisional AVIM unit.)

B-2 Use of Maintenance Allocation Chart (Section II).

NOTE

Approved item names are used throughout this MAC. Generic terms/nomenclature (if any) are expressed in parentheses and are not to be considered as official terminology.

B-2.1 This Maintenance Allocation Chart assigns maintenance functions to the lowest level of maintenance, based on past experience and the following considerations:

Skills available.

Work time required.

Tools and test equipment required and/or available.

B-2.2 Only the lowest level of maintenance authorized to perform a maintenance function is indicated. If the lowest maintenance level cannot perform all tasks of any single maintenance function (e.g., test, repair), then the higher maintenance level(s) that can accomplish additional tasks will also be indicated.

B-2.3 A maintenance function assigned to a maintenance level will automatically be authorized to be performed at any higher maintenance level.

B-2.4 A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance level. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the commander that has the authority to direct such tasking.

B-2.5 The assignment of maintenance function will not be construed as authorization to carry the related repair parts or spares in stock. Information to requisition or otherwise secure the necessary repair parts will be as specified in the associated RPSTL.

B-2.6 Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, at the request of a lower maintenance level and on a one-time basis, transfer of maintenance functions to the lower level may be accomplished by specific authorization of the maintenance officer of the higher level of maintenance to which the function is assigned. The special tools, equipment, etc required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility for the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

B-3 Maintenance Functions. Maintenance functions will be limited to and defined as follows:

B-3.1 Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination (e.g., by sight, sound or feel).

B-3.2 Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic or electrical characteristics of an item and comparing those characteristics with prescribed standards.

B-3.3 Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint or to replenish fuel, lubricants, chemical fluids or gases.

B-3.4 Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact positions or by setting the operating characteristics to specified parameters.

B-3.5 Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

B-3.6 Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

B-3.7 Remove/Install. To remove and install the same items when required to perform service or other maintenance functions. Install may be the act of emplacing, seating or fixing into position a spare, repair part or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

B-3.8 Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position code of the SMR code.

B-3.9 Repair. The application of maintenance services[1] including fault location/troubleshooting[2] removal installation, disassembly/assembly[3] procedures and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction or failure in a part, subassembly, module (component or assembly), end item, or system.

B-3.10 Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational conditions as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

B-3.11 Rebuild. Those services, actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

B-4 Explanation of Columns in the MAC, Section II .

B-4.1 Functional Groups (Columns 1 and 2). The functional groupings shown in the sample below identify maintenance significant components, assemblies, subassemblies and modules with the next higher assembly.

GROUP NUMBER	DESCRIPTION	GROUP NUMBER	DESCRIPTION
04	Engine System	0405	Accessory Gearbox Housing assembly, bearing housing and seal disk.
0401	Engine General Servicing, handling, inspection requirements, lubrication charts, overhaul and retirement schedules. External lines and hoses. (As applicable.)	0406	Fuel System Fuel control, body assembly, torque motor, valve assembly, fuel nozzle, external lines and hoses.
0402	Combustion Section Combustor case, combustion chamber airflow deflector.	0407	Electrical System Electronic sequence unit, exciter, igniter lead, electrical cables, history recorder.
0403	Power Turbine Section Turbine rotor, turbine tie shaft, turbine nozzle.	0408	Oil System Oil pump, clutch assembly, clutch assembly solenoid valve assembly.
0404	Compressor Section Inlet housing, support assembly, compressor rotor, oil disk, compressor housing. Deswirl deflector, diffuser assembly.		

GROUP NUMBER	DESCRIPTION	GROUP NUMBER	DESCRIPTION

[1]Services - inspect, test, service, adjust, align, calibrate and/or replace.

[2]Fault location/troubleshooting The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3]Disassemble/assemble Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least competency identified as maintenance significant (i.e., assigned an SMR code) for the level of maintenance under consideration.

[4]Actions - welding, grinding, riveting, straightening, facing, remachining and/or resurfacing.

AVUM, which corresponds to an O Code in the Repair Parts and Special Tools List (RPSTL)

AVIM, which corresponds to an F Code in the Repair Parts and Special Tools List (RPSTL)

DEPOT, which corresponds to a D Code in the Repair Parts and Special Tools List (RPSTL)

B-4.2 Maintenance Function (Column 3). Column 3 list the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B.2.)

B-4.3 Maintenance Level (Column 4). The maintenance levels AVUM, AVIM and Depot are listed on the Maintenance Allocation Chart with individual columns that include the work times for maintenance functions at each maintenance level. Work time presentations such as "0.1" indicate the average time (expressed in man-hours, in whole hours, or in decimals) it requires a maintenance level to perform a specified maintenance function. If a work time has not been established, the columnar presentation will indicate"--". Maintenance levels higher than the level of maintenance indicated are authorized to perform the indicated function.

B-4.4 Tools and Test Equipment Reference Code (Column 5). Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE and special tools, special TMDE and special support equipment required to perform the designated function.

B-4.5 Remarks Code (Column 6). When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section IV.

B-5 Explanation of Columns in Tools and Test Equipment Requirements, Section III.

B-5.1 Column 1, Tools and Test Equipment Reference Code. The tool and test equipment reference code correlates with a code used in MAC, Section II, Column 5.

B-5.2 Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

B-5.3 Column 3, Nomenclature. Name or identification of the tool or test equipment.

B-5.4 Column 4, National Stock Number. The National Stock Number of the tool or test equipment.

B-5.5 Column 5, Tool Number. The manufacturer's part number.

B-6 Explanation of Columns in Remarks, Section IV.

B-6.1 Column 1, Remarks Code. The code recorded in column 6, Section II.

B-6.2 Column 2, Remark. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0400	Engine System	INSPECT	--				
		REPAIR	--				
		OVERHAUL			--		
0401	Engine General	INSPECT	--				
		TEST	--				
		SERVICE	--				
		REPAIR	--				
0401 01	Plumbing and Electrical Installation	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
		REPAIR	--				
0401 02	Accessories and Components	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
0401 0201	Hydraulic Starter	INSPECT	--				
		REPLACE	--				
		OVERHAUL			--		
0401 0202	Lifting Lug	INSPECT	--				
		REPLACE	--				
0401 0203	Aft Mount Assembly	INSPECT	--				
		REPLACE	--				
0401 03	Engine Basic	INSPECT			--		
		REPAIR			--		
		OVERHAUL			--		
0401 0301	Compressor Inlet Plenum Assembly	INSPECT			--		
		REPLACE			--		
		REPAIR	--				
0402	Combustion Section	INSPECT	--			3,4,48,81	
		REPLACE		--			
		REPAIR			--		
0402 01	Combustion Chamber	INSPECT	--				
		REPLACE	--				
		REPAIR			--		

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0402 02	Combustor Cap	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
		REPAIR			--		
0402 03	Combustion Chamber Case	INSPECT			--	50, 81	
		REPLACE			--		
0402 04	Scroll Housing	INSPECT			--		
		REPLACE			--		
0402 05	Turbine Nozzle	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0402 06	Deswirl Airflow Deflector	INSPECT			--		
		REPLACE			--		
0403	Power Turbine Section	INSPECT			--	3, 4, 5, 6, 12 ,23,	
		REMOVE/			--	3439, 44, 47, 4	
		INSTALL			--	8, 50, 52, 53, 54,	
		REPLACE			--	55, 70, 74, 86, 8	
		REPAIR			--	7, 90, 97, 98, 99, 110, 111, 114	
0403 01	Turbine Rotor	INSPECT			--		
		REPLACE			--		
0403 02	Labyrinth Seal Assembly	INSPECT			--		
		REPLACE			--		
0403 03	Compressor Diffuser Assembly	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0403 04	Pilot Ring	INSPECT			--		
		REPLACE			--		

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0403 05	Compressor Rotor	INSPECT			--	23, 24, 91	
		REPLACE			--		
		REPAIR			--		
0403 06	Compressor Housing	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0404	Compressor Section	INSPECT			--	37	
		REMOVE/ INSTALL			--		
		REPLACE			--		
		REPAIR			--		
0404 01	Spur Gearshaft	INSPECT			--	43, 85, 87, 102	
		REPLACE			--		
		REPAIR			--		
0404 02	Seal Rotor	INSPECT			--		
		REPLACE			--		
0404 03	Support Assembly	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0404 04	Straight Shaft	INSPECT			--	34, 47	
		REPLACE			--		
0404 05	Matched Spur Gear Set	INSPECT			--		
		REPLACE			--		
0404 06	Planet Reduction Gear Carrier Assembly	INSPECT			--	80	
		REPLACE			--		
		REPAIR			--		
0404 07	Compressor Inlet Housing	INSPECT			--	48, 90	
		REPLACE			--		
		REPAIR			--		
0404 08	Inlet Compressor Housing Assembly	INSPECT			--		
		REPLACE			--		

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0405	Accessory Gearbox	INSPECT	--			10, 17, 36, 38, 61, 74, 91, 112, 113	
		REMOVE/ INSTALL			--		
		REPLACE					
		OVERHAUL			--		
0405 01	Idler Gear Shaft	INSPECT			--		
		REPLACE			--		
0405 02	Internal Gear	INSPECT			--		
		REPLACE			--		
0405 03	Carrier Ring Gear	INSPECT			--	5, 17, 91, 101, 113	
		REPLACE			--		
0405 04	Pinion Accessory Drive Gear	INSPECT			--	25, 88	
		REPLACE			--		
0405 05	Accessory Drive Idler Gear	INSPECT			--	36	
		REPLACE			--		
0405 06	Starter Adapter	INSPECT			--		
		REPLACE			--		
0405 07	Starter Spur Gear	INSPECT			--	38	
		REPLACE			--		
0405 08	Positive One Way Clutch	INSPECT			--	85	
		REPLACE			--		
0405 09	Starter Splined Shouldered Shaft	INSPECT			--	38, 61, 85	
		REPLACE			--		
0405 10	Fluid Pressure Regulating Valve	INSPECT			--	93	
		REPLACE			--		
0405 11	Liquid Level Gage Rod-Cap	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0405 12	Sight Gage	INSPECT	--				
		REPLACE	--				
0405 13	Gearbox Housing Assembly	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0406	Fuel System	INSPECT	--				
		REPLACE		--			
0406 01	Fuel Control Assembly	INSPECT	--			1, 14, 15, 67,	
		TEST			--	76, 82, 83, 84,	
		ADJUST			--	95, 105	
		REMOVE/ INSTALL	--				
		REPLACE			--		
		OVERHAUL			--		
0406 0101	Fuel Control Body	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0406 02	Fuel Solenoid Valve	INSPECT	--				
		TEST			--		
		REPLACE	--				
0406 03	Fuel Nozzle	INSPECT	--			2, 6, 73, 103	
		TEST			--		
		REMOVE/ INSTALL	--				
		REPLACE	--				
		REPAIR			--		
0407	Electrical System	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
		REPAIR	--				

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS CODE
0407 01	Wiring Harness Assembly	INSPECT	--				
		TEST	--				
		REMOVE/ INSTALL	--				
		REPAIR	--				
0407 02	Ignition Unit	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
0407 03	Igniter Plug lead	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
0407 04	Immersion Thermocouple	INSPECT	--				
		REPLACE	--				
0407 05	Motional Pickup Transducer	INSPECT	--			57	
		REPLACE	--				
0407 06	Igniter Plug	INSPECT	--				
		REPLACE	--				
0408	Oil System	INSPECT	--				
		REMOVE/ INSTALL	--				
		REPLACE	--				
0408 01	Oil Pump	INSPECT	--				
		TEST			--		
		REPLACE	--				
		OVERHAUL			--		

MAINTENANCE ALLOCATION CHART (CONT)

NOMENCLATURE OF END ITEMS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL AVUM	AVIM	DEPOT	(5) TOOLS AND TEST EQUIPMENT	(6) REMARKS CODE
0408 02	Clutch Assembly	INSPECT	--			7, 8, 9,16, 19, 20, 21,40, 41,42, 49, 51, 62, 63, 65, 68, 75,77,78,79, 94, 96,117, 118,119	
		TEST	--		--		
		REPLACE	--				
		OVERHAUL	--		--		
0408 0201	Clutch Shaft	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0408 0202	Output Housing	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0408 0203	Seal Plate	INSPECT			--		
		REPLACE			--		
		REPAIR			--		
0408 03	Oil Filter Element	REPLACE	--				
0408 04	Low Oil Pressure Switch	INSPECT	--				
		REPLACE	--				
0408 05	Pressure Relief Valve	INSPECT		--			
		REPLACE	--				
		REPAIR		--			

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	Depot	Adapter		SK59A-830
2	Depot	Adapter	4920-01-003-6198	293010-1
3	Depot	Adapter Assembly, Maintenance Stand	4920-01-003-6197	291978-1
4	Depot	Adapter Assembly, Turbine Seal Compression	4920-01-003-9025	291970-1 T230159
5	Depot	Adapter Assembly Turbine Seal Compression		T230159
6	Depot	Adapter, Fuel Nozzle	4920-01-127-3174	296505-1
7	Depot	Adapter, Press		T8356176-1
8	Depot	Adapter, Press, Bearing		T8356241
9	Depot	Adapter, Press Bearing		T8356239
10	Depot	Adapter, Pressure Test		T280333
11	Depot	Adapter, Puller	5120-01-008-8868	291967-4
12	Depot	Adapter, Puller	5120-01-056-8868	291967-7
13	Depot	Adapter Set		P47A-03-183
14	Depot	Adapter, Test Stand	4920-01-132-0659	296501-1
15	Depot	Adapter, Test, Cover & Plug, Fuel Control		298850-1
16	Depot	Adapter, Torque Splined		T8356499
17	Depot	Adapter, Torque Wrench		T8356221

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
18	Depot	Adapter, Torque Wrench		296846-1
19	Depot	Adapter, Torque Wrench		296845-7
20	Depot	Adapter, Torque Wrench		296845-3
21	Depot	Adapter, Torque Wrench		296845-1
22	Depot	Balance Inserts	3120-01-005-1359	291750-18
23	Depot	Balance Kit	4920-01-003-9879	291980-1
24	Depot	Balance Machine		50B-2-TC
25	Depot	Bearing Remover		T169496
26	AVUM	Brush, Scrub	7920-00-685-3969	MILB23958
27	AVUM	Caliper Set, Micrometer, Outside, 0-6 inch	5210-00-554-7134	GGG-C-105
28	AVUM	Caliper, Vernier Inside/Outside, 0.300-24/0-24 inch	5210-00-234-8017	GGG-C-111
29	AVUM	Container, Shipping		P7211651002-5
30	Depot	Cradle, Lab Test		TE249164
31	Depot	Crimper, Retainer		298213-3
32	AVUM	Crowfoot Attachment, Socket Wrench, Open End, 1 1/8 x 3/8 inch Drive	5120-00-517-7021	FC-36
33	Depot	Drain Adapter		HS5204-1-8000
34	Depot	Driver		T8356319
35	Depot	Driver, Bearing		T8356212

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
36	Depot	Driver, Bearing		T8356211 T8356212
37	Depot	Driver, Gearshaft		835339-1 T8314231
38	Depot	Drive, Installation, Bearing	4920-01-033-9027	291972-1
39	Depot	Drive, Installation Bearing	5120-01-016-6695	293163-1
40	Depot	Driver, Installation, Bearing		296843-1
41	Depot	Driver, Installation, Bearing		296842-1
42	Depot	Driver, Removal, Bearing		298167-1
43	Depot	Driver, Removal		T8356084
44	Depot	Driver, Removal, Seal	4920-01-003-9877	291966-1
45	Depot	Duct Assy, Exhaust		P47G-02-64
46	Depot	End Cap		P47E-04-456
47	Depot	Fixture and Driver Set		T8356217
48	Depot	Fixture Assembly Shaft Stretch, Hydraulic, LP Turbine	4920-01-003-9032	291990-1
49	Depot	Fixture, Holding		298171-1
50	Depot	Fixture, Installation, Plenum		298214-1
51	Depot	Fixture, Test, Pressure		T8306216
52	Depot	Force Gauge		298280-1
53	Depot	Gauge		G231087
54	Depot	Gauge Assembly		298206-1

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
55	Depot	Gauge Assembly	4920-01-020-0356	293162-1
56	AVUM	Gauge, Depth, Micrometer, 0-12 inch	5210-00-826-5368	GGG-C-105
57	AVUM	Gauge, Shim Checking, Monopole	4920-01-140-3982	294817-1
58	AVUM	Gloves, Chemical Protective	8415-00-266-8677	ZZ-G-381
59	AVUM	Goggles, Industrial	4240-00-052-3776	A-A-1110
60	Depot	Guide, Seal Installation	4920-01-127-4639	296421-1
61	Depot	Guide, Sleeve, Sprag Clutch		294234-13
62	Depot	Guide, Wrench		T8339088
63	Depot	Guide, Wrench		T8356240
64	AVUM	Gun, Air Blow	4940-00-333-5541	DGA520
65	Depot	Holder, Splined Output Adapter		296844-1
66	AVUM	Hose, Compressed Air	4240-01-251-8159	ED1313B-50
67	Depot	Inserter, Insert	5120-00-797-2404	3552-3
68	Depot	Installation Driver, Press, Seal		298169-1
69	Depot	Lifting Sling	1730-01-220-8476	7-267310016
70	Depot	Micing Base		T8356006
71	AVUM	Multimeter	6625-01-139-2512	T00377
72	AVUM	Ohmmeter	6625-01-125-3471	24700
73	Depot	Nozzle Tester	4920-00-377-3195	285496-1-1

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
74	Depot	Planetary Assembly Tool		TD249156
75	Depot	Plate, Bearing Removal		291397-24
76	Depot	Plug		SK47E-04-243
77	Depot	Press Adapter, Bearing Removal		298166-1
78	Depot	Press Adapter, Bearing		298172-1
79	Depot	Press Adapter, Seal Removal		298160-1
80	Depot	Puller	5120-00-288-7713	927ABC
81	Depot	Puller Assembly, Mechanical, Turbine Plenum	5120-01-016-6692	293171-1
82	Depot	Puller, Bearing		T8356215
83	Depot	Puller, Gear		T8356218
84	Depot	Puller, Sleeve		T8356216
85	Depot	Pusher, Bearing Remover		T230168
86	Depot	Pusher Assembly, Compressor Rotor Installation	4920-01-003-6196	291977-1
87	Depot	Pusher, Bearing	4920-01-003-6194	291975-1
88	Depot	Pusher, Bearing Installation		T8356176-7
89	Depot	Pusher, Bearing Installation		T8356176-2
90	Depot	Pusher, Seal		298968-1

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
91	Depot	Pusher, Shaft		T8356012-212
92	Depot	Pusher, Shaft		T230162-42
93	Depot	Puller, Regulator		T8356192
94	Depot	Rig, Vacuum Check		T8356236
95	Depot	Seal Bullet		T8356214
96	Depot	Seal Pilot		298170-1
97	Depot	Simulator, Turbine Wheel		831090-1
98	Depot	Spacer		T8356082
99	Depot	Stand, Maintenance	4920-00-283-2344	291400-1
100	Depot	Stand, Transportation	4920-00-861-3068	281270
101	Depot	Support		TC249179
102	Depot	Support and Driver, Removal, Spur Gearshaft	4920-01-003-9028	291974-1
103	Depot	Test Stand Assembly		291600-4-1
104	Depot	Test Stand Assy		P47A-05-47
105	Depot	Tool, Impact		P47-C-07-37
106	AVUM	Tool Kit, Aircraft Inspector	5180-00-323-5114	SC518099CLA09
107	AVUM	Tool Kit, Aircraft Maintenance	5180-00-003-5267	SC518099CLA13
108	AVUM	Tool Kit, Electrical	5180-00-323-4915	SC518099CLA06
109	AVUM	Tool Kit, General Mechanic's	5180-00-323-4944	SC518099CLA07
110	Depot	Transfer Fixture		833029-1
111	Depot	Transfer Fixture		833028-1

TOOL AND TEST EQUIPMENT REQUIREMENTS (CONT)

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
112	Depot	Transfer Tool		T8356089
113	Depot	Transfer Tool		T252677
114	Depot	Transfer Tool		G265781
115	Depot	Work stand		7-262100010
116	AVUM	Wrench, Open End, 1 ½ & 1 5/8 inch	5120-00-184-8439	A-A-1356
117	Depot	Wrench, Spanner		T249184-1
118	Depot	Wrench, Spanner		T8356238-1 ,-3
119	Depot	Wrench, Spanner		298168-1
120	AVUM	Wrench, Torque, Click Type, ¼ inch Drive, 30-150 inch-pounds	5120-00-542-4489	GGG-W-00686
121	AVUM	Apron, Laboratory, Light Duty	8415-00-234-9253	MC111
122	AVUM	Respirator, Air Filtering, Adjustable	4240-00-883-6519	85556
123	Depot	Test Stand, Fuel Accessories	4920-00-824-1470	281600-6-1
124	Depot	Support		T8356109
125	Depot	Puller		T8356243
126	Depot	Shaft		P47D-02-21
127	Depot	Adapter, Test		P47H-07-0202
128	Depot	Adapter, Test		T8356398
129	Depot	Test Fixture, Torque Motor		SK47B-01-525
130	Depot	Atomizer Assembly		3830061-1

SECTION IV REMARKS

GTCP36-55[H] Shaft Power Gas Turbine Engine Assembly

REMARKS CODE	REMARKS
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(9)	
(10)	
(11)	
(12)	
(13)	
(14)	
(15)	

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

Refer to TM 1-2835-213-23P for Repair Parts and Special Tools List.

APPENDIX D

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

SECTION I INTRODUCTION

D-1 SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the APU. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts and Heraldic Items).

D-2 EXPLANATION OF COLUMNS

a. Column I - Item D Number. This number is assigned to the entry in the listing and is referenced in the maintenance tasks to identify the material (e.g., " Use cleaning cloth (D5)").

b. Column 2 - National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

c. Column 3 - Description. Indicates the item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Commercial and Government Entity Codes (CAGEC) in parenthesis, if there is no NSN in column 2.

d. Column 4 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) U/M
1		Adhesive, MMM-A-1617	pt
2		Alcohol, Denatured, O-E-760, Type III	qt
3	8105-00-060-8961	Bag, Plastic 12 X 12, A-A-I 668	ea
4	8135-00-753-4661	Barrier Material, Greaseproof, Waterproof, Flexible MIL-B-121, Type I, Class 2, Grade A	yd.
5	7920-00-I 65-7195	Cloth, Cleaning, MIL-C-85043, Type II	ea
6	8030-00-087-8630	Compound, Antiseize, C5A	pt
7	9150-00-664-0050	Compound, Antisieze, Liqui-Moly NV	pt
8		Compound, Corrosive Preventive, Water Displacing, MIL-C-81309, Type II	pt
9	9525-00-618-0257	Lockwire, 0.020, MS20995NC020	rl
10	9525-00-335-6072	Lockwire, 0.032, MS20995NC032	rl
11	9150-00-I 806266	Lubricating Oil, MIL-L-23699	qt
12	9150-00-273-2388	Lubricating Oil, MIL-L-6081	qt
13	9150-00-782-2627	Lubricating Oil, MIL-L-7808	qt
14	6695-01-045-9820	Oil Sample Kit, MMEPD379	ea
15	9150-00-250-0926	Petrolatum, Braycote 248	pt
16	8040-00-851-0211	Sealant, RTV, MIL-A-46106, Type I	oz
17		Seal, Plug, MS83723-16	ea
18		Seal, Plug, MS83723-20	ea
19		Seal, Safetywire, S8187A	ea
20	6850-00-274-5421	Solvent, Dry Cleaning, P-D-680, Type III	
21		Strip, Teflon, S9851-015100	rl
22	7510-00-I 39-3834	Tape, Pressure Sensitive, PPP-T-60	rl
23	7920-00-965-I 709	Wipe, Lint-Free, A-A-I 447	
24		Wire, Electric, M22759-12-20-9	rl
25		Wire, Electric, M27500-20RE-2-N06	rl
26		Wire, Electric, 192-505-9003	rl
27	9150-00-944-8953	Grease, Aircraft, MIL-G-81322	cn

APPENDIX E

MANUFACTURED ITEMS LIST

Not Applicable

APPENDIX F

TORQUE LIMITS

TORQUE VALUES FOR BOLTS, SCREWS AND NUTS

Thread Size	Torque Value
3-48	5-7 inch-pounds
6-32	13-16 inch-pounds
10-31	24-27 inch-pounds
¼-28	55-70 inch-pounds
9/16-18	480-600 inch-pounds

MINIMUM DRAG TORQUE FOR SELF-LOCKING NUTS

Thread Size	Torque Value
10-32	2.0 inch-pounds
¼-28	3.5 inch-pounds
3/8-24	9.5 inch-pounds

TORQUE VALUES FOR PLUGS, UNIONS, ELBOWS AND NIPPLES

Size	Thread Size	Torque Value
4	7/16-20	135-150 inch-pounds
6	9/16-18	180-200 inch-pounds

TORQUE VALUES FOR FLARED TUBE COUPLING NUTS

Tube Size	Torque Value
4	135-150 inch-pounds
6	270-300 inch-pounds

TORQUE VALUES FOR FLARELESS TUBE COUPLING NUTS

Tube Size	Torque Value
2	75-85 inch-pounds
4	135-145 inch-pounds

Torque Wrench, 0-30 inch-pounds	NSN 5120-00-117-4832
Torque Wrench, 30-150 inch-pounds	NSN 5120-00-542-4489
Torque Wrench, 150-750 inch-pounds	NSN 5120-00-821-3441

GLOSSARY

SECTION I ABBREVIATIONS

APU ..... Auxiliary Power Unit
bg ..... Bag
DA ..... Department of the Army
ea ..... Each
EGT ..... Exhaust Gas Temperature
ESU ..... Electronic Sequence Unit
FM ..... Field Manual
FOD ..... Foreign Object Damage
gal ..... Gallon
GTCP ..... Gas Turbine Compressor and Shaft Powered
in ..... Inch
l ..... Liter
lb ..... Pound
MAC Maintenance Allocation Chart
max ..... Maximum
min ..... Minimum
MOC ..... Maintenance Operational Check
oz ..... Ounce
PCD ..... Compressor Discharge Pressure
psig ..... Pounds Per Square Inch Gauge
pt ..... Pint
QDR ..... Quality Deficiency Report
qt ..... Quart
rl ..... Roll
rpm ..... Revolutions per Minute
TB ..... Technical Bulletin
TM ..... Technical Manual
U/M ..... Unit of Measure
yd ..... Yard

SECTION II DEFINITIONS

TERM	DEFINITION
B	
Bend	Distortion
	Binding To confine and restrict the liberty of a free moving part, material or component. May cause serious damage if a chafing force is being imposed.
Break	Separation of a part.
Burnishing	Smoothing minor damage using a hand tool.
Burr	A rough or sharp edge on a hole or corner, usually caused by machining, sometimes by wearing.
C	
Contamination (Foreign Material)	Any foreign substance such as metal chips, lint, rust and (foreign material) water that would be harmful to the functioning of a part of system.
Corrosion (Direct Surface Attack)	A type of corrosion that results from direct reaction between a metal surface and the atmosphere. Rust on iron is a common example.
Corrosion (Galvanic)	Accelerated corrosion as a result of electrical contact between dissimilar metals.
Corrosion (Intergranular)	A corrosion type which attacks along the grain boundaries of a metal.
Corrosion (Pitting)	Formation of small cavities on a metallic surface caused by chemical or physical non-homogeneities.
Corrosion (Stress Cracking)	A type of corrosion which causes cracking and part failure due to a combination of corrosion and sustained tensile stress.
Crack	Parting of parent metal.
D	
Dent	A completely smooth surface depression caused by pressure or impact from a smooth ball-like foreign object. The parent material is displaced, but usually none is separated.
Distortion	Twisting or bending out of a normal, natural or original shape, usually caused from being exposed to excessive pressure or temperature either when restrained or unrestrained.
E	
Erosion	Wearing away of metal.

TERM	DEFINITION
F	
Ferrules	Metal band or socket.
Flaking	Breaking away of pieces of a plated or painted surface.
Flowing	Spreading of a plated or painted surface. Usually accompanied by flaking.
Foreign Material	See Contamination.
Foreign Object	Any object such as a tool, piece of equipment or APU part (nut, bolt, lockwire) that could in any way damage the APU.
Fraying	Wearing or rubbing of areas, generally used in reference to damage open wire-braid covering (of teflon hose) or on thermocouple harness.
G	
Galling	A transfer of metal from one surface to another. Do not confuse with pickup, scoring, gouging, or scuffing.
Glazing	Development of a hard glossy surface on plain bearing surfaces. An often beneficial condition.
Gouge	A wide rough scratch or group of scratches, usually, with one or more sharply impressed corners and frequently accompanied by deformation or removal of parent metal.
Grooving	Smooth rounded furrows, such as score marks whose sharp edges have been polished off.
Guttering	Deep, concentrated erosion.
I	
Inclusion	Foreign material enclosed in metal. Surface inclusions are indicated by dark spots or lines.
K	
Kinks	Short, tight twists or curls caused by a doubling or winding of a hose or line upon itself. Likely to cause difficulties in the operation.
L	
Loose	Abnormal movement of a part.
N	
Nick	A surface impression with sharp corners or bottom, usually caused by pressure or impact from a sharp-edged foreign body. The parent material is displaced but usually none is separated.

TERM	DEFINITION
P	
Parent Metal	The basic metal of a part, sometimes referred to as base metal; the term is used particularly in connection with welding, where the parent metal is that being welded rather than that used in welding rod.
Peening	Deformation of surface.
Pickup	Rolling up of metal, or transfer of metal from one surface to another.
Pile-Up	Displacement of particles of a surface from one point to another. Distinguished from pickup by presence of depressions at point from which the material has been displaced.
Pitting	Small, irregularly shaped cavities in a surface from which material has been removed by corrosion or chipping. Corrosion pitting is usually accompanied by a deposit formed by action of a corrosive agent on basis material.
Puncture	A hole that is pierced in a material.
R	
Repair	To restore a defective part, component, subassembly or assembly to a serviceable condition.
Rub	When one component contacts another and is moved in relationship to it causing material to be removed from it.
S	
Scoring	Multiple scratches, usually parallel and resulting from the same cause.
Scratch	A long, narrow sharp-cornered impression caused by the movement of a sharp object across the surface of parent material.
Spalling	Sharply roughened area characteristic of progressive chipping or peeling or surface material. Not to be confused with flaking.
Serviceable	Equipment or parts that are in a condition which allows them to be returned to operational status on an aircraft.
T	
Testing	Testing of equipment to determine that the unit functions properly within specified limits.
Tolerance	The range of variation allowed in maintaining a specified dimension in making part.
Torque	To tighten a nut, bolt or fitting, using a torque wrench, to a specified torque value expressed as inch-pounds or as foot-pounds.

TERM	DEFINITION
W	
Wear	Relatively slow removal of parent material from any cause, frequently not visible to the naked eye.

ALPHABETICAL INDEX

By Order of the Secretary of the Army:

Official:

JOEL B. HUDSON
Acting Administrative Assistant to the Secretary of the Army
01753

DENNIS J. REIMER
General, United States Army
Chief of Staff

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31-E, block no.3574, requirements for TM 1-2835-213-23.

These are the instructions for sending an electronic 2028

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.

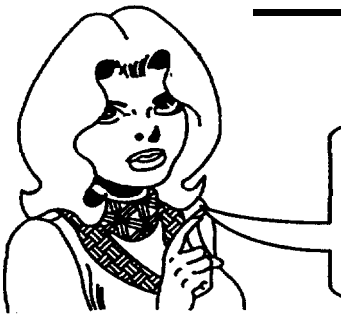
From: ' Whomever" <whomever@avma27.army.mil>
To: ls-lp@redstone.army.mil

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-JUL-99
8. ***Pub*** no; l-2840-246-50-4
9. ***Pub Title:*** MWO
10. ***Publication Date:*** 25-JUNE-1999
11. *Change Number: 0*
12. *Submitter* ***Rank:*** MSG
13. ***Submitter FName:*** Joe
14. *Submitter* ***MName:*** T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-I 23-l 234
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



THEN . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC John DOE
CO A 3rd Engineer Bn
Ft. Leonardwood, MO 63108

DATE SENT
22 August 1992

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM I-I 520-250- 10	15 June 1992	Operator' s manualMH60K Helicopter

BE EXACT PIN-POINT WHERE IT I

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

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 pointed at a bolt. In key to figure 4-3, item 16 is calle a shim. Please correct one or the other

EXAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317-7111

SIGN HERE

JOHN DOE John Doe

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M verprint2, 1 Nov 80

P.S.- • IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION, MAKE A CARBON COPY OF THIS AND GIVE TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-LS-LP
REDSTONE ARSENAL, AL 35898-5230

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT' S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 1-2835-213-23	29 February 1996	Engine, Assembly Gas Turbine GTCP36-55(H)

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M verprint2, 1 Nov 80

P.S.- - IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION. MAKE A CARBON COPY OF THIS AND GIVE TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-LS-LP
REDSTONE ARSENAL, AL 35898-5230

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM I-2835-21 3-23	29 February 1996	Engine, Assembly Gas Turbine GTCP36–55(H)

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DDNE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028–2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M verprint2, 1 Nov 80

P.S.- • IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION, MAKE A CARBON COPY OF THIS AND GIVE TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

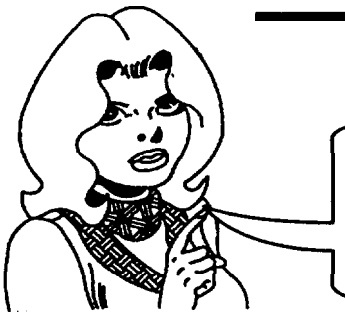
FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-LS-LP
REDSTONE ARSENAL, AL 358984230

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT' S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM I-2835-21 3-23	29 February 1996	Engine, Assembly Gas Turbine GTCP36-55(H)

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M verprint2, 1 Nov 80

P.S.- - IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION, MAKE A CARBON COPY OF THIS AND GIVE TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-LS-LP
REDSTONE ARSENAL, AL 35898-5230

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 milliliters = .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. mile

Cubic Measure

1 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 meters	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: 074685-001