TECHNICAL MANUAL

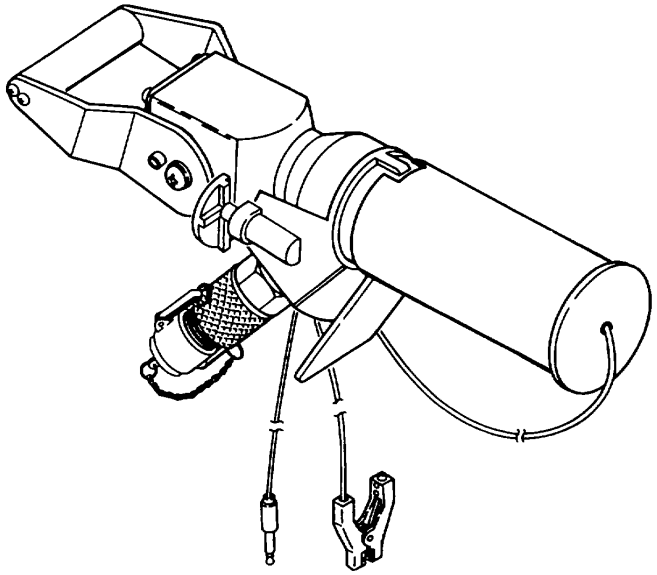
OPERATOR'S, UNIT, AND

DIRECT SUPPORT

MAINTENANCE MANUAL

INCLUDING REPAIR PARTS

AND SPECIAL TOOLS LIST



CLOSED-CIRCUIT

REFUELING NOZZLE

ASSEMBLY

MODEL 64017

(NSN: 4930-01-363-6449)

HEADQUARTERS, DEPARTMENT OF THE ARMY

15 DECEMBER 1993

URGENT

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February1997

Operator's, Unit, and Direct Support Maintenance Manual
Including Repair Parts and Special Tools List

CLOSED-CIRCUIT REFUELING NOZZLE ASSEMBLY
MODEL 64017
NSN: 4930-01-363-6449

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CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 7 May 1996

OPERATOR'S, UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

CLOSED-CIRCUIT REFUELING NOZZLE ASSEMBLY
MODEL 64017
NSN: 4930-01-363-6449

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CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 October 1995

OPERATOR'S, UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

CLOSED-CIRCUIT REFUELING NOZZLE ASSEMBLY
MODEL 64017
NSN: 4930-01-363-6449

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Remove pages	Insert pages
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5-21/(5-22 blank)	———
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C-15 through C-18	C-15 through C-18

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WARNINGS

DEATH or serious injury may result if personnel fail to observe safety precautions.

WARNING

FLAMMABLE FUEL

Fuels are toxic and flammable. Wear protective goggles and refuel only in well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy, get fresh air immediately, flush with clean water and get medical aid for eyes immediately.

BEFORE OPERATION be certain nozzle is secure to avoid spillage of fuel. Do not allow any smoking within 100 feet of the fuel servicing areas. Post NO SMOKING signs around the areas. Be certain a suitable fire extinguisher is present.

DURING OPERATION avoid spillage of fuel as much as possible. If spillage of fuel occurs, cover the areas with dry soil to reduce its rate of vaporization. Avoid getting fuel on the body or clothing. If clothing becomes saturated with fuel, remove the clothing immediately and wash the body with hot soapy water. Do not allow smoking within 100 feet of the dispensing area. Post NO SMOKING signs around the areas. Be certain the nozzle is properly bonded to the vehicle being filled. The vehicle being filled and the dispensing pump must be grounded. Be certain a suitable fire extinguisher is present and has been properly filled. Never dispense fuel to a vehicle while its engine is operating.

WARNING

SOLVENT HAZARD

Drycleaning solvent, AA 711, Types I and II, used to clean parts, is potentially dangerous to personnel and property. Eye protection required. Avoid repeated and prolonged skin contact by wearing rubber or nonporous gloves when handling solvents or material wet with drycleaning solvent. Wash hands immediately after exposure with soap and water and use a lanolin based skin cream to prevent skin drying. Do not use near open flame or excessive heat. Flash point of solvent is 138°F. Do not work with solvent in a closed room. Be sure there is good ventilation or the solvent vapors will build up in the air and become a poisonous mixture which can cause physical injury or even death.

FIRST AID instructions are given in FM 21-11, First Aid For Soldiers.

WARNINGS- (continued)

WARNING

COMPRESSED AIR HAZARD

Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psig working pressure.

WARNING

STATIC DISCHARGE

A static discharge between the vehicle and CCR Nozzle could ignite the fuel or cause an explosion of fuel vapors. Do not operate the nozzle until it has first been properly grounded to vehicle.

WARNING

ARCING

Radio transmitters can cause an arc at antennas. Do Not ground nozzle to a radio antenna.

WARNING

FUEL SPILLAGE ON PERSONNEL

Avoid getting fuel on your body or clothing. If clothing becomes saturated with fuel, remove clothing immediately and wash your body with hot soapy water.

TECHNICAL MANUAL

NO. TM 10-4930-245-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 December 1993

TECHNICAL MANUAL
OPERATOR'S UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)
FOR
CLOSED CIRCUIT REFUELING NOZZ,TE ASSEMBLY
MODEL 64017
NSN: 4930-01-363-6449

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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TABLE OF CONTENTS

TABLE OF CONTENTS - continued

HOW TO USE THIS MANUAL

Be sure to read all Warnings before using your equipment.

This manual contains operating and maintenance instructions for operation and maintenance of the Closed-Circuit Refueling (CCR) Nozzle Assembly.

- Chapter 1 - Introduces you to the equipment and gives you information such as weight, height, length, generally used abbreviations and information on how the unit works.
- Chapter 2 - Provides information necessary to identify and use the equipment. Operating instructions in this chapter tell you how to use the equipment in both usual and unusual weather conditions. In addition, preventive maintenance instructions provide information needed to inspect and service the closed-circuit refueling nozzle assembly.
- Chapter 3 - Provides operator troubleshooting procedures for identifying equipment malfunctions and maintenance procedures for performing operator maintenance tasks.
- Chapter 4 - Provides unit maintenance personnel with troubleshooting procedures for identifying equipment malfunctions and maintenance procedures for repairing defective equipment.
- Chapter 5 - Provides direct support maintenance personnel with maintenance instructions for performing repairs on equipment as authorized by the maintenance allocation chart.
- Appendix A - Provides a list of frequently used forms and publications referenced or used in this manual.
- Appendix B - The Maintenance Allocation Chart identifies repairable components and the maintenance level authorized to perform the repairs.
- Appendix C - The Repair Parts and Special Tools List.
- Appendix D - Lists components that are not mounted on the equipment, but are required to make the unit functional. All components in the Components of End Item and Basic Issue Items Lists are illustrated for easy identification.
- Appendix E - Lists additional equipment authorized for your unit for use with the CCR nozzle, but which are not supplied with the CCR nozzle.
- Appendix F - Provides you with information about expendable supplies such as sealants, lubricants, chemicals, etc., that are used when operating or maintaining equipment.
- Appendix G - Provides lubrication instructions.
- Appendix H - Mandatory Replacement Parts.
- Glossary.
- Alphabetical Index.

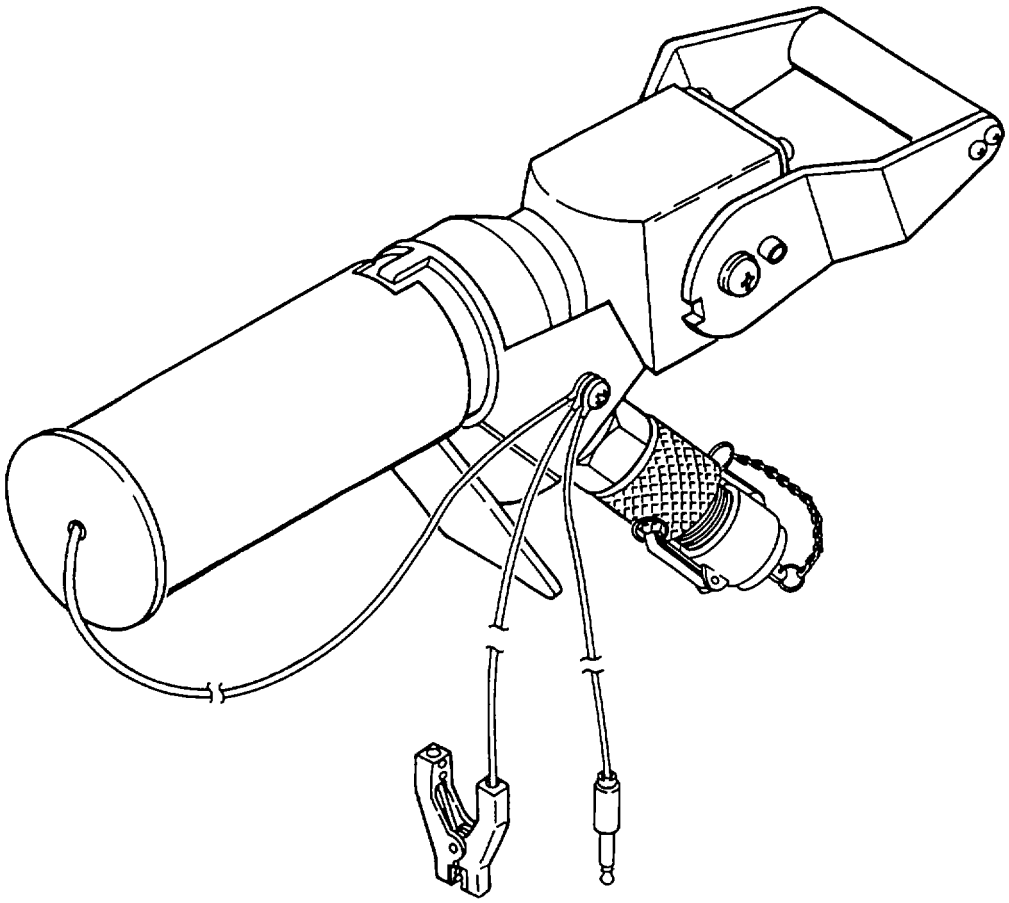


Figure 1-0. Closed Circuit Refueling Nozzle

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual. Operator's, Unit, and Direct Support Maintenance Manual, including Repair Parts and Special Tools List (RPSTL).

b. Model Number and Equipment Name. Model #64017 Nozzle Assembly, Closed-Circuit Refueling.

c. Purpose of Equipment. Closed Circuit Refueling Nozzle Assembly is used to refuel vehicles and helicopters. It mates with a closed-circuit adapter on the vehicle and features a quick-disconnect shutoff.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS.

Maintenance forms and records that you are required to use are DA Form 2402 (Exchange Tag), DA Form 2407 (Maintenance Request), and Standard Form 368 (Quality Deficiency Report). Their use and procedures for filling these forms are explained in DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Refer to TM 750-244-3 for instructions for destruction of equipment to prevent enemy use.

1-4. CORROSION PREVENTION AND CONTROL (CPC).

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling or breaking of the materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Using key words such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in DA PAM 738-750.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your CCR nozzle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798.

1-6. QUALITY ASSURANCE (QA) PROCEDURES.

Critical procedures or parts of procedures in this TM which require quality assurance inspections are identified by "(QA)" written after the applicable step.

1-7. NOMENCLATURE CROSS REFERENCE LIST.

Common Name	Official Nomenclature
CCR Nozzle	Nozzle Assembly, Closed-Circuit Refueling

1-8. LIST OF ABBREVIATIONS/ACRONYMS.

App	Appendix
CCR	Closed-Circuit Refueling
CN	Can
F	Fahrenheit
GL	Gallon
in.	lb. Inch Pounds
LB.	Pounds
PN	Part Number
psig	Pound-force per square inch, Gage
PT	Pint
TU	Tube

1-9. GLOSSARY.

Packing	O-Ring Seals

Section II. EQUIPMENT DESCRIPTION

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

a. Characteristics.

(1) Two-position flow control handle.

(2) Nozzle locks onto vehicle adapter.

(3) Indicator shows when flow stopped.

b. Capabilities and Features.

(1) Regulates delivery pressure.

(2) Fuel strainer provided.

(3) Control handle latches in closed position.

(4) Grounding cable assembly provided.

(5) Automatic fuel shutoff when removed from vehicle adapter.

(6) Dust cap and plug provided for inlet and outlet.

1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

a. Nozzle Housing. The Nozzle housing (1) contains the poppet assembly and pressure regulator.

b. Nozzle Collar. The nozzle collar (2) mates with the vehicle receptacle. The locking lugs are housed and actuated by the collar.

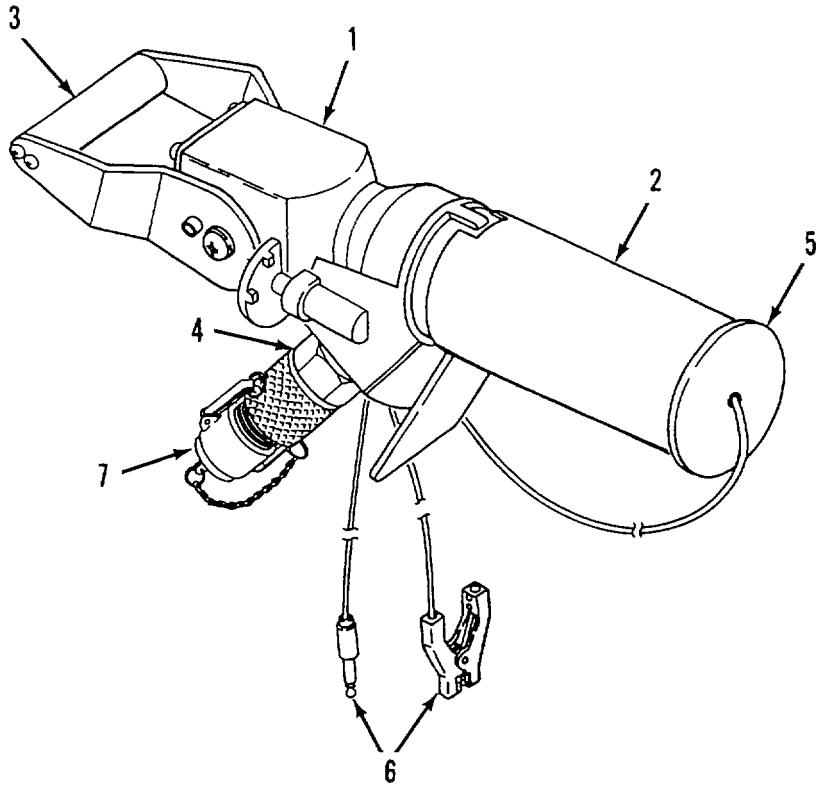
c. Handle Assembly. The handle assembly (3) allows for manual ON/OFF control of the flow rate either no flow or full flow.

d. Strainer Housing. The strainer housing (4) houses the fuel strainer.

e. Cover. A cover (5) is furnished to cover the nozzle outlet when not connected to a system for servicing.

f. Ground Cable. A ground cable (6) is provided for grounding to the vehicle prior to connection. A ground plug is provided for inserting into the vehicle ground receptacle. A clip type connector is used where a ground plug receptacle is not available.

g. Coupling Assembly. The coupling assembly (7) allows the nozzle assembly to be connected and disconnected from a fuel servicing source.



1-12. EQUIPMENT DATA.

GENERAL

Type:	MIL-N-52747D(ME), Type IA	Standard Service, with 2 inch quick-disconnect coupler.
Weight:	8 lb (3.7 kg) Maximum	
Maximum Dimensions:	10 inches L, 4 inches W, 9 inches H; not including Strainer Assembly and Coupling.	
Nozzle Disengagement Force:	10 to 32 lb	

Environmental Conditions:

- Operating Temperature Range: -25°F to + 140°F.
- Operating Relative Humidity: Zero to 100%.
- Sand and Dust: Exposure to desert environment.
- Storage Temperature Range: -50°F to + 150°F.

Section III. PRINCIPLES OF OPERATION

1-13. SYSTEM TECHNICAL PRINCIPLES OF OPERATION.

The CCR nozzle delivers pressure-regulated fuel to the closed-circuit adapter, the collar moves forward, locking the nozzle in place. The vehicle adapter contains an orifice sized to provide a predetermined fuel flow rate.

In addition to regulating fuel delivery pressure, the CCR nozzle serves as a fuel on-off valve. The valve is operated manually to either the closed or the flow (open) position. The internal poppet is then seated closed, shutting off flow.

Fuel flow is initiated by pushing forward on the handle latch, releasing the handle, then moving the handle up to the flow position. This unlocks the internal valve poppet and diaphragm allowing the fuel regulator to start fuel flow.

The fuel supply pressure exerts a force on the diaphragm assembly at the back of the poppet. This force is balanced by a calibrated regulator spring to maintain a valve opening which provides a nominal discharge flow from 15 to 125 psig nozzle inlet pressure.

The nozzle position indicator, attached to the back end of the poppet, provides a red indicator when the nozzle valve is closed. This indicator is visible to the operator at the center of the end cover.

When the refueled tank is filled, the pressure difference at the nozzle outlet is reduced to zero and flow ceases. The nozzle is removed from the adapter by pulling the collar away. Before removal from the vehicle adapter, the nozzle handle should be returned to the closed position. If, in an emergency situation, the nozzle is not returned to the closed position before removal, the dry quick-disconnect action of the nozzle will close its internal valve automatically.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. INTRODUCTION.

This section describes the controls and indicators you, as the operator, will be using most often. The following paragraphs will give you a brief description of each control and indicator.

2-2. LOCATION AND USE OF CONTROL AND INDICATORS.

CAUTION

Never attempt to tighten or loosen the poppet unless the diaphragm assembly is securely held in place by tool diaphragm wrench part number 220282. Failure to use this tool will cause damage to the diaphragm making the nozzle unusable.

CAUTION

Never operate the flow actuating handle unless the diaphragm is wetted by fuel. Actuation of this handle when the diaphragm is dry may greatly damage the diaphragm making the nozzle unusable.

CAUTION. Never use a screwdriver or sharp object to push the staybacks. Failure to heed this warning will result in damage to the collar causing binding. This will make the CCR nozzle non-operational.

CAUTION

Never defuel system without first isolating the CCR nozzle beforehand. Damage to the diaphragm may result making the nozzle unusable.

CAUTION

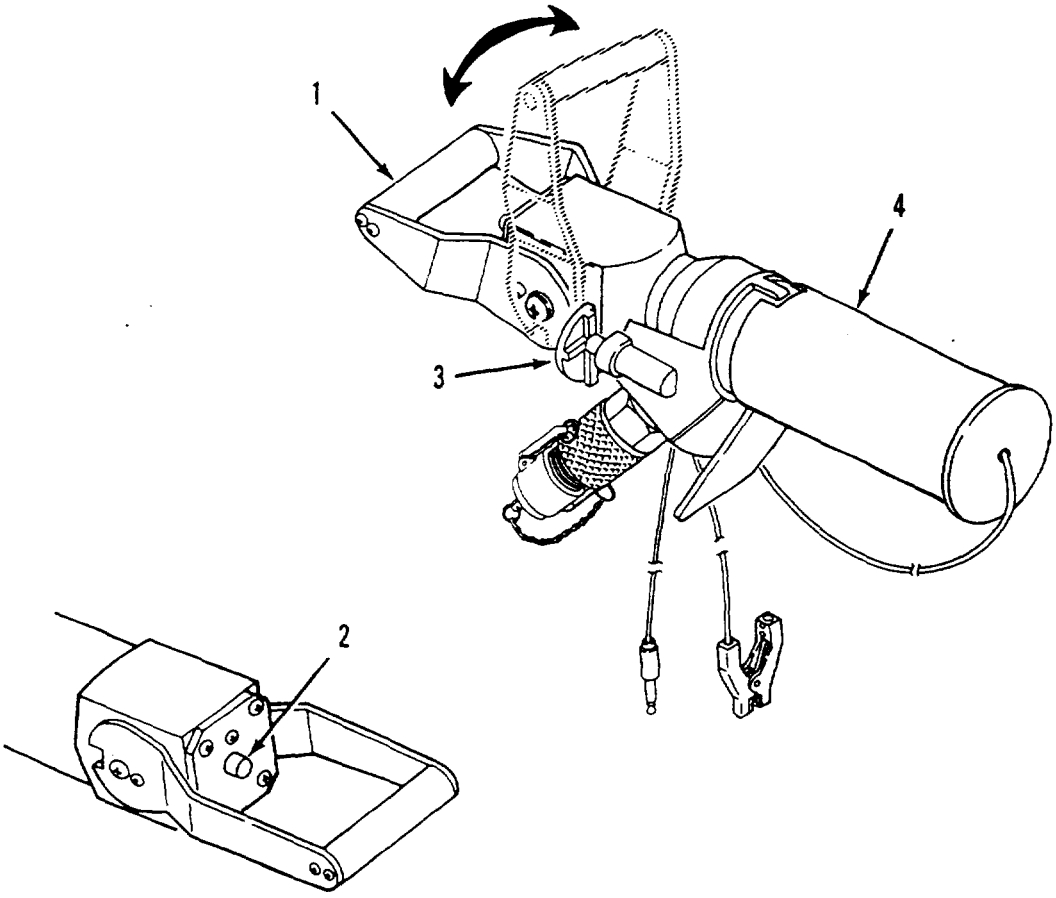
Never let the internal spring force slam the handle open because this may fracture the latch.

CAUTION

Never allow trapped fuel to remain in the CCR nozzles after use because damage results from increased internal pressure. Drain a substantial portion of the trapped fuel from all nozzles fitted with inlet valve fittings. This action should be taken immediately upon removing nozzle from the system.

2-2. LOCATION AND USE OF CONTROL AND INDICATORS - continued.

a. Handle (1) - Opens or closes the nozzle flow control valve. Handle shown in the closed position.
b. Flow Indicator (2) - When visible, red indicator shows that nozzle discharge flow is stopped.
c. Latch (3) - Holds nozzle handle in closed position. Latch must be pressed to release for changing position.
d. Quick-disconnect automatic shutoff coupler (4) - Connects to vehicle fuel servicing adapter.



Section II. OPERATORS PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. GENERAL.

Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the equipment operator, your mission is to:

a. Be sure to perform your PMCS each time you operate the equipment. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong.

b. Do your BEFORE (B) PMCS just before you operate the equipment. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

c. Do your DURING (D) PMCS while you operate the equipment. During operation means to monitor the equipment and its related components while it is actually being operated. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

d. Do your AFTER (A) PMCS right after operating the equipment. Pay attention to WARNINGs, CAUTIONs, and NOTEs.

e. Do your WEEKLY (W) PMCS once a week.

f. Do your MONTHLY (M) PMCS once a month.

g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.

h. Be prepared to assist organizational maintenance when they lubricate the equipment. Perform any other services when required by organizational maintenance.

2-4. PMCS TABLE COLUMNAR HEADINGS.

a. Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your equipment in good operating condition. It is set up so you can make your BEFORE (B) OPERATION checks as you walk around the equipment. The "ITEM" column of Table 2-1 relates to the callouts illustrations and is a numeric listing of the sequence in which the services and inspections are performed.

b. The "INTERVAL" column of Table 2-1 tells you when to do a certain check or service.

c. The "PROCEDURE" column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

2-4. PMCS TABLE COLUMNAR HEADINGS - continued.

NOTE

Terms "ready/available" and "mission capable" refer to same status: Equipment is on hand and ready to perform its combat missions. (See DA Pam 738-750).

d. The "EQUIPMENT IS NOT READY/AVAILABLE IF:" column in Table 2-1 tells you when your equipment is nonmission capable and why the equipment cannot be used.

e. If the equipment does not perform as required, refer to Chapter 3, Section II, Troubleshooting.

f. If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY, report it to your supervisor.

g. When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire nozzle:

(1) Keep It Clean. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (AA-711) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) Rust and Corrosion. Check equipment for rust and corrosion. If any bare metal or corrosion exists, clean, and apply a thin coat of oil. Report it to your supervisor.

(3) Bolts, Nuts, and Screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut or screw you think is loose, tighten it or report it to your supervisor.

(4) Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.

(5) Electric Wires and Connectors. Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.

(6) Hoses and Fluid Lines. Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to your supervisor.

h. When you check for "operating condition", you look at the component to see if it's serviceable.

2-5. CLEANING AGENTS.

WARNINGS

- DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places. Flash point of solvent is 138°F (60°C).
- USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

a. Cleaning Rust or Grease. When cleaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected area.

2-6. LEAKAGE DEFINITIONS FOR OPERATOR PMCS.

It is necessary for you to know how fluid leakage affects the status of the equipment. Following are types/classes of leakage an operator needs to know to be able to determine the status of the equipment. Learn these leakage definitions and remember when in doubt, notify your supervisor.

WARNINGS

- Equipment not mission capable if leaks are found.
- Leaks should be reported immediately to your supervisor.

a. CLASS I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

b. CLASS II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

c. CLASS III Leakage of fluid great enough to form drops that fall from item being checked/inspected.

2-7. EXPLANATION OF TABLE.

Table 2-1 contains a tabulated listing of preventive maintenance checks and services which must be performed by the operator.

CAUTION

Never attempt to tighten or loosen nozzle poppet unless the diaphragm assembly is securely held in place by diaphragm wrench (Appendix B, Section III, Item 6). Failure to heed this caution will result in irreparable damage to the diaphragm and nozzle.

CAUTION

Never operate the flow actuating handle unless the diaphragm is wetted by fuel. Actuation of this handle when diaphragm is dry may result in irreparable damage to the diaphragm, rendering the nozzle unusable.

NOTE

Within designated interval, these checks are to be performed in the order listed.

Table 2-1. Operator Preventive Maintenance Checks and Services

Item No.	Interval	Location of Item to be Inspected	Procedure	Not Fully Mission Capable If:
		CLOSE-CIRCUIT REFUELING NOZZLE		
1	Before	Locking Lugs and Stayback Lugs	Remove dust cover. Inspect for missing or damaged lugs. There should be three stayback lugs and nine locking lugs.	Lugs missing or damaged.
2	Before	Nozzle Housing	Inspect for leaks.	Any leaks found.
3	Before	Handle	Inspect handle action to see that it operates smoothly.	Fails to operate smoothly.
4	Before	Cable Assembly	Inspect cable for loose connection, frayed or damaged cables, bent or damaged plug or dip.	Damaged or frayed cables. Bent or damaged plug or dip.
5	Before	Cap Assembly	Inspect cap assembly cap for cracks, burrs or damage. Inspect cable for breaks, frays and security.	
6	Before	Coupling Assembly	Inspect coupling for leaks.	Any leaks found.

Table 2-1. Operator Preventive Maintenance Checks and Services

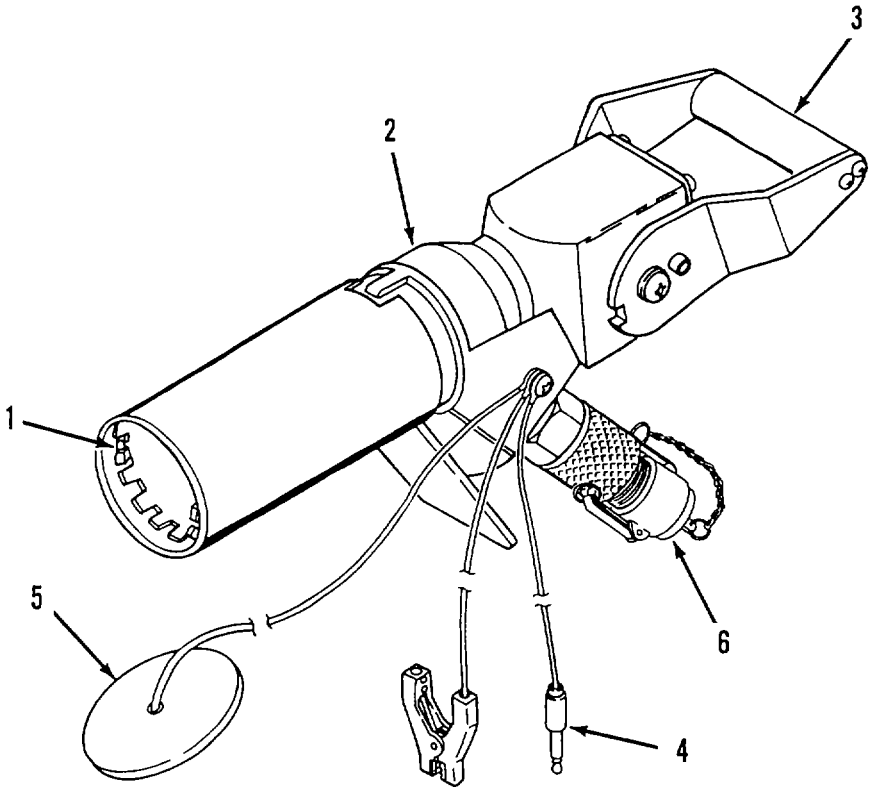
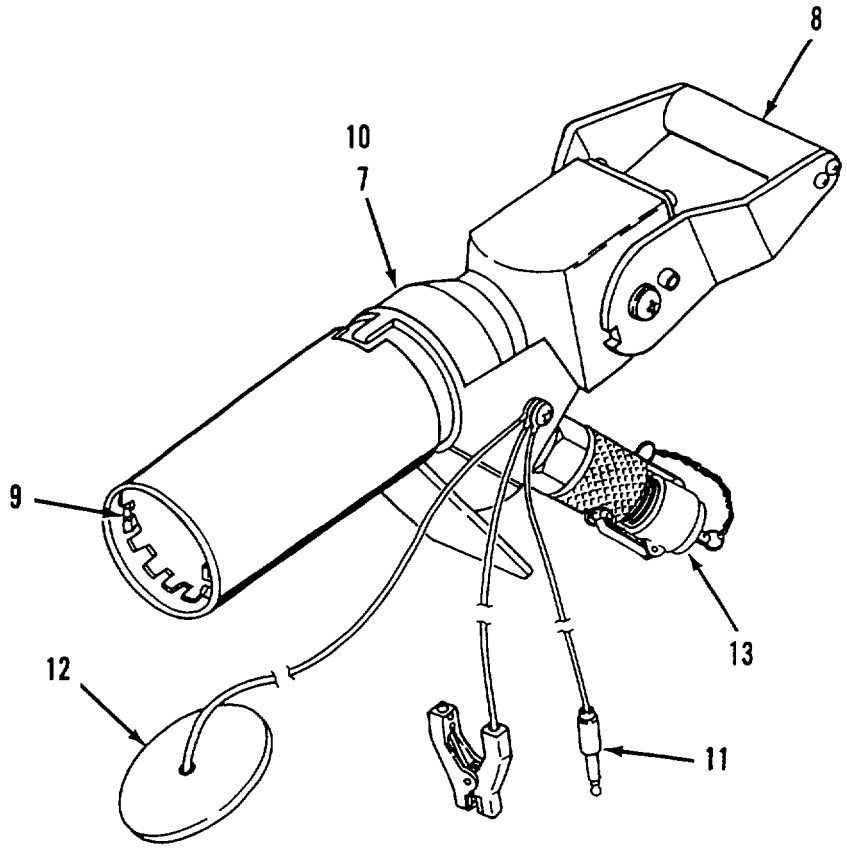


Table 2-1. Operator Preventive Maintenance Checks and Services - continued.

Item No.	Interval	Location Item to be Inspected	Procedure	Not Fully Mission Capable If:
		CLOSE-CIRCUIT REFUELING NOZZLE		
7	During	Nozzle Housing	Inspection for leaks.	Any leak found.
8	During	Handle	Inspect handle action to see that it operates smoothly.	Fails to operate smoothly.
9	After	Locking lugs and stayback lugs	Inspect for missing or damaged lugs. There should be three stayback lugs and nine locking lugs.	Lugs missing or damaged.
10	After	Nozzle Housing	Inspection for leaks.	Any leak found.
11	After	Cable Assembly	Inspect cable for loose connection, frayed or damaged cables, bent or damaged plug or clip.	Damaged or frayed cables. Bent or damaged plug or clip.
12	After	Cap Assembly	Inspect cap assembly cap for cracks, burrs or damage. Inspect cable for breaks, frays and security.	Cap cracked or cable broken.
13	After	Coupling Assembly	Inspect coupling for leaks.	Any leak found.

Table 2-1. Operator Preventive Maintenance Checks and Services — continued



SECTION III. OPERATION UNDER USUAL CONDITIONS.

2-8. ASSEMBLY AND PREPARATION FOR USE.

a. Position the nozzle handle in the closed (back) position.

b. Remove the dust cover from the CCR nozzle fuel inlet coupler. Connect the coupler to the fuel supply hose.

c. Pull the nozzle collar back and remove the discharge end dust cap before dispensing fuel.

2-9. OPERATING PROCEDURES.

a. Pull collar (1) back and remove dust cap (2).

WARNING

Do not operate the nozzle until it has first been properly grounded to the vehicle. Additional information on grounding may be obtained from TM 10-68, Aircraft Refueling. A static discharge between the vehicle and CCR nozzle could ignite the fuel or cause an explosion of fuel vapor.

Do not ground nozzle to a radio antenna. Radio transmitters can cause an arc at antennas.

CAUTION

Never attempt to tighten or loosen nozzle poppet unless the diaphragm assembly is securely held in place by diaphragm wrench (Appendix B, Section III, Item 6). Failure to heed this caution will result in irreparable damage to the diaphragm and nozzle. Never operate the flow actuating handle unless the diaphragm is wetted by fuel. Actuation of this handle when diaphragm is dry may result in irreparable damage to the diaphragm, rendering the nozzle unusable.

b. Insert ground plug (3) of nozzle into vehicle grounding jack, or attach nozzle grounding damp (4) to unpainted metal on the vehicle.

c. Connect the CCR nozzle (5) discharge coupler to the vehicle fuel servicing adapter and push until seated. A positive connection is indicated by the collar moving forward with an audible click.

d. Push the latch (6) on the right side of the nozzle forward to release the handle (7), and move the handle to the up (open) position to dispense fuel.

NOTE

When fuel flow is stopped, the red end of the position indicator should be visible at the center of the nozzle end.

e. When refueling is completed, move the handle to the downward (closed) position.

f. Pull the nozzle collar away from the vehicle fuel servicing adapter to remove the nozzle.

g. Disconnect ground cable assembly from vehicle and replace dust cap on nozzle.

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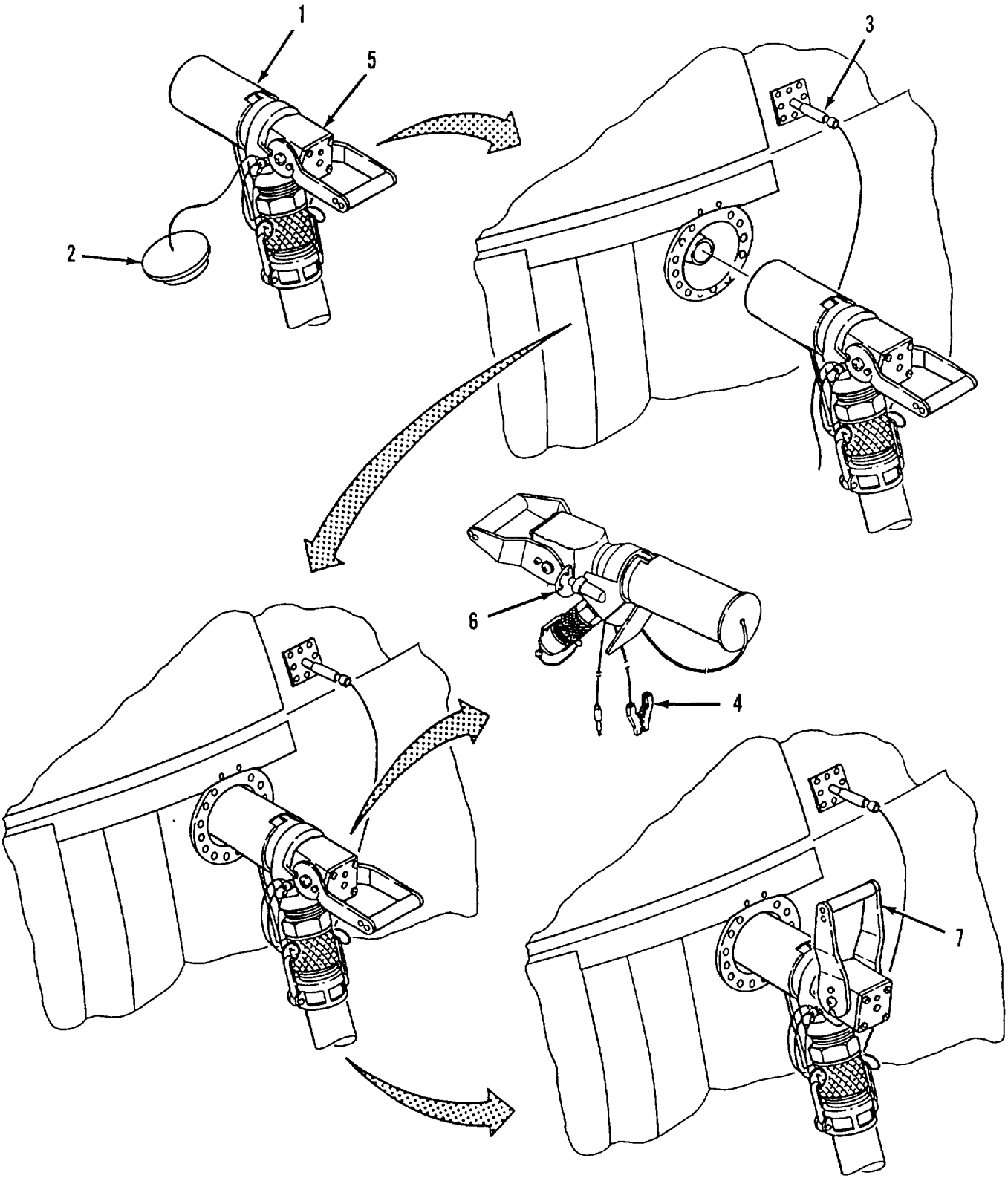
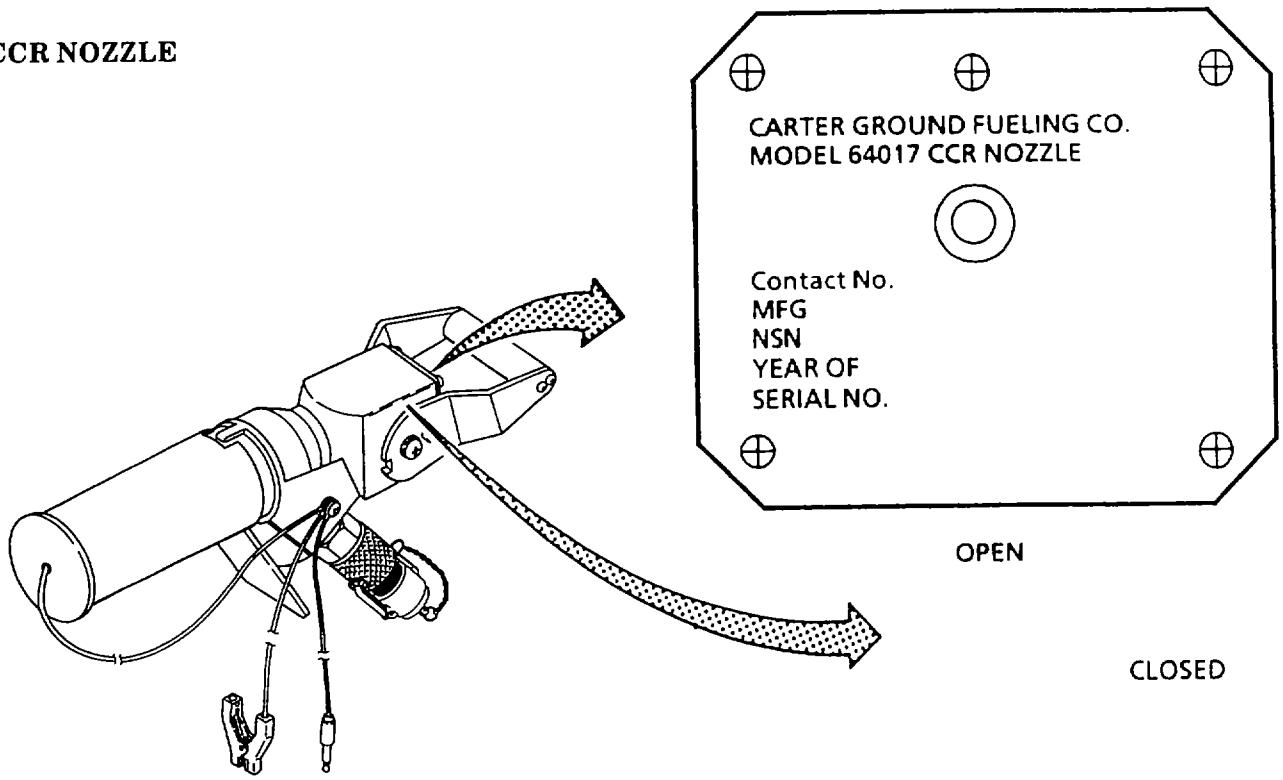
2-9. OPERATING PROCEDURES - continued.



2-10. DECALS AND INSTRUCTION PLATES.

CCR NOZZLE



Section IV. OPERATION UNDER UNUSUAL CONDITIONS.

2-11. UNUSUAL ENVIRONMENTAL / WEATHER.

a. Operation In Extreme Cold Conditions. Observe the following precautions when operating the CCR Nozzle in extreme cold conditions.

WARNING

Do not touch cold metal parts with bare hands when operating under extreme cold conditions. Frostbite can cause permanent injury.

(1) Always wear arctic mittens when handling nozzle and other equipment.

(2) Be careful when handling nozzle and hose assembly to avoid cracking hose.

2-11. UNUSUAL ENVIRONMENTAL / WEATHER- continued.

CAUTION

Accumulated ice and snow can damage nozzle assembly.

(3) Remove snow, sleet, or ice from nozzle before refueling.

(4) Always keep cap on the CCR nozzle and adapter when not in use.

(5) Perform operating procedure according to paragraph 2-7.

b. Operating the CCR Nozzle in Strong Winds and Sandy or Dusty Conditions.

(1) Strong Winds.

(a) Should not affect the performance or handling of the nozzle.

(b) Perform operating procedures according to paragraph 2-7.

(2) Sandy or Dusty Conditions.

(a) Remove any sand or dust from the nozzle before installing to either hose or adapter.

(b) Keep the protective cap installed when not in use.

(3) Perform operating procedure according to paragraph 2-7.

c. Operation in Extreme Heat Conditions.

(1) Keep the CCR nozzle under shade between operations.

(2) If shade is not available, erect a tent or tarpaulin.

(3) Perform operating procedure according to paragraph 2-7.

2-12. EMERGENCY PROCEDURES.

a. Leakage. If nozzle leakage occurs, remove nozzle from fuel system.

CAUTION

Avoid getting fuel on the body or clothing. If clothing becomes saturated with fuel, remove clothing immediately and wash your body with hot soapy water.

NOTE

Additional information on environmental cleanup may be obtained from TM 10-68, Aircraft Refueling.

b. Spillage. If spillage of fuel occurs, cover spill areas with dry soil to reduce vaporization rate.

2-13. NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES.

NOTE

Detailed decontamination procedures can be found in FM 3-3, FM 3-4, and FM 3-5.

a. General. The following emergency procedures can be followed until field NBC Decontamination Facilities are available. Assigned operators will assist the supporting NBC unit.

b. Procedure. If NBC attack is known or suspected, mask at once and perform the following:

(1) Stop dispensing of fuel.

(2) Do not disconnect the CCR nozzle.

(3) Have decontamination done on the equipment before resuming operation.

CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATING INSTRUCTIONS

No lubrication is required for the CCR nozzle.

Section II. OPERATOR TROUBLESHOOTING

3-1. INTRODUCTION.

The Malfunction Index, lists the common malfunctions which you may find during operation or maintenance of the CCR nozzle or its components. You should perform test/inspections and corrective actions in the order listed. This manual cannot list all malfunctions that may occur nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

3-2. MALFUNCTION INDEX.

For quick access to troubleshooting procedures, refer to Table 3-1, Malfunction Index.

MALFUNCTION INDEX

3-3. TROUBLESHOOTING.

Troubleshooting procedures for these malfunctions are given in Table 3-2. Notify Unit Maintenance for other malfunctions observed.

Table 3-2. Troubleshooting Table.

MALFUNCTION 1. Leakage At Discharge End of Nozzle During Refueling.

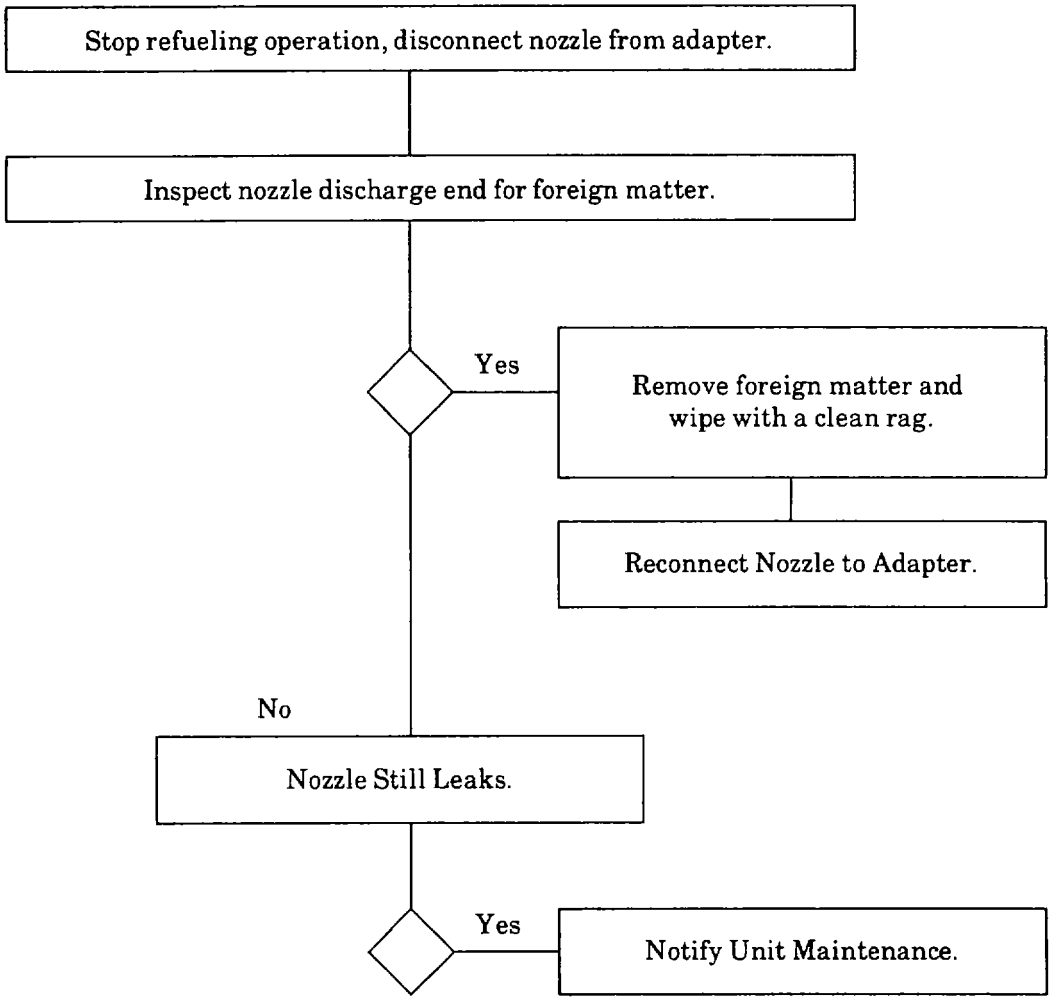
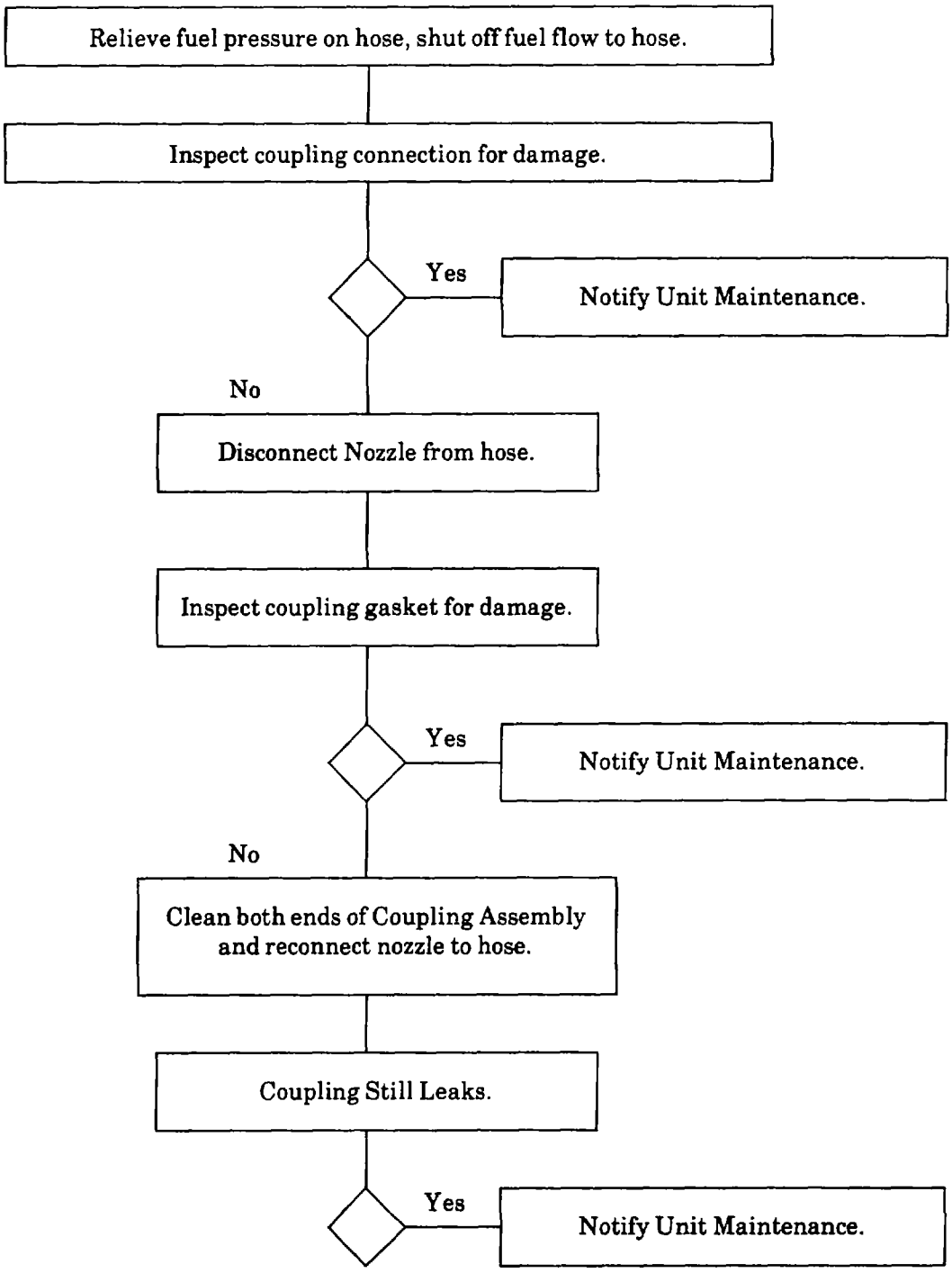


Table 3-2. Troubleshooting Table - continued.

MALFUNCTION 2. Leakage Between Nozzle Inlet Coupling and Hose Coupling.



Section III. MAINTENANCE PROCEDURES

Operator maintenance consists of inspection of components (see Table 2-1).

CHAPTER 4
UNIT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS AND SPECIAL TOOLS LIST

4-1. COMMON TOOLS AND EQUIPMENT.

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools, TMDE and support equipment are listed in the Maintenance Allocation Chart, Appendix B, and the Repair Parts and Special Tools List (RPSTL), Appendix C of this TM.

4-3. REPAIR PARTS.

Repair parts are listed and illustrated in Appendix C of this manual.

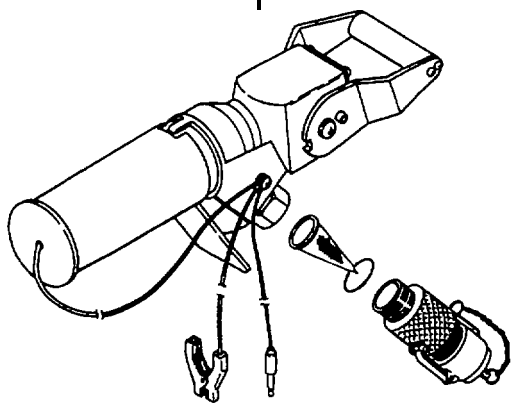
Section II. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-4. GENERAL.

To ensure that the CCR Nozzle is ready for use at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or equipment failure. The necessary preventive maintenance checks and services to be performed are listed and described in Table 4-1. Defects discovered during operation of the unit should be corrected as soon as possible. All deficiencies and shortcomings will be recorded, together with the corrective actions taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

Table 4-1. Unit Preventive Maintenance Checks and Services.

Item No.	Item to be Inspected	Interval	Procedures: Check for and have Repaired as Necessary	For Readiness Reporting Equipment is Not Ready/Available if:
1	Strainer	Every 2 weeks	Check for foreign matter and holes. Clean and/or replace as required (para. 4-10).	Holes in strainer.



Section III. UNIT TROUBLESHOOTING PROCEDURES

4-5. INTRODUCTION.

This section provides troubleshooting information for the CCR Nozzle at the unit level of maintenance. It consists of the malfunction index, table 4-1, listing the most common malfunctions, and troubleshooting table, table 4-2. The troubleshooting table is presented as flow diagrams for each malfunction listed in the malfunction index. Each diagram provides the procedure and corrective actions to return the CCR Nozzle to operational readiness.

4-6. TROUBLESHOOTING.

The troubleshooting table lists the common malfunctions which can occur in operation of the CCR Nozzle. The tests, inspections and corrective actions should be performed in the order given.

Table 4-1. Malfunction Index.

MALFUNCTION PAGE

Table 4-2. Troubleshooting Table - continued.

MALFUNCTION 1. Leakage Between Strainer Body and Strainer Housing

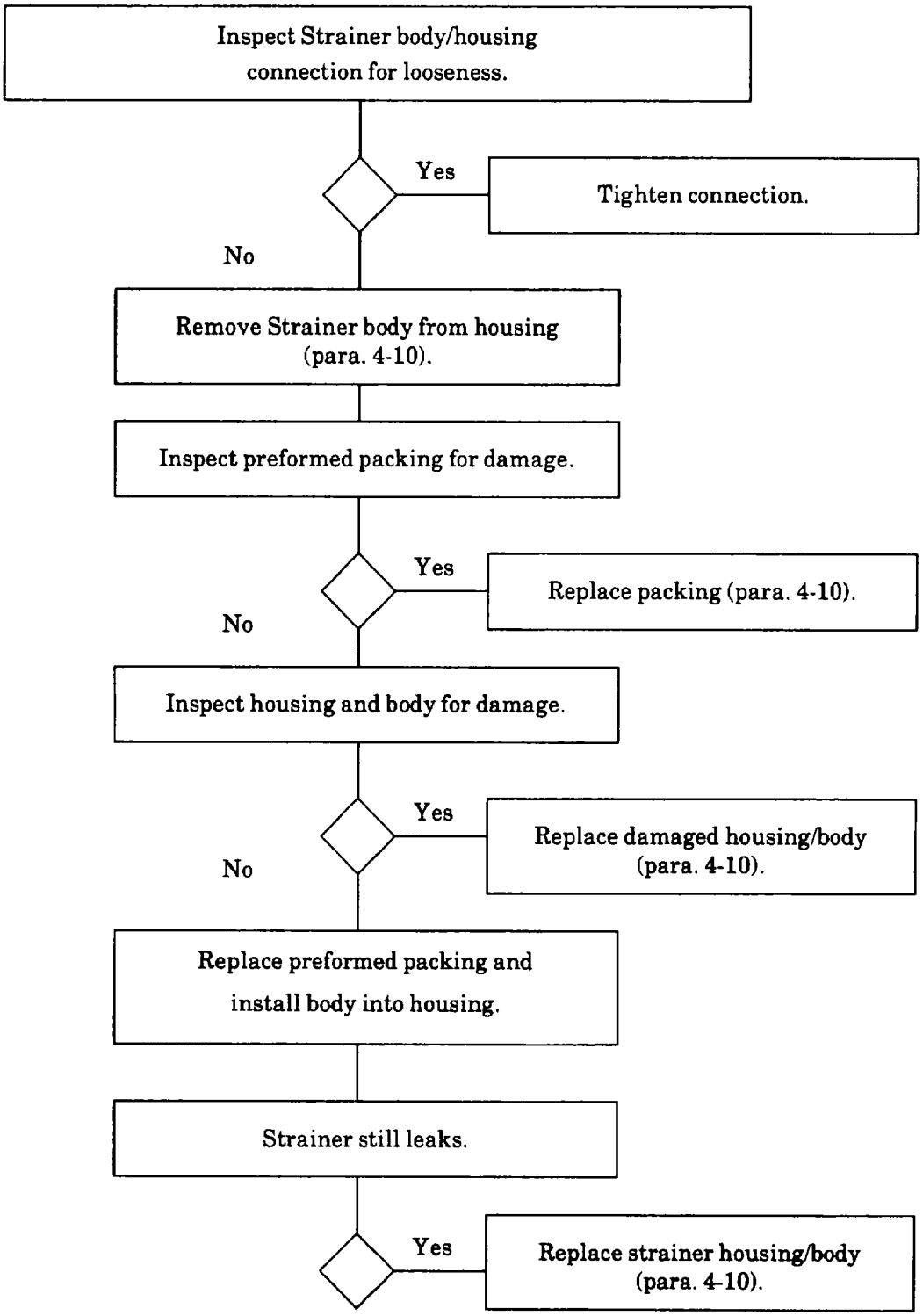


Table 4-2. Troubleshooting Table - continued.

MALFUNCTION 2. Leakage Between Nozzle Inlet Coupling and Hose Coupling

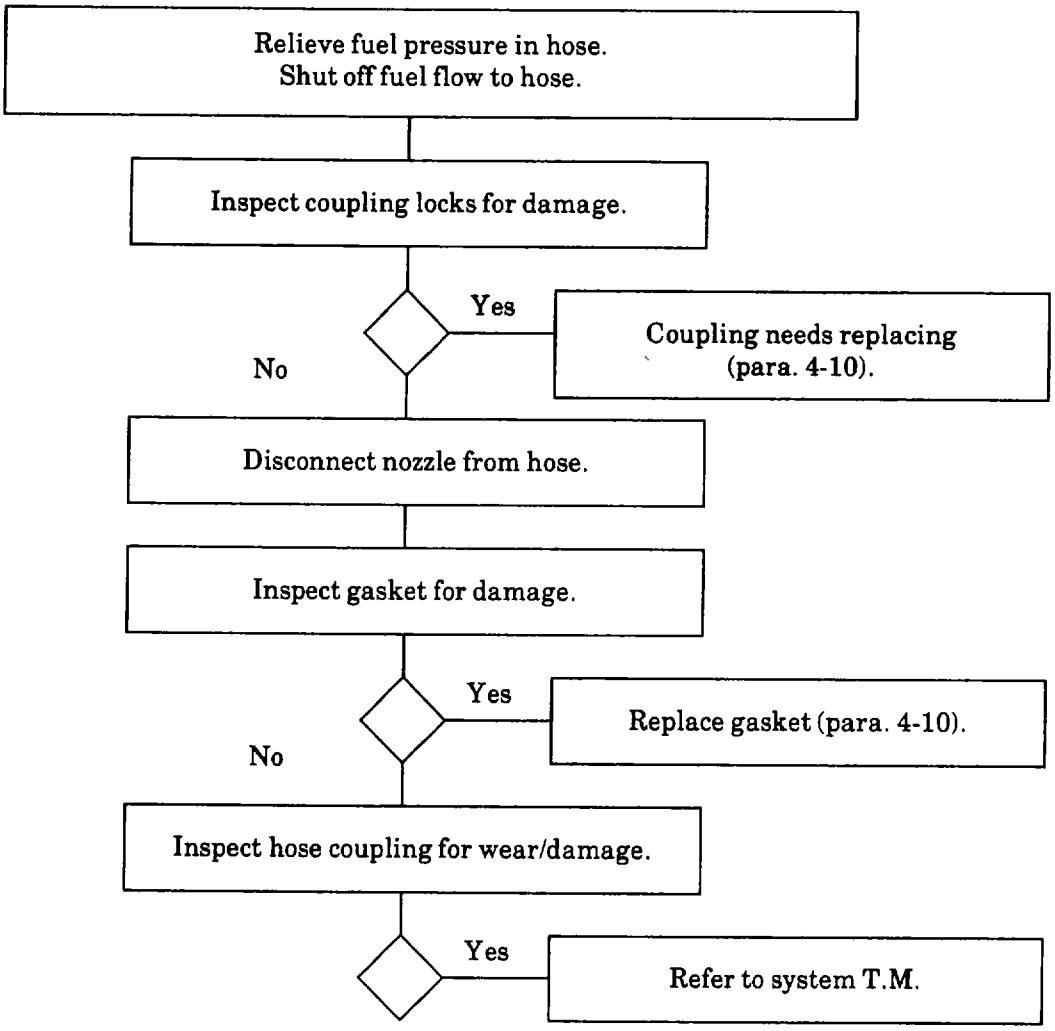
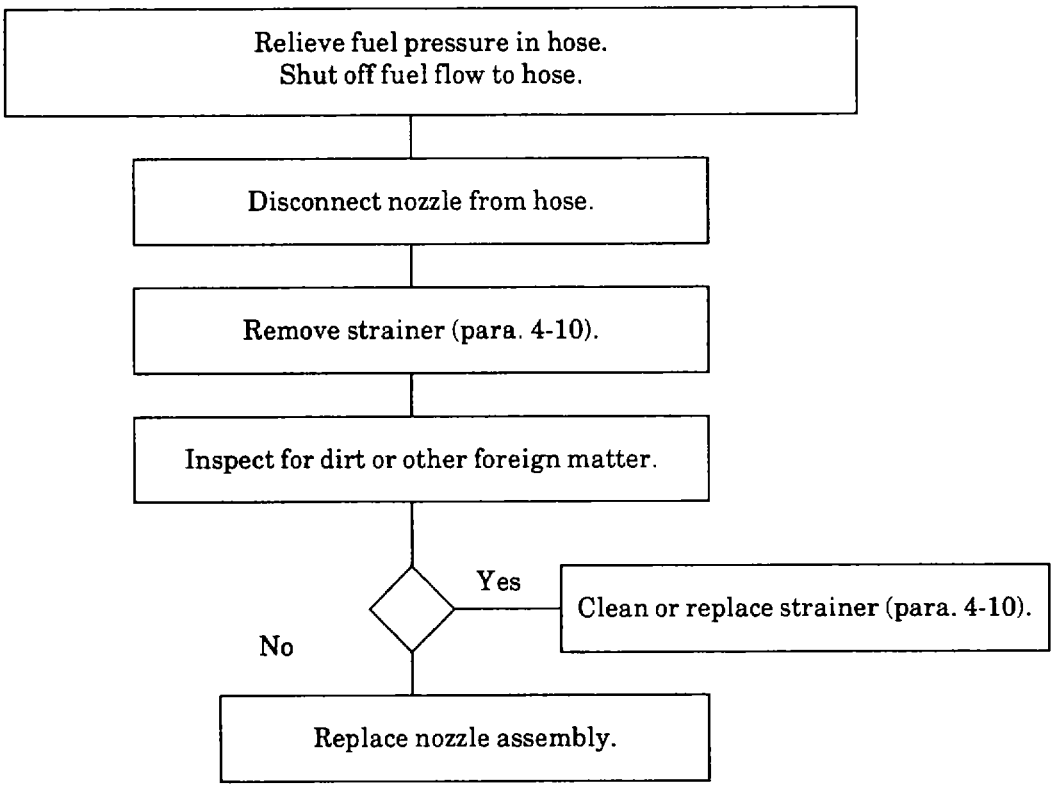


Table 4-2. Troubleshooting Table - continued.

MALFUNCTION 3. Inadequate Fuel Flow From CCR Nozzle



Section IV. UNIT MAINTENANCE PROCEDURES

4-7. GENERAL.

This section contains instructions for performing unit level maintenance on the CCR Nozzle.

4-8. PERSONNEL SAFETY.

Personnel must remove all items of jewelry (rings, bracelets, watches, necklaces, etc.) and loose clothing before working on equipment. Jewelry and loose fitting clothing can get caught in moving equipment and result in injury to personnel.

When performing maintenance of the CCR Nozzle, keep in mind the purpose of the equipment is to distribute fuel. Cleaning fluids, lubricants, preservatives, paint or other chemicals must not be allowed to contaminate the fuel.

Operate the equipment after performing maintenance to ensure repairs have been performed correctly and equipment can be returned to service.

4-9. PROPER EQUIPMENT.

Obtain proper equipment before starting maintenance. This includes hand tools and/or special tools, receptacles for storing small parts and expendable materials required by the maintenance task.

4-10. CCR NOZZLE ASSEMBLY REPAIR.

This task consists of: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP:

Tools:
Tool kit, General Mechanics (Item 1, Appendix B)
Vise (Item 2, Appendix B)

General Safety Requirements:

WARNINGS

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame.
- Area should be well-ventilated. Using drycleaning solvents incorrectly can cause injury or even death.
- Fuels Flammable/No Smoking

Equipment Condition:
CCR Nozzle removed from fuel system. (Reference Applicable System TM)

Materials/Parts Required:
Solvent (Item 1, Appendix E**)**
Wiping Rag (Item 2, Appendix E)
Silicone Compound (Item 3, Appendix E)
Sealing Compound (Item 4, Appendix E)
Packing, Preformed (Item 1, Appendix H)

a. Disassembly

(1) Pull the nozzle collar (1) back to release the cap (2) from the discharge end of the nozzle. Remove the cap assembly (2).

(2) Remove screw (3) holding the ground cable assembly (4) and cap assembly cable (2) to the nozzle housing (5).

(3) Remove strainer body (6) with coupling assembly (10) attached, by hand from strainer housing (7).

(4) Remove strainer (8) and preformed packing (9) from strainer housing (7). Discard packing.

(5) Place strainer body (6) into a soft face vise.

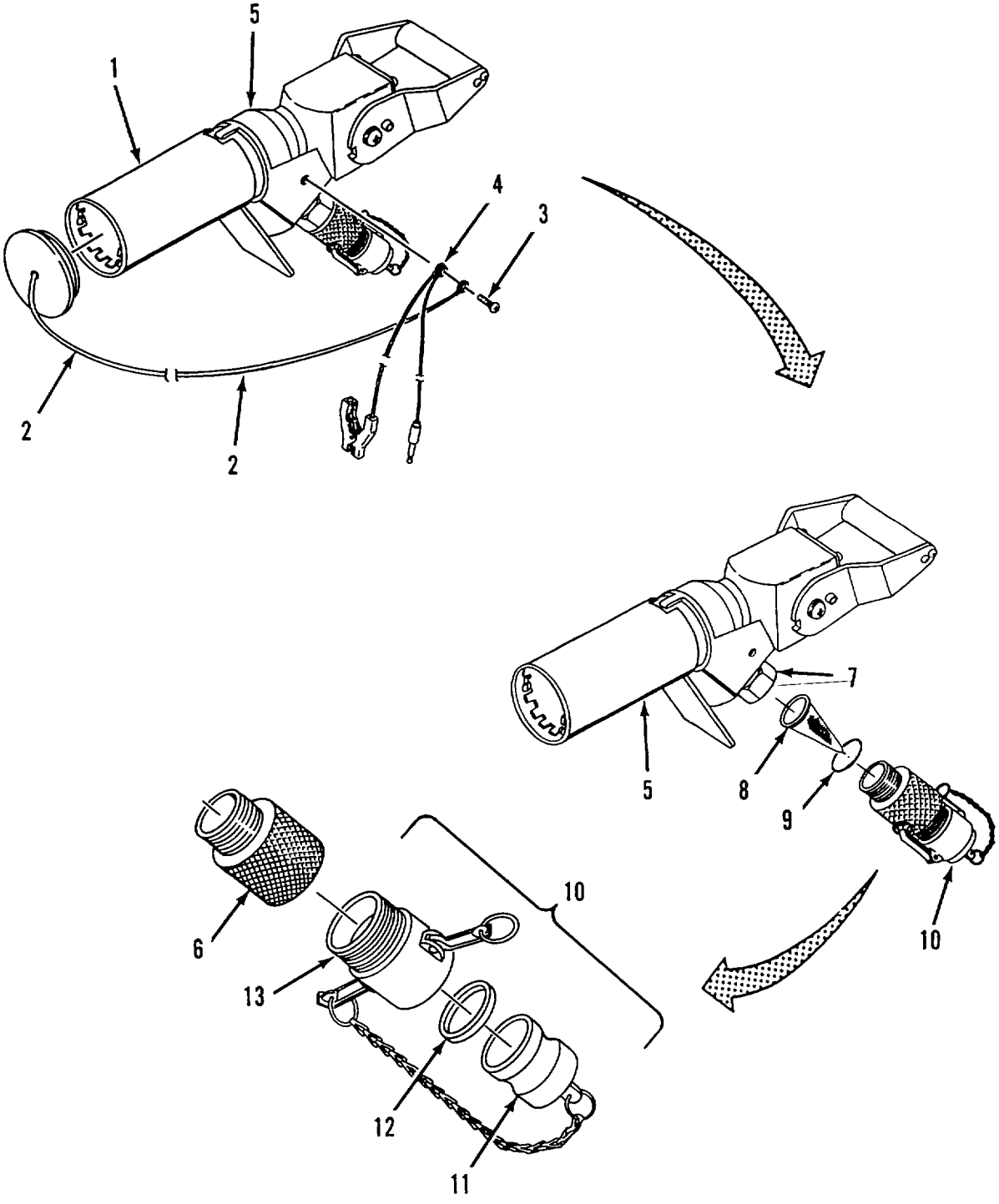
(6) Unscrew coupling assembly (10) from strainer body (6).

(7) Remove plug (11) from coupling half (13).

(8) Remove gasket (12) from coupling half (13).

4-10. CCR NOZZLE ASSEMBLY REPAIR - continued.

a. Disassembly - continued.



4-10. CCR NOZZLE ASSEMBLY REPAIR - continued.

b. Repair - continued.

WARNING

Drycleaning solvent, AA 711 Types I and II, used to clean parts is potentially dangerous to personnel and property. Use in a well-ventilated area as the fumes are dangerous if inhaled. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 138°F. on the discharge end of the nozzle.

b. Repair.

(1) Clean parts with drycleaning solvent. Dry with clean wiping rag.

(2) Inspect all parts for damage. Look for damage threads, worn, scored, or deformed parts, cracks or corrosion.

(3) Replace any damaged parts found by inspection.

c. Assembly.

(1) Install gasket (12) in coupling half(13).

(2) Install plug (11) in coupling half (13) and lock in place.

(3) Coat threads of coupling half (13) with anti-seize compound. Wipe off any excess with clean, dry wiping rag.

(4) Clamp strainer body (6) in a soft face vise and screw coupling half (13) into strainer body (6). Remove from vise.

(5) Install strainer (8) into strainer housing (7).

(6) Coat preformed packing (9) with silicone compound and install into groove at end of strainer housing (7) over strainer (8) lip.

(7) Install strainer body (6) into strainer housing (7) and hand tighten.

NOTE

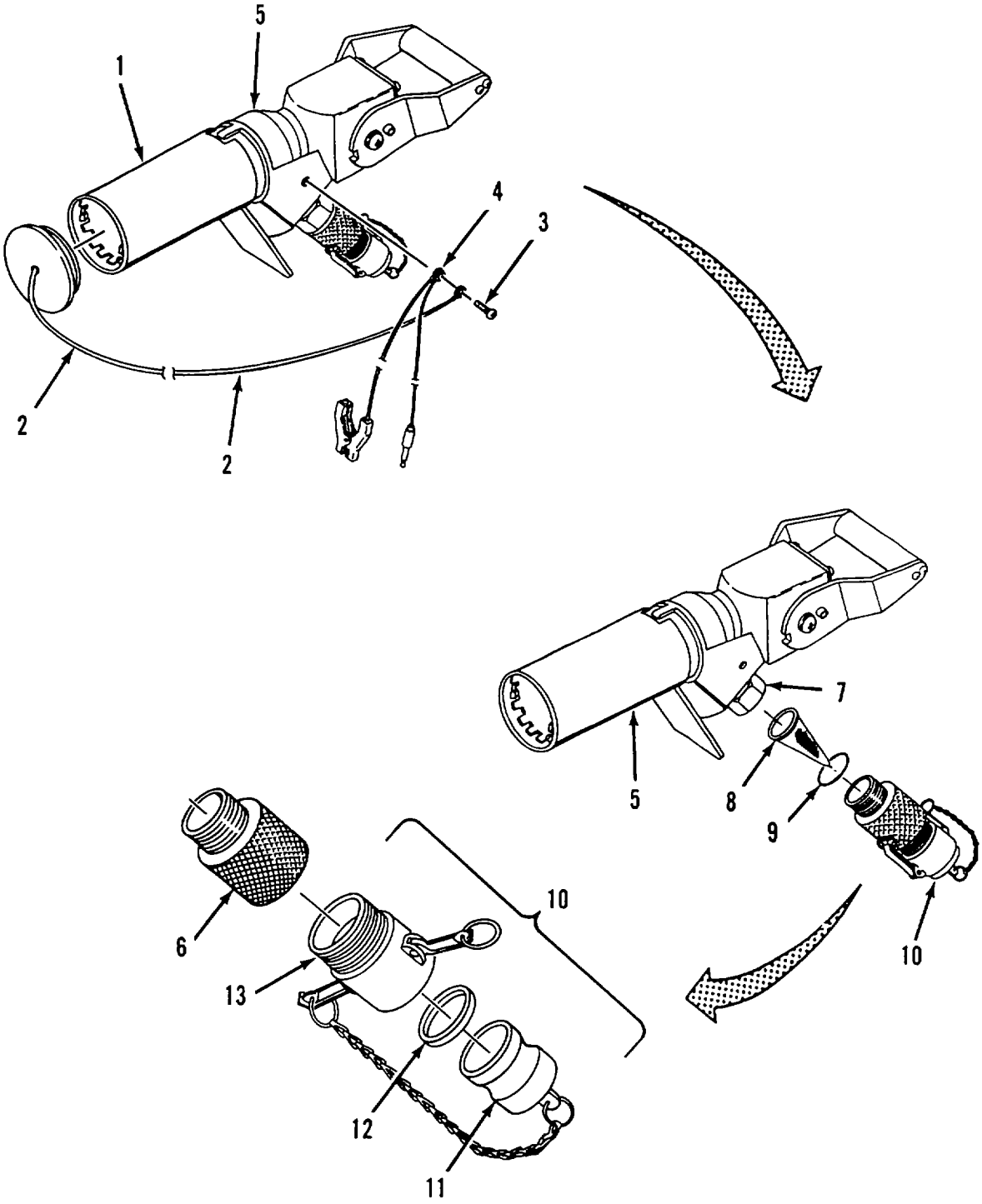
The two grounding cable lugs should be closest to the housing.

(8) Attach the two lugs on ground assembly cable (4) and lug on cap assembly cable (2) to the housing (5) with screw (3).

(9) Pull dust cap (2) on collar (1).

4-10. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.



Section V. PREPARATION FOR STORAGE OR SHIPMENT

4-11. SECURITY PROCEDURES.

Refer to AR 190-11 or AR 190-13.

4-12. PREPARATION FOR MOVEMENT.

NOTE

For disposal of contaminated fuel, refer to FM 10-20, Organizational Maintenance of Military Petroleum Pipelines, Tanks and Related Equipment.

a. Drain residual fuel from nozzle.

b. Install cover on nozzle outlet.

c. Install plug in coupling assembly.

d. The nozzle is now ready to be placed in a suitable container. For additional information on Packaging of Army Material for Shipment and Storage, refer to AR 746-1.

4-13. ADMINISTRATIVE STORAGE.

Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

Before placing the equipment in administrative storage, current preventive maintenance checks and services should be completed, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWO) should be applied.

Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers, and other containers may be used.

CHAPTER 5
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. TROUBLESHOOTING

Troubleshooting is not required on the CCR Nozzle at Direct Support level of maintenance.

Section II. MAINTENANCE INSTRUCTIONS

5-1. INTRODUCTION.

This section contains procedures for Direct Support level maintenance on the CCR Nozzle.

Maintenance consists of repair by replacement of defective components, then testing to ensure correction of malfunction.

5-2. CCR NOZZLE ASSEMBLY REPAIR.

This task consists of: a. Disassembly b. Repair c. Assembly d. Testing

INITIAL SET-UP:

Tools:
Tool Kit, General Mechanics (Item 3, Appendix B)
Body Wrench (Item 5, Appendix B)
Diaphragm Carrier Wrench (Item 6, Appendix B)
Piston Compression Tool (Item 7, Appendix B)
Locking Lug Assembly Tool (Item 8, Appendix B)
Poppet wrench (item 9, Appendix B)
Dial Caliper (Item 4, Appendix B)
Wrench 2i" (Item 4, Appendix B)
Vise (with softfaced jaws) (Item 4, Appendix B)
Compound, Sealant

Materials/Parts Required:
Rags (Item 2, Appendix E)
Solvent (Item 1, Appendix E)
Bushing (Item 2, Appendix H)
Diaphragm Assembly (Item 3, Appendix H)
Sleeve Seal (Item 4, Appendix H)
Seal, wiper (2 each) (Item 5, Appendix H)
Packing (Item 6, Appendix H)
Alcohol, Rubbing (Item 5, Appendix E)
Silicone Compound (Item 4, Appendix E)

General Safety Requirements:

WARNINGS

- Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well-ventilated. DO NOT SMOKE.
- Using drycleaning solvents incorrectly can cause injury or even death.

Equipment Condition:
Nozzle removed from fuel system (refer to system T.M.)

a. Disassembly.

(1) Push the piston compression tool into the nozzle discharge end until it latches in place.

(2) Compress valve latch activator (5) and move handle (8) to OPEN position.

WARNING

End cover is under spring pressure. Keep pressure on end cover while removing screws.

(3) Carefully remove four screws (1) and remove end cover (2).

(4) Screw (3) and lock pin (4) should not be removed unless damaged. If damaged, use a soft jaw chuck or vise to hold locking pin (4) in place and remove screw (3).

(5) Remove spring retainer (5) and spring (6).

(6) Remove four handle screws (7) and handle (8).

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

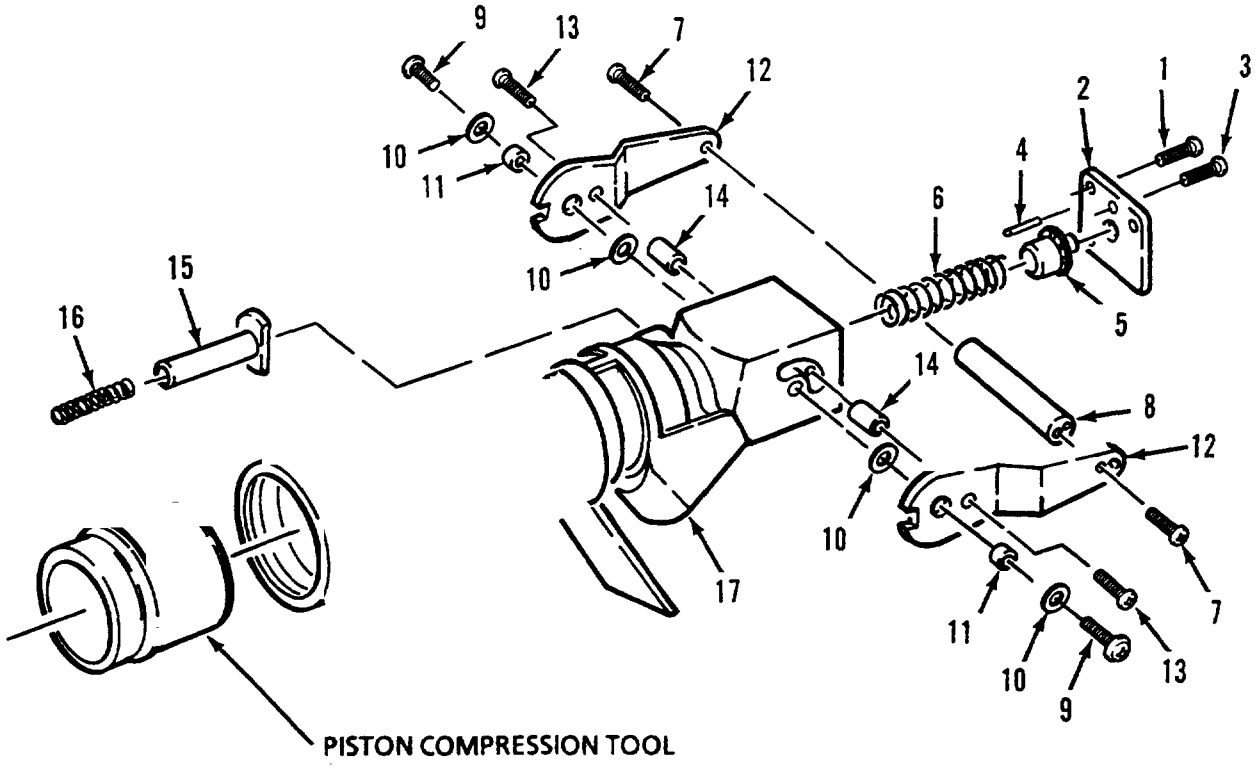
a. Disassembly - continued.

(7) On the nozzle left side, remove screw (9), one washer (10), bushing (11) and side plate (12). Remove bushing (11) and washer (10) from screw (9). Remove second washer (10) from housing (17).
(8) On the right side of nozzle loosen screw (9) only.
(9) While compressing valve latch actuator (15) on right side of nozzle, remove screw (9), one washer (10), bushing (11) and side plate (12). Remove bushing (11) and washer (10) from screw (9). Remove second washer (10) from housing (17).
(10) Slowly release valve latch actuator (15) and remove along with spring (16) from housing (17).

NOTE

Do not remove screw and actuating cam from side plate unless damaged and replacement is required.

(11) Hold the actuating cam (14) in place with a soft jaw chuck or vise and remove screw (13) from side plate.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

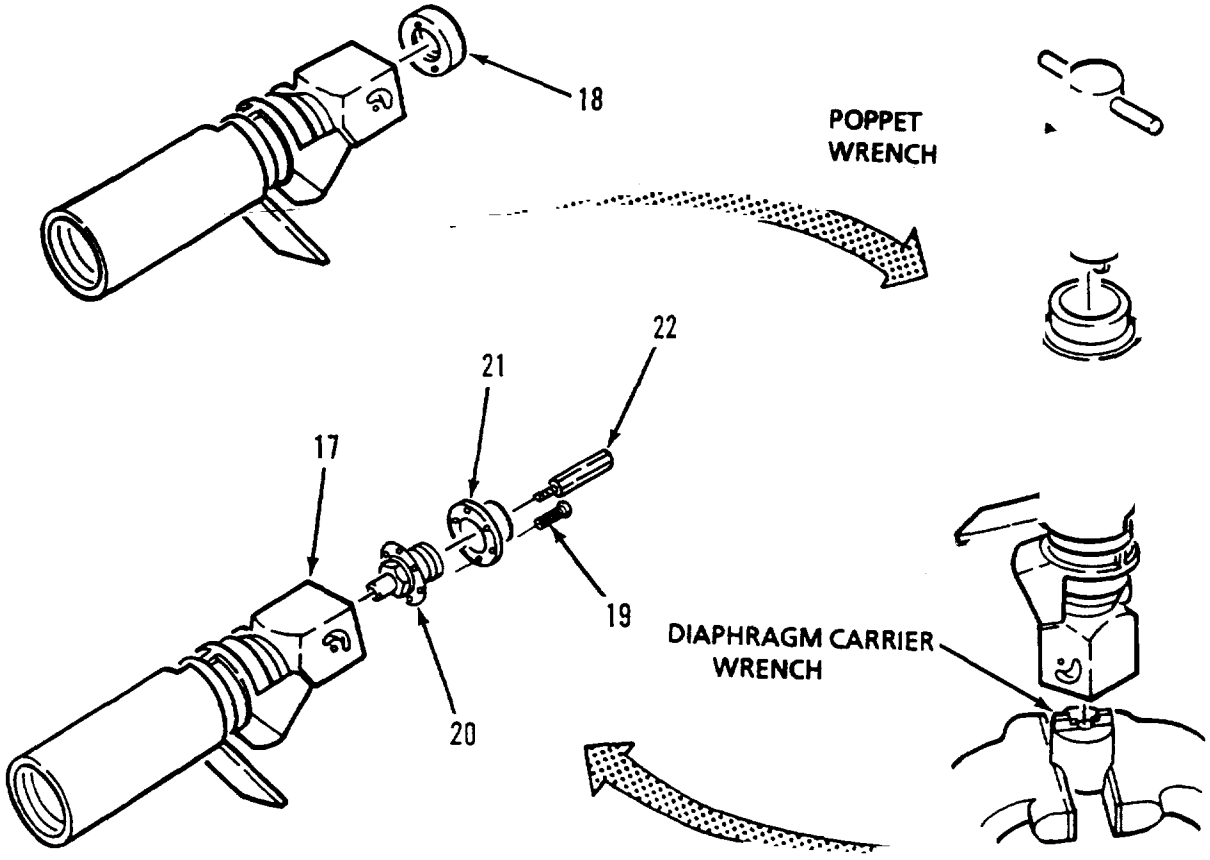
a. Disassembled - continued.

(12) Unscrew valve actuating ring (18) from diaphragm assembly (20) and remove.

CAUTION

Never attempt to tighten or loosen the poppet unless the diaphragm assembly is securely held in place by tool diaphragm wrench part number 220282. Failure to use this tool will cause damage to the diaphragm making the nozzle unusable.

(13) Secure diaphragm carrier wrench in a vise. Position nozzle on carrier wrench and slowly turn until the nozzle seats itself. Using the poppet wrench at the front of the nozzle, unscrew poppet. Remove poppet wrench from nozzle, nozzle from diaphragm carrier wrench and wrench from vise.
(14) Remove six screws (19) from housing (17) that secure the diaphragm retainer (21).
(15) Remove the diaphragm assembly (20) together with diaphragm retainer (21) and the flow indicator (22).
(16) Remove the diaphragm retainer (21).
(17) Unscrew and remove the flow indicator (22) from the diaphragm assembly (20). Discard diaphragm assembly.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

(18) While holding the piston compression tool, slowly pull back the collar (28). Spring (25) will push the piston compression tool, poppet (23) and sleeve seal (24) out of body (27).

(19) Remove spring (25) and flow guide (26) from the nozzle discharge end.

(20) Apply alcohol around collar (28) and body (27).

(21) Place housing (17) into a soft face vise with discharge end facing up, and tighten only enough to prevent housing from turning or falling from vise.

CAUTION

Failure to trip the latch mechanism will result in damage to the stayback detents during following steps.

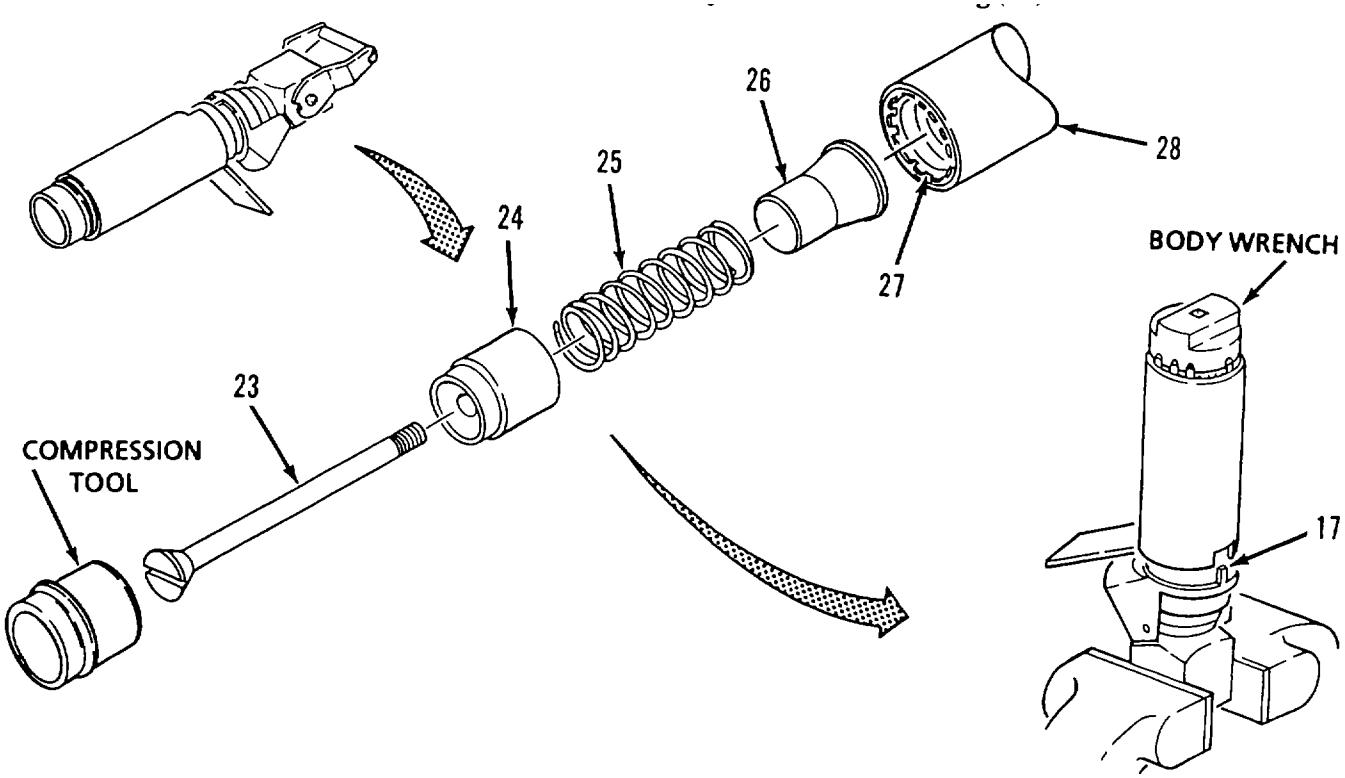
(22) Align the body wrench with the nine locking lugs (35) and press until the collar (28) trips in the forward position.

WARNING

Body is under spring pressure. Keep pressure on body wrench to prevent sudden separation.

CAUTION

To reduce the friction between the locking lugs and the collar, slightly pull back on the collar. (23) Turn the body wrench and loosen body (27) from the housing (17).



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

a. Disassembly - continued.

(24) While holding collar spring (29) and collar (28) together, remove collar (28) and collar spring (29) from housing (17).

(25) Carefully place collar (28), with body wrench still attached, on a workbench with discharge end down.

(26) Remove collar spring (29).

(27) Remove collar (28).

(28) Remove spring retainer (30) and stayback spring (31) from collar (28).

(29) Remove lug retaining ring (32), nine locking lugs (33), three stayback detents (34) and lug wire (35) from body (27).

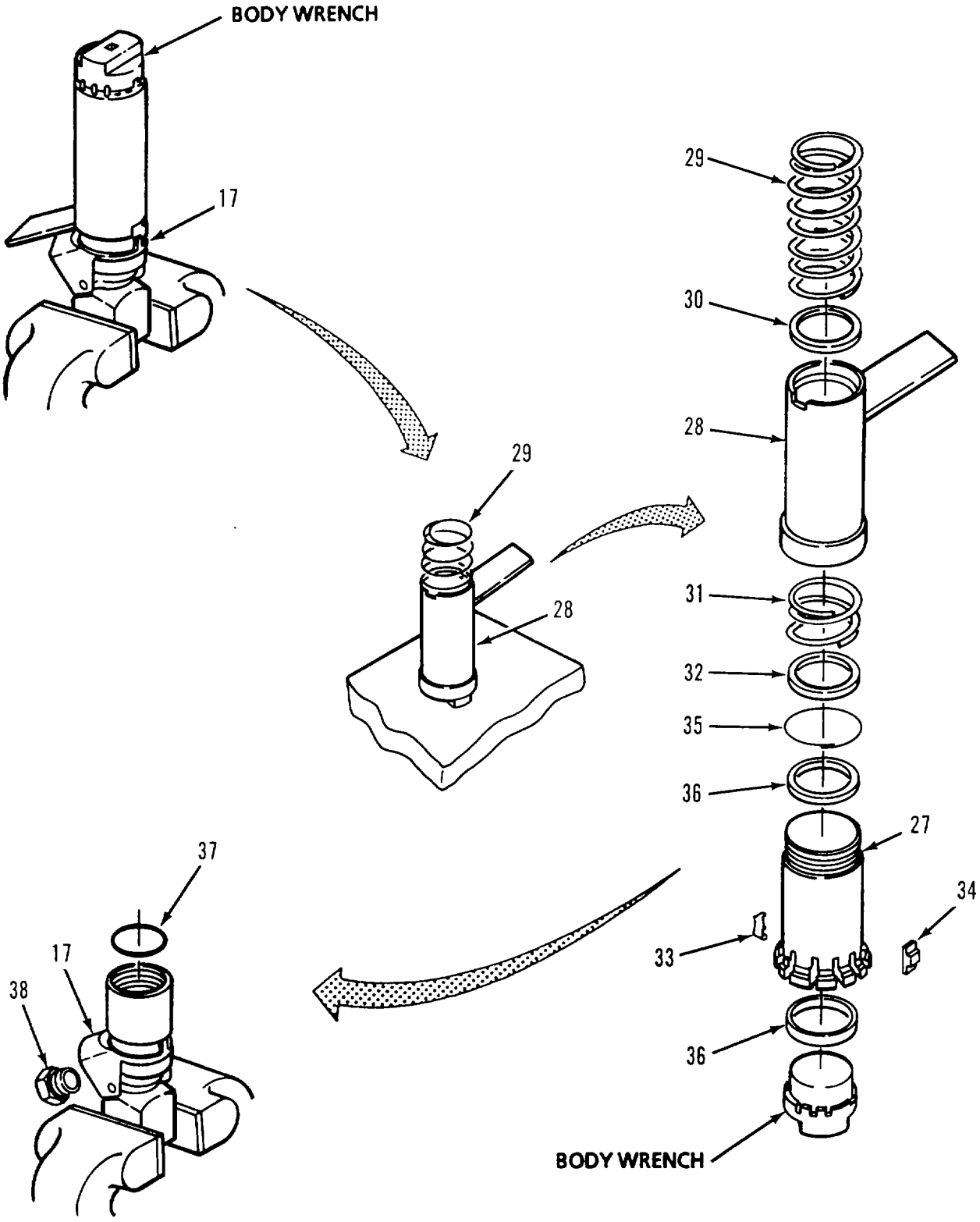
(30) Remove two wiper seals (36) from body (27). Discard wiper seals.

(31) Remove packing (37) from housing (17). Discard packing.

(32) Unscrew strainer housing (38) from housing (17).

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

a. Disassembly - continued.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

WARNING

Drycleaning solvent, AA 711 Types I and II, used to clean parts is potentially dangerous to personnel and property. Use in a well-ventilated area as the fumes are dangerous if inhaled. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 138°F

b. Repair.

(1) Clean all components removed using a wiping rag moistened with drycleaning solvent. Dry with a clean, dry wiping rag.

(2) Inspect all parts for damage. Look for damaged threads, broken, worn, scored, or deformed parts, cracks or corrosion.

(3) Replace any damaged parts found by inspection.

c. Assembly.

(1) Place lug assembly tool in vise.

(2) Lubricate two wiper seals (36) with silicone compound and install into nozzle body (27) in the internal groove closest to the threaded end. Make sure the seals are fully seated toward the slotted end and the open end of the U shape is facing out toward the threaded end of body (27).

CAUTION

Lug wire must be positioned so split is not over one of the slots in body.

(3) Install lug wire (35) into the lower groove on body (27) and insert body onto the lug assembly tool.

NOTE

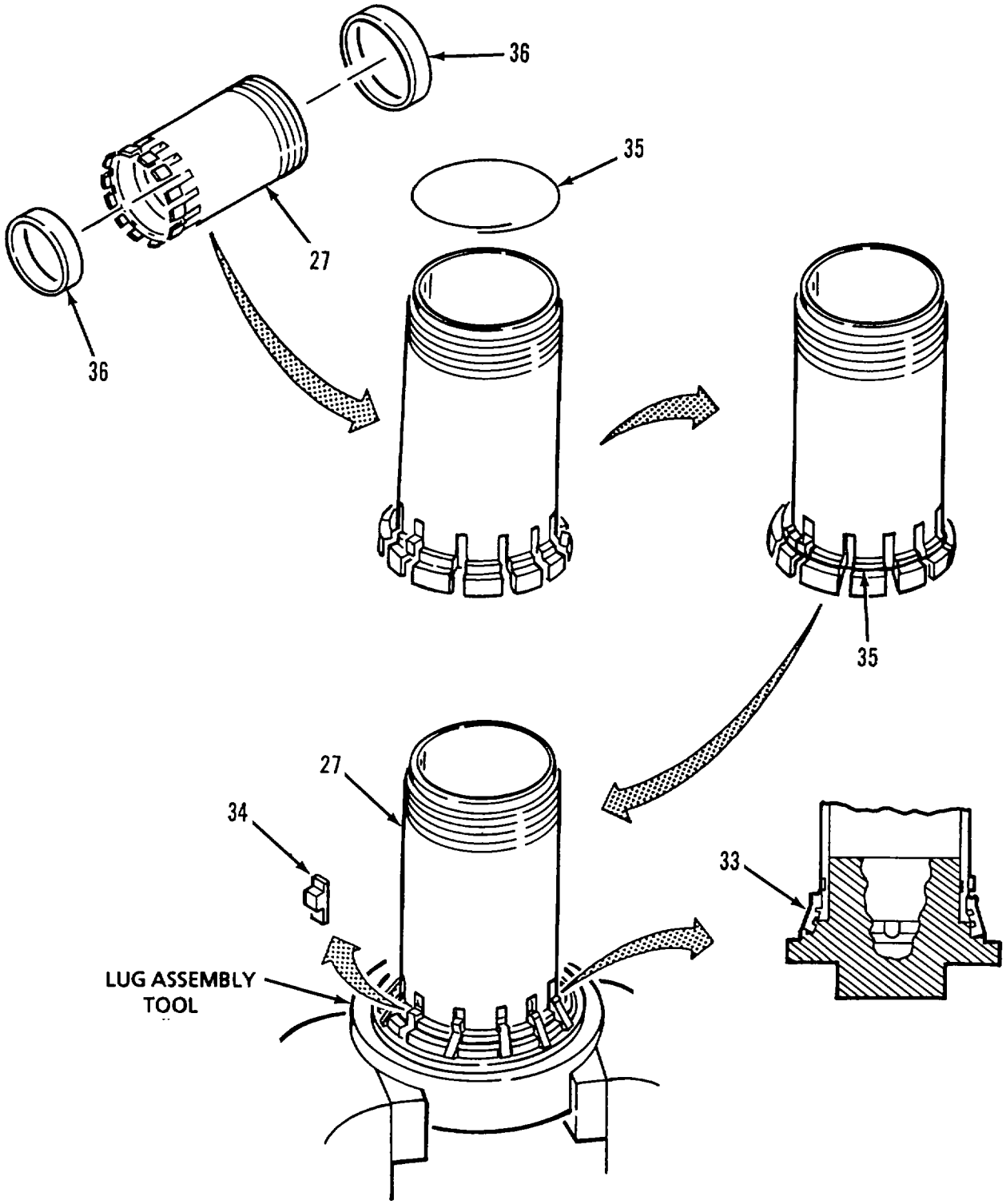
Stayback detents align with grooves in body and the three slots in the lug assembly tool. The detents are placed behind lug wire.

(4) Install three stayback detents (34) on body (27).

(5) Insert nine locking lugs (33) onto lug wire (35). Align locking lugs (33) with remaining grooves in body (27).

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

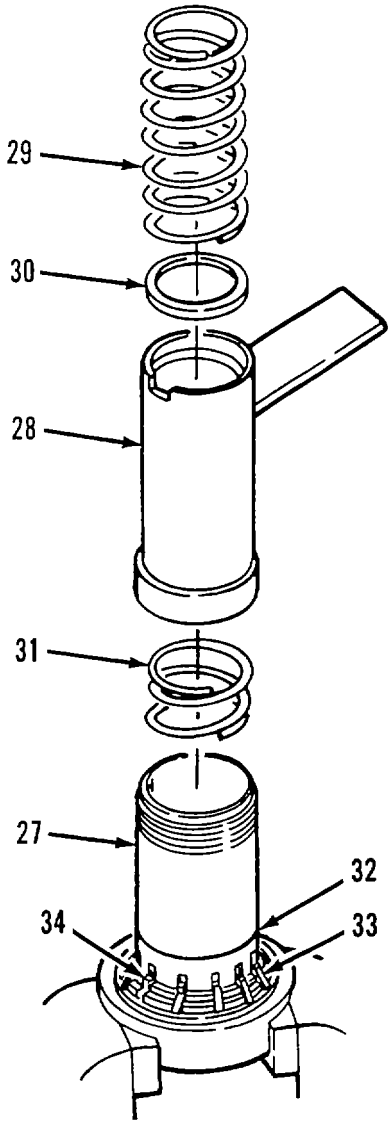
(6) Install lug retainer ring (32) onto body (27) with beveled end of ring facing locking lugs (33).

(7) Lubricate threads on body (27) with silicone compound.

(8) Install stayback spring (31) onto body (27).

(9) Install collar (28) over body (27), down over the locking lugs (33) and stayback detents (34).

(10) Install spring retainer (30) with groove facing down and collar spring (29) on body (27).



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

(11) Lubricate packing (37) with silicone compound and install into housing (17).

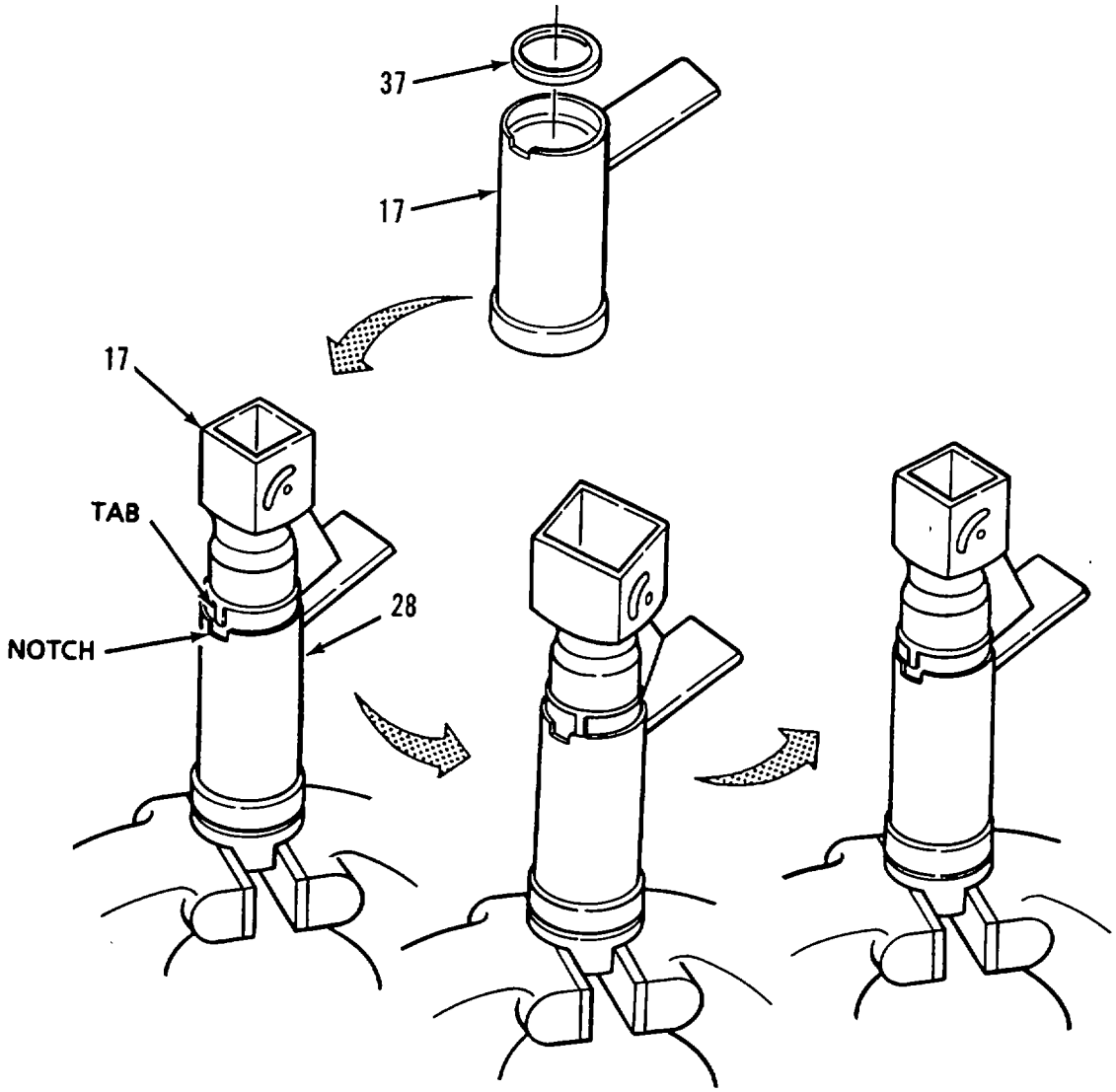
(12) Slide housing (17) into collar (28). Align the notch on the collar with the tap on top of housing.

CAUTION

Using the lug assembly tool to tighten body. Use the body wrench to complete the tightening process.

(13) Push down on housing (17) and rotate clockwise until tab contacts the collar (28). Rotate hosing (17) counterclockwise until notch and tab are aligned.

(14) Remove the assembled components from lug assembly tool and remove tool from vise. c.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

(15) Place housing (17), with discharge end facing up, into a soft face vise and tighten only enough to prevent housing from turning or falling from vise.

(16) Align body wrench with nine locking lugs and press down until the collar (28) trips in the forward position.

CAUTION

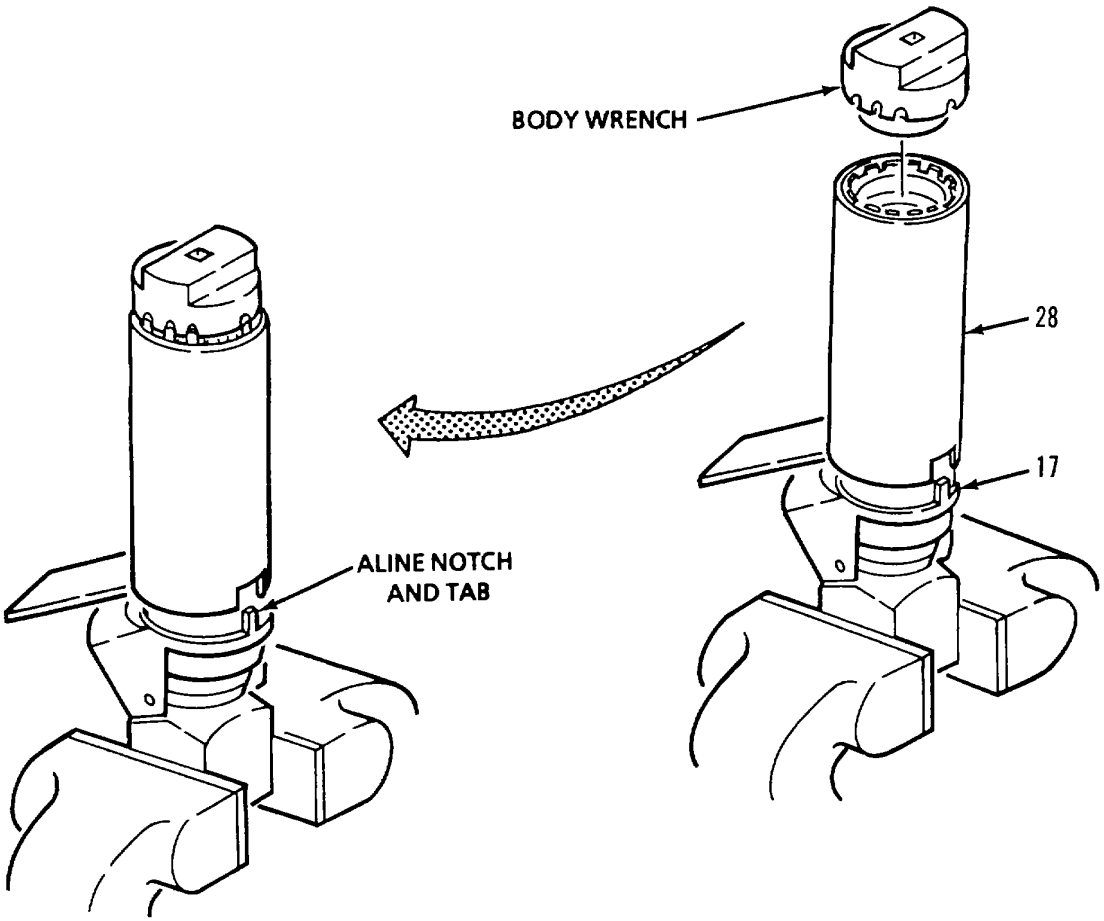
To reduce the friction between the locking lugs and the collar, slightly pull back on the collar.

NOTE

Always align the slot in the collar and the tab on the housing.

(17) Tighten the assembly to 300 in-lb.

(18) Pull back on collar (28) to release the body wrench, remove body wrench. Remove nozzle assembly from vise.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

(19) Install the flow indicator (22) onto diaphragm assembly (20).

(20) Prepare diaphram assembly (20) for installation by rolling the diaphragm until flange is aligned with brass ring.

(21) Position diaphragm retainer (21) over diaphragm assembly (20) and insert into housing (17).

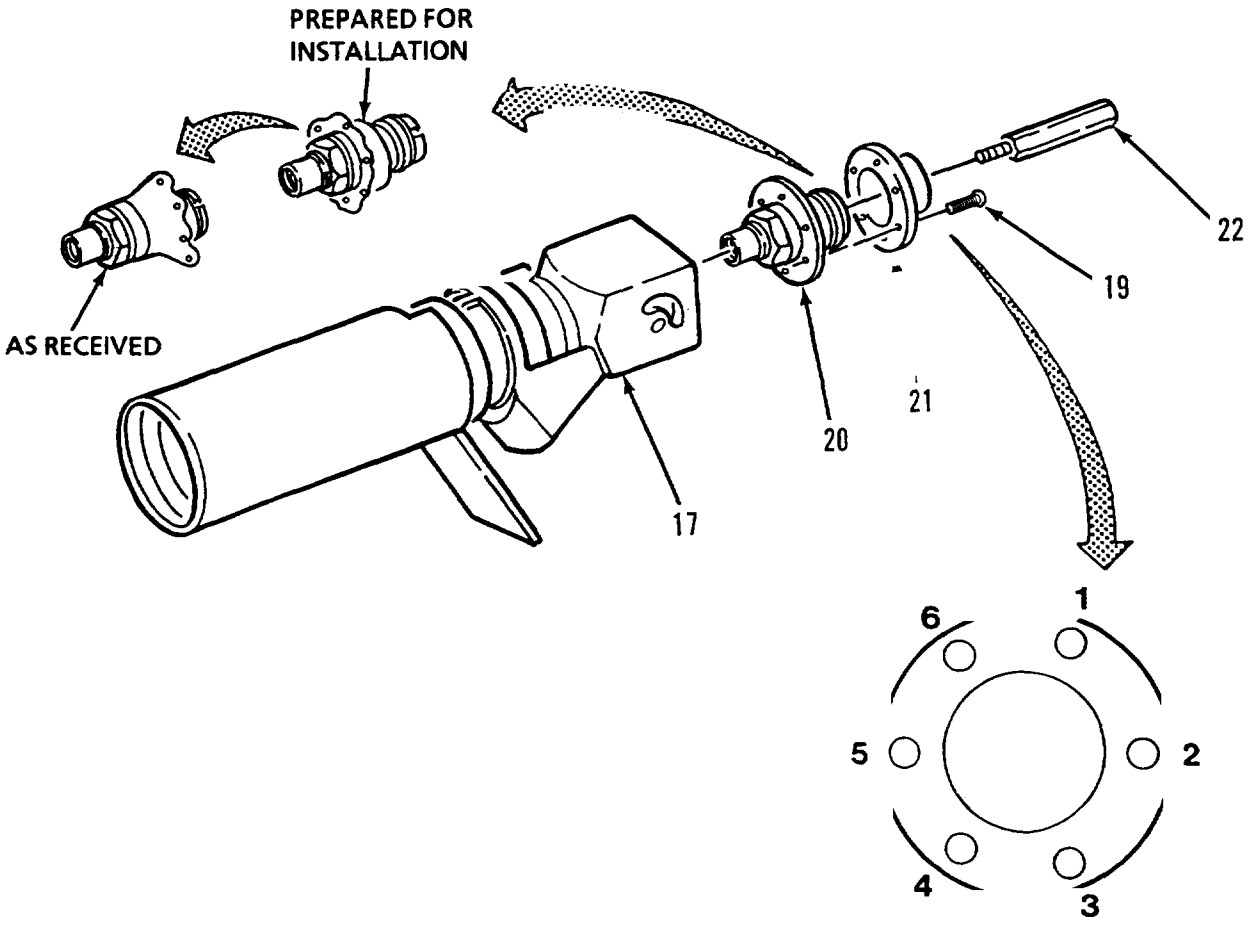
(22) Secure diaphragm retainer (21) to housing (17) using six screws (19) as follows:

(a) Tighten six screws (19) in the sequence shown.

(b) Using a torque wrench, tighten screw 1 to 15 in-lb. Repeat in order for screws 5, 3, 6, 4, and 2.

(c) Repeat step (b), tightening to a torque of 20 in-lb.

(d) Repeat step (b) tightening to a torque of 25 in-lb.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembled continued.

(23) Insert flow guide (26), valve spring (25) and sleeve seal (24) into housing (17). Push sleeve seal and valve spring down with compression tool until the tool locks onto the collar (28).

WARNING

Assembly under spring pressure, injury possible. If collar is pushed/pulled to the rear, piston tool and sleeve will be discharged under pressure. Do not push/pull the collar to the rear. Do not remove the piston removal tool until assembly is complete.

CAUTION

Never attempt to tighten or loosen the poppet unless the diaphragm assembly is securely held in place by tool diaphragm wrench part number 220282. Failure to use this tool will cause damage to the diaphragm making the nozzle unusable.

(24) Install diaphragm carrier wrench into vise. Position square end of housing (17) on carrier wrench and slowly turn until housing seats itself.

(25) Install poppet (23) through compression tool and tighten with the poppet wrench. Remove poppet wrench; and remove nozzle assembly from diaphragm carrier wrench; remove carrier wrench from vice.

(26) Check diaphragm assembly (20) for movement by gently pulling flow indicator (22) until it stops, then release.

(27) Install strainer housing (38) into housing (17).

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

(19) Install the flow indicator (22) onto diaphragm assembly (20).

(20) Prepare diaphragm assembly (20) for installation by rolling the diaphragm until flange is aligned with brass ring.

(21) Position diaphragm retainer (21) over diaphragm assembly (20) and insert into housing (17).

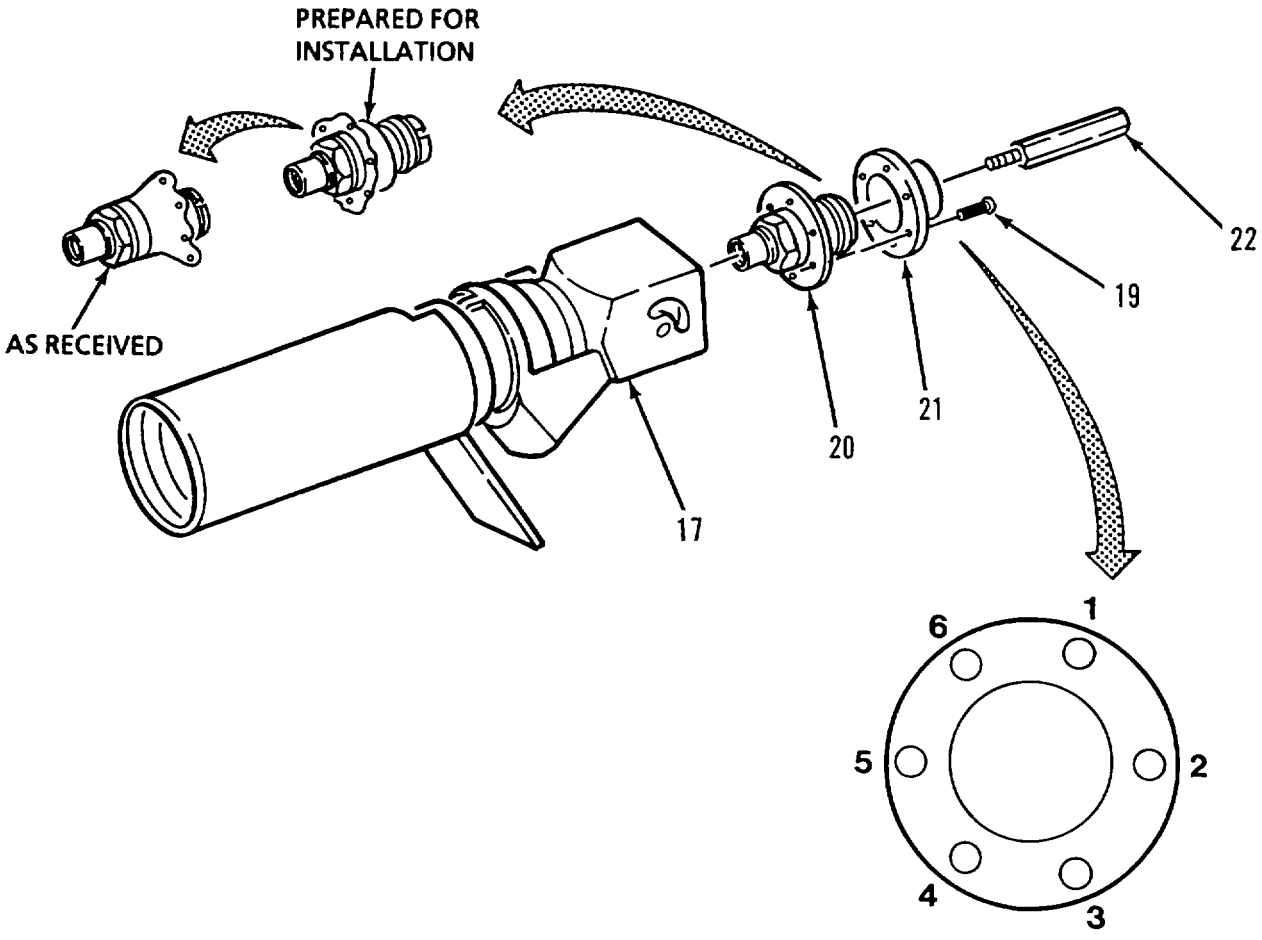
(22) Secure diaphragm retainer (21) to housing (17) using six screws (19) as follows:

(a) Tighten six screws (19) in the sequence shown.

(b) Using a torque wrench, tighten screw 1 to 5 in-lb. Repeat in order for screws 5, 3, 6, 4, and 2.

(c) Repeat step (b), tightening to a torque of 20 in-lb.

(d) Repeat step (b) tightening to a torque of 25 in-lb.



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.

(23) Insert flow guide (26), valve spring (25) and sleeve seal (24) into housing (17). Push sleeve seal and valve spring down with compression tool until the tool locks onto the collar (28).

WARNING

Assembly under spring pressure, injury possible. If collar is pushed/pulled to the rear, piston tool and sleeve will be discharged under pressure. Do not push/pull the collar the rear. Do not remove the piston removal tool until until assembly is complete.

(24) Install diaphragm carrier wrench into vise. Position square end of housing (17) on carrier wrench and slowly turn until housing seats itself.

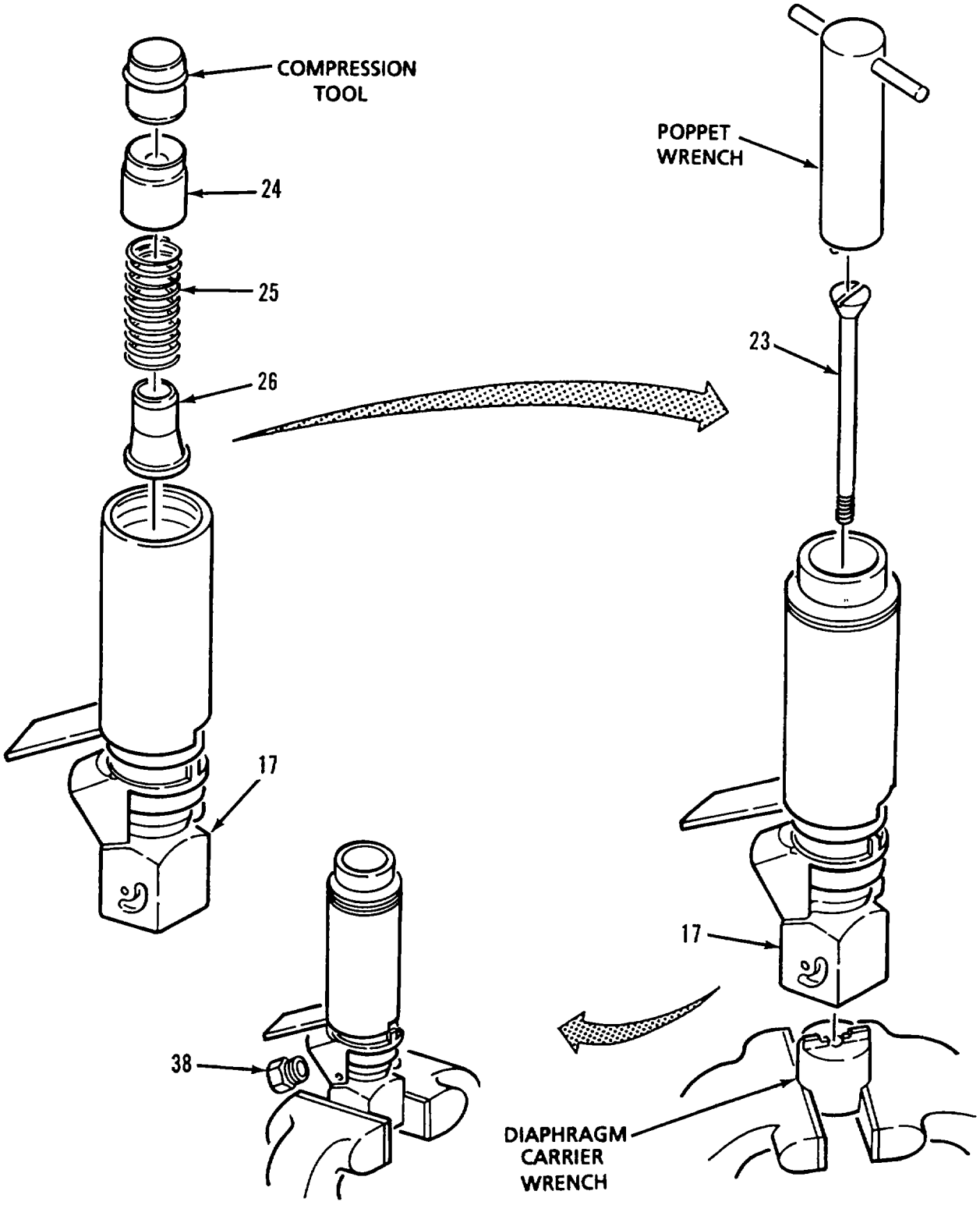
(25) Install poppet (23) through compression tool and tighten with the poppet wrench. Remove poppet wrench; and remove nozzle assembly from diaphragm carrier wrench; remove carrier wrench from vice.

(26) Check diaphragm assembly (20) for movement by gently pulling flow indicator (22) until it stops, then release.

(27) Install strainer housing (38) into housing (17).

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. Assembly - continued.



c. Assembly - continued.

(28) Using a soft jaw chuck or vise, assemble actuating cam (4) on the handle side plate (12) with screws (13) torque to 50 in-lb. Repeat for remaining side plate (12).

NOTE

The actuating cam must be behind the diaphragm retainer inside the housing.

(29) Place nozzle assembly into soft faced vise and position one washer (10) on housing (17) and insert the left side actuating cam (4) into the curved slot on housing (17) with the handle side plate (12) in the OPEN (up) position.

(30) Insert bushing (11) into handle side plate (12); place second washer (10) on outside of handle side plate and secure to housing (17) with screw (9).. Tighten screw (9) to 135 50 in-lb torque.

(31) Insert spring (16) and valve latch actuator (5) into housing (17) latch cavity (right side). Attach the right side handle side plate and parts as described in steps 30 and 31 while holding the valve latch actuator (5).

(32) Mount the handle (8) between the two handle side plates (12) and secure with four screws (7). Tighten four screws (7) to 50 5 in-lbs torque.

(33) Install valve actuating ring (18) into housing (17) by screwing it onto the diaphragm assembly (21) until .105 .135 inch of diaphragm assembly (21) shows past the valve actuating ring (18). Use dial caliper to verify the .105 .135 inch requirement. Holes in valve actuating ring should be in the OPEN/CLOSED position.

(34) Install regulator spring (6) and spring retainer (5) into housing (17) over flow indicator.

NOTE

Lockpin can be either toward the top or bottom of housing.

(35) Carefully install lock pin (4) on end plate (2) using a soft jaw chuck or vise with screw (3).

(36) Position end plate (2) on housing (17). Ensure lockpin (4) is in valve actuating ring (18) and the spring retainer (5) is positioned in the center hold.

WARNING

End cover is under spring pressure. Keep pressure on end cover while installing screws.

(37) Secure endplate (2) to housing (17) with four screws (1).

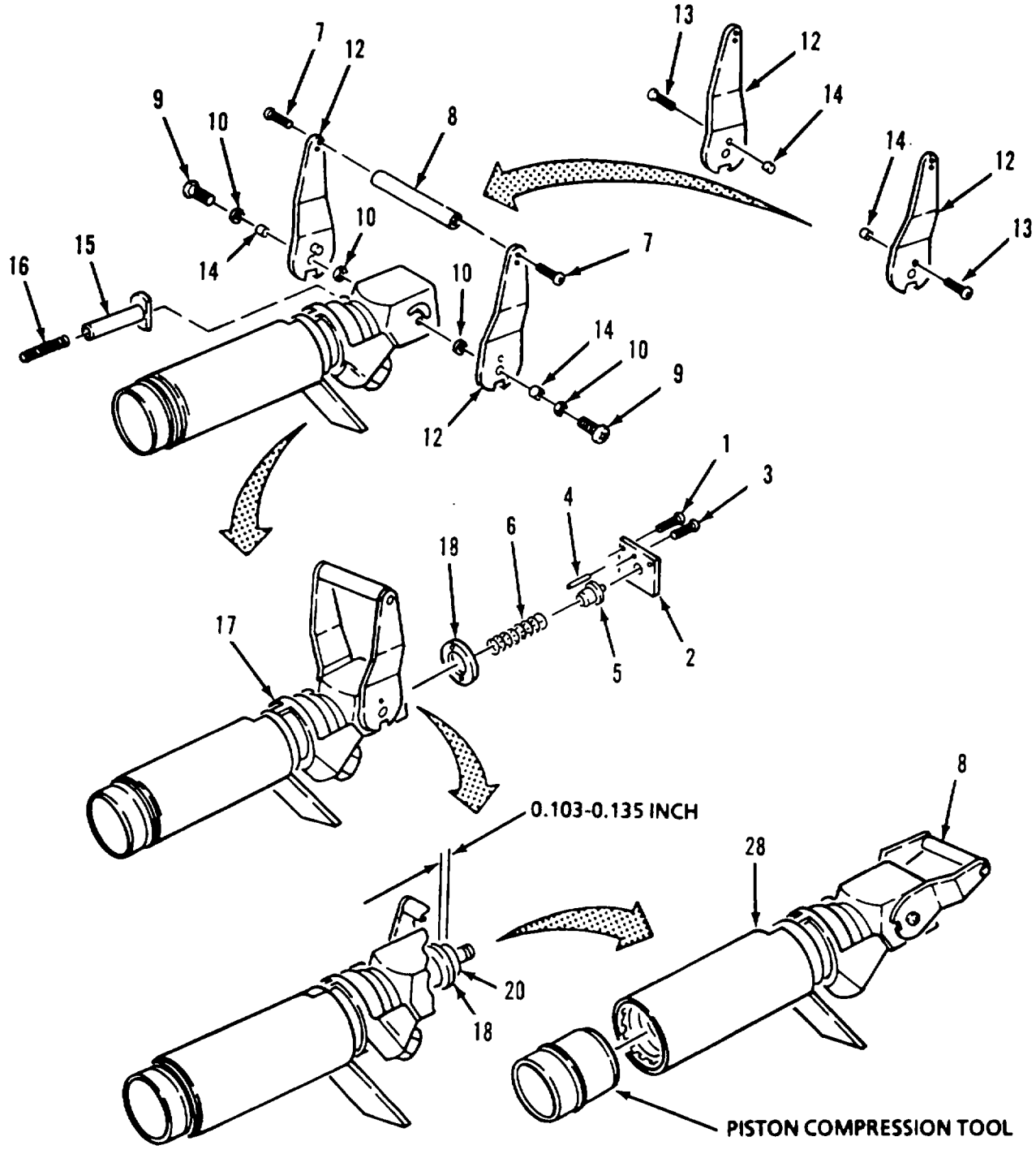
(38) Place handle (8) in the CLOSED position and pull collar (28) to remove piston compression tool.

5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

c. **Assembly - continued.**

NOTE

If strainer components and ground cables were removed, assemble (ref. 4-10).



5-2. CCR NOZZLE ASSEMBLY REPAIR - continued.

d. **Testing.** After repair and prior to release for aircraft refueling, connect nozzle to an operating. Pressurized refueling system and ensure no leakage occurs.

Text on pages 5-19 through 5-21/(5-22 blank) including figure 5-1 have been deleted.

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual. Also listed are publications that should be consulted for additional information.

A-2. FORMS.

Recommended Changes to Publications and Blank Forms ..... DA Form 2028
Recommended Changes to Equipment Technical Publications ..... DA Form 2028-2
Equipment Inspection and Maintenance Worksheet ..... DA Form 2404
Maintenance Request..... DA Form 2407
Equipment Log Assembly (Records) ..... DA Form 2408-9
Quality Deficiency Report ..... SF 368

A-3. FIELD MANUALS.

NBC Contamination Avoidance..... FM 3-3
NBC Protection ..... FM 3-4
NBC Decontamination..... FM 3-5
Organizational Maintenance of Military Petroleum
Pipelines, Tanks and Related Equipment ..... FM 10-20
Aircraft Refueling ..... FM 10-68
Petroleum Supply Point Equipment and Operations ..... FM 10-69
Rigging, Loading and Dropping Procedures ..... FM 10-564
First Aid for Soldiers ..... FM 21-11

A-4. TECHNICAL MANUALS.

Destruction of Army Material to Prevent Enemy Use..... TM 750-224-3

A-5. MISCELLANEOUS.

The Army Maintenance Management System ..... DA PAM 738-750
Security Procedures ..... AR 190-11, AR 190-13
Packing of Army Material for Shipment and Storage ..... AR 746-1

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair function authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and are defined as follows:

a. 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. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. 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.

d. Remove/Install. To remove and install the same item 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.

e. 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 3rd position code of the SMR code.

f. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions 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-2. MAINTENANCE FUNCTIONS- continued.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition 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.

k. Rebuild. Consists of 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 (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC - SECTION II.

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group numbers are "00".

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, see paragraph B-2).

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work time figure (expressed as man-hours shown as whole hours or decimals) in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column (3). This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or the complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation item including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The system designations for the various maintenance levels are shown below.

C .....Operator or crew
O .....Unit Maintenance
F.....Direct Support Maintenance
H .....General Support Maintenance
D .....Depot Maintenance

B-3. EXPLANATION OF COLUMNS IN THE MAC - SECTION II- continued.

the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The system designations for the various maintenance levels are shown on the following page.

C .....Operator or crew
O .....Unit Maintenance
F.....Direct Support Maintenance
H .....General Support Maintenance
D .....Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) common TMDE, and special tools, special TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column, when applicable, contains a letter code, in alphabetic order, which is keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Level. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The national stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS & EQUIP	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	Closed Circuit Refueling Nozzle Assembly	INSPECT REPLACE REPAIR	0.5	 0.2 0.5	 2.5			1,2,3,4,5,6,7,8,9	

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) REFERENCE CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	O	Tool Kit, General Mechanics	5180-00-177-7033	SC-5180-90-CL-N26
2	O	Shop Set, Automotive Vehicle	4910-00-754-0654	SC-4910-95-CL-A74
3	F	Tool Kit, General Mechanics	5180-00-699-5273	SC-5180-90-CL-N05
4	F	Shop Equipment, Automotive	4910-00-754-0705	SC-4910-95-CL-A31
5	F	Body Wrench		220281
6	F	Diaphragm Carrier Wrench		220282
7	F	Piston Compression Tool		220283
8	F	Locking Lug Assembly Tool		220284
9	F	Poppet Wrench		220329

Section IV. REMARKS

REFERENCE CODE	REMARKS

APPENDIX C

UNIT AND DIRECT SUPPORT REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This Repair Parts and Special Tools List (RPSTL) lists and authorizes spares and repair parts; special tools; special Test, Measurement, and Diagnostic Equipment (TMDE); and other special support equipment required for performance of unit level maintenance on the Closed-Circuit Refueling Nozzle. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the Source, Maintenance and Recoverability (SMR) codes.

C-2. GENERAL.

In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. This list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed in item name sequence. Repair parts kits are listed separately in their own functional group within Section II. Repair parts for repairable special tools are also listed in this section. Items listed are shown on the associated illustration(s)/figure(s).

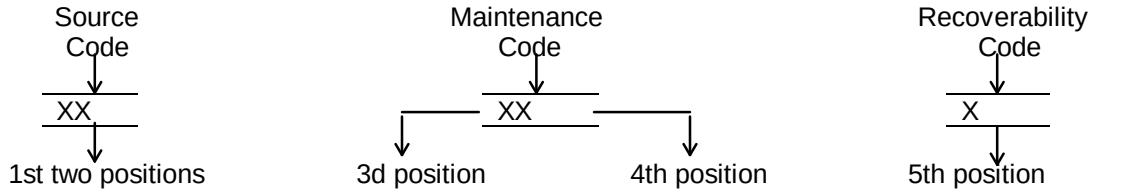
b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE column) for the performance of maintenance.

c. Section IV. Cross-Reference Indexes. A list, in National Item Identification Number (NIIN) sequence, of all National stock numbered items appearing in the listing, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross referenced to each illustration figure and item number appearance. The figure and item number index lists figure and item number in alphanumeric sequence and cross-references NSN, CAGE and part number.

C-3. EXPLANATION OF COLUMNS (SECTIONS II AND III).

a. ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



.

*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" functions in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

Code	Explanation
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request(requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. **NOTE: Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They re part of a kit which is authorized to the maintenance category indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO- (Made at Unit/AVUM Level) MF- (Made at DS/AVUM Level) MH- (Made at GS Level) ML- (Made at Specialized Repair Activity (SRA)) MD- (Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION and USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. H the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.

AO-	(Assembled by Unit/AVUM Level)
AF-	(Assembled by DS/AVIM Level)
AH-	(Assembled by GS Category)
AL-	(Assembled by SRA)
AD-	(Assembled by Depot)

} Items with these codes are not to be requested/ requisitioned individually. The puts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. H the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the items are assembled at a higher level, order the item from the higher level of maintenance

XA- Do not requisition "XA"-coded item. Order its next higher assembly. (Refer to the NOTE below.)

XB- If an "XB" item is not available from salvage, order it using the CAGEC and part number given.

XC- Installation drawing, diagram, instruction sheet, field service drawing, that is identified manufacturer's part number.

XD- Item is not stocked. Order an XD"-coded item through normal supply channels using the CAGEC and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

(2) Maintenance Code. Maintenance codes tells you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Code		Application/Explanation
C	-	Crew or operator maintenance done within organizational or aviation unit maintenance.
O	-	Organizational or aviation unit category can remove, replace, and use the item.
F	-	Direct support or aviation intermediate level can remove, replace, and use the item.
H	-	General support level can remove, replace, and use the item.
L	-	Specialized repair activity can remove, replace, and use the item.
D	-	Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e. perform all authorized repair functions.) NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes. This position will contain one of the following maintenance codes.

Code		Application/Explanation
O	-	Organizational or (aviation unit) is the lowest level that can do complete repair of the item.
F	-	Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	-	General Support is the lowest level that can do complete repair of the item.
L	-	Specialized repair activity is the lowest level that can do complete repair of the item.
D	-	Depot is the lowest level that can do complete repair of the item.
Z	-	Nonreparable. No repair is authorized.
B	-	No repair is authorized. (No parts or special tools are authorized for the maintenance of a "B" coded item). However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Codes		Application/Explanation
Z	-	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code.
O	-	Reparable item. When not economically reparable, condemn and dispose of the item at organizational or aviation unit level
F	-	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate level
H	-	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D	-	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	-	Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A	-	Item requires special handling or condemnation procedures because of. specific reasons (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. CAGEC (Column (3)). The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

d. PART NUMBER (Column (4)). Indicates the primary number used by the manufacturer, (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE: When you use an NSN to requisition an item, the item you receive may have a different part number from the part ordered.

e. DESCRIPTION AND USABLE ON CODE (UOC) (Column (5)). This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) The physical security classification of the item is indicated by the parenthetical entry, e.g., PhySec C1 - Confidential, Phy Sec C1 (S) - Secret, Phy Sec C1 (T) - Top Secret.

(3) Items that are included in kits and sets are listed below the name of the kit or set;

(4) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

(5) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

(6) When the item is not used with all serial numbers of the same model the effective serial numbers are shown on the last line(s) of the description (before UOC).

(7) The usable on code, when applicable (see paragraph 5, Special Information).

(8) In the Special Tools List section, the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.

(9) The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in both Section II and Section III.

(10) The indenture, shown as dots appearing before the repair part, indicates that the item is a repair part of the next higher assembly.

f. QTY (Column (6)). The QTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and may vary from application to application.

C-4. EXPLANATION OF COLUMNS (SECTION IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER column. This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN, i.e.

NSN
5305-01-574-1467
NIIN

When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) FIG. column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section III.

(3) ITEM column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. PART NUMBER INDEX. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) CAGEC column. The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

(3) STOCK NUMBER column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and CAGEC columns to the left.

(4) FIG. column. This column lists the number of the figure where the item is identified/located in Sections II and III.

(5) ITEM column. The item number is that number assigned to the item as it appears in the figure referenced in adjacent figure number column.

c. FIGURE AND ITEM NUMBER INDEX.

(1) FIG. column. This column lists the number of the figure where the item is identified/located in Section II and III.

(2) ITEM column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

(3) STOCK NUMBER column. This column lists the NSN for the item.

(4) CAGEC column. The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(5) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

C-5. SPECIAL INFORMATION.

a. USABLE ON CODE. The usable on code appears in the lower corner of the Description column heading. Usable on codes are shown as "UOC: ..... " in the Description Column (justified left) on the last line applicable item description/nomenclature. Uncoded items are applicable to all models.

b. ASSOCIATED PUBLICATIONS. Refer to Appendix A, References.

C-6. HOW TO LOCATE REPAIR PARTS.

a. When National Stock Number or Part Number is NOT Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number.

(4) Fourth. Refer to the Repair Parts List for the figure to find the part number for the item number noted on the figure.

(5) Fifth. Refer to the Part Number Index to find the NSN, if assigned.

b. When National Stock Number or Part Number is Known.

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence (see c-4a.(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see paragraph c-4.b). Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

(2) Second. After finding the figure and item number, verify that the item is the one you are looking for, then locate the item number in the repair parts list for the figure.

C-7. ABBREVIATIONS.

Abbreviations used in this manual are listed in MIL-STD-12.

C-8. FEDERAL SUPPLY CODES AND MANUFACTURERS.

CODE	MANUFACTURER
79136	Waldes Truarc, Inc. 500 Memorial Drive P.O. Box 6723 Somerset, NJ 08875-6723
ODT23	Carter Ground Fueling Company 671 West Seventeenth Street Costa Mesa, CA 92627-3605

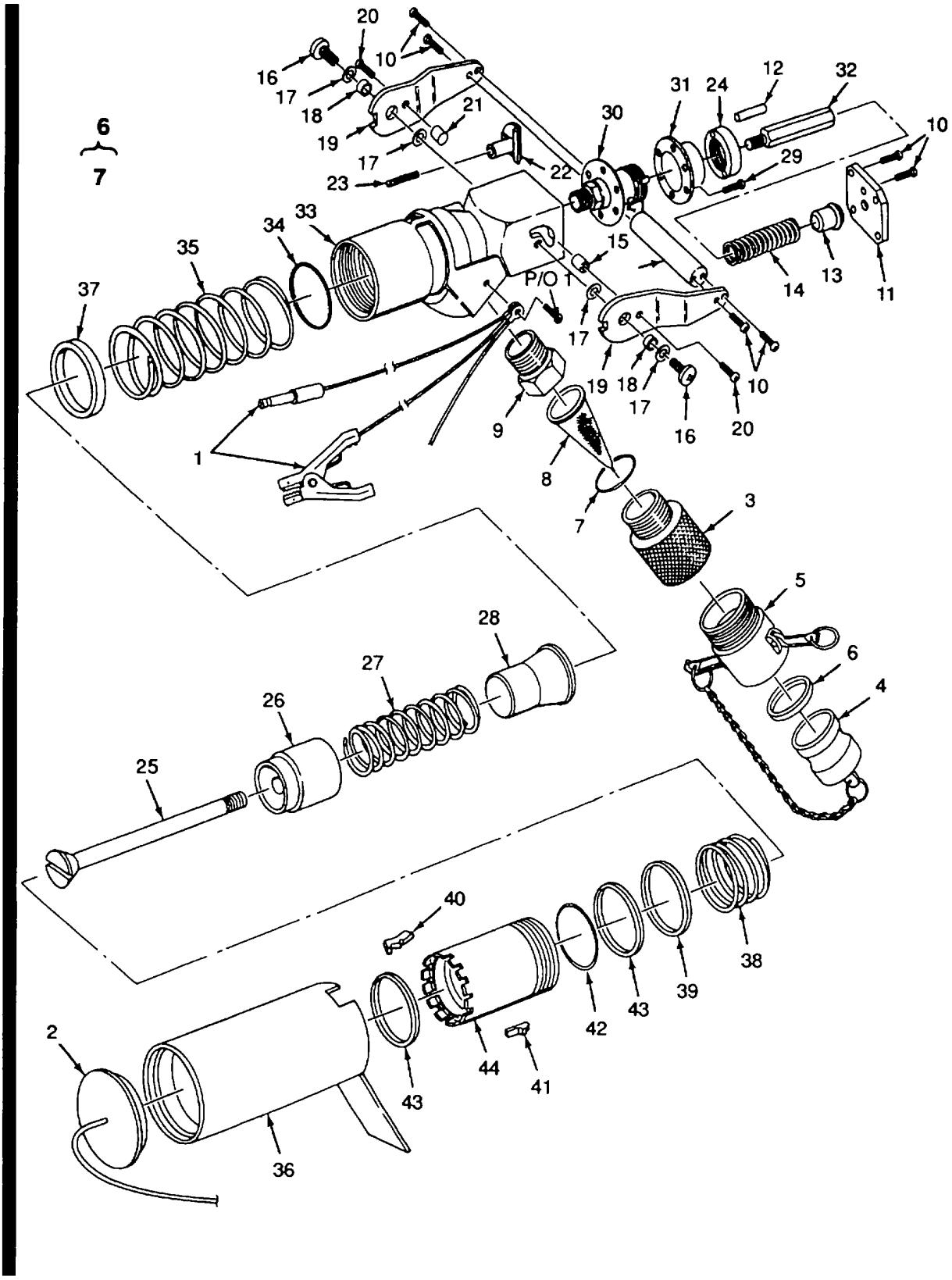


Figure 1. Closed Circuit Nozzle

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 00 CLOSED CIRCUIT REFUELING NOZZLE ASSEMBLY	
				FIG. 1 CLOSED CIRCUIT NOZZLE	
1	PAOZZ	ODT23	47028	CABLE ASSY, GROUND COMES WITH ATTACHING HARDWARE	1
2	XBOZZ	ODT23	47025-1	CAP, ASSEMBLY, METAL	1
3	XBOZZ	ODT23	220121-1	BODY, STRAINER	1
4	XAOZZ	96906	MS27029-11-TN	PLUG, COUPLING 2 IN	1
5	PAOOO	96906	MS27026-11-TN	COUPLING, FEMALE 2 IN	1
6	PCOZZ	96906	MS27030-6	GASKET PART OF KIT P/N KD64017-2	1
7	PCOZZ	96906	MS29513-226	PACKING, PREFORMED	1
8	PBOZZ	ODT23	220122-1 00	STRAINER	1
9	XBFZZ	ODT23	220120-1	HOUSING, STRAINER	1
10	XBFZZ	ODT23	LP51958-64	SCREW, PAN HEAD	9
11	XBFZZ	ODT23	220086-1	COVER, END	1
12	XBFZZ	ODT23	220111	PIN, LOCK	1
13	XBFZZ	ODT23	220097	RETAINER, SPRING	1
14	XBFZZ	ODT23	220113	SPRING, REGULATOR	1
15	XBFZZ	ODT23	220095-1	HANDLE, VALVE	1
16	XBFZZ	ODT23	LP51957-108	SCREW, PAN HEAD	2
17	XBFZZ	ODT23	5710-179-60	WASHER	4
18	KFFZZ	ODT23	220101	BUSHING PART OF KIT P/N KD64017-2	2
19	XBFZZ	ODT23	220090-1	SIDE PLATE HANDLE	2
20	XBFZZ	96906	MS16998-42L	SCREW SELF LOCKING	2
21	XBFZZ	ODT23	220109	CAM, ACTUATING	2
22	XBFZZ	ODT23	220202	ACTUATOR, LATCH	1
23	XBFZZ	ODT23	C0180-026-1000S	SPRING, DETENT	1
24	XBFZZ	ODT23	220098	RING, VALVE ACTUATE	1
25	XBFZZ	ODT23	220088	POPPET	1
26	KFFZZ	ODT23	220083-1	SLEEVE, SEAL PART OF KIT P/N KD64017-2	1
27	XBFZZ	ODT23	220112	SPRING, VALVE	1
28	XBFZZ	ODT23	220326	GUIDE, FLOW	1
29	XBFZZ	96906	MS16997-21L	SCREW, CAP, SOCKET HD	6
30	KFFZZ	ODT23	47060-1	DIAPHRAGM ASSEMBLY PART OF KIT P/N KD64017-2	1
31	XBFZZ	ODT23	220085	RETAINER, DIAPHRAGM	1
32	XBFZZ	ODT23	220160	INDICATOR, POSITION	1
33	XBFZZ	ODT23	220078-1	HOUSING	1
34	KFFZZ	96906	MS29513-136	PACKING, PREFORMED PART OF KIT P/N KD64017-2	1
35	XBFZZ	ODT23	220114	SPRING, COLLAR	1
36	XBFZZ	ODT23	220081-1	COLLAR	1
37	XBFZZ	ODT23	220096	RING, RETAINER	1
38	XBFZZ	ODT23	220103	SPRING, STAY BACK	1
39	XBFZZ	ODT23	220099	RING, LUG RETAINER	1
40	XBFZZ	ODT23	220093	LUG, LOCKING	9
41	XBFZZ	ODT23	220104	DETENT, STAY BACK	3
42	XBFZZ	ODT23	220100	WIRE, LUG	1

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
43	KFFZZ	ODT23	2200941	SEAL, WIPER PART OF KIT P/N KD6401 7-2	2
44	XBFZZ	ODT23	220080	BODY	1
	PCFZ	ODT23	KD64017-2	KIT, MAINTENANCE	1
				PACKING, PREFORMED (2) 1-35	
				SEAL, WIPER (2) 1-44	
				SLEEVE, SEAL (1) 1-27	
				BUSHING (2) 1-19	
				DIAPHRAGM ASSEMBLY (1) 1-31	
				PACKING, PREFORMED (1) 1-8	

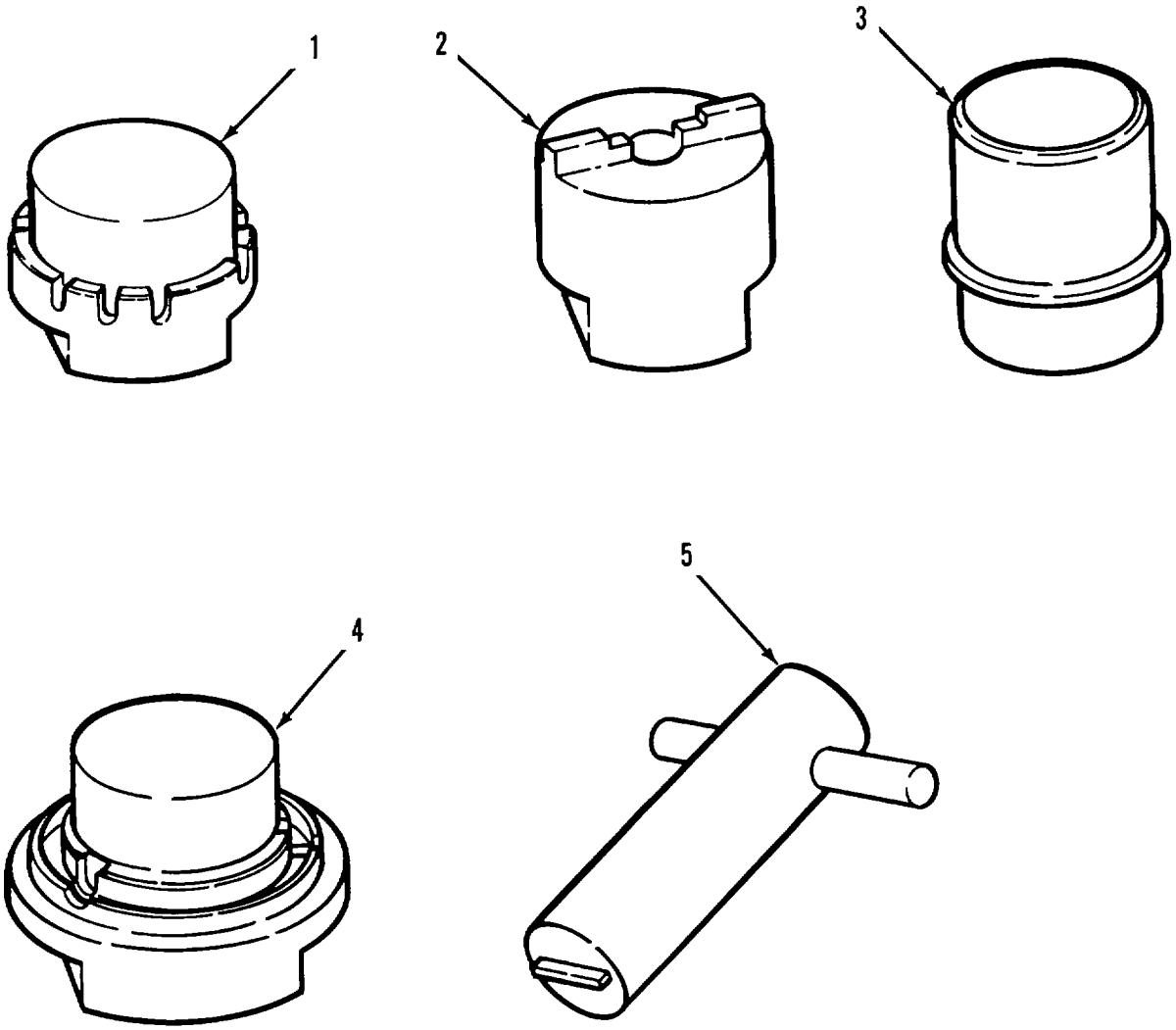


Figure 2. Special Tools.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 01 SPECIAL TOOLS	
				FIG. 2 SPECIAL TOOLS	
1	PFFZZ	ODT23	220281	WRENCH, BODY	
2	PFFZZ	ODT23	220282	WRENCH. DIAPHRAGM.....	
3	PAFFF	ODT23	220283	TOOL, PISTON COMPRES.....	
4	PFFZZ	ODT23	220284	TOOL, LOCKING LUG	
5	PFFZZ	ODT23	220329	POPPET WRENCH.....	
				END OF FIGURE	

SECTION IV

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5330-00-263-5173	1	7			
5330-00-612-2414	1	6			

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG	ITEM
ODT23	C0180-026-1000S		1	23
ODT23	KD64017-2		1	46
ODT23	LP51957-108		1	16
ODT23	LP51958-64		1	10
96906	MS16997-21L		1	29
96906	MS16998-42L		1	20
96906	MS16998-42L		1	21
96906	MS27026-11-TN		1	5
96906	MS27029-11-TN		1	4
96906	MS27030-6	5330-00-612-2414	1	6
96906	MS29513-136		1	34
96906	MS29513-226	5330-00-263-5173	1	7
ODT23	220078-1		1	33
ODT23	220080		1	44
ODT23	220081-1		1	36
ODT23	220083-1		1	26
ODT23	220085		1	31
ODT23	220086-1		1	11
			1	11
ODT23	220088		1	25
ODT23	220090-1		1	19
ODT23	220093		1	40
ODT23	220094-1		1	43
ODT23	220095-1		1	15
ODT23	220096		1	37
ODT23	220097		1	13
ODT23	330098		1	24
ODT23	220099		1	39
ODT23	220100		1	42
ODT23	220101		1	18
ODT23	220103		1	38
ODT23	220104		1	41
ODT23	220109		1	21
ODT23	220111		1	12
ODT23	220112		1	27
ODT23	220113		1	14
ODT23	220114		1	35
ODT23	220120-1		1	9
			1	09
ODT23	220121-1		1	3
ODT23	220122-100		1	8
ODT23	220160		1	32
ODT23	220202		1	22
ODT23	220281		2	1
ODT23	220282		2	2
ODT23	220283		2	3
ODT23	220284		2	4
ODT23	220326		1	28
ODT23	220329		2	5
ODT23	47025-1		1	2
ODT23	47028		1	1

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG	ITEM
ODT23	47060-1		1	30
ODT23	5710-179-60		1	17

CROSS-REFERENCE INDEXES

FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
1	1		ODT23	4702B
1	2		ODT23	47025-1
1	3		ODT23	220121 -1
1	4		96906	MS27029- 11 -TN
1	5		96906	MS27026-11-TN
1	6	5330-00-612-2414	96906	MS27030-6
1	7	5330-00-263-5173	96906	MS29513-226
1	8		ODT23	220122-100
1	9		ODT23	220120-1
1	09		ODT23	220120-1
1	10		ODT23	LP51958-64
1	11		ODT23	220086- 1
1	11		ODT23	220086-1
1	12		ODT23	220111
1	13		ODT23	220097
1	14		ODT23	220113
1	15		ODT23	220095-1
1	16		ODT23	LP51957-108
1	17		ODT23	5710-179-60
1	18		ODT23	220101
1	19		ODT23	220090-1
1	20		90696	MS16998-42L
1	21		ODT23	220109
1	21		96906	MS16998-42L
1	22		ODT23	220202
1	23		ODT23	C0180-026-1000S
1	24		ODT23	220098
1	25		ODT23	220088
1	26		ODT23	220083-1
1	27		ODT23	220112
1	28		ODT23	220326
1	29		96906	MS16997-21 L
1	30		ODT23	47060-1
1	31		ODT23	220085
1	32		ODT23	220160
1	33		ODT23	220078-1
1	34		96906	MS29513-136
1	35		ODT23	220114
1	36		ODT23	220081-1
1	37		ODT23	220096
1	38		ODT23	220103
1	39		ODT23	220099
1	40		ODT23	220093
1	41		ODT23	220104
1	42		ODT23	220100

CROSS-REFERENCE INDEXES

FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
1	43		ODT23	220094-1
1	44		ODT23	220080
1	46		ODT23	KD64017-2
2	1		ODT23	220281
2	2		ODT23	220282
2	2		ODT23	220282
2	3		ODT23	220283
2	4		ODT23	220284
2	5		ODT23	220329

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APPENDIX D
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists components of end item and basic issue items for the CCR Nozzle to help you inventory items required for safe and efficient operation.

D-2 GENERAL

The Components of End Item and Basic Issue Items List are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the CCR Nozzle in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the CCR Nozzle during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

D-3. EXPLANATION OF COLUMNS.

The following provides an explanation of columns found in the tabular listing:

a. ITEM NUMBER Column. This column indicates the number of the illustration in which the item is shown.

b. NATIONAL STOCK NUMBER Column. Indicates the national stock number assigned to the item and will be used for requisitioning purposes.

c. DESCRIPTION. CAGE CODE AND PART NUMBER Column. Indicates the Federal item and name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE Code (in parentheses) followed by the part number.

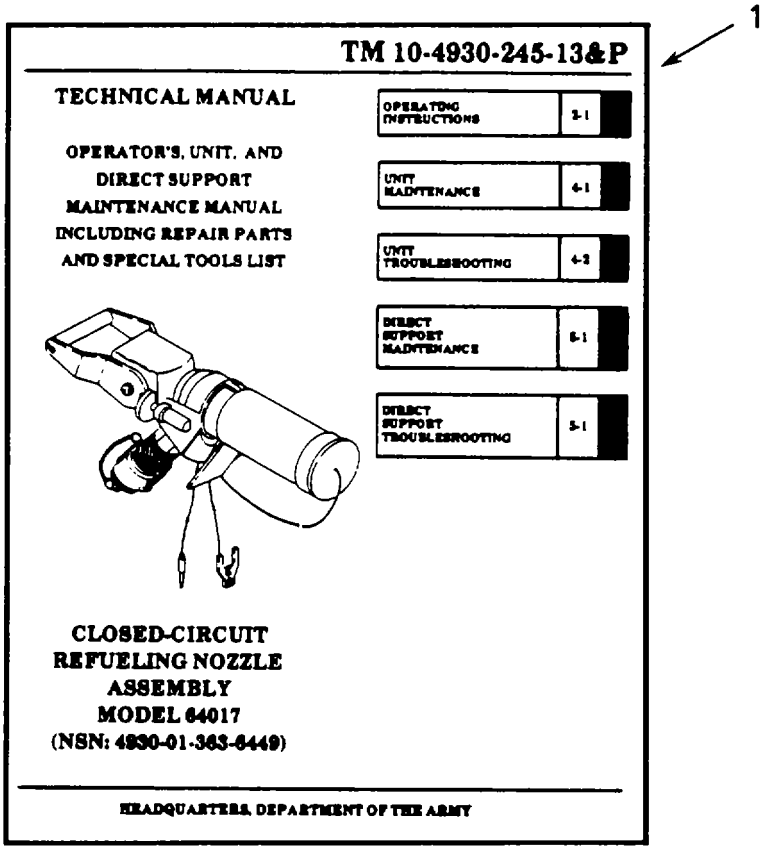
d. UNIT OF ISSUE (UII) Column. Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea. in, pr)

e. QUANTITY REQUIRED (QTY REQD) Column. Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM

Order NSN 4930-01-363-6449 to receive Closed Circuit Refueling Nozzle.

Section III. BASIC ISSUE ITEMS



ITEM NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION CAGE CODE AND PART NUMBER	U/I	QTY REQD
1	N/A	Operator's Unit, and Direct Support Maintenance Manual Including Repair Parts and Special Tools List TM 10-4930-245-13&P	EA	1

APPENDIX E
ADDITIONAL AUTHORIZATION LIST

Section I. Introduction.

E-1. SCOPE.

This appendix lists additional items you are authorized for the support of the CCR Nozzle .

E-2. GENERAL.

This list identifies items that do not have to accompany the CCR Nozzle and do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

E-3. EXPLANATION OF LISTING.

National stock number, descriptions and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name. If the item you require differs between serial numbers of the same model, effective serial numbers are shown in the last line of the description. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column.

Section II. Additional Authorization Items List

There are no additional items authorized to support the CCR nozzle.

APPENDIX F
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

F-1. SCOPE

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the Closed-Circuit Refueling Nozzle. This listing is for informational purpose only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

F-2. EXPLANATION OF COLUMNS.

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the task Initial Setup instructions to identify the material; e.g., "Drycleaning solvent (App E)."

b. Column 2 - Category. This column identified the lowest category of maintenance that requires the listed item:

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
G - General Support Maintenance

c. Column 3 - National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the items.

d. Column 4 - Description. Indicates the federal 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 (CAGE) Code for Manufacturer in parentheses, if applicable.

e. Column 5 - 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 rest of the issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE ITEMS LIST

Item Number	Category	National Stock Number	Description	U/M
1	O	6850 00-281 1985	Cleaning Solvent, Federal Specification AA 711, Types I and II	GL
2	O	7920-00-295-1711	Rags, wiping (58536) A-A-531	LB
3	O	9150-00- 119-9291	Silicone Compound TU (81349) MIL-G-4343	
4	O	8030-01-837-5885	Sealing Compound (77247) MIL-S-45180	TU
5	F	6505-00-655-8366	Alcohol, Rubbing	BT

APPENDIX G

ILLUSTRATED LIST OF MANUFACTURED ITEMS

There are no manufactured items for the CCR Nozzle.

APPENDIX H

MANDATORY REPLACEMENT PARTS

ITEM NO 4-36	NOMENCLATURE	PART NUMBER
1	Packing, Preformed	MS29513-226
2	Bushing	220101
3	Diaphragm Assembly	47060- 1
4	Seal, Sleeve	220083-1
5	Seal, Wiper	220094-1
6	Packing, Preformed	MS29513-136

GLOSSARY

Section I. ABBREVIATIONS

App	Appendix
BT	Bottle
CCR	Closed-Circuit Refueling
F	Fahrenheit
GL	Gallon
in lb	Inch Pounds
in	Inch
PL	Pound
PN	Part Number
psig	Pound-force per Square Inch, Gage
TU	Tube

Section II. DEFINITIONS OF UNUSUAL TERMS

Packing: O-Ring seals.

INDEX

SUBJECT, PARAGRAPH

SUBJECT, PARAGRAPH

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official: Milton H. Hamilton

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
05854

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The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>
To: mpmt/oavma28@st-louis-emh7.army.mil
Subject: DA Form 2028

1. ***From***: Joe Smith
2. *Unit*: home
3. ***Address:***4300 Park
4. ***City***: Hometown
5. ***St***: MO
6. ***Zip***: 77777
7. ***Date Sent***: 19-OCT-93
8. ***Pub*** *no*: 55-2840-229-23
9. ***Pub Title***: TM
10. ***Publication Date***: 04-JUL-85
11. *Change Number*.' 7
12. *Submitter Rank*: MSG
13. ***Submitter FName***: Joe
14. *Submitter MName*: T
15. ***Submitter LName***: Smith
16. ***Submitter Phone***: 123-123-1234
17. ***Problem***: **1**
18. *Page*: 2
19. *Paragraph*: 3
20. *Line*: 4
21. *NSN*: 5
22. *Reference*: 6
23. *Figure*: 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text****:*

This is the text for the problem below line 27.

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 decagram = 10 grams = .35 ounce
acres
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47

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

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 PUBLICATION

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

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.

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PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.