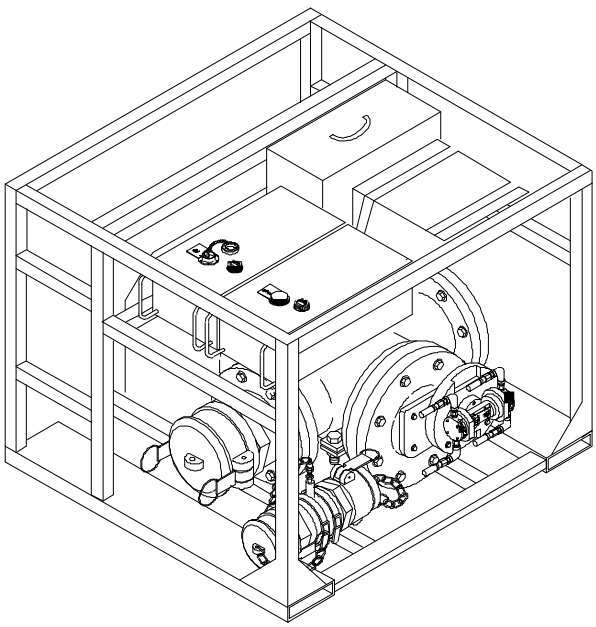
# TM 10-4930-364-13&P

**TECHNICAL MANUAL**
**OPERATOR AND FIELD MAINTENANCE MANUAL**
**INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)**
**FOR**

# FUEL ADDITIVE INJECTOR ASSEMBLY
# TPI-4T-4A-1
# NSN 4930-01-547-6265





**HEADQUARTERS, DEPARTMENT OF THE ARMY**
**JULY 2008**

# WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.

## GENERAL SAFETY WARNINGS DESCRIPTION

### ARCING

Radio transmitters can cause an arc at antennas. DO NOT ground to a radio antenna.

### CARBON MONOXIDE

Carbon Monoxide (exhaust gas) can kill you. Operate system outdoors or duct system outdoors.

### FIRST AID

First aid instructions are given in FM 4-25.11, First Aid.

### FUEL SPILLS

A spill caused during equipment priming is not usually dangerous. Use the spill kits bag of granular sorbent to spread over the spill. Scoop up the sorbent and contaminated soil using the 2-piece non-sparking shovel and place the sorbent and soil in plastic disposal bags. Use tie strips to seal the bags. Store and transport the bags in the 55 gallon drums marked with the Flammable Material caution plate.

Spilled fuel can ignite or explode and cause serious injury or death to operating personnel. A fire guard should stand by the spill area with a fire extinguisher until the cleanup operation is completed. To avoid fire and explosion during all fuel spill cleanup procedures:

Do not allow any flame producing material or equipment within 100 feet.

Do not smoke or allow smoking during any refueling operations.

Do not allow fuel to drip onto hot surfaces.

Do not refuel equipment while its engine is running unless mission dictates.

Do not allow spilled fuel to come in contact with exposed skin. ALWAYS wear gloves when cleaning up a fuel spill.

Do not allow spilled fuel to get in eyes. ALWAYS wear goggles when cleaning up any fuel spill.

Do not use rags to clean up a spill if low flash point fuel such as AVGAS or JP-4 is being used.

### HAND-HELD FIRE EXTINGUISHER

Personnel must be evacuated from the shelter after discharging a dry chemical fire extinguisher. Personnel must wear dust masks, hand, eye and skin protective equipment before re-entering the shelter to clean up residue.

**GENERAL SAFETY WARNINGS DESCRIPTION - CONTINUED**

**HAZARD REPORTING**

Report any and all hazards. It is your responsibility to report hazards through your chain-of-command.

**HEAVY OBJECTS**

Handling heavily weighted objects can cause bodily injury. Do not lift materials or equipment over 50 lb without using appropriate material handling equipment.

**HIGH VOLTAGE**

Use extreme caution when checking energized circuits. Always place power off warning tags on power supply switches so that no one will apply power while performing maintenance.

**ICE BUILDUP**

Cold weather operations could create ice buildup on exposed surfaces producing hazardous footing conditions. Use extreme care when operating under icing conditions; death or serious injury to personnel could occur.

**INHALATION HAZARD**

Always wear a respirator when exposure to fumes from battery acid, fuel or Chemical Agent Resistant Coating (CARC) paint could occur. Always wear a respirator when exposed to misting fuel, chemical agents and additives. Failure to comply with these warnings could result in injury or death to personnel.

**JEWELRY**

Remove rings, bracelets, wristwatches, earrings and neck chains before working around or on a unit.

**LEAD ACID BATTERIES**

Do not smoke around batteries. Personnel must wear goggles and chemical resistant gloves when removing or opening covers, adding electrolyte and cleaning up spills.

**MODULE MOVEMENT**

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Always use the number of soldiers called for by the procedures to move or relocate the equipment. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves and other suitable protective clothing.

**NO SMOKING**

Smoking is prohibited around the operations site.

## GENERAL SAFETY WARNINGS DESCRIPTION - CONTINUED

### NOISE

Use single hearing protection within 22 feet. Hearing can be permanently damaged if exposed to constant high noise.

### NUCLEAR, BIOLOGICAL OR CHEMICAL

In the event equipment has been exposed to nuclear, biological or chemical warfare, the equipment shall be handled with extreme caution and decontaminated in accordance with FM 3-5, instructions for immediate, operational and thorough decon procedures adapted for the marine environment. Unprotected personnel can experience injury or death if residual toxic agents or radioactive material are present. If equipment is exposed to radioactive, biological or chemical agents, personnel must wear protective mask, hood, and protective over garments, chemical gloves and chemical boots in accordance with MOPP level prescribed by the OIC or NCOIC.

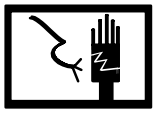
### TORQUE VALUES

For torque not specified in an individual work packages, refer to the *Torque Limits Work Package* located in *Field Maintenance Instructions,* Chapter 6 of this manual. Failure to tighten fasteners to specified torque may result in damage to equipment and death or injury to personnel.

## EXPLANATION OF SAFETY WARNING ICONS

EAR PROTECTION

**EAR PROTECTION** - Headphones over ears shows that noise level will harm ears.



ELECTRICAL

**ELECTRICAL** - Electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.

ELECTRICAL

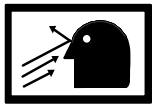
**ELECTRICAL 2** - Electrical wire to arm with electricity symbol running through body shows that shock hazard is present.

EYE PROTECTION

**EYE PROTECTION** - Person with goggles shows that the material will injure the eyes.

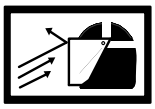
FALLING PARTS

**FALLING PARTS –** Arrow bouncing off human shoulder and head shows that falling parts present a danger to life and limb.



FLYING PARTICLES

**FLYING PARTICLES** - Arrows bouncing off face shows that particles flying through the air will harm face.



FLYING PARTICLES

**FLYING PARTICLES 2** - Arrows bouncing off face with face shield shows that particles flying through the air will harm face.

HEAVY OBJECTS

**HEAVY OBJECTS** - Human figure stooping over heavy object shows physical injury potential from improper lifting technique.

HEAVY PARTS

**HEAVY PARTS** - Foot with heavy object on top shows that heavy parts can crush and harm.

HEAVY PARTS

**HEAVY PARTS 2** - Hand with heavy object on top shows that heavy parts can crush and harm.

## EXPLANATION OF SAFETY WARNING ICONS- CONTINUED

HEAVY PARTS

**HEAVY PARTS 3** - Heavy object on human figure shows that heavy parts present a danger to life or limb.

HEAVY PARTS

**HEAVY PARTS 4** - Heavy object pushed up against human figure shows that heavy parts present a danger to life or limb.

HELMET PROTECTION

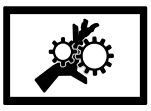
**HELMET PROTECTION** - Arrow bouncing off head with helmet shows that falling parts present a danger.

HIGH PRESSURE

**HIGH PRESSURE -** Arrow penetrating hand shows that skin may be penetrated by air or other contaminants.

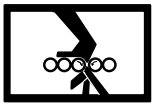
HOT AREA

**HOT AREA** - Hand over object radiating heat shows that part is hot and can burn.



MOVING PARTS

**MOVING PARTS** - Hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



MOVING PARTS

**MOVING PARTS 2** - Hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb.

MOVING PARTS

**MOVING PARTS 3** - Human figure with an arm caught between gears shows that the moving parts of the equipment present a danger to life or limb.

SHARP OBJECT

**SHARP OBJECT** - Pointed object in foot shows that a sharp object presents a danger to limb.

SHARP OBJECT

**SHARP OBJECT 2** - Sharp object on hand shows that a sharp object presents a danger to limb.

## EXPLANATION OF SAFETY WARNING ICONS- CONTINUED

SLICK FLOOR

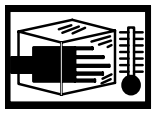
**SLICK FLOOR** - Wavy line on floor with legs prone shows that slick floor presents a danger for falling.

BIOLOGICAL

**BIOLOGICAL -** Abstract symbol bug shows that a material may contain bacteria or viruses that represent a danger to life or health.

CHEMICAL

**CHEMICALS** - Drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



CRYOGENIC

**CRYOGENICS** - Hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.

EXPLOSION

**EXPLOSION** - Rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition or high pressure.

FIRE

**FIRE** - Flame shows that a material may ignite and cause burns.

POISON

**POISON** - Skull and crossbones shows that a material is poisonous or is a danger to life.

RADIATION

**RADIATION** - Three circular wedges shows that the material emits radioactive energy and can injure human tissue.

VAPOR

**VAPOR -** Human figure in a cloud shows that material vapors present a danger to life or health.

**HAZARDOUS MATERIALS DESCRIPTION**

**WARNING**

CHEMICAL

EYE PROTECTION

**TAN CHEMICAL AGENT RESISTANT COATING (CARC) PAINT**

When working with tan CARC paint, avoid direct contact with eyes or skin or prolonged inhalation. Wear protective eyewear, impervious gloves, protective clothing, and mechanical filter respirator to remove solid airborne particles of overspray. Direct contact to the eyes by this product may produce irritation. First aid for eyes: flush with large amounts of water, lifting upper and lower lids occasionally. Seek medical attention. Direct contact to the skin may produce slight irritation. First aid for skin contact: thoroughly wash exposed area with soap and water. Remove contaminated clothing and launder before reuse. Prolonged inhalation may cause headache, and/or nausea. Chronic hazards include: Permanent brain and nervous system damage have been associated to overexposure of this product. First aid for inhalation: move to fresh air. Give oxygen or CPR as needed. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis, which is fatal. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. Dispose of this product in accordance with Local, State and Federal Hazardous Waste regulations.

**WARNING**

CHEMICAL

EYE PROTECTION

**GREEN CARC PAINT**

When working with green CARC paint, avoid direct contact with eyes or skin or prolonged inhalation. Wear protective eyewear, impervious gloves, protective clothing, and mechanical filter respirator to remove solid airborne particles of overspray. Direct contact to the eyes by this product may produce irritation. First aid for eyes: flush with large amounts of water, lifting upper and lower lids occasionally. Seek medical attention. Direct contact to the skin may produce slight irritation. First aid for skin contact: thoroughly wash exposed area with soap and water. Remove contaminated clothing and launder before reuse. Prolonged inhalation may cause headache, and/or nausea. Chronic hazards include: Permanent brain and nervous system damage have been associated to overexposure of this product. First aid for inhalation: move to fresh air. Give oxygen or CPR as needed. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis, which is fatal. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. Dispose of this product in accordance with Local, State and Federal Hazardous Waste regulations.

**HAZARDOUS MATERIALS DESCRIPTION – CONTINUED**

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**JP-8 FUEL**

When working with JP-8 fuel, avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wear protective clothing, protective rubber gloves and chemical splash goggles. Avoid prolonged or repeated breathing of vapors. Use only with adequate ventilation. Overexposure can irritate digestive tract. Aspiration into lungs may cause hemorrhaging. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. Launder contaminated clothing immediately and discard contaminated leather goods. If symptoms persist, seek medical attention. First aid for eye contact: immediately flush eyes with plenty of water for at least 15 minutes, retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Serious harm may result if treatment is delayed. Seek immediate medical attention and continue to flush eyes while awaiting medical attention. Monitor the eye daily as advised by a physician. First aid for inhalation: move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek immediate medical attention. Dispose of this product in accordance with Local, State and Federal Hazardous Waste regulations.

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**DIESEL FUEL**

When working with diesel fuel, avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wear protective clothing, protective rubber gloves and chemical splash goggles. Avoid prolonged or repeated breathing of vapors. Use only with adequate ventilation. Overexposure can irritate digestive tract. Aspiration into lungs may cause hemorrhaging. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. Launder contaminated clothing immediately and discard contaminated leather goods. If symptoms persist, seek medical attention. First aid for eye contact: immediately flush eyes with plenty of water for at least 15 minutes, retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Serious harm may result if treatment is delayed. Seek immediate medical attention and continue to flush eyes while awaiting medical attention. Monitor the eye daily as advised by a physician. First aid for inhalation: move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek immediate medical attention. Dispose of this product in accordance with Local, State and Federal Hazardous Waste regulations.

**HAZARDOUS MATERIALS DESCRIPTION – CONTINUED**

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**FUEL ADDITIVES**

Fuel additives can be toxic. Avoid prolonged or repeated breathing of vapors or contact with skin. Use only with adequate ventilation. Wear latex or rubber gloves and chemical splash goggles. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. If spilled, shovel dry spill into DOT approved drums for disposal. Absorb liquid spill with vermiculite. First aid for eyes: flush with water for 20 to 30 minutes, hold eyelids open. First aid for skin contact: flush with plenty of water. First aid for inhalation: remove to fresh air, provide CPR/oxygen if needed. First aid for oral consumption: if large quantities are swallowed and victim is conscious, drink lukewarm water. Do not induce vomiting. Call a physician at once.

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**SEALING COMPOUND, MIL-S-45180, TYPE II**

Sealing compound is toxic. Avoid prolonged or repeated breathing of vapors and contact with eyes or skin. Use only with adequate ventilation. Wear latex or rubber gloves and chemical splash goggles. First aid for ingestion: do not induce vomiting. Keep individual calm. Obtain medical attention. First aid for inhalation: remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, use oxygen. Get medical attention. First aid for skin contact: remove contaminated clothing. Wash area with soap and water. If irritation persists, seek medical attention. First aid for eye contact: immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

**HAZARDOUS MATERIALS DESCRIPTION – CONTINUED**

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**SEALING COMPOUND, 567**

Sealing compound is toxic. Avoid prolonged or repeated breathing of vapors and contact with eyes or skin. Use only with adequate ventilation. Wear latex or rubber gloves and chemical splash goggles. First aid for ingestion: If swallowed do not induce vomiting. Keep individual calm. Obtain medical attention. First aid for inhalation: If inhaled, remove to fresh air. If symptoms develop and persist, get medical attention. First aid for skin contact: Wash area with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. If irritation persists, seek medical attention. First aid for eye contact: Immediately flush eyes with plenty of water, preferably lukewarm water, for at least 15 minutes, holding eyelids open all the time. Get medical attention. Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention.

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

**SOLVENT CLEANING COMPOUND, MIL-PRF-680**

Cleaning solvents can cause eye and skin irritation. Wear protective rubber gloves and chemical splash goggles or face shield to avoid skin or eye contact. Use in a well ventilated area. First aid for skin contact: remove any contaminated clothing and wash skin thoroughly with soap and water. First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If irritation persists, call a physician. If overcome by vapors, move from exposed area and call a physician. In case of ingestion, Do not induce vomiting, call a physician immediately.

# LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: Zero in the “Change No.” column indicates an original page or work package.

Date of issue for the original manual is:

Original . . . . . 15 July 2008

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 24 AND TOTAL NUMBER OF WORK PACKAGES IS 71 CONSISTING OF THE FOLLOWING:**

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| i-x | 0 | WP 0035 (4 pgs) | 0 |
| Chp 1 title page | 0 | WP 0036 (4 pgs) | 0 |
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| WP 0010 (4 pgs) | 0 | WP 0048 (10 pgs) | 0 |
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**HEADQUARTERS,**
**DEPARTMENT OF THE ARMY**
**WASHINGTON, D.C., 15 JULY 2008**

**TECHNICAL MANUAL**

# OPERATOR AND FIELD MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL) FOR

# FUEL ADDITIVE INJECTOR ASSEMBLY TPI-4T-4A-1 NSN 4930-01-547-6265

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is http://aeps.ria.army.mil. The DA Form 2028 is located under the Public Applications section of AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this form on AEPS will enable us to respond quicker to your comments and better manage DA Form 2028 program. You may also mail, email, or fax your comments or DA Form 2028 directly to: U. S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LMPP/TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is tacomlcmc.daform2028 @ us.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

**CURRENT AS OF 13 JUNE 2008**

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# HOW TO USE THIS MANUAL

This manual contains certain features to improve the convenience of using this manual and increase the user's efficiency. These features include:

**a. Accessing Information**

Information is accessed by referring to the Table of Contents, located in the front of this manual, or by looking in the Alphabetical Index, located in the back of this manual.

**b. Illustrations**

Various methods are used to locate and repair components. Locate illustrations in Controls and Indicator tables, Preventive Maintenance Checks and Services (PMCS) tables, exploded views and cut-away diagrams make the information in the manual easier to understand and follow.

**c. Using This Manual**

When using this manual, read and understand the entire maintenance action before performing the task. Also, read and understand all warnings, cautions and notes as well as general safety precautions that apply to the task to be performed. The warning summary will inform personnel of hazards associated with the equipment to be worked on. However, the summary is not all-inclusive and personnel should be aware at all times of hazardous conditions that may arise.

Prior to starting the procedures in this manual, the initial setup requirements are located directly above each procedure. The information is given to ensure all materials; expendables, tools and any other equipment necessary are readily available for use. The initial setup will be accomplished prior to starting the actual steps of each maintenance procedure.

## LOCATING MAJOR COMPONENTS

Obtain the manual for the system to be worked on. Open to the Table of Contents located in the front of this manual. Find Chapter 1, *General Information*, *Equipment Description and Theory of Operation*. Under the chapter title you will find the work package titled *Equipment Description and Data*. Turn to the work package indicated. This work package will give a brief description of the major components, and show an illustration of what the component looks like and its location.

## OPERATING PROCEDURES

The Table of Contents may be used to locate sections within this manual. To locate a particular operating procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 2, *Operator Instructions.* Under this section, find the work package for the component you are trying to operate. To the right side of the procedure will be a work package number. Turn to the work package indicated and follow the steps to perform the procedure. The procedures list the how to set up the equipment, how to program the equipment and how to operate the equipment. Follow the procedures indicated to complete the task.

At the top of the task you will have a section called INITIAL SETUP. There are six basic headings listed under INITIAL SETUP.

**Test Equipment:** Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Maintenance Allocation Chart,* located in Chapter 8, *Supporting Information*.

**OPERATING PROCEDURES -CONTINUED**

**Tools:** Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Maintenance Allocation Chart,* located in Chapter 8, *Supporting Information*.

**Materials/Parts:** Lists all parts or materials necessary to perform the task. Expendable and durables are identified with an item number from the applicable work package located in Chapter 8, *Supporting Information*.

**Personnel Required:** Lists all personnel necessary to perform the task.

**Equipment Condition:** Notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the Technical Manual (TM) number.

**References:** Includes any other manuals necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the work package in Chapter 8, *Supporting Information*.

**TROUBLESHOOTING PROCEDURES**

The Table of Contents or Alphabetical Index may be used to locate sections within this manual. To locate a particular troubleshooting procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 3, *Operator Troubleshooting Procedures,* and Chapter 4 *Field Maintenance Troubleshooting Procedures.* Under this section, find a work package titled *Master Malfunction/Symptom Index*. Turn to the work package indicated, which lists all of the troubleshooting procedures. Look down the list until you find the appropriate work package for the problem you are trying to solve. To the right side of the procedure will be a work package number. Turn to the work package indicated and follow the steps to complete the troubleshooting procedure. The procedures list the malfunction, symptom and the corrective action. The corrective action will indicate which maintenance procedure to go to for the repair of the symptom or what level of maintenance is capable of repair of the problem. Follow the procedures indicated to complete the task. At the top of the task you will have a section called INITIAL SETUP. There are six basic headings listed under INITIAL SETUP.

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**References:** Includes any other manuals necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the work package *References* in Chapter 8, *Supporting Information*.

## MAINTENANCE INSTRUCTIONS

To locate a maintenance procedure, open the manual to the Table of Contents located in the front of this manual. Locate the chapter, which pertains to your level of maintenance; Chapter 5 for *Operator Maintenance Instructions*, or Chapter 6 for *Field Maintenance Instructions*. Look down the list and find the maintenance procedure to be accomplished. On the right side of the maintenance procedure will be a work package number. Turn to the work package indicated. Before beginning the maintenance task, look through the procedure to familiarize yourself with the entire maintenance procedure. At the top of the task you will have a section called INITIAL SETUP. There are six basic headings listed under INITIAL SETUP.

**Test Equipment:** Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Maintenance Allocation Chart,* located in Chapter 8, *Supporting Information*.

**Tools:** Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Maintenance Allocation Chart,* located in Chapter 8, *Supporting Information*.

**Materials/Parts:** Lists all mandatory replacement parts, expendable and durables necessary to perform the task. Expendable and durables and mandatory replacement parts are identified with an item number from the applicable work package located in Chapter 1, *Supporting Information*.

**Personnel Required:** Lists all personnel necessary to perform the task.

**References:** Includes any other manuals necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the work package *References* in Chapter 8, *Supporting Information*.

**Equipment Condition:** Notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the TM number.

## REPAIR PARTS AND SPECIAL TOOLS LIST

Refer to Chapter 8, *Supporting Information*, when requisitioning parts, special tools and equipment.

Identify the mandatory repair parts required to perform this task listed at the top of the work package in the INITIAL SETUP. Using the nomenclature and item number provided, refer to the *Mandatory Replacement Parts List* work package in Chapter 8, *Supporting Information*.

Look up the part number in the part number column and identify the figure and item number where the part is located. Turn to the figure and locate the item number listed.

# CHAPTER 1

# GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION FOR FUEL ADDITIVE INJECTOR ASSEMBLY

# OPERATOR AND FIELD MAINTENANCE
# GENERAL INFORMATION

## SCOPE

This manual contains descriptions and instructions for the Fuel Additive Injector Assembly, TPI-4T-4A-1.

Type of Manual: Operator, Field Maintenance and Repair Parts.

Model Number and Equipment Name: Model TPI-4T-4A-1, Fuel Additive Injector Assembly.

Purpose of Equipment: The Fuel Additive Injector Assembly covered by this manual is designed to be used by forward area petroleum personnel operating a fuel system to provide proportionate-to-flow additive injector capability.

## MAINTENANCE FORMS, RECORDS AND REPORTS

(A) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

(F) Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.

(MC) Maintenance forms and records used by Marine Corps personnel are prescribed by TM 4700-15/1.

(N) Planned Maintenance System (PMS) Maintenance Index Page (MIP) Series 6641 will be used to govern maintenance of TPI-4T-4A-1 injector.

## REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

(A) If your Fuel Additive Injector Assembly, TPI-4T-4A-1, 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. If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to https://aeps.ria.army.mil/aepspublic.cfm (scroll down and choose the “Submit Quality Deficiency Report” bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR) or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/facsimile numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

(MC) For Marine Corps users: Product Quality Deficiency Reports (PQDR) shall be submitted on SF 368 in accordance with MCO 4855.10. A reply will be furnished to you.

(F and N) Report in accordance with local policy.

## HAND RECEIPT (HR) MANUALS

There is no hand receipt manual for the Fuel Additive Injector Assembly, TPI-4T-4A-1.

## CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of 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 can be made to prevent the problem in future items.

**CORROSION PREVENTION AND CONTROL (CPC) - CONTINUED**

Corrosion specifically occurs with metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue and/or cracking.

Plastics, composites and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents) or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling and/or breaking.

(A) Submit form to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

(F) Submit SF 368 in accordance with T.O. 00-35D-54 to HQ, AFMSA/SGSL, Medical Logistics Division, 1423 Sultan Drive, Suite 200, Fort Derrick, MD 21702-5600.

(N) Submit SF 368 according to NAVSUPP-485 with copy to Commanding Officer, NSWCCD-SSES, Attn: Code 622, 1569 Constitution Ave, Philadelphia, PA 19112-1403.

(MC) Submit SF 368 in accordance with MCO 4855.10 to: Commander, Attn: OPS Business Office L150, 841 Radford Blvd, STE 20320, Albany, GA 31704-0320 or email to: mbmatcompqdrstracking@matcom.usmc.mil.

**DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE**

The procedures for destruction of Army materiel to prevent enemy use are contained in TM 43-0002-31, Destruction of Chemical Weapons and Defense Equipment to Prevent Enemy Use.

## LIST OF ABBREVIATIONS/ACRONYMS

| Abbreviation/Acronym | Name |
|---|---|
| A | Amperage |
| AC | Alternating Current |
| AEPS | Army Electronic Product Support |
| AL | Adapter Length |
| AOAP | Army Oil Analysis Program |
| AR | Army Regulation |
| AT | Applied Torque |
| AUX | Auxiliary |
| BII | Basic Issue Items |
| C | Centigrade |
| CAGEC | Commercial and Government Entity Code |
| CAN | Control Area Network |
| Cm | Centimeters |
| COEI | Components of End Item |
| CPC | Corrosion Prevention and Control |
| CPR | Cardiopulmonary Resuscitation |
| CTA | Common Table of Allowances |
| DA | Department of the Army |
| DBM | Data Bus Module |
| DC | Direct Current |
| DOT | Department of Transportation |
| DT | Desired Torque |
| DTC | Diagnostic Trouble Code |
| ECU | Engine Control Unit |
| EIR | Equipment Improvement Recommendations |
| EMI | Electromagnetic Interference |
| Eng Hrs | Engine Hours |
| F | Fahrenheit |
| FCG | Functional Group Code |
| FM | Field Manual |
| FMI | Failure Mode Identifier |
| FSSP | Fuel System Supply Point |
| ft | Feet/Foot |
| ft lb | Foot Pounds |
| GAL | Gallon |
| GPM | Gallons Per Minute |
| Hr | Hour |
| HR | Hand Receipt |
| HP | Horse Power |
| ID | Identification |
| ID | Inner Diameter |
| in. | Inches |
| in.Hg | Inches of Mercury |
| in. lb | Inch Pounds |
| JSTDS-SS | Joint Service Transportable Decontamination System – Small Scale |
| JTA | Joint Table of Allowances |
| kg | Kilograms |
| kg/cm2 | Kilograms per Centimeters Squared |
| kPa | Kilopascals |
| kW | Kilowatt |

**LIST OF ABBREVIATIONS/ACRONYMS - CONTINUED**

| Abbreviation/Acronym | Name |
|---|---|
| l/min. | Liters per Minute |
| l | Liter |
| lb | Pounds |
| LCD | Liquid Crystal Display |
| LT | Length of Torque Wrench |
| MAC | Maintenance Allocation Chart |
| MOPP | Mission Oriented Protective Posture |
| mm | Millimeter |
| MTOE | Modified Table of Organization and Equipment |
| NATO | North Atlantic Treaty Organization |
| NBC | Nuclear, Biological or Chemical |
| NCOIC | Non-Commissioned Officer in Charge |
| NHA | Next Higher Assembly |
| N-m | Newton-Meters |
| no. | Number |
| NSN | National Stock Number |
| OC | On Condition |
| OD | Outer Diameter |
| OIC | Officer in Charge |
| oz | Ounces |
| PB | Pushbutton |
| PEC | Programmable Engine Controller |
| PMCS | Preventive Maintenance Checks and Services |
| PN | Part Number |
| PSI | Pounds Per Square Inch |
| PSIG | Pounds Per Square Inch Gauge |
| RPM | Revolutions Per Minute |
| RPSTL | Repair Parts and Special Tools List |
| SAE | Society of Automotive Engineers |
| SMR | Source Maintenance and Recoverability |
| SPN | Suspect Parameter Number |
| sqdr. | Square Drive |
| Svrc. | Service |
| TAMMS | The Army Maintenance Management System |
| TDA | Table of Distributions and Allowances |
| TDC | Top Dead Center |
| TEMP | Temperature |
| TM | Technical Manual |
| TMDE | Test, Measurement and Diagnostic Equipment |
| TOE | Table of Organization and Equipment |
| UUT | Unit Under Test |
| UV | Ultra Violet |
| VDC | Volts Direct Current |
| W | Width |

## QUALITY OF MATERIAL

Material used for replacement, repair or modification must meet the requirements of this manual (TM 10-4930-364-13&P). If quality of material requirements are not stated in this manual (TM 10-4930-364-13&P), the material must meet the requirements of the drawings, standards, specifications or approved engineering change proposals applicable to the subject equipment.

## SAFETY, CARE AND HANDLING

The fuel additive injector is used in conjunction with other Class III systems used to pump various fuels. It must be assumed that residual fuel and fuel vapors are present in the fuel additive injector at all times, even after draining or purging is completed. Therefore the equipment must always be handled with the same degree of caution as actual fuel. One or more fully charged fire extinguishers must be present at all times, not only during operation. In addition, fuels may contain toxic additives. Rubber gloves should always be worn when handling additive fuel injector components which are in regular contact with fuel.

Static electric charge builds when the fuel is being pumped, stirred, shook or splashed. Any physical movement of the fuel will increase the static charge. If the charge is allowed to build sufficiently it will discharge, causing a spark which may ignite fuel vapors. The buildup of a static electric charge is controlled by bonding and grounding of all fuel handling equipment. Ground rods and grounding cable assemblies are provided with the additive fuel injector and must be inspected, maintained and used consistently and conscientiously to prevent fuel ignition due to electrostatic discharge. Petroleum products are dangerous under all conditions. Always observe fuel handling safety precautions.

## SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, Expendable/Durable Items (Except: Medical, Class V, Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items, as applicable to your unit.

## COPYRIGHT CREDIT LINE



## END OF WORK PACKAGE

## OPERATOR AND FIELD MAINTENANCE
## EQUIPMENT DESCRIPTION AND DATA

### EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

### FUEL ADDITIVE INJECTOR ASSEMBLY

The Fuel Additive Injector Assembly, TPI-4T-4A-1, is a fluid powered, multi-additive injector system that provides proportionate-to-flow additive injector by borrowing energy in the main flowing fuel line to turn the fluid motor. As fuel flow increases or decreases in flow rate, the fluid motor responds by turning faster or slower. Since the Fuel Additive Injector Assembly, TPI-4T-4A-1, is both powered and controlled by the flow of fuel passing through the fluid motor, no external power or meter is required for operation. The system is ”passive”. When fuel flow begins, injection begins. When flow slows or stops, injection slows or stops proportionately, with no action required from the operator. All that is required is fuel passing through the system and a supply of additives.

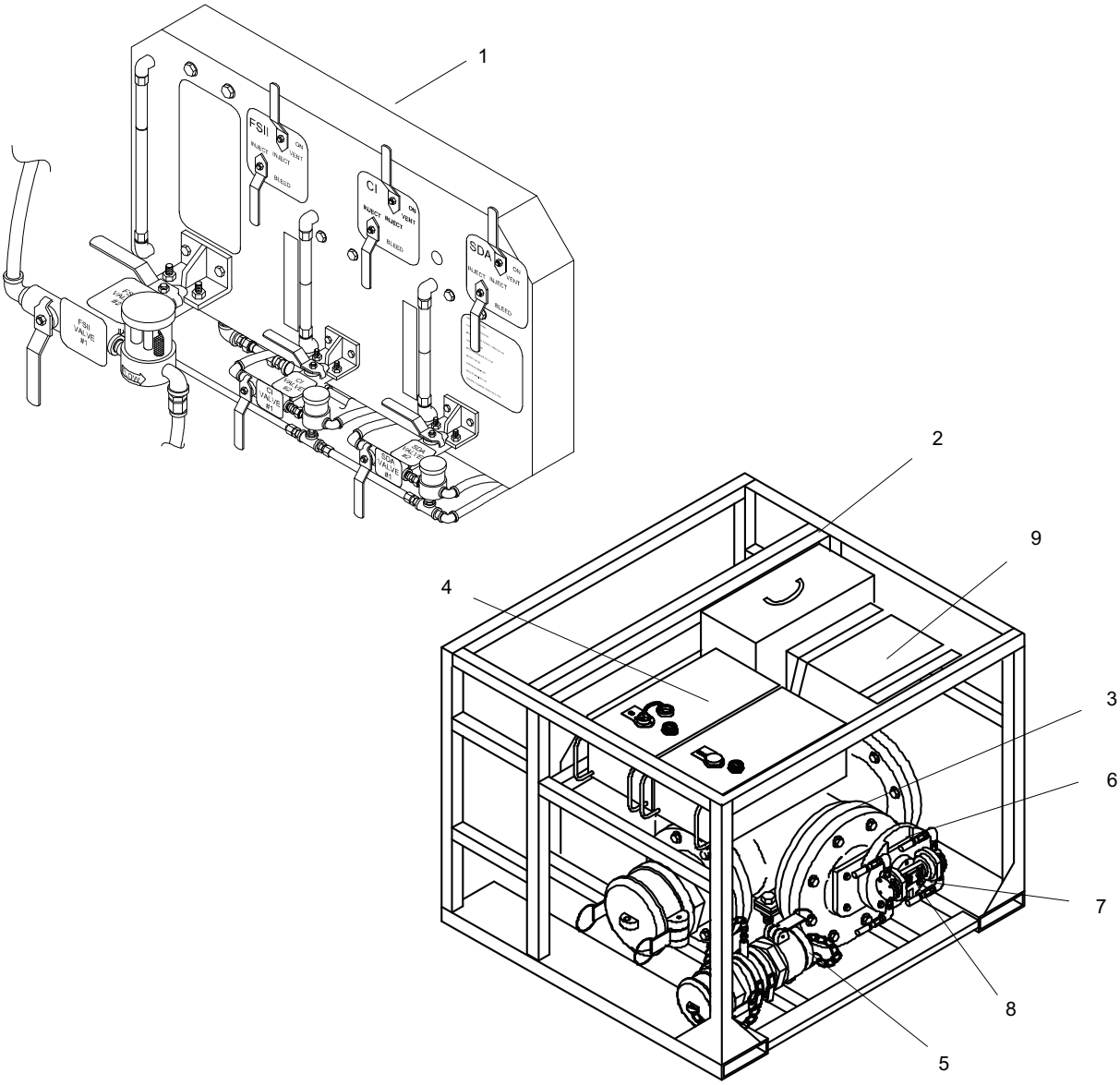
Since all three injectors are directly linked to the fluid motor, they also increase and decrease in speed with the flow of fuel as it passes through the system and are therefore proportionate-to-flow. After the injectors are calibrated at a given fuel flow rate, they remain at the same injection ratio throughout the flow range of the system. For example, if the injectors are calibrated to deliver a certain injection ratio at 300 gpm. The system will remain in calibration at any flow rate from 150 - 700 gpm.

In summary, the fuel additive injector assembly is a fluid powered, multi-additive injector system designed to inject Fuel System Icing Inhibitor (FSII), Static Discharge Additive (SDA) and Corrosion Inhibitor (CI) additives into fuels. The system is powered and controlled by the flow of fuel through the fluid motor. The system does not operate on external power or require any operators to control the system while in operation. As the flow of fuel either increases or decreases through the system, the fluid motor will either increase or decrease simultaneously.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

### FUEL ADDITIVE INJECTOR ASSEMBLY

The Fuel Additive Injector Assembly, TPI-4T-4A-1, consists of the following major components, as shown in Figures 1.




Legend for Figure 1:

1. Control Panel Sub-Assembly
2. Skid Sub-Assembly
3. Injector Sub-Assembly
4. 6 Gallon SS Tank Sub-Assembly
5. 4” Sample Probe Sub-Assembly
6. 3:1 Gear Reducer Sub-Assembly
7. 1P7-1P& SS Pump Sub-Assembly (CI-SDA)
8. 2L SS Pump Sub-Assembly (FSII)
9. FSII Sample Test Kit

Figure 1. TPI-4T-4A-1 Fuel Additive Injector Major Assembly.

**EQUIPMENT DATA**

Table 1 provides performance data pertaining to the operation and mechanical characteristics of components within the Fuel Additive Injector Assembly, TPI-4T-4A-1.

**Table 1. Applicator Module Assembly.**

| ITEM CHARACTERISTIC/SPECIFICATION | DESCRIPTION |
|---|---|
| Model | Hammonds TPI-4T-4A-1 |
| Description | Portable, multi-additive injector |
| Size | 40 in wide, 48 in long , 40 in high |
| Weight | 920 lbs |
| Product Connections | 4 in Cam-Lock |
| Additive Connections: | |
| CI and SDA | 1/4 in braided stainless Teflon® hose with JLC fitting |
| FSII | 3/4 in braided stainless Teflon® hose with JLC fitting |
| Fuel Flow Operating Range | 150 - 700 gpm |
| Injection Ratio Capacity: | |
| Corrosion Inhibitor (CI) | 40 PPM |
| Static Dissipative Additive ( SDA) | 40 PPM |
| Fuel System Icing Inhibitor (FSII) | 2100 PPM |
| Duty Cycle | Continuous |
| Operating Environment | Out of Doors |
| Operating Temperature | -25°F to + 120°F |
| Operating Pressure | Not to exceed 120 PSI |

**END OF TASK**

**END OF WORK PACKAGE**

# OPERATOR AND FIELD MAINTENANCE
# THEORY OF OPERATION

## INTRODUCTION

The fuel additive injector assembly is a fluid powered, multi-additive injector system designed to inject Fuel System Icing Inhibitor (FSII), Static Discharge Additive (SDA) and Corrosion Inhibitor (CI) additives into fuels. The Fuel Additive Injector Assembly is comprised of a number of separate major components which facilitate the process. The principles of operation of each of these major components and how they work within the system are defined in the following paragraphs.

## FUEL ADDITIVE INJECTOR ASSEMBLY

The Fuel Additive Injector Assembly, TPI-4T-4A-1, is a fluid powered, multi-additive injector system that provides proportionate-to-flow additive injector by borrowing energy in the main flowing fuel line to turn the fluid motor. As fuel flow increases or decreases in volume, the fluid motor responds by turning faster or slower. Since the Fuel Additive Injector Assembly, TPI-4T-4A-1, is both powered and controlled by the flow of fuel passing through the fluid motor, no external power or meter is required for operation. The system is ”passive”. When fuel flow begins, injection begins. When flow slows or stops, injection slows or stops proportionately, with no action required from the operator. All that is required is fuel passing through the system and a supply of additives.

Since all three injectors are directly linked to the fluid motor, they also increase and decrease in speed with the flow of fuel as it passes through the system and are therefore proportionate-to-flow. After the injectors are calibrated at a given fuel flow rate, they remain at the same injection ratio throughout the flow range of the system. For example, if the injectors are calibrated to deliver a certain injection ratio at 300 gpm. The system will remain in calibration at any flow rate from 150 - 700 gpm.

## FLUID MOTOR

The fluid motor borrows just enough energy from the flowing fuel to power the three additive injectors.

## SPEED REDUCER

Since the CI and SDA additives are injected at a very low ratio; these two injectors operate at a much slower speed than the FSII injector. The Fluid Motor speed is reduced by this gear reducer at a 3:1 ratio, making it possible to calibrate the CI and SDA injectors at a very low ratio.

## CI AND SDA INJECTORS

These injectors share a common power frame with one fluid end dedicated to each additive. Although mounted together in the same frame, each operates completely independent of the other. Both pumps include a stroke adjustment and each a separate additive source. Either injector may be turned off by closing the additive valve #1 or adjusting the stroke adjustment to zero.

## FSII INJECTOR

Since FSII is injected at a high ratio (1000 - 2000 PPM or 1 - 2 gallons per 1000 gallons of fuel) a high capacity injector is required. The FSII injector uses two large pump heads that are connected together for combined output. Although each pump head has a separate stroke adjustment and can be adjusted independently, both are usually set about the same to keep the system balanced. In an emergency, one of the heads operating at near full capacity could inject the required ratio of FSII with the other head stroke adjustment set to zero.

**INTRODUCTION - CONTINUED**

**PRIMING VALVE**

Since systems arrive empty, and are often stored for long periods of time, a means to prime the system initially and to purge or clean the system out prior to storage is provided. With fuel lines connected and flowing, the Priming valve takes fuel from the product line, under pressure and is used to feed all three injectors. First, close all of the #1 valves, set Bleed and vent valves to inject, open the Priming valve for at least 30 seconds. The manifold and pumps are filled almost instantly. Prior to storage, the system can be purged of additive with the same procedure. CI and SDA are particularly bad about drying in the pumps and lines, forming a thick, sticky residue that is very difficult to remove the next time the system is used. If the system is not purged before storage, it may be necessary to completely disassemble the pumps and clean them prior to the next use.

**ADDITIVE ON/OFF VALVE**

Labeled #1 valve for each additive. It is used to interrupt the supply of additive between the additive tank and the injector. It can be turned off at any time without harm to the pump. The units are transported and stored with all three of these valves in the closed position.

**CALIBRATION FILL VALVE:**

Labeled #2 valve for each additive. It is used to fill the calibration gauge to be able to field calibrate the injectors.

**SIGHT FLOW INDICATOR**

The Sight Flow Indicator serves a three-fold purpose. First, it allows the operator to monitor the presence of additive in the system. Second, it allows the operator to observe the exact amount of additive being injected into the system. Unlike some flow indicators that move wheels or rattle balls, the Sight Flow Indicator shoots the additive up out of the tube as it is drawn into the injector. Since every drop of additive that the injector pumps must pass through this indicator, this device provides proof positive that additive is moving into the system. The operator can see the additive as it is being drawn into the pumps. Finally, the Sight Flow Indicator has a screen filter. And since the walls of the indicator are glass, it is possible to observe the condition of the filter during operation and perform preventative maintenance when required.

**INJECTOR POINT CHECK VALVES**

These valves are special valves with soft seat elastomers that prevent jet fuel from migrating back into the injectors while allowing additive to be injected into the fuel. There is a separate line check valve for each additive (a total of three).

**INJECTOR STROKE ADJUSTMENTS**

The stroke adjustments allow the length of stroke of each pump fluid end to be adjustable throughout its range.

**BLEED VALVE**

These are three-way valves and are provided for each additive. The valve has two positions: *inject and bleed.*

**VENT VALVE**

These are two-way valves and are provided for each additive. The valve has two positions: inject (off) and on (open).

**INTRODUCTION - CONTINUED**

**FSII ¾" SUCTION LINE**

Its storage place is on a JIC fitting mounted on the skid. The swivel connection is only finger tight. Loosen and remove this end only as the other end is tightly connected to the FSII Sight Flow Indicator. Be careful not to get dirt in the end of this hose.

**CALIBRATION GAUGE**

One complete gauge is provided for each additive. It includes a translucent tube to see the level of liquid and a scale for volume measurement that runs parallel to the tube. The tube is directly connected to a reservoir of additive located behind the Control Panel. These reservoirs have enough capacity to make a sufficient calibration run.

**REFRACTOMETER KIT**

The Refractometer Kit is a complete kit for testing the FSII content of the fuel. The kit is packaged into a rugged case. It is secured to its storage location on the skid by 2 bungee stretch cords.

**TOOL BOX W/SPARES**

The tool box contains the necessary tools needed to perform preventative maintenance and repairs on the system. Also, contained in the tool box is a 2 year supply of spares. The spares are divided into 4 packages: 800ER Driver repair kit (Fluid Motor), 1P7-1P7 SS pump kit (CI & SDA), 2L SS pump kit (FSII), and HVSFI & 2 SFI repair kit (Sight Flow Indicators). The fittings to connect the FSII drum are contained in the tool box along with a quick reference illustration of a typical system layout.

**HAMMER**

The hammer is provided to drive the ground rods into the soil. The hammer is secured with a single removable pin in its storage place on the skid.

**GROUND ROD**

The system must be properly grounded before each use. See "Grounding the System".

**COPPER GROUNDING PLATE**

The copper grounding plate is provided to properly ground the system. The clamp attached to the ground rod is to be securely clamped to this plate.

**SAMPLE PROBE**

The system includes a 4" adapter with a sampling probe that can be used on either the fuel inlet or outlet of the injector.

**CI AND SDA ADDITIVE TANKS**

The additive tanks for CI & SDA are contained within the skid for your convenience and they are positioned for proper flooded suction to the injectors. The tanks are already connected in their proper locations. It is not necessary to neither disconnect the lines nor remove these tanks unless you are performing major repair service. Each tank can be filled from the top. Each tank has a filler with a stainless steel basket for straining the additive. There is a liquid level gauge provided on the top of each tank.

**INTRODUCTION - CONTINUED**

**VENT HOLE FILTER**

A vent hole is provided on both sides of the Fluid Motor to indicate when there is a mechanical seal leaking fuel. A vent hole is also provided on each fluid end of both injector pumps to indicate leaking additive when a diaphragm or plunger seal has failed. A filter is installed in each of these vent holes. This filter is a sintered material, which allows the venting to occur, and it prevents dirt from migrating inward.

**HOUSING DRAIN**

A ¼” pipe plug is provided in the bottom, center of the Fluid Motor housing to drain any remaining product when servicing is needed.

**END OF TASK**

**END OF WORK PACKAGE**

# CHAPTER 2

# OPERATOR INSTRUCTIONS
# FOR
# FUEL ADDITIVE INJECTOR ASSEMBLY

## OPERATOR INSTRUCTIONS
## DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

### FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS (OVERVIEW)

### GENERAL

The TPI-4T-4A-1 Fuel Additive Injector Assembly is a fluid powered, multi-additive injector system. It provides proportionate-to-flow additive injector by borrowing enough energy in the flowing fuel line to turn the fluid motor. As fuel flow increases or decreases in volume, the fluid motor responds by turning faster or slower. Since all three injectors are directly linked to the fluid motor, they also increase and decrease in speed with the flow of fuel as it passes through the system and are therefore proportionate-to-flow. After the injectors are calibrated at a given fuel flow rate, they remain at the same injection ratio throughout the flow range of the system. For example, if the injectors are calibrated to deliver a certain injection ratio at 300 gpm, the system will remain in calibration at any flow rate from 150-700 gpm.

The fuel additive injector assembly is both powered and controlled by the flow of fuel passing through the fluid motor. No external power or a meter is required for operation. The system is “passive”. When fuel flow begins, injection begins. When flow slows or stops, injection slows or stops proportionately, with no action required from the operator. All that is required is fuel passing through the system and a supply of additives.

### FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS

Refer to Figure 1 for identification of the fuel additive injector assembly controls and indicators. Table 1 describes the functions of the controls and indicators for the fuel additive injector assembly.

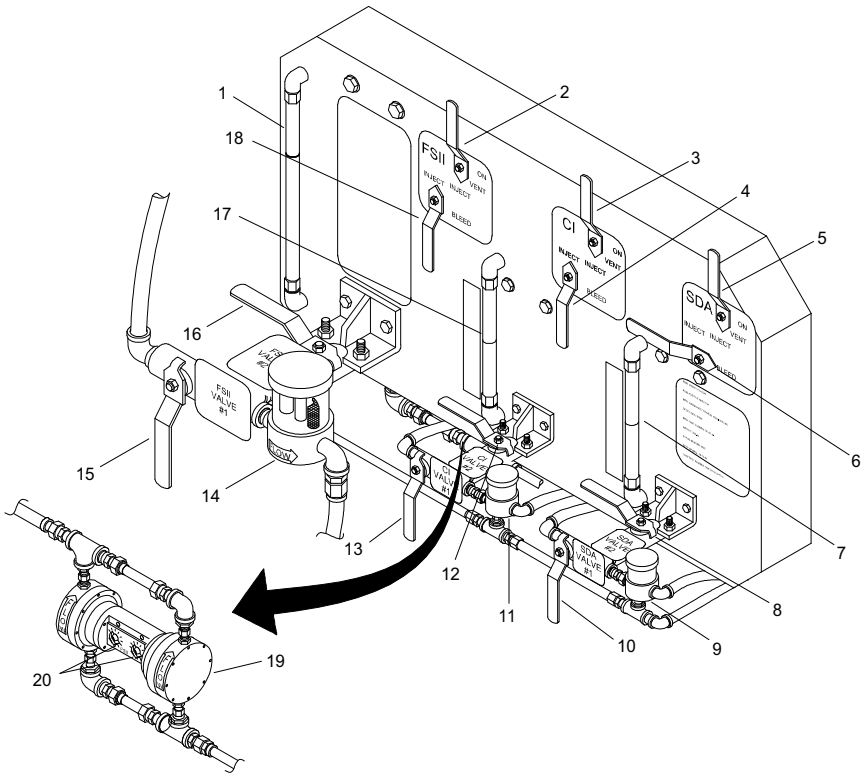



Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 1 of 3).

**FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED**

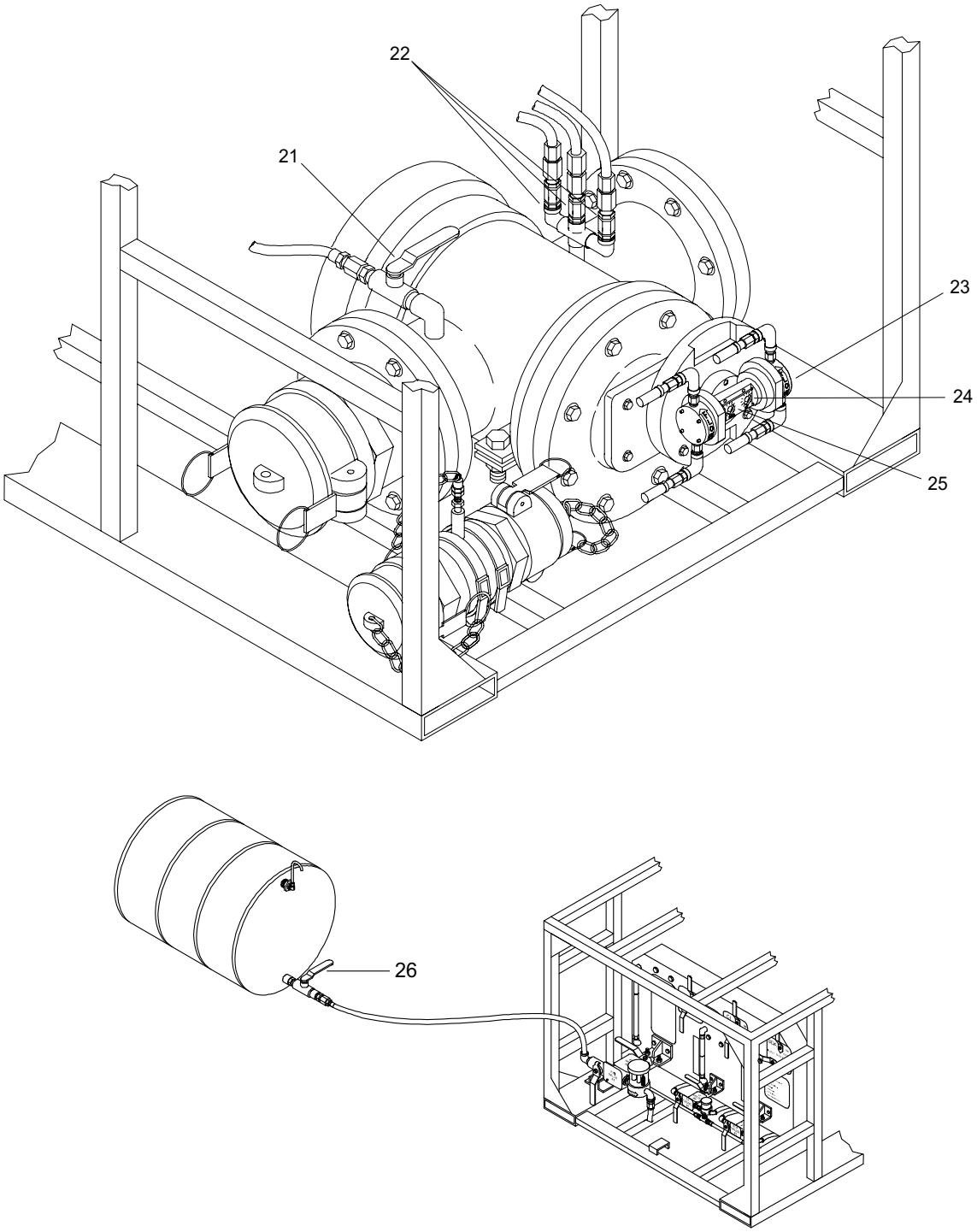



Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 2 of 3).

**FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED**

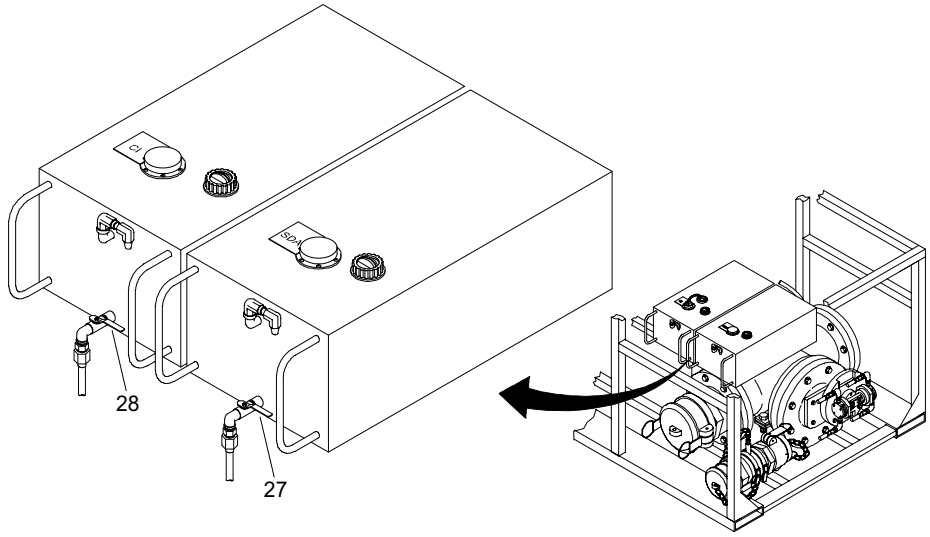



Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 3 of 3).

**Table 1. Fuel Additive Injector Assembly Controls and Indicators.**

| KEY | CONTROL/INDICATOR | FUNCTION |
|---|---|---|
| 1 | Fuel System Icing Inhibitor (FSII) Calibration Gauge | Used to calibrate amount of icing inhibitor to add to fuel. |
| 2 | FSII Vent Valve | Used to select between ON, VENT or INJECT for the fuel system icing inhibitor additive. |
| 3 | Corrosion Inhibitor (CI) Vent Valve | Used to select between ON, VENT or INJECT for the corrosion inhibitor additive. |
| 4 | CI Bleed Valve | Used to select between INJECT and BLEED for the corrosion inhibitor additive. |
| 5 | Static Discharge Additive (SDA) Vent Valve | Used to select between ON, VENT or INJECT for the static discharge additive. |
| 6 | SDA Bleed Valve | Used to select between INJECT and BLEED for the static discharge additive. |
| 7 | SDA Calibration Gauge | Used to calibrate amount of static discharge additive to add to fuel. |
| 8 | SDA VALVE #2 | Used to fill the static discharge additive calibration gauge during field calibration of the injectors. |
| 9 | SDA Sight Flow Indicator | Allows operator to monitor presence of additive in the system. Allows operator to observe the exact amount of additive being injected into the system. Used to observe the condition of the filter during operation. |

**FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED**

**Table 1. Fuel Additive Injector Assembly Controls and Indicators – Continued.**

| KEY | CONTROL/INDICATOR | FUNCTION |
|---|---|---|
| 10 | SDA VALVE #1 | Used to interrupt the supply of additive between the additive tank and the injector. |
| 11 | CI Sight Flow Indicator | Allows operator to monitor presence of additive in the system. Allows operator to observe the exact amount of additive being injected into the system. Used to observe the condition of the filter during operation. |
| 12 | CI VALVE #2 | Used to fill the corrosion inhibitor additive calibration gauge during field calibration of the injectors. |
| 13 | CI VALVE #1 | Used to interrupt the supply of additive between the additive tank and the injector. |
| 14 | FSII Hi Volume Sight Flow Indicator | Allows operator to monitor presence of additive in the system. Allows operator to observe the exact amount of additive being injected into the system. Used to observe the condition of the filter during operation. |
| 15 | FSII VALVE #1 | Used to interrupt the supply of additive between the additive tank and the injector. |
| 16 | FSII VALVE #2 | Used to fill the fuel system icing inhibitor additive calibration gauge during field calibration of the injectors. |
| 17 | CI Calibration Gauge | Used to calibrate amount of corrosion inhibitor to add to fuel. |
| 18 | FSII Bleed Valve | Used to select between INJECT and BLEED for the icing inhibitor additive. |
| 19 | FSII Injector Pump | Pump system used to inject the icing inhibitor additive. |
| 20 | FSII Stroke Adjustment Knobs | Used to adjust the length of stroke for the FSII injector pump. |
| 21 | Priming Valve | Used to initially prime system and to purge system prior to storage. |
| 22 | Injector Point Check Valves | Used to prevent fuel from migrating back into injectors. |
| 23 | CI and SDA Injector Pump | Pump system used to inject the corrosion inhibitor and the static discharge additives. |
| 24 | SDA Stroke Adjustment Knob | Used to adjust the length of stroke for the SDA pump. |
| 25 | CI Stroke Adjustment Knob | Used to adjust the length of stroke for the CI pump. |
| 26 | FSII Additive Shutoff Valve | Used to start or stop flow of FSII additive. When valve handle is positioned in line with the valve, additive will flow to the injector pump. When valve handle is positioned perpendicular with the valve, additive will not flow to the injector pump. |

**FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED**

**Table 1. Fuel Additive Injector Assembly Controls and Indicators – Continued.**

| KEY | CONTROL/INDICATOR | FUNCTION |
|---|---|---|
| 27 | SDA Additive Shutoff Valve | Used to start or stop flow of SDA additive. When valve handle is positioned in line with the valve, additive will flow to the injector pump. When valve handle is positioned perpendicular with the valve, additive will not flow to the injector pump. |
| 28 | CI Additive Shutoff Valve | Used to start or stop flow of CI additive. When valve handle is positioned in line with the valve, additive will flow to the injector pump. When valve handle is positioned perpendicular with the valve, additive will not flow to the injector pump. |

**END OF WORK PACKAGE**

## OPERATOR INSTRUCTIONS
## OPERATION UNDER USUAL CONDITIONS

**INITIAL SETUP:**

**Tools**

Gloves, rubber, industrial (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Apron, Utility (WP 0067, Item 2)
Wrench, bung (WP 0067, Item 13)

**Materials/Parts**

Tape, Teflon (WP 0070, Item 8)

**Personnel Required**

Petroleum Supply Specialist 92F

### GENERAL

After emplacement, the TPI-4T-4A-1 Fuel Additive Injector Assembly requires the preparation for use and movement procedures listed in this work package in order to operate safely and correctly. These procedures include grounding the system, filling and servicing tanks with additives, priming the assembly using the on-board priming system, calibration and purging and draining of the Fuel Additive Injector Assembly.

### EMPLACEMENT

1. Remove the fuel additive injector assembly and spill containment berm from pallet.
2. Place the spill containment berm on firm level ground where the fuel additive injector assembly is to be placed.
3. Using a forklift, place the fuel additive injector assembly in the spill containment berm.
4. Connect fuel additive injector assembly to the system.

**WARNING**

**HEAVY PARTS**

Use proper handling equipment when placing fuel spill control kit.

5. Place one fuel spill control kit near fuel additive injector assembly.
6. Follow procedures for grounding the fuel additive injector assembly (Figure 1).

**END OF TASK**

**GROUND THE FUEL ADDITIVE INJECTOR ASSEMBLY**

1. Remove ground cable clamp (Figure 1, Item 1) with copper ground cable (Figure 1, Item 2) from bail pin (Figure 1, Item 3).

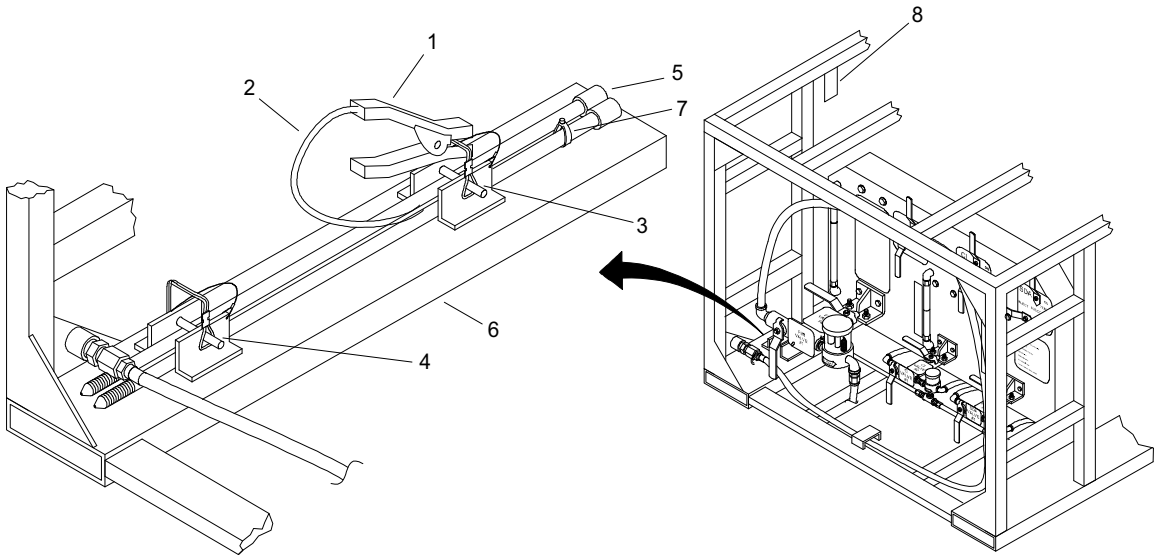



Figure 1. Fuel Additive Injector Assembly Grounding Rod Assembly.

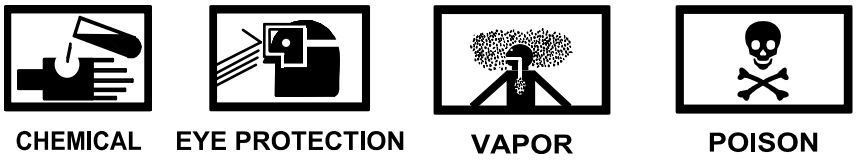
2. Remove bail pin (Figure 1, Item 3).
3. Remove bail pin (Figure 1, Item 4).
4. Remove ground rod (Figure 1, Item 5) from fuel additive injector assembly frame (Figure 1, Item 6) and thread the sections together.
5. Drive ground rod (Figure 1, Item 5) into the ground per FM 10-67-1 to allow sufficient ground for operations.
6. Loosen bolt (Figure 1, Item 7) on ground rod (Figure 1, Item 5).
7. Insert copper ground cable (Figure 1, Item 2) under bolt (Figure 1, Item 7) and tighten bolt (Figure 1, Item 7).
8. Attach ground cable clamp (Figure 1, Item 1) to copper grounding plate (Figure 1, Item 8) on fuel additive injector assembly frame (Figure 1, Item 6).

**END OF TASK**

**FILL/SERVICE FUEL ADDITIVE INJECTOR ASSEMBLY TANKS WITH ADDITIVES**

1. Remove cap (Figure 2, Item 1) from CI tank (Figure 2, Item 2).

**WARNING**




Fuel additives can be toxic. Avoid prolonged or repeated breathing of vapors or contact with skin. Use only with adequate ventilation. Wear latex or rubber gloves and chemical splash goggles. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. If spilled, shovel dry spill into DOT approved drums for disposal. Absorb liquid spill with vermiculite. First aid for eyes: flush with water for 20 to 30 minutes, hold eyelid open being careful not to rinse toxic into other eye. First aid for skin contact: flush with plenty of water. First aid for inhalation: remove to fresh air, provide CPR/oxygen if needed. First aid for oral consumption: if large quantities are swallowed and victim is conscious, drink lukewarm water. Do not induce vomiting. Call a physician at once.

2. Fill CI tank (Figure 2, Item 2) with additive.
3. Install cap (Figure 2, Item 1) on CI tank (Figure 2, Item 2).
4. Remove cap (Figure 2, Item 3) from SDA tank (Figure 2, Item 4).

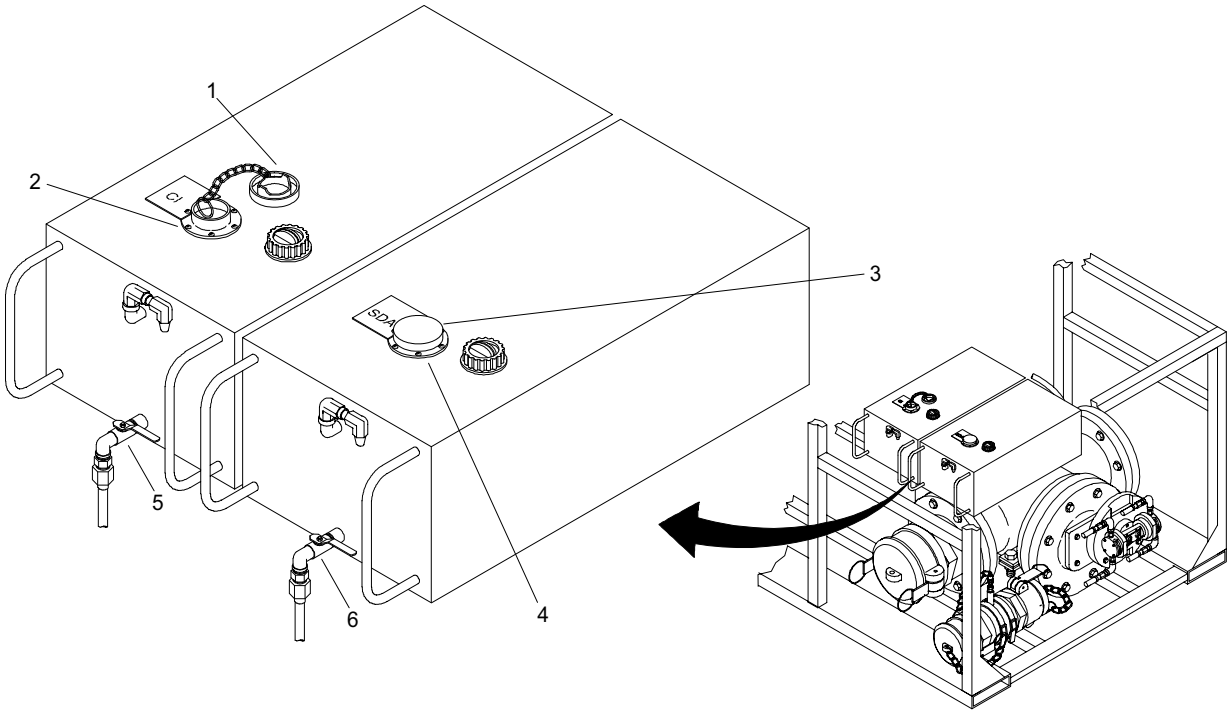



Figure 2. Fuel Additive Injector Assembly CI and SDA Tanks.

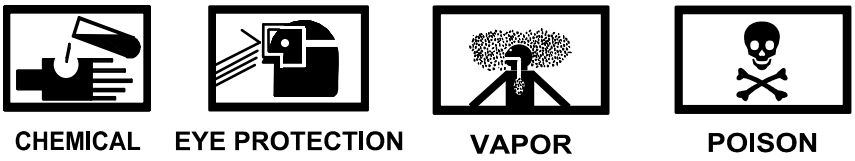
**FILL/SERVICE FUEL ADDITIVE INJECTOR ASSEMBLY TANKS WITH ADDITIVES – CONTINUED**

5. Fill SDA tank (Figure 2, Item 4) with additive.
6. Install cap (Figure 2, Item 3) on SDA tank (Figure 2, Item 4).
7. Position the CI additive tank valve (Figure 2, Item 5) to the open position (handle in line with valve).
8. Position the SDA additive tank valve (Figure 2, Item 6) to the open position (handle in line with valve).

**END OF TASK**

**INJECT FSII ADDITIVE USING ADDITIVE DRUM**

**WARNING**




Fuel additives can be toxic. Avoid prolonged or repeated breathing of vapors or contact with skin. Use only with adequate ventilation. Wear latex or rubber gloves and chemical splash goggles. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. If spilled, shovel dry spill into DOT approved drums for disposal. Absorb liquid spill with vermiculite. First aid for eyes: flush with water for 20 to 30 minutes, hold eyelids open. First aid for skin contact: flush with plenty of water. First aid for inhalation: remove to fresh air, provide CPR/oxygen if needed. First aid for oral consumption: if large quantities are swallowed and victim is conscious, drink lukewarm water. Do not induce vomiting. Call a physician at once.

**N**

The bottom of the additive supply must be at least as high as the inlet of the injector. If additive drums are placed in a horizontal position, the 2 in. dryer/vent assembly must be in top most position and the additive shutoff valve must be at lowest position.

1. Position the additive drum horizontally with the vent at the top. Keep the suction line below the level of the additive drum.

2. Disconnect end of the FSII 3/4 in. flex line (Figure 3, Item 1) from the storage connector (Figure 3, Item 2) on the fuel additive injector system frame (Figure 3, Item 3).

3. Remove the FSII 3/4 in. flex line (Figure 3, Item 1) from the frame clips (Figure 3, Item 4).

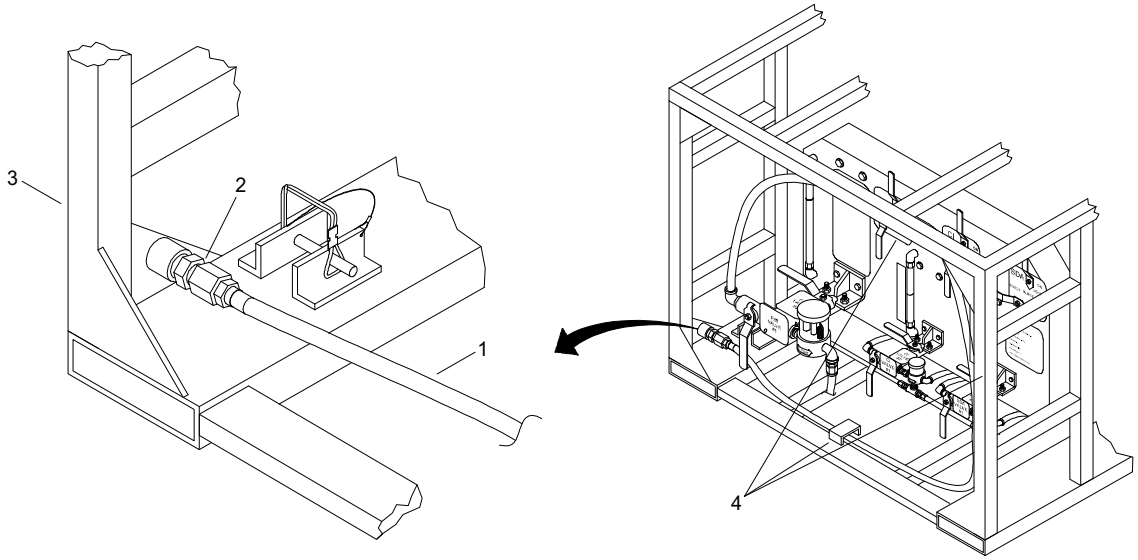



Figure 3. FSII Additive Hose Assembly.

**INJECT FSII ADDITIVE USING ADDITIVE DRUM – CONTINUED**

4. Connect the fuel additive hose for injecting FSII additive from containers.

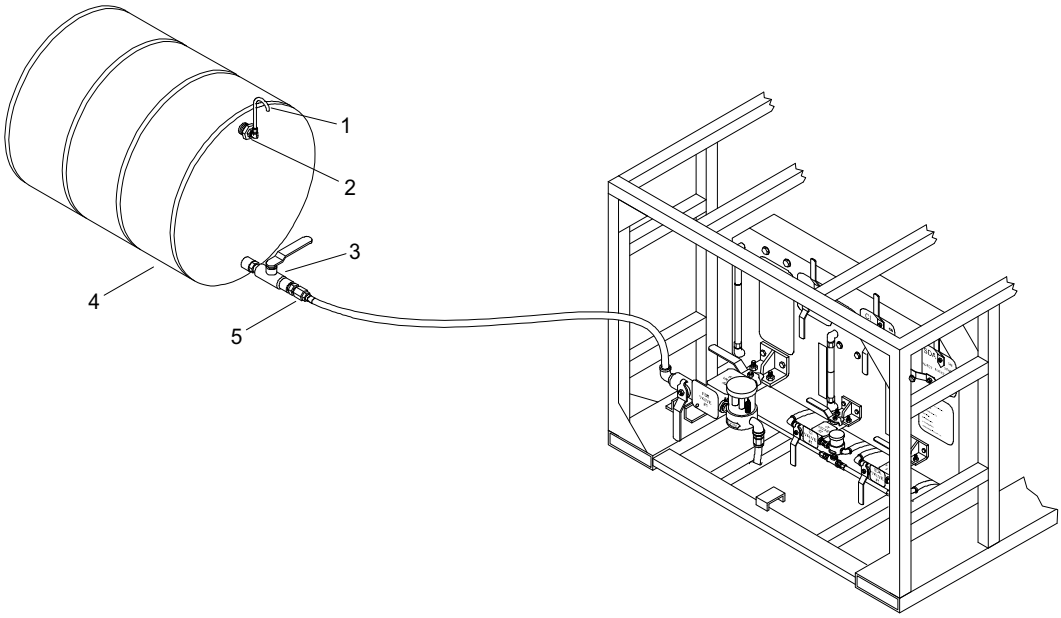



Figure 4. Injecting Additives Using Drums.

**N**

Use bung wrench to install FSII fuel additive shutoff valve and vent/dryer.

a. Install 2 in. vent/dryer (Figure 4, Item 1) in drum bung hole (Figure 4, Item 2).

b. Wrap the threads of the additive drum additive shutoff valve (Figure 4, Item 3) with teflon tape.

c. Install the FSII fuel additive drum additive shutoff valve (Figure 4, Item 3) in the FSII additive drum
(Figure 4, Item 4).

d. Connect the end of 3/4 in. flex line (Figure 4, Item 1) to the FSII fuel additive shutoff valve (Figure 4, Item 3).

5. Turn the FSII fuel additive drum additive shutoff valve (Figure 4, Item 3) on the FSII additive drum (Figure 4, Item 4) to the ON position.

**END OF TASK**

**INITIAL ADJUSTMENTS BEFORE USE**

1. Inspect all tanks, hoses, pumping assemblies, filter-separators, tee, valve and adapter assemblies for completeness, damage and for proper operation.
2. Perform preventive maintenance checks and services. (WP 0006)
3. Set FSII stroke knob to 30 and SDA and CI stroke knobs at 10 as a baseline.

**END OF TASK**

**PRIME THE FUEL ADDITIVE INJECTOR ASSEMBLY USING THE ON-BOARD PRIMING SYSTEM**

**N**

The fuel additive injector assembly must be primed prior to injecting fuel additive.

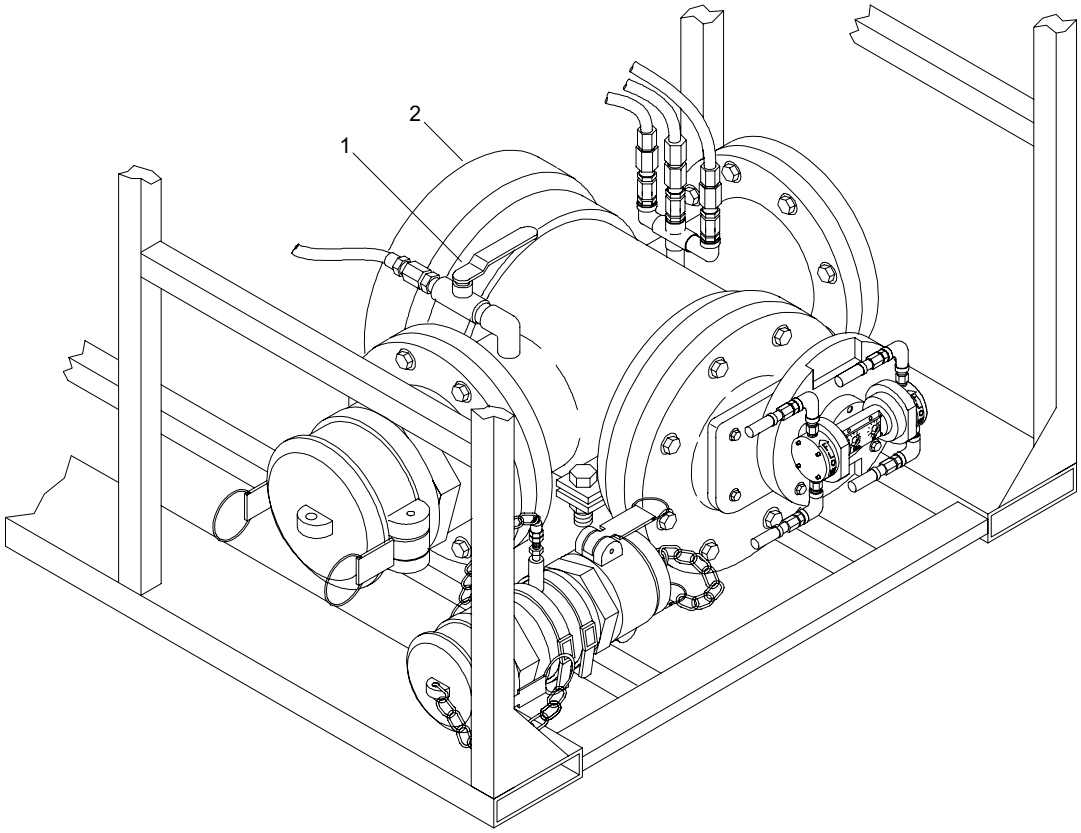



Figure 5. Fuel Priming Valve, Fuel Additive Injector Housing.

1. Start the pumping assemblies and pressurize the supported fuel system (i.e., FSSP, MFS, PLCA).
2. Locate the priming valve (Figure 5, Item 1) on the injector housing (Figure 5, Item 2).

**PRIME THE FUEL ADDITIVE INJECTOR ASSEMBLY USING THE ON-BOARD PRIMING SYSTEM – CONTINUED**

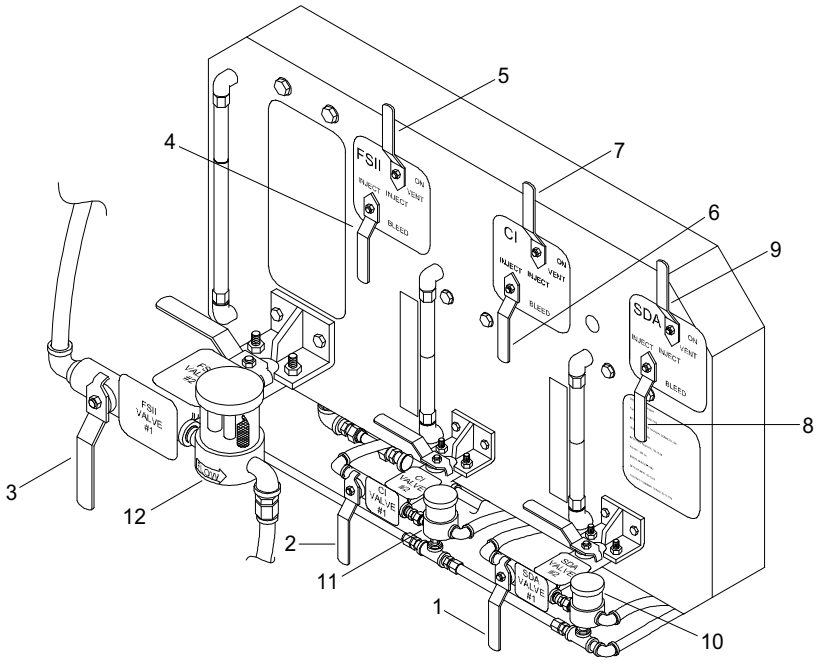



Figure 6. Priming Fuel Additive Injector Assembly with On-Board Priming System.

3. Close the SDA VALVE #1 (Figure 6, Item 1).
4. Close the CI VALVE #1 (Figure 6, Item 2).
5. Close the FSII VALVE #1 (Figure 6, Item 3).
6. Position the FSII bleed valve (Figure 6, Item 4) to the INJECT position.
7. Position the FSII vent valve (Figure 6, Item 5) to the INJECT position.
8. Position the CI bleed valve (Figure 6, Item 6) to the INJECT position.
9. Position the CI vent valve (Figure 6, Item 7) to the INJECT position.
10. Position the SDA bleed valve (Figure 6, Item 8) to the INJECT position.
11. Position the SDA vent valve (Figure 6, Item 9) to the INJECT position.
12. Position the priming valve (Figure 5, Item 1) on the injector housing (Figure 5, Item 2) to the ON position for at least 30 seconds. Leave the valve on until a clear, air-free stream of fuel is observed in the sight flow indicators (Figure 6, Items 10, 11 and 12).
13. Position the priming valve (Figure 5, Item 1) to the off position.
14. Open SDA VALVE #1 (Figure 6, Item 1).
15. Open CI VALVE #1 (Figure 6, Item 2).
16. Open FSII VALVE #1 (Figure 6, Item 3).
17. Let it run until the additives have purged the jet fuel from the sight flow indicators.

**PRIME THE FUEL ADDITIVE INJECTOR ASSEMBLY USING THE ON-BOARD PRIMING SYSTEM – CONTINUED**

18. The system is ready for operation.

**N**

Because SDA and CI are diluted at a ratio of 19 parts fuel to one part additive, it is necessary to allow approximately 1 minute for the additive to purge the jet fuel from the sight flow indicators. Also allow several minutes for FSII.

**END OF TASK**

**CALIBRATE THE FUEL ADDITIVE INJECTOR ASSEMBLY**

**N**

JP8 may be used to calibrate the injector.

**N**

Do not overfill the calibration gauges.

**N**

Ensure injectors are primed before calibration.

1. Check the vents on all additive tanks/drums and be sure they are open.

**CALIBRATE THE FUEL ADDITIVE INJECTOR ASSEMBLY - CONTINUED**

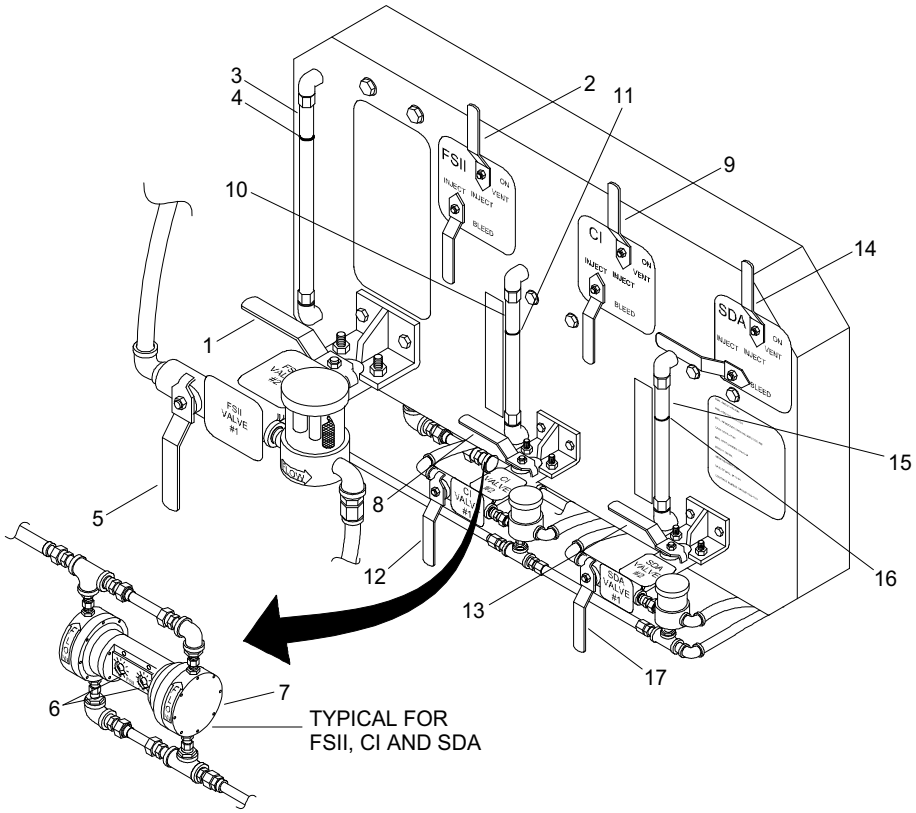



Figure 7. Calibrating the FSII Fuel Additive Injector.

2. Calibrate FSII fuel additive injector assembly.
   a. FSII valve #1 (Figure 7, Item 5) must be open and the FSII bleed and vent valve (Figure 7, Item 2) must be set to inject.
   b. Open the FSII VALVE #2 (Figure 7, Item 1).
   c. Position the FSII vent valve (Figure 7, Item 2) to the ON position to fill the FSII calibration gauge (Figure 7, Item 3).
   d. Position the FSII vent valve (Figure 7, Item 2) to the INJECT position when the FSII calibration gauge (Figure 7, Item 3) is filled to the 90 oz mark.
   e. Determine the amount of fuel to be delivered.
   f. Move calibration gauge o-ring (Figure 7, Item 4) to the additive level in the FSII calibration gauge (Figure 7, Item 3).
   g. Make note of amount of fuel to be used for calibration.
   h. Position FSII VALVE #1 (Figure 7, Item 5) to the OFF position.
   i. Position FSII vent valve (Figure 7, Item 2) to the ON position.
   j. Start the flow of fuel product to determine amount of FSII additive injected.
   k. After a small amount of fuel product is pumped, approximately 100–200 gallons, record the amount of FSII additive drawn from the FSII calibration gauge (Figure 7, Item 3).

**CALIBRATE THE FUEL ADDITIVE INJECTOR ASSEMBLY - CONTINUED**

l. Record the amount of fuel product that was pumped.

m. Position FSII vent valve (Figure 7, Item 2) to the INJECT position.

n. Close FSII VALVE #2 (Figure 7, Item 1).

o. Position the FSII VALVE #1 (Figure 7, Item 5) to the on position.

p. Divide the amount of additive used by the volume of fuel that was pumped, using the formula below:

EXAMPLE: (US)

ADDITIVE INJECTED = 70 oz

FUEL DELIVERED = 440 gallons

$\frac{70}{440}$ = .1590

$\frac{.1590}{128 \text{ oz/gal}}$ = .001242 (1242 MILLIONTHS) 128 Oz/Gal OR 1242 PPM (PARTS PER MILLION)

q. Increase or decrease delivered additive to fuel ratio by adjusting the stroke adjustment knobs (Figure 7, Item 6) on the additive injector. Repeat calibration steps until desired additive to fuel ratio is reached.

r. Lock the adjustments securely with the set screws located below each of the stroke adjustment knobs (Figure 7, Item 6).

3. Calibrate CI fuel additive injector assembly.

a. Open the CI VALVE #2 (Figure 7, Item 8).

b. Position the CI vent valve (Figure 7, Item 10) to the ON position to fill the CI calibration gauge (Figure 6, Item 11).

c. Position the CI vent valve (Figure 7, Item 9) to the INJECT position when the CI calibration gauge (Figure 7, Item 11) is filled to the 7 oz mark.

d. Determine the amount of fuel to be delivered.

e. Move calibration gauge o-ring (Figure 7, Item 12) to the additive level in the CI calibration gauge (Figure 7, Item 11).

f. Make note of amount of fuel to be used for calibration.

g. Position CI VALVE #1 to the OFF position (Figure 7, Item 8).

h. Position CI vent valve (Figure 7, Item 10) to the ON position.

i. Start the flow of fuel product to determine amount of CI additive injected.

j. After a small amount of fuel product is pumped, approximately 100–200 gallons, record the amount of CI additive drawn from the CI additive calibration gauge (Figure 7, Item 11).

k. Record the amount of fuel product that was pumped.

l. Position CI vent valve (Figure 7, Item 10) to the INJECT position.

m. Close CI VALVE #2 (Figure 7, Item 9).

n. Position CI VALVE #1 (Figure 7, Item 8) to the ON position.

**CALIBRATE THE FUEL ADDITIVE INJECTOR ASSEMBLY – CONTINUED**

o. Divide the amount of additive used by the volume of fuel that was pumped, using the formula below:

EXAMPLE: (US)

ADDITIVE INJECTED = 70 oz

FUEL DELIVERED = 400 gallons

$\frac{70}{400}$ = .1590

$\frac{.1590}{128 \text{ oz/gal}}$ = .001242 (1242 MILLIONTHS) 128 Oz/Gal OR 1242 PPM (PARTS PER MILLION)

p. Increase or decrease delivered additive to fuel ratio by adjusting the stroke adjustment knob (Figure 7, Item 6) on the additive injector (Figure 7, Item 7). Repeat calibration steps until desired additive to fuel ratio is reached.

q. Lock the adjustments securely with the set screws located below each of the stroke adjustment knobs (Figure 7, Item 6) USING 3/32 Allen wrench.

4. Calibrate SDA fuel additive injector assembly.

a. Open the SDA VALVE #2 (Figure 7, Item 13).

b. Position the SDA vent valve (Figure 7, Item 14) to the ON position to fill the SDI calibration gauge (Figure 6, Item 15).

c. Position the SDA vent valve (Figure 7, Item 14) to the INJECT position when the SDA calibration gauge (Figure 7, Item 15) is filled to the 7 oz mark.

d. Determine the amount of fuel to be delivered.

e. Move calibration gauge o-ring (Figure 7, Item 16) to the additive level in the SDA calibration gauge (Figure 7, Item 15).

f. Make note of amount of fuel to be used for calibration.

g. Position SDA VALVE #1 (Figure 7, Item 17) to the OFF position.

h. Position SDA vent valve (Figure 7, Item 14) to the ON position.

i. Start the flow of fuel product to determine amount of SDA additive injected.

j. After a small amount of fuel product is pumped, approximately 100–200 gallons, record the amount of SDA additive drawn from the SDA calibration gauge (Figure 7, Item 15).

k. Record the amount of fuel product that was pumped.

l. Position SDA vent valve (Figure 7, Item 14) to the INJECT position.

m. Close SDA VALVE #2 (Figure 7, Item 13).

n. Position SDA VALVE #1 (Figure 7, Item 17) to the ON position.

o. Divide the amount of additive used by the volume of fuel that was pumped, using the formula found in Step 3, sub-step n.

p. Increase or decrease delivered additive to fuel ratio by adjusting the stroke adjustment knob (Figure 7, Item 6) on the additive injector (Figure 7, Item 7). Repeat calibration steps until desired additive to fuel ratio is reached.

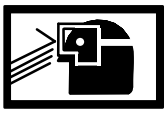
q. Lock the adjustments securely with the set screws located below each of the stroke adjustment knobs (Figure 7, Item 6).

**END OF TASK**

**PREPARATION FOR MOVEMENT**

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**N**

All fuel additives must be purged from the fuel additive injector pump assemblies prior to movement or storage.

**PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR**

1. Prepare fuel additive injector assembly for movement.

2. Close the FSII, CI and SDA VALVE #1 (Figure 8, Items 1, 2 and 3).

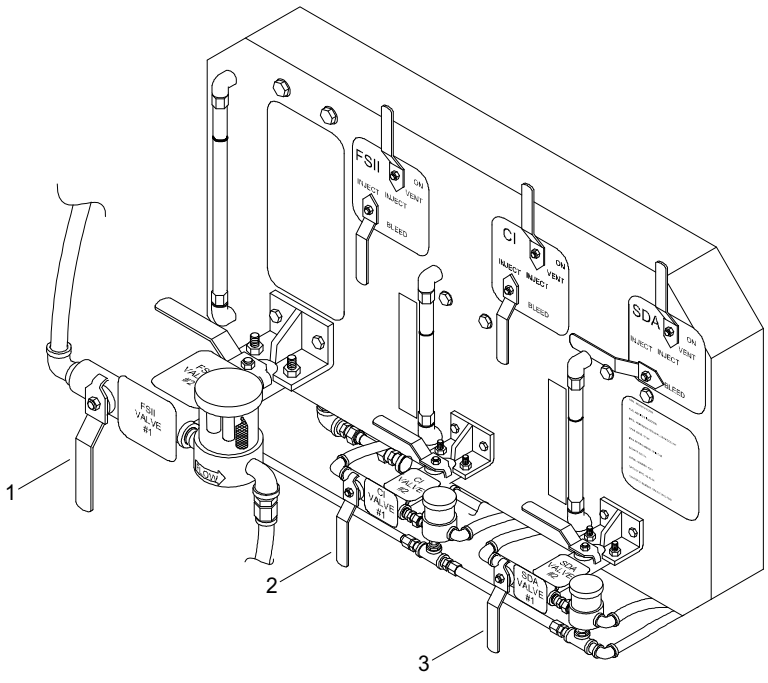



Figure 8. Fuel Additive Injector Assembly Supply Valves.

**PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR - CONTINUED**

**N**

If the unit is going to be inoperative for more than 1 week in normal summertime temperature or for more than 72 hours in temperatures less than freezing, the injectors should be purged of all additive with jet fuel. Make certain all the #1 valves remain closed.

3. Operate the fuel system to pressurize the system.
4. Place priming valve (Figure 9, Item 1) in the ON position for 30 seconds.

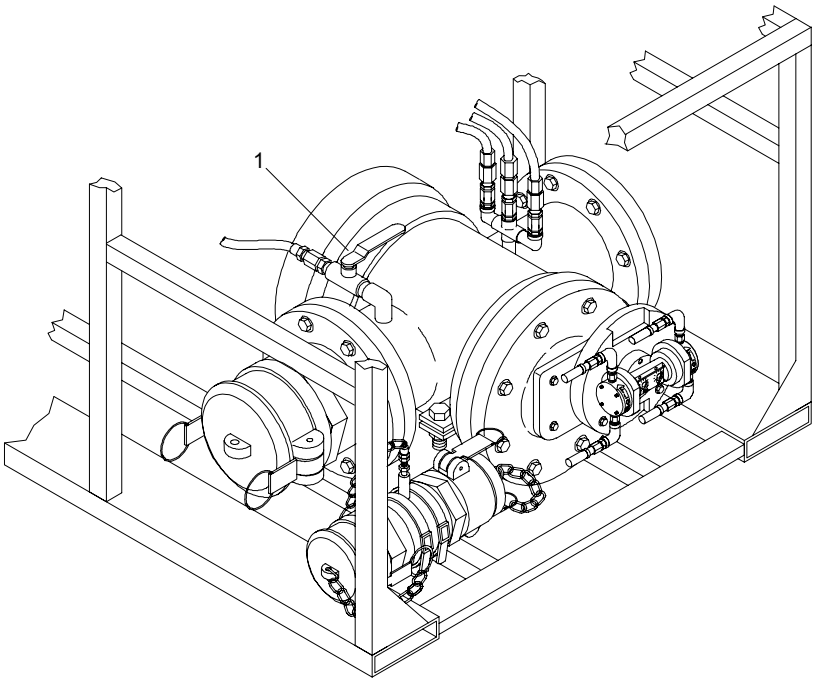



Figure 9. Fuel Additive Injector Assembly Priming Valve.

5. Shut down the pumping assembly, IAW the appropriate technical manual, after 30 seconds and turn off the priming valve.
6. Place FSII additive shutoff valve (Figure 10, Item 1) on the FSII supply drum (Figure 10, Item 2) in the OFF position.

**PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR - CONTINUED**

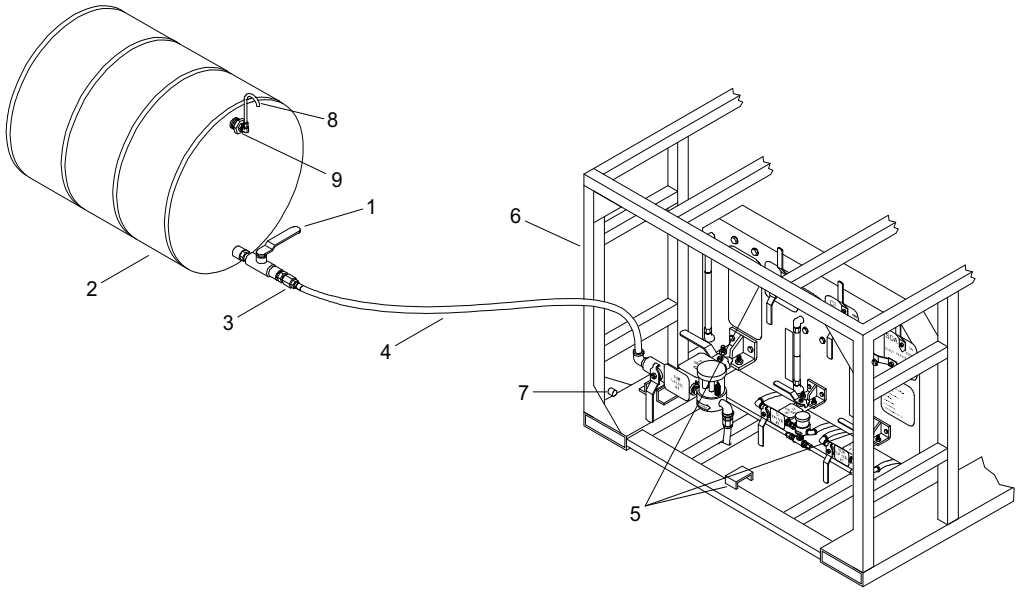



Figure 10. Injecting Additives Using Drums.

7. Disconnect the end of 3/4 in. flex line (Figure 10, Item 3) from the FSII additive shutoff valve (Figure 10, Item 1).

8. Install the FSII 3/4 in. flex line (Figure 10, Item 4) in the frame clips (Figure 10, Item 5) on the fuel additive injector assembly frame (Figure 10, Item 6).

9. Connect end of the FSII 3/4 in. flex line (Figure 10, Item 3) to the storage connector (Figure 10, Item 7) on the fuel additive injector assembly frame (Figure 10, Item 6).

10. Remove 2 in. vent/dryer (Figure 10, Item 8) from drum bung hole (Figure 10, Item 9) and store in additive injector assembly frame tool box.

11. For all three additives, ensure that the bleed and vent valves are in the inject position and valves #1 and valves #2 are closed.

12. Disconnect inlet and outlet fuel hoses.

13. Replace the dust covers.

14. Position SDA additive shutoff valve (Figure 11, Item 1) to the OFF position.

15. Position the CI additive shutoff valve (Figure 11, Item 2) to the OFF position.

16. Remove cap (Figure 11, Item 3) from CI tank (Figure 11, Item 4).

**PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR - CONTINUED**

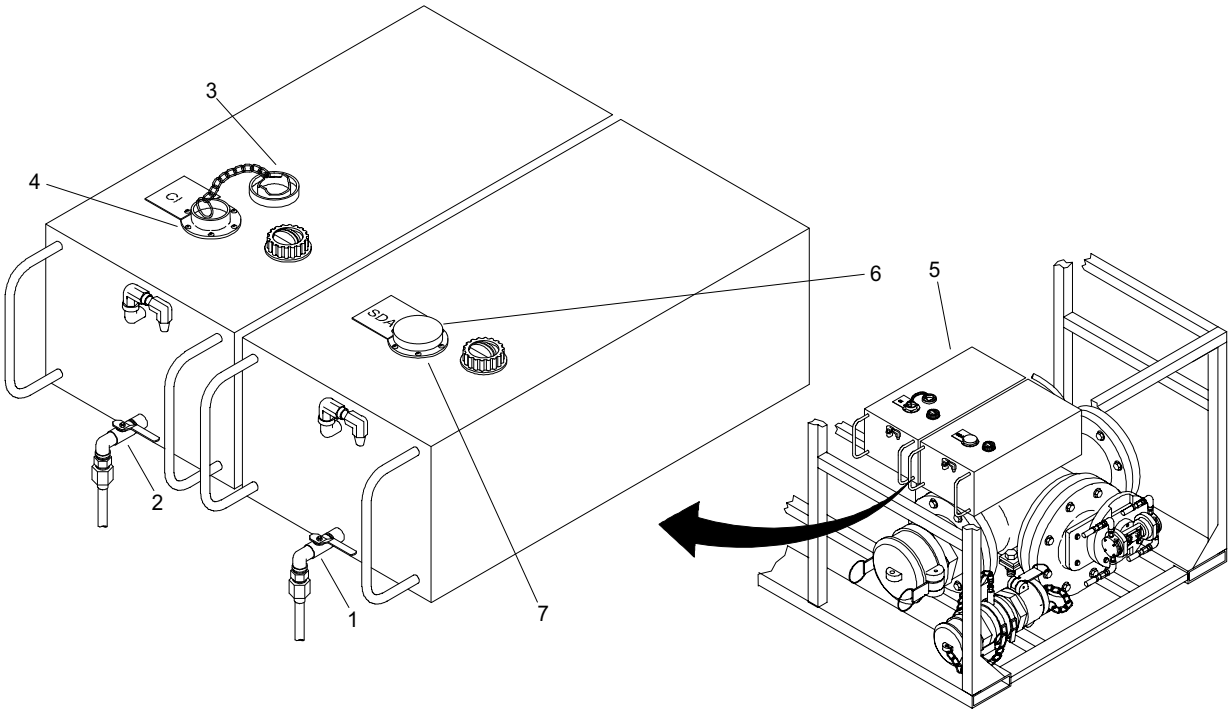



Figure 11. Fuel Additive Injector Assembly CI and SDA Tanks.

17. Position the CI drain valve (Figure 11, Item 2) to the open position and drain CI tank (Figure 11, Item 4) of additive into suitable container.

18. Install cap (Figure 11, Item 3) on CI tank (Figure 11, Item 4).

19. Remove cap (Figure 11, Item 6) from SDA tank (Figure 11, Item 7).

20. Position the SDA drain valve (Figure 11, Item 1) to the open position and drain SDA tank (Figure 11, Item 7) of additive into suitable container.

21. Install cap (Figure 11, Item 6) on SDA tank (Figure 11, Item 7).

22. To drain remaining jet fuel from the fuel additive injector assembly (Figure 11, Item 5) use Displacement/Evacuation procedures IAW technical manual of system being used.

23. Once system is drained of additives and jet fuel it is ready for transport or storage.

**END OF TASK**

**END OF WORK PACKAGE**

## OPERATOR INSTRUCTIONS
## OPERATE FSII SAMPLE TEST KIT UNDER USUAL CONDITIONS

**INITIAL SETUP:**

**Test Equipment**
Not Applicable

**Personnel Required**
Petroleum Supply Specialist 92F

**Materials/Parts**
Gloves, rubber, industrial(WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Apron, Utility (WP 0067, Item 2)

**References**
TM 5-315

### OPERATING PROCEDURES - OPERATE FSII SAMPLE TEST KIT

### FSII SAMPLE TEST KIT ASSEMBLY

1. Remove test kit stand (Figure 1, Item 1) with rod (Figure 1, Item 2), ring (Figure 1, Item 3), funnel bottle (Figure 1, Item 4), two foil dishes (Figure 1, Item 5), graduated beaker (Figure 1, Item 6) and piston type pipet (Figure 1, Item 7) from test kit case (Figure 1, Item 8).

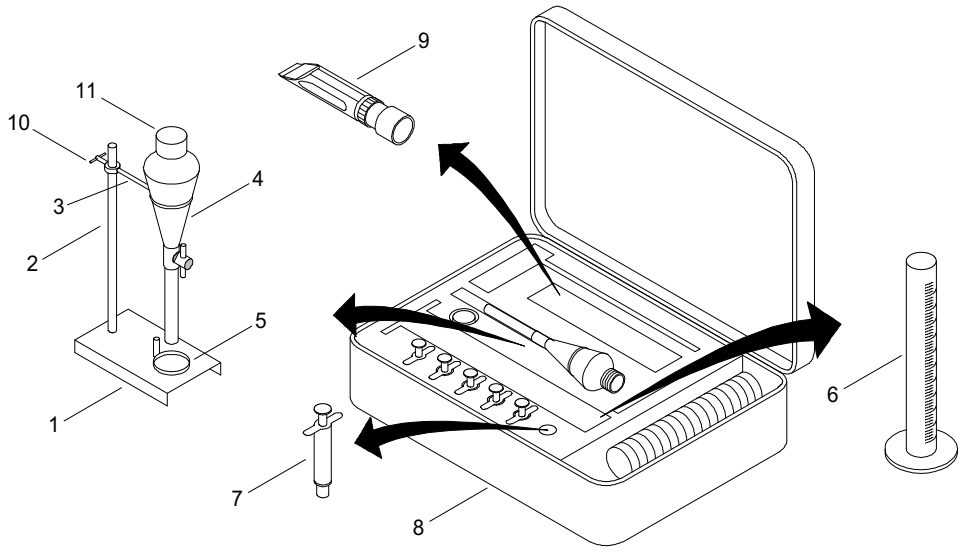



Figure 1. FSII Sample Test Kit.

2. Remove refractometer (Figure 1, Item 9) from box in test kit case (Figure 1, Item 8).
3. Install ring (Figure 1, Item 3) on rod (Figure 1, Item 2) and secure with t-handle (Figure 1, Item 10).
4. Place assembled test kit stand (Figure 1, Item 1) on flat, level surface.
5. Remove funnel bottle cap (Figure 1, Item 11) from test kit case (Figure 1, Item 8).
6. Fill one foil dish (Figure 1, Item 5) halfway with tap or other clean water source.

**FSII SAMPLE TEST KIT ASSEMBLY -CONTINUED**

7. Set zero on refractometer (Figure 2, Item 1).

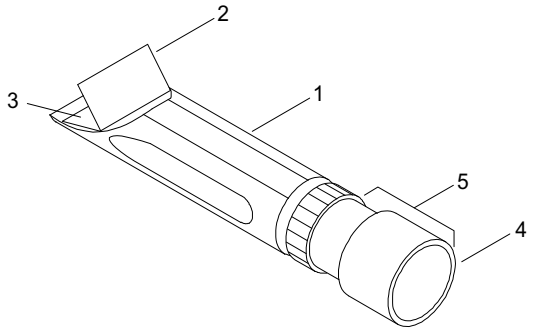



Figure 2. Refractometer Used In (%V) Test.

a. Open sampling cover (Figure 2, Item 2) on refractometer (Figure 2, Item 1).

b. Using a pencil (or like object that will not deteriorate in fuel), dip tip into foil dish (Figure 1, Item 5) and place several drops of water on refractometer sampling window (Figure 2, Item 3).

c. While looking into eye piece (Figure 2, Item 4), turn rim (Figure 2, Item 5) until test scale (Figure 3, Item 1) is clear.

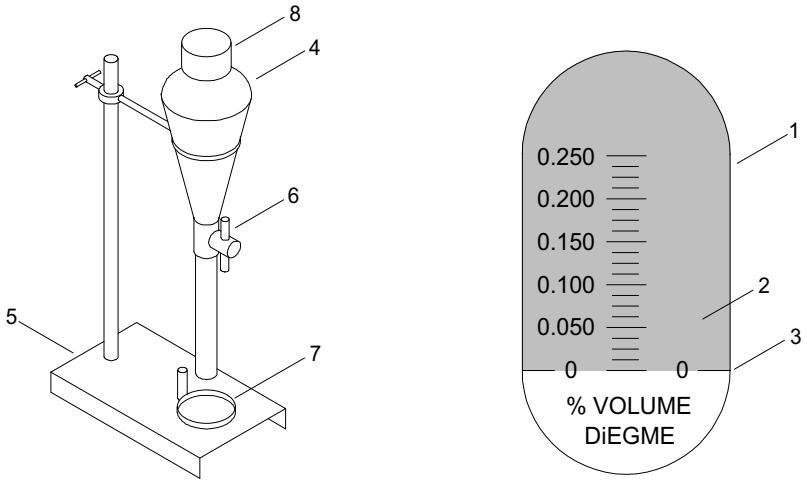



Figure 3. Test Equipment In Stand and Scale As Viewed Through Refractometer.

d. Locate shadow line (Figure 3, Item 2) in refractometer on test scale (Figure 3, Item 1). Proceed to step f if shadow line (Figure 3, Item 2) and zero mark (Figure 3, Item 3) are lined up or proceed to next step if not lined up.

**FSII SAMPLE TEST KIT ASSEMBLY -CONTINUED**

**A I N**

Do not use excessive force in zeroing refractometer scale. Failure to comply could result in damage to equipment.

e. Using screwdriver, adjust test scale (Figure 3, Item 1) to zero.

(1) Locate adjusting screw in middle of identification tag on refractometer (Figure 2, Item 1).

(2) Using screwdriver, gently turn adjusting screw until shadow line (Figure 3, Item2) and zero mark (Figure 3, Item 3) of test scale (Figure 3, Item 1) are aligned.

f. Using cleaning cloth, dry refractometer (Figure 2, Item 1).

**N**

The drain valve is closed when the valve handle is parallel to the test kit stand base.

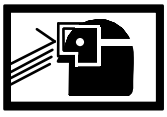
8. Install funnel bottle (Figure 3, Item 4) in test kit stand (Figure 3, Item 5) and verify drain valve (Figure 3, Item 6) at base of funnel bottle (Figure 3, Item 4) is closed.

**END OF TASK**

**FSII ADDITIVE VOLUME PERCENT (%V) TEST**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with JP-8 fuel, avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wear protective rubber gloves and chemical splash goggles. Avoid prolonged or repeated breathing of vapors. Use only with adequate ventilation. Overexposure can irritate digestive tract. Aspiration into lungs may cause hemorrhaging.

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Use graduated beaker (Figure 1, Item 6) to obtain 200 mL (6.8 fl oz) of fuel to be tested.

2. Pour 160 mL (5.44 fl oz) of test fuel into funnel bottle (Figure 3, Item 4).

**FSII ADDITIVE VOLUME PERCENT (%V) TEST - CONTINUED**

3. Using piston type pipet (Figure 1, Item 7), draw water from foil dish (Figure 3, Item 7).
4. Release exactly 2 mL (0.068 fl oz) of water into funnel bottle (Figure 3, Item 4).
5. Install funnel bottle cap (Figure 3, Item 8) on funnel bottle (Figure 3, Item 4).
6. Remove funnel bottle (Figure 3, Item 4) from test kit stand (Figure 3, Item 5) and shake for 5 minutes to combine fuel and water.
7. Place funnel bottle (Figure 3, Item 4) back in test kit stand (Figure 3, Item 5).
8. Place a clean foil dish (Figure 3, Item 7) under drain valve (Figure 3, Item 6).
9. Allow water to separate from fuel for two minutes in accordance with ASTM D 5006 Standards.
10. Slowly open drain valve (Figure 3, Item 6) and allow small amount of water to drain into foil dish (Figure 3, Item 7). If nothing drains into foil dish (Figure 3, Item 7), close drain valve (Figure 3, Item 6), loosen funnel bottle cap (Figure 3, Item 8) and slowly open drain valve (Figure 3, Item 6) again.
11. Close drain valve (Figure 3, Item 6) when several drops of water have drained into foil dish (Figure 3, Item 7).
12. Open sampling cover (Figure 2, Item 2) on refractometer (Figure 2, Item 1).
13. Using a clean piston type pipet, dip tip into foil dish (Figure 3, Item 7) and place several drops of water on refractometer sampling window (Figure 2, Item 3).
14. Close sampling cover (Figure 2, Item 2) on refractometer (Figure 2, Item 1).

**N**

Volume percent values on scale are actual. No calculations are required.

15. View test scale (Figure 3, Item 1) and make note of %v of additive.
16. Remove funnel bottle cap (Figure 3, Item 8) from funnel bottle (Figure 3, Item 4) and empty contents.
17. Dispose of water/fuel mixture in accordance with local procedures.
18. Using cleaning cloth, clean and thoroughly dry test equipment.
19. Using fuel spill control kit, clean up any spilled fluid and dispose of fuel spill control kit waste and cleaning cloth per local procedures.

**END OF TASK**

**FSII SAMPLE TEST KIT DISASSEMBLY**

1. Loosen t-handle (Figure 1, Item 10) on ring (Figure 1, Item 3).
2. Remove ring (Figure 1, Item 3) from rod (Figure 1, Item 2).
3. Return test kit stand (Figure 1, Item 1), rod (Figure 1, Item 2), ring (Figure 1, Item 3), funnel bottle (Figure 1, Item 4), two foil dishes (Figure 1, Item 5), graduated beaker (Figure 1, Item 6), piston type pipet (Figure 1, Item 7) and funnel bottle cap (Figure 1, Item 11) to test kit case (Figure 1, Item 8).
4. Place refractometer (Figure 1, Item 9) in box and return to test kit case (Figure 1, Item 8).

**END OF TASK**

**END OF WORK PACKAGE**

## OPERATOR INSTRUCTIONS
## OPERATION UNDER UNUSUAL CONDITIONS

**INITIAL SETUP:**

**Test Equipment**
Not Applicable

**Personnel Required**
Petroleum Supply Specialist 92F

**Materials/Parts**
Gloves, rubber, industrial ((WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Apron, Utility (WP 0067, Item 2)

**References**
TM 5-315

**UNUSUAL ENVIRONMENT/WEATHER**

**N**

The Fuel Additive Injector Assembly is designed to operate normally within a wide range of climatic conditions. However, some extreme conditions require special operating and servicing procedures to prevent undue loading and excessive wear on the equipment.

1. Operation in extreme heat conditions.

**WARNING**

Leaking fuel can ignite and cause serious injury to personnel and damage to equipment. Failure to follow procedures could result in serious injury or death to personnel. When operating the Fuel Additive Injector Assembly in temperatures of 125ºF (52ºC) or higher, extra care should be taken to minimize the possibility of fuel fire and explosion. Failure to comply could result in serious injury or death to personnel.

   a. Ensure all fittings and hose connections are tight and do not leak fuel.

   b. Clean up all spills and drips as they occur to prevent accumulation of explosive fumes from the evaporating fuel.

2. Operation in extreme cold conditions.

**WARNING**

Most fuels evaporate very quickly and can quickly lower the temperature of exposed skin until there is a great danger of frost bite. Prevent leakage of fuel onto bare skin of personnel. Failure to follow procedures could result in serious injury or death to personnel.

**UNUSUAL ENVIRONMENT/WEATHER – CONTINUED**

**A I N**

When operating Fuel Additive Injector Assembly in temperatures down to -50ºF (-45ºC), extra care should be taken to minimize damage to equipment.

a. Remove any fuel from exposed skin as soon as possible. Operation under conditions of extreme cold may cause equipment problems due to loss of flexibility.

3. Operation in sandy or dusty conditions.
   a. Clean filters and all other areas of dust and sand accumulation daily.
   b. Check for dust or sand contaminated fuel.
   c. Ensure all hose and piping connections are tight.
   d. Ensure the insides of all Fuel Additive Injector Assembly components are clean before connecting components during setup or assembly.
4. Operation in salt air and sea spray conditions.

**A I N**

Accumulation of salt can cause corrosion and cause damage to equipment.

a. Clean all exposed surfaces frequently.
b. Rinse all exposed surfaces with fresh water to remove salt.

**END OF TASK**

## EMERGENCY PROCEDURES - FUEL SPILL CONTAINMENT AND CLEANUP

### FUEL SPILL CLEANUPS

**WARNING**

CHEMICAL

EYE PROTECTION

When working with JP-8 fuel, avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wear protective rubber gloves and chemical splash goggles. Avoid prolonged or repeated breathing of vapors. Use only with adequate ventilation. Overexposure can irritate digestive tract. Aspiration into lungs may cause hemorrhaging.

1. Army Regulation (AR) 200-1 prescribes Department of the Army (DA) responsibilities, policies and procedures to preserve, protect and restore the quality of the environment. It incorporates all applicable statutory and regulatory requirements in the area of hazardous substances spill contingency planning, control and emergency response; solid and hazardous waste management and environmental restoration for Class III operations. Management of fuel spills, use of the fuel spill control kit, disposal of contaminated kit material and the restoration of the environment after a spill is the responsibility of the installation, activity and unit commander in consultation with AR 200-1 and environmental authorities.
2. Every spill, no matter how small, should be reported by Class III point operators and investigated in accordance with AR 200-1 so that the cause can be determined and future spills prevented. Every spill should be treated as a potential source of soil contamination and fire. Cleanup procedures are described below.
3. Detailed instructions must be given by the responsible environmental authority. Each spill must be treated as an individual case because of size, type of fuel involved, wind conditions, weather, equipment available, possible involvement of vehicles and other similar variables. In general, the following are basic actions that should be considered and carried out if spills occur.
4. Start immediate cleanup. A quick cleanup slows down the spread of contamination and saves on cleanup costs. Absorb spilled fuel or allow it to evaporate before using the spill area for operation.

**FUEL SPILL CLEANUPS- CONTINUED**

**N**

Fuel spills are classified by the area covered by the spill. The seriousness of a fuel spill is determined by the area of contact between the fuel, soil and air. It is on or above the surface that a flammable, vapor-air mixture can form and fire can take place. The number of sq ft covered by the spill is more important than the amount of fuel spilled.

1. Determine the size of the fuel spill.
   a. A small priming spill is one that covers less than 18 inches (45.7 cm) in diameter.
   b. A small spill is one that is less than 10 ft (3.05 m) in diameter or that covers less than 50 sq ft (4.65 sq m). It is not a continuous spill (tank leak).
   c. A large spill is one that is larger than 10 ft (3.05 m) in diameter , that covers an area larger than 50 sq ft (4.65 sq m) or one that is continuous (a tank leak).
2. Perform the following actions for all fuel spills.
   a. Stop the flow of fuel, if possible. Examples of stopping a spill include shutting off the valves in a hoseline and closing secondary containment valves around storage tanks.
   b. Contain the spill. Examples of containing a spill include constructing berms and cut-off trenches and using the fuel spill control kits enclosed oil absorbents. Do not contain gasoline or other volatile chemical spills. Instead, disperse the volatile fuel away from equipment and let it evaporate.
   c. Evacuate personnel from vehicle involved.
   d. Shut down operations in the area of large spills, if necessary.
   e. Notify fire fighting and environmental support activities if the spill is serious. Call for help immediately. Once started, fuel fires spread quickly. Reaction speed is the single most important element in fighting a fuel fire successfully.
   f. Check thoroughly for vapors trapped in equipment used in the Class III point, such as pumps or filter-separators, and in the refueled vehicle's structure if fuel is spilled on or into a vehicle. Be sure vapors have dissipated before the equipment and vehicles are returned to service.
   g. Start immediate cleanup. A quick cleanup slows down the spread of contamination and saves on cleanup costs. Absorb spilled fuel or allow it to evaporate before using the spill area for operation.
3. Perform the following actions for small priming fuel spills.
   a. Use the fuel spill control kits bag of granular absorbent to spread over the spill.
   b. A fireguard should stand by the spill area with a fire extinguisher until the cleanup operation is completed.
4. Perform the following actions for small fuel spills.
   a. Stop operation at the spill site and post a fireguard with a fire extinguisher by the spill.
   b. Use the fuel spill control kits 10 ft long (3.05 m) enclosed oil absorbents, which are filled with loose absorbent material, to contain the spill by forming a dike around it.
5. Perform the following actions for large fuel spills.
   a. At a permanent installation or large temporary refueling point where there is a fire department or fire brigade, call the firefighters immediately and stop operations in the area. As soon as the fire assistance has been called, the actions described below should be performed as necessary.

**FUEL SPILL CLEANUPS – CONTINUED**

b. If the fuel is MOGAS or JP-4, a large spill should be blanketed with fire extinguisher foam as soon as possible to reduce danger of fire or to put out the fire if one exists.

c. It may be necessary to have all personnel leave a vehicle if the spill is at or near it. No one other than authorized personnel should move through the spill area. If anyone gets fuel on his clothes, he should take them off and wash them with soap and water. Any person whose clothes are on fire should roll or be rolled on the ground to put out the fire or be wrapped in a blanket to smother the flames.

d. Mobile refueling equipment may be the largest single source of fuel near the spill. If the fuel spill has not caught fire, starting the engine of a refueler or other vehicle could supply the spark that would ignite the spill or vapors. The decision on what procedure is least hazardous, driving the refueler away or not starting the engine, must be made on the spot by the person in charge. If the vehicle engine is running, normal practice is to drive the vehicle away from the spill unless this would pose an unacceptable risk to the driver.

e. If an aircraft in the spill area has its engine running at the time of the spill, usually it should lift off out of the spill area. The heat of the engines can cause the spill to ignite. The rotor or prop wash from an aircraft can spread the vapor hazard to an area where ignition sources may be present, thus increasing the danger. It can also cause problems by dissipating fire fighting agents.

6. Clean up small priming fuel spills.

a. Post a fireguard by the spill area with a fire extinguisher until the cleanup operation is completed.

b. Use the fuel spill control kits bag of granular absorbent to spread over the spill.

c. Dig up the absorbent and contaminated soil using the two-piece non-sparking shovel and place the absorbent and soil into plastic disposal bags.

d. Use tie strips to seal the bags. Store and transport the bags in the 55 gallon drums marked with the “Hazardous Material” caution plate.

7. Clean up small fuel spills.

a. Post a fireguard by the spill area with a fire extinguisher until the cleanup operation is completed.

b. Use the fuel spill control kits bag of granular absorbent to spread over the spill.

c. Use the fuel spill control kits 16 1/2 in. wide X 20 in. long absorbent pads to absorb the fuel, if necessary.

d. If low flash point fuel, such as JP-4, has been spilled, dig up the absorbent and contaminated soil using the two-piece non-sparking shovel and place them either in the kits 5 gallon pails or into plastic disposal bags.

e. Use tie strips to seal the bags. Store and transport the bags in the 55 gallon drums marked with the “Hazardous Material” caution plate.

8. Clean up large fuel spills.

a. At a permanent installation or large temporary refueling point where there is a fire department or fire brigade fire fighters must be standing by and operations stopped in the area.

b. After the immediate emergency is over, go to the unit’s appropriate response plan document prepared per AR 200-1 for instructions on whom to call.

**FUEL SPILL CLEANUPS – CONTINUED**

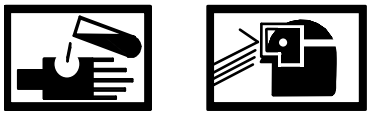
c. Until cleanup help arrives, it may be best to rope off the area, post a guard, close down nearby refueling operations and allow the spill to evaporate.

d. The spill area should not be used for operations again until it is free of fuel vapors.

**END OF TASK**

**EMERGENCY PROCEDURES - FIRE**

**WARNING**



**CHEMICAL EYE PROTECTION**

When working with JP-8 fuel, avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wear protective rubber gloves and chemical splash goggles. Avoid prolonged or repeated breathing of vapors. Use only with adequate ventilation. Overexposure can irritate digestive tract. Aspiration into lungs may cause hemorrhaging.

1. Shut off fuel flow to the area immediately at the nearest shutoff valve.
2. If possible, shut down the pumping assembly.
3. If possible, close suction and discharge gate valves on the pumping assembly.
4. Refer to TM 5-315 and position portable fire extinguishers or available fire fighting equipment.
5. Extinguish fire.
6. After the fire is extinguished, check for damage caused by fire.
7. Contact Unit Maintenance for replacement of any components that are damaged by fire.
8. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# CHAPTER 3

# OPERATOR TROUBLESHOOTING PROCEDURES FOR FUEL ADDITIVE INJECTOR ASSEMBLY

## OPERATOR MAINTENANCE
## MASTER MALFUNCTIONS/SYMPTOM INDEX

**MALFUNCTION/SYMPTOM** **TROUBLESHOOTING PROCEDURE**

**GENERAL**



**END OF TASK**

**END OF WORK PACKAGE**

# OPERATOR MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, WILL NOT TURN
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Petroleum Supply Specialist 92F

**Equipment Condition**
System set on level ground in protected area

## TROUBLESHOOTING PROCEDURE

## FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, WILL NOT TURN

### SYMPTOM

Fuel additive injector assembly will not turn.

### MALFUNCTION

Fuel hoses connected incorrectly causing fuel to pass through the system in the wrong direction.

### CORRECTIVE ACTION

1. Verify direction of flow arrow is pointing in the direction of fuel flow. If the arrow is pointing in the wrong direction the fuel hoses must be disconnected and the fuel additive injector assembly turned around to position the arrow in the right direction. Perform the procedures to remove and install components with camlock connectors.

2. If fuel hoses are connected properly and the fuel additive injector assembly still will not turn, proceed to next malfunction.

### MALFUNCTION

Fuel hose is kinked upstream or downstream of system.

### CORRECTIVE ACTION

1. Straighten hose assembly.

2. If the fuel additive injector assembly still will not turn, proceed to next malfunction.

### MALFUNCTION

Valve upstream or downstream is partially or fully closed.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, WILL NOT TURN - CONTINUED**

**CORRECTIVE ACTION**

1. Perform the procedure to dispense fuel in accordance with the appropriate systems manual.
2. If the fuel additive injector assembly still will not turn, proceed to next malfunction.

**MALFUNCTION**

Gate valves in the fuel system are set too low and are not providing enough fuel to power the injector.

**CORRECTIVE ACTION**

1. Adjust gate valve.
2. If the fuel additive injector assembly still will not turn, proceed to next malfunction.

**MALFUNCTION**

Injector is jammed by foreign object.

**CORRECTIVE ACTION**

1. Check that fluid motor rotates freely by turning the motor with your hand.
2. If the fuel additive injector assembly still will not turn, proceed to next malfunction.

**MALFUNCTION**

Fuel additive injector assembly still will not turn.

**CORRECTIVE ACTION**

Contact unit maintenance.

**END OF WORK PACKAGE**

# OPERATOR MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, TURNS, WILL NOT PICK UP ADDITIVE TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Tools**
Tool Kit, General Mechanic's(item 1, WP 0067)

**Equipment Condition**
System set on level ground in protected area

**Personnel Required**
Petroleum Supply Specialist 92F

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE**

**N**

This troubleshooting procedure is typical for the FSII, CI and SDA fuel additive injector systems.

**SYMPTOM**

Fuel additive injector assembly turns, but will not pick up additive.

**MALFUNCTION**

Additive level in tank is low.

**CORRECTIVE ACTION**

1. Perform the procedure to fill/service fuel additive injector assembly tanks with additives in WP 0005.
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

VALVE #1 is in the closed position.

**CORRECTIVE ACTION**

1. Place VALVE #1 in the open position (WP 0004).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE - CONTINUED**

**MALFUNCTION**

VALVE #2 is fully opened.

**CORRECTIVE ACTION**

1. Place VALVE #2 in the closed position (WP 0004).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Bleed valve is placed to the BLEED position.

**CORRECTIVE ACTION**

1. Place bleed valve in the INJECT position (WP 0004).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Vent valve is either in the ON or VENT position.

**CORRECTIVE ACTION**

1. Position the vent valve to the INJECT position (WP 0004).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Additive shutoff valve is not fully opened.

**CORRECTIVE ACTION**

1. Position the additive shutoff valve to the fully open position (WP 0004).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Fuel additive supply hose leaking.

**CORRECTIVE ACTION**

1. Tighten hose connections.
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE - CONTINUED**

**MALFUNCTION**

Fuel additive injector assembly still will not pick up additive.

**CORRECTIVE ACTION**

Contact field maintenance.

**END OF WORK PACKAGE**

# OPERATOR MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTORS PRIMED, SYSTEM RUNNING BUT INJECTION LOW OR ERRATIC
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Tools**

Tool Kit, General Mechanic's(item 1, WP 0067)

**Equipment Condition**

System set on level ground in protected area

**Personnel Required**

Petroleum Supply Specialist 92F

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC**

**N**

This troubleshooting procedure is typical for the FSII, CI and SDA fuel additive injector systems.

**SYMPTOM**

System is primed and running, but injection is either low or erratic.

**MALFUNCTION**

Additive level in tank is low.

**CORRECTIVE ACTION**

1. Perform the procedure to fill/service fuel additive injector assembly tanks with additives in WP 0005.
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

VALVE #1 is not fully opened.

**CORRECTIVE ACTION**

1. Place VALVE #1 in the fully open position (WP 0004).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC - CONTINUED**

**MALFUNCTION**

VALVE #2 is fully opened.

**CORRECTIVE ACTION**

1. Place VALVE #2 in the closed position (WP 0004).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

Bleed valve is placed to the BLEED position.

**CORRECTIVE ACTION**

1. Place bleed valve in the INJECT position (WP 0004).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

Vent valve is either in the ON or VENT position.

**CORRECTIVE ACTION**

1. Position the vent valve in the INJECT position (WP 0004).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

Additive shutoff valve is not fully opened.

**CORRECTIVE ACTION**

1. Position the additive shutoff valve to the fully open position (WP 0004).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

Fuel additive supply hose leaking.

**CORRECTIVE ACTION**

1. Tighten hose connections.
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC - CONTINUED**

**MALFUNCTION**

Temperature is too low, causing the additive to thicken.

**CORRECTIVE ACTION**

1. Warm additive.
2. Perform the procedures to calibrate the fuel additive injector assembly in WP 0005.
3. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

System is primed and running, but injection is still either low or erratic.

**CORRECTIVE ACTION**

Contact field maintenance.

**END OF WORK PACKAGE**

# CHAPTER 4

# FIELD MAINTENANCE TROUBLESHOOTING PROCEDURES FOR FUEL ADDITIVE INJECTOR ASSEMBLY

## FIELD MAINTENANCE
## MASTER MALFUNCTIONS/SYMPTOM INDEX

**MALFUNCTION/SYMPTOM** **TROUBLESHOOTING PROCEDURE**

**GENERAL**



**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, WILL NOT TURN (O)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, WILL NOT TURN (O)**

**SYMPTOM**

Fuel additive injector assembly will not turn (O).

**MALFUNCTION**

A line check valve is installed incorrectly or not functioning properly.

**CORRECTIVE ACTION**

1. Perform the procedures to remove and install CI and SDA pump suction check valves in WP 0037, CI and SDA pump discharge check valves in WP 0038, FSII pump suction check valve in WP 0042 and FSII pump discharge check valve in WP 0043.

2. If fuel additive injector assembly still will not turn, proceed to next malfunction.

**MALFUNCTION**

Fuel additive injector assembly still will not turn.

**CORRECTIVE ACTION**

Contact next higher level maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, TURNS, WILL NOT PICK UP ADDITIVE (O) TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

## TROUBLESHOOTING PROCEDURE

## FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE (O)

### SYMPTOM

Fuel additive injector assembly turns, but will not pick up additive (O).

### MALFUNCTION

Stroke adjustment knob in the off position.

#### CORRECTIVE ACTION

1. Perform the procedure to calibrate fuel additive injector assembly (WP 0005).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

### MALFUNCTION

FSII HI volume sight flow indicator leaking.

#### CORRECTIVE ACTION

1. Repair HI volume sight flow indicator (FSII) (WP 0030).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

### MALFUNCTION

CI sight flow indicator leaking.

#### CORRECTIVE ACTION

1. Repair sight flow indicator (CI) (WP 0032).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE (O) - CONTINUED**

**MALFUNCTION**

SDA sight flow indicator leaking.

**CORRECTIVE ACTION**

1. Repair sight flow indicator SDA (WP 0034).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Check valves clogged with dried additive.

**CORRECTIVE ACTION**

1. Perform the procedure to purge fuel additive injector assembly (WP 0005).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Fuel additive injector assembly turns, but still will not pick up additive.

**CORRECTIVE ACTION**

Contact next higher level maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTORS PRIMED, SYSTEM RUNNING BUT INJECTION LOW OR ERRATIC (O)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

## TROUBLESHOOTING PROCEDURE

## FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC (O)

### SYMPTOM

System is primed and running, but injection is either low or erratic (O).

### MALFUNCTION

Suction check valves not functioning properly.

#### CORRECTIVE ACTION

1. Perform the procedures to remove and install CI and SDA pump suction check valves (WP 0037) and FSII pump suction check valve (WP 0042).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

### MALFUNCTION

Pump power frame assembly mounting screws have worked loose, causing stroke adjustment knobs to slip or move around.

#### CORRECTIVE ACTION

1. Tighten pump power frame mounting screws.
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

### MALFUNCTION

Check valves clogged with dried additive.

#### CORRECTIVE ACTION

1. Perform the procedure to purge fuel additive injector assembly (WP 0005).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC (O) - CONTINUED**

**MALFUNCTION**

Performance ratio of the fluid motor is out of tolerance.

**CORRECTIVE ACTION**

1. Perform procedure to calibrate the fuel additive injector assembly (WP 0005).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

System is still operating low or erratic.

**CORRECTIVE ACTION**

Contact next higher level maintenance.

**END OF WORK PACKAGE**

## FIELD MAINTENANCE
## FUEL ADDITIVE INJECTOR ASSEMBLY,
## INJECTOR IS RUNNING SLOWLY EVEN WITH HIGH FUEL FLOW RATE (O)
## TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

| Personnel Required | Equipment Condition |
|---|---|
| Quartermaster Equipment Repairer, 63J | System set on level ground in protected area |

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR IS RUNNING SLOWLY EVEN WITH HIGH FUEL FLOW RATE (O)**

**SYMPTOM**

Injector is running slowly even with high flow rates (O).

**MALFUNCTION**

Performance ratio of the fluid motor is out of tolerance.

**CORRECTIVE ACTION**

1. Remove the FSII pump power frame cover and check the fluid motor performance ratio. The fluid motor will rotate 0.4 revolutions for every gallon of fuel that passes through the system.
2. Establish a flow rate in gallon per minute and count the revolutions for 30–60 seconds. If the counted RPM is off by more than 20%, contact next higher level maintenance.

**MALFUNCTION**

Fluid motor vanes are damaged or excessively worn.

**CORRECTIVE ACTION**

Contact next higher level maintenance.

**END OF WORK PACKAGE**

**FIELD MAINTENANCE**
**FUEL ADDITIVE INJECTOR ASSEMBLY,**
**INJECTOR WILL NOT FLOW AND APPEARS TO BE LOCKED UP (O)**
**TROUBLESHOOTING PROCEDURES**

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR WILL NOT FLOW AND APPEARS TO BE LOCKED UP (O)**

**SYMPTOM**

Fuel additive injector is locked up (O).

**MALFUNCTION**

Fluid motor vanes are loose.

**CORRECTIVE ACTION**

Contact next higher level of maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, WILL NOT TURN (F)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, WILL NOT TURN (F)**

**SYMPTOM**

Fuel additive injector assembly will not turn (F).

**MALFUNCTION**

Fluid motor rotor and shaft assembly has loose or broken vanes.

**CORRECTIVE ACTION**

Contact next higher level of maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, TURNS, WILL NOT PICK UP ADDITIVE (F) TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

## TROUBLESHOOTING PROCEDURE

## FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE (F)

### SYMPTOM

Fuel additive injector assembly turns, but will not pick up additive (F).

### MALFUNCTION

FSII pump diaphragm is leaking.

#### CORRECTIVE ACTION

1. Replace FSII injector pump diaphragm (WP 0044).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

### MALFUNCTION

FSII injector pump damaged.

#### CORRECTIVE ACTION

1. Replace FSII injector pump (WP 0046).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

### MALFUNCTION

CI and SDA pump lip seal is leaking.

#### CORRECTIVE ACTION

1. Replace CI and SDA pump lip seal (WP 0045).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, TURNS, BUT WILL NOT PICK UP ADDITIVE (F) - CONTINUED**

**MALFUNCTION**

Damaged CI and SDA injector pump.

**CORRECTIVE ACTION**

1. Replace CI and SDA injector pump (WP 0047).
2. If fuel additive injector assembly turns, but still will not pick up additive, proceed to next malfunction.

**MALFUNCTION**

Fuel additive injector assembly turns, but still will not pick up additive.

**CORRECTIVE ACTION**

Contact sustainment maintenance for repair of fuel additive injector assembly.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTOR PRIMED, SYSTEM RUNNING BUT INJECTION LOW OR ERRATIC (F)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

## TROUBLESHOOTING PROCEDURE

## FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC (F)

### SYMPTOM

System is primed and running, but injection is either low or erratic (F).

### MALFUNCTION

FSII pump diaphragm is defective.

#### CORRECTIVE ACTION

1. Replace FSII injector pump diaphragm (WP 0044).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

### MALFUNTICON

FSII pump power frame damaged.

#### CORRECTIVE ACTION

1. Replace FSII injector pump (WP 0046).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

### MALFUNCTION

CI and SDA pump lip seal is defective.

#### CORRECTIVE ACTION

1. Replace CI and SDA pump lip seal (WP 0045).
2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTORS ARE PRIMED AND SYSTEM IS RUNNING, BUT INJECTION IS EITHER LOW OR ERRATIC (F) - CONTINUED**

**MALFUNCTION**

CI and SDA pump power frame damaged.

**CORRECTIVE ACTION**

1. Replace CI and SDA injector pump (WP 0047).

2. If fuel additive injector assembly still has low or erratic injection while the system is running, proceed to next malfunction.

**MALFUNCTION**

Performance ratio of the fluid motor is out of tolerance.

**CORRECTIVE ACTION**

Contact sustainment maintenance for repair of fuel additive injector assembly.

**MALFUNCTION**

Fuel additive injector assembly still has low or erratic injection while the system is running.

**CORRECTIVE ACTION**

Contact sustainment maintenance for repair of fuel additive injector assembly.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTOR IS RUNNING SLOWLY WVWN WITH HIGH FUEL FLOW RATE (F)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

| Personnel Required | Equipment Condition |
|---|---|
| Quartermaster Equipment Repairer, 63J | System set on level ground in protected area |

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR IS RUNNING SLOWLY EVEN WITH HIGH FUEL FLOW (F)**

**SYMPTOM**

Injector is running slowly even with high flow rates (F).

**MALFUNCTION**

Performance ratio of the fluid motor is out of tolerance.

**CORRECTIVE ACTION**

Contact sustainment maintenance.

**MALFUNCTION**

Fluid motor vanes are excessively worn.

**CORRECTIVE ACTION**

Contact sustainment maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTOR WILL NOT FLOW AND APPEARS TO BE LOCKED UP (F)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Personnel Required**
Quartermaster Equipment Repairer, 63J

**Equipment Condition**
System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR WILL NOT FLOW AND APPEARS TO BE LOCKED UP (F)**

**SYMPTOM**

Fuel additive injector is locked up (F).

**MALFUNCTION**

Fluid motor has thrown one or more vanes.

**CORRECTIVE ACTION**

Contact next higher level maintenance.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY,
# INJECTOR SYSTEM DOES NOT INJECT THE CORRECT AMOUNT OF ADDITIVE (F)
# TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Tools**

Gloves, rubber, industrial (WP 0067,Item 2)
Goggles, industrial (WP 0067,Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J
Petroleum Supply Specialist 92F

**Equipment Condition**

System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR SYSTEM DOES NOT INJECT THE CORRECT AMOUNT OF ADDITIVE (F)**

## WARNING

Wear chemical gloves and eye protection before starting this troubleshooting procedure. Failure to comply could cause injury or death to personnel.

**SYMPTOM**

Incorrect amount of additive is being injected (F).

**MALFUNCTION**

Suction check valves not functioning properly.

**CORRECTIVE ACTION**

1. Remove and install FSII injector pump suction check valves (WP 0042).
2. Perform System checkout IAW the appropriate TM.
3. Incorrect amount of additive still being injected, proceed to next malfunction.

**MALFUNCTION**

Discharge check valves not functioning properly.

**CORRECTIVE ACTION**

1. Remove and install FSII injector pump discharge check valves (WP 0043).
2. Perform system checkout IAW the appropriate TM.
3. Incorrect amount of additive still being injected, proceed to next malfunction.

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, INJECTOR SYSTEM DOES NOT INJECT THE CORRECT AMOUNT OF ADDITIVE - CONTINUED**

**MALFUNCTION**

FSII injector pump not functioning properly.

**CORRECTIVE ACTION**

1. Remove and install FSII injector pump (WP 0046).
2. Perform system checkout IAW the appropriate TM.
3. Incorrect amount of additive still being injected, proceed to next malfunction.

**MALFUNCTION**

CI and SDA injector pump not functioning properly.

**CORRECTIVE ACTION**

1. Replace CI and SDA injector pump (WP 0047).
2. Perform system checkout IAW the appropriate TM.

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, LEAKS DURING OPERATION TROUBLESHOOTING PROCEDURES

**INITIAL SETUP:**

**Tools**

Gloves, rubber, industrial (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Equipment Condition**

System set on level ground in protected area

**TROUBLESHOOTING PROCEDURE**

**FUEL ADDITIVE INJECTOR ASSEMBLY, PART NUMBER TPI-4T-4A-1, LEAKS DURING OPERATION (F)**

## WARNING

Wear chemical gloves and eye protection before starting this troubleshooting procedure. Failure to comply could cause injury or death to personnel.

**SYMPTOM**

Fuel leaking from fuel additive injector assembly (F).

**MALFUNCTION**

Fluid motor not functioning properly.

**CORRECTIVE ACTION**

Repair fuel additive injector assembly fluid motor (WP 0048).

**END OF WORK PACKAGE**

# CHAPTER 5

# OPERATOR MAINTENANCE INSTRUCTIONS FOR FUEL ADDITIVE INJECTOR ASSEMBLY

## OPERATOR MAINTENANCE
## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

### INTRODUCTION

#### General

Preventive Maintenance Checks and Services (PMCS) are performed to keep the fuel additive injector assembly equipment in operating condition. The checks are used to find, correct or report problems. Operators are to do the PMCS as shown in the PMCS table. Preventive maintenance checks and services are performed every day the equipment is operated, using the PMCS table. Pay attention to WARNING and CAUTION statements. A WARNING means someone could be injured or killed. A CAUTION means equipment could get damaged.

Before you begin operating the equipment, conduct a before Preventive Maintenance Checks Services (PMCS).

During operation, perform During operations PMCS.

After operation, perform After operations PMCS.

Once a week do Weekly PMCS. If equipment has not been operated in a week, also perform a Before PMCS at the same time.

Do Monthly PMCS once a month. If the equipment has not been operated in a month, also perform a Before PMCS at the same time.

If you are operating the equipment for the first time, do your Weekly and Monthly PMCS the first time while you do your Before PMCS.

If you find something wrong when performing PMCS, repair it if you can, using troubleshooting procedures and/or maintenance procedures.

The right-hand column of the PMCS table list conditions that make the equipment not fully mission capable. Write up Items not-fixed on DA Form 5988-E for unit maintenance. For further information on how to use this form, see DA PAM 750-8.

If tools required to perform PMCS are not listed in (WP 0067), notify field maintenance.

### LEAKAGE DEFINITIONS

**A I N**

Equipment operation is allowed with minor leakages (Class I or II), except for fuel leaks. Of course, consideration must be given to the fluid capacity of the Item or system being checked. When in doubt, ask your supervisor.

When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.

Class III leaks should be reported immediately to your supervisor.

**INTRODUCTION – CONTINUED**

**LEAKAGE DEFINITIONS - CONTINUED**

It is necessary for you to know how fluid leakage affects the status of the fuel additive injector assembly. Following are definitions of the classes of leakage an operator needs to know to be able to determine the condition of the leak. Learn and then be familiar with them, and REMEMBER - WHEN IN DOUBT, ASK YOUR SUPERVISOR.

Classification of Leakage for Operator PMCS:

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

CLASS II - Leakage of fluid great enough to form drops but not enough to cause drops to drip from Item being inspected.

CLASS III - Leakage of fluid great enough to form drops that fall from the Item being inspected.

**INSPECTION**

Look for signs of a problem or trouble. You can feel, smell, hear or see many problems. Be alert when using the equipment.

Inspect to see if Items are in good condition. Are they correctly assembled, stowed, secured, excessively worn, leaking, corroded or properly lubricated? Correct any problems found or notify field maintenance.

There are some common Items to check all over the equipment. These include the following:

1. Bolts, clamps, nuts and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust or corrosion around bolt and screw heads and nuts. Tighten them when you find them loose. If tools are not available, contact field maintenance.

2. Welds: Many Items on the equipment are welded. To check these welds, look for chipped paint, rust, corrosion or gaps. When these conditions exist, notify field maintenance on DA Form 2404.

3. Electrical wires, connectors and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires and broken connectors. If any are found, notify field maintenance.

4. Hoses and fluid lines: Look for wear, damage and leaks, and make sure clamps and fittings are tight. Wet spots mean a leak. A stain by a fitting or connector can also mean a leak. When you find a leak, notify field maintenance.

**LUBRICATION SERVICE INTERVALS - NORMAL CONDITIONS**

For safer, more trouble free operations, make sure that your equipment is serviced when it needs it.

## LUBRICATION SERVICE INTERVALS - UNUSUAL CONDITIONS

Your equipment will require extra service and care when you operate under unusual conditions. High or low temperatures, long periods of hard use or continued use in sand, water, mud or snow will break down the lubricant, requiring you to add or change lubricant more often.

## CLEANING AND LUBRICATION

Proper cleaning and lubrication can aid in avoiding possible problems or trouble, so make it a habit to do the following:

**A I N**

Follow all cleaning and lubrication instructions carefully; failure to do so can result in damage to equipment.

1. Thoroughly wash all equipment exposed to salt spray with clean, fresh water.
2. Clean parts to be lubricated with solvent cleaning compound, MIL-PRF-680 or equivalent. Do not use fluid or semi-fluid lubricant on SFD coated surfaces. Wipe surface dry before lubricating.
3. Clean grease fittings before lubrication.
4. Lubricate all equipment at conclusion of the operation before equipment storage.
5. Always use the PMCS lubrication instructions as a guide.
6. Never use too much lubricant.
7. Never use the wrong type or grade of lubricant.
8. Lubricate more during constant use and less during inactive periods.
9. Use the correct grade of lubricant for seasonal temperature expected.

## 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 can be made to prevent the problem in future Items.

Corrosion is typically associated with rusting of metals or galvanic corrosion, which produces a white powder. Corrosion also includes 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 SF 368 Product Quality Deficiency Report. Use of 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 750-8.

## OIL FILTERS

There are no oil filters in the Fuel Additive Injector Assembly.

**ARMY OIL ANALYSIS PROGRAM (AOAP)**

There are no components of the Fuel Additive Injector Assembly enrolled in the AOAP program.

**END OF TASK**

**END OF WORK PACKAGE**

## OPERATOR MAINTENANCE
## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION PROCEDURES

**INITIAL SETUP:**

**Tools**

Gloves, rubber, industrial (WP 0067,Item 2)
Goggles, industrial (WP 0067,Item 2)
Apron, Utility (WP 0067,Item 2)

**Personnel Required**

Petroleum Supply Specialist 92F

**Materials/Parts**

Tape, Teflon (WP 0070, Item 8)

**PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**

**Table 1. Preventive Maintenance Checks and Services (Before PMCS).**

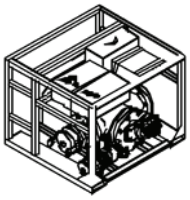
| ITEM NO. | INTERVAL | MAN-HOURS | ITEM TO BE CHECKED OR SERVICED | PROCEDURE | EQUIPMENT NOT READY/ AVAILABLE IF: |
|---|---|---|---|---|---|
| 1 | Before | .2 | Fuel Additive Injector Assembly  | Check general condition of all gauges, valves and tubing. If damage is found, replace with a serviceable like Item. | Broken or missing parts. |
| 2 | Before | .2 | | Check for loose or missing hardware. If found, replace with a serviceable like Item. | Hardware missing. |
| 3 | Before | .2 | | Check for missing dust caps. If dust caps are missing, replace with a serviceable like Item. | |
| 4 | Before | .2 | Fuel Additive Tanks and Barrel | Check fuel additive injector assembly additive tanks and barrel for the proper level of additives. Refill additive tanks or barrel, as necessary (WP 0005). | Class III leakage is found. |

**Table 1. Preventive Maintenance Checks and Services (PMCS). (Continued)**

| ITEM NO. | INTERVAL | MAN-HOURS | ITEM TO BE CHECKED OR SERVICED | PROCEDURE | EQUIPMENT NOT READY/ AVAILABLE IF: |
|---|---|---|---|---|---|
| 5 | Before | .2 | Ground Rod | Check ground rod for damage that would prevent proper grounding of equipment. If ground rod is damaged, contact Field Maintenance. | Ground rod is damaged and will not ground equipment. |
| 6 | Before | .2 | Coupling Halves | Check fuel additive injector assembly coupling halves for leakage. If found, replace coupling gaskets. If fuel additive injector assembly still leaks, contact Field Maintenance. | Class III leakage is found. |
| 7 | Before | .2 | Lines, Valves and Pumps | Check fuel additive injector assembly for leakage at additive lines, valves and around pumps. If leakage is found, contact Field Maintenance. | Class III leakage is found. |
| 8 | During | .2 | Fuel Additive Tanks and Barrel | Check fuel additive injector assembly additive tanks and barrel for the proper level of additives. Refill additive tanks or barrel, as necessary. (WP 0005) | Class III leakage is found. |
| 9 | During | .2 | Ground Rod | Check ground rod for damage that would prevent proper grounding of equipment. If ground rod is damaged, contact Field Maintenance. | Ground rod is damaged and will not ground equipment. |
| 10 | During | .2 | Coupling Halves | Check fuel additive injector assembly coupling halves for leakage. If found, replace coupling gaskets. If fuel additive injector assembly still leaks, contact Field Maintenance. | Class III leakage is found. |
| 11 | During | .2 | Lines, Valves and Pumps | Check fuel additive injector assembly for leakage at additive lines, valves and around pumps. If leakage is found, contact Field Maintenance. | Class III leakage is found. |

**Table 1. Preventive Maintenance Checks and Services (PMCS). (Continued)**

| ITEM NO. | INTERVAL | MAN-HOURS | ITEM TO BE CHECKED OR SERVICED | PROCEDURE | EQUIPMENT NOT READY/ AVAILABLE IF: |
|---|---|---|---|---|---|
| 12 | During | .2 | Spill Containment Berm | Check fuel additive injector assembly spill containment berm for evidence of fuel leakage. If fuel is found in spill containment berm, clean up spill (WP 0007) and perform troubleshooting procedures to correct fuel or additive leakage. | Class III leakage is found. |
| 13 | After | .2 | Fuel Additive Tanks and Barrel | Check fuel additive injector assembly additive tanks and barrel for the proper level of additives. Refill additive tanks or barrel, as necessary (WP 0005). | Class III leakage is found. |
| 14 | After | .2 | Ground Rod | Check ground rod for damage that would prevent proper grounding of equipment. If ground rod is damaged, contact Field Maintenance. | Ground rod is damaged and will not ground equipment. |
| 15 | After | .2 | Coupling Halves | Check fuel additive injector assembly coupling halves for leakage. If found, replace coupling gaskets. If fuel additive injector assembly still leaks, contact Field Maintenance. | Class III leakage is found. |
| 16 | After | .2 | Lines, Valves and Pumps | Check fuel additive injector assembly for leakage at additive lines, valves and around pumps. If leakage is found contact Field Maintenance | Class III leakage is found. |

**END OF WORK PACKAGE**

## OPERATOR MAINTENANCE
## FUEL ADDITIVE INJECTOR ASSEMBLY, P/N TPI-4T-4A-1, ADDITIVE FILLING/SERVICING

**INITIAL SETUP:**

**Tools**
Apron, utility (WP 0067,Item 2)
Gloves, rubber, industrial (WP 0067,Item 2)
Goggles, industrial (WP 0067,Item 2)

**Personnel Required**
Petroleum Supply Specialist 92F

**Equipment Condition**
System set on level ground in protected area

### FUEL ADDITIVE INJECTOR ASSEMBLY ADDITIVE TANKS FILLING/SERVICING

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**FUEL ADDITIVE INJECTOR ASSEMBLY ADDITIVE TANKS FILLING/SERVICING - CONTINUED**

1. Remove cap (Figure 1, Item 1) from CI tank (Figure 1, Item 2).

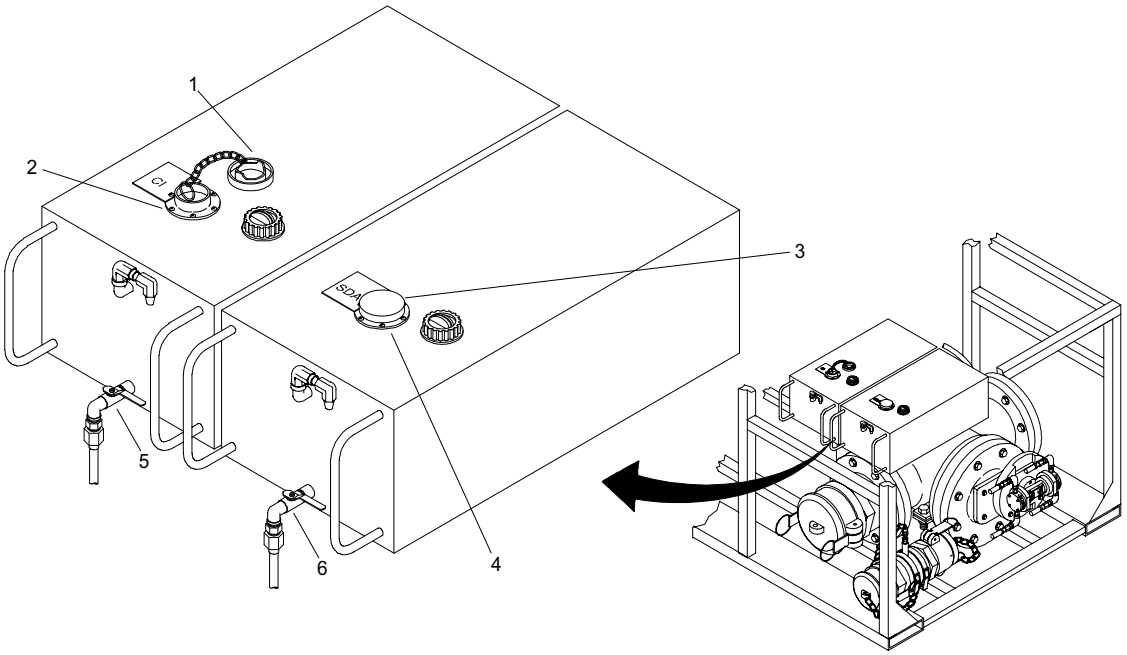



Figure 1. Fuel Additive Injector Assembly CI and SDA Tanks.

2. Fill CI tank (Figure 1, Item 2) with additive.
3. Install cap (Figure 1, Item 1) on CI tank (Figure 1, Item 2).
4. Remove cap (Figure 1, Item 3) from SDA tank (Figure 1, Item 4).
5. Fill SDA tank (Figure 1, Item 4) with additive.
6. Install cap (Figure 1, Item 3) on SDA tank (Figure 1, Item 4).
7. Position the CI additive shutoff valve (Figure 1, Item 5) to the open position (handle in line with valve).
8. Position the SDA additive shutoff valve (Figure 1, Item 6) to the open position (handle in line with valve).

**END OF TASK**

**END OF WORK PACKAGE**

# CHAPTER 6

# FIELD MAINTENANCE INSTRUCTIONS FOR FUEL ADDITIVE INJECTOR ASSEMBLY

## FIELD MAINTENANCE
## SERVICE UPON RECEIPT OF MATERIEL

**INITIAL SETUP:**

| Personnel Required | References |
|---|---|
| Quartermaster and Chemical Repairman 63J | SF 361<br>DA PAM 750-8 |

### GENERAL INFORMATION

The following paragraphs contain the procedures for unloading, unpacking and general checking of the unpacked Fuel Additive Injector Assembly, TPI-4T-4A-1.

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 750-8).

### EMPLACEMENT

The Fuel Additive Injector Assembly should be assembled on a level area free of debris and large rocks. Special care should be taken to ensure that no hose assemblies will be placed on or near rocks or other objects that may have sharp points or edges which may damage the hose assemblies when the fuel system is operated. Be sure that the site allows for enough room to assemble the fuel system.

### UNLOADING

#### Unloading Metal Containers

The components of the Fuel Additive Injector Assembly are shipped in containers. The containers may be lifted by forklift, crane or sling. To unload, perform the following steps:

1. Check all containers for damage. Damaged containers indicate probable damage to equipment.

2. Remove all blocking and tie downs that may have been used to secure the containers onto the carrier.

3. Use a forklift truck or other suitable material handling equipment to remove the containers from the carrier.

If a special design reusable container is involved for either the end Item or components which are authorized for replacements, instructions shall be prepared to report or reenter the empty container through supply channels. Instructions shall be prepared on how to package the unserviceable component in the empty container in the same manner that the new component was packaged if a component is being replaced.

#### Unpacking

Unpack ISO containers. Refer to Shipping and Storage Instructions (SSI).

**CHECK UNPACKED EQUIPMENT**

**Table 1. Equipment Inspection.**

| COMPONENT | ACCEPTABLE | REPAIRABLE | NONREPARABLE |
|---|---|---|---|
| **ISO CONTAINER** | | | |
| Exterior | Minor rust, cracks, indentations or splits that would not impair waterproofing or serviceability of containers. | Dents or bending that does not affect access door operation. | Damage or bending that will not allow doors to open. |
| Interior | Items within the container have remained in stowed position. No broken, dented or cracked equipment. | Broken or missing hardware or handles. | Damage to pallets that would prevent storage of equipment. |
| Hardware | Hardware is present and tight. | Hardware is missing or loose. | None. |
| | Nuts, bolts, screws and fasteners present and in good condition. | Nuts, bolts, screws and fasteners that can be replaced or properly sealed. | None. |
| Container | Free from damage. | Broken or missing handles. | Damage that would prevent shipping. |
| **COMPONENTS** | | | |
| Fuel Additive Injector Assembly | Free from major damage. | Any damage that does not affect the serviceability of the Fuel Additive Injector Assembly. | Major damage that affects the serviceability of the Fuel Additive Injector Assembly. |

**INSTALLATION INSTRUCTIONS**

Tools, test equipment and materials needed for installation.

**ASSEMBLE EQUIPMENT**

1. Refer to the operator instructions in Chapter 2 of this technical manual.

2. Place all components of the Fuel Additive Injector Assembly into position.

**PRELIMINARY SERVICING OF EQUIPMENT**

Refer to the operator PMCS procedures in Chapter 5 of this technical manual for instructions on lubricating requirements prior to operating equipment.

**END OF TASK**

**END OF WORK PACKAGE**

**FIELD MAINTENANCE**
**HI VOLUME SIGHT FLOW INDICATOR (FSII)**
**CLEANING**

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Kit, fuel spill control (WP 0070, Item 6,)
Pan, drip (WP 0067, Item 2)
Petrolatum, technical (WP 0070, Item 7)
O-ring (2) ( WP 0071, Item 7)

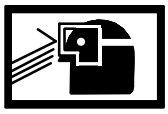
**Equipment Condition**

System set on level ground in protected area and detached from fuel system

**HI VOLUME SIGHT FLOW INDICATOR (FSII) DISASSEMBLY**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pan under HI volume sight flow indicator (Figure 1, Item 1).

**HI VOLUME SIGHT FLOW INDICATOR (FSII) DISASSEMBLY - CONTINUED**

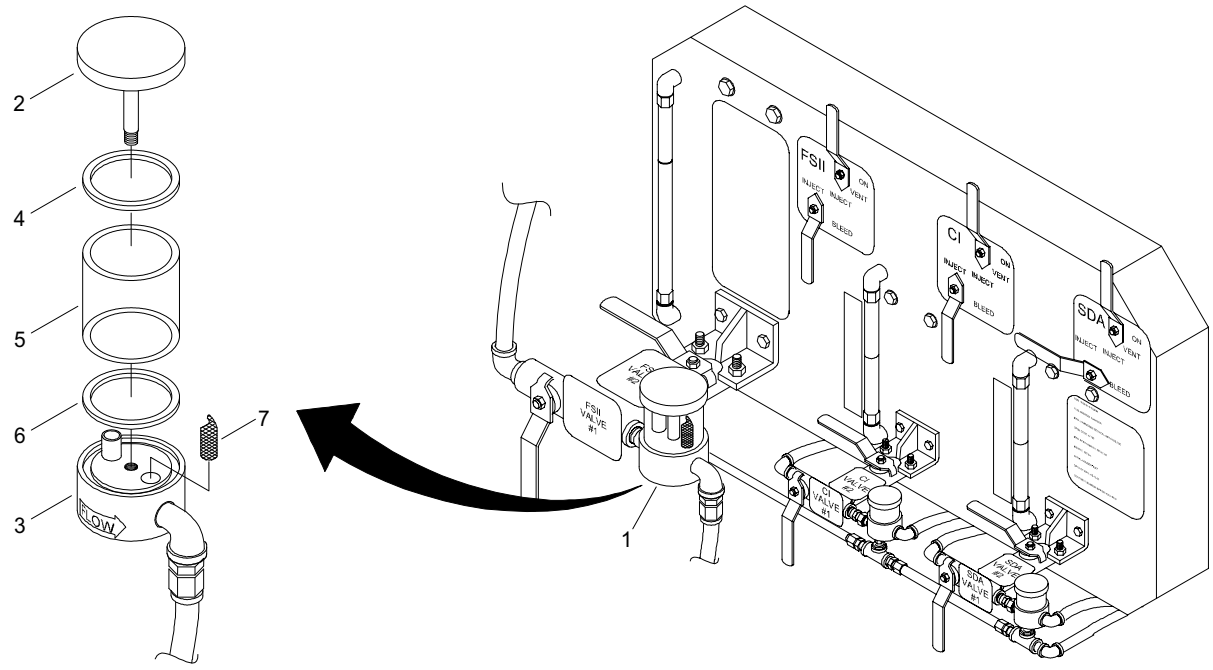



Figure 1. Fuel Additive Injector Assembly HI Volume Sight Flow Indicator (FSII).

2. Remove cap (Figure 1, Item 2) from body (Figure 1, Item 3) of HI volume sight flow indicator (Figure 1, Item 1).

3. Remove o-ring (Figure 1, Item 4) from cap (Figure 1, Item 2).

4. Discard o-ring (Figure 1, Item 4).

5. Remove glass (Figure 1, Item 5) from body (Figure 1, Item 3).

6. Remove o-ring (Figure 1, Item 6) from body (Figure 1, Item 3).

7. Discard o-ring (Figure 1, Item 6).

8. Remove filter element (Figure 1, Item 7) from body (Figure 1, Item 3).

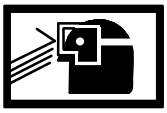
9. Remove drip pan under HI volume sight flow indicator (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**HI VOLUME SIGHT FLOW INDICATOR (FSII) CLEANING**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using dry cleaning cloth, clean glass free of all dirt and debris.
2. Using cleaning cloth and solvent cleaning compound, clean all metal parts and filter element.
3. Allow all parts to thoroughly air dry.
4. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**HI VOLUME SIGHT FLOW INDICATOR (FSII) INSPECTION**

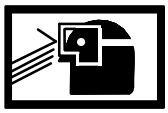
1. Inspect filter element (Figure 1, Item 7) for torn or bent mesh. If mesh is torn or bent, replace with a serviceable like Item.
2. Inspect glass (Figure 1, Item 5) for broken or cracked condition. If broken, cracked, or no longer able to see through replace with a serviceable like Item.
3. Inspect body (Figure 1, Item 3) and cap (Figure 1, Item 2) for stripped or damaged threads, cracks, corrosion or broken fittings. If stripped or damaged threads, cracks, corrosion or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**HI VOLUME SIGHT FLOW INDICATOR (FSII) ASSEMBLY**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Install filter element (Figure 1, Item 7) in body (Figure 1, Item 3).
2. Apply thin coat of petrolatum to new o-rings (Figure 1, Item 4, 6).
3. Install o-ring (Figure 1, Item 6) on body (Figure 1, Item 3) of Hi Volume Sight Flow Indicator (Figure 1, Item 1).
4. Install glass (Figure 1, Item 5) on body (Figure 1, Item 3).
5. Install o-ring (Figure 1, Item 4) on cap (Figure 1, Item 2).
6. Install cap (Figure 1, Item 2) on body (Figure 1, Item 3) of Hi Volume Sight Flow Indicator (Figure 1, Item 1). Hand tighten cap (Figure 1, Item 2).
7. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# HI VOLUME SIGHT FLOW INDICATOR (FSII)
# REPAIR

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Kit, fuel spill control (WP 0070, Item 6,)
Pan, drip (2) (WP 0067, Item 2)
Tape, teflon (WP 0070, Item 8)

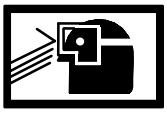
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
High volume sight flow indicator disassembled (WP 0029)

## HI VOLUME SIGHT FLOW INDICATOR (FSII) REMOVAL

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to disconnect fittings from tubes and hoses. Failure to comply could result in damage to equipment.

**N**

Repair is limited to replacement of parts found defective during inspection.

1. Place drip pans under HI volume sight flow indicator (Figure 1, Item 1).

**HI VOLUME SIGHT FLOW INDICATOR (FSII) REMOVAL - CONTINUED**

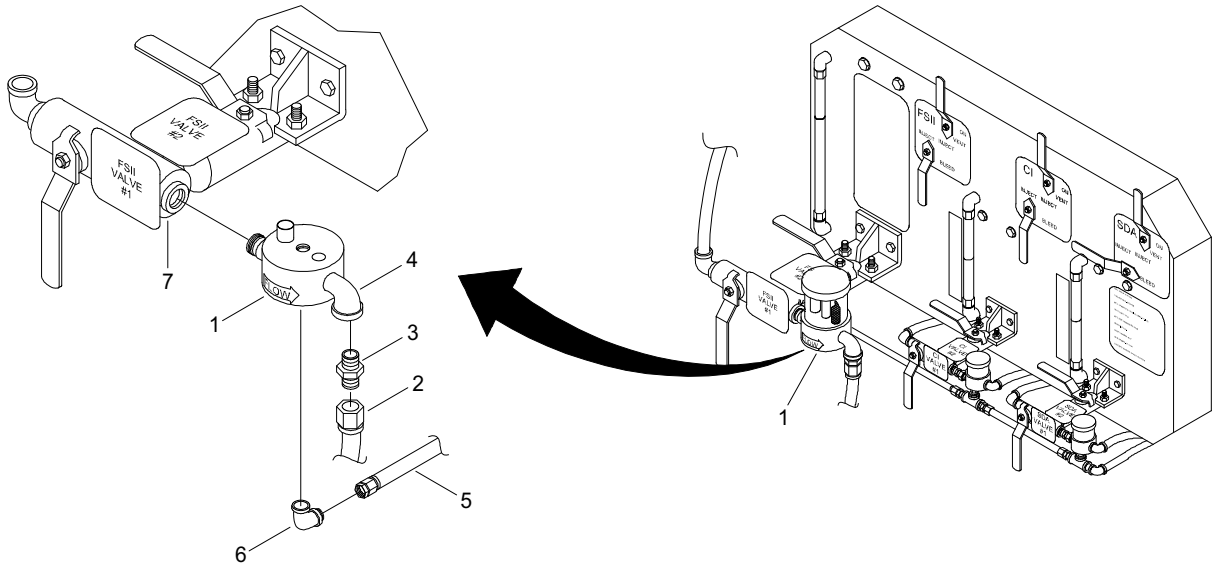


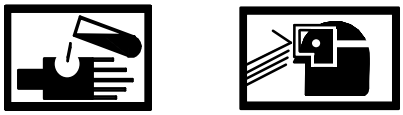

Figure 1. Fuel Additive Injector Assembly HI Volume Sight Flow Indicator (FSII) Removal.

2. Disconnect hose assembly (Figure 1, Item 2) from reducer (Figure 1, Item 3).
3. Remove reducer (Figure 1, Item 3) from elbow assembly (Figure 1, Item 4).
4. Disconnect tube (Figure 1, Item 5) from 90° elbow (Figure 1, Item 6) at bottom of HI volume sight flow indicator (Figure 1, Item 1).
5. Remove HI volume sight flow indicator (Figure 1, Item 1) from valve (Figure 1, Item 7).
6. Remove drip pan under HI volume sight flow indicator (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**HI VOLUME SIGHT FLOW INDICATOR (FSII) CLEANING**

**WARNING**



**CHEMICAL** **EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/massive concentrations can cause coma or be fatal.

**HI VOLUME SIGHT FLOW INDICATOR (FSII) CLEANING - CONTINUED**

1. Using cleaning cloth and solvent cleaning compound, clean all metal parts.
2. Allow all parts to thoroughly air dry.
3. Dispose of cleaning cloth per local procedures.

**END OF TASK**

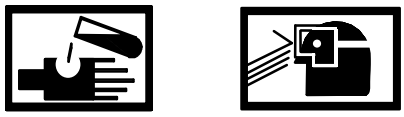
**HI VOLUME SIGHT FLOW INDICATOR (FSII) INSPECTION**

1. Inspect body (Figure 1, Item 1) for cracks, corrosion or wear. If cracks, corrosion or wear is found, replace with a serviceable like Item.
2. Inspect body (Figure 1, Item 1) for stripped or damaged threads or broken fittings. If stripped or damaged threads or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**HI VOLUME SIGHT FLOW INDICATOR (FSII) INSTALLATION**

**WARNING**



**CHEMICAL** **EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads of fitting on side of HI volume sight flow indicator (Figure 1, Item 1).

**A I N**

Use two wrenches to install fittings to prevent damage.

2. Install HI volume sight flow indicator (Figure 1, Item 1) on valve (Figure 1, Item 7).
3. Apply teflon tape to threads of 90° elbow (Figure 1, Item 6) at bottom of HI volume sight flow indicator (Figure 1, Item 1).
4. Connect tube (Figure 1, Item 5) to 90° elbow (Figure 1, Item 6) at bottom of HI volume sight flow indicator (Figure 1, Item 1). Tighten tube (Figure 1, Item 5).
5. Apply teflon tape to threads of reducer (Figure 1, Item 3) at bottom of HI volume sight flow indicator (Figure 1, Item 1).
6. Install reducer (Figure 1, Item 3) on elbow assembly (Figure 1, Item 4).
7. Connect hose assembly (Figure 1, Item 2) to reducer (Figure 1, Item 3) on elbow assembly (Figure 1, Item 4).

**HI VOLUME SIGHT FLOW INDICATOR (FSII) INSTALLATION - CONTINUED**

8. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# SIGHT FLOW INDICATOR (CI)
# CLEANING

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Kit, fuel spill control (WP 0070, Item 6,)
Pan, drip (2) (WP 0067, Item 2)
Petrolatum, technical (WP 0070, Item 7)
O-ring (2) (WP 0071, Item 6)

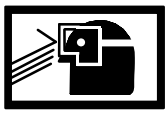
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## SIGHT FLOW INDICATOR (CI) DISASSEMBLY

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pans under sight flow indicator (Figure 1, Item 1).
2. Remove cap (Figure 1, Item 2) from body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1).
3. Remove o-ring (Figure 1, Item 4) from cap (Figure 1, Item 2).
4. Discard o-ring (Figure 1, Item 4).

**SIGHT FLOW INDICATOR (CI) DISASSEMBLY - CONTINUED**

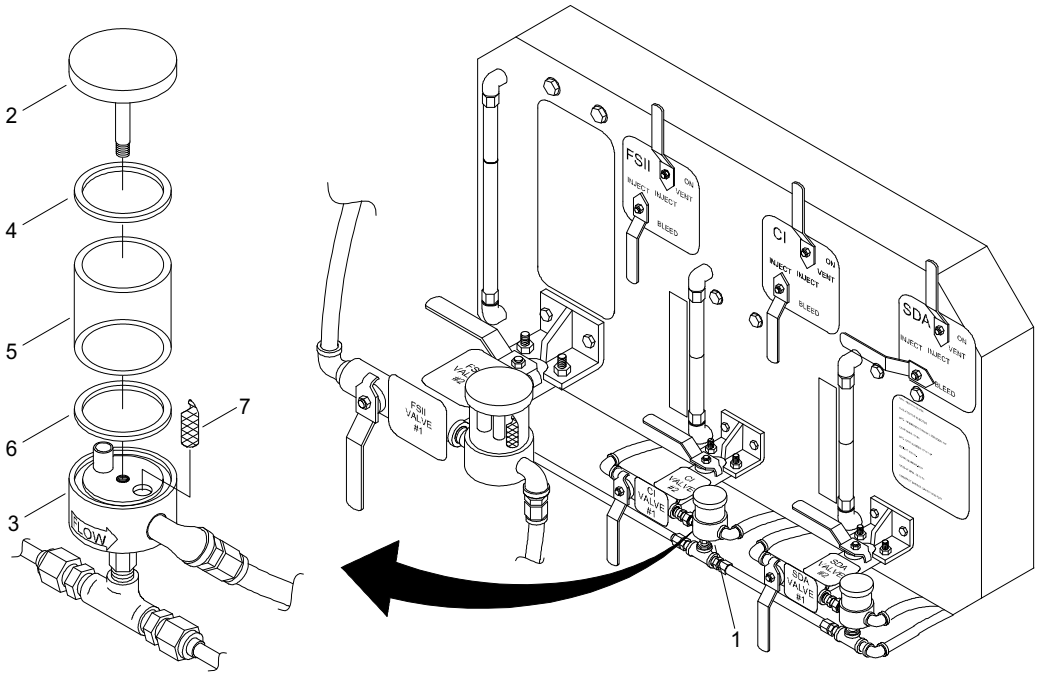


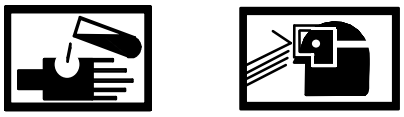

Figure 1. CI Sight Flow Indicator.

5. Remove glass (Figure 1, Item 5).
6. Remove o-ring (Figure 1, Item 6) from body (Figure 1, Item 3).
7. Discard o-ring (Figure 1, Item 6).
8. Remove filter element (Figure 1, Item 7) from body (Figure 1, Item 3).
9. Remove drip pans under sight flow indicator (Figure 1, Item 1) and dispose of contents in accordance with local procedures.

**END OF TASK**

**SIGHT FLOW INDICATOR (CI) CLEANING**

**WARNING**



**CHEMICAL** **EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

**SIGHT FLOW INDICATOR (CI) CLEANING – CONTINUED**

1. Using dry cleaning cloth, clean glass free of all dirt and debris.
2. Using cleaning cloth and solvent cleaning compound, clean all metal parts and filter element.
3. Allow all parts to thoroughly air dry.
4. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**SIGHT FLOW INDICATOR (CI) INSPECTION**

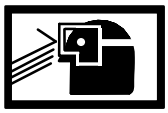
1. Inspect filter (Figure 1, Item 7) element for torn or bent mesh. If mesh is torn or bent, replace with a serviceable like Item.
2. Inspect glass (Figure 1, Item 5) for broken or cracked condition. If broken or cracked, replace with a serviceable like Item.
3. Inspect body (Figure 1, Item 3) and cap (Figure 1, Item 2) for stripped or damaged threads, cracks, corrosion or broken fittings. If stripped or damaged threads, cracks, corrosion or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**SIGHT FLOW INDICATOR (CI) ASSEMBLY**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Install filter element (Figure 1, Item 7) on body (Figure 1, Item 3).
2. Apply thin coat of petrolatum to new o-rings (Figure 1, Item 4, 6).
3. Install new o-ring (Figure 1, Item 6) on body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1).
4. Install glass (Figure 1, Item 5) on body (Figure 1, Item 3).
5. Install new o-ring (Figure 1, Item 4) on cap (Figure 1, Item 2).
6. Install cap (Figure 1, Item 2) on body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1). Hand tighten cap (Figure 1, Item 2).
7. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# SIGHT FLOW INDICATOR (CI)
# REPAIR

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 3)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Tape, teflon (WP 0070, Item 8)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
CI sight flow indicator disassembled (WP 0031).

## SIGHT FLOW INDICATOR (CI) REMOVAL

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to disconnect fittings from tubes and hoses. Failure to comply could result in damage to equipment.

**N**

Repair is limited to replacement of parts found defective during inspection.

1. Place drip pans under CI sight flow indicator (Figure 1, Item 1).

**SIGHT FLOW INDICATOR (CI) REMOVAL - CONTINUED**

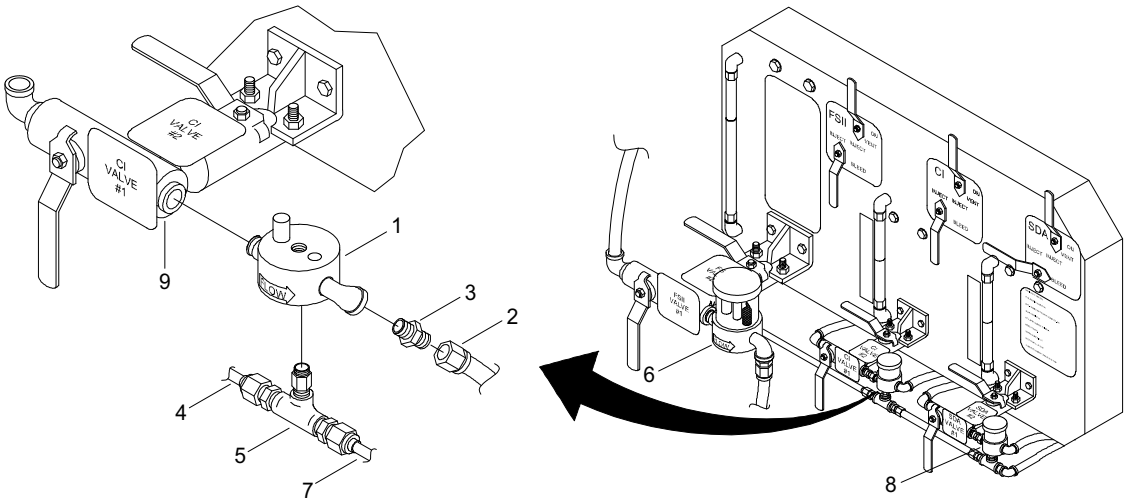
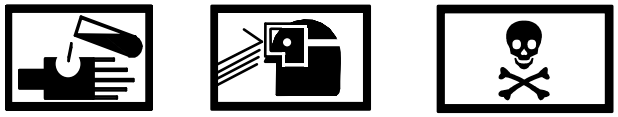



Figure 1. CI Sight Flow Indicator Removal.

2. Disconnect hose assembly (Figure 1, Item 2) from reducer (Figure 1, Item 3).
3. Remove reducer (Figure 1, Item 3) from CI sight flow indicator (Figure 1, Item 1).
4. Disconnect tube (Figure 1, Item 4) from tee assembly (Figure 1, Item 5) and from bottom of FSII sight flow indicator (Figure 1, Item 6).
5. Disconnect tube (Figure 1, Item 7) from tee assembly (Figure 1, Item 5) and from bottom of SDA sight flow indicator (Figure 1, Item 8).
6. Turn SDA sight flow indicator (Figure 1, Item 8) slightly counterclockwise until tube (Figure 1, Item 7) is easily removed.
7. Remove tee assembly (Figure 1, Item 5) from CI sight flow indicator (Figure 1, Item 1).
8. Remove CI sight flow indicator (Figure 1, Item 1) from valve (Figure 1, Item 9).
9. Remove drip pans under HI volume sight flow indicator (Figure 1, Item 1) and dispose of contents per local procedures.

**SIGHT FLOW INDICATOR (CI) CLEANING**

**WARNING**



**CHEMICAL** **EYE PROTECTION** **POISON**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Clean all metallic parts with a cleaning cloth or parts cleaning brush and solvent cleaning compound.
2. Allow parts to dry thoroughly.

**END OF TASK**

**SIGHT FLOW INDICATOR (CI) INSPECTION**

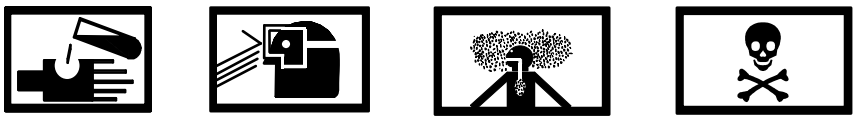
1. Inspect body (Figure 1, Item 1) for cracks, corrosion or wear. If cracks, corrosion or wear is found, replace with a serviceable like Item.

2. Inspect body (Figure 1, Item 1) for stripped or damaged threads or broken fittings. If stripped or damaged threads or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**SIGHT FLOW INDICATOR (CI) INSTALLATION**

**WARNING**



CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads on tee assembly (Figure 1, Item 5).

**A I N**

Use two wrenches to connect fittings to tubes and hoses. Failure to comply could result in damage to equipment.

2. Install tee assembly (Figure 1, Item 5) on CI sight flow indicator (Figure 1, Item 1).
3. Connect tube (Figure 1, Item 7) to SDA sight flow indicator (Figure 1, Item 8) and turn clockwise slightly until tube (Figure 1, Item 7) can be connected to tee assembly Figure 1, Item 5).
4. Connect tube (Figure 1, Item 7) to tee assembly (Figure 1, Item 5) at bottom of CI sight flow indicator (Figure 1, Item 1). Tighten tube (Figure 1, Item 7).
5. Connect tube (Figure 1, Item 4) to tee assembly (Figure 1, Item 5) and bottom of FSII sight flow indicator (Figure 1, Item 6). Tighten tube (Figure 1, Item 4).
6. Install reducer (Figure 1, Item 3) on CI sight flow indicator (Figure 1, Item 1).
7. Connect hose assembly (Figure 1, Item 2) to reducer (Figure 1, Item 3) on CI sight flow indicator (Figure 1, Item 1). Tighten hose assembly (Figure 1, Item 2).
8. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.
9. Assemble CI sight flow indicator (WP 0031).

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# SIGHT FLOW INDICATOR (SDA)
# CLEANING

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 3)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Petrolatum, technical (WP 0070, Item 7)
O-ring (2) (WP 0071, Item 6)

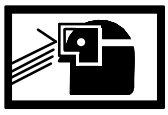
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## SIGHT FLOW INDICATOR (SDA) DISASSEMBLY

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pans under sight flow indicator (Figure 1, Item 1).
2. Remove cap (Figure 1, Item 2) from body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1).
3. Remove o-ring (Figure 1, Item 4) from cap (Figure 1, Item 2).
4. Discard o-ring (Figure 1, Item 4).
5. Remove glass (Figure 1, Item 5).

**SIGHT FLOW INDICATOR DISASSEMBLY - CONTINUED**

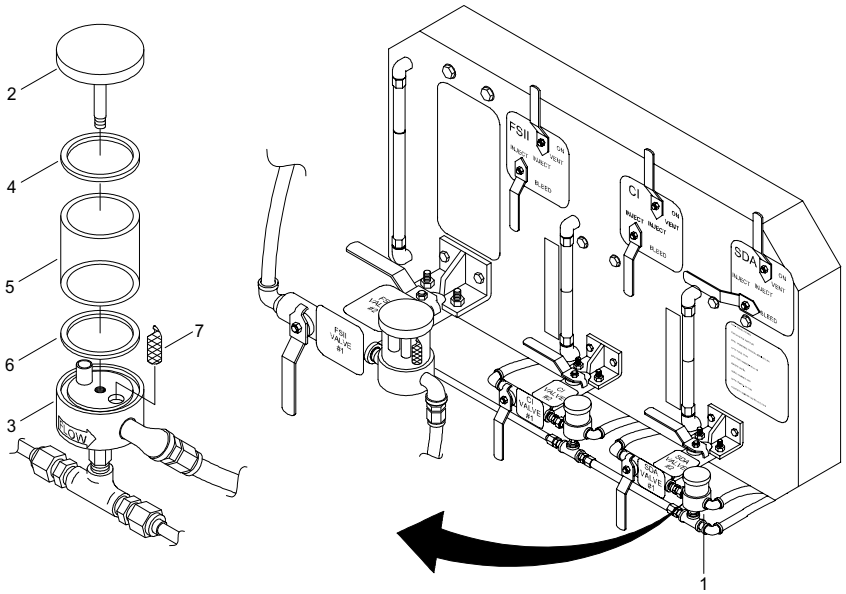



Figure 1. Fuel Additive Injector Assembly Sight Flow Indicator (SDA).

6. Remove o-ring (Figure 1, Item 6) from body (Figure 1, Item 3).

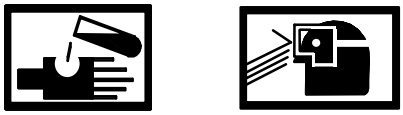
7. Discard o-ring (Figure 1, Item 6).

8. Remove filter element (Figure 1, Item 7) from body (Figure 1, Item 3).

9. Remove drip pans under sight flow indicator (Figure 1, Item 1) and dispose of contents per local procedures.

**SIGHT FLOW INDICATOR (SDA) CLEANING**

**WARNING**



**CHEMICAL** **EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using dry cleaning cloth, clean glass free of all dirt and debris.

2. Using cleaning cloth and solvent cleaning compound, clean all metal parts and filter element.

3. Allow all parts to thoroughly air dry.

4. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**SIGHT FLOW INDICATOR (SDA) INSPECTION**

1. Inspect filter element (Figure 1, Item 7) for torn or bent mesh. If mesh is torn or bent, replace with a serviceable like Item.

2. Inspect glass (Figure 1, Item 5) for broken or cracked condition. If broken or cracked, replace with a serviceable like Item.

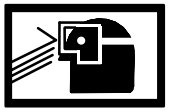
3. Inspect body (Figure 1, Item 1) and cap (Figure 1, Item 2) for stripped or damaged threads, cracks, corrosion or broken fittings. If stripped or damaged threads, cracks, corrosion or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**SIGHT FLOW INDICATOR (SDA) ASSEMBLY**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply thin coat of petrolatum to new o-rings (Figure 1, Item 4, 6).

2. Install o-ring (Figure 1, Item 6) on body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1).

3. Install filter element (Figure 1, Item 7) on body (Figure 1, Item 3).

4. Install glass (Figure 1, Item 5) on body (Figure 1, Item 3).

5. Install o-ring (Figure 1, Item 4) on cap (Figure 1, Item 2).

6. Install cap (Figure 1, Item 2) on body (Figure 1, Item 3) of sight flow indicator (Figure 1, Item 1). Hand tighten cap (Figure 1, Item 2).

7. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# SIGHT FLOW INDICATOR (SDA)
# REPAIR

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 3)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Petrolatum, technical (WP 0070, Item 7)
O-ring (2) (WP 0071, Item 6)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
SDA sight flow indicator disassembled (WP 0031).

## SIGHT FLOW INDICATOR (SDA) REMOVAL

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to disconnect fittings from tubes and hoses. Failure to comply could result in damage to equipment.

**N**

Repair is limited to replacement of parts found defective during inspection.

1. Place drip pans under SDA sight flow indicator (Figure 1, Item 1).

**SIGHT FLOW INDICATOR (SDA) REMOVAL - CONTINUED**

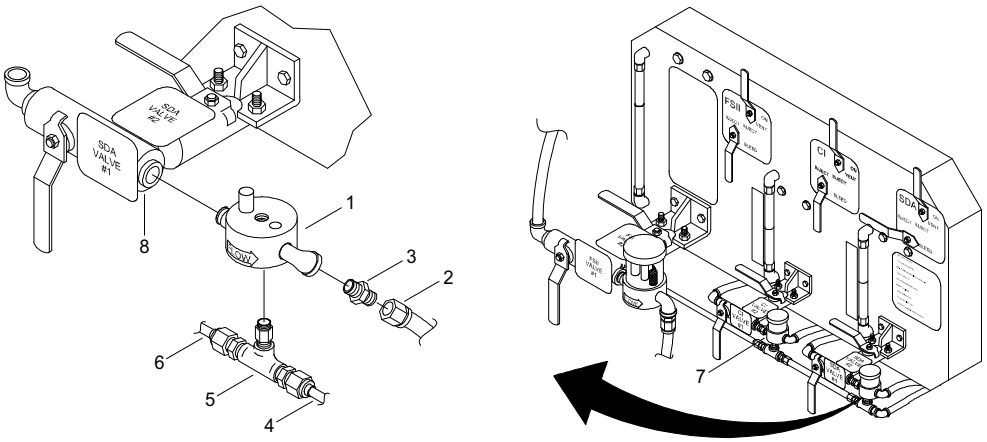



Figure 1. SDA Sight Flow Indicator Removal.

2. Disconnect hose assembly (Figure 1, Item 2) from reducer (Figure 1, Item 3).
3. Remove reducer (Figure 1, Item 3) from SDA sight flow indicator (Figure 1, Item 1).
4. Disconnect tube (Figure 1, Item 4) from tee assembly (Figure 1, Item 5) at bottom of SDA sight flow indicator (Figure 1, Item 1).
5. Disconnect tube (Figure 1, Item 6) from tee assembly (Figure 1, Item 5) and from CI sight flow indicator (Figure 1, Item 7).
6. Turn SDA sight flow indicator (Figure 1, Item 1) slightly counterclockwise until tube (Figure 1, Item 6) is easily removed.
7. Remove tee assembly (Figure 1, Item 5) from SDA sight flow indicator (Figure 1, Item 1).
8. Remove SDA sight flow indicator (Figure 1, Item 1) from SDA valve (Figure 1, Item 8).
9. Remove drip pans under SDA sight flow indicator (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**SIGHT FLOW INDICATOR (SDA) CLEANING**

**WARNING**

**CHEMICAL** **EYE PROTECTION** **POISON**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Clean all metallic parts with a cleaning cloth and solvent cleaning compound.
2. Allow parts to dry thoroughly.

**END OF TASK**

**SIGHT FLOW INDICATOR (SDA) INSPECTION**

1. Inspect body (Figure 1, Item 1) for cracks, corrosion or wear. If cracks, corrosion or wear is found, replace with a serviceable like Item.
2. Inspect body (Figure 1, Item 1) for stripped or damaged threads or broken fittings. If stripped or damaged threads or broken fittings are found, replace with a serviceable like Item.

**END OF TASK**

**SIGHT FLOW INDICATOR (SDA) INSTALLATION**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads of SDA valve (Figure 1, Item 8).

**A I N**

Use two wrenches to connect fittings to tubes and hoses. Failure to comply could result in damage to equipment.

2. Install SDA sight flow indicator (Figure 1, Item 1) on tee assembly (Figure 1, Item 5).
3. Apply teflon tape to threads of tee assembly (Figure 1, Item 5) at bottom of SDA sight flow indicator (Figure 1, Item 1).
4. Connect tube (Figure 1, Item 6) to tee assembly Figure 1, Item 5) and turn SDA sight flow indicator (Figure 1, Item 1) clockwise slightly until tube (Figure 1, Item 6) can be connected to CI sight flow indicator (Figure 1, Item 7). Tighten tube (Figure 1, Item 6).
5. Connect tube (Figure 1, Item 4) to tee assembly (Figure 1, Item 5) at bottom of sight flow indicator (Figure 1, Item 1). Tighten tube (Figure 1, Item 4).
6. Install reducer (Figure 1, Item 3) on SDA sight flow indicator (Figure 1, Item 1). Tighten reducer (Figure 1, Item 3).
7. Connect hose assembly (Figure 1, Item 2) to reducer (Figure 1, Item 3). Tighten hose assembly (Figure 1, Item 2).
8. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.
9. Assemble SDA sight flow indicator (WP 0033).

**END OF TASK**

**END OF WORK PACKAGE**

**FIELD MAINTENANCE**
**CALIBRATION GAUGE**
**CLEANING**

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 3)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)

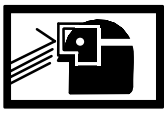
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

**CALIBRATION GAUGE REMOVAL**

## WARNING

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pans under calibration gauge (Figure 1, Item 1).
2. Disconnect calibration gauge (Figure 1, Item 1) from upper and lower elbows (Figure 1, Item 2).
3. Remove calibration gauge (Figure 1, Item 1).

**CALIBRATION GAUGE REMOVAL - CONTINUED**

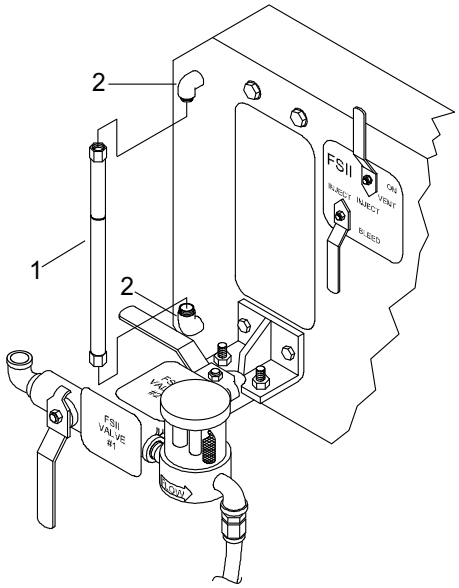



Figure 1. Fuel Additive Injector Assembly Calibration Gauge.

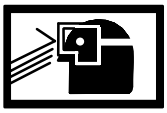
4. Remove drip pans under calibration gauge (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**CALIBRATION GAUGE CLEANING**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using dry cleaning cloth and solvent cleaning compound, clean calibration gauge glass tube free of all dirt and debris.

2. Allow all parts to thoroughly air dry.

3. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**CALIBRATION GAUGE INSPECTION**

1. Inspect calibration gauge glass tube (Figure 1, Item 1) for broken or cracked condition. If broken or cracked, replace with a serviceable like Item.

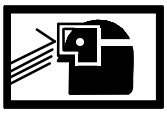
2. Inspect calibration gauge fittings for stripped or damaged threads. If threads are stripped or damaged, replace with a serviceable like Item.

**END OF TASK**

**CALIBRATION GAUGE INSTALLATION**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Position calibration gauge (Figure 1, Item 1) between upper and lower elbows (Figure 1, Item 2).

2. Tighten calibration gauge (Figure 1, Item 1) on upper and lower elbows (Figure 1, Item 2).

3. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# CALIBRATION GAUGE
# REPAIR

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's ( WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)

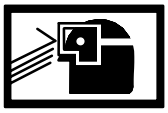
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## CALIBRATION GAUGE DISASSEMBLY

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**N**

Repair is limited to replacement of parts found defective during inspection.

1. Place drip pans under calibration gauge (Figure 1, Item 1).
2. Disconnect calibration gauge (Figure 1, Item 1) from upper and lower elbows (Figure 1, Item 2).
3. Remove calibration gauge (Figure 1, Item 1).

**FUEL ADDITIVE INJECTOR ASSEMBLY CALIBRATION GAUGE DISASSEMBLY**

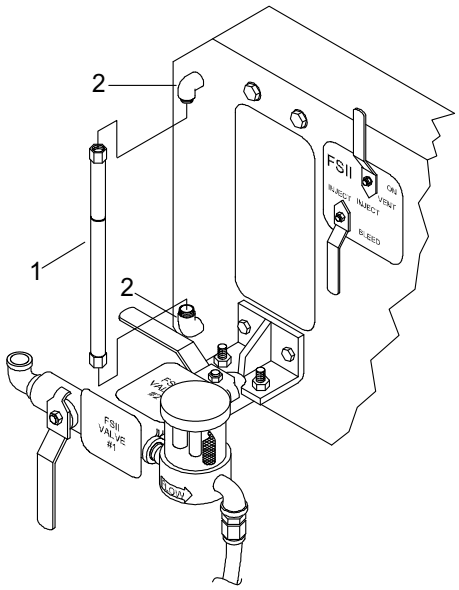



Figure 1. Fuel Additive Injector Assembly Calibration Gauge Removal.

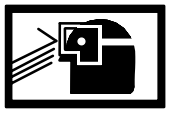
4. Remove drip pans under calibration gauge (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**CALIBRATION GAUGE CLEANING**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using dry cleaning cloth and solvent cleaning compound, clean calibration gauge and fittings.

2. Allow all parts to thoroughly air dry.

3. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**CALIBRATION GAUGE INSPECTION**

1. Inspect calibration gauge for broken or cracked condition. If broken or cracked, replace with a serviceable like Item.
2. Inspect fittings for stripped or damaged threads. If threads are stripped or damaged, replace with a serviceable like Item.

**END OF TASK**

**CALIBRATION GAUGE ASSEMBLY**

1. Position calibration gauge (Figure 1, Item 1) between upper and lower elbows (Figure 1, Item 2).
2. Tighten calibration gauge (Figure 1, Item 1) on upper and lower elbows (Figure 1, Item 2).
3. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# CI AND SDA PUMP SUCTION CHECK VALVE REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

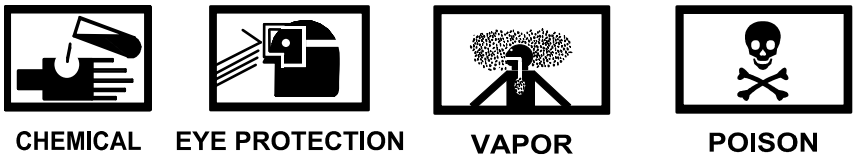
Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## CI AND SDA PUMP SUCTION CHECK VALVES REMOVAL

**WARNING**




When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pans under CI and SDA pump (Figure 1, Item 1) suction check valve (Figure 1, Item 2).

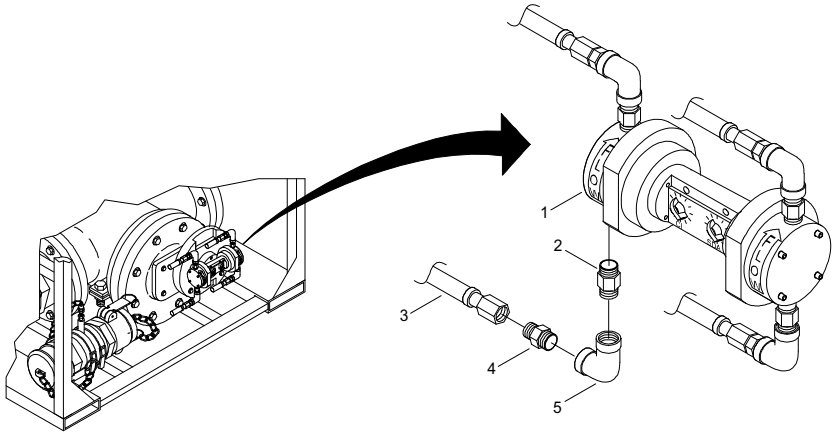



Figure 1. CI and SDA Pump Suction Check Valves.

**CI AND SDA PUMP SUCTION CHECK VALVES REMOVAL - CONTINUED**

2. Tag and disconnect suction tube assembly (Figure 1, Item 3) from tube adapter (Figure 1, Item 4).
3. Remove tube adapter (Figure 1, Item 4) from 90° elbow (Figure 1, Item 5).
4. Disconnect 90° elbow assembly (Figure 1, Item 5) from suction check valve (Figure 1, Item 2).
5. Remove suction check valve (Figure 1, Item 2) from CI and SDA pump (Figure 1, Item 1).
6. Discard suction check valve (Figure 1, Item 2).
7. Remove drip pans and dispose of contents per local procedures.

**END OF TASK**

**CI AND SDA PUMP SUCTION CHECK VALVES INSTALLATION**

**WARNING**

**CHEMICAL EYE PROTECTION VAPOR POISON**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to the threads of new suction check valve (Figure 1, Item 2).

**A I N**

Ensure suction check valves are installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

2. Install new suction check valve (Figure 1, Item 2) on CI and SDA pump (Figure 1, Item 1).
3. Connect 90° elbow assembly (Figure 1, Item 5) to suction check valve (Figure 1, Item 2).
4. Apply teflon tape to the threads of tube adapter (Figure 1, Item 4).
5. Install tube adapter (Figure 1, Item 4) on 90° elbow (Figure 1, Item 5).
6. Connect suction tube assembly (Figure 1, Item 3) to tube adapter (Figure 1, Item 4) and remove tags.
7. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# CI AND SDA PUMP DISCHARGE CHECK VALVE REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Tape, teflon (WP 0070, Item 8)
Pan, drip (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## CI AND SDA PUMP DISCHARGE CHECK VALVES REMOVAL

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pans under CI and SDA pump (Figure 1, Item 1) discharge check valve (Figure 1, Item 2).
2. Tag and disconnect tube assembly (Figure 1, Item 3) from tube adapter (Figure 1, Item 4).
3. Remove tube adapter (Figure 1, Item 4) from 90° elbow assembly (Figure 1, Item 5).
4. Disconnect 90° elbow assembly (Figure 1, Item 5) from discharge check valve (Figure 1, Item 2).

**CI AND SDA PUMP DISCHARGE CHECK VALVES REMOVAL - CONTINUED**

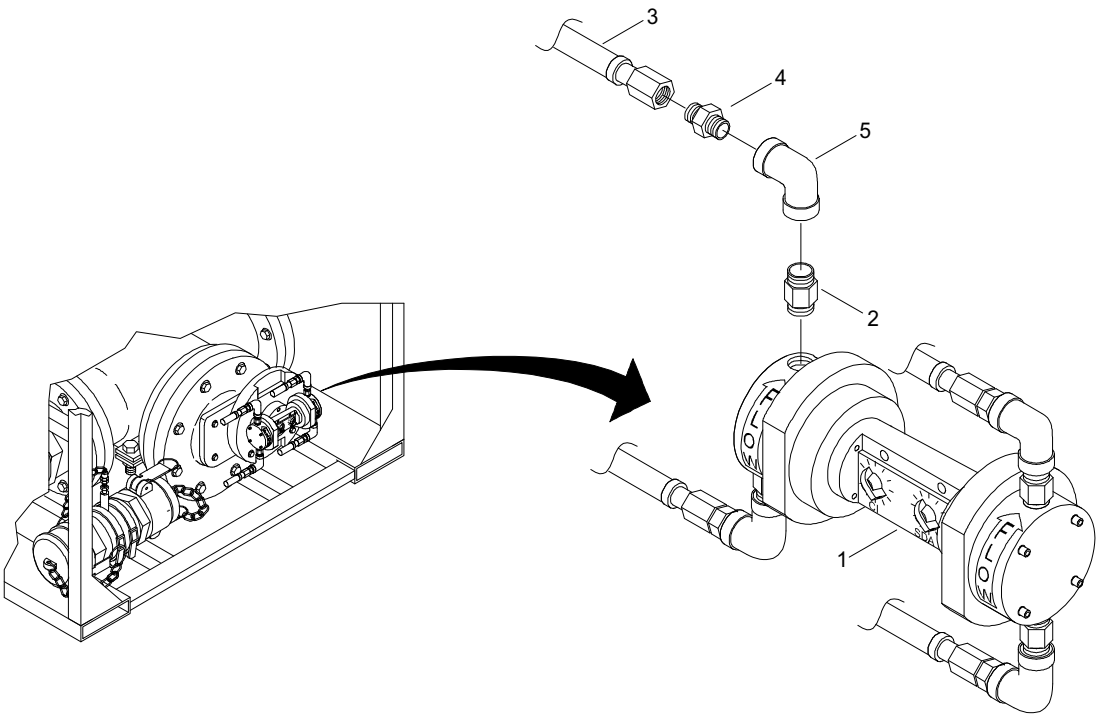



Figure 1. CI and SDA Pump Discharge Check Valves Removal.

5. Remove discharge check valve (Figure 1, Item 2) from CI and SDA pump (Figure 1, Item 1).
6. Discard discharge check valve (Figure 1, Item 2).
7. Remove drip pans and dispose of contents per local procedures.

**END OF TASK**

**CI AND SDA PUMP DISCHARGE CHECK VALVES INSTALLATION**

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads of new discharge check valve (Figure 1, Item 2).

**A I N**

Ensure discharge check valve is installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

2. Install new discharge check valve (Figure 1, Item 2) on CI and SDA pump (Figure 1, Item 1). Tighten discharge check valve (Figure 1, Item 2).

3. Connect 90° elbow assembly (Figure 1, Item 5) to discharge check valve (Figure 1, Item 2). Tighten elbow assembly (Figure 1, Item 5).

4. Apply teflon tape to threads of tube adapter (Figure 1, Item 4).

5. Install tube adapter (Figure 1, Item 4) on 90° elbow assembly (Figure 1, Item 5). Tighten tube adapter (Figure 1, Item 4).

6. Connect discharge tube assembly (Figure 1, Item 3) to tube adapter (Figure 1, Item 4). Tighten discharge tube assembly (Figure 1, Item 3) and remove tags.

7. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR PUMP DRIVE BEARING
# LUBRICATING

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Tape, Teflon (WP 0070, Item 8)
Washer, lock (4) (WP 0071,Item 12)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## POWER FRAME COVER REMOVAL

1. Mark position of stroke two adjustment knobs (Figure 1, Item 1) on the power frame cover (Figure 1, Item 2) for assembly purposes.

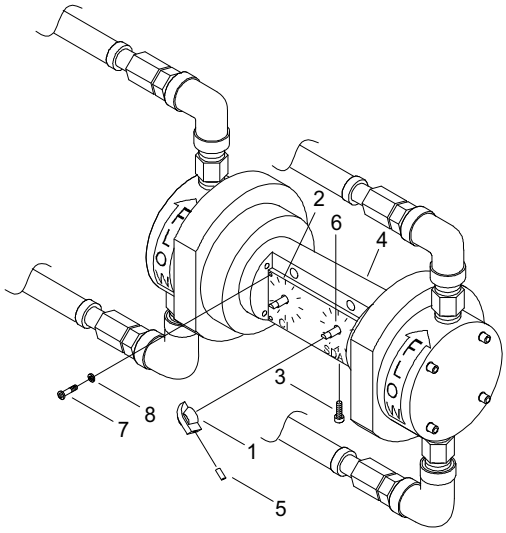



Figure 1. Fuel Additive Injector Pump Power Frame Cover.

2. Loosen two stroke adjustment setscrews (Figure 1, Item 3) on bottom of power frame (Figure 1, Item 4).
3. Loosen two setscrews (Figure 1, Item 5) on two stroke adjustment knobs (Figure 1, Item 1).
4. Remove two stroke adjustment knobs (Figure 1, Item 1) from two stroke adjustment cams (Figure 1, Item 6).

**POWER FRAME COVER REMOVAL - CONTINUED**

5. Remove four screws (Figure 1, Item 7) and four lockwashers (Figure 1, Item 8) from power frame cover (Figure 1, Item 2). Discard lockwashers (Figure 1, Item 8).
6. Remove power frame cover (Figure 1, Item 2) from power frame (Figure 1, Item 4).

**END OF TASK**

**FUEL ADDITIVE INJECTOR PUMP DRIVE BEARING CAVITY LUBRICATION**

**WARNING**

**CHEMICAL** **EYE PROTECTION** **POISON**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

When working with ball and roller bearing grease, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use only with adequate ventilation. Injector under skin can cause local necrosis. Accidental ingestion of this material may cause irritation of digestive tract.

1. Flush area around the drive bearing (Figure 2, Item 1) and between power frame and crosshead (Figure 2, Item 2) with solvent cleaning compound to remove old grease and contaminants.

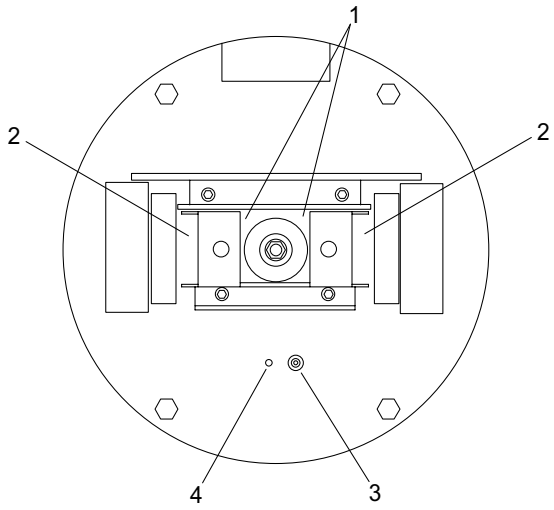



Figure 2. Fuel Additive Injector Pump and Bearing.

2. Hand pack the area around the drive bearing (Figure 2, Item 1) and between power frame and crosshead (Figure 2, Item 2) with ball and roller bearing grease.

**FUEL ADDITIVE INJECTOR PUMP DRIVE BEARING CAVITY LUBRICATION - CONTINUED**

3. Using hand lubricating gun, lube gear reduction fitting (Figure 2, Item 3) on CI and SDA side of pumping assembly until excess exits the hole next to the fitting (Figure 2, Item 4).

4. Wipe off excess grease with cleaning cloth to prevent contamination of pumping assembly.

**END OF TASK**

**POWER FRAME COVER INSTALLATION**

1. Position power frame cover (Figure 1, Item 2) onto power frame (Figure 1, Item 4).

2. Install four new lockwashers (Figure 1, Item 8) and four screws (Figure 1, Item 7) on power frame cover (Figure 1, Item 2). Tighten screws (Figure 1, Item 7).

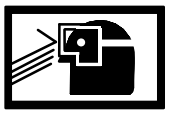
3. Position two stroke adjustment knobs (Figure 1, Item 1) on two stroke adjustment cams (Figure 1, Item 6). Tighten setscrews (Figure 1, Item 5).

4. Turn two stroke adjustment knobs (Figure 1, Item 1) to previously marked positions on power frame cover (Figure 1, Item 2).

5. Tighten two stroke adjustment setscrews (Figure 1, Item 3) in bottom of power frame (Figure 1, Item 4).

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with ball and roller bearing grease, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use only with adequate ventilation. Injection under skin can cause local necrosis. Accidental ingestion of this material may cause irritation of digestive tract.

6. Clean up any grease with a cleaning cloth and dispose of waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

## FIELD MAINTENANCE
## CI AND SDA ADDITIVE TANK VENT FILTER CLEANING

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Tape, teflon (WP 0070, Item 8)
Pan, drip (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)

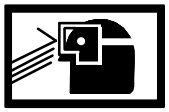
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

### CI AND SDI ADDITIVE TANK VENT FILTER DISASSEMBLY

**WARNING**

CHEMICAL



EYE PROTECTION

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drip pan under vent filter (Figure 1, Item 1) and additive tank (Figure 1, Item 2).

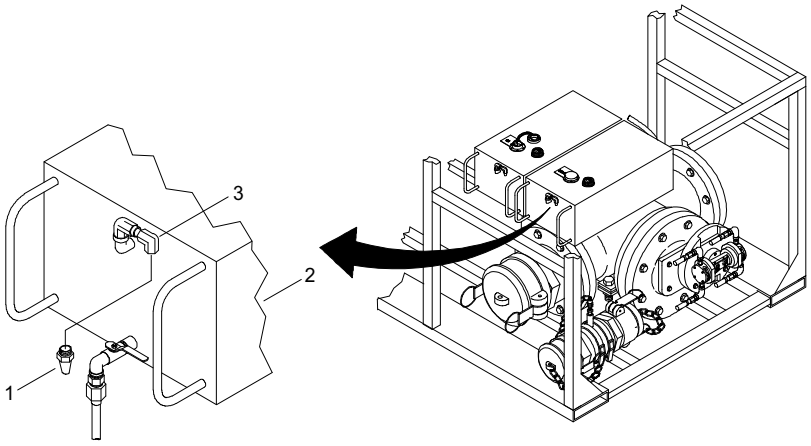



Figure 1. CI and SDA Additive Tank Vent Filter.

**CI AND SDI ADDITIVE TANK VENT FILTER DISASSEMBLY - CONTINUED**

2. Remove vent filter (Figure 1, Item 1) from 90° elbow (Figure 1, Item 3).

3. Remove drip pan from under vent filter (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**CI AND SDI ADDITIVE TANK VENT FILTER CLEANING**

**WARNING**

**CHEMICAL**

**EYE PROTECTION**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using cleaning cloth and solvent cleaning compound, clean vent filter free of all dirt and debris.

2. Allow all parts to thoroughly air dry.

3. Dispose of cleaning cloth per local procedures.

**END OF TASK**

**CI AND SDI ADDITIVE TANK VENT FILTER INSPECTION**

1. Inspect the vent filter (Figure 1, Item 1) for broken or cracked condition. If broken or cracked, replace with a serviceable like Item.

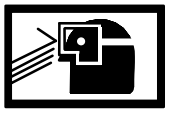
2. Inspect vent filter fitting (Figure 1, Item 1) for stripped or damaged threads. If threads are stripped or damaged, replace with a serviceable like Item.

**END OF TASK**

**CI AND SDI ADDITIVE TANK VENT FILTER ASSEMBLY**

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads of vent filter (Figure 1, Item 1).
2. Install vent filter (Figure 1, Item 1) on 90° elbow (Figure 1, Item 3) on additive tank (Figure 1, Item 2).
3. Tighten vent filter (Figure 1, Item 1).
4. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# ADDITIVE TANK
# REPAIR

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's(WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Pan, drip (2) (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Tape, Teflon (WP 0070, Item 8)
Gasket (2) (WP 0071, Item 3)
Gasket (WP 0071, Item 5)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## ADDITIVE TANK DISASSEMBLY

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**N**

Repair is limited to replacement of parts found defective during inspection.

1. Place drip pan under additive tank (Figure 1, Item 1).

**ADDITIVE TANK DISASSEMBLY - CONTINUED**

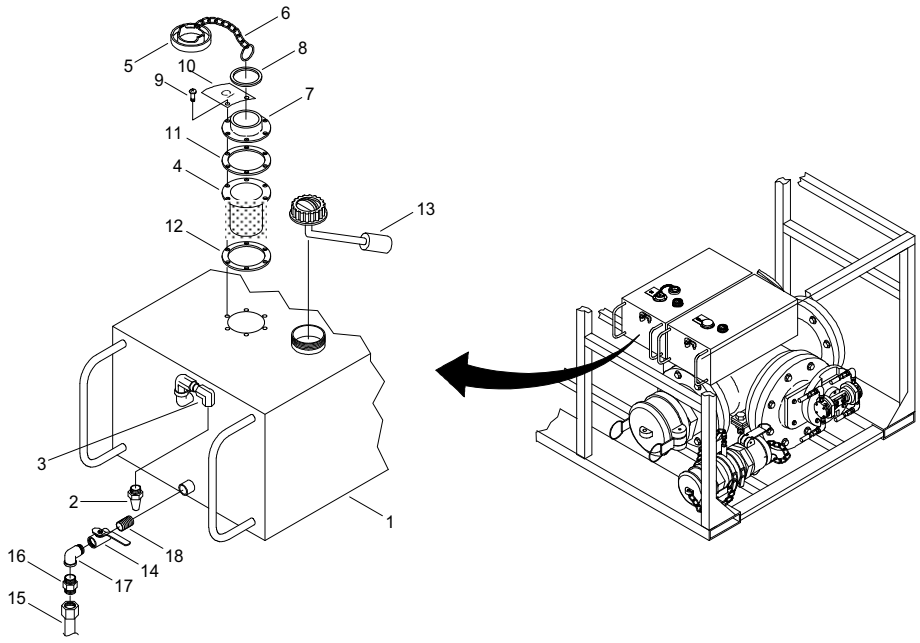



Figure 1. Fuel Additive Injector Assembly CI and SDA Additive Tank.

2. Remove vent filter (Figure 1, Item 2) from 90° elbow (Figure 1, Item 3).
3. Remove filler/strainer (Figure 1, Item 4) from additive tank (Figure 1, Item 1).
4. Remove cap (Figure 1, Item 5) from filler/strainer (Figure 1, Item 4).
5. Remove chain (Figure 1, Item 6) from retainer ring (Figure 1, Item 7).
6. Remove gasket (Figure 1, Item 8) from cap (Figure 1, Item 5).
7. Discard gasket (Figure 1, Item 8).
8. Remove six screws (Figure 1, Item 9) securing filler/strainer (Figure 1, Item 4) to additive tank (Figure 1, Item 1).
9. Remove tank tag (Figure 1, Item 10) from filler/strainer (Figure 1, Item 4).
10. Remove retainer ring (Figure 1, Item 7) from filler/strainer (Figure 1, Item 4).
11. Remove gasket (Figure 1, Item 11) from filler/strainer (Figure 1, Item 4).
12. Discard gasket (Figure 1, Item 11).
13. Remove filler/strainer (Figure 1, Item 4) from additive tank (Figure 1, Item 1).
14. Remove gasket (Figure 1, Item 12) from filler/strainer (Figure 1, Item 4).
15. Discard gasket (Figure 1, Item 12).

**ADDITIVE TANK DISASSEMBLY - CONTINUED**

16. Remove level gauge (Figure 1, Item 13) from additive tank (Figure 1, Item 1).
17. Remove additive shutoff valve (Figure 1, Item 14) from additive tank (Figure 1, Item 1).
18. Disconnect hose (Figure 1, Item 15) from adapter (Figure 1, Item 16).
19. Remove adapter (Figure 1, Item 16) from 90° elbow (Figure 1, Item 17).
20. Remove 90° elbow (Figure 1, Item 17) from additive shutoff valve (Figure 1, Item 14).
21. Remove additive shutoff valve (Figure 1, Item 14) from additive tank (Figure 1, Item 1).
22. Remove nipple (Figure 1, Item 18) from additive shutoff valve (Figure 1, Item 14).
23. Remove drip pan under additive tank (Figure 1, Item 1) and dispose of contents per local procedures.

**END OF TASK**

**ADDITIVE TANK AND COMPONENTS CLEANING**

**WARNING**

**CHEMICAL** **EYE PROTECTION** **POISON**

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Clean all metallic parts using a cleaning cloth and solvent cleaning compound.
2. Clean filler/strainer free of all dirt and debris using a cleaning cloth and solvent cleaning compound.
3. Clean vent filter free of all dirt and debris using a cleaning cloth dampened with solvent cleaning compound.
4. Clean additive shutoff valve using a cleaning cloth and solvent cleaning compound.
5. Clean level gauge using a cleaning cloth and solvent cleaning compound.
6. Allow parts to dry thoroughly.

**END OF TASK**

**ADDITIVE TANK AND COMPONENTS INSPECTION**

1. Inspect all metallic parts for cracks, corrosion or broken fittings. If cracks, corrosion or broken fittings are found, replace with a serviceable like Item.

2. Inspect the level gauge (Figure 1, Item 3) for stripped threads and broken or cracked condition. If level gauge is broken or cracked or threads are stripped, replace with serviceable like Item.

3. Inspect fittings on additive tank (Figure 1, Item 1) for stripped or damaged threads. If threads are stripped or damaged, replace with serviceable like Item.

4. Inspect additive shutoff valve (Figure 1, Item 14) for cracks and stripped threads. If cracks or stripped threads are found, replace with serviceable like Item.

5. Inspect additive shutoff valve handle (Figure 1, Item 14) for proper operation. If handle does not operate properly, replace with serviceable like Item.

6. Inspect vent filter (Figure 1, Item 2) for broken or cracked condition. If broken or cracked, replace with serviceable like Item.

7. Inspect vent filter fitting (Figure 1, Item 2) for stripped or damaged threads. If threads are stripped or damaged, replace with serviceable like Item.

8. Inspect additive shutoff valve adapter (Figure 1, Item 16) for cracks, corrosion, broken fittings or stripped threads. If found, replace with serviceable like Item.

9. Inspect filler/strainer (Figure 1, Item 4) for cracks, corrosion or torn screen. If found, replace with serviceable like Item.

**END OF TASK**

**ADDITIVE TANK ASSEMBLY**

**WARNING**

**CHEMICAL** **EYE PROTECTION** **VAPOR** **POISON**

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to threads of nipple (Figure 1, Item 18).

2. Install nipple (Figure 1, Item 18) in additive shutoff valve (Figure 1, Item 14). Tighten nipple (Figure 1, Item 18).

**ADDITIVE TANK ASSEMBLY - CONTINUED**

3. Install additive shutoff valve (Figure 1, Item 14) into additive tank (Figure 1, Item 1). Tighten additive shutoff valve (Figure 1, Item 14).
4. Apply teflon tape to threads of 90° elbow (Figure 1, Item 17).
5. Install 90° elbow (Figure 1, Item 17) on additive shutoff valve (Figure 1, Item 14). Tighten 90° elbow (Figure 1, Item 17).
6. Apply teflon tape to threads of adapter (Figure 1, Item 16).
7. Install adapter (Figure 1, Item 16) on 90° elbow (Figure 1, Item 17).
8. Connect hose (Figure 1, Item 15) to adapter (Figure 1, Item 16).
9. Install level gauge (Figure 1, Item 13) in additive tank (Figure 1, Item 1).
10. Install new gasket (Figure 1, Item 12) on filler/strainer (Figure 1, Item 4).
11. Install filler/strainer (Figure 1, Item 4) in additive tank (Figure 1, Item 1).
12. Install new gasket (Figure 1, Item 11) on filler/strainer (Figure 1, Item 4).
13. Install new gasket (Figure 1, Item 8) on cap (Figure 1, Item 5).
14. Install chain (Figure 1, Item 6) on retainer ring (Figure 1, Item 7).
15. Install retainer ring (Figure 1, Item 7) on filler/strainer (Figure 1, Item 4).
16. Install tank tag (Figure 1, Item 10) on filler/strainer (Figure 1, Item 4).
17. Install six screws (Figure 1, Item 9) to secure tank tag (Figure 1, Item 10) and filler/strainer (Figure 1, Item 4) to additive tank (Figure 1, Item 1). Tighten six screws (Figure 1, Item 9).
18. Install cap (Figure 1, Item 5) on filler/strainer (Figure 1, Item 4).
19. Apply teflon tape to threads of vent filter (Figure 1, Item 2).
20. Install vent filter (Figure 1, Item 2) on 90° elbow (Figure 1, Item 3).
21. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FSII PUMP SUCTION CHECK VALVE
# REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial(WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Tape, teflon (WP 0070, Item 8)
Pan, Drip (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Antiseize compound (WP 0070, Item 1)
Washer, lock (8) (WP 0071, Item 11)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## FSII PUMP FLUID END CAP ASSEMBLY REMOVAL

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

1. Place drain pan below FSII pump (Figure 1, Item 1).

**FSII PUMP FLUID END CAP ASSEMBLY REMOVAL - CONTINUED**

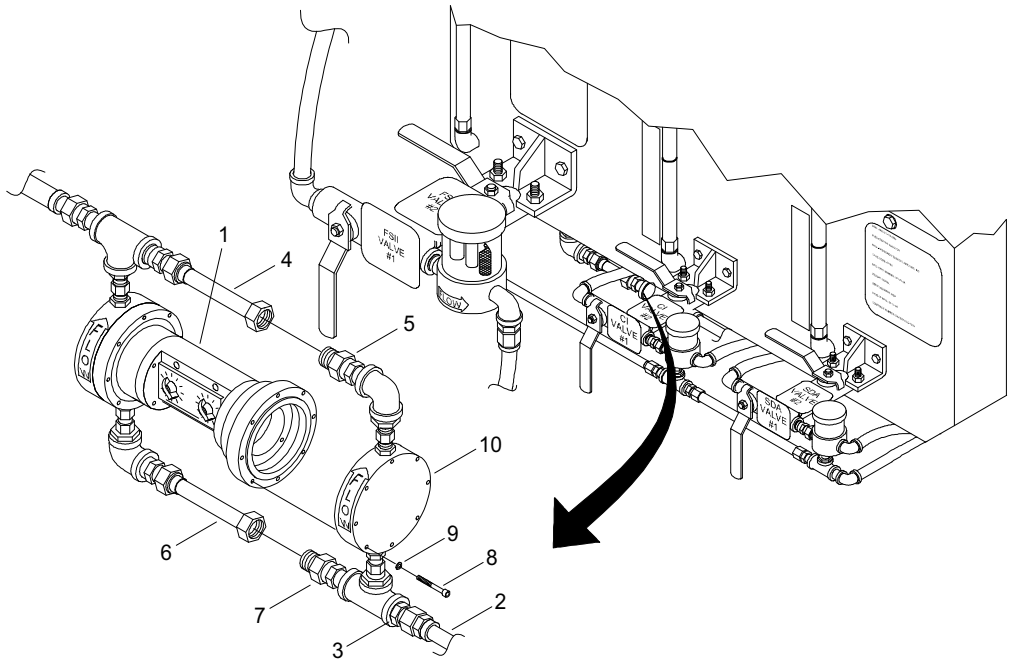



Figure 1. FSII Pump Fluid End Cap Assembly.

2. If required, disconnect tube assembly (Figure 1, Item 2) from tube adapter (Figure 1, Item 3).
3. Disconnect discharge tube (Figure 1, Item 4) from tube adapter (Figure 1, Item 5).
4. Disconnect suction tube (Figure 1, Item 6) from tube adapter (Figure 1, Item 7).
5. Remove eight screws (Figure 1, Item 8) and eight lockwashers (Figure 1, Item 9) from fluid end cap assembly (Figure 1, Item 10).
6. Discard lockwashers (Figure 1, Item 9).
7. Remove fluid end cap assembly (Figure 1, Item 10) from FSII pump (Figure 1, Item 1).
8. Remove drain pan and dispose of contents per local procedures.

**END OF TASK**

**FSII PUMP SUCTION CHECK VALVES REMOVAL**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Remove tee assembly (Figure 2, Item 1), tube adapter (Figure 2, Item 2), reducer bushing (Figure 2, Item 3) and suction check valve (Figure 2, Item 4) as an assembly from FSII pump (Figure 2, Item 5).

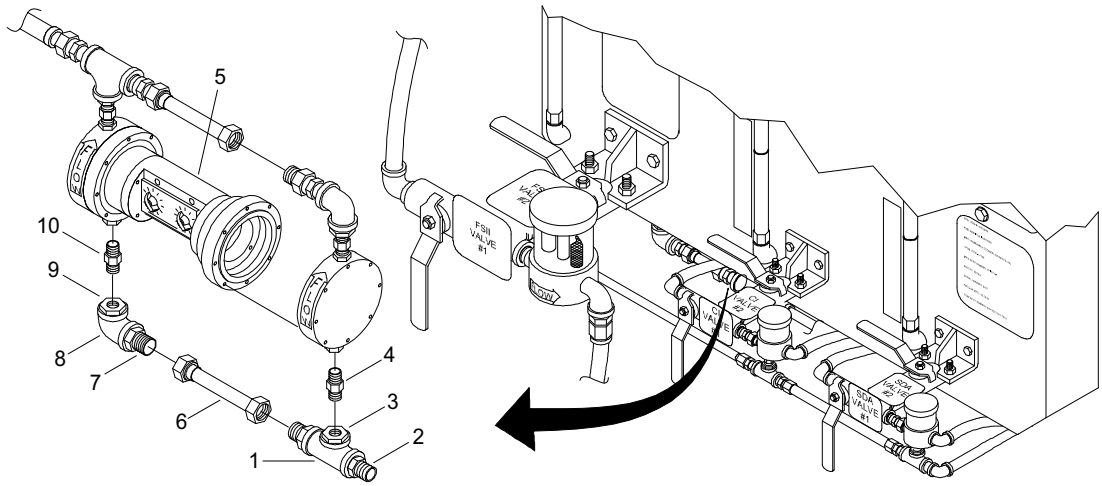



Figure 2. FSII Pump Suction Check Valves.

2. Remove suction check valve (Figure 2, Item 4) from reducer bushing (Figure 2, Item 3). Discard suction check valve (Figure 2, Item 4).

3. Disconnect suction tube (Figure 2, Item 6) from tube adapter (Figure 2, Item 7).

4. Remove 90° elbow (Figure 2, Item 8), tube adapter (Figure 2, Item 7), reducer bushing (Figure 2, Item 9) and suction check valve (Figure 2, Item 10) as an assembly from FSII pump (Figure 2, Item 5).

5. Remove suction check valve (Figure 2, Item 10) from reducer bushing (Figure 2, Item 9). Discard suction check valve (Figure 2, Item 10).

**END OF TASK**

**FSII PUMP SUCTION CHECK VALVES INSTALLATION**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to the threads of new suction check valve (Figure 2, Item 10).

**A I N**

Ensure suction check valve is installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

2. Install suction check valve (Figure 2, Item 10) on reducer bushing (Figure 2, Item 9). Tighten suction check valve (Figure 2, Item 10).

**A I N**

Use caution when installing suction check valve to ensure filter is not damaged or broken during installation.

3. Install suction check valve (Figure 2, Item 10), reducer bushing (Figure 2, Item 9), 90° elbow (Figure 2, Item 8) and tube adapter (Figure 2, Item 7) as an assembly on FSII pump (Figure 2, Item 5). Tighten suction check valve (Figure 2, Item 10).

4. Connect suction tube (Figure 2, Item 6) on tube adapter (Figure 2, Item 7). Tighten suction tube (Figure 2, Item 6).

5. Apply teflon tape to the threads of new suction check valve (Figure 2, Item 4).

**A I N**

Ensure suction check valve is installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

6. Install suction check valve (Figure 2, Item 4) on reducer bushing (Figure 2, Item 3). Tighten suction check valve (Figure 2, Item 4).

7. Install suction check valve (Figure 2, Item 4), reducer bushing (Figure 2, Item 3), tee assembly (Figure 2, Item 1)and tube adapter (Figure 2, Item 2) as an assembly on FSII pump (Figure 2, Item 6). Tighten suction check valve (Figure 2, Item 5).

**END OF TASK**

**FSII PUMP FLUID END CAP ASSEMBLY INSTALLATION**

**WARNING**

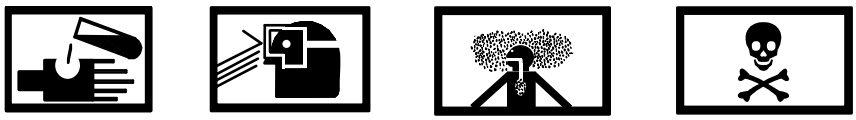
When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to connect fittings to prevent damage. Failure to comply will result in damage to fittings.

1. Position fluid end cap assembly (Figure 1, Item 10) on FSII pump (Figure 1, Item 1) ensuring proper alignment with tubes (Figure 1, Item 4, 6).

**WARNING**



CHEMICAL EYE PROTECTION VAPOR POISON

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

2. Apply antiseize compound to eight screws (Figure 1, Item 8).

3. Install eight new lockwashers (Figure 1, Item 9) and eight screws (Figure 1, Item 8) through fluid end cap assembly (Figure 1, Item 10).

4. Hand tighten eight screws (Figure 1, Item 8).

**A I N**

Failure to torque screws to 40 in. lb (4.52 N-m) will reduce pump head performance, resulting in insufficient injection ratio. Repeat torque only one time. Failure to comply can cause diaphragms to fail.

5. Using torque wrench, screwdriver bit and torque sequence diagram (Figure 3), torque eight screws (Figure 1, Item 8) to 40 in. lb (4.52 N-m).

**FSII PUMP FLUID END CAP ASSEMBLY INSTALLATION - CONTINUED**

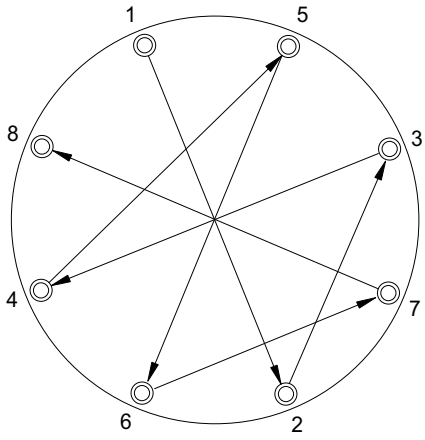



Figure 3. Torque Sequence Diagram.

6. Connect suction tube (Figure 1, Item 6) on tube adapter (Figure 1, Item 7). Tighten suction tube (Figure 1, Item 6).

7. Connect discharge tube (Figure 1, Item 4) on tube adapter (Figure 1, Item 5). Tighten discharge tube (Figure 1, Item 4).

8. If required, connect tube assembly (Figure 1, Item 2) on tube adapter (Figure 1, Item 3).

9. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FSII PUMP DISCHARGE CHECK VALVE REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Tape, teflon (WP 0070, Item 8)
Pan, Drip (WP 0067, Item 2)
Kit, fuel spill control (WP 0070, Item 6)
Antiseize compound (WP 0070, Item 1)
Washer, lock (8) (WP 0071, Item 1)

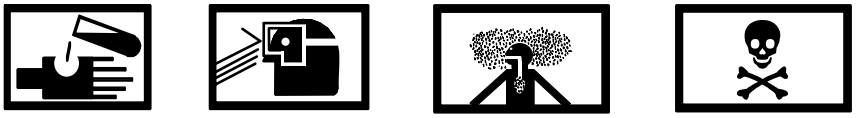
**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

FSII pump fluid end cap assembly removed (WP 0042).

## FSII PUMP DISCHARGE CHECK VALVES REMOVAL

**WARNING**



CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drain pan below tube assembly (Figure 1, Item 1).

**A I N**

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

2. Disconnect tube assembly (Figure 1, Item 1) from tube adapter (Figure 1, Item 2).

**FSII PUMP DISCHARGE CHECK VALVES REMOVAL-CONTINUED**

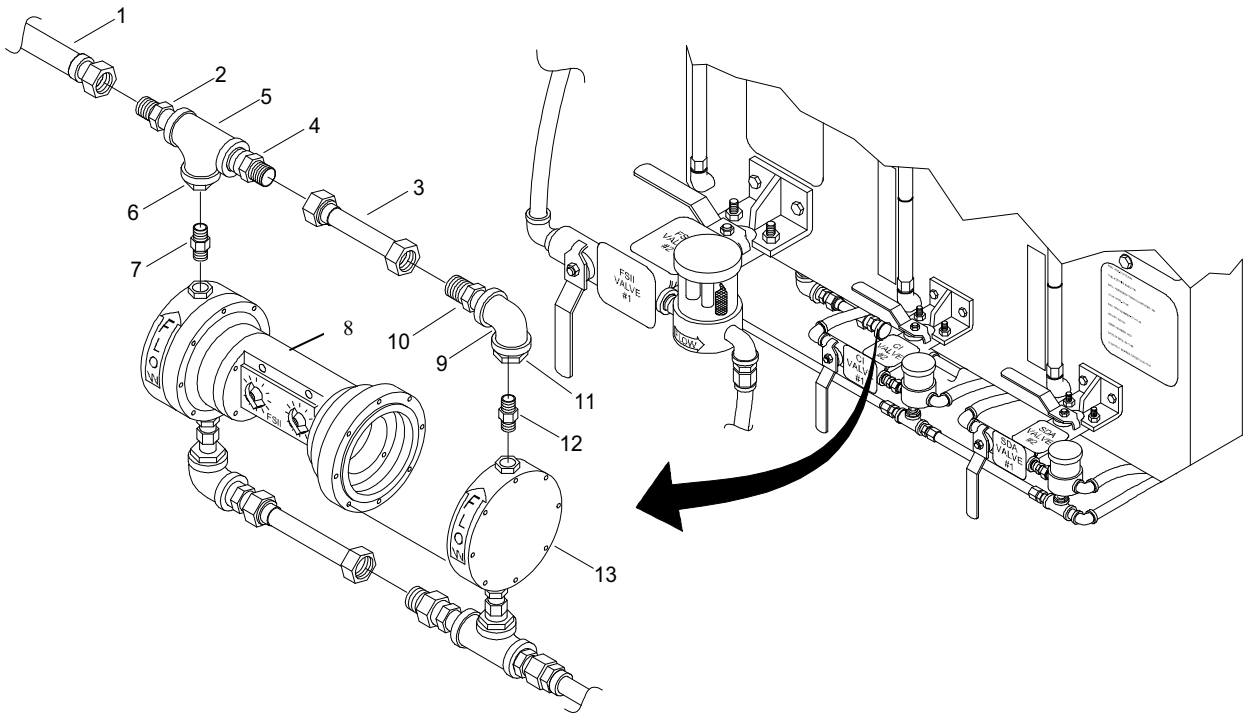



Figure 1. FSII Pump Discharge Check Valves.

**A I N**

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

3. Disconnect tube assembly (Figure 1, Item 3) from tube adapter (Figure 1, Item 4).

4. Remove tee assembly (Figure 1, Item 5), tube adapters (Figure 1, Item 2, 4), reducer bushing (Figure 1, Item 6) and discharge check valve (Figure 1, Item 7) as an assembly from FSII pump (Figure 1, Item 8).

5. Remove discharge check valve (Figure 1, Item 7) from reducer bushing (Figure 1, Item 6). Discard discharge check valve (Figure 1, Item 7).

6. Remove 90° elbow (Figure 1, Item 9), tube adapter (Figure 1, Item 10), reducer bushing (Figure 1, Item 11) and discharge check valve (Figure 1, Item 12) as an assembly from end cap assembly (Figure 1, Item 13).

7. Remove discharge check valve (Figure 1, Item 12) from reducer bushing (Figure 1, Item 11). Discard discharge check valve (Figure 1, Item 12).

8. Remove drain pan and dispose of contents per local procedures.

**END OF TASK**

**FSII PUMP DISCHARGE CHECK VALVES INSTALLATION**

## WARNING

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Apply teflon tape to the threads of new discharge check valve (Figure 1, Item 12).

## CAUTION

Ensure discharge check valve is installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

2. Install discharge check valve (Figure 1, Item 12) on reducer bushing (Figure 1, Item 11). Tighten discharge check valve (Figure 1, Item 12).

3. Install discharge check valve (Figure 1, Item 12), reducer bushing (Figure 1, Item 11), 90° elbow (Figure 1, Item 9) and tube adapter (Figure 1, Item 10) as an assembly on end cap assembly (Figure 1, Item 13). Tighten discharge check valve (Figure 1, Item 12).

4. Apply teflon tape to the threads of new discharge check valve (Figure 1, Item 7).

## CAUTION

Ensure discharge check valve is installed with stamped arrow in direction of fluid flow. Failure to do so may cause damage to pump.

5. Install discharge check valve (Figure 1, Item 7) on reducer bushing (Figure 1, Item 6). Tighten discharge check valve (Figure 1, Item 7).

6. Install discharge check valve (Figure 1, Item 7), reducer bushing (Figure 1, Item 6), tee assembly (Figure 1, Item 5) and tube adapters (Figure 1, Item 2, 4) as an assembly on FSII pump (Figure 1, Item 8). Tighten discharge check valve (Figure 1, Item 7).

## CAUTION

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

7. Connect tube assembly (Figure 1, Item 3) on tube adapter (Figure 1, Item 4). Tighten tube assembly (Figure 1, Item 3).

**FSII PUMP DISCHARGE CHECK VALVES INSTALLATION - CONTINUED**

**A I N**

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

8. Connect tube assembly (Figure 1, Item 1) on tube adapter (Figure 1, Item 2). Tighten tube assembly (Figure 1, Item 1).

9. Install FSII pump fluid end cap assembly (WP 0042).

10. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FSII INJECTOR PUMP DIAPHRAGM REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility(WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Wrench, torque, 3/8 in. sqdr 0–300 in. lb (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Kit, fuel spill control (WP 0070, Item 6)
Pan, drain (WP 0067, Item 2)
Antiseize compound (WP 0070, Item 1)
Washer, lock (8) (WP 0071, Item 12)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## FSII INJECTOR PUMP DIAPHRAGM REMOVAL

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to remove fittings to prevent damage. Failure to comply will result in damage to fittings.

1. Place drain pan below FSII injector pump (Figure 1, Item 1).
2. Disconnect discharge tube (Figure 1, Item 2) from fluid end cap assembly (Figure 1, Item 3).
3. Disconnect suction tube (Figure 1, Item 4) from fluid end cap assembly (Figure 1, Item 3).
4. Remove eight screws (Figure 1, Item 5) and eight lockwashers (Figure 1, Item 6) from fluid end cap assembly (Figure 1, Item 3). Discard lockwashers (Figure 1, Item 6).

**FSII INJECTOR PUMP DIAPHRAGM REMOVAL - CONTINUED**

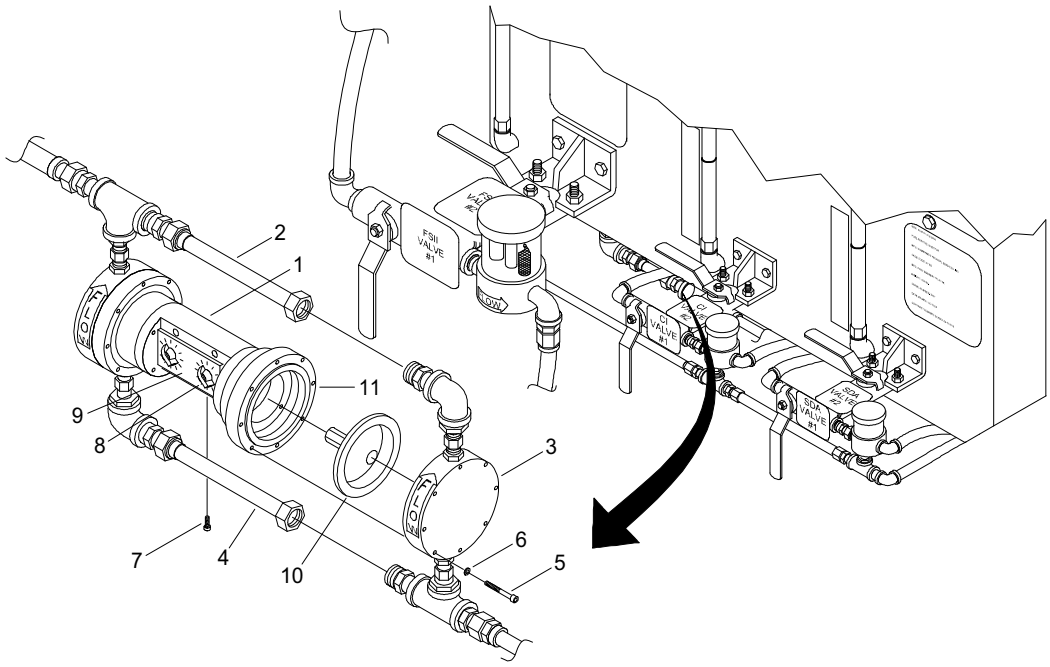



Figure 1. FSII Injector Pump Diaphragm.

5. Remove fluid end cap assembly (Figure 1, Item 3) from FSII injector pump (Figure 1, Item 1).
6. Loosen setscrew (Figure 1, Item 7) from beneath FSII injector pump (Figure 1, Item 1).
7. Mark position of stroke adjustment knob (Figure 1, Item 8) on power frame cover (Figure 1, Item 9).
8. Rotate stroke adjustment knob (Figure 1, Item 8) counterclockwise to the zero position until FSII pump diaphragm (Figure 1, Item 10) has cleared adapter ring (Figure 1, Item 11).
9. Remove FSII pump diaphragm (Figure 1, Item 10) by rotating counterclockwise.
10. Discard FSII pump diaphragm (Figure 1, Item 10).
11. Remove drain pan and dispose of contents per local procedures.

**END OF TASK**

**FSII INJECTOR PUMP DIAPHRAGM INSTALLATION**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use two wrenches to connect fittings to prevent damage. Failure to comply will result in damage to fittings.

1. Install new FSII pump diaphragm (Figure 1, Item 10) into FSII injector pump (Figure 1, Item 1) by rotating clockwise.

2. Rotate stroke adjustment knob (Figure 1, Item 8) clockwise to position marked on power frame cover (Figure 1, Item 9).

3. Tighten setscrew (Figure 1, Item 7).

4. Position fluid end cap assembly (Figure 1, Item 3) on adapter ring (Figure 1, Item 11), ensuring alignment with discharge and suction tubes (Figure 1, Item 2, 4).

**WARNING**


When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

5. Apply antiseize compound to eight screws (Figure 1, Item 5).

6. Install eight new lockwashers (Figure 1, Item 6) and eight screws (Figure 1, Item 5) through fluid end cap assembly (Figure 1, Item 3) into adapter ring (Figure 1, Item 11).

7. Hand tighten eight screws (Figure 1, Item 5) finger tight.

**A I N**

Failure to torque screws to 40 in. lb (4.52 N-m) will reduce pump head performance, resulting in insufficient injection ratio.

Repeat torque only one time. Failure to comply can cause diaphragms to fail.

**FSII INJECTOR PUMP DIAPHRAGM INSTALLATION - CONTINUED**

8. Using torque wrench and torque sequence diagram (Figure 2), torque eight screws (Figure 1, Item 5) to 40 in. lb (4.52 N-m).

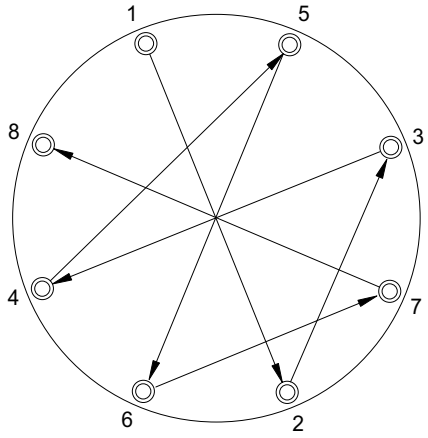



Figure 2. Torque Sequence Diagram.

9. Connect suction tube (Figure 1, Item 4) to fluid end cap assembly (Figure 1, Item 3). Tighten suction tube (Figure 1, Item 4).
10. Connect discharge tube (Figure 1, Item 2) to fluid end cap assembly (Figure 1, Item 3). Tighten discharge tube (Figure 1, Item 2).
11. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# CI AND SDA INJECTOR PUMP LIP SEAL REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber(WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Wrench, torque, 3/8 in. sqdr 0–300 in. lb (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

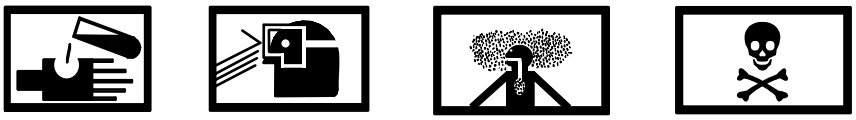
Kit, fuel spill control (WP 0070 Item 6)
Pan, drain (WP 0067, Item 2)
Antiseize compound (WP 0070, Item 1)
Washer, lock (8) (WP 0071, Item 12)
O-ring (WP 0071, Item 9)
Seal, lip (WP 0071, Item 2)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.

## CI AND SDA INJECTOR PUMP LIP SEAL REMOVAL

**WARNING**



CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Place drain pans below CI and SDA injector pump (Figure 1, Item 1).
2. Remove four screws (Figure 1, Item 2) and four lockwashers (Figure 1, Item 3) from fluid end cap assembly (Figure 1, Item 4).
3. Discard lockwashers (Figure 1, Item 3).

**CI AND SDA INJECTOR PUMP LIP SEAL REMOVAL - CONTINUED**

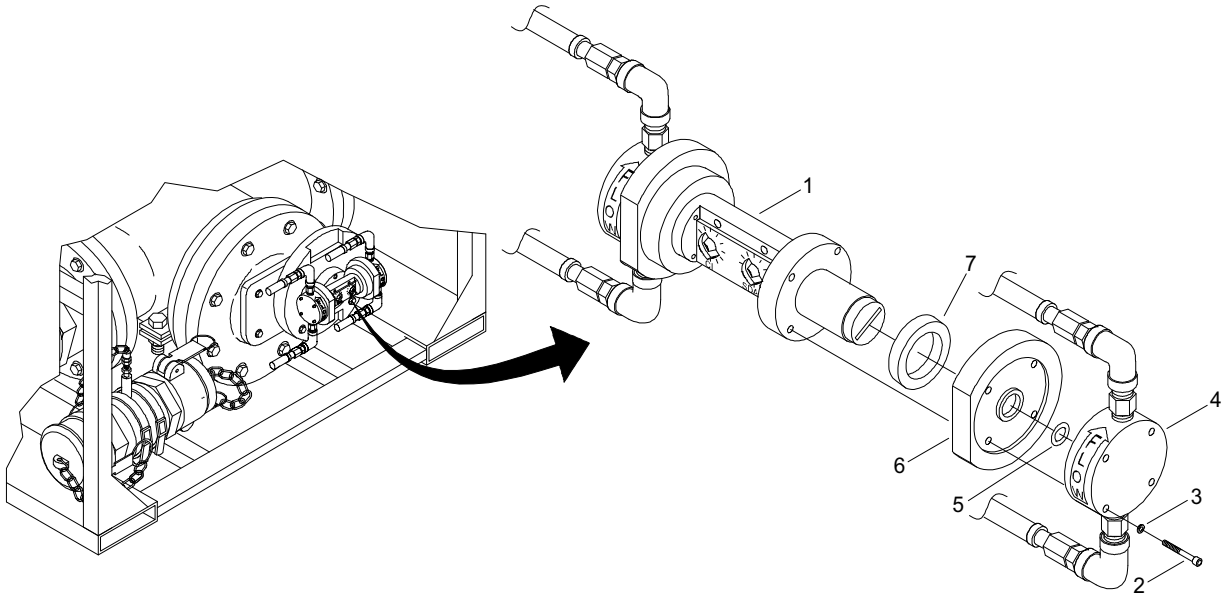



Figure 1. CI and SDA Pump Lip Seal.

4. Remove fluid end cap assembly (Figure 1, Item 4).
5. Remove o-ring (Figure 1, Item 5) from adapter seal (Figure 1, Item 6).
6. Remove adapter seal (Figure 1, Item 6) from CI and SDA injector pump (Figure 1, Item 1).
7. Remove lip seal (Figure 1, Item 7) from adapter seal (Figure 1, Item 6).
8. Discard lip seal (Figure 1, Item 7) and o-ring (Figure 1, Item 5).
9. Remove drain pans and dispose of contents per local procedures.

**END OF TASK**

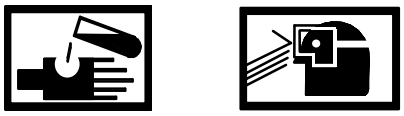
**CI AND SDA INJECTOR PUMP LIP SEAL INSTALLATION**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Install new lip seal (Figure 1, Item 7) in adapter seal (Figure 1, Item 6).
2. Install adapter seal (Figure 1, Item 6) on CI and SDA injector pump (Figure 1, Item 1).
3. Install new o-ring (Figure 1, Item 5) in fluid end cap assembly (Figure 1, Item 4).
4. Position fluid end cap assembly (Figure 1, Item 4) on adapter seal (Figure 1, Item 6).

**WARNING**




When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

5. Apply antiseize compound to four screws (Figure 1, Item 2).
6. Install four new lockwashers (Figure 1, Item 3) and four screws (Figure 1, Item 2) through fluid end cap assembly (Figure 1, Item 4) into adapter seal (Figure 1, Item 6).
7. Tighten four screws (Figure 1, Item 2) finger tight.

**A I N**

Failure to torque screws to 40 in. lb (4.52 N-m) will reduce pump head performance, resulting in insufficient injection ratio.

Repeat torque only one time. Failure to comply can cause adapter seal to fail.

Using a torque wrench and torque pattern diagram (Figure 2), torque screws (Figure 1, Item 2) to 40 in. lb (4.52 N-m).

**CI AND SDA INJECTOR PUMP LIP SEAL INSTALLATION - CONTINUED**

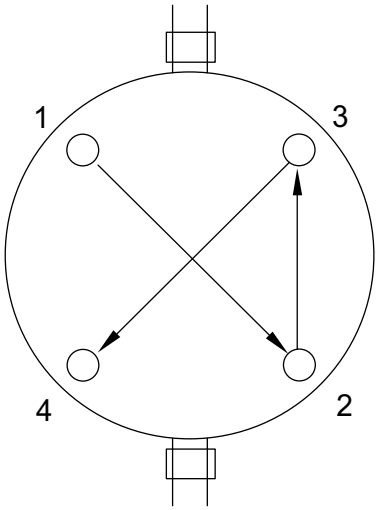



Figure 2. Torque Pattern Diagram.

8. Clean up spilled fluid with fuel spill control kit and dispose of fuel spill control kit waste per local procedures.

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FSII INJECTOR PUMP
# REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Pliers, retaining ring (WP 0067, Item 2)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Kit, fuel spill control (WP 0070, Item 6)
Pan, drain (WP 0067, Item 2)
Antiseize compound (WP 0070, Item 1)
Washer, lock (4) (WP 0071, Item 12)
Washer, lock (4) (WP 0071, Item 1)
Washer, lock (2) (WP 0071, Item 11)
O-ring (2) (WP 0071, Item 4)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
FSII injector pump diaphragm removed (WP 0044).
FSII injector pump discharge check valves removed (WP 0043).

## FSII INJECTOR PUMP REMOVAL

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Position drain pans below FSII injector pump assembly (Figure 1, Item 1).
2. Loosen stroke adjustment setscrews (Figure 1, Item 2) on bottom of FSII injector pump assembly (Figure 1, Item 1).
3. Loosen two setscrews (Figure 1, Item 3) from stroke adjustment knobs (Figure 1, Item 4).
4. Remove stroke adjustment knobs (Figure 1, Item 4) from the stroke adjustment cams (Figure 1, Item 5).
5. Remove stroke indicator (Figure 1, Item 6) from the stroke adjustment cams (Figure 1, Item 5).

**FSII INJECTOR PUMP REMOVAL - CONTINUED**

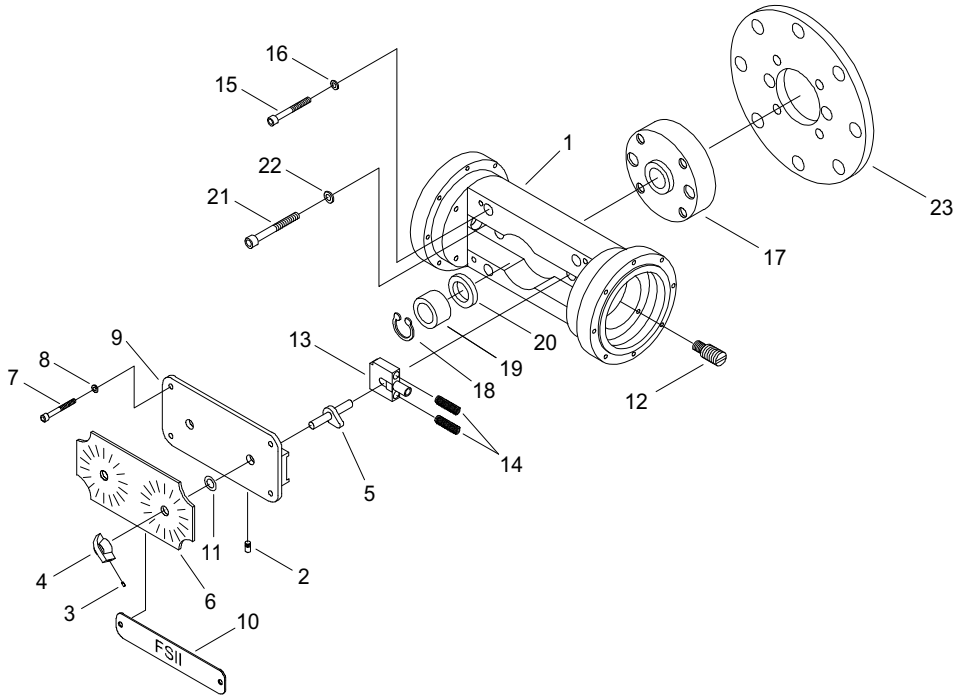



Figure 1. FSII Injector Pump Assembly.

6. Remove four screws (Figure 1, Item 7) and four lockwashers (Figure 1, Item 8) securing cam guide cover (Figure 1, Item 9) and FSII indicator tag (Figure 1, Item 10) to stroke adjustment cams (Figure 1, Item 5). Discard four lockwashers (Figure 1, Item 8).

7. Remove FSII indicator tag (Figure 1, Item 10) from cam guide cover (Figure 1, Item 9).

8. Remove cam guide cover (Figure 1, Item 9) and stroke adjustment cams (Figure 1, Item 5) from FSII injector pump assembly (Figure 1, Item 1).

9. Remove two o-rings (Figure 1, Item 11) from cam guide cover (Figure 1, Item 9). Discard o-rings (Figure 1, Item 11).

10. Remove stroke adjustment cams (Figure 1, Item 5) from cam guide cover (Figure 1, Item 9).

11. Remove two adapter screws (Figure 1, Item 12) from FSII injector pump assembly (Figure 1, Item 1).

12. Remove two crossheads (Figure 1, Item 13) and four springs (Figure 1, Item 14) from FSII injector pump assembly (Figure 1, Item 1).

13. Remove four screws (Figure 1, Item 15) and four lockwashers (Figure 1, Item 16) securing FSII injector pump assembly (Figure 1, Item 1) to bearing cap (Figure 1, Item 17). Discard lockwashers (Figure 1, Item 16).

14. Using retaining ring pliers, remove retaining ring (Figure 1, Item 18) from eccentric drive bearing (Figure 1, Item 19).

15. Remove eccentric drive bearing (Figure 1, Item 19) and spacer (Figure 1, Item 20) from FSII injector pump assembly (Figure 1, Item 1).

**FSII INJECTOR PUMP REMOVAL - CONTINUED**

16. Remove two screws (Figure 1, Item 21) and two lockwashers (Figure 1, Item 22) securing FSII injector pump assembly (Figure 1, Item 1) to bearing cap (Figure 1, Item 17). Discard lockwashers (Figure 1, Item 22).
17. Remove FSII injector pump assembly (Figure 1, Item 1) and bearing cap (Figure 1, Item 17) from end plate (Figure 1, Item 23).
18. Remove drain pans and dispose of contents per local procedures.

**END OF TASK**

**FSII INJECTOR PUMP INSTALLATION**

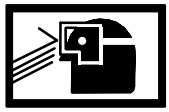
**N**

The eccentric drive bearing is mounted off-center on the shaft. It may be necessary to move the pump power frame in a circle to locate the center of the hole in the rear of the frame.

1. Position bearing cap (Figure 1, Item 17) and FSII injector pump assembly (Figure 1, Item 1) on end plate (Figure 1, Item 23).

**WARNING**

CHEMICAL



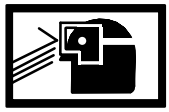
EYE PROTECTION

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

2. Apply antiseize compound to two screws (Figure 1, Item 21).
3. Install two new lockwashers (Figure 1, Item 22) and two screws (Figure 1, Item 21) through FSII injector pump assembly (Figure 1, Item 1) and bearing cap (Figure 1, Item 17) into end plate (Figure 1, Item 23). Tighten two screws (Figure 1, Item 21).
4. Position spacer (Figure 1, Item 20) and eccentric drive bearing (Figure 1, Item 19) in FSII injector pump assembly (Figure 1, Item 1).
5. Using retaining ring pliers, install retaining ring (Figure 1, Item 18) on eccentric drive bearing (Figure 1, Item 19).

**WARNING**

CHEMICAL



EYE PROTECTION

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

**FSII INJECTOR PUMP INSTALLATION - CONTINUED**

6. Apply antiseize compound to four screws (Figure 1, Item 15).

7. Install four new lockwashers (Figure 1, Item 16) and four screws (Figure 1, Item 15) through FSII injector pump assembly (Figure 1, Item 1) and bearing cap (Figure 1, Item 17) into end plate (Figure 1, Item 23). Tighten four screws (Figure 1, Item 15).

8. Install four springs (Figure 1, Item 14) and two crossheads (Figure 1, Item 13) in FSII injector pump assembly (Figure 1, Item 1).

9. Install two adapter screws (Figure 1, Item 12) on FSII injector pump assembly (Figure 1, Item 1).

10. Install stroke adjustment cams (Figure 1, Item 5) in cam guide cover (Figure 1, Item 9).

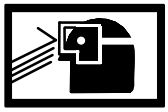
11. Install two new o-rings (Figure 1, Item 11) on cam guide cover (Figure 1, Item 9).

12. Install cam guide cover (Figure 1, Item 9) and stroke adjustment cams (Figure 1, Item 5) on FSII injector pump assembly (Figure 1, Item 1).

13. Position FSII indicator tag (Figure 1, Item 10) on cam guide cover (Figure 1, Item 9).

**WARNING**

**CHEMICAL**



**EYE PROTECTION**

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

14. Apply antiseize compound to four screws (Figure 1, Item 7).

15. Install four new lockwashers (Figure 1, Item 8) and four screws (Figure 1, Item 7) to secure cam guide cover (Figure 1, Item 9) and FSII indicator tag (Figure 1, Item 10) on FSII injector pump assembly (Figure 1, Item 1).

16. Install stroke indicator (Figure 1, Item 6) on stroke adjustment cams (Figure 1, Item 5).

17. Position stroke adjustment knobs (Figure 1, Item 4) onto stoke adjustment cams (Figure 1, Item 5).

18. Tighten two setscrews (Figure 1, Item 3) on stroke adjustment knobs (Figure 1, Item 4).

19. Tighten stroke adjustment setscrews (Figure 1, Item 2) on bottom of FSII injector pump assembly (Figure 1, Item 1).

20. Install FSII injector pump diaphragm (WP 0044).

21. Install FSII pump discharge check valves (WP 0043).

**END OF TASK**

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# CI AND SDA INJECTOR PUMP
# REPLACEMENT

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Pliers, retaining ring (WP 0067, Item 2)

**Personnel Required**

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**Materials/Parts**

Kit, fuel spill control (WP 0070, Item 6)
Pan, drain (WP 0067, Item 2)
Antiseize compound (WP 0070, Item 1)
Washer, lock (4) (WP 0071, Item 12)
Washer, lock (4) (WP 0071, Item 1)
Washer, lock (2) (WP 0071, Item 11)
O-ring (2) (WP 0071, Item 4)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
CI and SDA injector pump suction check valves removed (WP 0037).
CI and SDA injector pump discharge check valves removed (WP 0038).
CI and SDA injector pump lip seals removed (WP 0045).

## CI AND SDA INJECTOR PUMP REMOVAL

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

1. Position drain pans below CI and SDA injector pump assembly (Figure 1, Item 1).
2. Loosen stroke adjustment setscrews (Figure 1, Item 2) on bottom of CI and SDA injector pump assembly (Figure 1, Item 1).
3. Loosen two setscrews (Figure 1, Item 3) on stroke adjustment knobs (Figure 1, Item 4).
4. Remove stroke adjustment knobs (Figure 1, Item 4) from the stroke adjustment cams (Figure 1, Item 5).
5. Remove stroke indicator (Figure 1, Item 6) from the stroke adjustment cams (Figure 1, Item 5).

**CI AND SDA INJECTOR PUMP REMOVAL - CONTINUED**

6. Remove four screws (Figure 1, Item 7) and four lockwashers (Figure 1, Item 8) securing cam guide cover (Figure 1, Item 9) and CI and SDA indicator tag (Figure 1, Item 10) to stroke adjustment cams (Figure 1, Item 5). Discard four lockwashers (Figure 1, Item 8).

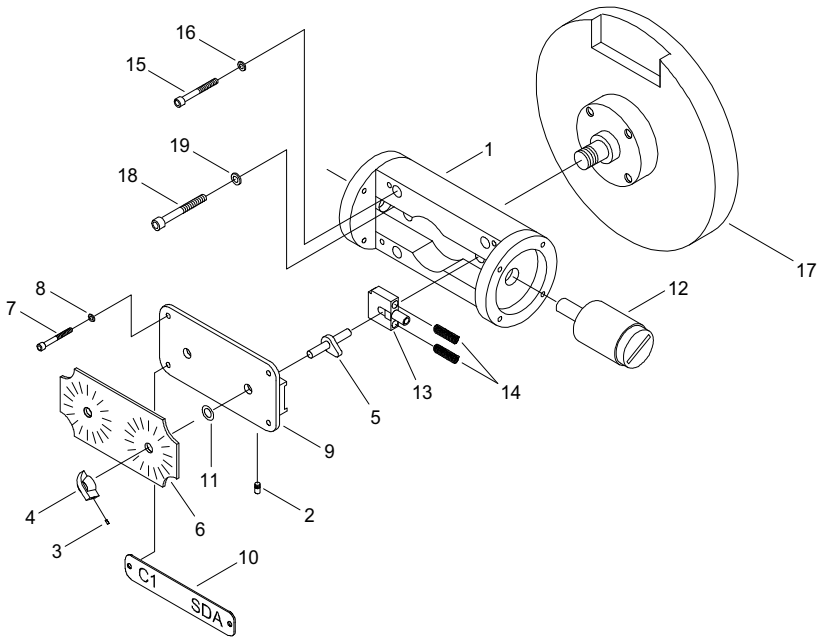



Figure 1. CI and SDA Injector Pump Assembly.

7. Remove CI and SDA indicator tag (Figure 1, Item 10) from cam guide cover (Figure 1, Item 9).

8. Remove cam guide cover (Figure 1, Item 9) and stroke adjustment cams (Figure 1, Item 4) from CI and SDA injector pump assembly (Figure 1, Item 1).

9. Remove two o-rings (Figure 1, Item 11) from cam guide cover (Figure 1, Item 9). Discard o-rings (Figure 1, Item 11).

10. Remove stroke adjustment cams (Figure 1, Item 5) from cam guide cover (Figure 1, Item 9).

11. Remove two plungers (Figure 1, Item 12) from CI and SDA injector pump assembly (Figure 1, Item 1).

**N**

The eccentric drive bearing is mounted off-center on the shaft. It may be necessary to move the pump power frame in a circle to remove both crossheads.

12. Remove two crossheads (Figure 1, Item 13) and four springs (Figure 1, Item 14) from CI and SDA injector pump assembly (Figure 1, Item 1).

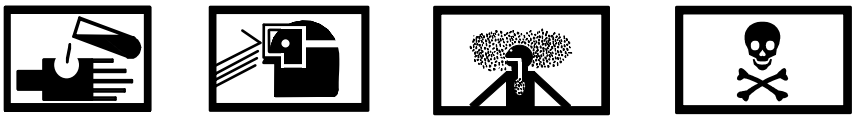
13. Remove four screws (Figure 1, Item 15) and four lockwashers (Figure 1, Item 16) securing CI and SDA injector pump assembly (Figure 1, Item 1) to gear housing (Figure 1, Item 17). Discard four lockwashers (Figure 1, Item 16).

**CI AND SDA INJECTOR PUMP REMOVAL - CONTINUED**

14. Remove two screws (Figure 1, Item 18) and two lockwashers (Figure 1, Item 19) securing CI and SDA injector pump assembly (Figure 1, Item 1) to gear housing (Figure 1, Item 17). Discard lockwashers (Figure 1, Item 19).

15. Remove CI and SDA injector pump assembly (Figure 1, Item 1) from gear housing (Figure 1, Item 17).

**WARNING**



CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

16. Remove drain pans and dispose of contents per local procedures.

**TASK OF TASK**

**CI AND SDA INJECTOR PUMP INSTALLATION**

**N**

The eccentric drive bearing is mounted off-center on the shaft. It may be necessary to move the pump power frame in a circle to locate the center of the hole in the rear of the frame.

1. Install CI and SDA injector pump assembly (Figure 1, Item 1) onto gear housing (Figure 1, Item 17).

**WARNING**

CHEMICAL EYE PROTECTION

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

2. Apply antiseize compound to two screws (Figure 1, Item 18).

3. Install two new lockwashers (Figure 1, Item 19) and two screws (Figure 1, Item 18) through CI and SDA injector pump assembly (Figure 1, Item 1) into gear housing (Figure 1, Item 17). Tighten two screws (Figure 1, Item 18).

4. Apply antiseize compound to four screws (Figure 1, Item 15).

**CI AND SDA INJECTOR PUMP INSTALLATION - CONTINUED**

5. Install four new lockwashers (Figure 1, Item 16) and four screws (Figure 1, Item 15) through CI and SDA injector pump assembly (Figure 1, Item 1) into gear housing (Figure 1, Item 17). Tighten four screws (Figure 1, Item 15).

6. Install four springs (Figure 1, Item 14) and two crossheads (Figure 1, Item 13) on CI and SDA injector pump assembly (Figure 1, Item 1).

7. Install two plungers (Figure 1, Item 12) on CI and SDA injector pump assembly (Figure 1, Item 1). Tighten plungers (Figure 1, Item 12).

8. Install stroke adjustment cams (Figure 1, Item 5) in cam guide cover (Figure 1, Item 9).

9. Install two new o-rings (Figure 1, Item 11) on cam guide cover (Figure 1, Item 9).

10. Install cam guide cover (Figure 1, Item 9) and stroke adjustment cams (Figure 1, Item 5) on CI and SDA injector pump assembly (Figure 1, Item 1).

11. Position CI and SDA indicator tag (Figure 1, Item 10) on cam guide cover (Figure 1, Item 9).

**WARNING**

CHEMICAL

EYE PROTECTION

When working with antiseize compound, MIL-T-5544, avoid contact with eyes or skin. Wear protective rubber gloves and chemical splash goggles. Use in a well ventilated area. Failure to comply could cause injury or death to personnel.

12. Apply antiseize compound to four screws (Figure 1, Item 7).

13. Install four new lockwashers (Figure 1, Item 8) and four screws (Figure 1, Item 7) to secure CI and SDA indicator tag (Figure 1, Item 10) and cam guide cover (Figure 1, Item 9) to CI and SDA injector pump assembly (Figure 1, Item 1).

14. Install stroke indicator (Figure 1, Item 6) on stroke adjustment cams (Figure 1, Item 5).

15. Position stroke adjustment knobs (Figure 1, Item 4) onto stoke adjustment cams (Figure 1, Item 5).

16. Tighten two setscrews (Figure 1, Item 3) on stroke adjustment knobs (Figure 1, Item 4).

17. Tighten stroke adjustment setscrews (Figure 1, Item 2) on bottom of CI and SDA injector pump assembly (Figure 1, Item 1).

18. Install CI and SDA injector pump lip seals (WP 0045).

19. Install CI and SDA pump suction check valves (WP 0037).

20. Install CI and SDA pump discharge check vales (WP 0038).

**END OF TASK**

**END OF WORK PACKAGE**

**FIELD MAINTENANCE**
**FUEL ADDITIVE INJECTOR ASSEMBLY**
**FLUID MOTOR REPAIR**

**INITIAL SETUP:**

**Tools**

Tool kit, general mechanic's (WP 0067, Item 1)
Apron, utility (WP 0067, Item 2)
Gloves, rubber (WP 0067, Item 2)
Goggles, industrial (WP 0067, Item 2)
Pliers, retaining ring (WP 0067, Item 2)
Press, arbor, hand operated (WP 0067, Item 11)

**Personnel Required**

Quartermaster and Chemical Repairman 63J

**Materials/Parts**

Cleaning compound, solvent (WP 0070, Item 2)
Cloth, cleaning (WP 0070, Item 4)
Petrolatum, technical (WP 0070, Item 7)
Kit, fuel spill control (WP 0070, Item 6)
Pan, drain (WP 0067, Item 2)
Washer, lock (8) (WP 0071, Item 13)
Washer, lock (8) (WP 0071, Item 14)
O-ring (WP 0071, Item 15)

**Equipment Condition**

System set on level ground in protected area and detached from fuel system.
FSII injector pump removed (WP 0044).
CI and SDA injector pump removed (WP 0045).

## FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR DISASSEMBLY

**WARNING**

CHEMICAL EYE PROTECTION VAPOR POISON

When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use of the incorrect size retaining ring pliers will distort the snap ring during removal. A distorted snap ring must be replaced.

**N**

The fuel additive injector pump fluid motor can be disassembled from either the FSII injector pump side or the CI and SDA injector pump side of the motor, which is preferred.

To aid in the assembly of the fuel additive injector pump fluid motor, lay the parts out, in order, as they are removed.

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR DISASSEMBLY–CONTINUED**

1. Position drain pan below fuel additive injector pump fluid motor housing (Figure 1, Item 1).

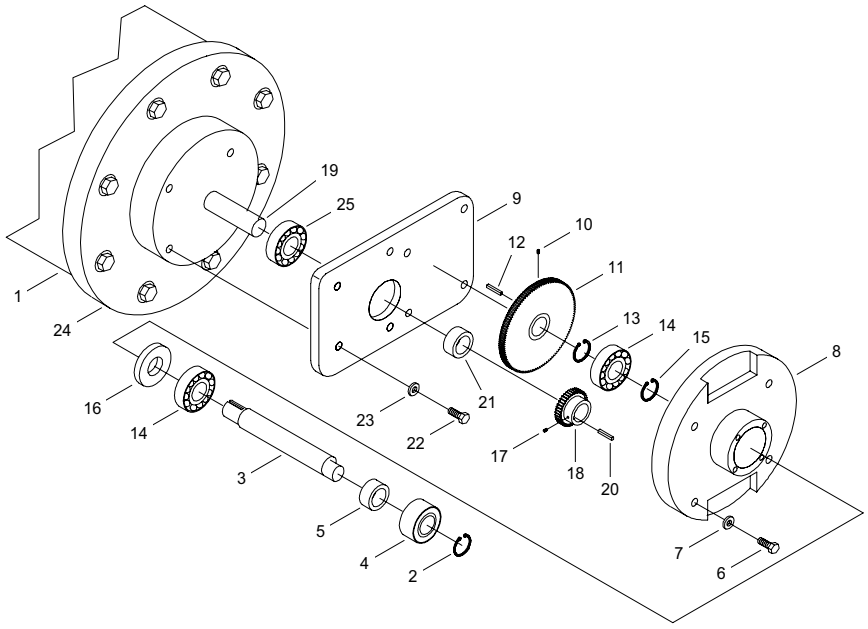



Figure 1. Fuel Additive Injector Pump Bearing Housing.

2. Using retaining ring pliers, remove snap ring (Figure 1, Item 2) from output shaft (Figure 1, Item 3).

3. Remove drive bearing (Figure 1, Item 4) and spacer (Figure 1, Item 5) from output shaft (Figure 1, Item 3).

4. Remove four bolts (Figure 1, Item 6) and four lockwashers (Figure 1, Item 7) from gear housing (Figure 1, Item 8).

5. Discard four lockwashers (Figure 1, Item 7).

6. Remove gear housing (Figure 1, Item 8) from adapter plate (Figure 1, Item 9).

7. Loosen setscrew (Figure 1, Item 10) and remove gear (Figure 1, Item 11) from gear housing (Figure 1, Item 8).

8. Remove key (Figure 1, Item 12) from output shaft (Figure 1, Item 3).

9. Using retaining ring pliers, remove snap ring (Figure 1, Item 13) from output shaft (Figure 1, Item 3).

10. Using arbor press, remove output shaft (Figure 1, Item 3) and two bearings (Figure 1, Item 14) from gear housing (Figure 1, Item 8).

11. Using retaining ring pliers, remove snap ring (Figure 1, Item 15) from output shaft (Figure 1, Item 3).

12. Remove seal (Figure 1, Item 16) from gear housing (Figure 1, Item 8).

13. Loosen setscrew (Figure 1, Item 17) and remove gear (Figure 1, Item 18) from shaft (Figure 1, Item 19).

14. Remove key (Figure 1, Item 20) and spacer (Figure 1, Item 21) from shaft (Figure 1, Item 19).

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR DISASSEMBLY - CONTINUED**

15. Remove four bolts (Figure 1, Item 22) and four lockwashers (Figure 1, Item 23) from adapter plate (Figure 1, Item 9).

16. Discard four lockwashers (Figure 1, Item 23).

17. Remove adapter plate (Figure 1, Item 9) from end plate (Figure 1, Item 24).

18. Remove bearing (Figure 1, Item 25) from adapter plate (Figure 1, Item 9).

19. Using retaining ring pliers, remove snap ring (Figure 2, Item 1) from shaft (Figure 2, Item 2).

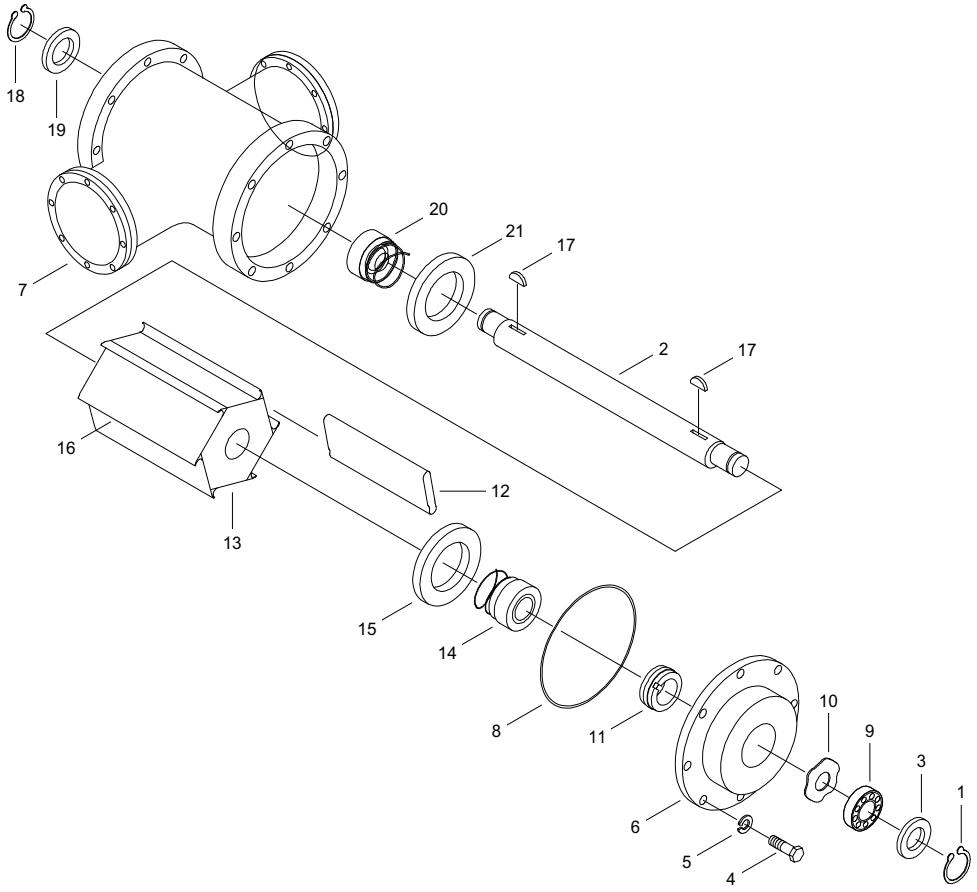



Figure 2. Fuel Additive Injector Pump Fluid Motor.

20. Remove thrust washer (Figure 2, Item 3) from shaft (Figure 2, Item 2).

**A I N**

To reduce uneven stress on end plate, end plate bolts must be removed in a crisscross pattern.

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR DISASSEMBLY - CONTINUED**

21. Remove eight bolts (Figure 2, Item 4) and eight lockwashers (Figure 2, Item 5) from end plate (Figure 2, Item 6).
22. Discard eight lockwashers (Figure 2, Item 5).

**A I N**

During removal of end plate, do not drag end plate against shaft, as damage to shaft may occur.

**N**

Observe the location of the alignment pin at the top of the fuel additive injector pump housing to aid in reinstallation of the end plate onto the fuel additive injector pump fluid motor housing.

23. While supporting end plate (Figure 2, Item 6) evenly with both hands, carefully remove end plate (Figure 2, Item 6) from the fuel additive injector pump fluid motor housing (Figure 2, Item 7).
24. Remove o-ring (Figure 2, Item 8) from end plate (Figure 2, Item 6).
25. Discard o-ring (Figure 2, Item 8).
26. Remove bearing (Figure 2, Item 9) and spring washer (Figure 2, Item 10) from end plate (Figure 2, Item 6).
27. Remove ceramic seal (Figure 2, Item 11) from end plate (Figure 2, Item 6).

**N**

Observe the relationship of the teflon vanes and the discharge vent in the housing prior to removing the teflon vanes to aid in reinstallation of end plate onto fuel additive injector pump assembly fluid motor housing.

28. Perform the following inspection steps prior to removal of six teflon vanes (Figure 2, Item 12):

**N**

Teflon vanes are replaced as a matched set. If replaced individually, the performance of the fuel additive injector pump fluid motor will be rough.

a. Inspect the position of six teflon vanes (Figure 2, Item 12) and how they lay against fluid additive injector pump fluid motor housing (Figure 2, Item 7). If teflon vanes (Figure 2, Item 12) do not lay flat against fluid additive injector pump fluid motor housing (Figure 2, Item 7), replace six teflon vanes (Figure 2, Item 12).
b. Inspect each teflon vane (Figure 2, Item 12) for freedom of movement as they fall against the fuel additive injector pump fluid motor housing (Figure 2, Item 7). If teflon vanes (Figure 2, Item 12) are binding, replace six teflon vanes (Figure 2, Item 12).
c. Inspect each teflon vane (Figure 2, Item 12) for excessive wear in vane socket (Figure 2, Item 13). If teflon vane (Figure 2, Item 12) can be easily pulled out of vane socket (Figure 2, Item 13), replace six teflon vanes (Figure 2, Item 12).

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR DISASSEMBLY - CONTINUED**

29. Remove six teflon vanes (Figure 2, Item 12) from vane sockets (Figure 2, Item 13).

**A I N**

Do not touch the face of mechanical (carbon) seal during removal as damage to mechanical (carbon) seal may occur.

Do not drop mechanical (carbon) seal during removal as damage to mechanical (carbon) seal may occur.

30. Remove mechanical (carbon) seal (Figure 2, Item 14) from shaft (Figure 2, Item 2).

31. Remove wear ring (Figure 2, Item 15) from shaft (Figure 2, Item 2).

**WARNING**

**HEAVY PARTS**

The rotor weighs 28 lb. Both hands must be used to remove rotor from housing or serious injury to personnel could occur.

**A I N**

The vane sockets on rotor are very thin and could bend or break easily. Be careful not to damage vane sockets when setting rotor down.

32. Remove rotor (Figure 2, Item 16) from fuel additive injector pump fluid motor housing (Figure 2, Item 7).

33. Remove two keys (Figure 2, Item 17) from shaft (Figure 2, Item 2).

34. Using retaining ring pliers, remove snap ring (Figure 2, Item 18) from shaft (Figure 2, Item 2).

35. Remove thrust washer (Figure 2, Item 19) from shaft (Figure 2, Item 2).

**N**

During removal of shaft from fuel additive injector pump fluid motor housing, the FSII pump side bearing may fall out of end plate. If bearing falls out, reinstall bearing.

36. Pull firmly on shaft (Figure 2, Item 2) to remove from fuel additive injector pump fluid motor housing (Figure 2, Item 7).

**A I N**

Do not touch the face of mechanical (carbon) seal during removal, as damage to mechanical (carbon) seal may occur.

Do not drop mechanical (carbon) seal during removal, as damage to mechanical (carbon) seal may occur.

37. Remove mechanical (carbon) seal (Figure 2, Item 20) from shaft (Figure 2, Item 2).

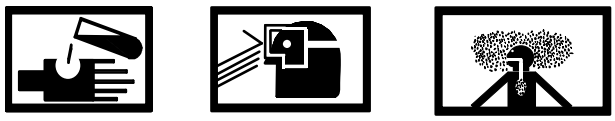
38. Remove wear ring (Figure 2, Item 21) from shaft (Figure 2, Item 2).

39. Remove drain pan and dispose of contents per local procedures.

**END OF TASK**

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR COMPONENTS CLEANING**

**WARNING**



CHEMICAL EYE PROTECTION VAPOR

When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal.

1. Using a dry cleaning cloth, clean bearings, seals, snap rings, bolts, washers, teflon vanes, keys and rotor free of all fuel and debris.

2. Using a cleaning cloth lightly dampened with solvent cleaning compound, clean shaft, end plates and inside fuel additive injector pump fluid motor housing free of all fuel and debris.

**END OF TASK**

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR COMPONENTS INSPECTION**

**N**

Excessive wear and scratches in the housing and end plates may increase the wear rate of the teflon vanes and reduce efficiency in the lower flow ranges of the system.

1. Inspect fuel additive injector pump fluid motor housing for nicks, gouges, excessive scratches and wear. If nicks, gouges, excessive scratches or wear is found, replace with serviceable like Item.

2. Inspect fuel additive injector pump fluid motor housing for evidence of leakage on either the FSII injector pump side or the CI and SDA injector pump side of the motor. If evidence of leakage is found, replace mechanical (carbon) seal on the side of the fuel additive injector pump fluid motor housing that is leaking.

3. Inspect end plate for nicks, gouges, excessive scratches and wear. If nicks, gouges, excessive scratches or wear is found, replace with serviceable like Item.

4. Inspect shaft for nicks, gouges, excessive scratches and wear. If nicks, gouges, excessive scratches or wear is found, replace with serviceable like Item.

5. Inspect rotor, especially on each end, for wear, breakage of the vane sockets and wear of the anodized coating. If wear, breakage of the vane sockets or wear of the anodized coating is found, replace with serviceable like Item.

6. Inspect snap rings, seals and wear rings for wear and tear. If wear and tear is found, replace with serviceable like Item.

7. Inspect bearings for evidence of overheating, pitting or roughness while turning. Bearings must spin freely. If bearings are burned, pitted or rough while turning, replace bearings.

**END OF TASK**

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR ASSEMBLY**

**WARNING**


When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives and an eye wash station and safety shower should be available. Can be toxic, harmful or fatal, if absorbed through skin or inhaled in large quantities. May irritate respiratory tract. Can affect central nervous system. Ingestion can cause pulmonary edema, hemorrhaging and/or be fatal.

**A I N**

Use of the incorrect size retaining ring pliers will distort the snap ring during removal. A distorted snap ring must be replaced.

**N**

The fuel additive injector pump fluid motor must be assembled from the same side that disassembly occurred.

During installation, pay particular attention to the direction of flow and installation procedures for the rotor, ceramic seal and mechanical (carbon) seal.

1. Lightly coat wear ring (Figure 2, Item 21) with petrolatum and install on shaft (Figure 2, Item 2).

**A I N**

Do not touch the face of mechanical (carbon) seal during installation, as damage to mechanical (carbon) seal may occur.

Do not drop mechanical (carbon) seal during installation, as damage to mechanical (carbon) seal may occur.

2. Install mechanical (carbon) seal (Figure 2, Item 20) on shaft (Figure 2, Item 2).

**N**

During installation of shaft in fuel additive injector pump fluid motor housing, ensure the FSII pump side bearing does not fall out of end plate.

3. Install shaft (Figure 2, Item 2) in fuel additive injector pump fluid motor housing (Figure 2, Item 7).

4. Install thrust washer (Figure 2, Item 19) on shaft (Figure 2, Item 2).

5. Using retaining ring pliers, install snap ring (Figure 2, Item 18) on shaft (Figure 2, Item 2).

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR ASSEMBLY - CONTINUED**

6. Install two keys (Figure 2, Item 17) on shaft (Figure 2, Item 2).

**WARNING**

**HEAVY PARTS**

The rotor weighs 28 lb. Both hands must be used to install rotor in housing. Failure to comply could result in serious injury to personnel or damage to equipment.

7. Install rotor (Figure 2, Item 16) in fuel additive injector pump fluid motor housing (Figure 2, Item 7).

8. Lightly coat wear ring (Figure 2, Item 15) with petrolatum and install on shaft (Figure 2, Item 2).

**A I N**

Do not touch the face of mechanical (carbon) seal during installation, as damage to mechanical (carbon) seal may occur.

Do not drop mechanical (carbon) seal during installation, as damage to mechanical (carbon) seal may occur.

9. Install mechanical (carbon) seal (Figure 2, Item 14) on shaft (Figure 2, Item 2).

10. Install six teflon vanes (Figure 2, Item 12) in vane sockets (Figure 2, Item 13).

11. Lightly coat inside o-ring of ceramic seal (Figure 2, Item 11) with petrolatum and install in end plate (Figure 2, Item 6).

12. Install spring washer (Figure 2, Item 10) and bearing (Figure 2, Item 9) in end plate (Figure 2, Item 6).

13. Install new o-ring (Figure 2, Item 8) in groove of fuel additive injector pump fluid motor housing (Figure 2, Item 7).

**A I N**

During installation of the end plate, do not drag the plate against the shaft as damage to the shaft may occur.

14. While supporting end plate (Figure 2, Item 6) evenly with both hands, carefully install end plate (Figure 2, Item 6) onto fuel additive injector pump fluid motor housing (Figure 2, Item 7).

**A I N**

To reduce uneven stress on end plate, end plate bolts must be installed and tightened in a criss-cross pattern.

**N**

A leak free seal does not depend on tightness as the o-ring is compressed when the end plate and the housing are mated face-to-face. Just snug the bolts until the lockwashers are compressed flat.

15. Install eight new lockwashers (Figure 2, Item 5) and eight bolts (Figure 2, Item 4) on end plate (Figure 2, Item 6). Tighten bolts (Figure 2, Item 4).

**FUEL ADDITIVE INJECTOR ASSEMBLY FLUID MOTOR ASSEMBLY - CONTINUED**

16. Install thrust washer (Figure 2, Item 3) on shaft (Figure 2, Item 2).
17. Using retaining ring pliers, install snap ring (Figure 2, Item 1) on shaft (Figure 2, Item 2).
18. Install bearing (Figure 1, Item 25) on adapter plate (Figure 1, Item 9).
19. Install adapter plate (Figure 1, Item 9) on end plate (Figure 1, Item 24).
20. Install four new lockwashers (Figure 1, Item 23) and four bolts (Figure 1, Item 22) on adapter plate (Figure 1, Item 9). Tighten bolts (Figure 1, Item 22).
21. Install spacer (Figure 1, Item 21) and key (Figure 1, Item 20) on shaft (Figure 1, Item 19).
22. Install gear (Figure 1, Item 18) on shaft (Figure 1, Item 19) and tighten setscrew (Figure 1, Item 17).
23. Install seal (Figure 1, Item 16) in gear housing (Figure 1, Item 8).
24. Using retaining ring pliers, install snap ring (Figure 1, Item 15) on output shaft (Figure 1, Item 3).
25. Using arbor press, install output shaft (Figure 1, Item 3) and two bearings (Figure 1, Item 14) in gear housing (Figure 1, Item 8).
26. Using retaining ring pliers, install snap ring (Figure 1, Item 13) in output shaft (Figure 1, Item 3).
27. Install key (Figure 1, Item 12) on output shaft (Figure 1, Item 3).
28. Install gear (Figure 1, Item 11) in gear housing (Figure 1, Item 8) and tighten setscrew (Figure 1, Item 10).
29. Install gear housing (Figure 1, Item 8) on adapter plate (Figure 1, Item 9).
30. Install four new lockwashers (Figure 1, Item 7) and four bolts (Figure 1, Item 6) on gear housing (Figure 1, Item 8). Tighten bolts (Figure 1, Item 6).
31. Install spacer (Figure 1, Item 5) and drive bearing (Figure 1, Item 4) on output shaft (Figure 1, Item 3).
32. Using retaining ring pliers, install snap ring (Figure 1, Item 2) on output shaft (Figure 1, Item 3).
33. Install CI and SDA injector pump (WP 0047).
34. Install FSII injector pump (WP 0046).

**END OF TASK**

**END OF WORK PACKAGE**

**FIELD MAINTENANCE**
**FUEL ADDITIVE INJECTOR ASSEMBLY, TPI-4T-4A-1**
**TORQUE LIMITS**

## TORQUE LIMITS AND TORQUE TABLES

### WHEN TO USE TORQUE LIMITS

When a torque is not specified in an individual work package, use the procedures in this work package to determine proper torque limits and use of adapters with torque wrenches.

### WHEN TO USE ADAPTERS WITH TORQUE WRENCHES

When an adapter is necessary due to space or type of fitting being torqued, it must be determined how the adapter changes the amount of force applied. If the adapter increases or decreases the distance from the drive of the torque wrench to the fitting being torqued, an equation must be used to compensate for the difference.

### HOW TO USE ADAPTERS WITH TORQUE WRENCHES

**N**

The following abbreviations apply to the below procedures:

DT = Desired Torque
LT = Length of Torque Wrench
AL = Adapter Length
AT = Applied Torque

1. If the adapter used decreases the distance between the center of the torque wrench handle and the center of the drive, first find the desired torque for the fitting, then calculate as follows:

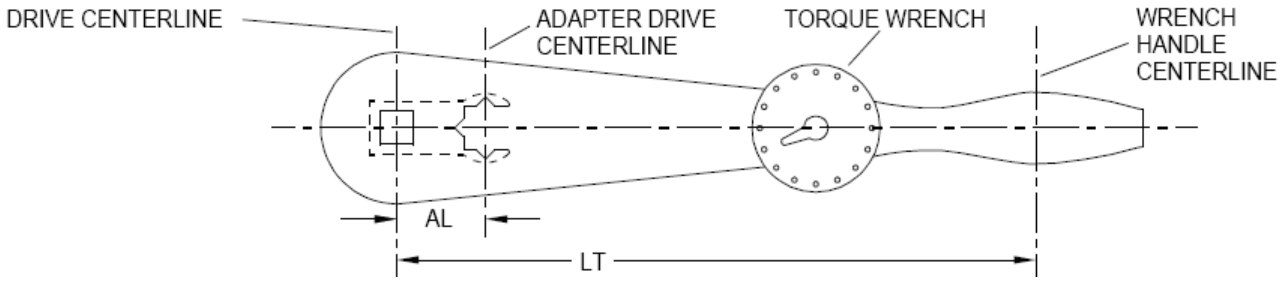



Figure 1. Torque Wrench.

   a. Multiply DT by LT.

   b. Subtract AL from LT.

   c. Divide the first answer by the second answer to find AT.

**HOW TO USE ADAPTERS WITH TORQUE WRENCHES – CONTINUED**

2. If the adapter used increases the distance between the center of the torque wrench handle and the center of the drive, first find the desired torque for the fitting, then calculate as follows:

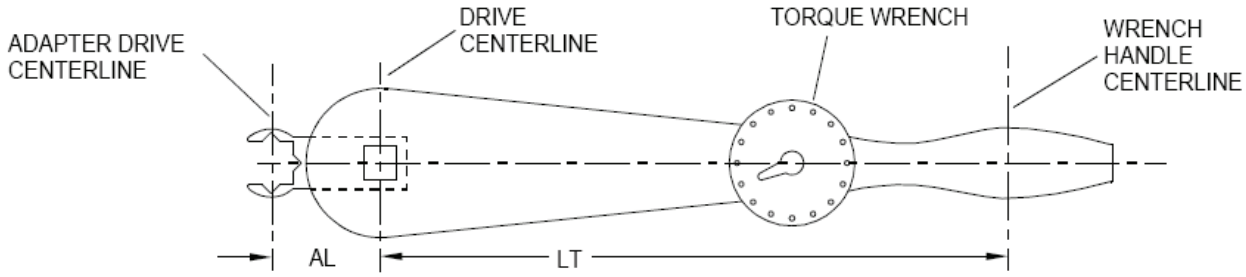



Figure 2. Torque Wrench.

a. Multiply DT by LT.

b. Add AL and LT.

c. Divide the first answer by the second answer to find AT.

**HOW TO USE TORQUE TABLES**

1. Measure the diameter of the bolt to be torqued.

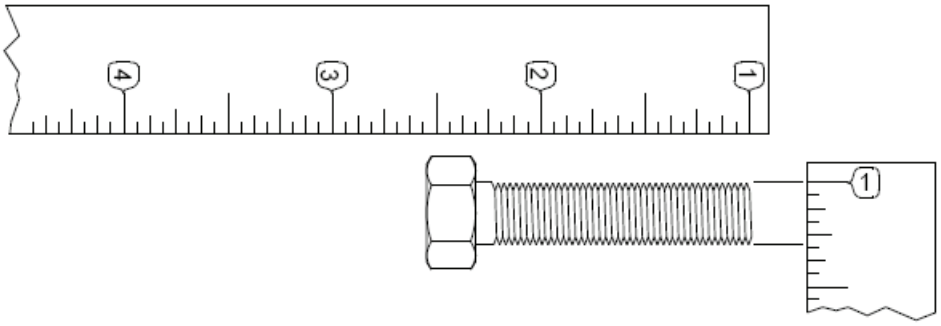



Figure 3. Torque Wrench Measurement.

2. For Society of Automotive Engineers (SAE) fasteners, determine the threads per inch by counting the threads. For metric fasteners, determine the thread pitch using a thread pitch gage.

3. Determine the type of markings on the bolt you are torquing by comparing the markings on the head of the bolt with the chart below.

**HOW TO USE TORQUE TABLES – CONTINUED**

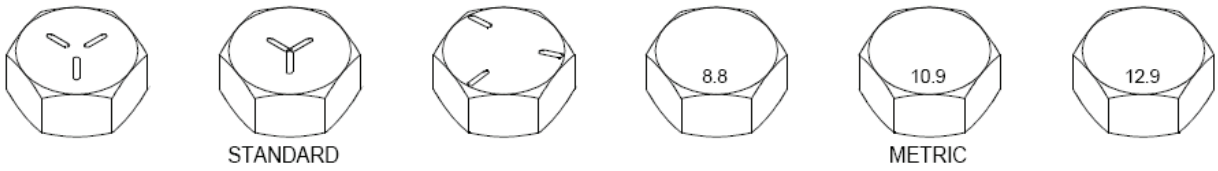



Figure 4. Torque Wrench Standard and Metric.

4. Determine if this will be a wet or dry torque.
   a. Wet torque is any bolt that is lubricated or coated with an antiseize compound.
   b. Dry torque is any bolt that is not lubricated or coated with an antiseize compound.
5. On the table below, locate the bolt to be torqued.
   a. Locate the diameter of the bolt.
   b. Determine the threads per inch for the SAE fastener or the thread pitch for the metric fastener.
   c. Slide across the table to the proper grade.
   d. Choose wet or dry.
   e. Slide down the proper column and across the proper row until they intersect, this is the proper torque value.

**Table 1. SAE Standard Torque Table.**

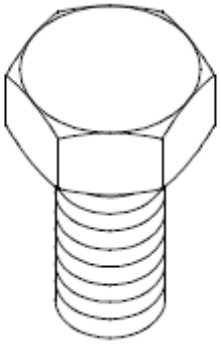
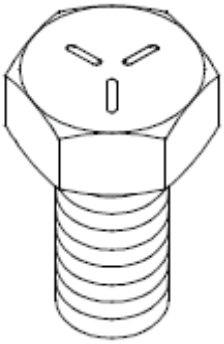
| | | SAE GRADE NO. 2 | | | | SAE GRADE NO. 5 | | | | SAE GRADE NO. 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | |  | | | |  | | | |
| | | DRY | | WET | | DRY | | WET | | DRY | | WET | |
| DIA IN. | THREADS PER IN. | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M |
| 1/4 | 20 | 66 | 7.46 | 49 | 5.54 | 101 | 11.41 | 76 | 8.58 | 143 | 16.15 | 107 | 12.09 |
| 1/4 | 28 | 75 | 8.47 | 56 | 6.33 | 116 | 13.10 | 87 | 9.83 | 164 | 18.53 | 123 | 13.89 |
| 5/16 | 18 | 135 | 15.25 | 101 | 11.41 | 209 | 23.61 | 157 | 17.73 | 295 | 33.32 | 221 | 24.96 |
| 5/16 | 24 | 150 | 17.17 | 112 | 12.65 | 230 | 25.98 | 173 | 19.54 | 327 | 36.94 | 245 | 27.68 |
| 3/8 | 16 | 240 | 27.11 | 180 | 20.33 | 370 | 41.80 | 278 | 31.40 | 523 | 59.08 | 392 | 44.28 |
| 3/8 | 24 | 272 | 30.73 | 204 | 23.04 | 420 | 47.44 | 315 | 35.58 | 593 | 66.99 | 445 | 50.27 |
| 7/16 | 14 | 384 | 43.38 | 288 | 32.53 | 593 | 66.99 | 445 | 50.27 | 837 | 94.55 | 628 | 70.94 |
| 7/16 | 20 | 428 | 48.35 | 321 | 36.26 | 662 | 74.78 | 496 | 56.03 | 935 | 105.62 | 700 | 79.07 |
| 1/2 | 13 | 585 | 66.08 | 439 | 49.59 | 904 | 102.12 | 678 | 76.59 | 1277 | 144.25 | 958 | 108.22 |
| 1/2 | 20 | 660 | 74.55 | 495 | 55.92 | 1020 | 115.22 | 764 | 86.30 | 1440 | 162.66 | 1080 | 122.00 |

**Table 2. SAE Standard Torque Table.**

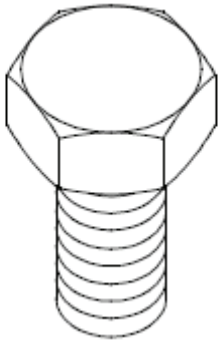
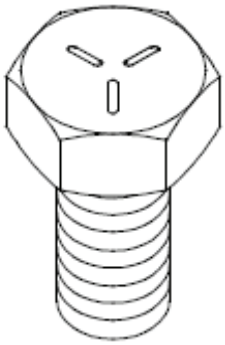
| | | SAE GRADE NO. 2 | | | | SAE GRADE NO. 5 | | | | SAE GRADE NO. 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | |  | | | |  | | | |
| | | DRY | | WET | | DRY | | WET | | DRY | | WET | |
| DIA IN. | THREADS PER IN. | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M |
| 9/16 | 12 | 70 | 94.92 | 53 | 71.87 | 109 | 147.80 | 82 | 111.19 | 154 | 208.82 | 115 | 155.94 |
| 9/16 | 18 | 78 | 105.77 | 59 | 80.00 | 121 | 164.08 | 91 | 123.40 | 171 | 231.88 | 128 | 173.57 |
| 5/8 | 11 | 97 | 131.53 | 73 | 98.99 | 150 | 203.40 | 113 | 153.23 | 212 | 287.47 | 159 | 215.60 |
| 5/8 | 18 | 110 | 149.16 | 82 | 111.19 | 170 | 230.52 | 127 | 172.21 | 240 | 325.44 | 180 | 244.08 |
| 3/4 | 10 | 172 | 233.23 | 129 | 174.92 | 269 | 364.76 | 201 | 272.56 | 376 | 509.86 | 282 | 382.39 |
| 3/4 | 16 | 192 | 260.35 | 144 | 195.26 | 297 | 402.73 | 223 | 302.29 | 420 | 569.52 | 315 | 427.14 |
| 1 | 8 | - | - | - | - | 644 | 873.26 | 483 | 654.95 | 909 | 1232.60 | 683 | 926.15 |
| 1 | 12 | - | - | - | - | 704 | 954.62 | 528 | 715.97 | 995 | 1349.22 | 746 | 1011.58 |

**Table 3. Metric Standard Torque Table.**

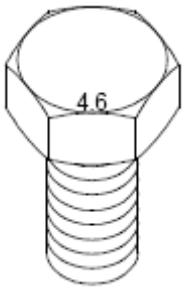
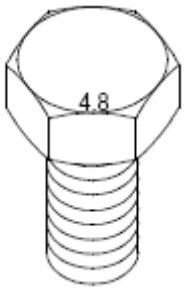
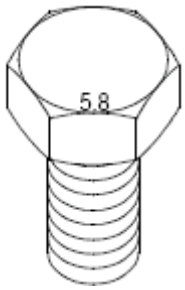
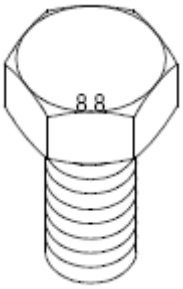
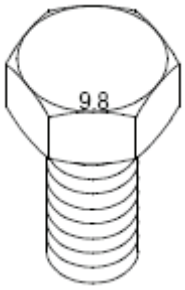
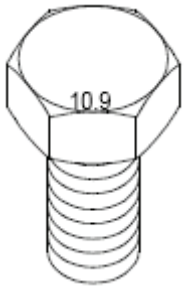
| | | CLASS 4.6   | | | | CLASS 4.8   | | | | CLASS 5.8   | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DRY | | WET | | DRY | | WET | | DRY | | WET | |
| DIA IN. | THREADS PITCH | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB | N-M | IN. LB |
| 3.0 | 0.5 | .50 | 4 | .40 | 4 | .70 | 6 | .50 | 4 | - | - | - | - |
| 3.5 | 0.6 | .80 | 7 | .60 | 5 | 1.10 | 10 | .80 | 7 | - | - | - | - |
| 4.0 | 0.7 | 1.20 | 11 | .90 | 8 | 1.60 | 14 | 1.20 | 11 | - | - | - | - |
| 5.0 | 0.8 | 2.40 | 21 | 1.80 | 16 | 3.30 | 29 | 2.50 | 22 | 4.00 | 35 | 3.00 | 27 |
| 6.0 | 1.0 | 4.00 | 35 | 3.00 | 27 | 5.66 | 50 | 4.20 | 37 | 6.90 | 61 | 5.20 | 46 |
| 8.0 | 1.25 | 9.90 | 88 | 7.40 | 66 | 13.60 | 120 | 10.20 | 90 | 16.70 | 148 | 12.50 | 111 |
| 10. | 1..50 | 19.60 | 174 | 14.70 | 130 | 27.00 | 239 | 20.00 | 177 | 33.10 | 293 | 24.80 | 220 |
| 12.0 | 1.75 | 34.10 | 302 | 25.60 | 227 | 47.00 | 416 | 35.00 | 310 | 58.00 | 513 | 43.00 | 381 |
| 14.0 | 2.0 | 54.30 | 481 | 40.80 | 361 | 75.00 | 664 | 56.00 | 496 | 92.00 | 814 | 69.00 | 611 |

**Table 4. Metric Standard Torque Table.**

| | | CLASS 8.8   | | | | CLASS 9.8   | | | | CLASS 10.9   | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DRY | | WET | | DRY | | WET | | DRY | | WET | |
| DIA IN. | THREADS PITCH | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB | N-M | FT LB |
| 8.0 | 1.25 | 26.40 | 19 | 19.80 | 15 | 28.50 | 21 | 21.40 | 16 | 36.50 | 27 | 27.30 | 20 |
| 10.0 | 1.50 | 52.20 | 38 | 39.20 | 29 | 56.60 | 42 | 42.40 | 31 | 72.20 | 53 | 54.20 | 40 |
| 12.0 | 1.75 | 91.00 | 67 | 68.00 | 50 | 99.00 | 73 | 74.00 | 55 | 126.00 | 93 | 94.00 | 69 |
| 14.0 | 2.00 | 145.00 | 107 | 109.00 | 80 | 157.00 | 116 | 118.00 | 87 | 200.00 | 147 | 150.00 | 111 |
| 16.0 | 2.00 | 226.00 | 167 | 170.00 | 125 | 245.00 | 181 | 184.00 | 136 | 313.00 | 231 | 235.00 | 173 |
| 20.0 | 2.50 | 441.00 | 325 | 331.00 | 244 | 478.00 | 353 | 358.00 | 264 | 610.00 | 450 | 458.00 | 338 |
| 24.0 | 3.00 | 762.00 | 562 | 572.00 | 422 | 826.00 | 609 | 620.00 | 457 | 1055.00 | 778 | 791.00 | 583 |
| 30.0 | 3.50 | 1515.00 | 1117 | 1136.00 | 838 | 1641.00 | 1210 | 1231.00 | 908 | 2095.00 | 1545 | 1572.00 | 1159 |
| 36.0 | 4.00 | 2647.00 | 1952 | 1985.00 | 1464 | 2868.00 | 2115 | 2151.00 | 1586 | 3662.00 | 2701 | 2746.00 | 2025 |

**END OF WORK PACKAGE**

# CHAPTER 7

# PARTS INFORMATION
# FOR
# FUEL ADDITIVE INJECTOR ASSEMBLY

**FIELD MAINTENANCE**
**FUEL ADDITIVE INJECTOR ASSEMBLY, TPI-4T-4A-1**

## PARTS INFORMATION INTRODUCTION

### SCOPE

This chapter lists and authorizes spare and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of field maintenance of the Fuel Additive Injector Assembly. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

### GENERAL

In addition to the Introduction Work Package, this RPSL is divided into the following work packages:

**1. Repair Parts List Work Packages.** Work packages containing lists of spare and repair parts authorized by this RPSTL for use in the performance of maintenance. The 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. Sending units, brackets, filters, and bolts are listed with the component they mount on. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations/figures.

**2. Special Tools List Work Packages.** Work packages containing lists of special tools, special TMDE and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.

**3. Cross-Reference Indexes Work Packages.** There are two cross-reference indexes work packages in this RPSTL: The National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number appearance. The Part Number Index work package lists all part numbers in alphanumeric sequence and refers you to the figure and item number.

## EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES

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

**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:

Table 1. SMR Code

| Source Code | | Maintenance Code | | Recoverability Code |
|---|---|---|---|---|
| XX | | XX | | X |
| 1st two Positions: How to get an item. | 3rd position: Who can install, replace or use the item. | 4th position: Who can do complete repair* on the item. | | 5th position: Who determines disposition action on unserviceable items. |

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

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

| Source Code | Application/Explanation |
|---|---|
| PA<br>PB<br>PC**<br>PD<br>PE<br>PF<br>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.<br>****NOTE**<br>**Items coded PC are subject to deterioration.** |
| KD<br>KF<br>KB | Items with these codes are not to be requested/requisitioned individually. They are 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 Level)<br>MF- (Made at DS Level)<br>MH- (Made at GS Level)<br>ML- (Made at Specialized Repair Act (SRA))<br>MD- (Made at Depot)<br>MG-Navy Only | 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 the RPSTL. If 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 Level)<br>AF- (Assembled by DS Level)<br>AH- (Assembled by GS Level)<br>AL- (Assembled by SRA)<br>AD- (Assembled by Depot) | Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorized you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance. |
| XA | Do not requisition an XA-coded item. Order its next higher assembly. (Also, refer to the note below.) |
| XB | If an XB item is not available from salvage, order it using CAGEC and part number given. |
| XC | Installation drawing, diagram, instruction sheet, field service drawing that is identified by 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. |

**N**

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.

**Maintenance Code.** Maintenance codes tell 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:

Third Position. 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.

| Maintenance Code | Application/Explanation |
|---|---|
| C – | Crew or operator maintenance done within organizational maintenance. |
| O* – | Unit level /AMC maintenance can remove, replace, and use the item. |
| F – | Direct support level can remove, replace, and use the item. |
| H – | General support level can remove, replace, and use the item. |
| L – | Specialized repair activity/TASMG can remove, replace, and use the item. |
| G – | Afloat and ashore intermediate maintenance can remove, replace and use the item. (Navy only) |
| K– | Contractor facility can remove, replace and use the item. |
| Z– | Item is not authorized to be removed, replaced or used at any maintenance level. |
| D – | Depot level can remove, replace, and use the item. |

*NOTE – Army may use C in the third position. However, for joint service publications, Army will use O.

Fourth Position. The maintenance code entered in the fourth position tells you 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).

## N

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.

| Maintenance Code | Application/Explanation |
|---|---|
| O – | Unit is the lowest level that can do complete repair of the item. |
| F – | Direct support 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 (designate the 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. |
| G – | Afloat and ashore intermediate maintenance can remove, replace and use the item. (Navy only) |
| K– | Contractor facility can remove, replace and use the item. |
| Z – | Non-repairable. 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. |

**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 Code | Application/Explanation |
|---|---|
| Z – | Non-repairable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3rd position of SMR code. |
| O – | Reparable item. When uneconomically reparable, condemn and dispose of the item at unit level. |
| F – | Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support 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. |
| G – | Field level reparable item. Condemn and dispose at either afloat or ashore intermediate levels. (Navy only) |
| K– | Contractor facility can remove, replace and use the item. |

**NSN (Column (3)).** The NSN for the item is listed in this column.

**CAGEC (Column (4)).** The Commercial and Government Entity Code (CAGEC) is a 5-digit code which is used to identify the manufacturer, distributor, or Government agency/activity, that supplies the item.

**PART NUMBER (Column (5)).** 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. Part numbers not available (N/A) will be provided as updates to this manual when available.

**N**

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

**DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)).** This column includes the following information:

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

**(2)** Items that are included in kits and sets are listed below the name of the kit or set.

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

**(4)** Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.

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

**(6)** The statement END OF FIGURE appears just below the last item description in column 6 for a given figure in both the repair parts list and special tools list work packages.

**QTY (Column (7)).** 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 the quantity may change from application to application.

**EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGES FORMAT AND COLUMNS**

**1. National Stock Number (NSN) Index Work Package.** NSNs in this index are listed in National Item Identification Number (NIIN) sequence.

**STOCK NUMBER Column.** This column lists the NSN in NIIN sequence. The NIIN consists of the last nine digits of the NSN. 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.
For example, if the NSN is 4720-01-542-7663, then the NIIN is 01-542-7663.

**FIG. Column.** This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts and special tools list work packages.

**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.

**2. Part Number (P/N) Index Work Package.** 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).

**PART NUMBER Column.** Indicates the part number assigned to the item.

**FIG. Column.** This column lists the number of the figure where the item is identified/located in the repair parts list and special tool list work packages.

**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.

**SPECIAL INFORMATION**

**Index Numbers.** Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number Index and the bulk material list in the repair parts list work packages.

**Associated Publications.** The publications listed below pertain to the 800K Fuel System Supply Point (FSSP).
TM 10-4930-363-13 800K FSSP Operator’s Field and Sustainment Maintenance Manual
TM 10-4930-364-13&P Fuel Additive Injector Field and Sustainment Maintenance Manual
TM 10 4930-363-23P Repair Parts and Special Tool List, Field and Sustainment Maintenance for 800K FSSP
TM 5-5430-19-13 350 GPM Filter Separator
TM 10-6630-240-12&P Test Kit Petroleum, Aviation Fuel Contaminant

**Illustrations.** The illustrations in this RPSTL contain unit authorized items. Illustrations published in TM 10-4930-363-13, that contain unit authorized items also appear in the RPSTL. The tabular list in the repair parts list work package contains only those parts coded “O” in the third position of the SMR code, therefore, there may be a break in the item number sequence.

## HOW TO LOCATE REPAIR PARTS

**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.

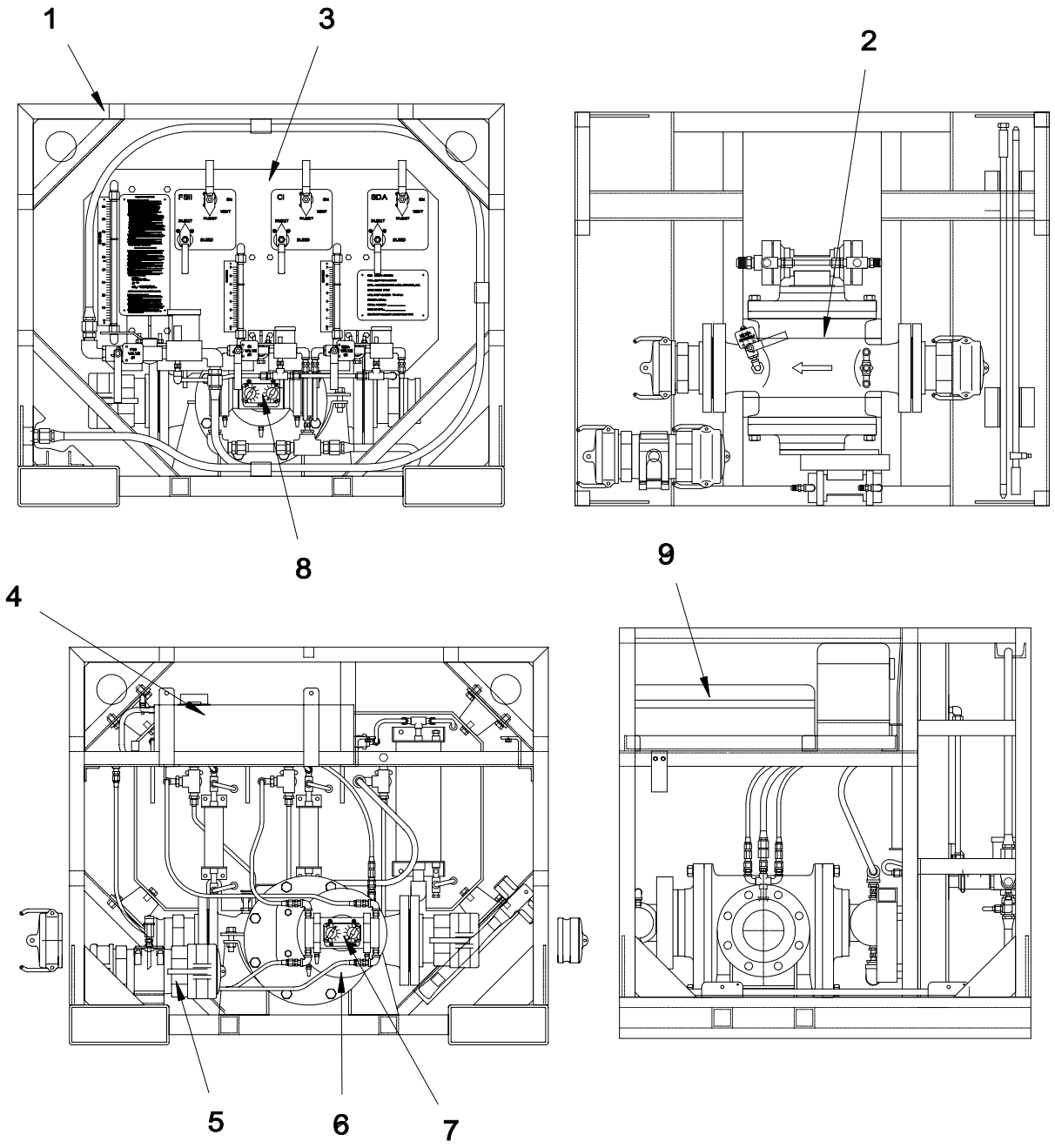
**(2) Second.** Find the figure covering the assembly group or subassembly group to which the item belongs.

**(3) Third.** Identify the item on the figure and use the Figure and Item Number Index to find the NSN.

**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. The part numbers in the Part Number index are listed in ascending alphanumeric sequence. 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're looking for, then locate the item number in the repair parts list for the figure.




| INDEX NO. | FIGURE TITLE | FIGURE NO. |
|---|---|---|
| 1 | Skid Sub-Assembly | 2 |
| 2 | Injector Sub-Assembly | 3 |
| 3 | Control Panel Sub-Assembly | 5 |
| 4 | Six Gallon SS Tanks Sub-Assembly | 8 |
| 5 | Four Inch Sample Probe Sub-Assembly | 9 |
| 6 | Gear Reducer Sub-Assembly | 10 |
| 7 | 1P7-1P7 SS Pump Sub-Assembly (CI-SDA) | 11 |
| 8 | 2L SS Pump Sub-Assembly (FSII) | 12 |
| 9 | FSII Sample Test Kit | 13 |

Figure 1. Fuel Additive Injector Assembly, TPI-4T-4A-1.

**FIELD MAINTENANCE**
**SKID SUB-ASSEMBLY, 4TP- 4A SKID**

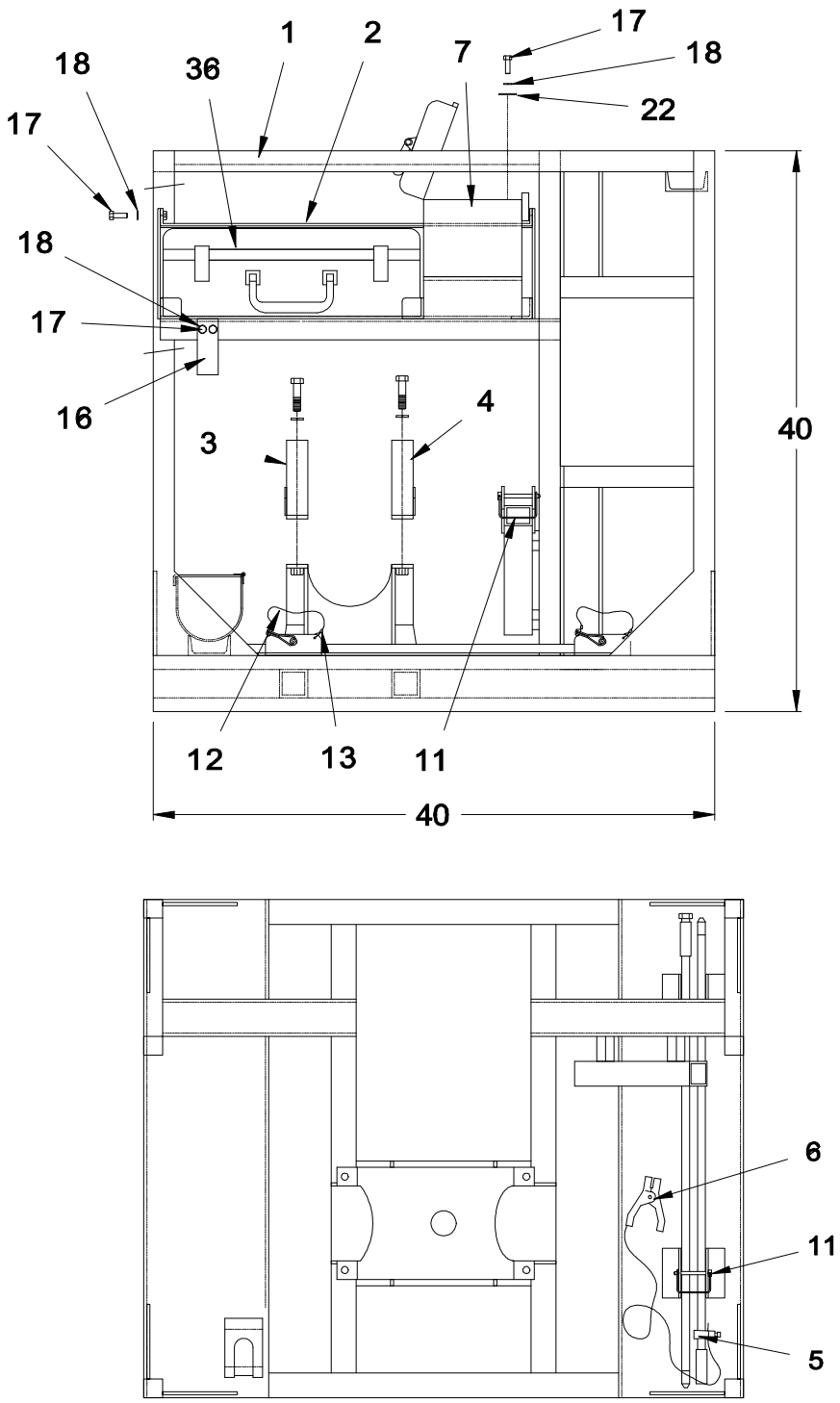



Figure 2. Skid Sub-Assembly, 4TP-4A SKID (Sheet 1 of 2).

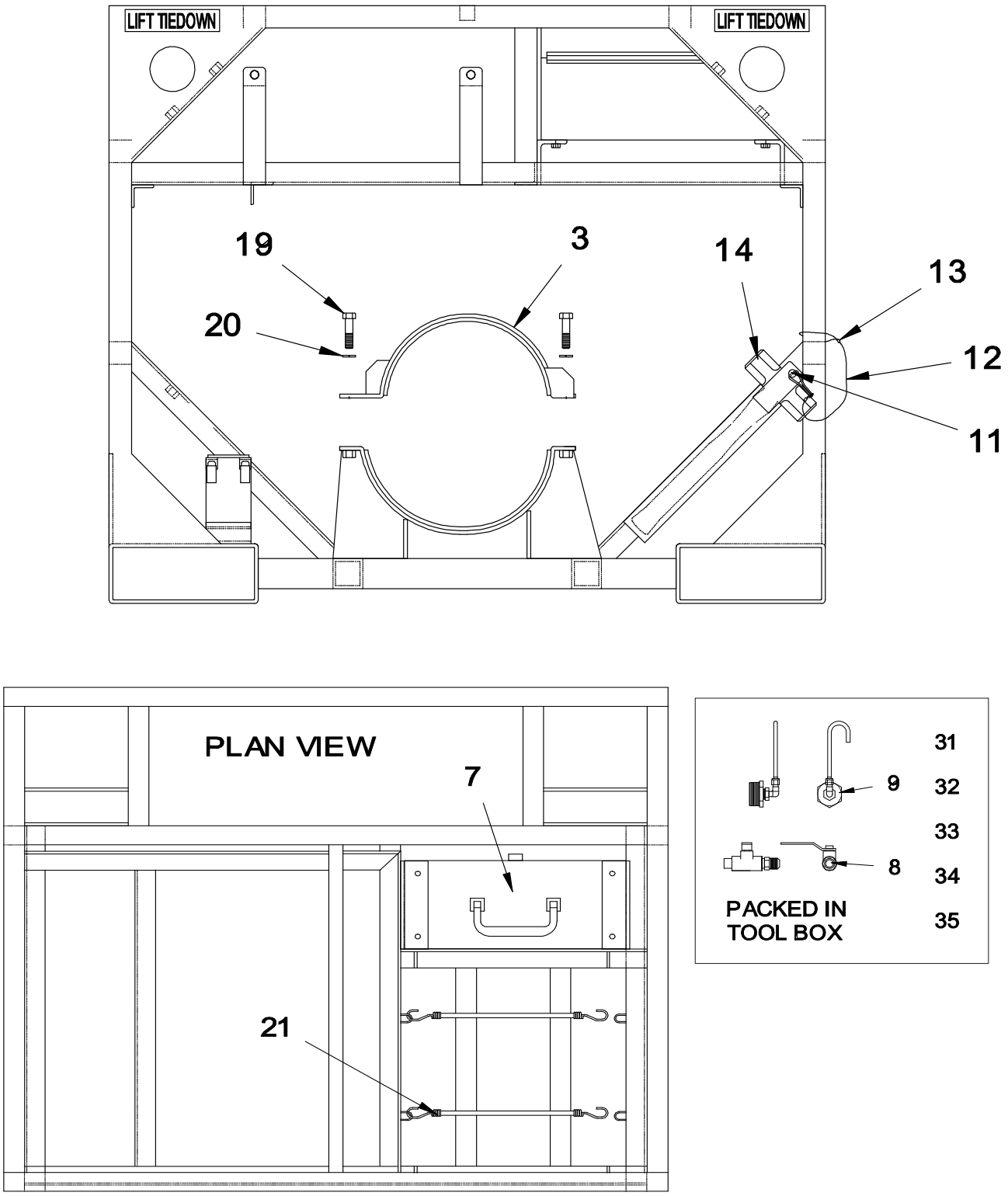



Figure 2. Skid Sub-Assembly, 4TP-4A SKID (Sheet 2 of 2).

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0002** | |
| | | | | | **FIG. 2 SKID-SUB-ASSEMBLY, 4TP-4A SKID** | |
| 1 | PBOZZ | 5340-01-544-5790 | 47186 | 882400 | SKID, 4TP-4A | 1 |
| 2 | PAOZZ | 5340-01-543-9543 | 47186 | 102515 | TANK STRAP | 2 |
| 3 | PAOZZ | 3990-01-543-5530 | 47186 | 102458L | CRADLE STRAP, LEFT | 1 |
| 4 | PAOZZ | 3990-01-543-8347 | 47186 | 102458R | CRADLE STRAP, RIGHT | 1 |
| 5 | PAOZZ | 5975-01-543-6229 | 47186 | 882376 | GROUND ROD | 1 |
| 6 | PAOZZ | | 47186 | 882377 | GROUND CLAMP | 1 |
| 7 | PAOZZ | 5140-01-543-9894 | 47186 | 162120 | TOOL BOX | 1 |
| 8 | PAOZZ | 4820-01-543-8361 | 47186 | 102485 | 3/4 " VALVE FITTING | 1 |
| 9 | PAOZZ | 4930-01-543-5102 | 47186 | 102486 | 2" VENT ASSEMBLY | 1 |
| 10 | PAOZZ | 4720-01-543-8354 | 47186 | 882344 | 3/4 " MJIC x 3/4 " MNPT ADPT, SS | 1 |
| 11 | PAOZZ | 5340-01-543-8425 | 47186 | 162119 | SNAP PIN | 3 |
| 12 | PAOZZ | 4010-01-543-8407 | 47186 | 101895 | STAINLESS CABLE,3/64" | 3 |
| 13 | PAOZZ | | 47186 | 101869 | OVAL SLEEVE, 3/64" | 6 |
| 14 | PAOZZ | | 47186 | 162128 | SLEDGE HAMMER, 4LB. INCLUDED IN TOOL KIT #4TP-4A TOOLS | 1 |
| 15 | PAOZZ | 7690-01-543-6123 | 47186 | 102490 | LABEL, LIFT TIEDOWN | 4 |
| 16 | PAOZZ | 5975-01-543-6600 | 47186 | 102516 | GROUND PLATE | 1 |
| 17 | PAOZZ | 5306-01-544-2796 | 47186 | 881422 | 5/16 -18 x 1" HEX BOLT, SS | 10 |
| 18 | PAOZZ | 5310-01-543-8726 | 47186 | 881417 | 5/16 LOCK WASHER SS | 10 |
| 19 | PAOZZ | 5306-01-543-7956 | 47186 | 883012 | 1/2 -13 x 2" HEX BOLT, SS | 4 |
| 20 | PAOZZ | 5310-01-543-7915 | 47186 | 882667 | 1/2" LOCK WASHER, SS | 4 |
| 21 | XBOZZ | | 47186 | 882353 | BUNGEE CORD, 24" BLACK | 2 |
| 22 | PAOZZ | 5310-01-543-4023 | 47186 | 882306 | 5/16 x 1 1/4 " FENDER WASHER | 4 |
| 23 | PCOZZ | 4720-01-543-8381 | 47186 | 882348 | 3/4" JIC x 120" HOSE, TEFLON/SS | |
| 24 | PCOZZ | 4720-01-543-8745 | 47186 | 882356 | 3/4" JIC x 60" HOSE, TEFLON/SS | |
| 25 | PCOZZ | 4720-01-543-3903 | 47186 | 882357 | 1/2" JIC x 38" HOSE, TEFLON/SS | |
| 26 | PCOZZ | 4720-01-543-8735 | 47186 | 882347 | 1/2" JIC x 21" HOSE, TEFLON/SS | |
| 27 | PCOZZ | 4720-01-543-8381 | 47186 | 882346 | 3/8" JIC x 20" HOSE, TEFLON/SS | 1 |
| 28 | PCOZZ | 4720-01-543-7926 | 47186 | 882359 | 1/4" JIC x 49" HOSE, TEFLON/SS | 2 |
| 29 | PCOZZ | 4720-01-543-8739 | 47186 | 882358 | 1/4" JIC x 39" HOSE, TEFLON/SS | 4 |
| 30 | PCOZZ | 4720-01-543-7930 | 47186 | 882345 | 1/4" JIC x 28" HOSE, TEFLON/SS | 2 |
| 31 | XBOOO | | 47186 | 4TP-4A TOOLS | TOOL KIT, 4TP-4A | 1 |
| 32 | XBOZZ | | 47186 | 800ER KIT | REPAIR KIT | 1 |
| 33 | XBOZZ | | 47186 | 2L SS KIT | REPAIR KIT | 1 |
| 34 | XBOZZ | | 47186 | 1P7-1P7 SS KIT | REPAIR KIT | 1 |
| 35 | XBOZZ | | 47186 | SFI MIL KIT | REPAIR KIT | 1 |
| 36 | PAOZZ | 3835-01-543-7977 | 47186 | 882378 | FSII SAMPLE TEST KIT | 1 |

# FIELD MAINTENANCE
# INJECTOR SUB-ASSEMBLY, 800ER-2L-1P7-1P7

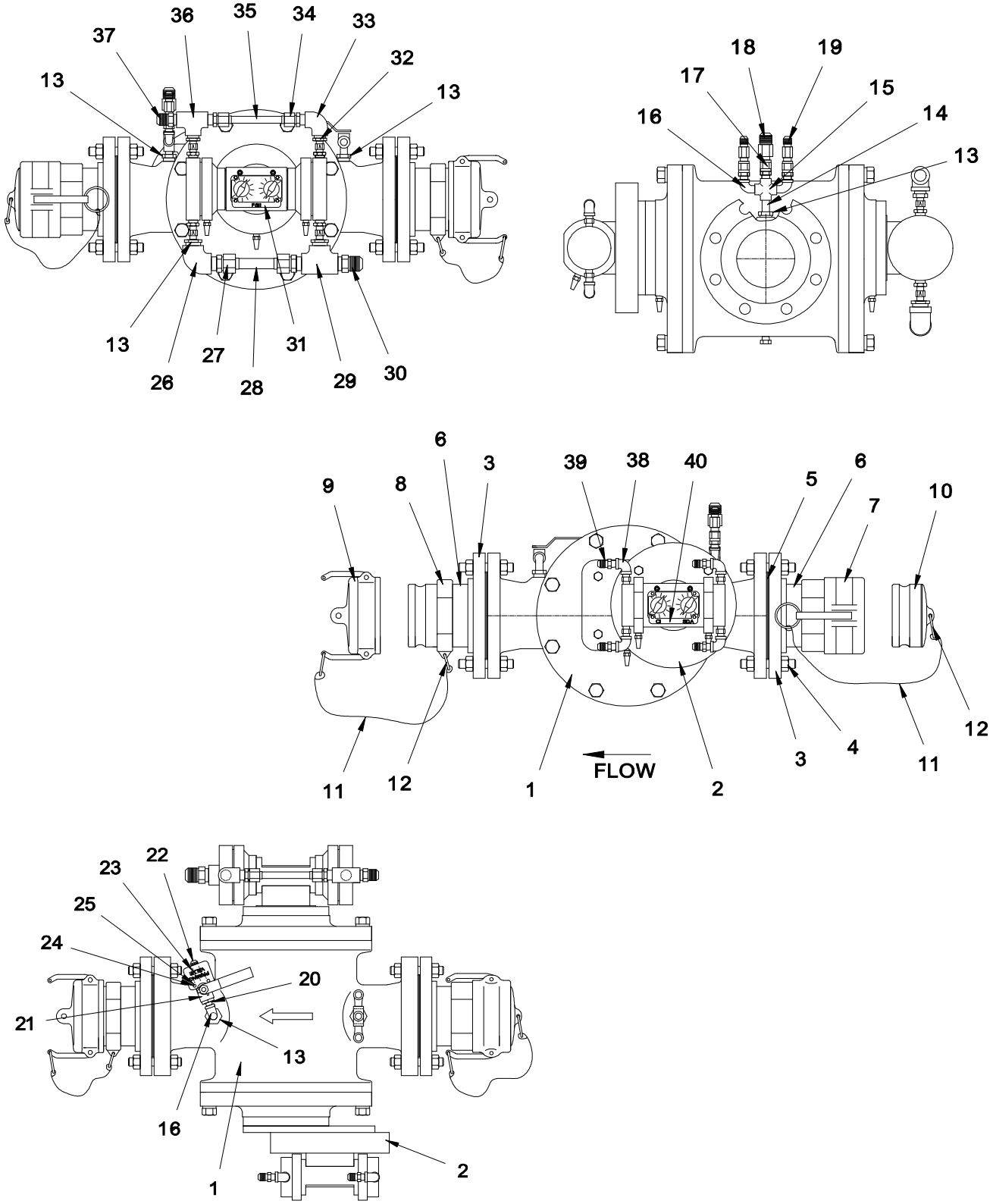



Figure 3. Injector Sub-Assembly.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0003** | |
| | | | | | **FIG. 3 INJECTOR SUB-ASSEMBLY, 800ER-2L-1P7-1P7** | |
| 1 | XBOOO | | 47186 | 807ER | 800 DRIVER | 1 |
| 2 | XBOZZ | | 47186 | 883745 | 3:1 GEAR REDUCER | 1 |
| 3 | PAOZZ | 4730-01-543-4522 | 47186 | 271498 | 4” 150# COMP. FLANGE 4” NPT | 2 |
| 4 | PAOZZ | 5307-01-543-7945 | 47186 | 881249 | 5/8-11 x 4 STUD W/NUTS | 16 |
| 5 | PCOZZ | 5330-01-395-7688 | 47186 | 161001 | 4 “ GASKET | 2 |
| 6 | PCOZZ | 4730-01-543-5168 | 47186 | 881740 | 4 “ X CL. PIPE NIPPLE | 2 |
| 7 | PAOZZ | 4730-01-543-3916 | 47186 | 881724 | 4 “ FEMALE CAMLOCK W/ 4 “ FNPT, ALUM. | 1 |
| 8 | PAOZZ | 4730-01-543-7923 | 47186 | 881722 | 4 “ MALE CAMLOCK W/ 4 “ FNPT, ALUM. | 1 |
| 9 | PAOZZ | 4730-01-543-8000 | 47186 | 881260 | 4 “ DUST CAP, ALUM. | 1 |
| 10 | PAOZZ | 4730-01-543-4610 | 47186 | 881725 | 4 “ DUST PLUG, ALUM. | 1 |
| 11 | PAOZZ | 4010-01-543-4617 | 47186 | 881117 | CHAIN, 12” | 2 |
| 12 | PAOZZ | 5365-01-543-4026 | 47186 | 101833 | RING | 2 |
| 13 | PAOZZ | 5365-01-543-4594 | 47186 | 271113 | 3/4” X 1/4” REDUCING BUSHING, SS | 4 |
| 14 | PAOZZ | 4730-01-543-8716 | 47186 | 101070 | 1/4” X 1/2” PIPE NIPPLE, SS | 1 |
| 15 | PAOZZ | 4730-01-543-8374 | 47186 | 101032 | 1/4” CROSS, SS | 1 |
| 16 | PAOZZ | 4730-01-543-8366 | 47186 | 271125 | 1/4” 90 ST. EL, SS | 3 |
| 17 | PAOZZ | 4820-01-543-6040 | 47186 | 882911 | 1/4” INJECTOR CHECK VALVE, SS | 3 |
| 18 | PAOZZ | 4730-01-543-6143 | 47186 | 882361 | 1/2” MJIC X 1/4” FNPT ADAPTER, SS | 1 |
| 19 | PAOZZ | 4730-01-543-6154 | 47186 | 882360 | 1/4” MJIC X 1/4” FNPT ADAPTER, SS | 2 |
| 20 | PAOZZ | 4730-01-543-8435 | 47186 | 101069 | 1/4” X CL PIPE NIPPLE, SS | 1 |
| 21 | PAOZZ | 4820-01-543-8385 | 47186 | 101230 | 1/4” ON/OFF VALVE, SS | 1 |
| 22 | PAOZZ | 4730-01-544-5274 | 47186 | 882339 | 3/8” MJIC X 1/4” FNPT ADAPTER, SS | 1 |
| 23 | PAOZZ | 9905-01-544-5724 | 47186 | 882354 | PRIMING VALVE TAG | 1 |
| 24 | PAOZZ | 5305-01-543-5587 | 47186 | 881645 | #10-24 X 3/8” SOC HEAD CAP,SS | 2 |
| 25 | PAOZZ | 5310-01-543-7939 | 47186 | 882949 | #10 LW INTERNAL TOOTH,SS | 2 |
| 26 | PAOZZ | 4730-01-543-8702 | 47186 | 271123 | 3/4 “ 90 ELBOW, SS | 1 |
| 27 | PAOZZ | 4730-01-543-5173 | 47186 | 101128 | 3/4” X 3/4” MNPT TUBE ADAPTER , SS | 2 |
| 28 | PAOZZ | 4710-01-544-5279 | 47186 | 102513 | 3/4 “ SUCTION TUBE ASS’Y, 2L SS | 1 |
| 29 | PAOZZ | 4730-01-543-7919 | 47186 | 271131 | 3/4 “ TEE, SS | 1 |
| 30 | PAOZZ | 4720-01-543-8354 | 47186 | 882344 | 3/4” MJIC X 3/4” MNPT ADAPTER, SS | 1 |
| 31 | PAOZZ | 9905-01-544-4910 | 47186 | 882355 | PUMP TAG, FSII | 1 |
| 32 | PAOZZ | 4730-01-543-8451 | 47186 | 271112 | 1/2” X 1/4” REDUCING BUSHING, SS | 2 |
| 33 | PAOZZ | 4730-01-543-3921 | 47186 | 271122 | 1/2” 90 ELBOW, SS | 1 |
| 34 | PAOZZ | 4730-01-543-8349 | 47186 | 101141 | 1/2” X 1/2” MNPT TUBE ADAPTER , SS | 2 |
| 35 | PAOZZ | 4710-01-548-4304 | 47186 | 102514 | 1/2” DISCHARGE TUBE ASS’Y, 2L SS | 1 |
| 36 | PAOZZ | 4730-01-543-6057 | 47186 | 271130 | 1/2” TEE,SS | 1 |
| 37 | PAOZZ | 4730-01-543-6063 | 47186 | 882343 | 1/2” MJIC X 1/2” MNPT ADAPTER, SS | 1 |
| 38 | PAOZZ | 4730-01-548-2616 | 47186 | 101021 | 1/4” 90 ELBOW, SS | 4 |
| 39 | PAOZZ | 4730-01-543-8397 | 47186 | 882342 | 1/4” MJIC X 1/4” MNPT ADAPTER, SS | 4 |
| 40 | PBOZZ | 9905-01-544-4916 | 47186 | 882372 | PUMP TAG, CI/SDA | 1 |

# FIELD MAINTENANCE
# MODEL 800ER DRIVER (ALUM), 807ER

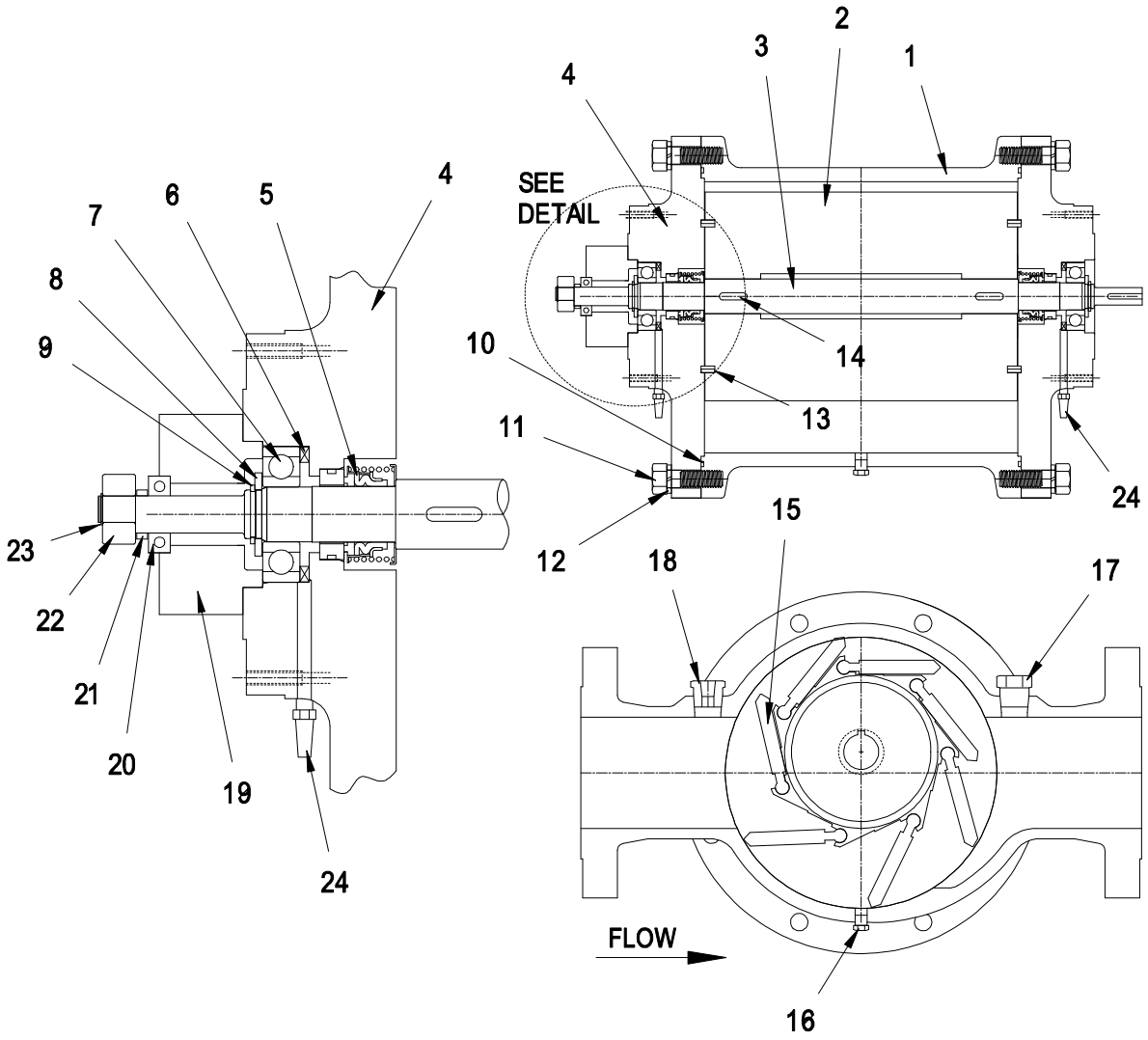



Figure 4. Model 800ER Driver, 807ER.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0003** | |
| | | | | | **FIG. 4 MODEL 800ER DRIVER, 807ER** | |
| 1 | PAOZZ | 4320-01-543-7917 | 47186 | 184038 | HOUSING, ALUMINUM | 1 |
| 2 | PAOZZ | 4320-01-543-8346 | 47186 | 184166 | ROTOR, 7 VANE | 1 |
| 3 | PAOZZ | 3040-01-543-8367 | 47186 | 184081 | SHAFT, ER (SINGLE ECC) | 1 |
| 4 | PAOZZ | 4320-01-543-7875 | 47186 | 184093 | END PLATE | 2 |
| 5 | PCOZZ | 4320-01-460-4807 | 47186 | 141036 | MECHANICAL SEAL | 2 |
| 6 | PCOZZ | 5310-01-543-5553 | 47186 | 103383 | WAVE SPRING WASHER | 2 |
| 7 | PAOZZ | 3110-01-543-5247 | 47186 | 881623 | BEARING | 2 |
| 8 | PAOZZ | 3120-01-543-4044 | 47186 | 184004 | THRUST WASHER | 2 |
| 9 | PAOZZ | 5325-01-543-8453 | 47186 | 103381 | SNAP RING | 2 |
| 10 | PCOZZ | 5331-01-543-7984 | 47186 | 103409 | O-RING , VITON | 2 |
| 11 | PAOZZ | 5306-01-543-8344 | 47186 | 881621 | BOLT, 5/8-11 x 2” | 16 |
| 12 | PAOZZ | 5310-01-543-8339 | 47186 | 882076 | LOCK WASHER, 5/8” | 16 |
| 13 | PAOZZ | 4320-01-543-8669 | 47186 | 184167 | WEAR RING | 2 |
| 14 | | | 47186 | | KEY | 2 |
| 15 | PCOZZ | 4320-01-543-8337 | 47186 | 184011 | VANE, TEFLON | 7 |
| 16 | PCOZZ | 4730-04-543-5152 | 47186 | 151005 | 1/4” PIPE PLUG | 1 |
| 17 | PAOZZ | 4730-01-543-6034 | 47186 | 271249 | 3/4” PIPE PLUG | 1 |
| 18 | PAOZZ | 5365-01-543-4594 | 47186 | 271113 | 3/4” x 1/4 RED. BUSHING | 1 |
| 19 | PAOZZ | 3130-01-543-8457 | 47186 | 184037 | BEARING CAP | 1 |
| 20 | PAOZZ | 3110-01-543-4597 | 47186 | 881882 | BEARING | 1 |
| 21 | PAOZZ | 5365-01-543-4046 | 47186 | 881999 | SPACER | 1 |
| 22 | PAOZZ | 3110-01-543-5516 | 47186 | 881157 | H.D. DRIVE BEARING | 1 |
| 23 | PAOZZ | 5325-01-543-4603 | 47186 | 101045 | SNAP RING | 1 |
| 24 | PAOZZ | | 47186 | 101749 | 1/8” FILTER | 2 |
| | | | | | **END OF FIGURE** | |

# FIELD MAINTENANCE
# CONTROL PANEL SUB-ASSEMBLY, 102489

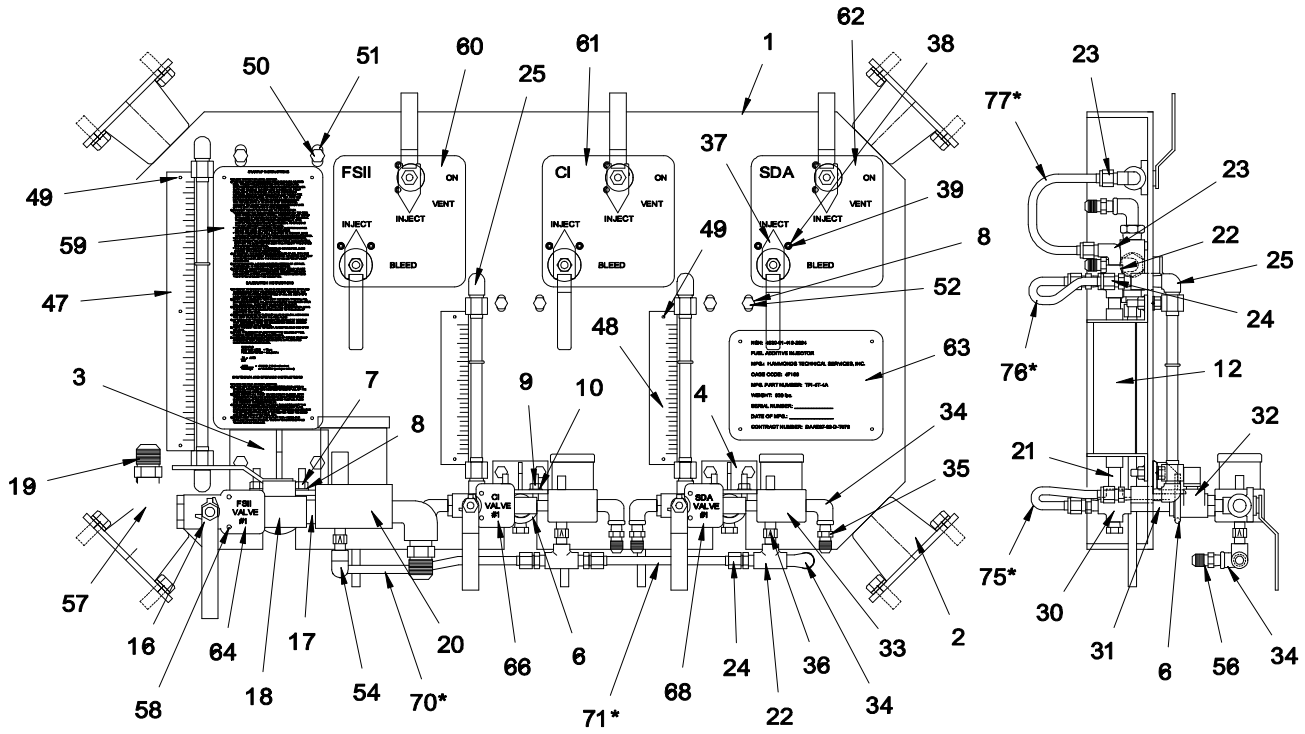



Figure 5. Control Panel Sub-Assembly (Sheet 1 of 3).

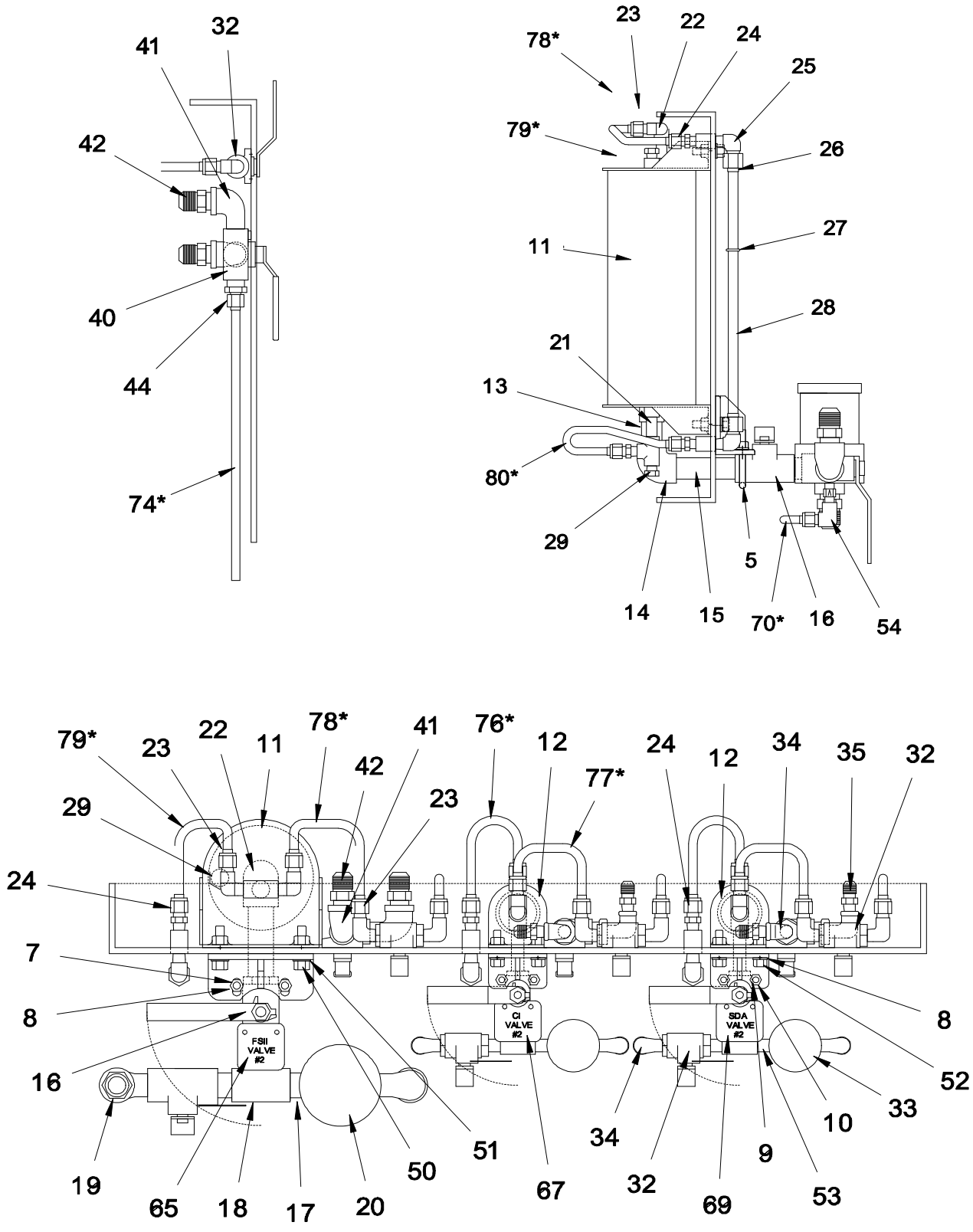



Figure 5. Control Panel Sub-Assembly (Sheet 2 of 3).

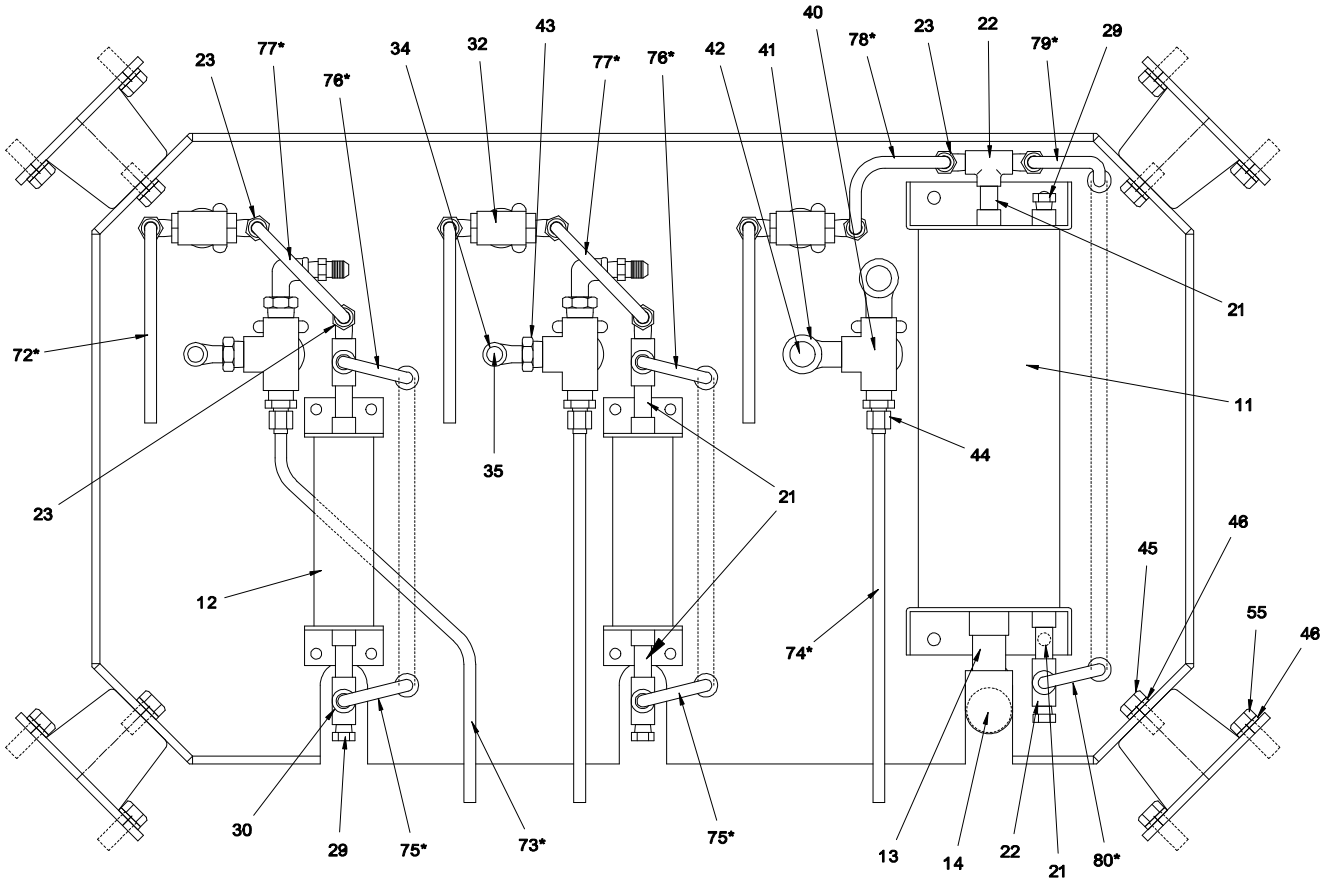



Figure 5. Control Panel Sub-Assembly (Sheet 3 of 3).

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0004** | |
| | | | | | **FIG. 5 CONTROL PANEL SUB-ASSEMBLY, 102489** | |
| 1 | XDOZZ | | 47186 | 102471 | PANEL, 4T-4A | 1 |
| 2 | PAOZZ | 5340-01-543-4049 | 47186 | 882341 | VIBRATION ISOLATOR | 4 |
| 3 | PAOZZ | 5340-01-543-8330 | 47186 | 102472 | 3/4" L-BRACKET | 1 |
| 4 | PAOZZ | 5340-01-543-5594 | 47186 | 102473 | 1/4" L-BRACKET | 2 |
| 5 | PAOZZ | 5306-01-544-2774 | 47186 | 882336 | 5/16 U-BOLT , SS | 1 |
| 6 | PAOZZ | 5306-01-543-7914 | 47186 | 882335 | 1/4" U-BOLT , SS | 2 |
| 7 | PAOZZ | 5310-01-543-5607 | 47186 | 881419 | 5/16" -18 HEX NUT , SS | 2 |
| 8 | PAOZZ | 5310-01-543-8726 | 47186 | 881417 | 5/16" LOCK WASHER, SS | 10 |
| 9 | PAOZZ | 5310-01-543-7986 | 47186 | 881774 | 1/4" -20 HEX NUT, SS | 4 |
| 10 | PAOZZ | 5310-01-543-8637 | 47186 | 881259 | 1/4" LOCK WASHER, SS | 4 |
| 11 | PAOZZ | 4320-01-543-9379 | 47186 | 102469 | FSII RESERVOIR | 1 |
| 12 | PAOZZ | 4320-01-543-9147 | 47186 | 102470 | CI/SDA RESERVOIR | 2 |
| 13 | PAOZZ | 4730-01-543-7911 | 47186 | 271095 | 3/4" X 2" NIPPLE, 304 SS | 1 |
| 14 | PAOZZ | 4730-01-543-8702 | 47186 | 271123 | 3/4" 90 ELBOW, 304 SS | 1 |
| 15 | PAOZZ | 4730-01-543-8463 | 47186 | 271097 | 3/4" X 4" NIPPLE, 304 SS | 1 |
| 16 | PAOZZ | 4820-01-543-6068 | 47186 | 101205 | 3/4" ON/OFF VALVE, 316 SS | 2 |
| 17 | PAOZZ | 4730-01-543-7909 | 47186 | 271094 | 3/4" X CL NIPPLE, 304 SS | 3 |
| 18 | PAOZZ | 4730-01-543-7919 | 47186 | 271131 | 3/4" TEE, 304 SS | 1 |
| 19 | PAOZZ | 4720-01-543-8354 | 47186 | 882344 | 3/4" MJIC X 3/4" MNPT ADAPTER, SS | 2 |
| 20 | PCOZZ | 6680-01-543-5771 | 47186 | 152020 | SIGHT FLOW INDICATOR, HI-VOLUME, NEOPRENE | 1 |
| 21 | PAOZZ | 4730-01-543-8716 | 47186 | 101070 | 1/4" X 11/2" NIPPLE, 304 SS | 6 |
| 22 | PAOZZ | 4730-01-543-3933 | 47186 | 101023 | 1/4" TEE,304 SS | 8 |
| 23 | PAOZZ | 4730-01-543-8642 | 47186 | 101068 | ELBOW ADAPTER, 3/8" TUBE X 1/4" MNPT | 10 |
| 24 | PAOZZ | 4730-01-543-5186 | 47186 | 101034 | STRAIGHT ADAPTER, 3/8" TUBE X 1/4" MNPT | 14 |
| 25 | PAOZZ | 4730-01-543-8319 | 47186 | 101095 | ELBOW ADAPTER, 1/2" TUBE X 1/4" MNPT | 6 |
| 26 | PAOZZ | | 47186 | 101685 | 1/2" TUBE INSERT | 6 |
| 27 | PCOZZ | 5331-01-543-9548 | 47186 | 101337 | 112 O-RING, NEOPRENE | 3 |
| 28 | MOOZZ | 4730-01-544-5969 | 47186 | 101379-1 | 1/2" TEFLON TUBING | 3' |
| 29 | PAOZZ | 4730-01-543-5152 | 47186 | 151005 | 1/4" HEX PLUG, 304 SS | 4 |
| 30 | PAOZZ | 4730-01-543-8374 | 47186 | 101032 | 1/4" CROSS, 304 SS | 2 |
| 31 | PAOZZ | 4730-01-543-8549 | 47186 | 271353 | 1/4" X 2 1/2" NIPPLE, 304 SS | 2 |
| 32 | PAOZZ | 4820-01-543-8385 | 47186 | 101230 | 1/4" ON/OFF VALVE, SS | 7 |
| 33 | PAOZZ | 6680-01-543-5777 | 47186 | 152011 | SIGHT FLOW INDICATOR, STANDARD, VITON® | 2 |
| 34 | PAOZZ | 4730-01-543-8366 | 47186 | 271125 | 1/4" 90 ST EL, 304SS | 9 |
| 35 | PAOZZ | 4730-01-543-8397 | 47186 | 882342 | 1/4" MJIC X 1/4" MNPT ADAPTER, SS | 6 |
| 36 | PAOZZ | 4820-01-543-7906 | 47186 | 102463 | 1/4" CHECK VALVE, SS | 3 |
| 37 | PAOZZ | 4820-01-543-8399 | 47186 | 102285 | VALVE POINTER | 6 |
| 38 | PAOZZ | 5310-01-543-7939 | 47186 | 882949 | #10 LW INT. TOOTH, SS | 24 |
| 39 | PAOZZ | 5305-01-543-4055 | 47186 | 881037 | #10-24 X ½" SOC. HEAD CAP, SS | 12 |
| 40 | PAOZZ | 4820-01-543-3953 | 47186 | 101180 | 1/2" 3-WAY VALVE, SS | 3 |
| 41 | PAOZZ | 4730-01-543-7902 | 47186 | 2711126 | 1/2" 90 ST EL, 304SS | 2 |
| 42 | PAOZZ | 4730-01-543-6063 | 47186 | 882343 | 1/2" MJIC X 1/2" MNPT ADAPTER, SS | 2 |
| 43 | PAOZZ | 4730-01-543-8451 | 47186 | 271112 | 1/2" X 1/4" RED BUSHING, 304SS | 4 |
| 44 | PAOZZ | 4730-01-543-7905 | 47186 | 101284 | STRAIGHT ADAPTER, 3/8" TUBE X 1/2 " MNPT | 3 |
| 45 | PAOZZ | 5306-01-543-8023 | 47186 | 882865 | 1/2" 13 X 1" HEX BOLT, SS | 4 |
| 46 | PAOZZ | 5310-01-543-9616 | 47186 | 882867 | 1/2" LOCK WASHER, SS | 12 |
| 47 | PAOZZ | 5930-00-090-0872 | 47186 | 882333 | FSII STRIP GAUGE | 1 |
| 48 | XAOZZ | | 47186 | 882334 | CI/SDA STRIP GAUGE | 2 |
| 49 | XAOZZ | | 47186 | 401952 | #6 X 5/16" DRIVE SCREW, SS | 15 |
| 50 | PAOZZ | 5306-01-543-5616 | 47186 | 883233 | 3/8" – 16 X 1 1/4" HEX BOLTS | 4 |
| 51 | PAOZZ | 5310-01-543-7931 | 47186 | 881711 | 3/8" LOCK WASHER, SS | 4 |

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| 52 | PAOZZ | 5306-01-543-5693 | 47186 | 883344 | 5/16" -18 X 1 1/4 " HEX BOLT, SS | 8 |
| 53 | PAOZZ | 4730-01-543-8435 | 47186 | 101069 | 1/4" X CL NIPPLE, 304 SS | 6 |
| 54 | PAOZZ | 4730-01-543-9525 | 47186 | 101091 | FEMALE ADAPTER, ELBOW 3/8" TUBE X 1/4" FNPT | 1 |
| 55 | PAOZZ | 5306-01-543-7898 | 47186 | 882349 | 1/28" – 13 X 1 1/4" HEX BOLTS, SS | 8 |
| 56 | PAOZZ | 4730-01-544-5274 | 47186 | 882339 | 3/8" MJIC X 1/4" MNPT ADAPTER, SS | 1 |
| 57 | PAOZZ | 4730-01-543-8084 | 47186 | 271127 | 3/4" 90 ST EL, 304 SS | 2 |
| 58 | PAOZZ | 5305-01-543-5587 | 47186 | 881645 | #10-24 X 3/8" SOC. HEAD CAP, SS | 12 |
| 59 | PBOZZ | | 47186 | 102475 | INSTRUCTION PLACARD, 4T-4A | 1 |
| 60 | XDOZZ | | 47186 | 102476 | FSII VALVE PLATE | 1 |
| 61 | PAOZZ | 4310-01-543-9123 | 47186 | 102477 | CI VALVE PLATE | 1 |
| 62 | XDOZZ | | 47186 | 102478 | SDA VALVE PLATE | 1 |
| 63 | PBOZZ | 9905-01-544-4923 | 47186 | 102484 | NSN DATA PLATE | 1 |
| 64 | PBOZZ | 9905-01-544-4884 | 47186 | 882366 | FSII VALVE #1 TAG | 1 |
| 65 | PBOZZ | 9905-01-544-4882 | 47186 | 882367 | FSII VALVE #2 TAG | 1 |
| 66 | PBOZZ | 9905-01-544-4885 | 47186 | 882368 | CI VALVE #1 TAG | 1 |
| 67 | PBOZZ | 9905-01-544-4881 | 47186 | 882369 | CI VALVE #2 TAG | 1 |
| 68 | PBOZZ | 9905-01-544-4891 | 47186 | 882370 | SDA VALVE #1 TAG | 1 |
| 69 | PBOZZ | 9905-01-544-4893 | 47186 | 882371 | SDA VALVE #2 TAG | 1 |
| *70 | PAOZZ | 4710-01-544-5285 | 47186 | 102501 | 3/8" SS LINE, FSII SFI TO CI SFI | 1 |
| *71 | PAOZZ | 4710-01-543-9538 | 47186 | 102502 | 3/8" SS LINE, CI SFI TO SDA SFI | 1 |
| *72 | PAOZZ | 4710-01-543-6074 | 47186 | 102503 | 3/8" SS VENT LINE | 3 |
| *73 | PAOZZ | 4710-01-543-8644 | 47186 | 102504 | 3/8" SS BLEED LINE, SDA | 1 |
| *74 | PAOZZ | 4720-01-543-5227 | 47186 | 102505 | 3/8" SS BLEED LINE, FSII AND CI | 2 |
| *75 | PAOZZ | 4720-01-543-7893 | 47186 | 102506 | 3/8" SS LINE, CI/SDA LOWER RESERVOIR TO GAUGE | 2 |
| *76 | PAOZZ | 4710-01-543-3964 | 47186 | 102507 | 3/8" SS LINE, CI/SDA UPPER RESERVOIR TO GAUGE | 2 |
| *77 | PAOZZ | 4710-01-543-8061 | 47186 | 102508 | 3/8" SS LINE, CI/SDA UPPER RESERVOIR TO VENT | 2 |
| *78 | PAOZZ | 4710-01-543-7858 | 47186 | 102509 | 3/8" SS LINE, FSII UPPER RESERVOIR TO VENT | 1 |
| *79 | PAOZZ | 4710-01-543-6117 | 47186 | 102510 | 3/8" SS LINE, FSII UPPER RESERVOIR TO GAUGE | 1 |
| *80 | PAOZZ | 4710-01-543-3979 | 47186 | 102511 | 3/8" SS LINE, FSII LOWER RESERVOIR TO GAUGE | 1 |
| * | XBOOO | | 47186 | 102512 | TUBE SET, COMPLETE FOR CONTROL PANEL | 1 |

* INCLUDES ALL TUBE ASSEMBLIES WITH * BY ITEM NUMBER

# FIELD MAINTENANCE
# HI VOLUME SIGHT FLOW INDICATOR, 152020

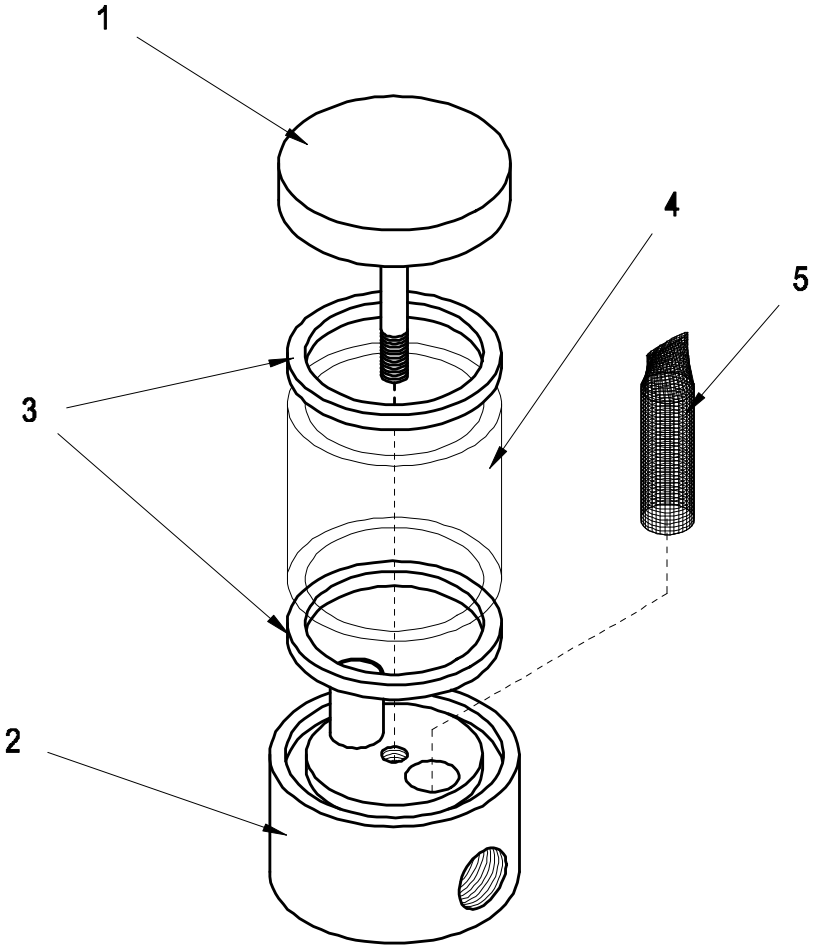



Figure 6. HI-Volume Sight Flow Indicator.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0004** | |
| | | | | | **FIG. 6 HI-VOLUME SIGHT FLOW INDICATOR, 152020** | |
| 1 | PAOZZ | 5340-01-543-8648 | 47186 | 152081 | CAP | 1 |
| 2 | PAOZZ | | 47186 | 152080 | BODY | 1 |
| 3 | PCOZZ | 5331-01-395-7687 | 47186 | 151010 | GASKET, NEOPRENE | 2 |
| 4 | PAOZZ | 6680-01-396-0270 | 47186 | 151009 | GLASS | 1 |
| 5 | PAOZZ | 4330-01-543-4591 | 47186 | 152025 | FILTER ELEMENT | 1 |
| | | | | | **END OF FIGURE** | |

## FIELD MAINTENANCE
## SIGHT FLOW INDICATOR, STD., 152011

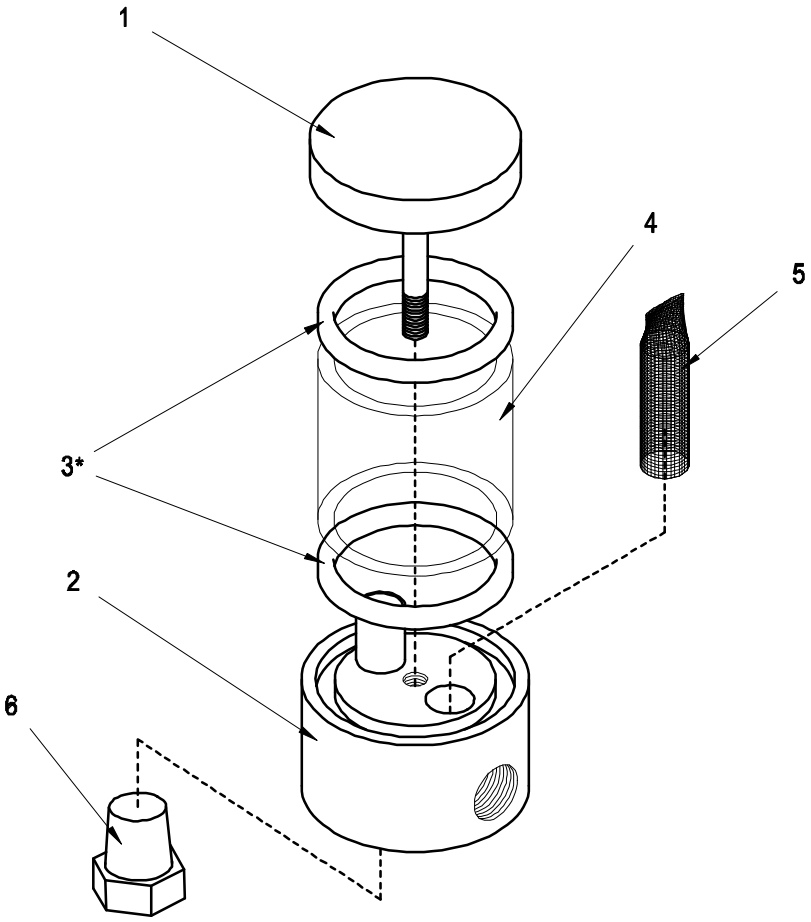



Figure 7. Sight Flow Indicator, Standard, 152011.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0004** | |
| | | | | | **FIG. 7 SIGHT FLOW INDICATOR, STD., 152011** | |
| 1 | PAOZZ | 5340-01-543-9138 | 47186 | 152074 | CAP, ASSEMBLY | 1 |
| 2 | PAOZZ | 6680-01-543-5766 | 47186 | 152075 | BODY, ASSEMBLY | 1 |
| 3 | PCOZZ | 5331-01-395-7686 | 47186 | 151002 | O-RING | 2 |
| 4 | PAOZZ | 6680-01-383-7453 | 47186 | 151001 | GLASS | 1 |
| 5 | PAOZZ | 6680-01-396-0271 | 47186 | 152002 | FILTER ELEMENT | 1 |
| 6 | PAOZZ | 4730-01-543-5152 | 47186 | 152005 | PIPE PLUG, 1/4 “ | 1 |
| | | | | | **END OF FIGURE** | |

# FIELD MAINTENANCE
# SIX GALLON SS TANK SUB-ASSEMBLY, 212013

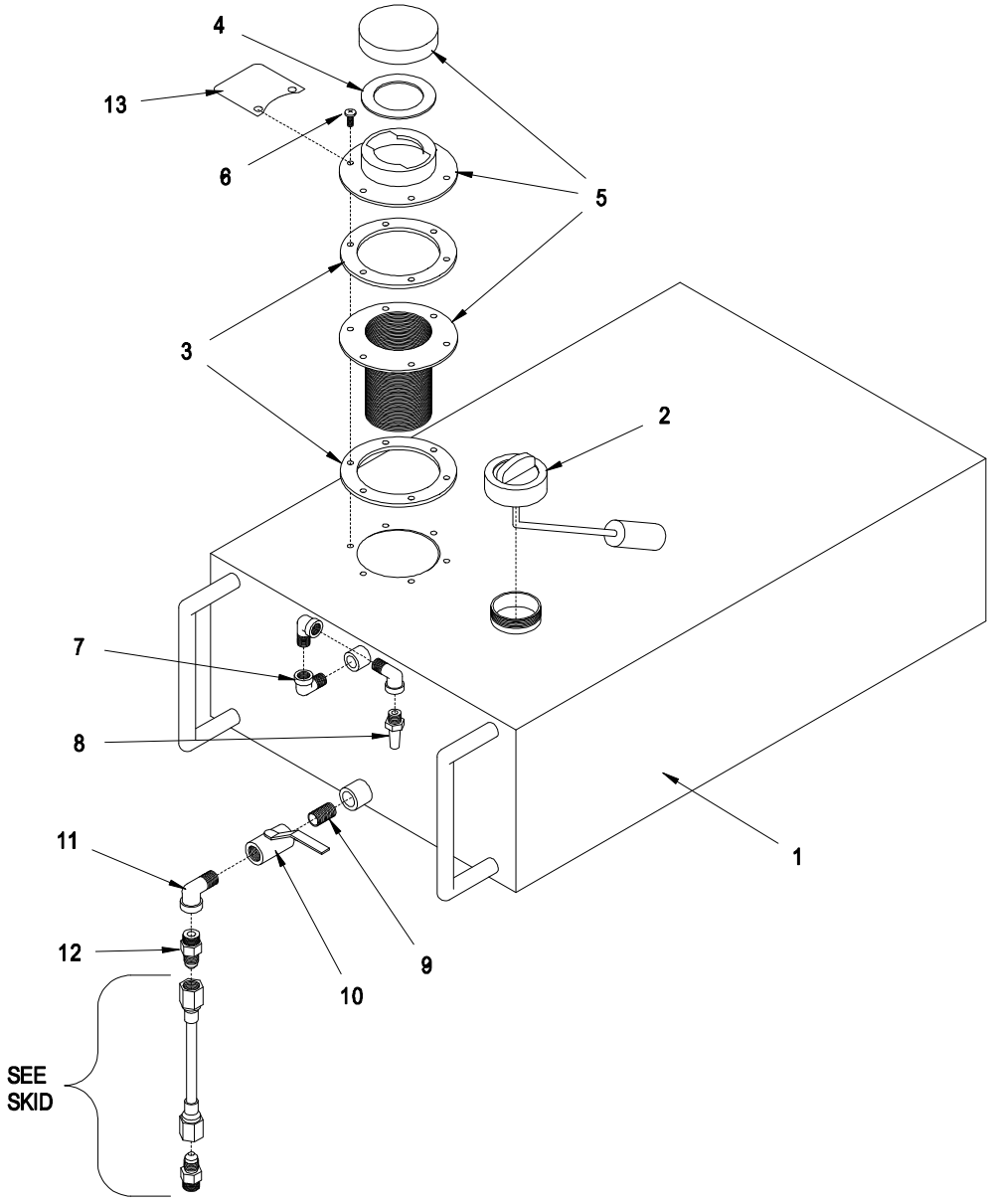



Figure 8. Six Gallon SS Tank Sub-Assembly, 212013.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0005** | |
| | | | | | **FIG. 8 TANK ASSEMBLY, 6 GALLON, 212013** | |
| 1 | PAOZZ | 5430-01-543-9624 | 47186 | 102278 | TANK SHELL, 6 GALLON | 1 |
| 2 | PAOZZ | 6680-01-548-7172 | 47186 | 883189 | LEVEL GAUGE | 1 |
| 3 | PCOZZ | 5330-01-543-4621 | 47186 | 102460 | GASKET, VITION | 2 |
| 4 | PCOZZ | 5330-01-543-5712 | 47186 | 102482 | GASKET, VITION | 1 |
| 5 | PAOZZ | 4730-01-543-4588 | 47186 | 700089 | FILLER/STRAINER | 1 |
| 6 | PAOZZ | | 47186 | 881223 | SCREW, 10-32 X 1/2” PHIL INCLUDED W/ #5 | 6 |
| 7 | PAOZZ | 4730-01-543-4583 | 47186 | 881714 | 1/8” ST. ELBOW | 3 |
| 8 | PAOZZ | 4320-01-543-4601 | 47186 | 101749 | 1/8” VENT FILTER | 1 |
| 9 | PAOZZ | 4730-01-543-8435 | 47186 | 101069 | 1/4” X CL NIPPLE | 1 |
| 10 | PAOZZ | 4820-01-543-8385 | 47186 | 101230 | 1/4” X ON/OFF VALVE | 1 |
| 11 | PAOZZ | 4730-01-543-8366 | 47186 | 271125 | 1/4” X ST. ELBOW | 1 |
| 12 | PAOZZ | 4730-01-543-8397 | 47186 | 882342 | 1/4” X JIC ADAPTER | 1 |
| 13 | PAOZZ | 9905-01-544-4927 | 47186 | 882362 | CI TANK TAG | 1 |
| 13 | PAOZZ | 9905-01-544-4933 | 47186 | 882373 | SDA TANK TAG | 1 |
| | | | | | **END OF FIGURE** | |

# FIELD MAINTENANCE
# 4 INCH SAMPLE PROBE SUB-ASSEMBLY, 102491

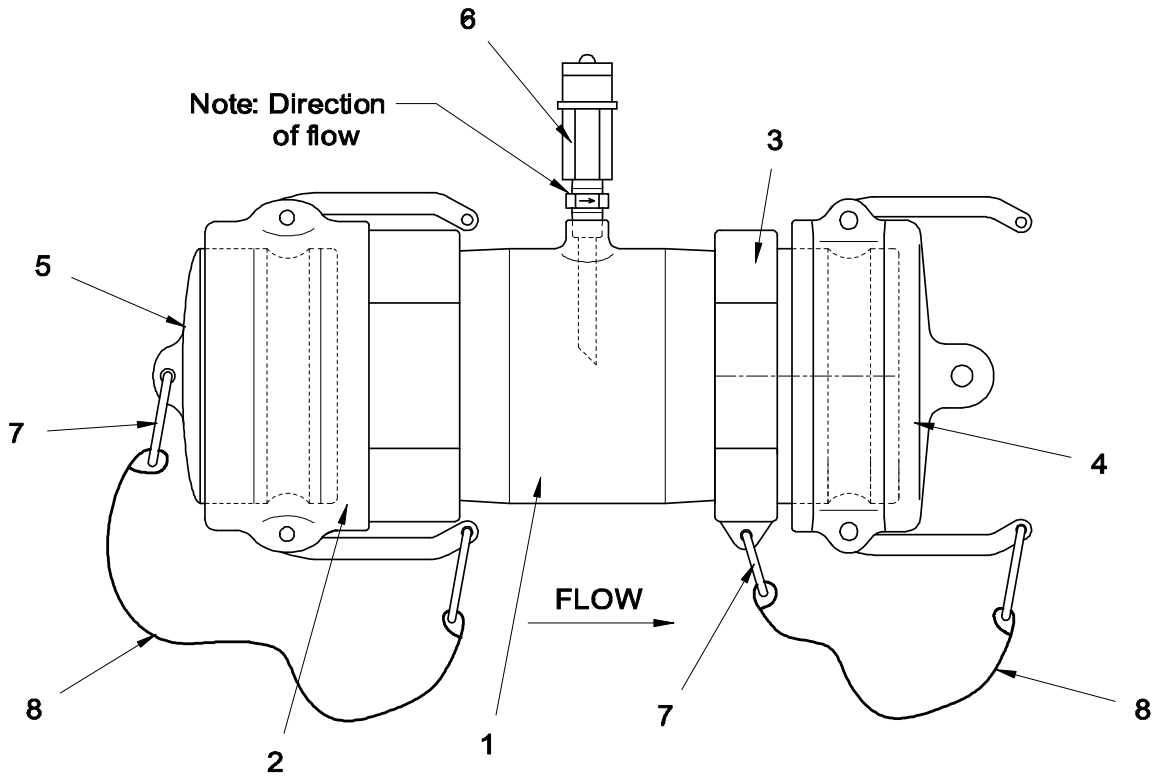



Figure 9. 4” Sample Probe Sub-Assembly.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0006** | |
| | | | | | **FIG. 9 4" SAMPLE PROBE SUBASSEMBLY, 102491** | |
| 1 | PAOZZ | 2910-01-543-5241 | 47186 | 882399 | 4" HOUSING, SS | 1 |
| 2 | PAOZZ | 4730-01-543-3916 | 47186 | 881724 | 4" FEMALE CAMLOCK W/4" FNPT, ALUM. | 1 |
| 3 | PAOZZ | 4730-01-543-7923 | 47186 | 881722 | 4" MALE CAMLOCK W/4" FNPT, ALUM. | 1 |
| 4 | PAOZZ | 4730-01-543-8000 | 47186 | 881260 | 4" DUST CAP, ALUM. | 1 |
| 5 | PAOZZ | 4730-01-543-4610 | 47186 | 881725 | 4" DUST PLUG, ALUM. | 1 |
| 6 | PAOZZ | 6625-01-543-8458 | 47186 | 882374 | 1/4" PROBE ASSEMBLY | 1 |
| 7 | PAOZZ | 5365-01-543-4026 | 47186 | 101833 | RING | 2 |
| 8 | PAOZZ | 4010-01-543-4617 | 47186 | 881117 | CHAIN, 12" | 2 |
| | | | | | **END OF FIGURE** | |

# FIELD MAINTENANCE
# 3:1 GEAR REDUCER SUB-ASSEMBLY, 883745

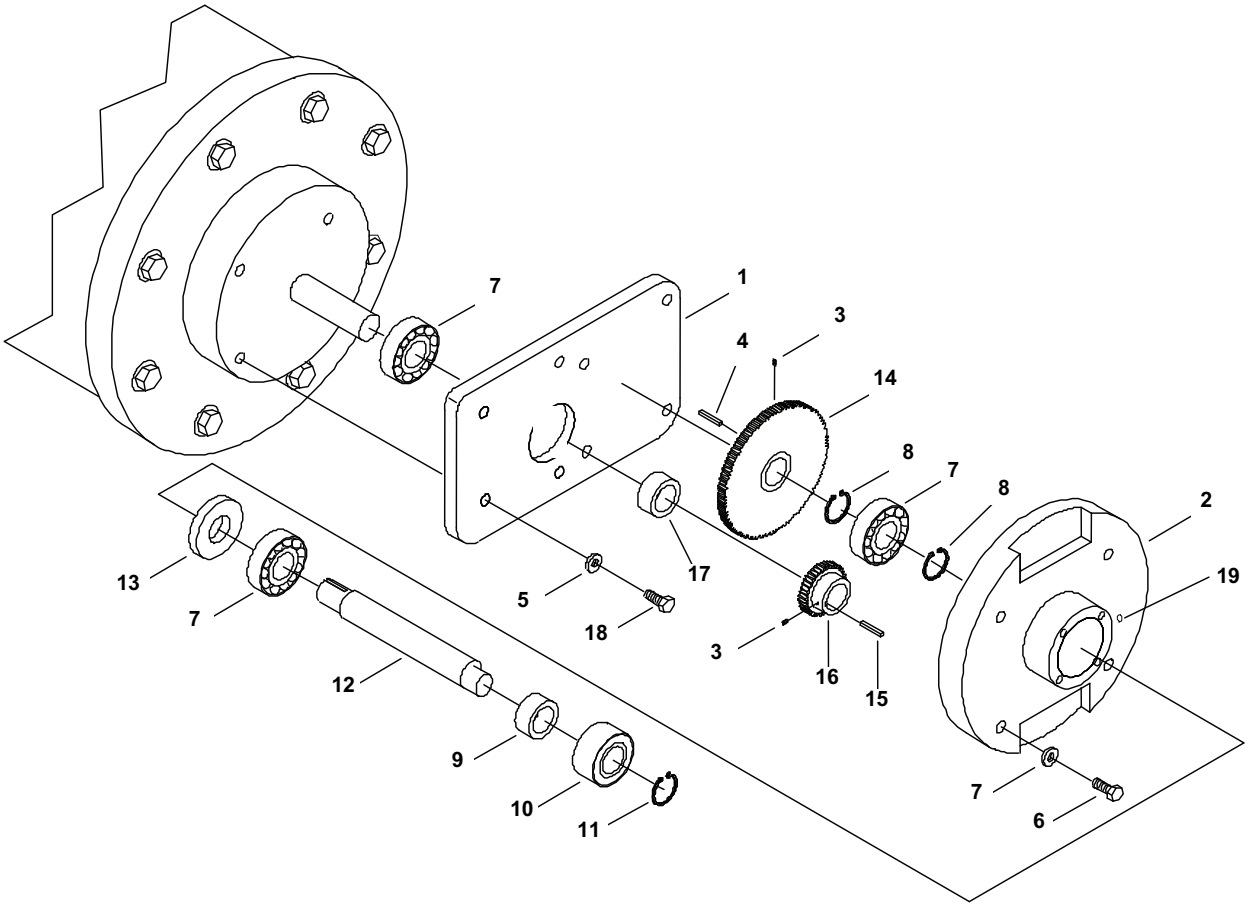



Figure 10. 3:1 Gear Reducer Sub-Assembly.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0007** | |
| | | | | | **FIG. 10 3:1 GEAR REDUCER SUB-ASSEMBLY ,883745** | |
| 1 | PAOZZ | 5340-01-543-9172 | 47186 | 184047 | ADAPTER PLATE | 1 |
| 2 | PAOZZ | 3040-01-543-2655 | 47186 | 184048 | GEAR HOUSING | 1 |
| 3 | PAOZZ | 5305-01-543-4570 | 47186 | 881673 | SET SCREW | 2 |
| 4 | | | 47186 | | KEY,1/8” SQ. X 5/8” | 1 |
| 5 | PAOZZ | 5310-01-543-4580 | 47186 | 881083 | LOCK WASHER | 8 |
| 6 | PAOZZ | 5306-01-543-8042 | 47186 | 881318 | BOLT | 4 |
| 7 | PAOZZ | 3130-01-543-7263 | 47186 | 881120 | BEARING | 3 |
| 8 | PAOZZ | 5325-01-543-7921 | 47186 | 881119 | SNAP RING | 2 |
| 9 | PAOZZ | 5365-01-543-4059 | 47186 | 881630 | SPACER | 1 |
| 10 | PAOZZ | 3110-01-543-5516 | 47186 | 881157 | BEARING, H.D. DRIVE | 1 |
| 11 | PAOZZ | 5325-01-543-4603 | 47186 | 101045 | SNAP RING | 1 |
| 12 | PAOZZ | 3040-01-544-2290 | 47186 | 212048 | OUTPUT SHAFT | 1 |
| 13 | PCOZZ | 5330-01-543-8036 | 47186 | 881024 | SEAL | 1 |
| 14 | PAOZZ | 3020-01-543-3531 | 47186 | 190012 | GEAR, 120 TOOTH | 1 |
| 15 | | | 47186 | | KEY,3/16” SQ. X 23/32” | 1 |
| 16 | PAOZZ | 3020-01-543-8698 | 47186 | 190011 | GEAR, 40 TOOTH | 1 |
| 17 | PAOZZ | 5365-01-543-4577 | 47186 | 881670 | SPACER | 1 |
| 18 | PAOZZ | 5306-01-543-7889 | 47186 | 881084 | BOLT | 4 |
| 19 | XBOZZ | | 47186 | 881521 | GREASE FITTING | 1 |
| | | | | | **END OF FIGURE** | |

## FIELD MAINTENANCE
## 1P7-1P7 SS PUMP SUB-ASSEMBLY (CI-SDA), 1P7-1P7 SS

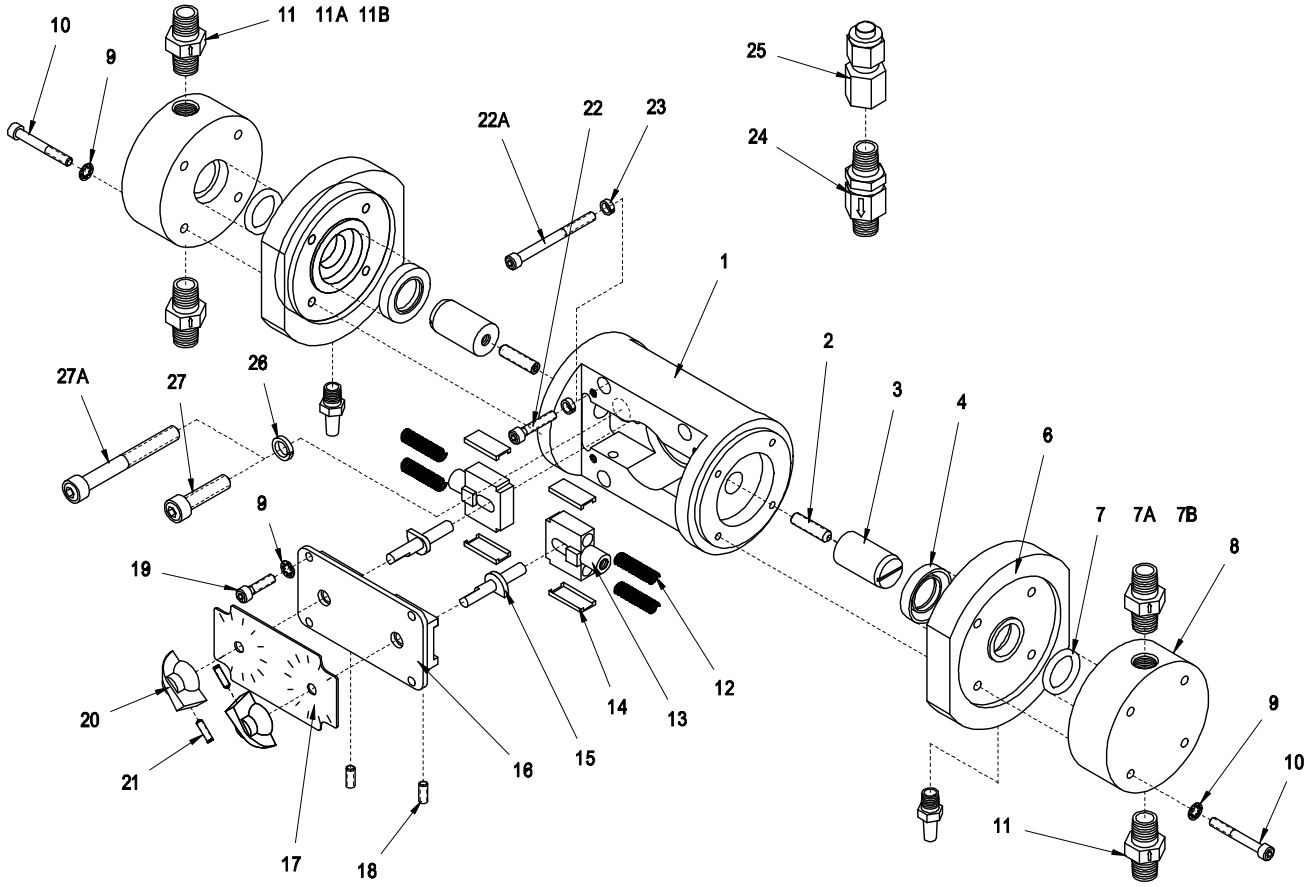



Figure 11. 1P7-1P7 SS Pump Sub-Assembly (CI-SDA).

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0008** | |
| | | | | | **FIG. 11 PUMP SUB-ASSEMBLY ,1P7-1P7 SS** | |
| 1 | PAOZZ | 4320-01-543-9542 | 47186 | 101774 | POWER FRAME, STAINLESS STEEL | 1 |
| 2 | PAOZZ | 5305-01-543-5717 | 47186 | 881045 | SETSCREW, ¼-20 X 1” | 2 |
| 3 | PAOZZ | | 47186 | 102192 | PLUNGER, P7 | 2 |
| 4 | PAOZZ | 5330-01-543-7947 | 47186 | 881765 | SEAL, LIP | 2 |
| 5 | PAOZZ | 4320-01-543-4601 | 47186 | 101749 | 1/8” FILTER | 2 |
| 6 | PAOZZ | 5340-01-543-5724 | 47186 | 102474 | SEAL ADAPTER, VENTED | 2 |
| 7 | PCOZZ | 5331-01-543-7885 | 47186 | 101490 | O-RING, AFLAS | 2 |
| 8 | PAOZZ | 4320-01-543-8661 | 47186 | 102193 | FLUID END, P7 | 2 |
| 9 | PAOZZ | 5310-01-543-7939 | 47186 | 882949 | LOCK WASHER, #10 INTERNAL | 12 |
| 10 | PAOZZ | 5306-01-543-4001 | 47186 | 881317 | SCREW, #10-32 X 2” | 8 |
| 11 | PAOZZ | 4820-01-543-7906 | 47186 | 102463 | CHECK VALVE, AFLAS | 4 |
| 11A | XBOZZ | | 47186 | 881637 | CHECK VALVE, VITON (OPTION) | 4 |
| 11B | XBOZZ | | 47186 | 881970 | CHECK VALVE, EPDM (OPTION) | 4 |
| 12 | PAOZZ | 5360-01-543-8045 | 47186 | 101007 | RETURN SPRING | 4 |
| 13 | PAOZZ | 4810-01-543-7870 | 47186 | 282042 | CROSSHEAD, SS | 2 |
| 14 | PAOZZ | 3120-01-543-4568 | 47186 | 101152 | SLIDE BEARING | 4 |
| 15 | PAOZZ | 3040-01-543-5014 | 47186 | 282043 | STROKE ADJUSTMENT CAM, SS | 2 |
| 16 | PAOZZ | 4320-01-543-3992 | 47186 | 101659 | CAM GUIDE/ COVER, SS | 1 |
| 17 | PAOZZ | 9905-01-544-4919 | 47186 | 101670 | STROKE INDICATOR | 1 |
| 18 | PAOZZ | 5305-01-543-8010 | 47186 | 883578 | SETSCREW, 10 -32 X 1 3/8'' | 2 |
| 19 | PAOZZ | 5306-01-543-8662 | 47186 | 881089 | SCREW, 10 -32 X 3/4” | 4 |
| 20 | PAOZZ | 5306-01-543-9627 | 47186 | 101612 | STROKE ADJUSTMENT KNOB | 2 |
| 21 | PAOZZ | 5305-01-543-4012 | 47186 | 101615 | SETSCREW, M4 X .7X 10 | 2 |
| 22 | PAOZZ | 5306-01-543-8043 | 47186 | 881301 | SCREW, 10 -32 X 1/2” | 4 |
| 22A | XBOZZ | | 47186 | 883170 | SCREW, 10 -32 X 2 1/2”(OPT) | 4 |
| 23 | PAOZZ | 5310-01-543-5734 | 47186 | 101038 | LOCK WASHER, #10 H.C. | 4 |
| 24 | PAOZZ | 4820-01-543-6040 | 47186 | 882911 | CHECK VALVE, INJECTOR | 1* |
| 25 | PAOZZ | 4730-01-543-7843 | 47186 | 101088 | 3/8'' X1/4 FNPT TUBE ADAPTER | 1* |
| 26 | PAOZZ | 5310-01-543-7927 | 47186 | 882352 | LOCK WASHER, 5/16” SS | 2 |
| 27 | PAOZZ | 5306-01-543-8031 | 47186 | 883863 | SCREW, 5/16”-18 X 11/4” SS | 2 |
| 27A | XBOZZ | | 47186 | 882351 | SCREW, 5/16”-18 X 21/4” SS (OPTION) | 2 |
| 28 | PcOZZ | 5331-01-543-9637 | 47186 | 102480 | O-RING | 2 |
| | | | | | **END OF FIGURE** | |

* QUANTITY IS 2 WITH A 1P7-1P7 PUMP

# FIELD MAINTENANCE
# 2L SS PUMP SUB-ASSEMBLY (FSII), 2L SS

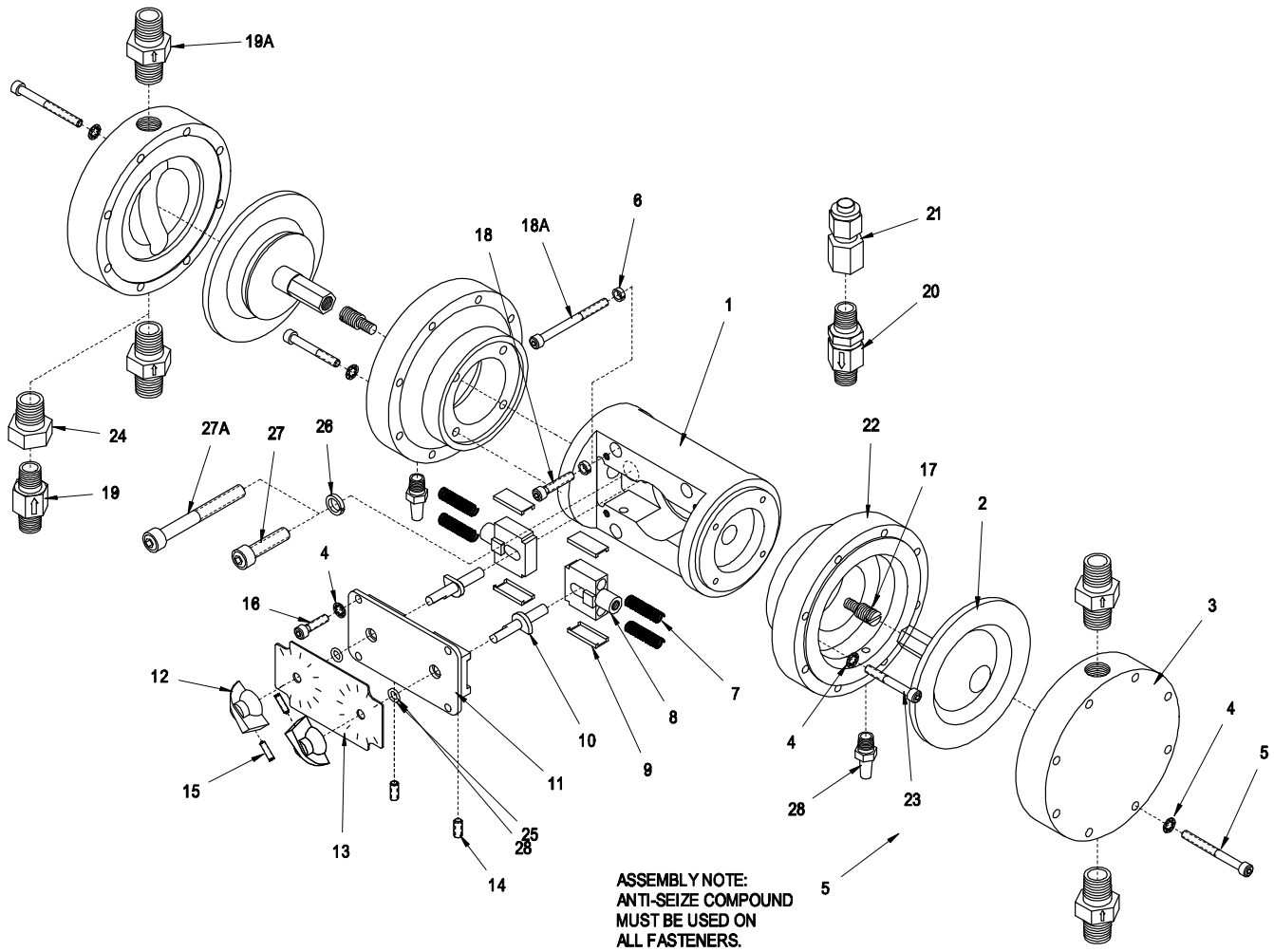



Figure 12. 2L SS Pump Sub-Assembly.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 0009** | |
| | | | | | **FIG. 12 PUMP SUB-ASSEMBLY, 2L SS (FSII)** | |
| 1 | PAOZZ | 4320-01-543-9542 | 47186 | 101774 | POWER FRAME, STAINLESS STEEL | 1 |
| 2 | PAOZZ | 4320-01-396-1905 | 47186 | 282004 | DIAPHRAGM, L | 2 |
| 3 | PAOZZ | 4320-01-543-4564 | 47186 | 282001 | FLUID END, L | 2 |
| 4 | PAOZZ | 5310-01-543-7939 | 47186 | 882949 | LOCK WASHER, #10, INT. TOOTH | 28 |
| 5 | PAOZZ | 5306-01-543-7366 | 47186 | 881247 | SCREW, 10 -32 X 1 3/4'' | 16 |
| 6 | PAOZZ | 5310-01-543-5734 | 47186 | 101038 | LOCK WASHER, #10, H.C. | 4 |
| 7 | PAOZZ | 5360-01-543-8045 | 47186 | 101007 | RETURN SPRING | 4 |
| 8 | PAOZZ | 4810-01-543-7870 | 47186 | 282042 | CROSSHEAD, SS | 2 |
| 9 | PAOZZ | 3120-01-543-4568 | 47186 | 101152 | SLIDE BEARING | 4 |
| 10 | PAOZZ | 3040-01-543-5014 | 47186 | 282043 | STROKE ADJUSTMENT CAM, SS | 2 |
| 11 | PAOZZ | 4320-01-543-3992 | 47186 | 101659 | CAM GUIDE/COVER, SS | 1 |
| 12 | PAOZZ | 5306-01-543-9627 | 47186 | 101612 | STROKE ADJUSTMENT KNOB | 2 |
| 13 | PAOZZ | 9905-01-544-4919 | 47186 | 101670 | STROKE INDICATOR | 1 |
| 14 | PAOZZ | 5305-01-543-8010 | 47186 | 883578 | SETSCREW, 10 -32 X 1 3/8'' | 2 |
| 15 | PAOZZ | 5305-01-543-4012 | 47186 | 101615 | SETSCREW, M4 X .7 X 10 | 2 |
| 16 | PAOZZ | 5306-01-543-4562 | 47186 | 881126 | SCREW, 10 -32 X 1/2" | 4 |
| 17 | PAOZZ | 5307-01-543-4018 | 47186 | 282005 | ADAPTER SCREW | 2 |
| 18 | PAOZZ | 5306-01-543-8043 | 47186 | 881301 | SCREW, 10 -32 X 1/2" | 4 |
| 18A | XBOZZ | | 47186 | 883170 | SCREW, 10 -32 X 2 1/2"(OPT) | 4 |
| 19 | PAOZZ | 4820-01-543-7906 | 47186 | 102463 | 1/4'' CHECK VALVE, AFLAS | 4 |
| 19A | XBOZZ | | 47186 | 103403 | 3/8'' CHECK VALVE | 4 |
| 20 | PAOZZ | 4820-01-543-6040 | 47186 | 882911 | CHECK VALVE, INJECTOR | 1* |
| 21 | PAOZZ | 4730-01-543-7843 | 47186 | 101088 | 3/8'' X1/4 FNPT TUBE ADAPTER | 1* |
| 22 | PAOZZ | 5330-01-543-9656 | 47186 | 282016 | L ADAPTER RING, SS | 2 |
| 23 | PAOZZ | 5306-01-543-7881 | 47186 | 881545 | SCREW, 10-32 X 1 ¼ " | 8 |
| 24 | PAOZZ | 4730-01-543-8664 | 47186 | 271111 | 3/8'' X1/4" REDUCING BUSHING | 4 |
| 25 | PCOZZ | 5331-01-543-9637 | 47186 | 102480 | O-RING | 2 |
| 26 | PAOZZ | 5310-01-543-7927 | 47186 | 882352 | LOCK WASHER, 5/16" SS | 2 |
| 27 | PAOZZ | 5306-01-543-8031 | 47186 | 883863 | SCREW, 5/16"-18 X 11/4" SS | 2 |
| 27A | XBOZZ | | 47186 | 882351 | SCREW, 5/16"-18 X 21/4" SS (OPTION) | 2 |
| 28 | PAOZZ | 4320-01-543-4601 | 47186 | 101749 | 1/8'' FILTER | 2 |
| | | | | | **END OF FIGURE** | |

# FIELD MAINTENANCE
# FSII SAMPLE TEST KIT, 882378

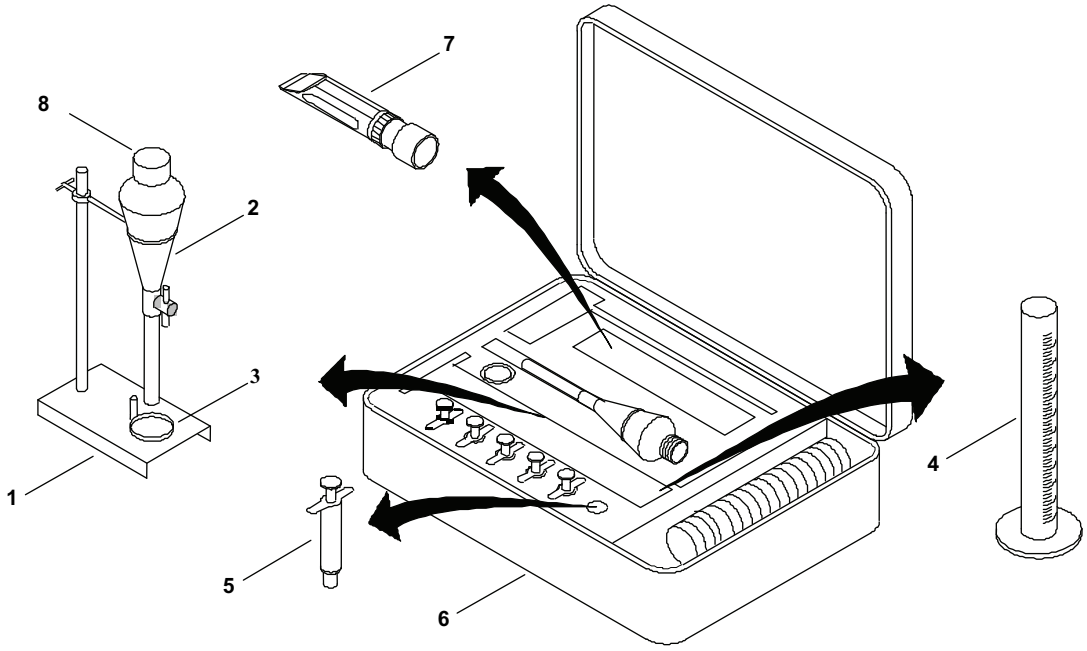



Figure 13. FSII Sample Test Kit, 882378.

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODE (UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | **GROUP 00010** | |
| | | | | | **FIG. 13 FSII SAMPLE TEST KIT, 882378** | |
| 1 | PAOZZ | 5340-01-543-5740 | 47186 | HB-S-1 | SUPPORT STAND ASSEMBLY | 1 |
| 2 | PAOZZ | 6640-01-237-6125 | 62935 | HB-F-1 | FUNNEL, SEPARATORY | 1 |
| 3 | XBOZZ | | 62935 | HB-D-1 | DISHES, ALUMINUM FOIL, 100 CT | 1 |
| 4 | PAOZZ | 6640-01-238-0357 | 62935 | HB-G-1 | CYLINDER, GRADUATED, 250 ML | 1 |
| 5 | PAOZZ | 6640-01-240-3826 | 47186 | HB-P-1 | PIPET, PISTON STYLE, 3 ML | 1 |
| 6 | PAOZZ | 4920-01-476-0748 | 47186 | HB-P-CA | TEST KIT CASE | 1 |
| 7 | PAOZZ | 6650-01-229-5751 | 62935 | HB-R-1 | REFRACTOMETER | 1 |
| 8 | PAOZZ | 6640-01-379-2178 | 62935 | HB-B-1 | BOTTLE, 60ML WITH SCREW CAP | 1 |
| | | | | | **END OF FIGURE** | |

## FIELD MAINTENANCE
## NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 2910-01-543-5241 | 9 | 1 |
| 3020-01-543-3531 | 10 | 14 |
| 3020-01-543-8698 | 10 | 16 |
| 3040-01-543-2655 | 10 | 2 |
| 3040-0-1543-5014 | 11 | 15 |
| 3040-01-543-5014 | 12 | 10 |
| 3040-01-543-8367 | 4 | 3 |
| 3040-01-544-2290 | 10 | 12 |
| 3110-01-543-4597 | 4 | 20 |
| 3110-01-543-5247 | 4 | 7 |
| 3110-01-543-5516 | 10 | 10 |
| 3110-01-543-5516 | 4 | 22 |
| 3120-01-543-4044 | 4 | 8 |
| 3120-01-543-4568 | 11 | 14 |
| 3120-01-543-4568 | 12 | 9 |
| 3130-01-543-7263 | 10 | 7 |
| 3130-01-543-8457 | 4 | 19 |
| 3835-01-543-7977 | 2 | 36 |
| 3990-01-543-5530 | 2 | 3 |
| 3990-01-543-8347 | 2 | 4 |
| 4010-01-543-4617 | 3 | 11 |
| 4010-01-543-4617 | 9 | 8 |
| 4010-01-543-8407 | 2 | 12 |
| 4310-01-543-9123 | 5 | 61 |
| 4320-01-396-1905 | 12 | 2 |
| 4320-01-460-4807 | 4 | 5 |
| 4320-01-543-3992 | 11 | 16 |
| 4320-01-543-3992 | 12 | 11 |
| 4320-01-543-4564 | 12 | 3 |
| 4320-01-543-4601 | 8 | 8 |
| 4320-01-543-4601 | 11 | 5 |
| 4320-01-543-4601 | 12 | 28 |
| 4320-01-543-7875 | 4 | 4 |
| 4320-01-543-7917 | 4 | 1 |
| 4320-01-543-8337 | 4 | 15 |
| 4320-01-543-8346 | 4 | 2 |
| 4320-01-543-8661 | 11 | 8 |
| 4320-01-543-8669 | 4 | 13 |
| 4320-01-543-9147 | 5 | 12 |
| 4320-01-543-9379 | 5 | 11 |
| 4320-01-543-9542 | 11 | 1 |
| 4320-01-543-9542 | 12 | 1 |
| 4330-01-543-4591 | 6 | 5 |
| 4710-01-543-3964 | 5 | *76 |
| 4710-01-543-3979 | 5 | *80 |
| 4710-01-543-6074 | 5 | *72 |
| 4710-01-543-6117 | 5 | *79 |
| 4710-01-543-7858 | 5 | *78 |
| 4710-01-543-8061 | 5 | *77 |
| 4710-01-543-8644 | 5 | *73 |
| 4710-01-543-9538 | 5 | *71 |
| 4710-01-544-5279 | 3 | 28 |
| 4710-01-544-5285 | 5 | *70 |
| 4720-01-543-3903 | 2 | 25 |
| 4720-01-543-5227 | 5 | *74 |
| 4720-01-543-7893 | 5 | *75 |
| 4720-01-543-7926 | 2 | 28 |
| 4720-01-543-7930 | 2 | 30 |

## FIELD MAINTENANCE
## NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 4720-01-543-8354 | 2 | 10 |
| 4720-01-543-8354 | 3 | 30 |
| 4720-01-543-8354 | 5 | 19 |
| 4720-01-543-8381 | 2 | 23 |
| 4720-01-543-8735 | 2 | 26 |
| 4720-01-543-8739 | 2 | 29 |
| 4720-01-543-8745 | 2 | 24 |
| 4730-01-543-3916 | 3 | 7 |
| 4730-01-543-3916 | 9 | 2 |
| 4730-01-543-3921 | 3 | 33 |
| 4730-01-543-3933 | 5 | 22 |
| 4730-01-543-4522 | 3 | 3 |
| 4730-01-543-4583 | 8 | 7 |
| 4730-01-543-4588 | 8 | 5 |
| 4730-01-543-4610 | 3 | 10 |
| 4730-01-543-4610 | 9 | 5 |
| 4730-01-543-5152 | 5 | 29 |
| 4730-01-543-5152 | 7 | 6 |
| 4730-01-543-5168 | 3 | 6 |
| 4730-01-543-5173 | 3 | 27 |
| 4730-01-543-5186 | 5 | 24 |
| 4730-01-543-6034 | 4 | 17 |
| 4730-01-543-6057 | 3 | 36 |
| 4730-01-543-6063 | 3 | 37 |
| 4730-01-543-6063 | 5 | 42 |
| 4730-01-543-7843 | 11 | 25 |
| 4730-01-543-7843 | 12 | 21 |
| 4730-01-543-7902 | 5 | 41 |
| 4730-01-543-7905 | 5 | 44 |
| 4730-01-543-7909 | 5 | 17 |

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 4730-01-543-7911 | 5 | 13 |
| 4730-01-543-7919 | 3 | 29 |
| 4730-01-543-7919 | 5 | 18 |
| 4730-01-543-7923 | 3 | 8 |
| 4730-01-543-7923 | 9 | 3 |
| 4730-01-543-8000 | 3 | 9 |
| 4730-01-543-8000 | 9 | 4 |
| 4730-01-543-8084 | 5 | 57 |
| 4730-01-543-8319 | 5 | 25 |
| 4730-01-543-8349 | 3 | 34 |
| 4730-01-5438-366 | 3 | 16 |
| 4730-01-543-8366 | 5 | 34 |
| 4730-01-543-8366 | 8 | 11 |
| 4730-01-543-8397 | 3 | 39 |
| 4730-01-543-8397 | 5 | 35 |
| 4730-01-543-8397 | 8 | 12 |
| 4730-01-543-8435 | 3 | 20 |
| 4730-01-543-8435 | 5 | 53 |
| 4730-01-543-8435 | 8 | 9 |
| 4730-01-543-8451 | 3 | 32 |
| 4730-01-543-8451 | 5 | 43 |
| 4730-01-543-8463 | 5 | 15 |
| 4730-01-543-8549 | 5 | 31 |
| 4730-01-543-8642 | 5 | 23 |
| 4730-01-543-8664 | 12 | 24 |
| 4730-01-543-8702 | 3 | 26 |
| 4730-01-543-8702 | 5 | 14 |
| 4730-01-543-8716 | 3 | 14 |
| 4730-01-543-8716 | 5 | 21 |
| 4730-01-543-9525 | 5 | 54 |

## FIELD MAINTENANCE
## NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 4730-01-544-5274 | 3 | 22 |
| 4730-01-544-5274 | 5 | 56 |
| 4730-01543-5152 | 4 | 16 |
| 4810-01-543-7870 | 11 | 13 |
| 4810-01-543-7870 | 12 | 8 |
| 4820-01-543-3953 | 5 | 40 |
| 4820-01-543-6040 | 3 | 17 |
| 4820-0-543-6040 | 11 | 24 |
| 4820-01-543-6040 | 12 | 20 |
| 4820-01-543-6068 | 5 | 16 |
| 4820-01-543-7906 | 5 | 36 |
| 4820-01-543-7906 | 11 | 11 |
| 4820-01-543-7906 | 12 | 19 |
| 4820-01-543-8361 | 2 | 8 |
| 4820-01-543-8385 | 3 | 21 |
| 4820-01-543-8385 | 5 | 32 |
| 4820-01-543-8385 | 8 | 10 |
| 4820-01-543-8399 | 5 | 37 |
| 4930-01-543-5102 | 2 | 9 |
| 5305-01-543-4012 | 11 | 21 |
| 5305-01-543-4012 | 12 | 15 |
| 5305-01-543-4055 | 5 | 39 |
| 5305-01-543-4570 | 10 | 3 |
| 5305-01-543-5587 | 3 | 24 |
| 5305-01-543-5587 | 5 | 58 |
| 5305-01-543-5717 | 11 | 2 |
| 5305-01-543-8010 | 11 | 18 |
| 5305-01-543-8010 | 12 | 14 |
| 5306-01-543-4001 | 11 | 10 |
| 5306-01-543-4562 | 12 | 16 |
| 5306-01-543-5616 | 5 | 50 |
| 5306-01-543-5693 | 5 | 52 |
| 5306-01-543-7366 | 12 | 5 |
| 5306-01-543-7881 | 12 | 23 |
| 5306-01-543-7889 | 10 | 18 |
| 5306-01-543-7898 | 5 | 55 |
| 5306-01-543-7914 | 5 | 6 |
| 5306-01-543-7956 | 2 | 19 |
| 5306-01-543-8023 | 5 | 45 |
| 5306-01-543-8031 | 11 | 27 |
| 5306-01-543-8031 | 12 | 27 |
| 5306-01-543-8042 | 10 | 6 |
| 5306-01-543-8043 | 11 | 22 |
| 5306-01-543-8043 | 12 | 18 |
| 5306-01-543-8344 | 4 | 11 |
| 5306-01-543-8662 | 11 | 19 |
| 5306-01-543-9627 | 11 | 20 |
| 5306-01-543-9627 | 12 | 12 |
| 5306-01-544-2774 | 5 | 5 |
| 5306-01-544-2796 | 2 | 17 |
| 5307-01-543-4018 | 12 | 17 |
| 5307-01-543-7945 | 3 | 4 |
| 5310-01-543-4023 | 2 | 22 |
| 5310-01-543-4580 | 10 | 5 |
| 5310-01-543-5553 | 4 | 6 |
| 5310-01-543-5607 | 5 | 7 |
| 5310-01-543-5734 | 11 | 23 |
| 5310-01-543-5734 | 12 | 6 |
| 5310-01-543-7915 | 2 | 20 |
| 5310-01-543-7927 | 11 | 26 |

## FIELD MAINTENANCE
## NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 5310-01-543-7927 | 12 | 26 |
| 5310-01-543-7931 | 5 | 51 |
| 5310-01-543-7939 | 3 | 25 |
| 5310-01-543-7939 | 5 | 38 |
| 5310-01-543-7939 | 11 | 9 |
| 5310-01-543-7939 | 12 | 4 |
| 5310-01-543-7986 | 5 | 9 |
| 5310-01-543-8339 | 4 | 12 |
| 5310-01-543-8637 | 5 | 10 |
| 5310-01-543-8726 | 2 | 18 |
| 5310-01-543-8726 | 5 | 8 |
| 5310-01-543-9616 | 5 | 46 |
| 5325-01-543-4603 | 10 | 11 |
| 5325-01-543-4603 | 4 | 23 |
| 5325-01-543-7921 | 10 | 8 |
| 5325-01-543-8453 | 4 | 9 |
| 5330-01-395-7688 | 3 | 5 |
| 5330-01-543-4621 | 8 | 3 |
| 5330-01-543-5712 | 8 | 4 |
| 5330-01-543-7947 | 11 | 4 |
| 5330-01-543-8036 | 10 | 13 |
| 5330-01-543-9656 | 12 | 22 |
| 5331-01-395-7686 | 7 | 3 |
| 5331-01-395-7687 | 6 | 3 |
| 5331-01-543-7885 | 11 | 7 |
| 5331-01-543-7984 | 4 | 10 |
| 5331-01-543-9548 | 5 | 27 |
| 5331-01-543-9637 | 11 | 28 |
| 5331-01-543-9637 | 12 | 25 |
| 5340-01-543-4049 | 5 | 2 |
| 5340-01-543-5594 | 5 | 4 |
| 5340-01-543-5724 | 11 | 6 |
| 5340-01-543-5740 | 13 | 1 |
| 5340-01-543-8330 | 5 | 3 |
| 5340-01-543-8425 | 2 | 11 |
| 5340-01-543-8648 | 6 | 1 |
| 5340-01-543-9138 | 7 | 1 |
| 5340-01-543-9172 | 10 | 1 |
| 5340-01-543-9543 | 2 | 2 |
| 5340-01-544-5790 | 2 | 1 |
| 5360-01-543-8045 | 11 | 12 |
| 5360-01-543-8045 | 12 | 7 |
| 5365-01-543-4026 | 3 | 12 |
| 5365-01-543-4026 | 9 | 7 |
| 5365-01-543-4046 | 4 | 21 |
| 5365-01-543-4059 | 10 | 9 |
| 5365-01-543-4577 | 10 | 17 |
| 5365-01-543-4594 | 3 | 13 |
| 5365-01-543-4594 | 4 | 18 |
| 5430-01-543-9624 | 8 | 1 |
| 5975-01-543-6229 | 2 | 5 |
| 5975-01-543-6600 | 2 | 16 |
| 6625-01-543-8458 | 9 | 6 |
| 6680-01-383-7453 | 7 | 4 |
| 6680-01-396-0270 | 6 | 4 |
| 6680-01-396-0271 | 7 | 5 |
| 6680-01-543-5766 | 7 | 2 |
| 6680-01-543-5771 | 5 | 20 |
| 6680-01-543-5777 | 5 | 33 |
| 7690-01-543-6123 | 2 | 15 |

## FIELD MAINTENANCE
## NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 9905-01-544-4881 | 5 | 67 |
| 9905-01-544-4882 | 5 | 65 |
| 9905-01-544-4884 | 5 | 64 |
| 9905-01-544-4885 | 5 | 66 |
| 9905-01-544-4891 | 5 | 68 |
| 9905-01-544-4893 | 5 | 69 |
| 9905-01-544-4910 | 3 | 31 |
| 9905-01-544-4916 | 3 | 40 |
| 9905-01-544-4919 | 11 | 17 |
| 9905-01-544-4919 | 12 | 13 |
| 9905-01-544-4923 | 5 | 63 |
| 9905-01-544-4927 | 8 | 13 |
| 9905-01-544-4933 | 8 | 14 |
| 9905-01-544-5724 | 3 | 23 |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| 101007 | 11 | 12 |
| 101007 | 12 | 7 |
| 101021 | 3 | 38 |
| 101023 | 5 | 22 |
| 101032 | 3 | 15 |
| 101032 | 5 | 30 |
| 101034 | 5 | 24 |
| 101038 | 11 | 23 |
| 101038 | 12 | 6 |
| 101045 | 4 | 23 |
| 101045 | 10 | 11 |
| 101068 | 5 | 23 |
| 101069 | 3 | 20 |
| 101069 | 5 | 53 |
| 101069 | 8 | 9 |
| 101070 | 3 | 14 |
| 101070 | 5 | 21 |
| 101088 | 11 | 25 |
| 101088 | 12 | 21 |
| 101091 | 5 | 54 |
| 101095 | 5 | 25 |
| 101128 | 3 | 27 |
| 101141 | 3 | 34 |
| 101152 | 11 | 14 |
| 101152 | 12 | 9 |
| 101180 | 5 | 40 |
| 101205 | 5 | 16 |
| 101226 | 11 | 7A |
| 101230 | 3 | 21 |
| 101230 | 5 | 32 |
| 101230 | 8 | 10 |
| 101284 | 5 | 44 |
| 101337 | 5 | 27 |
| 101379 | 5 | 28 |
| 101490 | 11 | 7 |
| 101612 | 11 | 20 |
| 101612 | 12 | 12 |
| 101615 | 11 | 21 |
| 101615 | 12 | 15 |
| 101659 | 11 | 16 |
| 101659 | 12 | 11 |
| 101670 | 11 | 17 |
| 101670 | 12 | 13 |
| 101685 | 5 | 26 |
| 101749 | 4 | 24 |
| 101749 | 8 | 8 |
| 101749 | 11 | 5 |
| 101749 | 12 | 28 |
| 101774 | 11 | 1 |
| 101774 | 12 | 1 |
| 101833 | 3 | 12 |
| 101833 | 9 | 7 |
| 101869 | 2 | 13 |
| 101880 | 11 | 7B |
| 101895 | 2 | 12 |
| 102192 | 11 | 3 |
| 102193 | 11 | 8 |
| 102278 | 8 | 1 |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| 102285 | 5 | 37 |
| 102460 | 8 | 3 |
| 102463 | 5 | 36 |
| 102463 | 11 | 11 |
| 102463 | 12 | 19 |
| 102469 | 5 | 11 |
| 102470 | 5 | 12 |
| 102471 | 5 | 1 |
| 102472 | 5 | 3 |
| 102473 | 5 | 4 |
| 102474 | 11 | 6 |
| 102475 | 5 | 59 |
| 102476 | 5 | 60 |
| 102477 | 5 | 61 |
| 102478 | 5 | 62 |
| 102480 | 11 | 28 |
| 102480 | 12 | 25 |
| 102482 | 8 | 4 |
| 102484 | 5 | 63 |
| 102485 | 2 | 8 |
| 102486 | 2 | 9 |
| 102490 | 2 | 15 |
| 102501 | 5 | 70 |
| 102502 | 5 | 71 |
| 102503 | 5 | 72 |
| 102504 | 5 | 73 |
| 102505 | 5 | 74 |
| 102506 | 5 | 75 |
| 102507 | 5 | 76 |
| 102508 | 5 | 77 |
| 102509 | 5 | 78 |
| 102510 | 5 | 79 |
| 102511 | 5 | 80 |
| 102512 | 5 | 81 |
| 102513 | 3 | 28 |
| 102514 | 3 | 35 |
| 102515 | 2 | 2 |
| 102516 | 2 | 16 |
| 103381 | 4 | 9 |
| 103383 | 4 | 6 |
| 103403 | 12 | 19A |
| 103409 | 4 | 10 |
| 141036 | 4 | 5 |
| 151001 | 7 | 4 |
| 151002 | 7 | 3 |
| 151005 | 4 | 16 |
| 151005 | 5 | 29 |
| 151009 | 6 | 4 |
| 151010 | 6 | 3 |
| 152002 | 7 | 5 |
| 152005 | 7 | 6 |
| 152011 | 5 | 33 |
| 152020 | 5 | 20 |
| 152025 | 6 | 5 |
| 152074 | 7 | 1 |
| 152075 | 7 | 2 |
| 152080 | 6 | 2 |
| 152081 | 6 | 1 |
| 161001 | 3 | 5 |
| 162119 | 2 | 11 |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| 162120 | 2 | 7 |
| 162128 | 2 | 14 |
| 184004 | 4 | 8 |
| 184011 | 4 | 15 |
| 184037 | 4 | 19 |
| 184038 | 4 | 1 |
| 184047 | 10 | 1 |
| 184048 | 10 | 2 |
| 184081 | 4 | 3 |
| 184093 | 4 | 4 |
| 184166 | 4 | 2 |
| 184167 | 4 | 13 |
| 190011 | 10 | 16 |
| 190012 | 10 | 14 |
| 212048 | 10 | 12 |
| 271094 | 5 | 17 |
| 271095 | 5 | 13 |
| 271097 | 5 | 15 |
| 271111 | 12 | 24 |
| 271112 | 3 | 32 |
| 271112 | 5 | 43 |
| 271113 | 3 | 13 |
| 271113 | 4 | 18 |
| 271122 | 3 | 33 |
| 271123 | 3 | 26 |
| 271123 | 5 | 14 |
| 271125 | 3 | 16 |
| 271125 | 5 | 34 |
| 271125 | 8 | 11 |
| 271127 | 5 | 57 |
| 271130 | 3 | 36 |
| 271131 | 3 | 29 |
| 271131 | 5 | 18 |
| 271249 | 4 | 17 |
| 271353 | 5 | 31 |
| 271498 | 3 | 3 |
| 282001 | 12 | 3 |
| 282004 | 12 | 2 |
| 282005 | 12 | 17 |
| 282016 | 12 | 22 |
| 282042 | 11 | 13 |
| 282042 | 12 | 8 |
| 282043 | 11 | 15 |
| 282043 | 12 | 10 |
| 401952 | 5 | 49 |
| 700089 | 8 | 5 |
| 881024 | 10 | 13 |
| 881037 | 5 | 39 |
| 881045 | 11 | 2 |
| 881083 | 10 | 5 |
| 881084 | 10 | 18 |
| 881089 | 11 | 19 |
| 881117 | 3 | 11 |
| 881117 | 9 | 8 |
| 881119 | 10 | 8 |
| 881120 | 10 | 7 |
| 881126 | 12 | 16 |
| 881157 | 4 | 22 |
| 881157 | 10 | 10 |
| 881223 | 8 | 6 |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| 881247 | 12 | 5 |
| 881249 | 3 | 4 |
| 881259 | 5 | 10 |
| 881260 | 3 | 9 |
| 881260 | 9 | 4 |
| 881301 | 11 | 22 |
| 881301 | 12 | 18 |
| 881317 | 11 | 10 |
| 881318 | 10 | 6 |
| 881417 | 2 | 18 |
| 881417 | 5 | 8 |
| 881419 | 5 | 7 |
| 881422 | 2 | 17 |
| 881521 | 10 | 19 |
| 881545 | 12 | 23 |
| 881621 | 4 | 11 |
| 881623 | 4 | 7 |
| 881630 | 10 | 9 |
| 881637 | 11 | 11A |
| 881645 | 3 | 24 |
| 881645 | 5 | 58 |
| 881670 | 10 | 17 |
| 881673 | 10 | 3 |
| 881711 | 5 | 51 |
| 881714 | 8 | 7 |
| 881722 | 3 | 8 |
| 881722 | 9 | 3 |
| 881724 | 3 | 7 |
| 881724 | 9 | 2 |
| 881725 | 3 | 10 |
| 881725 | 9 | 5 |
| 881740 | 3 | 6 |
| 881765 | 11 | 4 |
| 881774 | 5 | 9 |
| 881882 | 4 | 20 |
| 881970 | 11 | 11B |
| 881999 | 4 | 21 |
| 882076 | 4 | 12 |
| 882306 | 2 | 22 |
| 882333 | 5 | 47 |
| 882334 | 5 | 48 |
| 882335 | 5 | 6 |
| 882336 | 5 | 5 |
| 882339 | 3 | 22 |
| 882339 | 5 | 56 |
| 882341 | 5 | 2 |
| 882342 | 3 | 39 |
| 882342 | 5 | 35 |
| 882342 | 8 | 12 |
| 882343 | 3 | 37 |
| 882343 | 5 | 42 |
| 882344 | 2 | 10 |
| 882344 | 3 | 30 |
| 882344 | 5 | 19 |
| 882345 | 2 | 30 |
| 882347 | 2 | 26 |
| 882348 | 2 | 23 |
| 882348 | 2 | 27 |
| 882349 | 5 | 55 |
| 882351 | 11 | 27A |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| 882351 | 12 | 27A |
| 882352 | 11 | 26 |
| 882352 | 12 | 26 |
| 882353 | 2 | 21 |
| 882354 | 3 | 23 |
| 882355 | 3 | 31 |
| 882356 | 2 | 24 |
| 882357 | 2 | 25 |
| 882358 | 2 | 29 |
| 882359 | 2 | 28 |
| 882360 | 3 | 19 |
| 882361 | 3 | 18 |
| 882362 | 8 | 13 |
| 882366 | 5 | 64 |
| 882367 | 5 | 65 |
| 882368 | 5 | 66 |
| 882369 | 5 | 67 |
| 882370 | 5 | 68 |
| 882371 | 5 | 69 |
| 882372 | 3 | 40 |
| 882373 | 8 | 14 |
| 882374 | 9 | 6 |
| 882376 | 2 | 5 |
| 882377 | 2 | 6 |
| 882378 | 2 | 36 |
| 882399 | 9 | 1 |
| 882400 | 2 | 1 |
| 882667 | 2 | 20 |
| 882865 | 5 | 45 |
| 882867 | 5 | 46 |
| 882911 | 3 | 17 |
| 882911 | 11 | 24 |
| 882911 | 12 | 20 |
| 882949 | 3 | 25 |
| 882949 | 5 | 38 |
| 882949 | 11 | 9 |
| 882949 | 12 | 4 |
| 883012 | 2 | 19 |
| 883170 | 11 | 22A |
| 883170 | 12 | 18A |
| 883189 | 8 | 2 |
| 883233 | 5 | 50 |
| 883344 | 5 | 52 |
| 883578 | 11 | 18 |
| 883578 | 12 | 14 |
| 883745 | 3 | 2 |
| 883863 | 11 | 27 |
| 883863 | 12 | 27 |
| 2711126 | 5 | 41 |
| ??key | 4 | 14 |
| ??key | 10 | 4 |
| ??key | 10 | 15 |
| 102458L | 2 | 3 |
| 102458R | 2 | 4 |
| 1P7-1P7 SS KIT | 2 | 34 |
| 2L SS KIT | 2 | 33 |
| 4TP-4A TOOLS | 2 | 31 |
| 800ER KIT | 2 | 32 |
| 807ER | 3 | 1 |
| HB-F-1 | 13 | 4 |

## FIELD MAINTENANCE
## PART NUMBER INDEX

| PART NUMBER | FIG. | ITEM |
|---|---|---|
| HB-G-1 | 13 | 6 |
| HB-P-1 | 13 | 7 |
| HB-P-Ca | 13 | 8 |
| HB-R-1 | 13 | 9 |
| HB-S-1 | 13 | 1 |
| HB-S-1 | 13 | 2 |
| HB-S-1 | 13 | 3 |
| HB-S-1 | 13 | 5 |
| SFI MIL KIT | 2 | 35 |

# CHAPTER 8

# SUPPORTING INFORMATION
# FOR
# FUEL ADDITIVE INJECTOR ASSEMBLY

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, TPI-4T-4A-1
# REFERENCES

## SCOPE

This work package lists all field manuals, forms, technical manuals and miscellaneous publications referenced in this manual.

## ARMY REGULATIONS

| | |
|---|---|
| AR 200-1 | Environmental Protection and Enhancement |
| AR 700-138 | Army Logistics Readiness and Sustainability |

## DA PAMPHLETS

| | |
|---|---|
| DA PAM 750-8 | The Army Maintenance Management System (TAMMS) Users Manual |

## FIELD MANUAL

| | |
|---|---|
| FM 3-5 | NBC, Decontamination |
| FM 3-11.4 | Multiservice Tactics, Techniques and Procedures for Nuclear, Biological and Chemical (NBC) Protection |
| FM 4-25.11 | First Aid |
| FM 10-67-1 | Concepts and Equipment of Petroleum Operations |

## FORMS

| | |
|---|---|
| DA Form 2028 | Recommended Changes to Publications and Blank Forms |
| DA Form 2404 | Equipment Inspection and Maintenance Worksheet |
| DA Form 5988-E | Equipment Maintenance and Inspection Worksheet |
| SF 361 | Transportation Discrepancy Report |
| SF 368 | Product Quality Deficiency Report |

## MISCELLANEOUS

| | |
|---|---|
| ASME Y14.38-1999 | The American Society of Mechanical Engineers Abbreviations and Acronyms |
| CTA 8-100 | Common Table of Allowances, Army Medical Department Expendable/Durable Items |
| CTA 50-970 | Common Table of Allowances, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items) |

## SUPPLY CATALOGS

| | |
|---|---|
| SC 4910-95-A72 | Shop Equipment, Automotive Maintenance and Repair Organizational Maintenance, Common No. 2 |
| SC 4910-95-A74 | Shop Equipment, Automotive Maintenance and Repair Organizational Maintenance, Common No. 1 |
| SC 5180-95-N26 | Tool Kit, General Mechanic’s Automotive |

**TECHNICAL BULLETIN**

| | |
|---|---|
| TB 10-4930-232-25 | Preservation, Packing, Packaging and Marking for Fuel System Supply Point (FSSP) |

**TECHNICAL MANUALS**

| | |
|---|---|
| TM 5-5430-219-13 | Operators, Unit and Intermediate Direct Support Maintenance Manual for Tank, Fabric, Collapsible POL |
| TM 10-4330-235-13&P | Operator, Unit and Direct Support Maintenance Manual Including Repair Parts and Special Tools List for Filter-Separator, Liquid Fuel, Frame Mounted 350 GPM Capacity |
| TM 10-4930-248-13&P | Operators, Unit, and Direct Support Maintenance Manual Including Repair Parts and Special Tools List for Closed-Circuit Refueling Nozzle Assembly Model 64017B (NSN: 4930-01-383-9467) |
| TM 10-4930-363-13 | Operator's Field and Sustainment Maintenance Manual for 800K Gallon Fuel System Supply Point (FSSP) (NSN: 4930-01-545-6669). |
| TM 10-4930-363-23P | Repair Parts and Special Tools List, Field Maintenance for 800K Fuel System Supply Point (FSSP) (NSN: 4930-01-545-6669). 800,000 Gallon System Model. |
| TM 10-4930-364-13&P | Operators, Field and Sustainment Maintenance and Repair Parts and Special Tools List for Fuel Additive Injector Assembly, (NSN: 4930-01-418-2694). |
| TM 10-6630-240-12&P | Operators Unit Maintenance Manual, Including Repair Parts and Special Tools List, for Test Kit Petroleum, Aviation Fuel Contaminant, Model PTK-100 (NSN: 6630-01-347-9670) |
| TM 55-8145-203-13&P | Operators, Unit and Direct Support Maintenance Manual Including Repair Parts and Special Tools List (RPSTL) for Tricon Container, Model ESETC-1. |
| TM 750-244-6 | Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use. |
| TM 10-3835-242-14 | Operator's Unit, Direct Support and General Support Maintenance Manual for Fuel Unit Assembly (FUA) NSN 4930-01-534-6423 Pipeline Connection Assembly (PLCA) NSN 3835-01-534-7393. |
| TM 10-4320-374-14 | Operator's Unit, Direct Support And General Support Maintenance Manual For Fuel Pumping Assembly, Diesel Engine Driven, Wheel Mounted, 600 Gallons Per Minute (GPM) At 150 PSI NSN 4320-01-193-3429 |

**END OF WORK PACKAGE**

# FIELD MAINTENANCE
# FUEL ADDITIVE INJECTOR ASSEMBLY, TPI-4T-4A-1
# MAINTENANCE ALLOCATION CHART (MAC)

## MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION

### The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field — includes three subcolumns, Crew maintenance (C), Service maintenance (O) and Field maintenance (F).

Sustainment — includes two subcolumns, Below Depot (H) and Depot (D).

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

### Maintenance Functions

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
    a. Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
    b. Repack. To return item to packing box after service and other maintenance operations.
    c. Clean. To rid the item of contamination.
    d. Touchup. To spot paint scratched or blistered surfaces.
    e. Mark. To restore obliterated identification.
4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.
6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of

**MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION – CONTINUED**

two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. 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.
8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. “Replace” is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
9. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, 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.

**N**

The following definitions are applicable to the “repair” maintenance function:

Services. Inspect, test, service, adjust, align, calibrate and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. 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. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. 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 materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

**Explanation of Columns in the MAC**

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

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

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 refer to “Maintenance Functions” outlined above.)

**MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION – CONTINUED**

**Explanation of Columns in the MAC - Continued**

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate sub column. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to 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 time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

C = Operator or crew maintenance
O = Unit maintenance
F = Direct support maintenance

Sustainment:

L = Specialized Repair Activity
H = General support maintenance
D = Depot maintenance

**N**

The “L” maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the “H” column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

**Explanation of Columns in the Tools and Test Equipment Requirements**

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) Nomenclature. Name or identification of the tool or test equipment.

Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) Tool Number. The manufacturer’s part number, model number, or type number.

**MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION – CONTINUED**

**Explanation of the Columns in the Remarks**

Column (1) Remarks Code. The code recorded in column (6) of the MAC.

Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

**END OF TASK**

**END OF WORK PACKAGE**

## FIELD AND SUSTAINMENT MAINTENANCE
## MAINTENANCE ALLOCATION CHART (MAC)
## MAINTENANCE ALLOCATION CHART

### MAINTENANCE ALLOCATION CHART

**Table 1. Maintenance Allocation Chart (MAC).**

| (1) | (2) | (3) | (4) MAINTENANCE LEVEL | | | | | (5) | (6) |
|---|---|---|---|---|---|---|---|---|---|
| | | | FIELD | | | SUSTAINMENT | | | |
| | | | CREW | SERVICE | FIELD | BELOW DEPOT | DEPOT | | |
| | | | C | O | F | H | D | | |
| GROUP NUMBER | COMPONENT/ ASSEMBLY | MAINTENANCE FUNCTION | | | | | | TOOLS AND EQUIPMENT REF CODE | REMARKS CODE |
| **00** | **FUEL ADDITIVE INJECTOR ASSEMBLY** | | | | | | | | |
| **01** | **SKID SUB-ASSEMBLY** | | | | | | | | |
| **02** | **INJECTOR SUB-ASSEMBLY** | | | | | | | | |
| 0201 | CI and SDA Pump Suction Check Valve | Inspect | .5 | | | | | 1, 2, | |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |
| 0202 | Fuel Additive Injector Assembly Fluid Motor | Inspect | .5 | | | | | 1, 2, | |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| **03** | **CONTROL PANEL SUB-ASSEMBLY** | | | | | | | | |
| 0301 | HI Volume Sight Indicator (FSII) | Inspect | .5 | | | | | 1,2, | A |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |
| 0302 | Sight Flow Indicator (CI) | Inspect | .5 | | | | | 1, 2, | A |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |
| 0303 | Sight Flow Indicator (SDA) | Inspect | .5 | | | | | 1, 2, | A |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |
| 0304 | Calibration Gauge | Inspect | .5 | | | | | 1, 2, | A |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |

**Table 1. Maintenance Allocation Chart (MAC) – Continued.**

| (1) | (2) | (3) | (4) MAINTENANCE LEVEL | | | | | (5) | (6) |
|---|---|---|---|---|---|---|---|---|---|
| | | | FIELD | | | SUSTAINMENT | | | |
| | | | CREW | SERVICE | FIELD | BELOW DEPOT | DEPOT | | |
| | | | C | O | F | H | D | | |
| GROUP NUMBER | COMPONENT/ ASSEMBLY | MAINTENANCE FUNCTION | | | | | | TOOLS AND EQUIPMENT REF CODE | REMARKS CODE |
| **04** | **SIX GALLON SS TANK SUB-ASSEMBLY** | | | | | | | | |
| 0401 | Additive tank | Inspect | .5 | | | | | 1, 2, 10 | A |
| | | Replace | | 1.0 | | | | | |
| | | Repair | | 1.0 | | | | | |
| **07** | **1P7-1P7 SS PUMP SUB-ASSEMBLY (CI-SDA)** | | | | | | | | |
| 0701 | CI and SDA Injector Pump | Inspect | .5 | | | | | 1, 2, 10 | A |
| | Lip Seal | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| 0702 | CI and SDA Injector Pump | Inspect | .5 | | | | | 1, 2, 4, 6 | A |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| **08** | **2L SS PUMP SUB-ASSEMBLY (FSII)** | | 0 | | | | | | |
| 0801 | FSII Pump Check Valve | Inspect | .5 | | | | | 1, 2, 4, 6 | A |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| 0802 | FSII Injector Pump | Inspect | .5 | | | | | 1, 2, 4, 6 | A |
| | Diaphragm | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| 0803 | FSII Inection Pump | Inspect | .5 | | | | | 1, 2, 4, 6 | A |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |

## MAINTENANCE ALLOCATION CHART, TOOLS AND TEST EQUIPMENT

**Table 2. Tools and Test Equipment for the Fuel Additive Injector Assembly.**

| TOOL OR TEST EQUIPMENT REF CODE | MAINTENANCE LEVEL | NOMENCLATURE | NATIONAL STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | O | Tool kit, general mechanic's | 5180-00-177-7033 | SC 5180-95-N26 |
| 2 | O | Tool kit, organizational maintenance common #1 | 4910-00-754-0654 | SC 4910-95-A74 |
| 3 | O | Tool kit, organizational maintenance common #2 | 4910-00-754-0650 | SC 4910-95-A72 |
| 4 | O | Wrench, torque, 0–30 in. lb | 5120-00-117-4832 | B107.14M |
| 5 | O | Tool,clamping, strap band, hose | 5120-00-278-9925 | C001 |
| 6 | O | Wrench, torque, 0–150 in. lb | 5120-01-374-1931 | GGG-W-2843 |
| 7 | O | Wrench, torque, 0–175 ft lb | 5120-01-396-5751 | 1753LDF |
| 8 | O | Adapter, socket wrench, 3/8 in. female square end, 1/2 in. male square end | 5120-00-240-8703 | B107.10M |
| 9 | O | Multimeter | 6625-01-265-6000 | 27 W/ACCE |
| 10 | D | Tool, clamping | | P1000 |
| 11 | H | Press, arbor, hand operated | 3444-00-449-7295 | A-A-51194 |
| 12 | H | Wrench, pipe 48 in. | 5120-01-399-8982 | 848HD |

## MAINTENANCE ALLOCATION CHART, REMARKS

**Table 3. Remarks for the Fuel Additive Injector Assembly.**

| REMARKS CODE | REMARKS |
|---|---|
| A | Crew/operator inspection limited to preventive maintenance checks and services (PMCS). |

**END OF TASK**

**END OF WORK PACKAGE**

## FIELD MAINTENANCE
## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

### INTRODUCTION

#### Scope

This work package lists COEI and BII for the Fuel Additive Injector Assembly to help you inventory items for safe and efficient operation of the equipment.

#### General

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the Fuel Additive Injector Assembly. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the Fuel Additive Injector Assembly in operation, operate it, and to do emergency repairs. Although shipped in separately, BII must be with the Fuel Additive Injector Assembly during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

#### Explanation of Columns in the COEI and BII List

Column (1) Illus Number. Gives you the number of the item illustrated.

Column (2) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the CAGEC (Commercial and Government Entity Code) (in parentheses) and the part number.

Column (4) Usable on Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (5) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.

**COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS – CONTINUED**

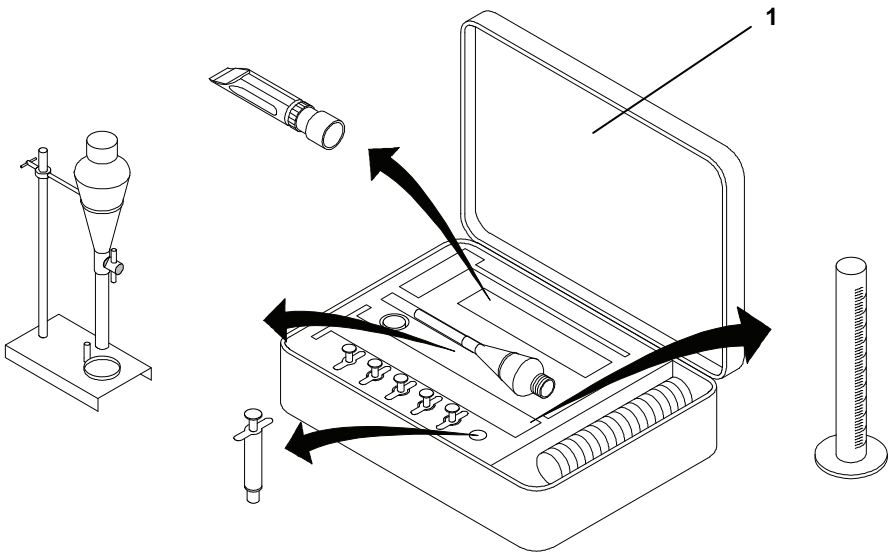



**Table 1. Component of End Item (COEI).**

| (1) ILLUS NUMBER | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION, PART NUMBER/(CAGEC) | (4) USABLE ON CODE | (5) U/I | (6) QTY RQR |
|---|---|---|---|---|---|
| 1 | 4730-01-543-3986 | FSII SAMPLE TEST KIT<br>882378(47186/62935) | | EA | 1 |

**COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS – CONTINUED**

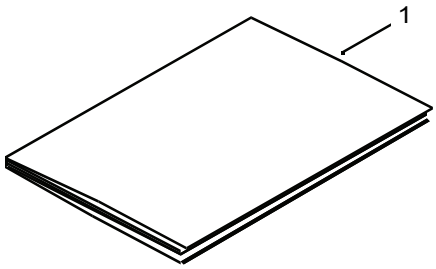



**Table 2. Basic Issue Items (BII).**

| (1) ILLUS NUMBER | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION, (CAGEC) AND PART NUMBER | (4) USABLE ON CODE | (5) U/M | (6) QTY RQD |
|---|---|---|---|---|---|
| 1 | | Technical manual, TM 10-4930-363-13 | | EA | 1 |
| 2 | | *Tool Kit, 4TP-4A<br>(47186)<br>4TP-4A TOOLS | | EA | 1 |
| 3 | | *Repair Kit, 800ER Driver<br>(47186)<br>800ER KIT | | EA | 1 |
| 4 | | *Repair Kit, 2L SS Pump<br>(47186)<br>2L SS KIT | | EA | 1 |
| 5 | | *Repair Kit, 1P7- 1P7 Pump<br>(47186)<br>1P7-1P7 SS KIT | | EA | 1 |
| 6 | | *Repair Kit, 1 HVSFI and 2 SFI<br>(47186)<br>SFI MIL KIT | | EA | 1 |
| 7 | 5120-00-244-4389 | *Wrench, bung<br>GSA | | EA | 1 |

***** Illustrations of these kits unavailable.

**END OF TASK**

**END OF WORK PACKAGE**

## FIELD MAINTENANCE
## ADDITIONAL AUTHORIZATION LIST (AAL)

### INTRODUCTION

#### Scope

This work package lists additional items you are authorized for the support of the Fuel Additive Injector Assembly.

#### General

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

#### Explanations of Columns in the AAL

Column (1) - National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) - Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) - Usable On Code. When applicable, gives you a code if an item you need is not the same for different models of equipment.

Column (4) – U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) - Qty Recm. Indicates the quantity recommended.

**Table 1. Additional Authorization List**

| National Stock Number | Description, Part Number/(CAGEC) | Usuable On Code | U/I | QTY RECM |
|---|---|---|---|---|
| 4310-01-158-3262 | COMPRESSOR UNIT, ROTARY<br>35083880(33968) | | EA | 1 |
| 6630-01-347-9670 | TESTING KIT, PETROLEUM, aviation fuel contamination<br>(90598) | | EA | 1 |

**END OF WORK PACKAGE**

## FIELD AND SUSTAINMENT MAINTENANCE
## EXPENDABLE AND DURABLE ITEMS LIST (EDIL)

### INTRODUCTION

#### Scope

This work package lists expendable and durable items that you will need to operate and maintain the Fuel Additive Injector Assembly. This list is for information 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.

#### Explanation of Columns in the Expendable/Durable Items List

Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the item.

Column (2) - Level. This column identifies, as applicable, the lowest level of maintenance that requires the listed item.

(C = Operator/Crew , O = Service, F = Field, H = Below Depot, D = Depot)

Column (3) - National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) - Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) – U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

**Table 1. Expendable and Durable Items List (EDIL).**

| (1) ITEM NUMBER | (2) LEVEL | (3) NATIONAL STOCK NUMBER | (4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC) | (5) U/I |
|---|---|---|---|---|
| 1 | F | 8030-01-044-5034 | Antiseize compound graphite and petroleum, one pound can for use on threaded fasteners and fittings<br>MIL-T-5544(80348) | CN |
| 2 | C | 6850-01-474-2302 | Cleaning compound, solvent<br>MIL-PRF-680(81349) | GL |
| 3 | H | 5330-00-246-0330 | Cloth, abrasive, aluminum oxide, 320 grit, 11x9 in.<br>ANSI B74.18(80204) | PG |
| 4 | C | 7920-00-044-9281 | Cloth, cleaning<br>MIRACLEWIPEL001(51200) | BX |
| 5 | O | 9150-01-117-2928 | Grease, ball and roller bearing<br>DOD-G-24508 (81349) | CN |

**Table 1. Table Expendable And Durable Items List (EDIL) – Continued.**

| (1) ITEM NUMBER | (2) LEVEL | (3) NATIONAL STOCK NUMBER | (4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC) | (5) U/I |
|---|---|---|---|---|
| 6 | O | | Kit, fuel spill control<br>59359TYII (0N5W4) | EA |
| 7 | O | 9150-00-250-0926 | Petrolatum technical<br>VV-P-236 (81348) | LB |
| 8 | C | | Tape, teflon 0.75 in. wide, 0.003 in. thick<br>6802K44 (39428) | RL |
| 9 | | 9150-01-485-7630 | Lubriplate grease, 3/8 oz. LUBRIPLATE 105<br>L0034-076 | |

**END OF WORK PACKAGE**

## OPERATOR AND FIELD MAINTENANCE
## MANDATORY REPLACEMENT PARTS LIST (MRPL)

### INTRODUCTION

This work package includes a list of all mandatory replacement parts referenced in the task initial setups and procedures. These are items that must be replaced during maintenance whether they have failed or not. This includes items based on usage intervals such as miles, time, rounds fired, etc.

**Table 1. Mandatory Replacement Parts List (MRPL).**

| ITEM NO. | PART NUMBER/ CAGEC | NATIONAL STOCK NUMBER | NOMENCLATURE | QTY |
|---|---|---|---|---|
| 1 | 101038 (47186) | | Washer, lock | 8 |
| 2 | 101490 (15886) | | Seal, lip | 1 |
| 3 | 102460 (15886) | | Gasket | 2 |
| 4 | 102480 (47186) | | O-ring | 4 |
| 5 | 102482 (15886) | | Gasket | 1 |
| 6 | 151002 (47186) | 5331-01-395-7686 | O-ring | 8 |
| 7 | 151010 (47186) | 5331-01-395-7687 | O-ring | 4 |
| 8 | 685701 (00515) | | Washer, lock | 8 |
| 9 | 881765 (15886) | | O-ring | 2 |
| 10 | 882078 (47186) | | Washer, lock | 32 |
| 11 | 882352 (47186) | | Washer, lock | 4 |
| 12 | 882949 (47186) | | Washer, lock | 32 |
| 13 | 881083 (47186) | | Washer, lock | 8 |
| 14 | 882076 (47186) | | Washer, lock | 32 |
| 15 | 103409 (47186) | | O-ring | 2 |

**END OF TASK**

**END OF WORK PACKAGE**

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
*General, United States Army*
*Chief of Staff*

Official:

JOYCE E. MORROW
*Administrative Assistant to the Secretar*

0816906

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|---|---|---|
| TM 10-4930-364-13&P | 15 July 2008 | Operator and Field Maintenance Manual for Fuel Additive Injector Assembly TPI-4T-4A-1 |

| ITEM NO. | PAGE NO. | PARA-GRAPH | LINE NO. * | FIGURE NO. | TABLE NO. | RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible). |
|---|---|---|---|---|---|---|
| | | | | | | |



**Reference to line numbers within the paragraph or subparagraph.*

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|---|---|---|
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|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

SAMPLE

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# THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
1 Kilometer = 1,000 Meters = 0.621 Miles

### SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

### CUBIC MEASURE

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

### TEMPERATURE

Degrees Fahrenheit (F) = ˚C • 9 ÷ 5 + 32
Degrees Celsius (C) = F˚ - 32 • 5 ÷ 9
212˚ Fahrenheit is equivalent to 100˚ Celsius
90˚ Fahrenheit is equivalent to 32.2˚ Celsius
32˚ Fahrenheit is equivalent to 0˚ Celsius

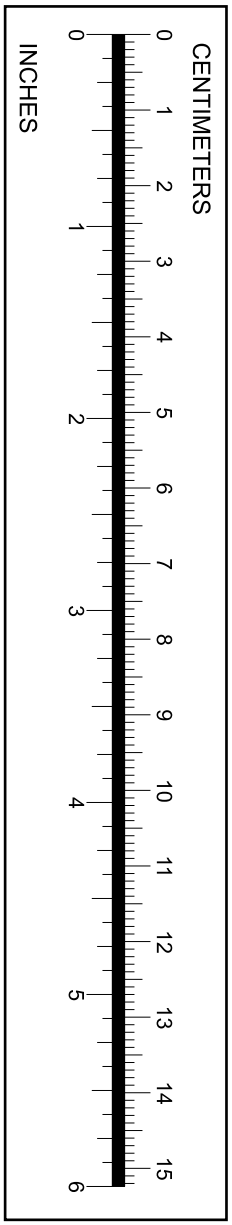
### WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
1 Kilogram = 1,000 Grams = 2.2 Lb
1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

## APPROXIMATE CONVERSION FACTORS

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Inches | Millimeters | 25.4 |
| Inches | Centimeters | 2.540 |
| Feet | Meters | 0.305 |
| Yards | Meters | 0.914 |
| Miles | Kilometers | 1.609 |
| Square Inches | Square Centimeters | 6.451 |
| Square Feet | Square Meters | 0.093 |
| Square Yards | Square Meters | 0.836 |
| Square Miles | Square Kilometers | 2.590 |
| Acres | Square Hectometers | 0.405 |
| Cubic Feet | Cubic Meters | 0.028 |
| Cubic Yards | Cubic Meters | 0.765 |
| Fluid Ounces | Milliliters | 29.573 |
| Pints | Liters | 0.473 |
| Quarts | Liters | 0.946 |
| Gallons | Liters | 3.785 |
| Ounces | Grams | 28.349 |
| Pounds | Kilograms | 0.4536 |
| Short Tons | Metric Tons | 0.907 |
| Pound-Feet | Newton-Meters | 1.356 |
| Pounds Per Square Inch | Kilopascals | 6.895 |
| Miles Per Gallon | Kilometers Per Liter | 0.425 |
| Miles Per Hour | Kilometers Per Hour | 1.609 |

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Millimeters | Inches | 0.03937 |
| Centimeters | Inches | 0.3937 |
| Meters | Feet | 3.280 |
| Meters | Yards | 1.094 |
| Kilometers | Miles | 0.621 |
| Square Centimeters | Square Inches | 0.155 |
| Square Meters | Square Feet | 10.764 |
| Square Meters | Square Yards | 1.196 |
| Square Kilometers | Square Miles | 0.386 |
| Square Hectometers | Acres | 2.471 |
| Cubic Meters | Cubic Feet | 35.315 |
| Cubic Meters | Cubic Yards | 1.308 |
| Milliliters | Fluid Ounces | 0.034 |
| Liters | Pints | 2.113 |
| Liters | Quarts | 1.057 |
| Liters | Gallons | 0.264 |
| Grams | Ounces | 0.035 |
| Kilograms | Pounds | 2.2046 |
| Metric Tons | Short Tons | 1.102 |
| Newton-Meters | Pound-Feet | 0.738 |
| Kilopascals | Pounds Per Square Inch | 0.145 |
| Kilometers Per Liter | Miles Per Gallon | 2.354 |
| Kilometers Per Hour | Miles Per Hour | 0.621 |



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