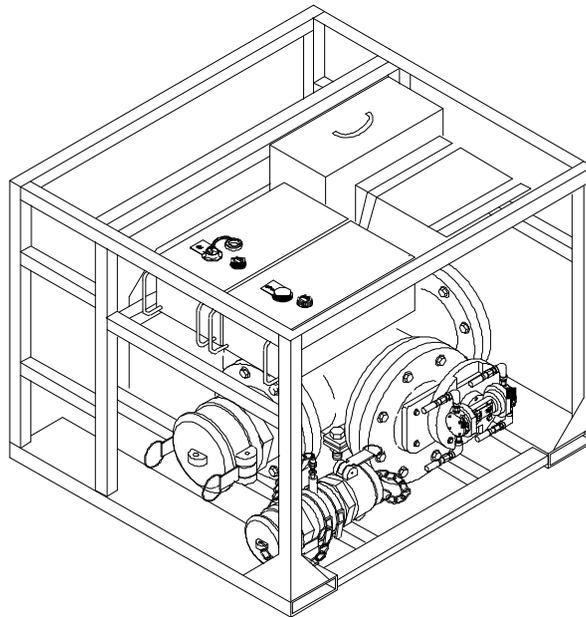


TM 10-4930-364-13&P

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



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

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.



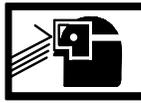
ELECTRICAL

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.



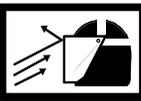
FALLING PARTS

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.



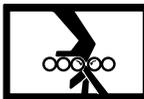
HOT AREA

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.



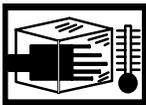
BIOLOGICAL

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

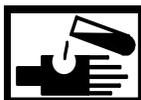


EYE PROTECTION

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:

Page / WP No.	Change No.	Page / WP No.	Change No.
Front Cover	0	WP 0033 (4 pgs)	0
Warning summary (10 pgs)	0	WP 0034 (4 pgs)	0
i-x	0	WP 0035 (4 pgs)	0
Chp 1 title page	0	WP 0036 (4 pgs)	0
WP 0001 (6 pgs)	0	WP 0037 (2 pgs)	0
WP 0002 (4 pgs)	0	WP 0038 (4 pgs)	0
WP 0003 (4 pgs)	0	WP 0039 (4 pgs)	0
Chp 2 title page	0	WP 0040 (4 pgs)	0
WP 0004 (6 pgs)	0	WP 0041 (6 pgs)	0
WP 0005 (16 pgs)	0	WP 0042 (6 pgs)	0
WP 0006 (6 pgs)	0	WP 0043 (4 pgs)	0
WP 0007 (6 pgs)	0	WP 0044 (4 pgs)	0
Chp 3 title page	0	WP 0045 (4 pgs)	0
WP 0008 (2 pgs)	0	WP 0046 (4pgs)	0
WP 0009 (2 pgs)	0	WP 0047 (4 pgs)	0
WP 0010 (4 pgs)	0	WP 0048 (10 pgs)	0
WP 0011 (4 pgs)	0	WP 0049 (8 pgs)	0
Chp 4 title page	0	Chp 7 title page	0
WP 0012 (2 pgs)	0	WP 0050 (8 pgs)	0
WP 0013 (2 pgs)	0	WP 0051 (4 pgs)	0
WP 0014 (2 pgs)	0	WP 0052 (4 pgs)	0
WP 0015 (2 pgs)	0	WP 0053 (4 pgs)	0
WP 0016 (2 pgs)	0	WP 0054 (6 pgs)	0
WP 0017 (2 pgs)	0	WP 0055 (4 pgs)	0
WP 0018 (2 pgs)	0	WP 0056 (4 pgs)	0
WP 0019 (2 pgs)	0	WP 0057 (4 pgs)	0
WP 0020 (2 pgs)	0	WP 0058 (4 pgs)	0
WP 0021 (2 pgs)	0	WP 0059 (2 pgs)	0
WP 0022 (2 pgs)	0	WP 0060 (24pgs)	0
WP 0023 (2 pgs)	0	WP 0061 (4 pgs)	0
WP 0024 (2 pgs)	0	WP 0062 (24pgs)	0
Chp 5 title page	0	WP 0063 (2 pgs)	0
WP 0025 (4 pgs)	0	WP 0064 (2 pgs)	0
WP 0026 (4 pgs)	0	Chp 8 title page	0
WP 0027 (2 pgs)	0	WP 0065 (2 pgs)	0
Chp 6 title page	0	WP 0066 (4 pgs)	0
WP 0028 (2 pgs)	0	WP 0067 (4pgs)	0
WP 0029 (4pgs)	0	WP 0068 (4pgs)	0
WP 0030 (4 pgs)	0	WP 0069 (2 pgs)	0
WP 0031 (4 pgs)	0	WP 0070 (2 pgs)	0
WP 0032 (4 pgs)	0	WP 0071 (2 pgs)	0

**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://aeeps.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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TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
Warning Summary		
How To Use This Manual		
Chapter 1 - General Information, Equipment Description and Theory of Operation for Fuel Additive Injector Assembly		
General Information.....		WP 0001
Equipment Description and Data.....		WP 0002
Figure 1. TPI-4T-4A-1 Fuel Additive Injector Major Assembly	0002-2	
Table 1. Applicator Module Assembly	0002-3	
Theory of Operation.....		WP 0003
Chapter 2 - Operator Instructions for Fuel Additive Injector Assembly		
Description and Use of Operator Controls and Indicators.....		WP 0004
Figure 1. Fuel Additive Injector Assembly Controls and Indicators.....	0004-1	
Table 1. Fuel Additive Injector Assembly Controls and Indicators.....	0004-3	
Operation Under Usual Conditions - Operator Instructions: Grounding, Fill Service Tanks with Additives, Inject FSII Additive Using Drum, Priming with On-Board Priming System, Calibrate, Prepare for Movement		WP 0005
Figure 1. Fuel Additive Injector Assembly Grounding Rod Assembly.....	0005-2	
Figure 2. Fuel Additive Injector Assembly CI and SDA Tanks	0005-3	
Figure 3. FSII Additive Hose Assembly	0005-5	
Figure 4. Injecting Additives Using Drums	0005-6	
Figure 5. Fuel Priming Valve, Fuel Additive Injector Housing.....	0005-7	
Figure 6. Priming Fuel Additive Injector Assembly With On-Board Priming System	0005-8	
Figure 7. Calibrating the FSII Fuel Additive Injector.....	0005-10	
Figure 8. Fuel Additive Injector Assembly Supply Valves.....	0005-13	
Figure 9. Fuel Additive Injector Assembly Priming Valve	0005-14	
Figure 10. Injecting Additives Using Drums	0005-15	
Figure 11. Fuel Additive Injector Assembly CI and SDA Tanks.....	0005-16	

TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
Operate FSII Sample Test Kit.....		WP 0006
Figure 1. FSII Sample Test Kit	0006-1	
Figure 2. Refractometer Used in (%V) Test	0006-2	
Figure 3. Test Equipment in Stand and Scale As Viewed Through Refractometer	0006-2	
Operation Under Unusual Conditions- Unusual Environment/ Weather, Emergency Procedures		WP 0007
 Chapter 3 - Operator Troubleshooting Procedures for Fuel Additive Injector Assembly		
Master Malfunctions/Symptom Index		WP 0008
Fuel Additive Injector Assembly, Will Not Turn		WP 0009
Fuel Additive Injector Assembly Turns, Will Not Pick Up Additive		WP 0010
Fuel Additive Injector Assembly, Injectors Primed, System Running But Injection Low or Erratic		WP 0011
 Chapter 4 - Field Troubleshooting Procedures for Fuel Additive Injector Assembly		
Master Malfunctions/Symptoms Index		WP 0012
Fuel Additive Injector Assembly, Will Not Turn (O)		WP 0013
Fuel Additive Injector Assembly, Turns, Will Not Pick-up Additive (O)		WP 0014
Fuel Additive Injector Assembly, Injectors Primed, System Running But Injection Low or Erratic (O).....		WP 0015
Fuel Additive Injector Assembly, Injector Is Running Slowly Even with High Fuel Flow Rate (O).....		WP 0016
Fuel Additive Injector Assembly, Injector Will Not Flow and Appears to be Locked Up (O).....		WP 0017
Fuel Additive Injector Assembly, Will Not Turn (F).....		WP 0018
Fuel Additive Injector Assembly, Turns, Will Not Pick-up Additive (F)		WP 0019
Fuel Additive Injector Assembly, Injectors Primed, System Running But Injection Low or Erratic (F)		WP 0020
Fuel Additive Injector Assembly, Injector Is Running Slowly Even with High Fuel Flow Rate (F)		WP 0021
Fuel Additive Injector Assembly, Injector Will Not Flow and Appears to be Locked Up (F)		WP 0022
Fuel Additive Injector Assembly, Injector System Does Not Inject the Correct Amount of Additive (F)		WP 0023

TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
Fuel Additive Injector Assembly, Leaks During Operation (F)		WP 0024
Chapter 5 - Operator Maintenance Instructions for Fuel Additive Injector Assembly		
Preventive Maintenance Checks and Services (PMCS) Introduction		WP 0025
Preventive Maintenance Checks and Services (PMCS) and Lubrication Procedures		WP 0026
Table 1. Preventive Maintenance Checks and Services for Fuel Additive Injector Assembly	0026-1	
Fuel Additive Injector Assembly P/N TPI-4T-4A-1, Additive Tanks Filling/Serviceing		WP 0027
Figure 1. Fuel Additive Injector Assembly CI and SDA Tanks	0027-2	
Chapter 6 – Field Maintenance Instructions for Fuel Additive Injector Assembly		
Service Upon Receipt		WP 0028
Table 1. Equipment Inspection	0028-2	
HI Volume Sight Flow Indicator (FSII) Cleaning		WP 0029
Figure 1. HI Volume Sight Flow Indicator (FSII)	0029-2	
HI Volume Sight Flow Indicator (FSII) Repair		WP 0030
Figure 1. HI Volume Sight Flow Indicator (FSII) Removal	0030-2	
Sight Flow Indicator (CI) Cleaning		WP 0031
Figure 1. Sight Flow Indicator (CI)	0031-2	
Sight Flow Indicator (CI) Repair		WP 0032
Figure 1. Sight Flow Indicator (CI) Removal	0032-2	
Sight Flow Indicator (SDA) Cleaning		WP 0033
Figure 1. Sight Flow Indicator (CI)	0033-2	
Sight Flow Indicator (SDA) Repair		WP 0034
Figure 1. Sight Flow Indicator (CI) Removal	0034-2	
Calibration Gauge Cleaning		WP 0035
Figure 1. Fuel Additive Injector Assembly Calibration Gauge	0035-2	
Calibration Gauge Repair		WP 0036
Figure 1. Calibration Gauge Removal	0036-2	

TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
CI and SDA Pump Suction Check Valve Replacement		WP 0037
Figure 1. CI and SDA Pump Suction Check Valve ...	.0037-1	
CI and SDA Pump Discharge Check Valve Replacement		WP 0038
Figure 1. CI and SDA Pump Discharge Check Valves.....	.0038-2	
Fuel Additive Injector Pump Drive Bearing Lubricating		WP 0039
Figure 1. Fuel Additive Injector Pump Power Frame Cover .....	.0039-1	
Figure 2. Fuel Additive Injector Pump And Bearing .....	.0039-2	
CI and SDA Additive Tank Vent Filter Cleaning		WP 0040
Figure 1. CI and SDA Additive Tank Vent Filter .....	.0040-1	
Additive Tank Repair		WP 0041
Figure 1. Fuel Additive Injector Assembly CI and SDA Additive Tank.....	.0041-2	
FSII Pump Suction Check Valve Replacement.....		WP 0042
Figure 1. FSII Pump Fluid End Cap Assembly.....	.0042-2	
Figure 2. FSII Pump Suction Check Valves .....	.0042-3	
Figure 3. Torque Sequence Diagram .....	.0042-6	
FSII Pump Discharge Check Valve Replacement.....		WP 0043
Figure 1. FSII Pump Discharge Check Valves .....	.0043-2	
FSII Injector Pump Diaphragm Replacement.....		WP 0044
Figure 1. FSII Injector Pump Diaphragm.....	.0044-2	
Figure 2. Torque Sequence Diagram .....	.0044-4	
CI and SDA Injector Pump Lip Seal Replacement.....		WP 0045
Figure 1. CI and SDA Lip Seal .....	.0045-2	
Figure 2. Torque Sequence Diagram .....	.0045-4	
FSII Injector Pump Replacement.....		WP 0046
Figure 1. FSII Injector Pump Assembly.....	.0046-2	
CI and SDA Injector Pump Replacement		WP 0047
Figure 1. CI and SDA Injector Pump Assembly .....	.0047-2	
Fuel Additive Injector Assembly Fluid Motor Repair.....		WP 0048
Figure 1. Fuel Additive Injector Pump Bearing Housing .....	.0048-2	
Figure 2. Fuel Additive Injector Pump Fluid Motor.....	.0048-3	

TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
Torque Limits and Torque Tables		WP 0049
Figure 1. Torque Wrench.....	0049-1	
Figure 2. Torque Wrench.....	0049-2	
Figure 3. Torque Wrench Measurement	0049-2	
Figure 4. Torque Wrench Standard and Metric.....	0049-3	
Table 1. SAE Standard Torque Table	0049-4	
Table 2. SAE Standard Torque Table	0049-5	
Table 3. Metric Standard Torque Table.....	0049-6	
Table 4. Metric Standard Torque Table.....	0049-7	
 Chapter 7 – Parts Information for Additive Fuel Injector Assembly		
Parts Information Introduction		WP 0050
Figure 1. Fuel Additive Injector Assembly TPI-4T-4A-1	0050-7	
Skid Sub-Assembly, 4TP-4A-1 SKID		WP 0051
Figure 2. Skid Sub-Assembly, 4TP-4A-1 SKID,	0051-1	
Injector Sub-Assembly, 800ER-2L-1P7-1P7-1.....		WP 0052
Figure 3. Injector Sub-Assembly	0052-2	
Model ER Driver, 807ER		WP 0053
Figure 4. Model 800ER Driver, 807ER	0053-2	
Control Panel Sub-Assembly.....		WP 0054
Figure 5. Control Panel Sub-Assembly	0054-2	
Hi Volume Sight Flow Indicator		WP 0055
Figure 6. Hi Volume Sight Flow Indicator.....	0055-2	
Sight Flow Indicator		WP 0056
Figure 7. Sight Flow Indicator.....	0056-2	
6 Gallon SS Tank Sub-Assembly		WP 0057
Figure 8. 6 Gallon SS Tank Sub-Assembly.....	0057-2	
4 IN Sample Probe Sub-Assembly		WP 0058
Figure 9. 4 IN Sample Probe Sub-Assembly.....	0058-2	
3:1 Gear Reducer Sub-Assembly.....		WP 0059
Figure 10. 3:1 Gear Reducer Sub-Assembly	0059-2	
1P7-1P7 SS Pump Sub-Assembly (CI and SDA).....		WP 0060
Figure 11. 1P7-1P7 SS Pump Sub-Assembly.....	0060-2	

TABLE OF CONTENTS

	<u>Page No.</u>	<u>WP Sequence No.</u>
2L SS Pump Sub-Assembly (FSII)		WP 0061
Figure 12. 2L SS Pump Sub-Assembly	0061-2	
FSII Sample Test Kit.....		WP0062
Figure 13. FSII Sample Test Kit Sub-Assembly	0062-2	
NSN Index Work Package.....		WP 0063
Part Number Index Work Package.....		WP 0064
 Chapter 8 – Supporting Information for Fuel Additive Injector Assembly, TPI-4T-4A-1		
References.....		WP 0065
Fuel Additive Injector Assembly, TPI-4T-4A-1 Maintenance Allocation		
Chart (MAC) Introduction		WP 0066
Field (Unit and Direct Support) Maintenance Allocation		
Chart (MAC)		WP 0067
Table 1. Maintenance Allocation Chart (MAC).....	0067-1	
Table 2. Tools and Test Equipment for the		
Additive Fuel Injector Assembly	0067-3	
Table 3. Remarks for the		
Additive Fuel Injector Assembly	0067-3	
Components of End Item (COEI) and Basic Issue Items (BII) Lists.....		WP 0068
Table 1. Component of End Item (COEI) List.....	0068-2	
Table 2. Basic Issue Items (BII) List.....	0068-3	
Additional Authorization List (AAL).....		WP 0069
Table 1. Additional Authorization (AAL) List.....	0069-1	
Expendable and Durable Items List (EDIL).....		WP 0070
Table 1. Expendable/Durable Items List (EDIL).....	0070-1	
Mandatory Replacement Parts List (MRPL).....		WP 0071
Table 1. Expendable/Durable Items List (EDIL).....	0071-1	

DA Form 2028

Authentication Page

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.

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 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 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 *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/cm ²	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.

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Operating Instructions and Maintenance Manual, Hammonds 4T-4A Portable Multi-Additive Injector

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.

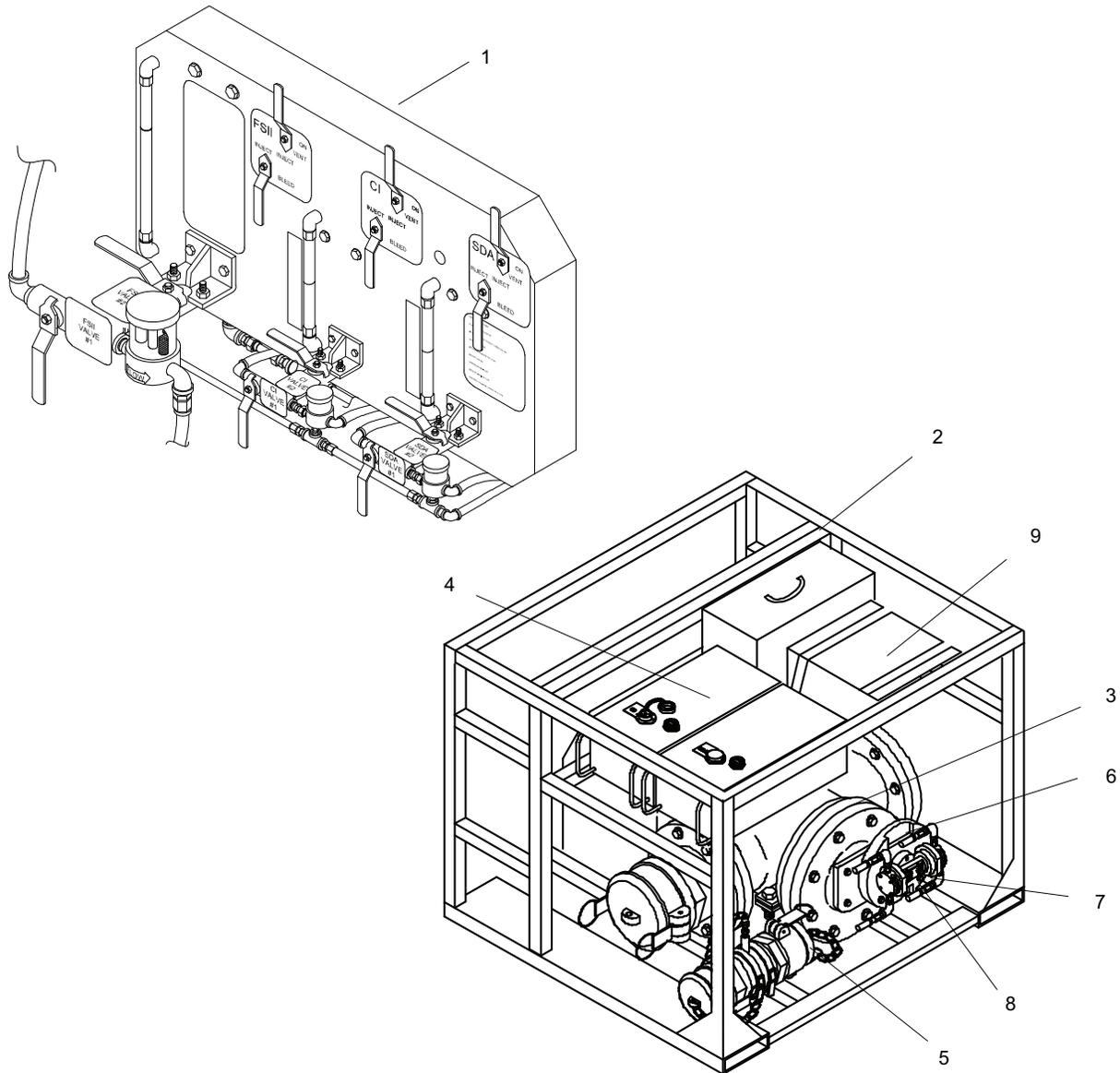
Since all three injectors are directly linked to the fluid motor, they also increase and decrease in speed with the flow of fuel as it passes through the system and are therefore proportionate-to-flow. After the injectors are calibrated at a given fuel flow rate, they remain at the same injection ratio 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 | 6. 3:1 Gear Reducer Sub-Assembly |
| 2. Skid Sub-Assembly | 7. 1P7-1P& SS Pump Sub-Assembly (CI-SDA) |
| 3. Injector Sub-Assembly | 8. 2L SS Pump Sub-Assembly (FSII) |
| 4. 6 Gallon SS Tank Sub-Assembly | 9. FSII Sample Test Kit |
| 5. 4" Sample Probe Sub-Assembly | |

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 FSII	1/4 in braided stainless Teflon® hose with JLC fitting 3/4 in braided stainless Teflon® hose with JLC fitting
Fuel Flow Operating Range	150 - 700 gpm
Injection Ratio Capacity: Corrosion Inhibitor (CI) Static Dissipative Additive (SDA) Fuel System Icing Inhibitor (FSII)	40 PPM 40 PPM 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.

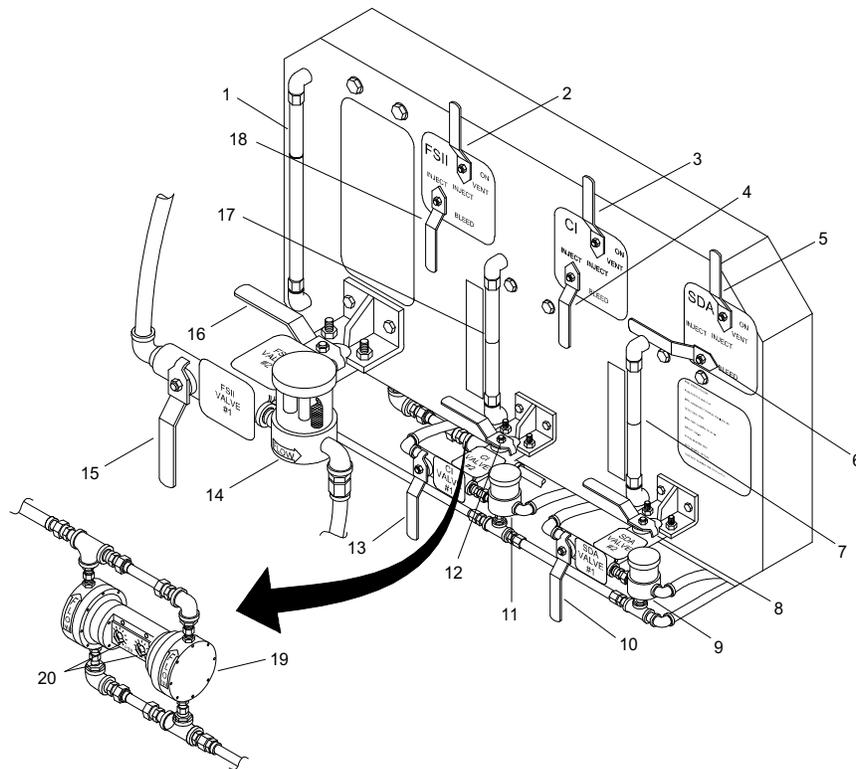


Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 1 of 3).

FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED

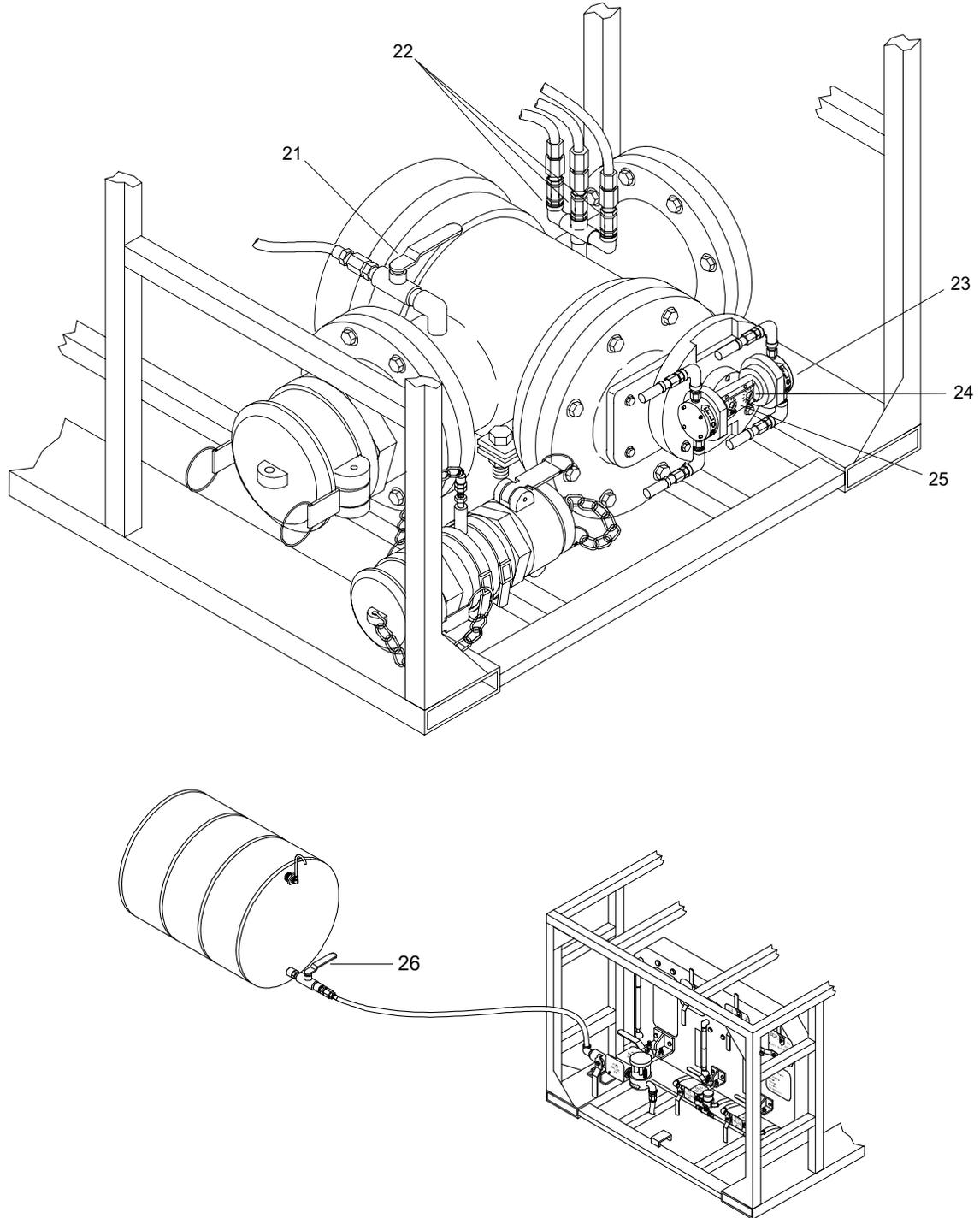


Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 2 of 3).

FUEL ADDITIVE INJECTOR ASSEMBLY CONTROLS AND INDICATORS – CONTINUED

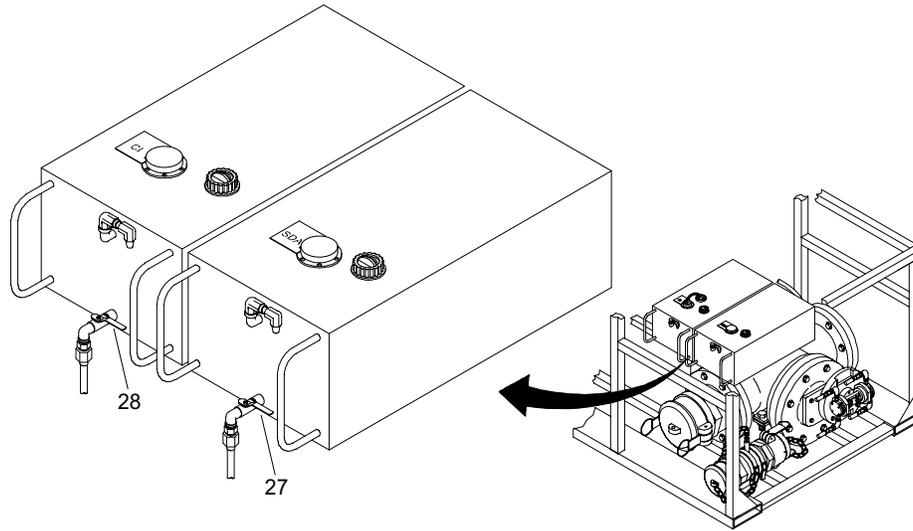


Figure 1. Fuel Additive Injector Assembly Controls and Indicators (Sheet 3 of 3).

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)

Personnel Required

Petroleum Supply Specialist 92F

Materials/Parts

Tape, Teflon (WP 0070, Item 8)

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).

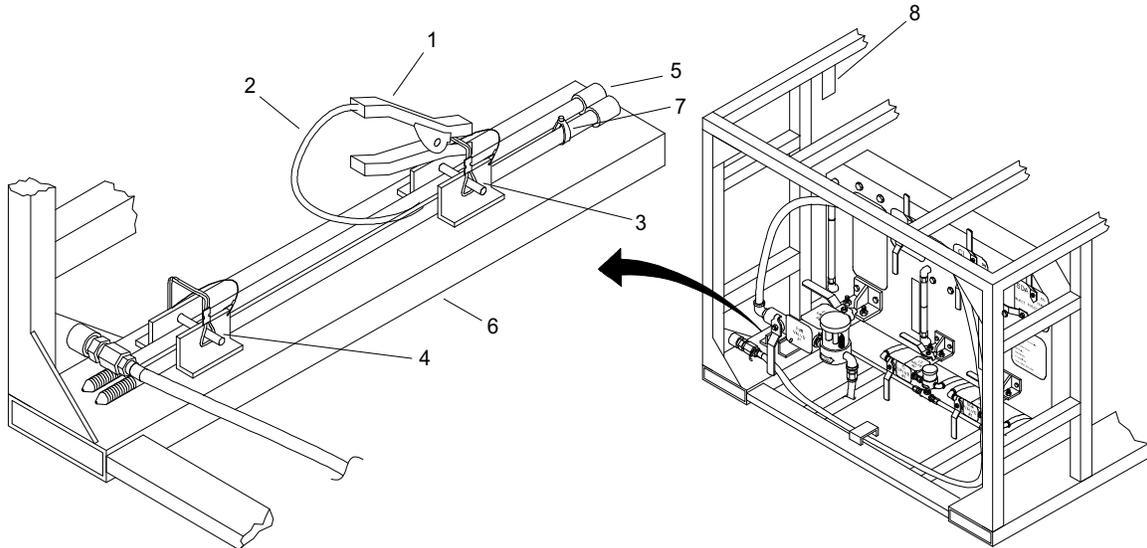


Figure 1. Fuel Additive Injector Assembly Grounding Rod Assembly.

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

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).

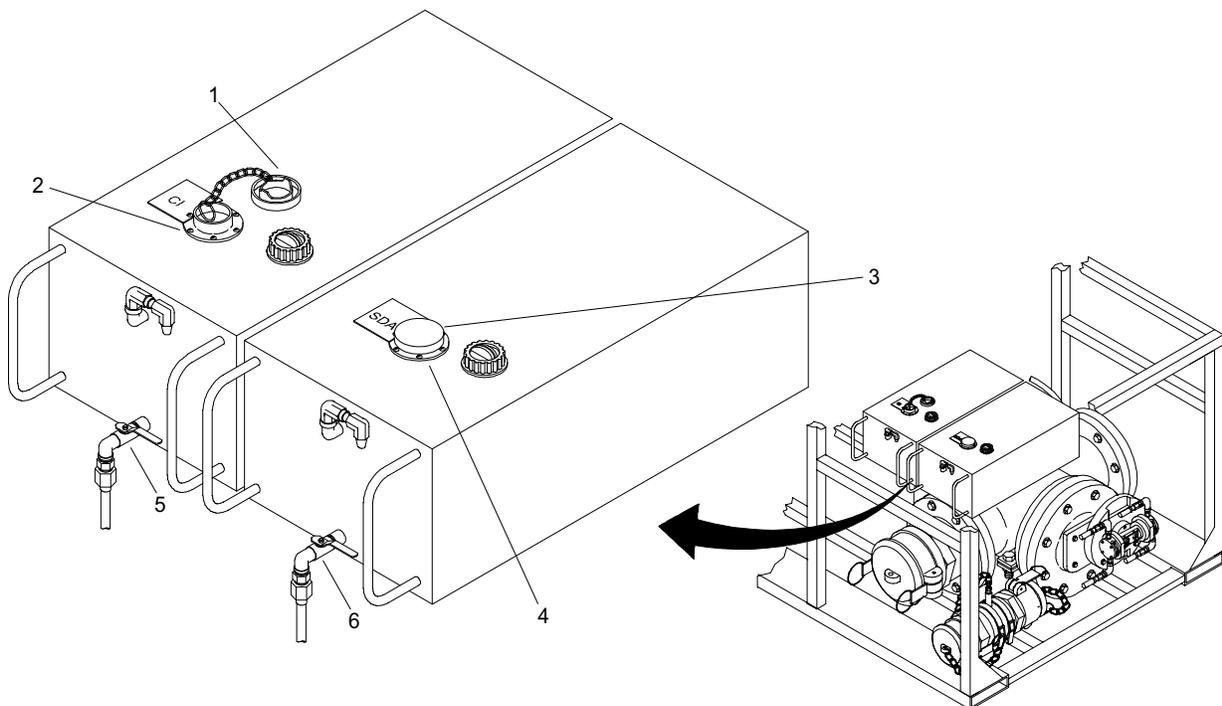


Figure 2. Fuel Additive Injector Assembly CI and SDA Tanks.

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

CHEMICAL



EYE PROTECTION



VAPOR



POISON

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).

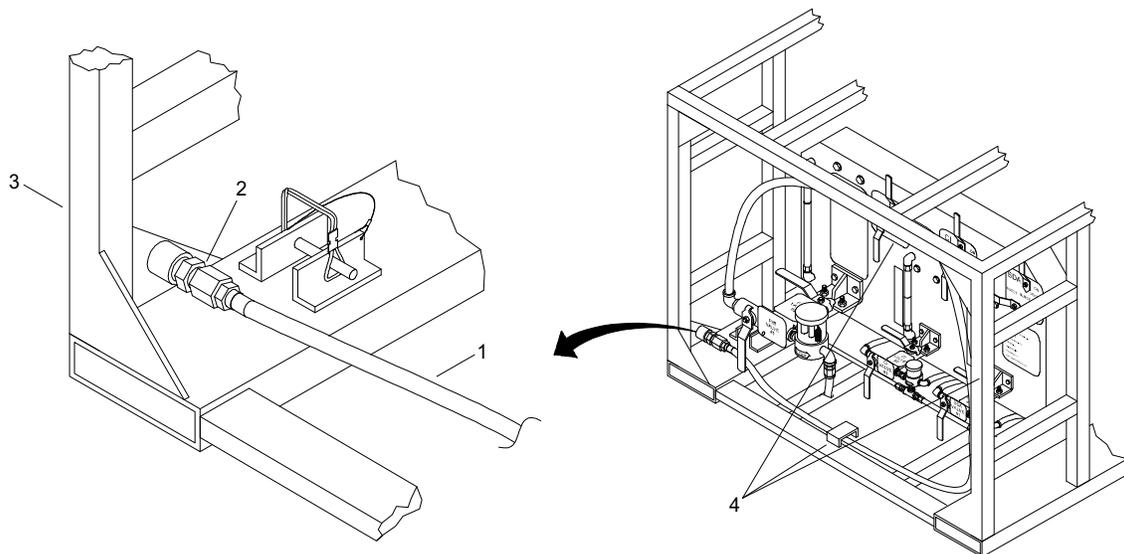


Figure 3. FSII Additive Hose Assembly.

INJECT FSII ADDITIVE USING ADDITIVE DRUM – CONTINUED

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

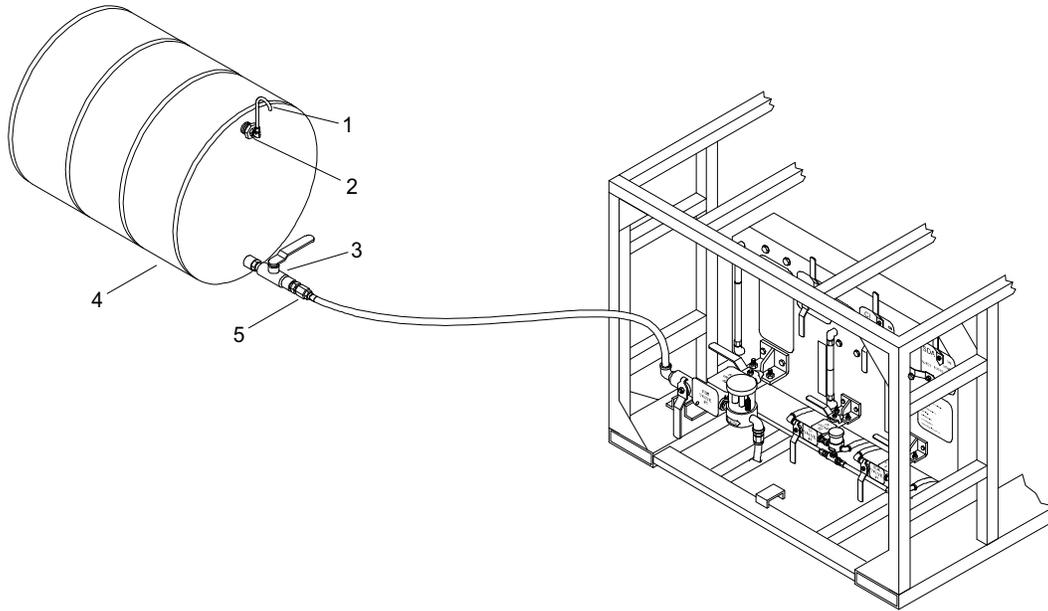


Figure 4. Injecting Additives Using Drums.

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 5) 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.

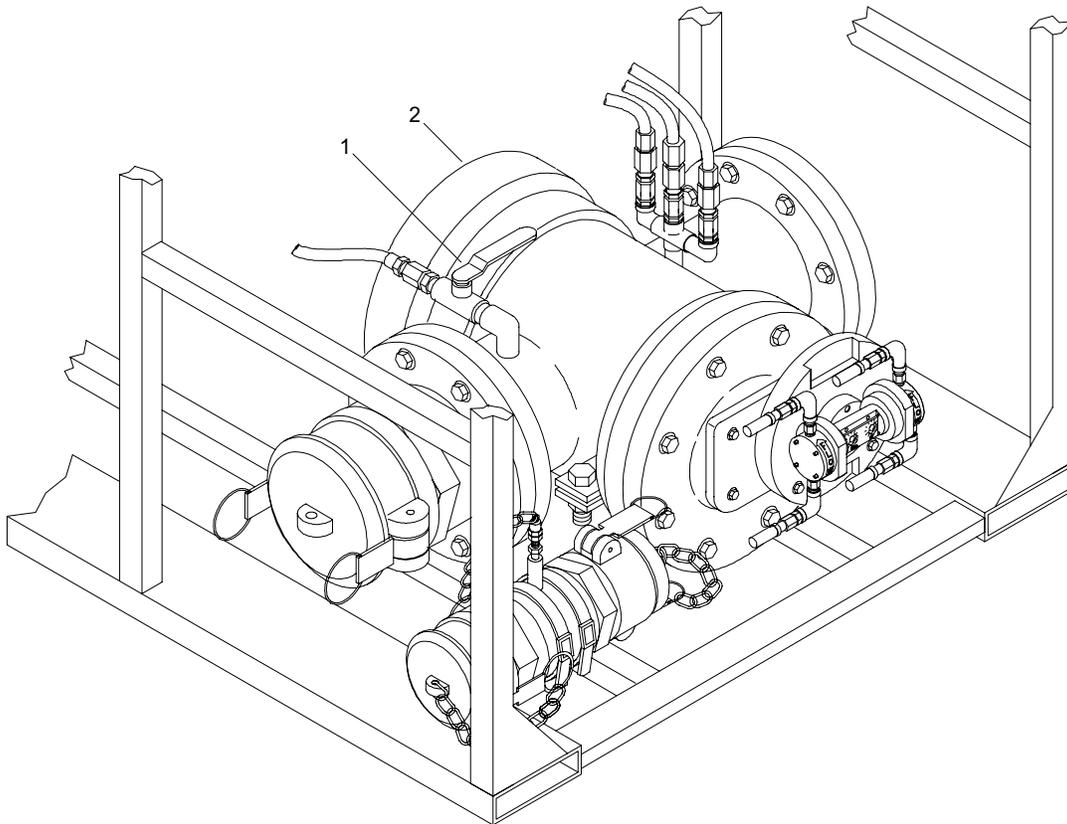


Figure 5. Fuel Priming Valve, Fuel Additive Injector Housing.

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

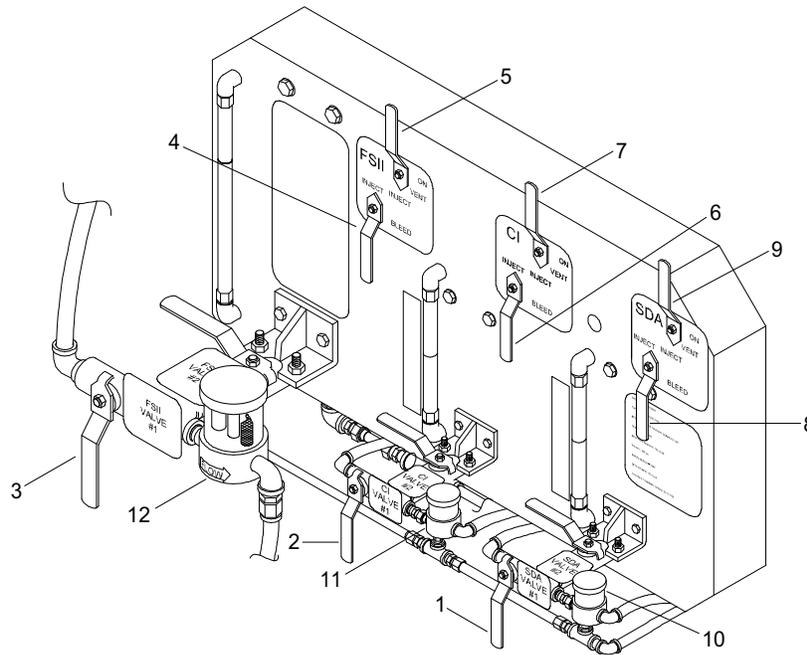


Figure 6. Priming Fuel Additive Injector Assembly with On-Board Priming System.

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

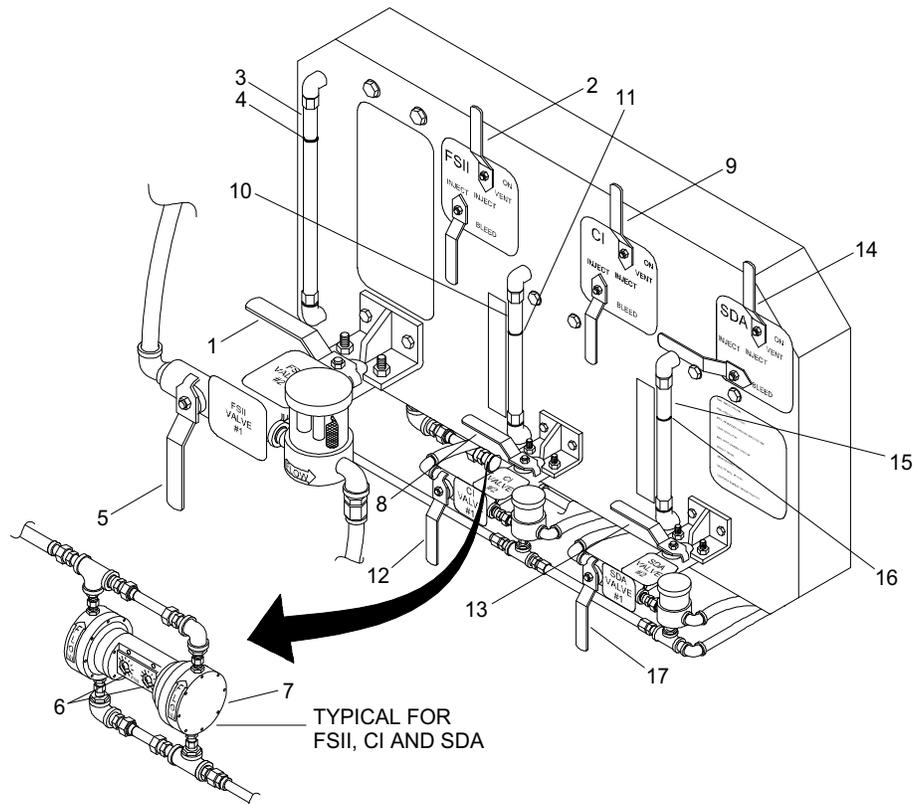


Figure 7. Calibrating the FSII Fuel Additive Injector.

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.
- Open the SDA VALVE #2 (Figure 7, Item 13).
 - Position the SDA vent valve (Figure 7, Item 14) to the ON position to fill the SDI calibration gauge (Figure 6, Item 15).
 - 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.
 - Determine the amount of fuel to be delivered.
 - Move calibration gauge o-ring (Figure 7, Item 16) to the additive level in the SDA calibration gauge (Figure 7, Item 15).
 - Make note of amount of fuel to be used for calibration.
 - Position SDA VALVE #1 (Figure 7, Item 17) to the OFF position.
 - Position SDA vent valve (Figure 7, Item 14) to the ON position.
 - Start the flow of fuel product to determine amount of SDA additive injected.
 - 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).
 - Record the amount of fuel product that was pumped.
 - Position SDA vent valve (Figure 7, Item 14) to the INJECT position.
 - Close SDA VALVE #2 (Figure 7, Item 13).
 - Position SDA VALVE #1 (Figure 7, Item 17) to the ON position.
 - Divide the amount of additive used by the volume of fuel that was pumped, using the formula found in Step 3, sub-step n.
 - 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.
 - Lock the adjustments securely with the set screws located below each of the stroke adjustment knobs (Figure 7, Item 6).

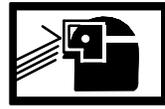
END OF TASK

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).

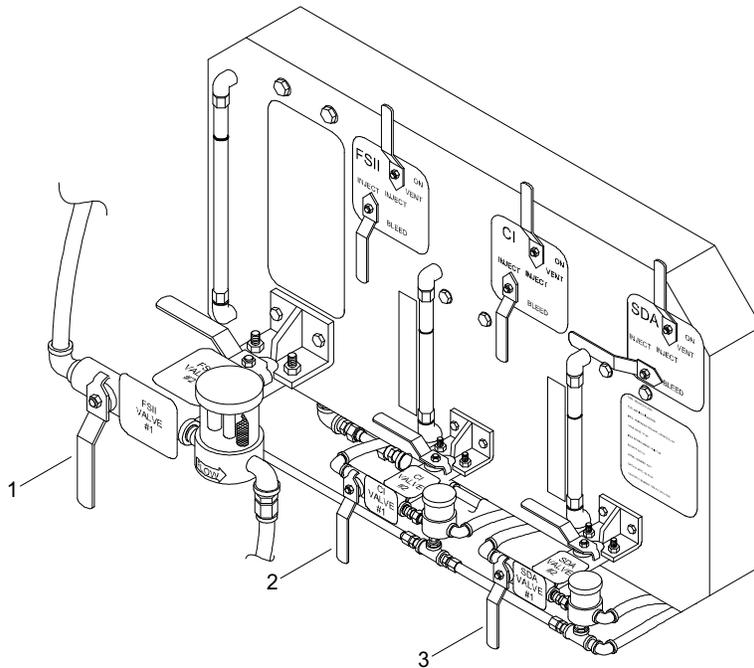


Figure 8. Fuel Additive Injector Assembly Supply Valves.

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.

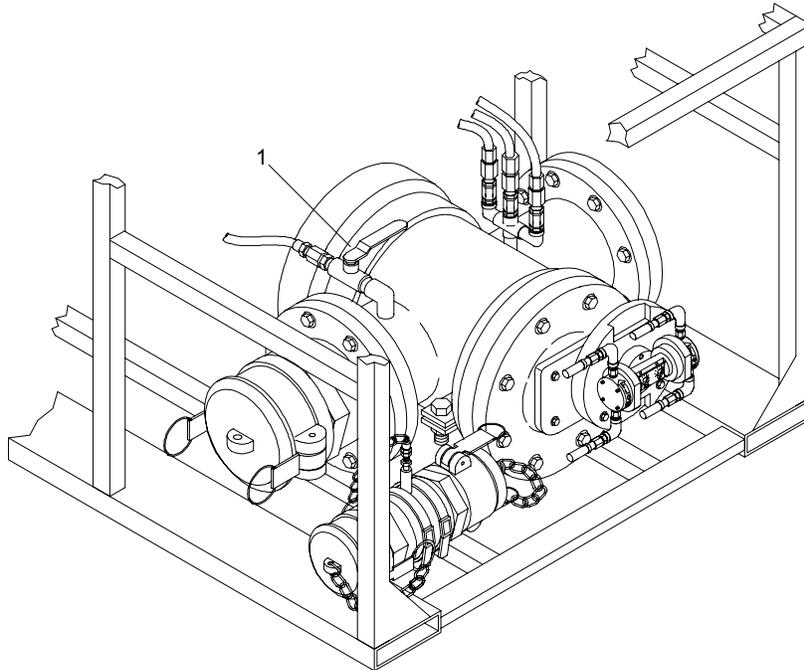


Figure 9. Fuel Additive Injector Assembly Priming Valve.

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.

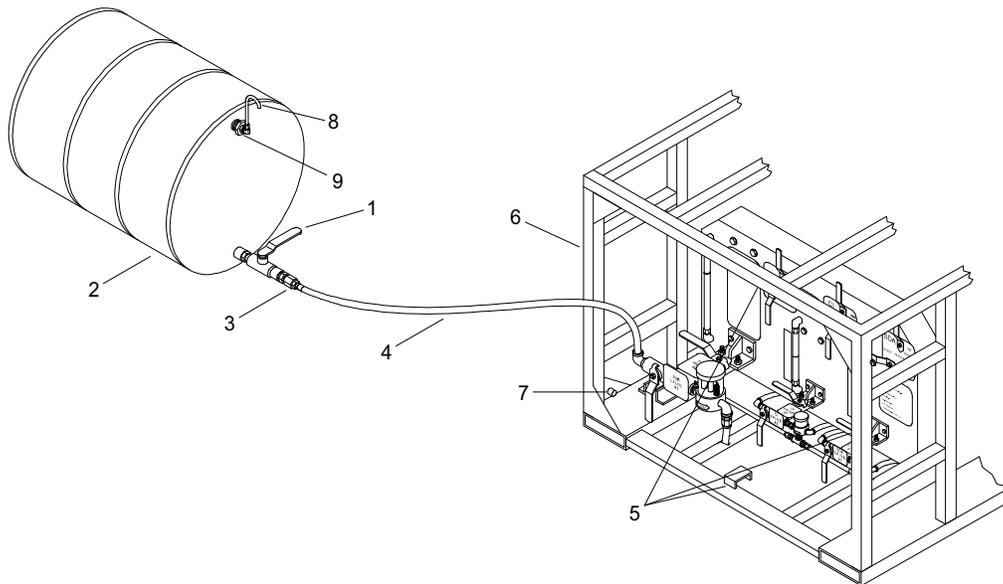
PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR - CONTINUED

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).

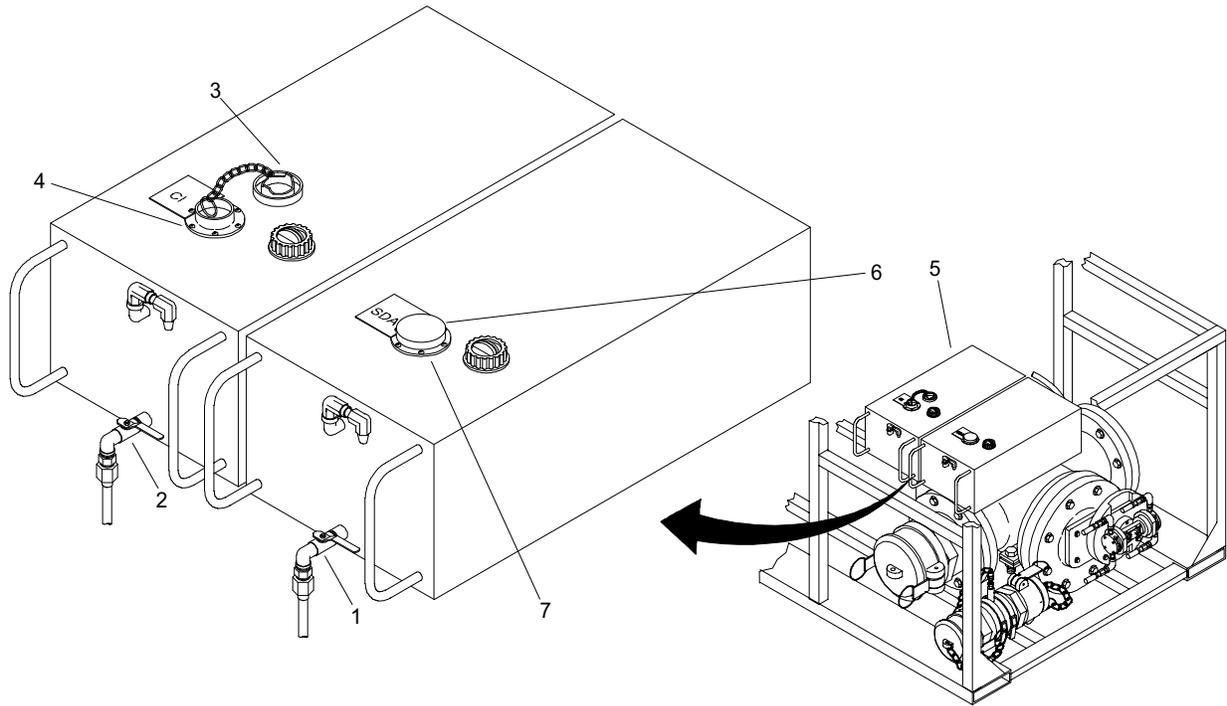
PURGE ADDITIVE AND FUEL FROM ADDITIVE INJECTOR - CONTINUED

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).

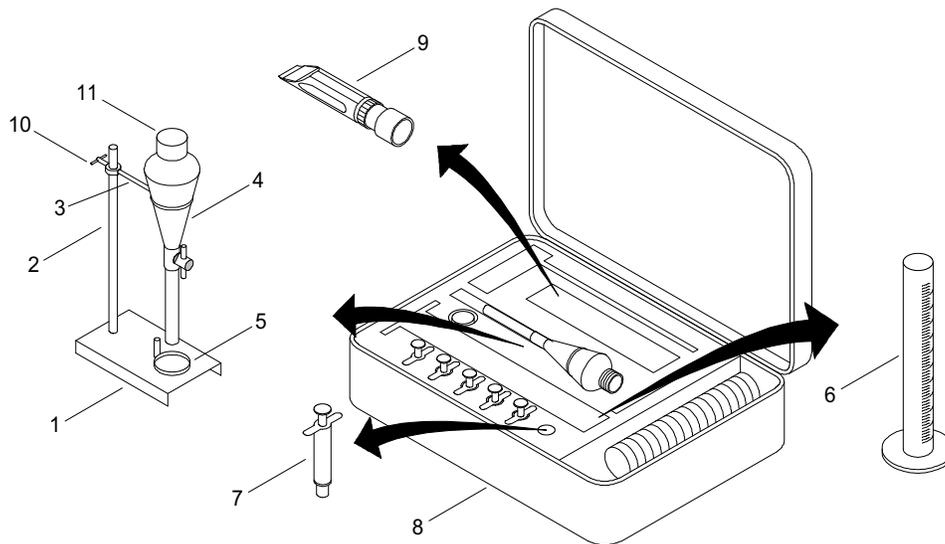


Figure 1. FSII Sample Test Kit.

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).

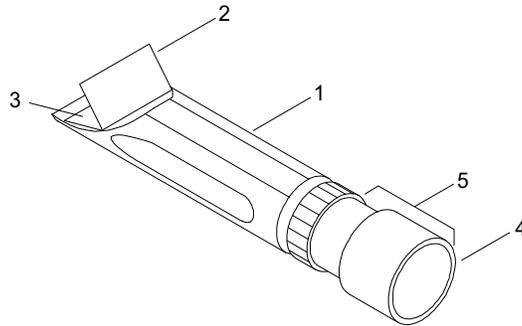


Figure 2. Refractometer Used In (%V) Test.

- 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.

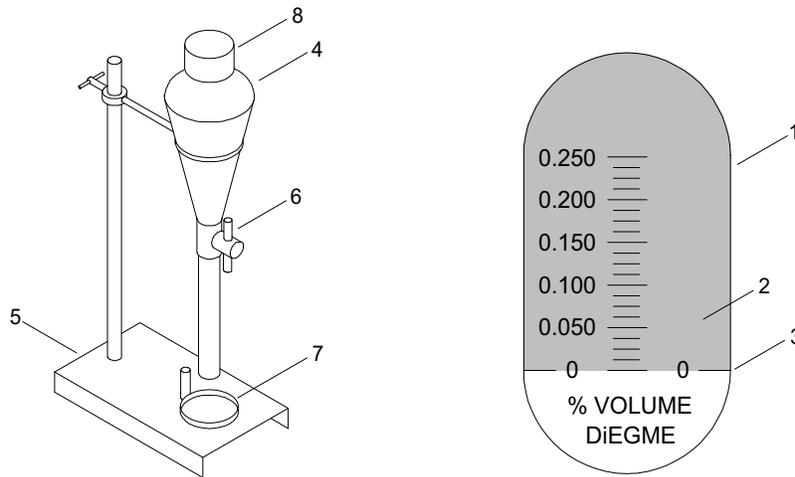


Figure 3. Test Equipment In Stand and Scale As Viewed Through Refractometer.

- 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 125°F (52°C) 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 -50°F (-45°C), 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

- 1. Fuel Additive Injector Assembly, TPI-4T-4A-1, Will Not Turn..... WP 0009
- 2. Fuel Additive Injector Assembly, TPI-4T-4A-1, Turns, But Will Not Pick Up Additive..... WP 0010
- 3. Fuel Additive Injector Assembly, TPI-4T-4A-1, Injectors Are Primed And System Is Running, But Injection Is Either Low Or Erratic..... WP 0011

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

- | | |
|--|---------|
| 1. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Will Not Turn (O)..... | WP 0013 |
| 2. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Turns, But Will Not Pick Up Additive (O)..... | WP 0014 |
| 3. 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)..... | WP 0015 |
| 4. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Injector Is Running Slowly Even With High Fuel Flow Rate (O)..... | WP 0016 |
| 5. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Injector Will Not Flow And Appears To Be Locked Up (O) | WP 0017 |
| 6. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Will Not Turn (F) | WP 0018 |
| 7. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Turns, But Will Not Pick Up Additive (F)..... | WP 0019 |
| 8. 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)..... | WP 0020 |
| 9. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Injector Is Running Slowly Even With High Fuel Flow Rate (F)..... | WP 0021 |
| 10. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Injector Will Not Flow And Appears To Be Locked Up (F)..... | WP 0022 |
| 11. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Injector System Does Not Inject The Correct Amount Of Additive (F)..... | WP 0023 |
| 12. Fuel Additive Injector Assembly, Part Number TPI-4T-4A-1, Leaks During Operation (F)..... | WP 0024 |

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**

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 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.

MALFUNCTION

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 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)

Equipment Condition

System set on level ground in protected area

Personnel Required

Quartermaster and Chemical Repairman 63J
Petroleum Supply Specialist 92F

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)

Equipment Condition

System set on level ground in protected area

Personnel Required

Quartermaster and Chemical Repairman 63J

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).

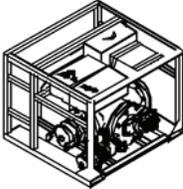
ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before	.2	Fuel Additive Injector Assembly 	Check general condition of all gauges, valves and tubing. If damage is found, replace with a serviceable like Item.	Broken or missing parts.
2	Before	.2		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**

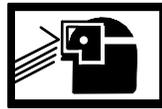
Apron, utility (WP 0067,Item 2)
Gloves, rubber, industrial (WP 0067,Item 2)
Goggles, industrial (WP 0067,Item 2)

Equipment Condition

System set on level ground in protected area

Personnel Required

Petroleum Supply Specialist 92F

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).

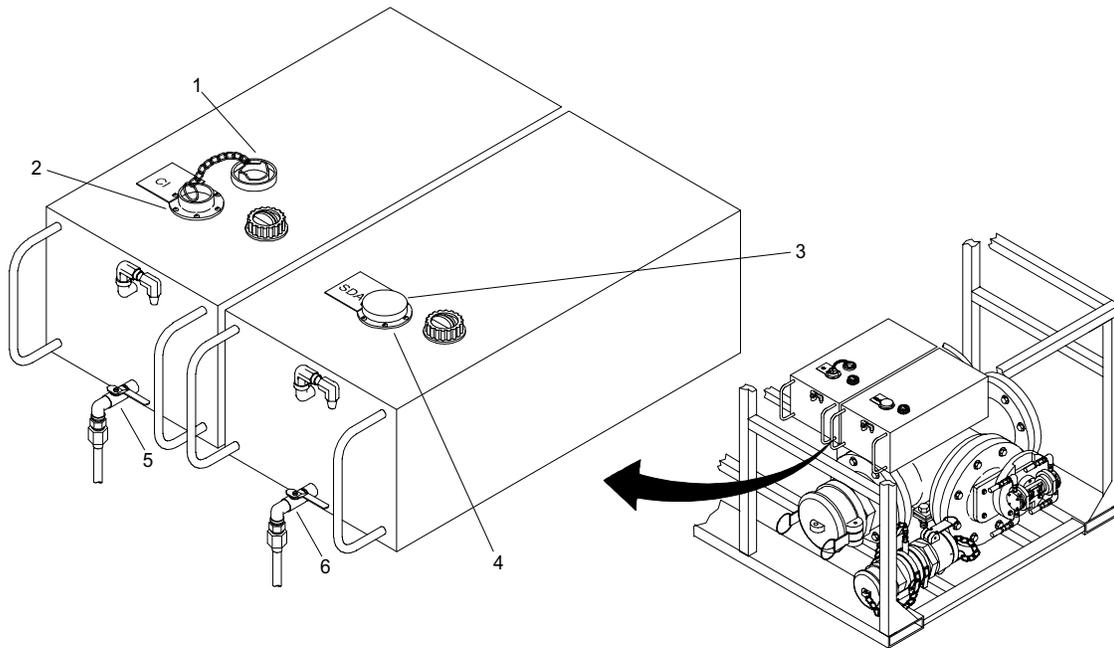


Figure 1. Fuel Additive Injector Assembly CI and SDA Tanks.

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**

Quartermaster and Chemical Repairman 63J

ReferencesSF 361
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. Nuts, bolts, screws and fasteners present and in good condition.	Hardware is missing or loose. Nuts, bolts, screws and fasteners that can be replaced or properly sealed.	None. 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

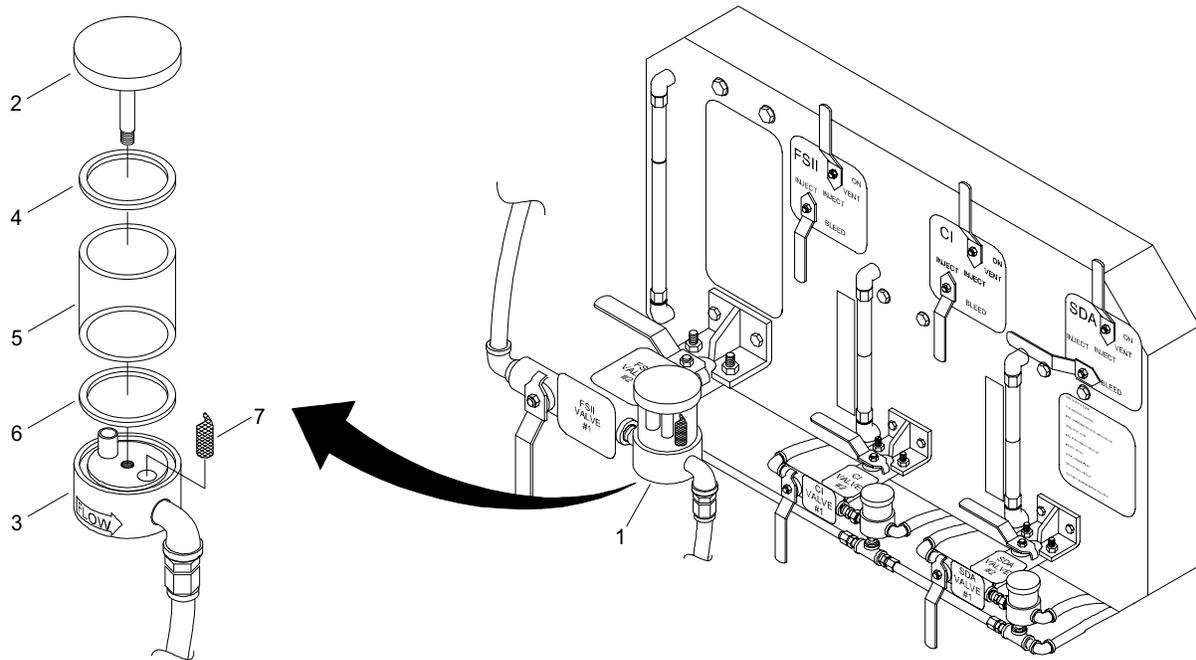


Figure 1. Fuel Additive Injector Assembly HI Volume Sight Flow Indicator (FSII).

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**

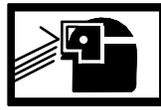
When working with solvent cleaning compound, MIL-PRF-680, avoid contact with eyes and skin. Wear protective rubber gloves and chemical splash goggles or face shield. Use in a well ventilated area. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, 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

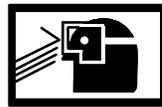
Quartermaster and Chemical Repairman 63J

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

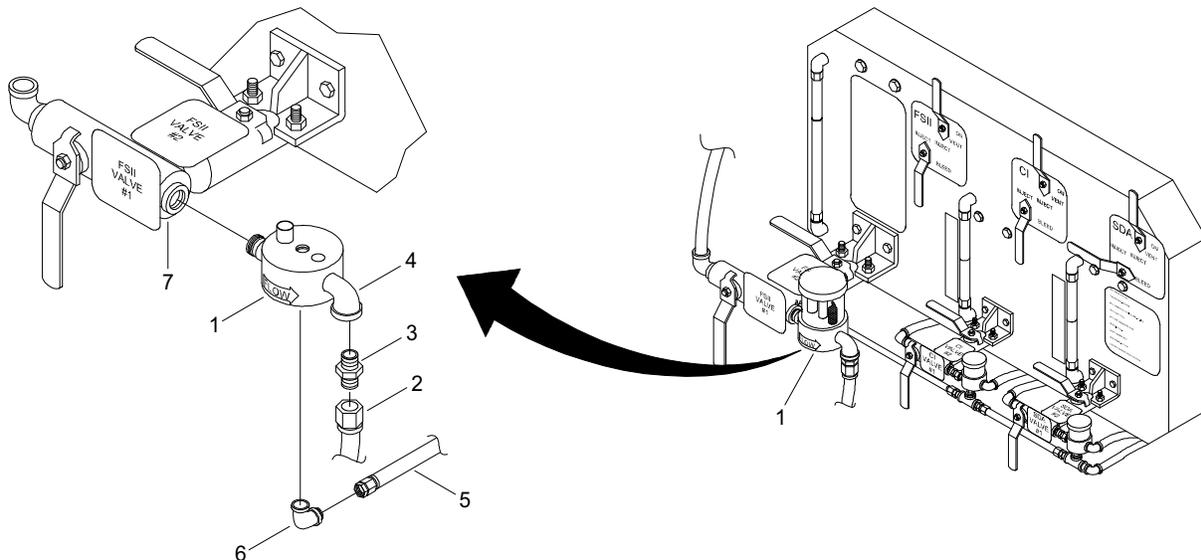


Figure 1. Fuel Additive Injector Assembly HI Volume Sight Flow Indicator (FSII) Removal.

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

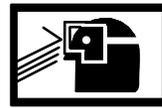
Quartermaster and Chemical Repairman 63J

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

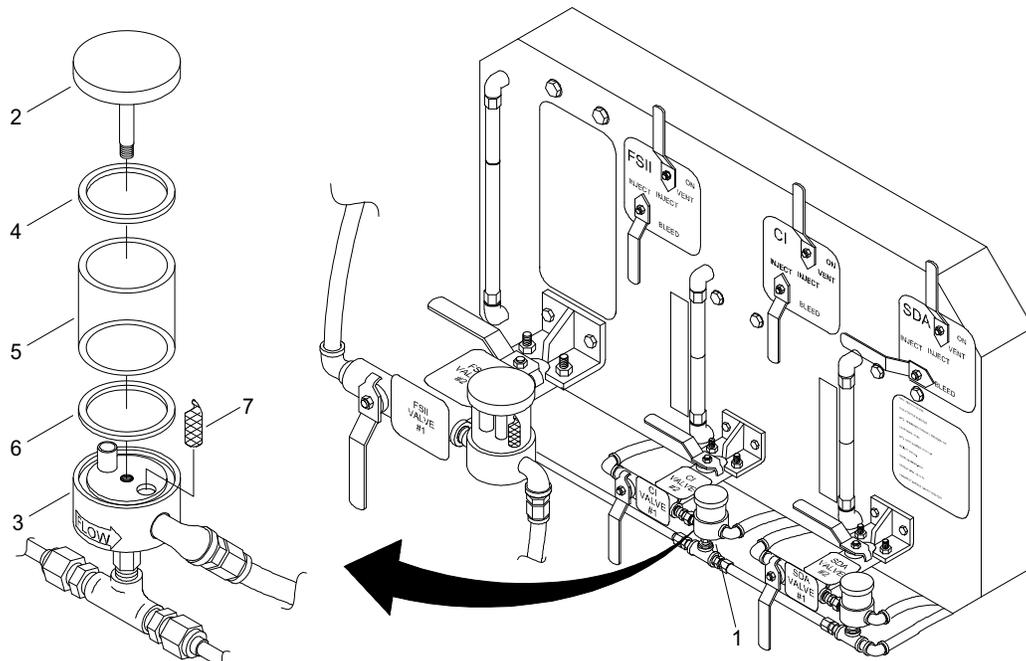


Figure 1. CI Sight Flow Indicator.

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).

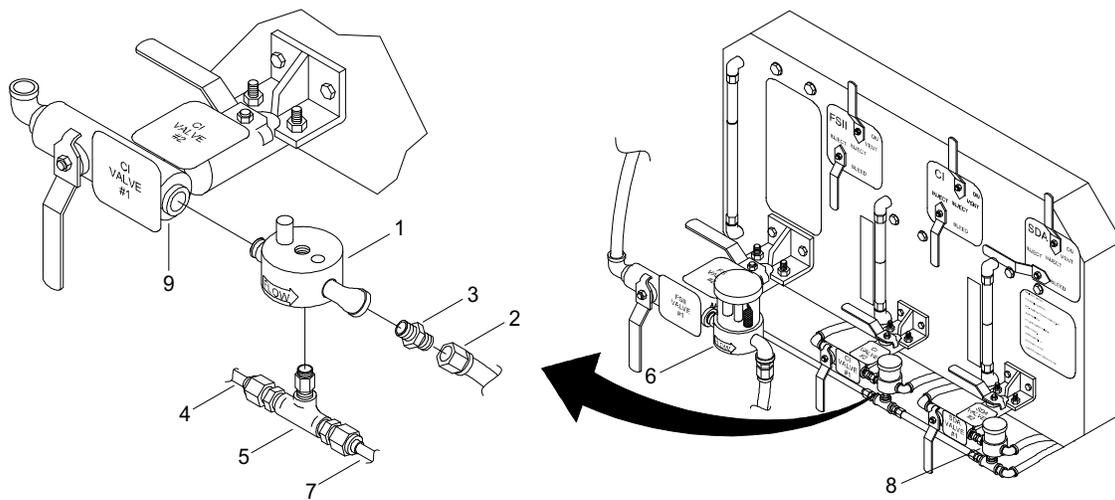
SIGHT FLOW INDICATOR (CI) REMOVAL - CONTINUED

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

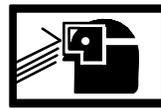
Quartermaster and Chemical Repairman 63J

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).

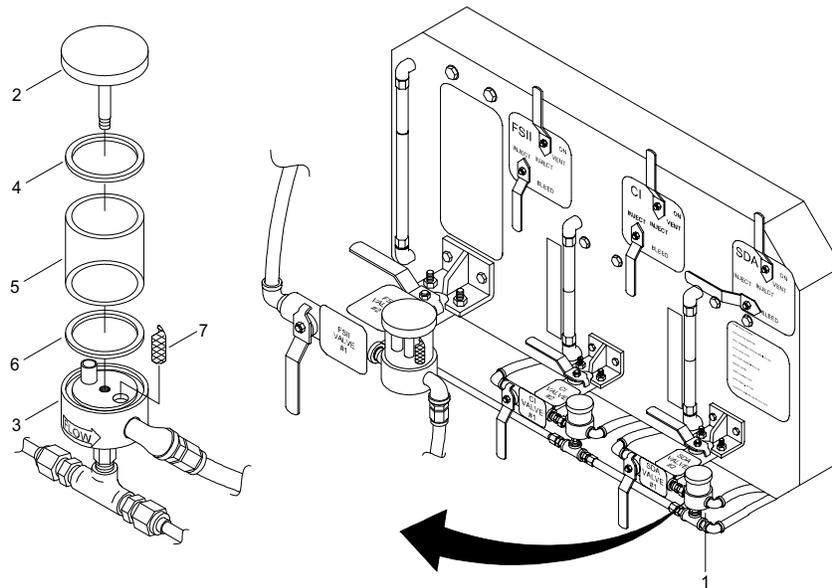
SIGHT FLOW INDICATOR DISASSEMBLY - CONTINUED

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****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 SDA sight flow indicator (Figure 1, Item 1).

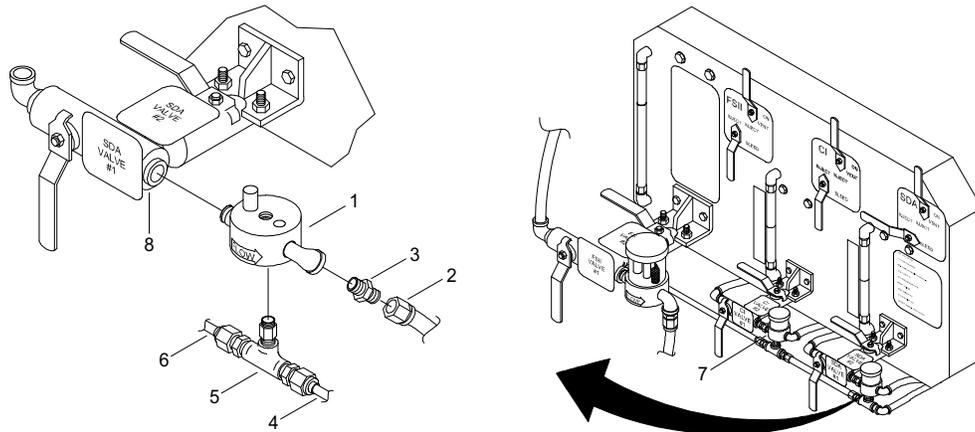
SIGHT FLOW INDICATOR (SDA) REMOVAL - CONTINUED

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****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 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

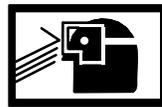
Quartermaster and Chemical Repairman 63J

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).

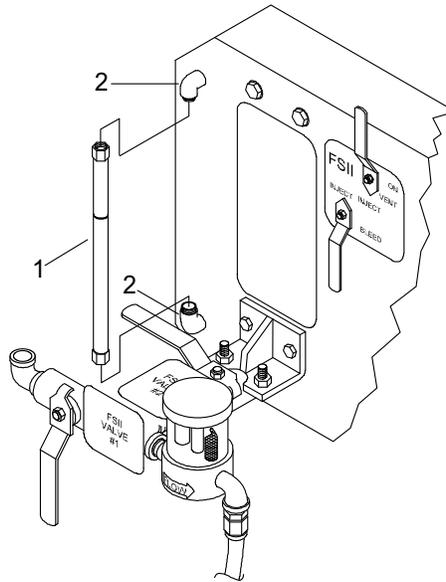
CALIBRATION GAUGE REMOVAL - CONTINUED

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

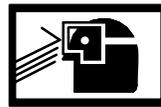
Quartermaster and Chemical Repairman 63J

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

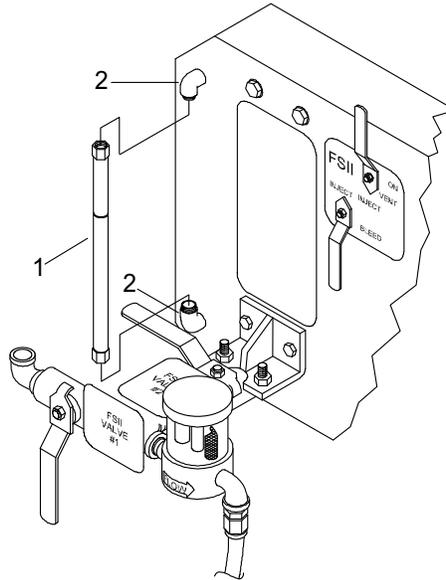


Figure 1. Fuel Additive Injector Assembly Calibration Gauge Removal.

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

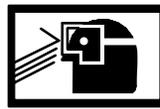
END OF TASK

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.

- Using dry cleaning cloth and solvent cleaning compound, clean calibration gauge and fittings.
- Allow all parts to thoroughly air dry.
- 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



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) suction check valve (Figure 1, Item 2).

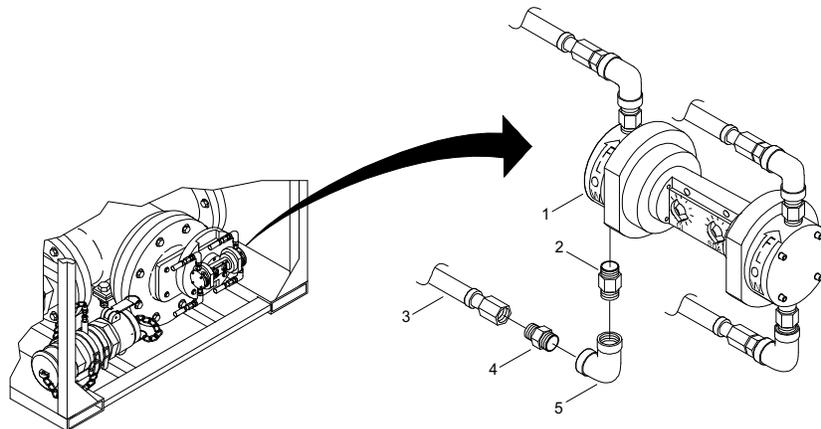


Figure 1. CI and SDA Pump Suction Check Valves.

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).

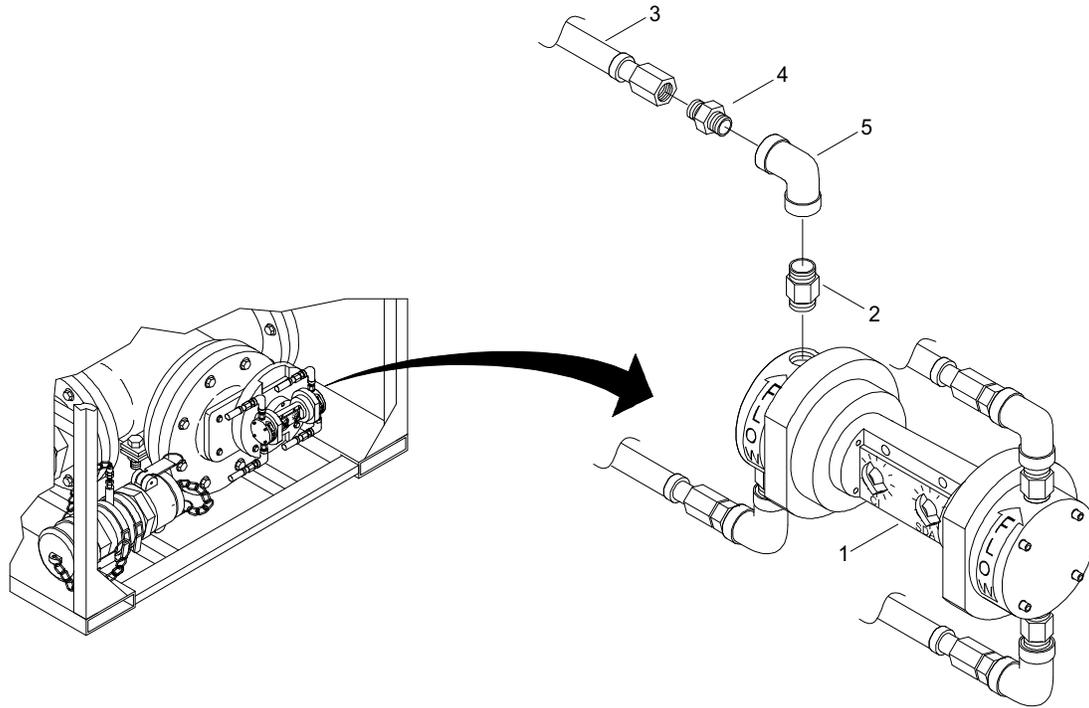
CI AND SDA PUMP DISCHARGE CHECK VALVES REMOVAL - CONTINUED

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.

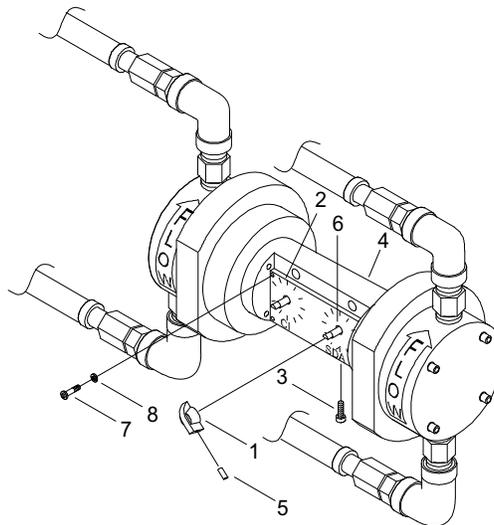


Figure 1. Fuel Additive Injector Pump Power Frame Cover.

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.

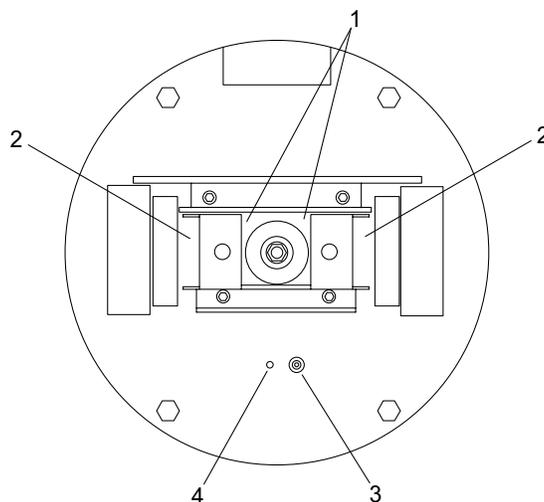


Figure 2. Fuel Additive Injector Pump and Bearing.

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).

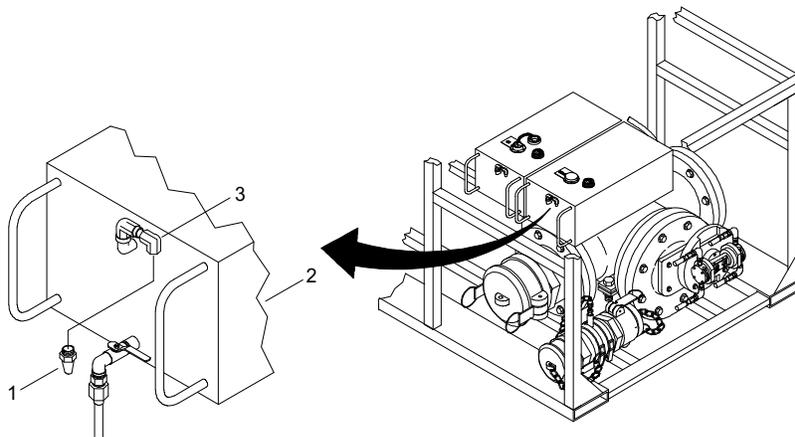


Figure 1. CI and SDA Additive Tank Vent Filter.

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****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.

N

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

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

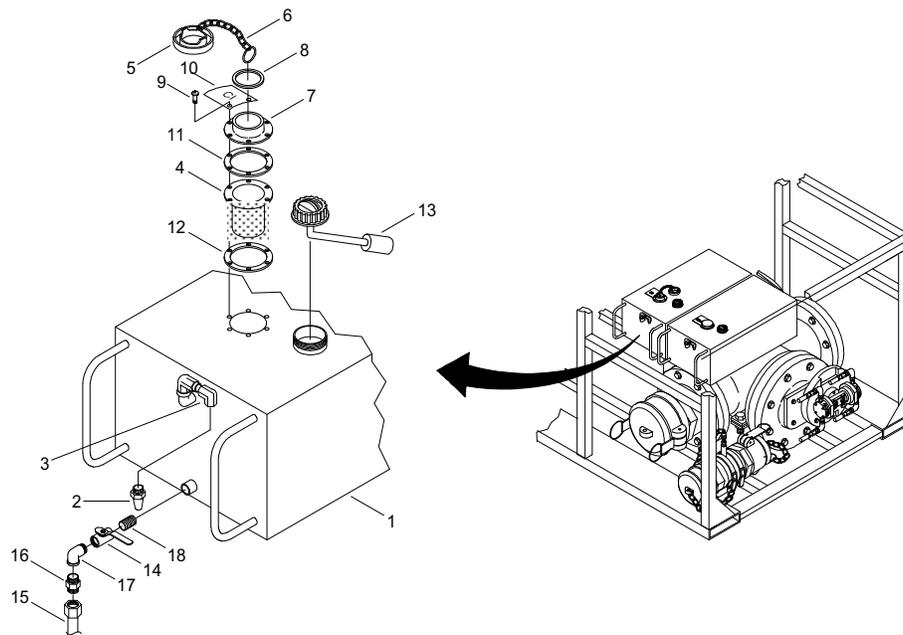
ADDITIVE TANK DISASSEMBLY - CONTINUED


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).

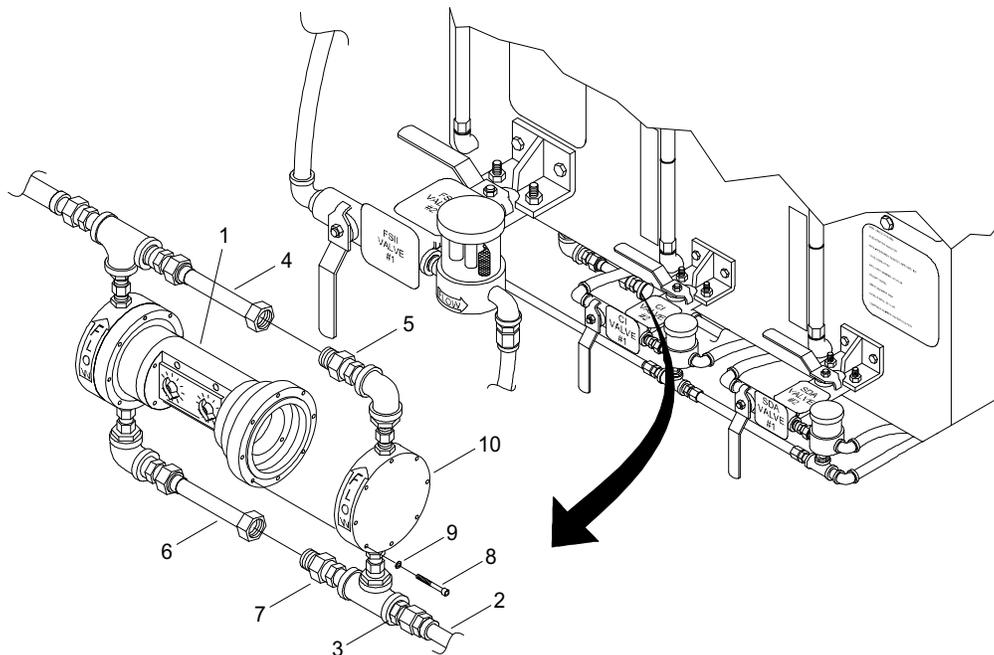
FSII PUMP FLUID END CAP ASSEMBLY REMOVAL - CONTINUED


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****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. 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).

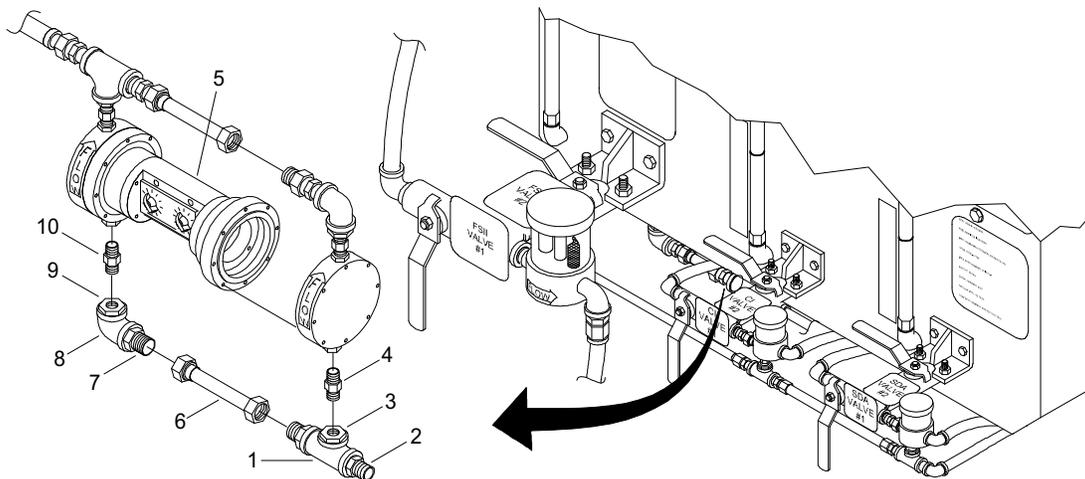
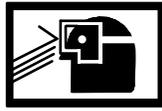


Figure 2. FSII Pump Suction Check Valves.

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**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 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).

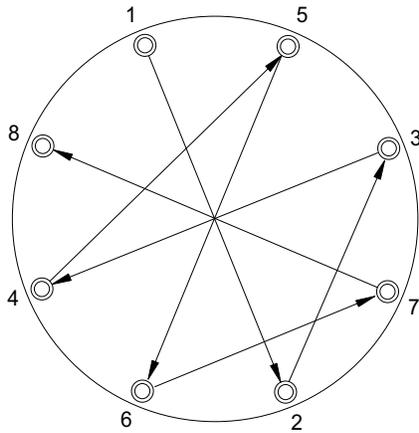
FSII PUMP FLUID END CAP ASSEMBLY INSTALLATION - CONTINUED

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

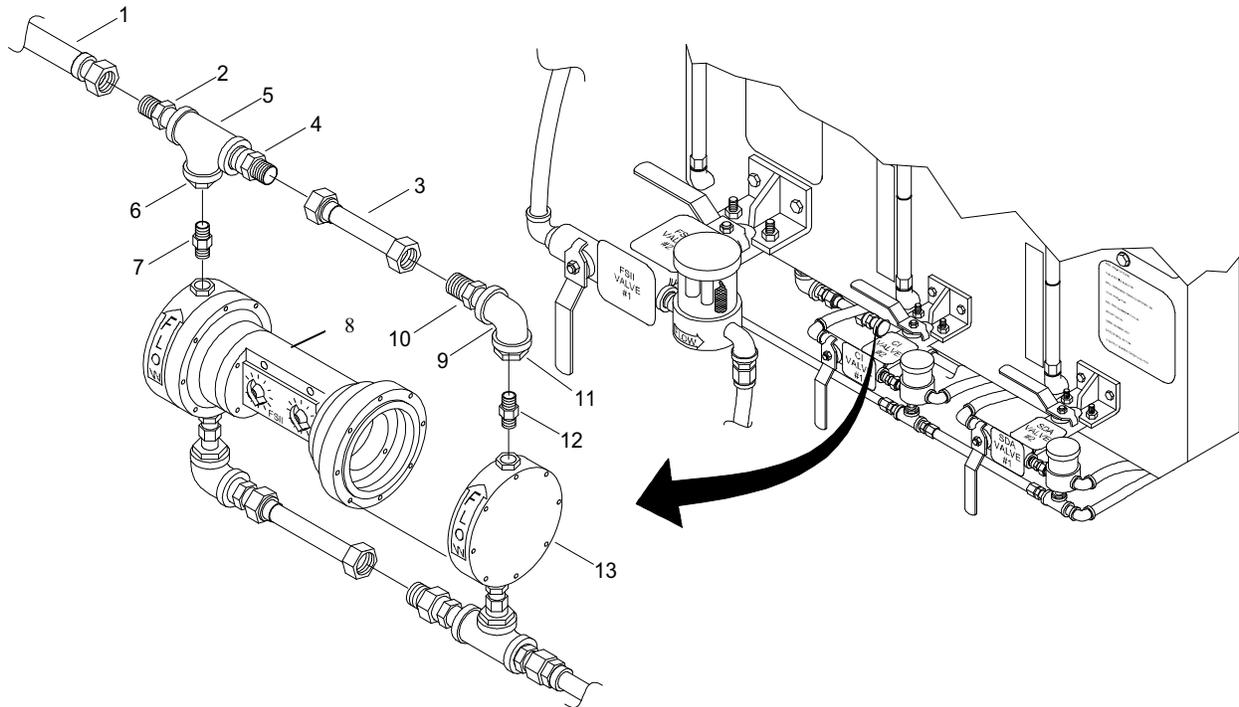


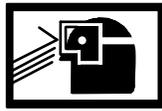
Figure 1. FSII Pump Discharge Check Valves.

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).

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 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).

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.

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).

A I N

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).

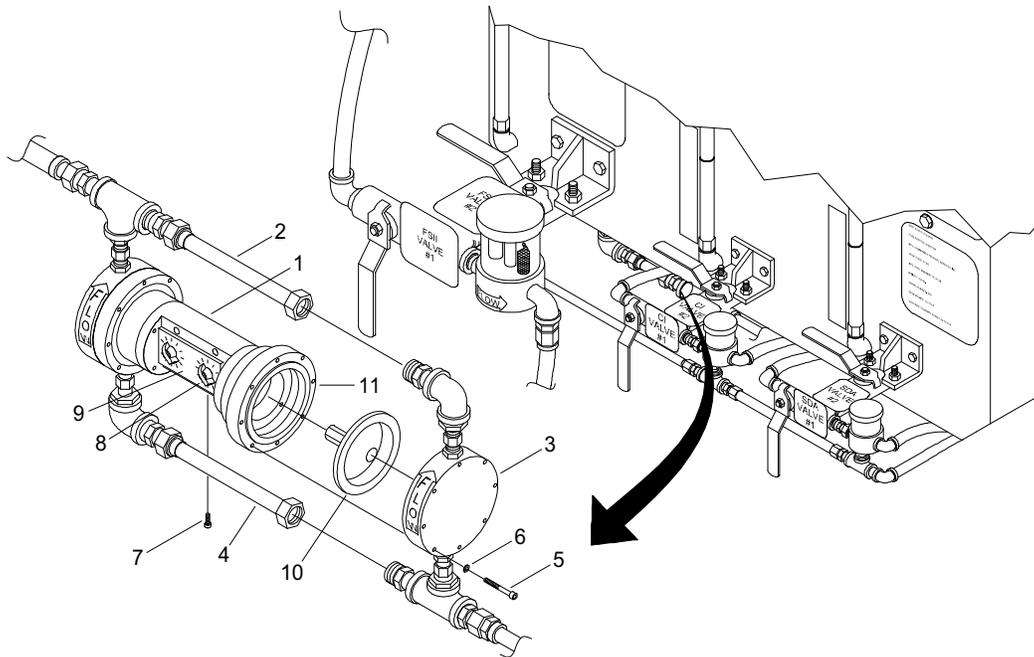
FSII INJECTOR PUMP DIAPHRAGM REMOVAL - CONTINUED


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



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 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



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.

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

- Using torque wrench and torque sequence diagram (Figure 2), torque eight screws (Figure 1, Item 5) to 40 in. lb (4.52 N-m).

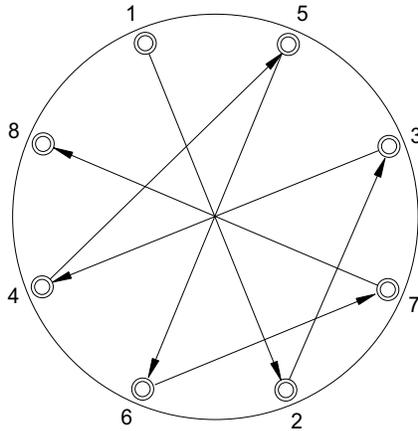


Figure 2. Torque Sequence Diagram.

- Connect suction tube (Figure 1, Item 4) to fluid end cap assembly (Figure 1, Item 3). Tighten suction tube (Figure 1, Item 4).
- Connect discharge tube (Figure 1, Item 2) to fluid end cap assembly (Figure 1, Item 3). Tighten discharge tube (Figure 1, Item 2).
- 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).

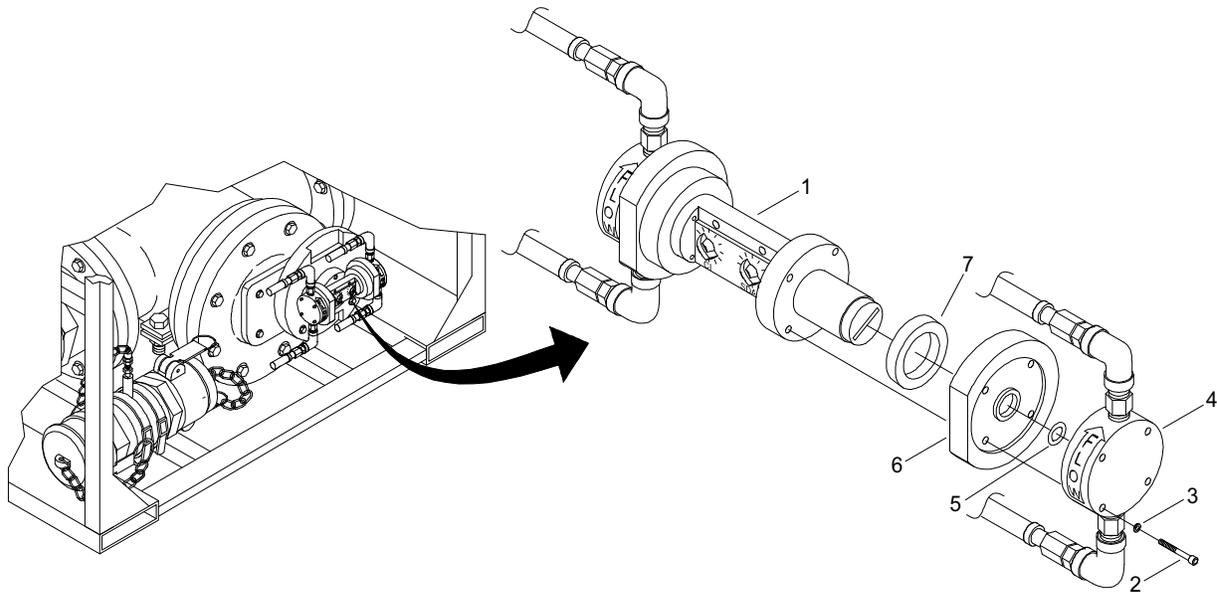
CI AND SDA INJECTOR PUMP LIP SEAL REMOVAL - CONTINUED

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



CHEMICAL



EYE PROTECTION



VAPOR



POISON

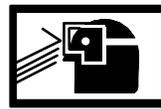
When working with fuel additives, avoid contact with eyes or skin. Wear protective rubber gloves or other impermeable gloves and chemical splash goggles. Avoid breathing of vapors. Use only with adequate ventilation. Use respirator as needed. Protective clothing should be worn when using fuel additives 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. 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



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.

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).

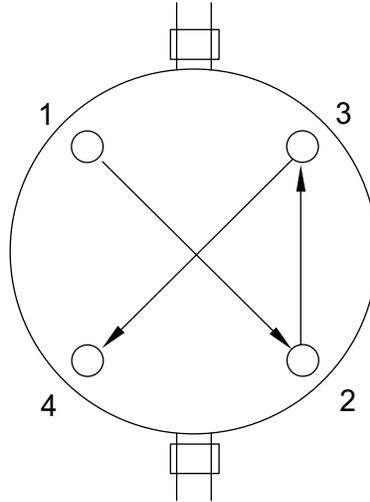
CI AND SDA INJECTOR PUMP LIP SEAL INSTALLATION - CONTINUED

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****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. 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

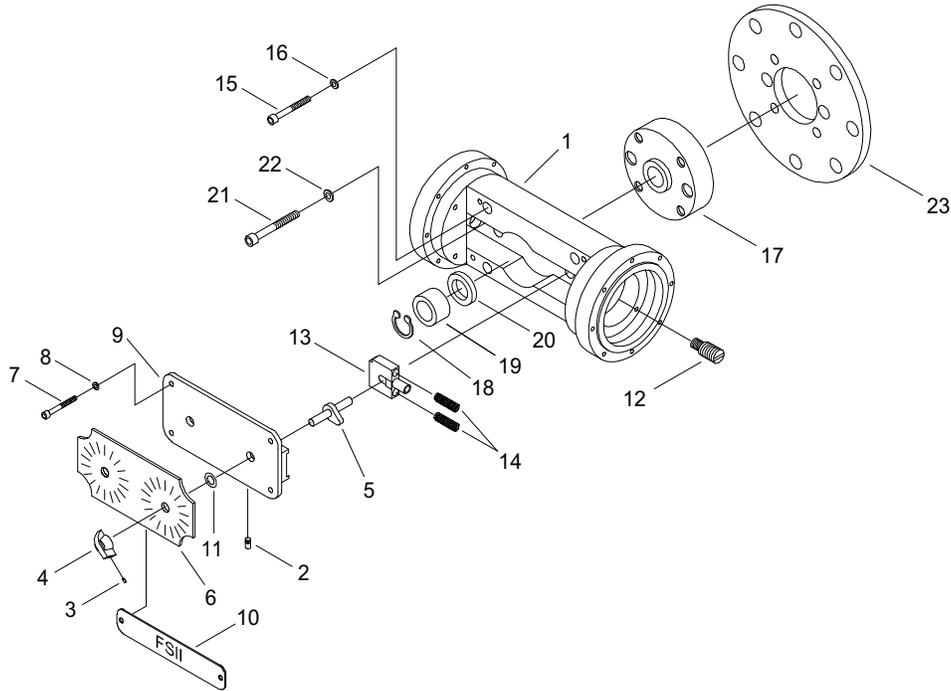


Figure 1. FSII Injector Pump Assembly.

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 stroke 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

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.
 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****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. 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).

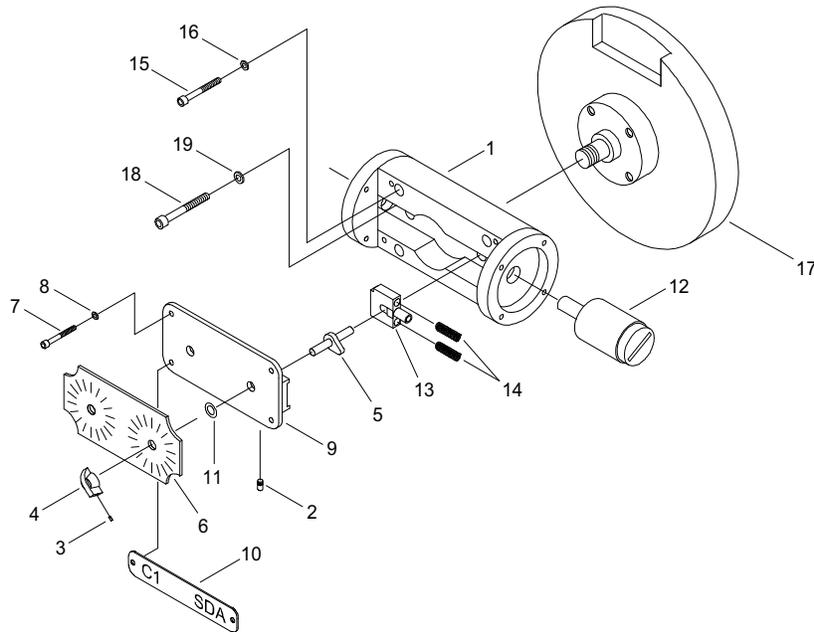


Figure 1. CI and SDA Injector Pump Assembly.

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 stroke 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 valves (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).

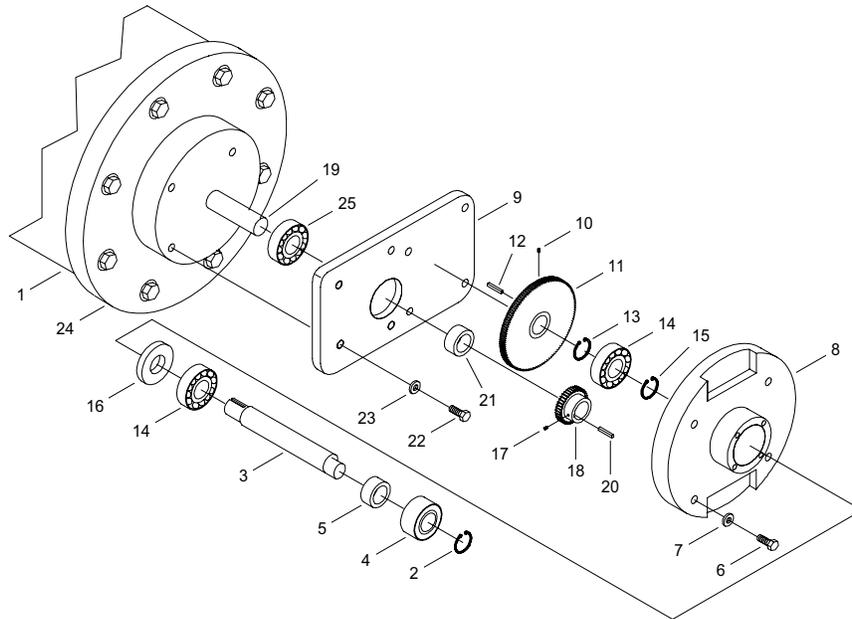


Figure 1. Fuel Additive Injector Pump Bearing Housing.

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).

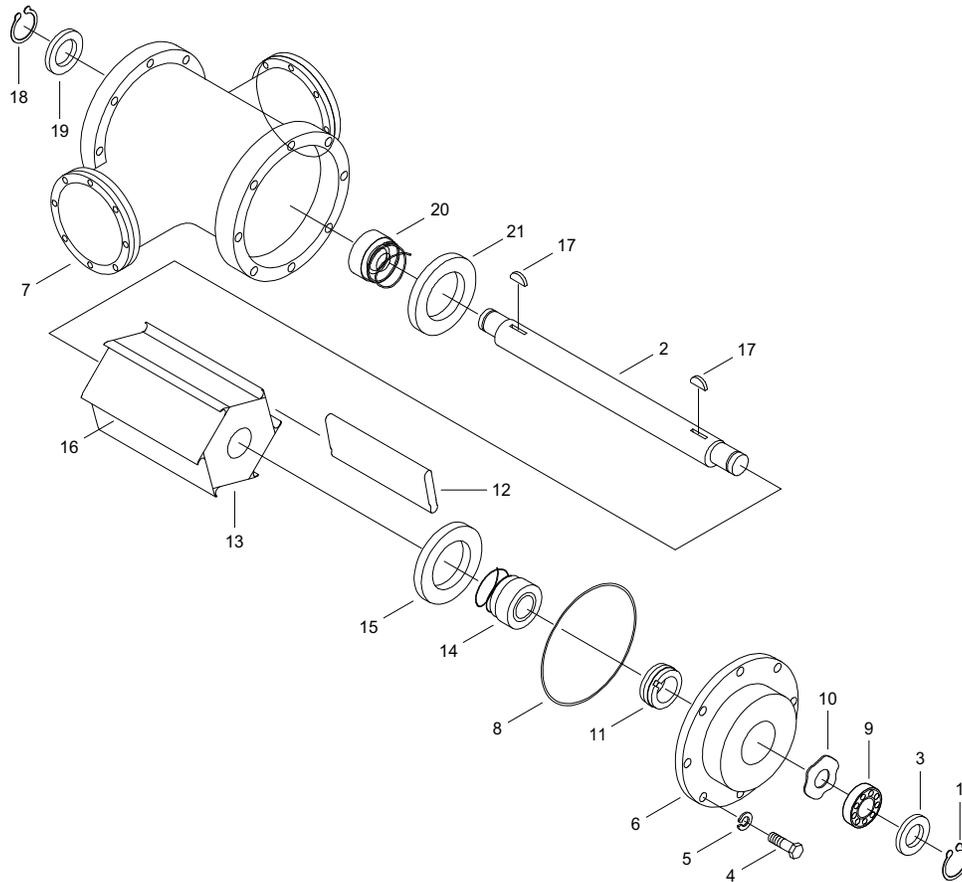


Figure 2. Fuel Additive Injector Pump Fluid Motor.

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.

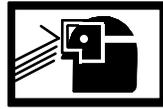
Do not drop mechanical (carbon) seal during removal, as damage to mechanical (carbon) seal may occur.

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.

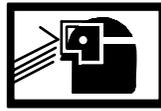
1. Inspect fuel additive injector pump fluid motor housing for nicks, gouges, excessive scratches and wear. If nicks, gouges, excessive scratches or wear is found, replace with serviceable like item.
2. Inspect fuel additive injector pump fluid motor housing for evidence of leakage on either the FSII 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

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 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:

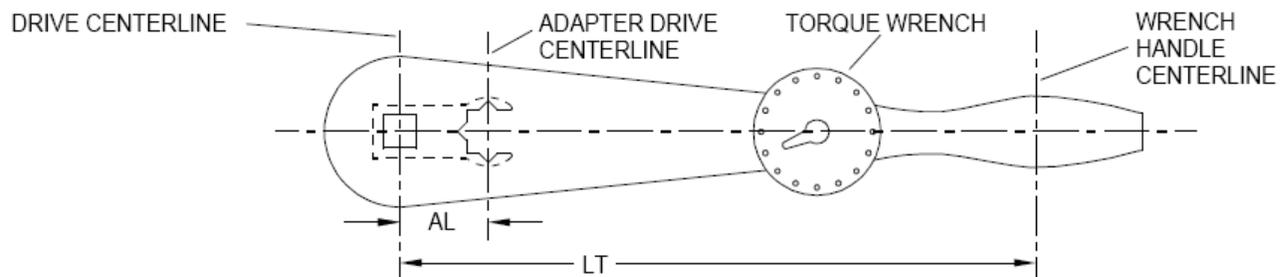


Figure 1. Torque Wrench.

- 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

- 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:

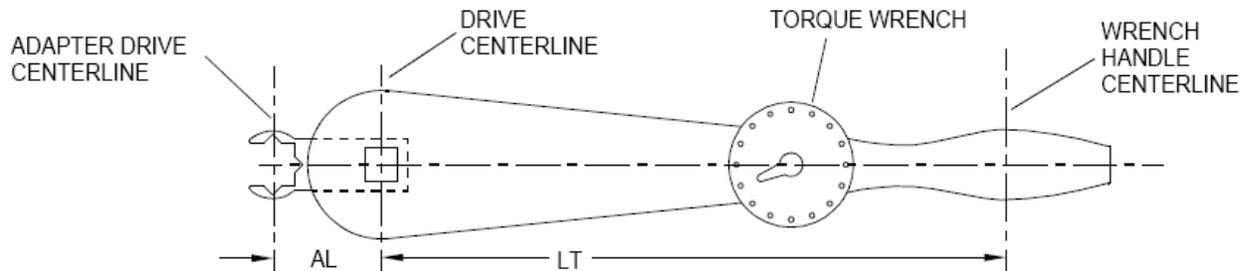


Figure 2. Torque Wrench.

- Multiply DT by LT.
- Add AL and LT.
- Divide the first answer by the second answer to find AT.

HOW TO USE TORQUE TABLES

- Measure the diameter of the bolt to be torqued.

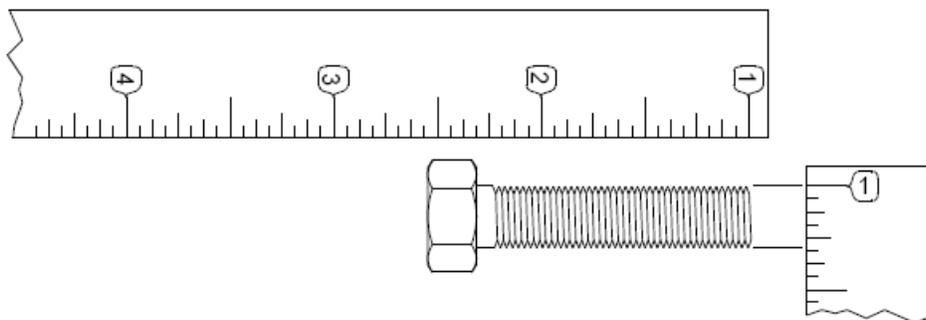


Figure 3. Torque Wrench Measurement.

- 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.
- 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.

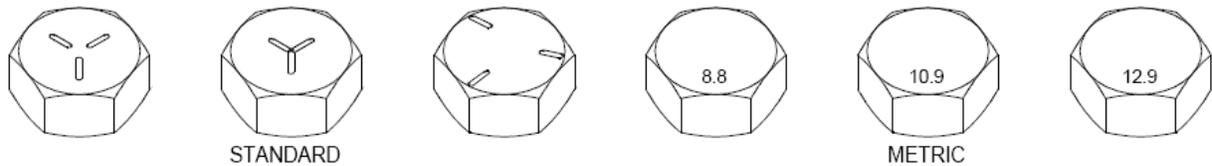
HOW TO USE TORQUE TABLES – CONTINUED


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.

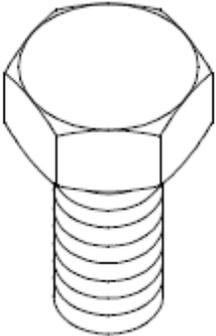
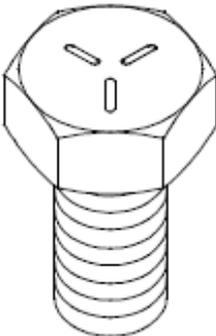
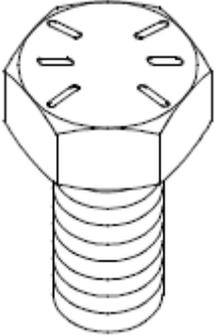
		SAE GRADE NO. 2				SAE GRADE NO. 5				SAE GRADE NO. 8			
													
		DRY		WET		DRY		WET		DRY		WET	
DIA IN.	THREADS PER IN.	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M
1/4	20	66	7.46	49	5.54	101	11.41	76	8.58	143	16.15	107	12.09
1/4	28	75	8.47	56	6.33	116	13.10	87	9.83	164	18.53	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.

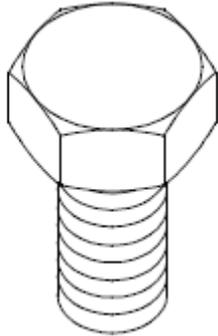
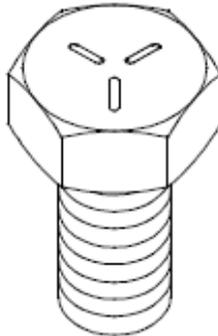
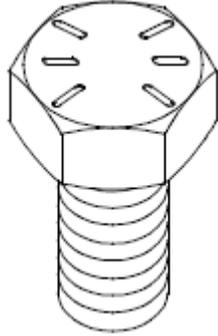
		SAE GRADE NO. 2				SAE GRADE NO. 5				SAE GRADE NO. 8			
													
		DRY		WET		DRY		WET		DRY		WET	
DIA IN.	THREADS PER IN.	FT LB	N-M	FT LB	N-M	FT LB	N-M	FT LB	N-M	FT LB	N-M	FT LB	N-M
9/16	12	70	94.92	53	71.87	109	147.80	82	111.19	154	208.82	115	155.94
9/16	18	78	105.77	59	80.00	121	164.08	91	123.40	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.

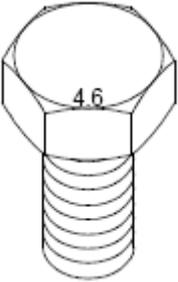
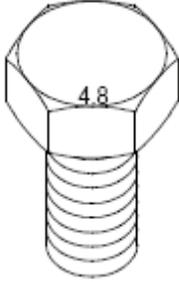
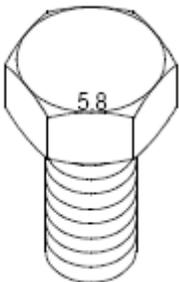
		CLASS 4.6		CLASS 4.8		CLASS 5.8					
											
		DRY		WET		DRY		WET			
DIA IN.	THREADS PITCH	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB	N-M	IN. LB
3.0	0.5	.50	4	.40	4	.70	6	.50	4	-	-
3.5	0.6	.80	7	.60	5	1.10	10	.80	7	-	-
4.0	0.7	1.20	11	.90	8	1.60	14	1.20	11	-	-
5.0	0.8	2.40	21	1.80	16	3.30	29	2.50	22	4.00	35
6.0	1.0	4.00	35	3.00	27	5.66	50	4.20	37	6.90	61
8.0	1.25	9.90	88	7.40	66	13.60	120	10.20	90	16.70	148
10.	1.50	19.60	174	14.70	130	27.00	239	20.00	177	33.10	293
12.0	1.75	34.10	302	25.60	227	47.00	416	35.00	310	58.00	513
14.0	2.0	54.30	481	40.80	361	75.00	664	56.00	496	92.00	814

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 repairable 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
1 st two Positions: How to get an item.	3 rd position: Who can install, replace or use the item.	4 th position: Who can do complete repair* on the item.	5 th 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 }
PB }
PC** }
PD }
PE }
PF }
PG }

Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code.

****NOTE**

Items coded PC are subject to deterioration.

KD }
KF }
KB }

Items with these codes are not to be requested/requisitioned individually. They 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)
MF- (Made at DS Level)
MH- (Made at GS Level)
ML- (Made at Specialized
Repair Act (SRA))
MD- (Made at Depot)
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)
AF- (Assembled by DS Level)
AH- (Assembled by GS Level)
AL- (Assembled by SRA)
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

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 repairable, condemn and dispose of the item at unit level.
F –	Reparable item. When uneconomically repairable, condemn and dispose of the item at the direct support level.
H –	Reparable item. When uneconomically repairable, 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 repairable 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.

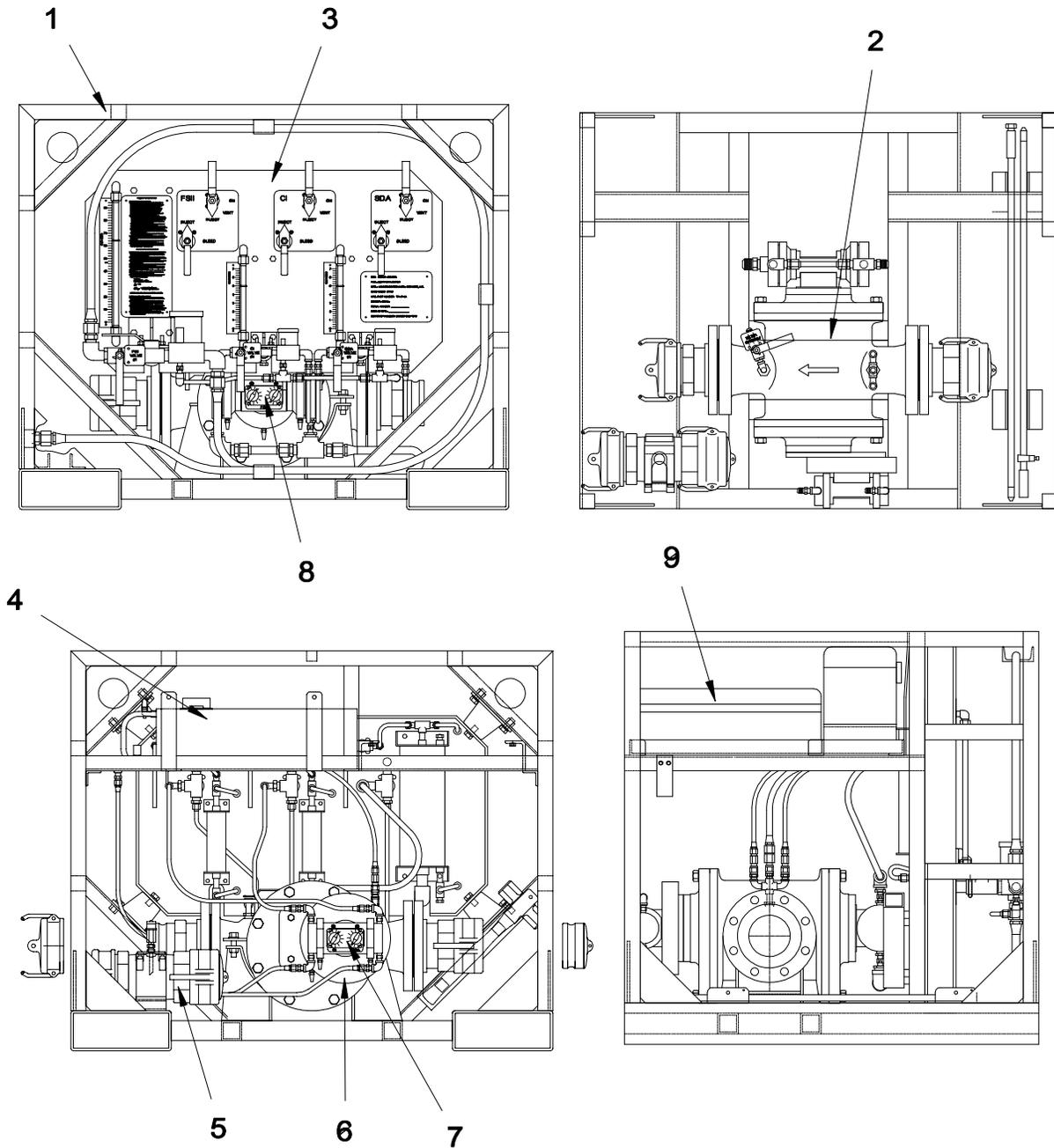
(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(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**

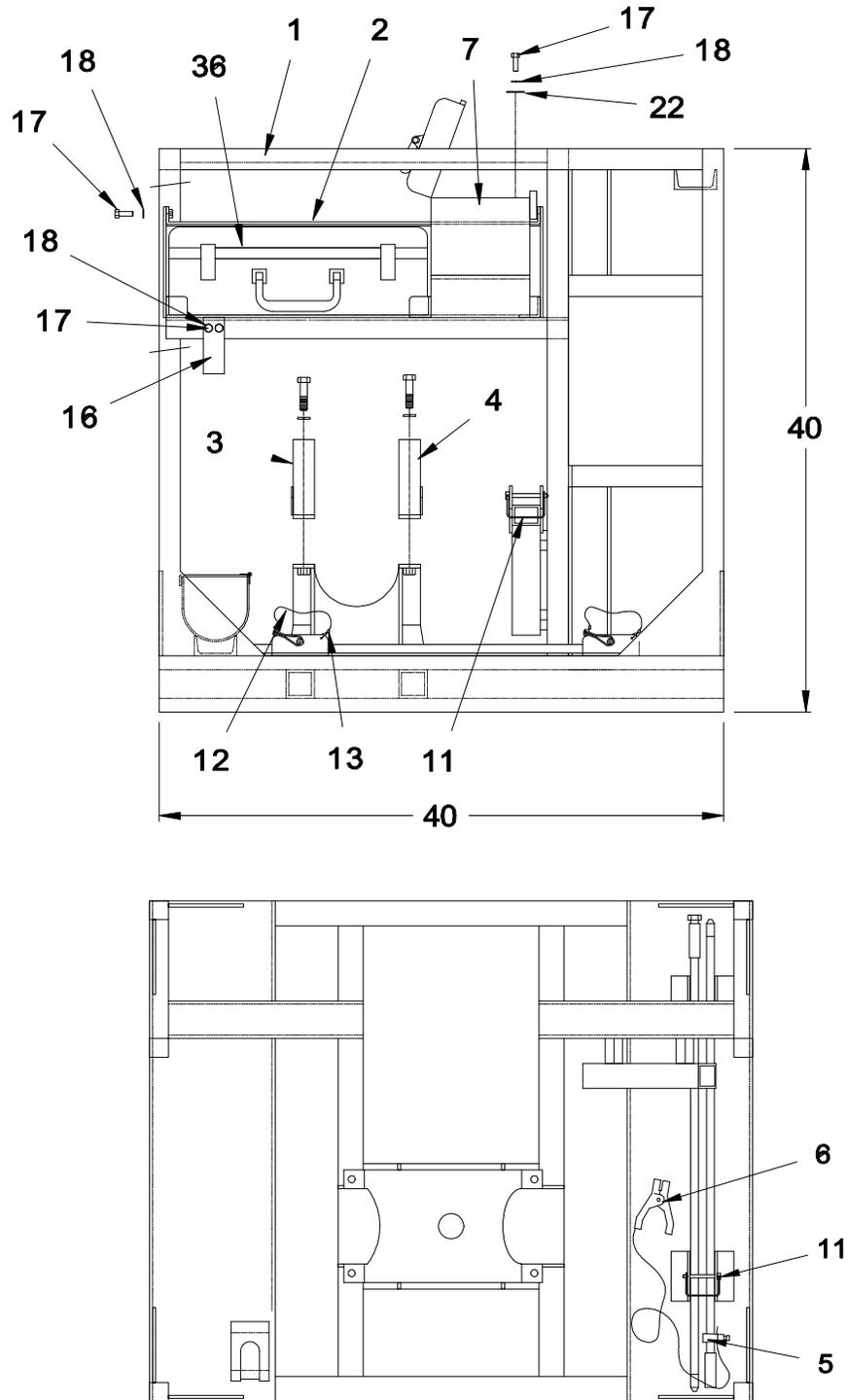


Figure 2. Skid Sub-Assembly, 4TP-4A SKID (Sheet 1 of 2).

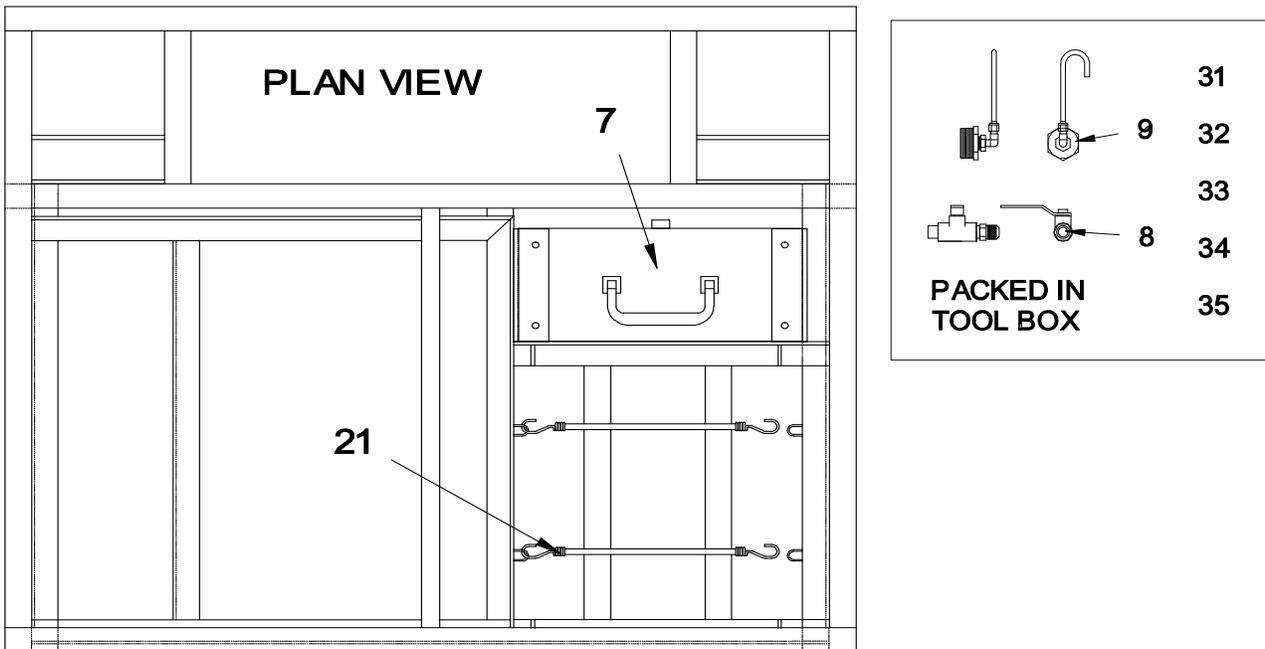
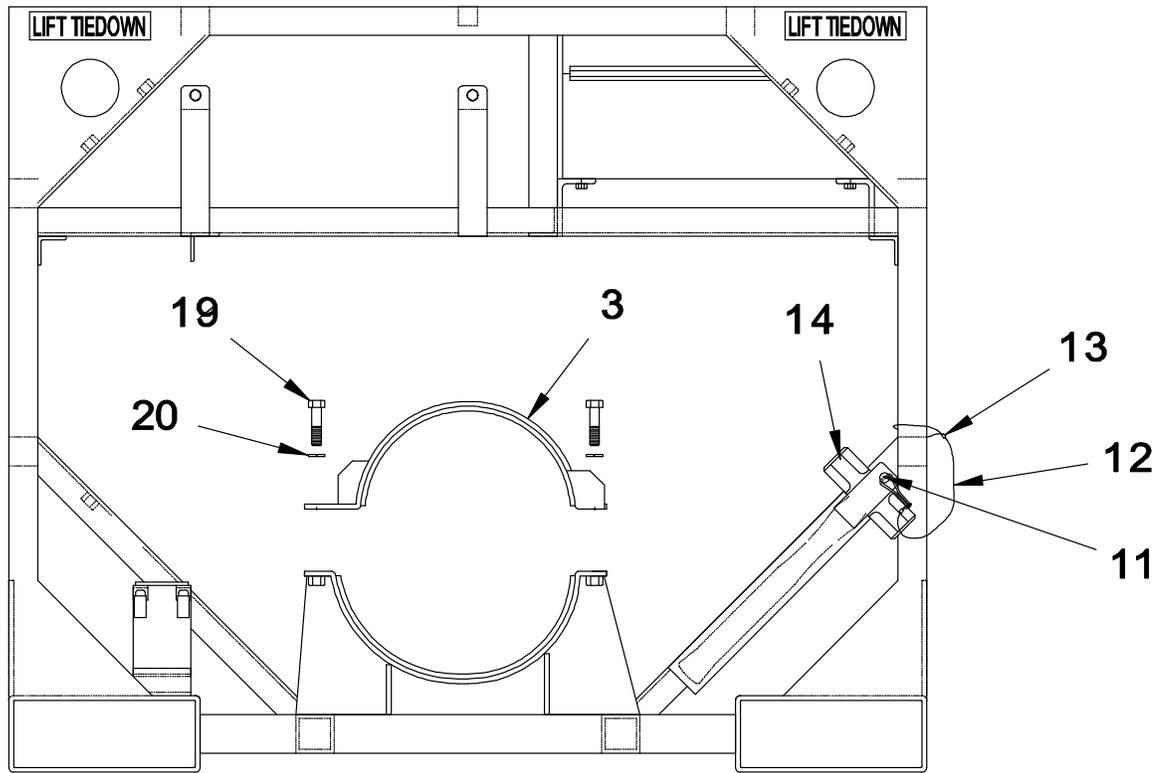


Figure 2. Skid Sub-Assembly, 4TP-4A SKID (Sheet 2 of 2).

(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**

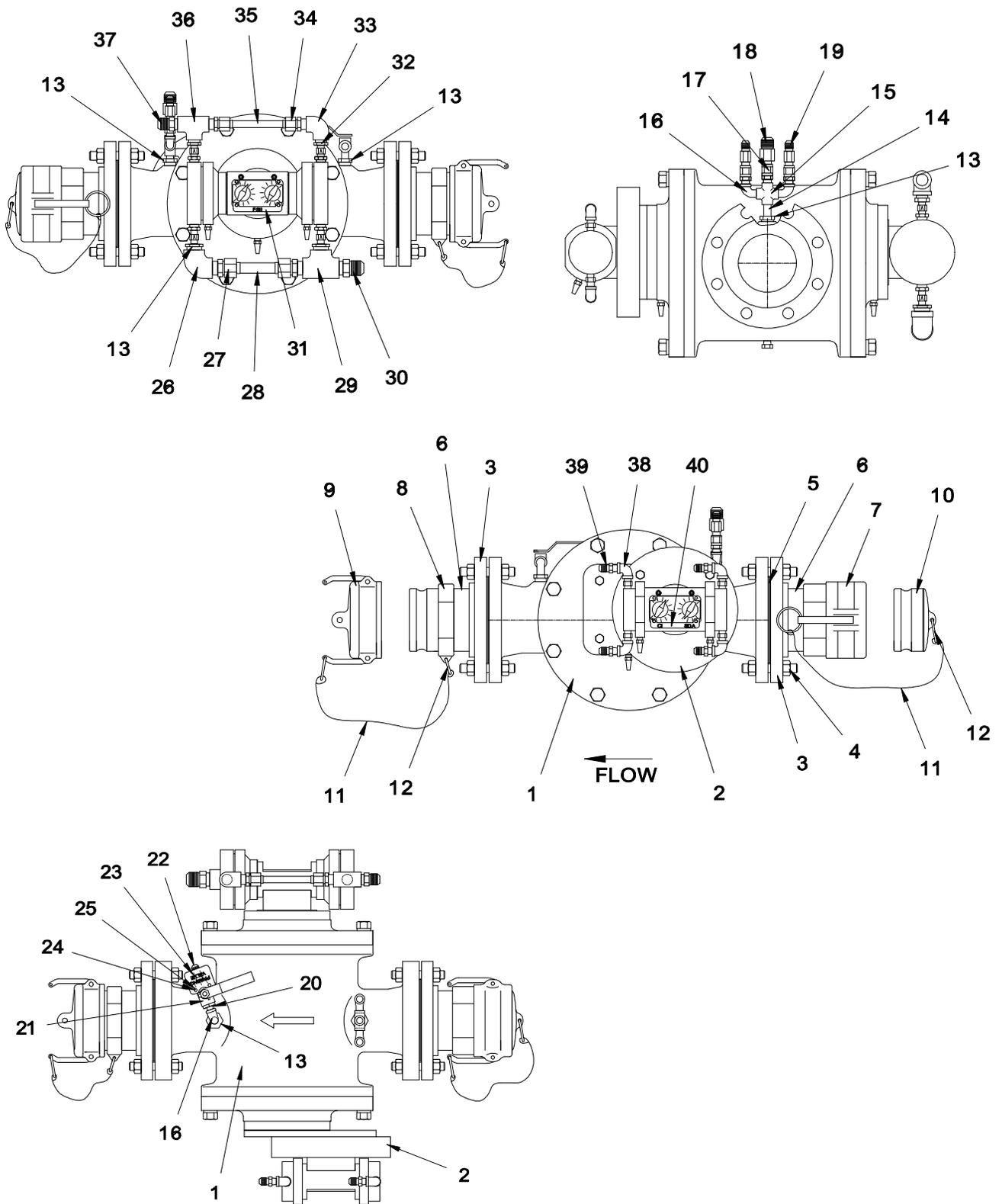


Figure 3. Injector Sub-Assembly.

(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**

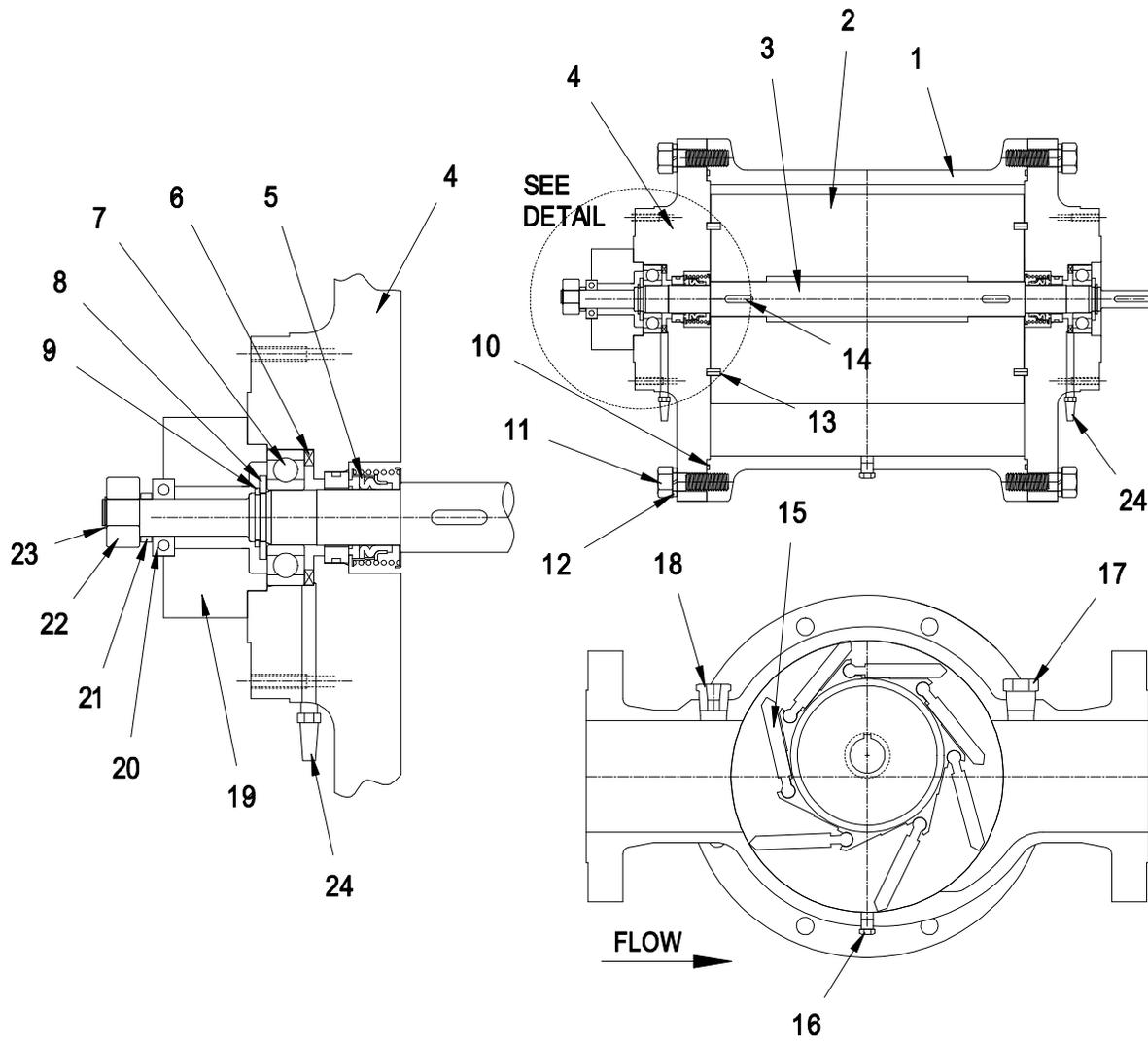


Figure 4. Model 800ER Driver, 807ER.

(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

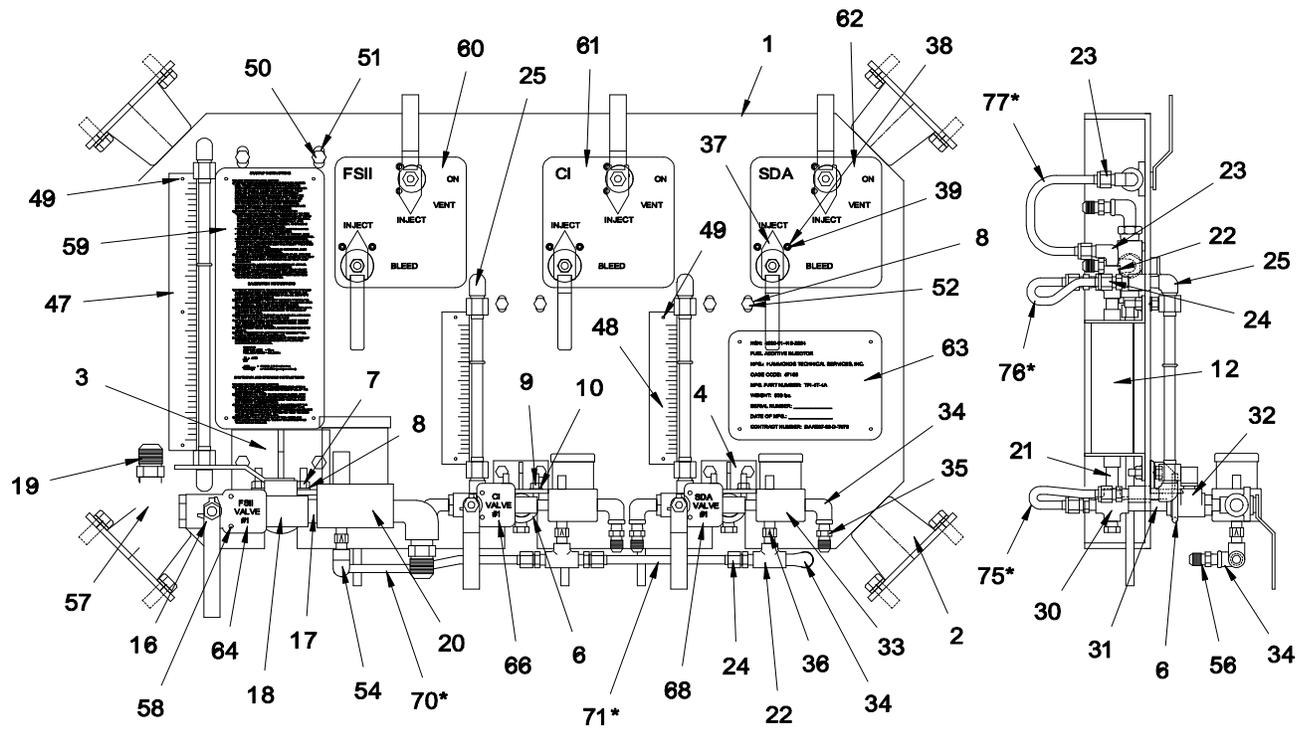


Figure 5. Control Panel Sub-Assembly (Sheet 1 of 3).

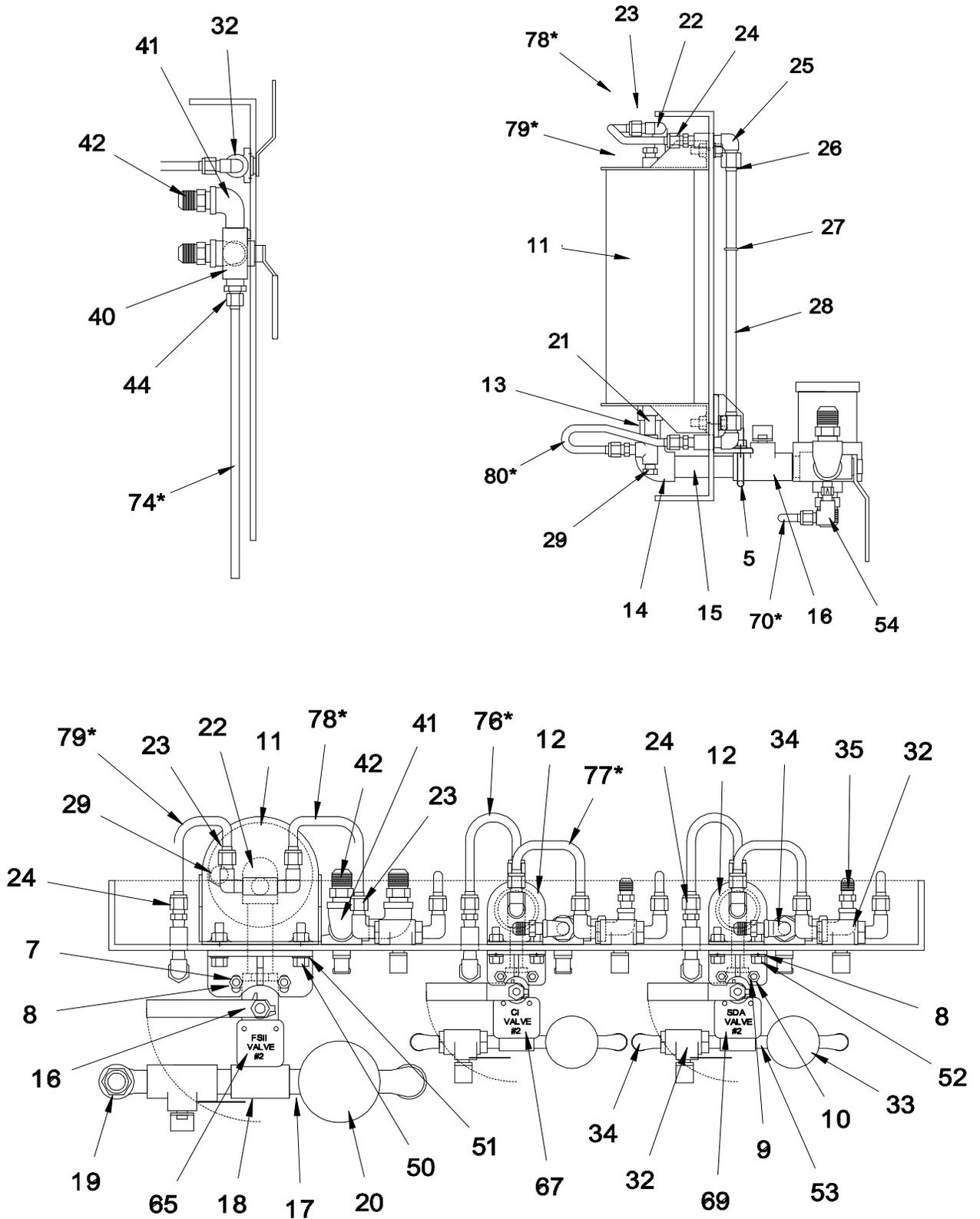


Figure 5. Control Panel Sub-Assembly (Sheet 2 of 3).

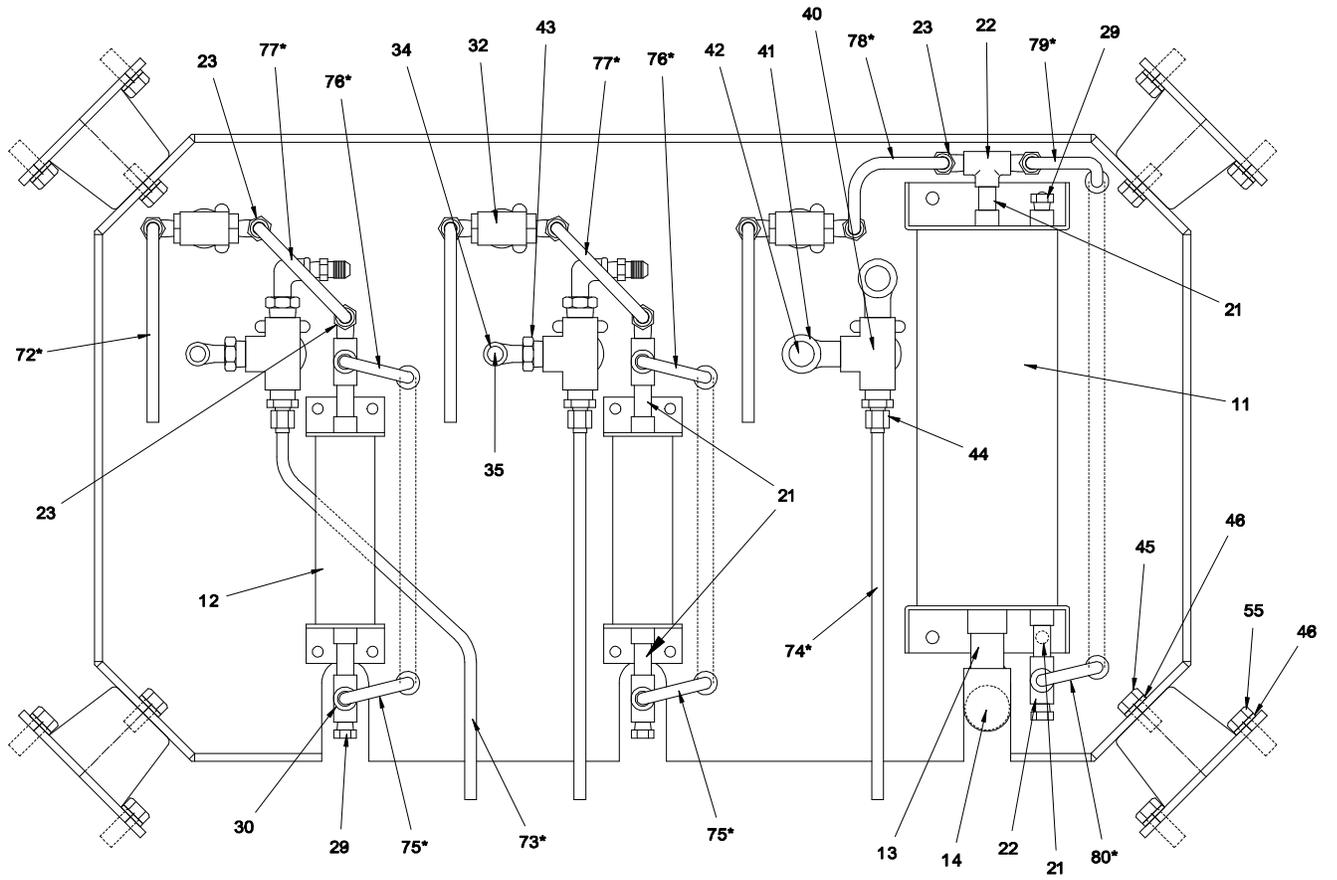


Figure 5. Control Panel Sub-Assembly (Sheet 3 of 3).

(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 1 1/2" 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 1/2" 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**

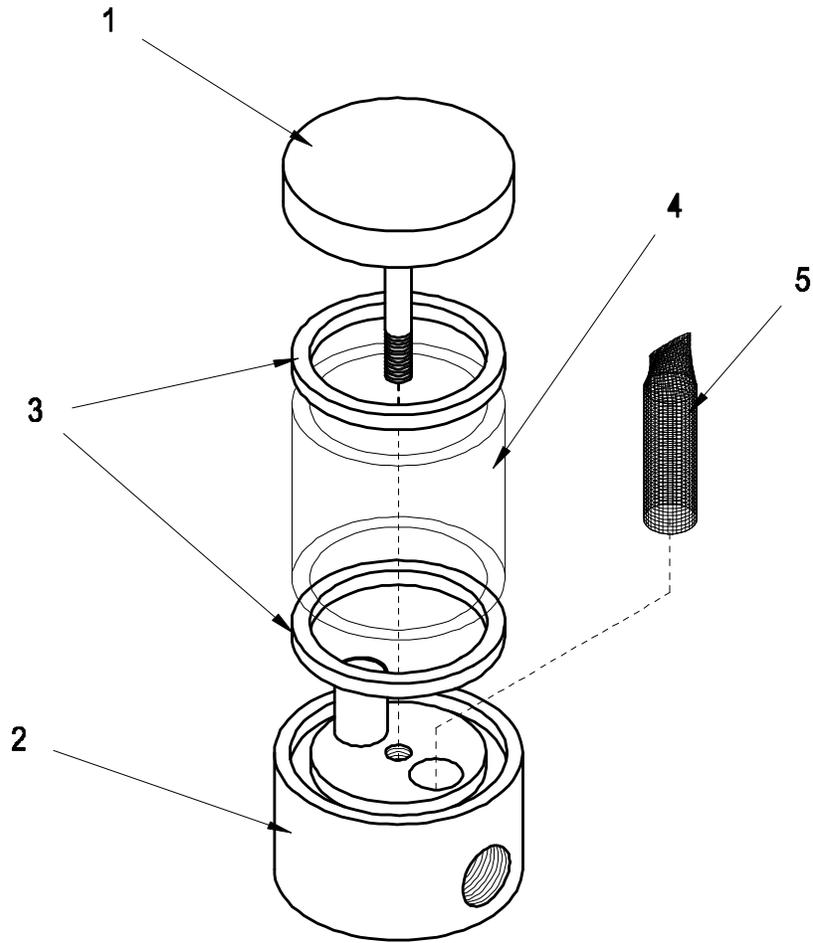


Figure 6. HI-Volume Sight Flow Indicator.

(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**

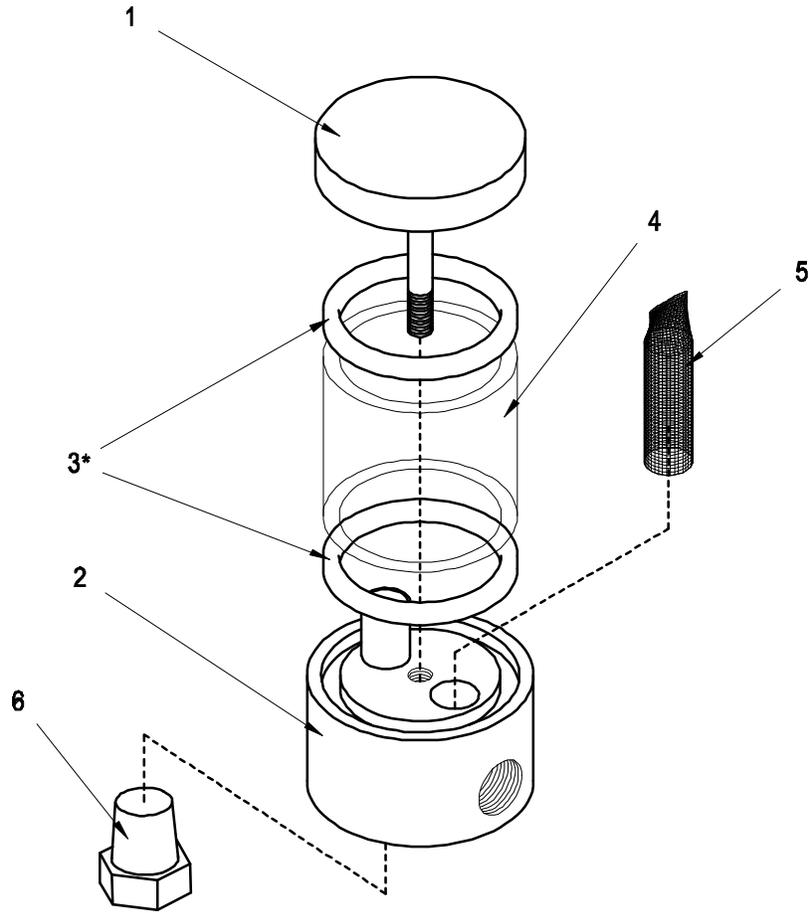


Figure 7. Sight Flow Indicator, Standard, 152011.

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
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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**

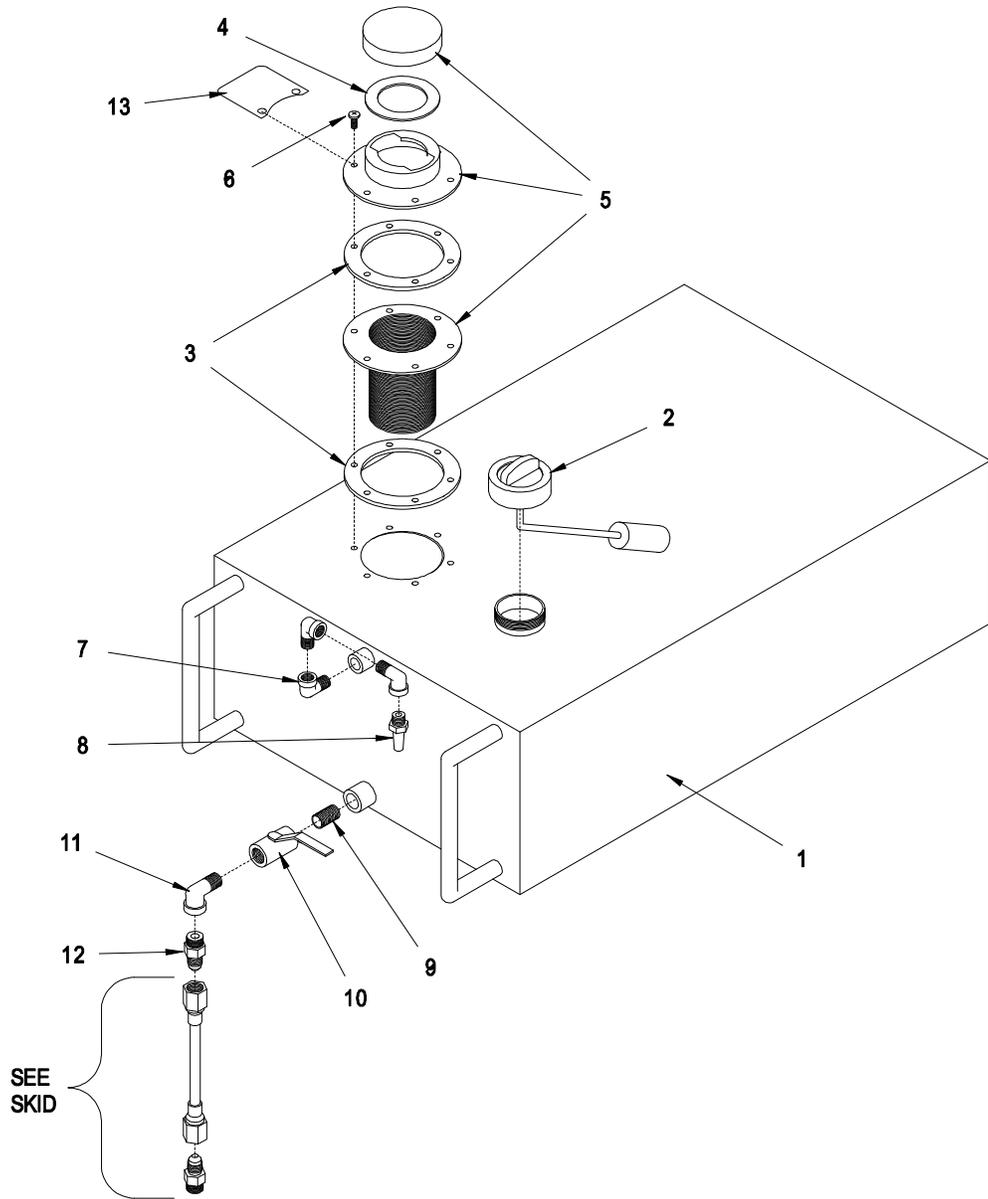


Figure 8. Six Gallon SS Tank Sub-Assembly, 212013.

(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**

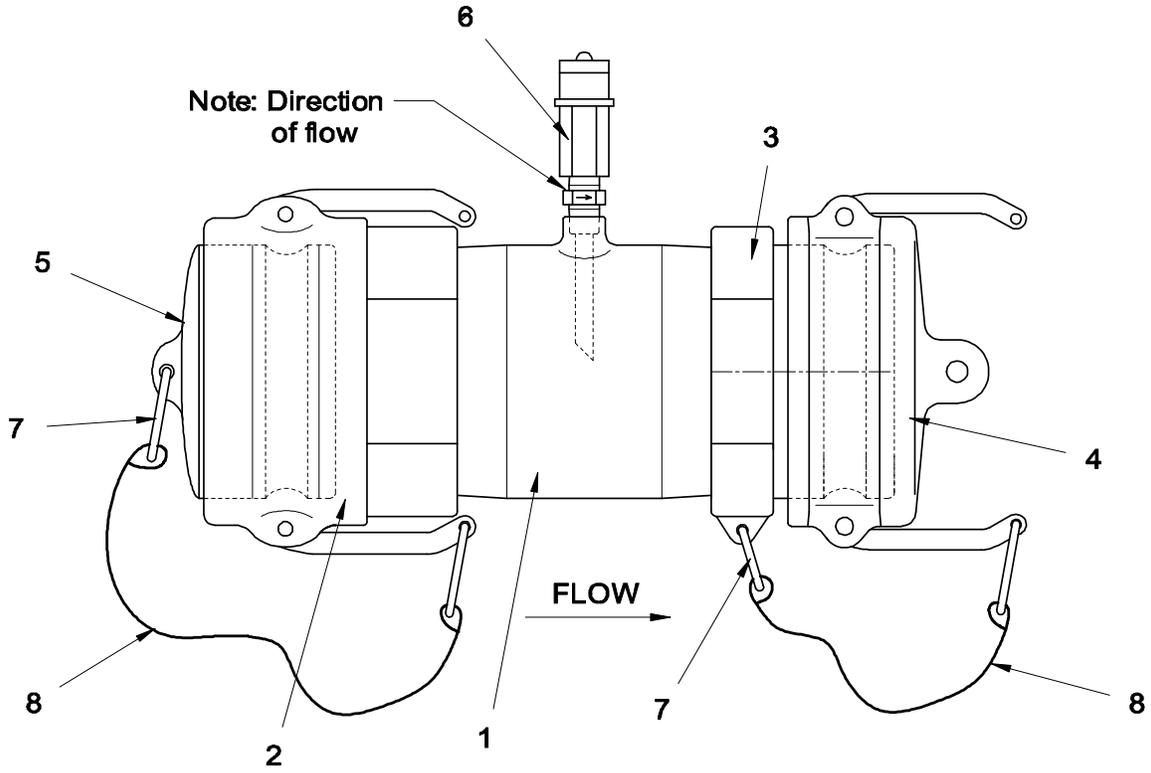


Figure 9. 4" Sample Probe Sub-Assembly.

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
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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

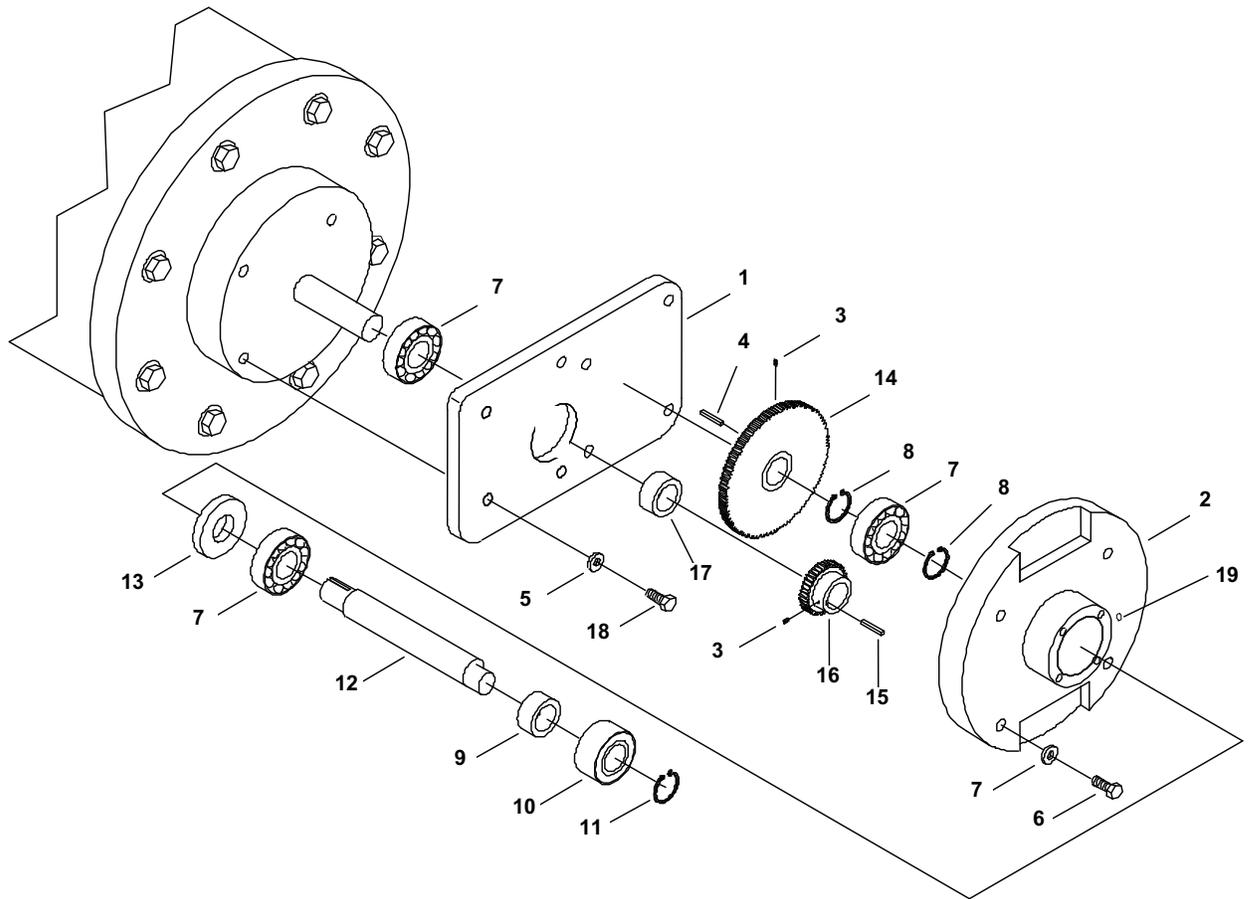


Figure 10. 3:1 Gear Reducer Sub-Assembly.

(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

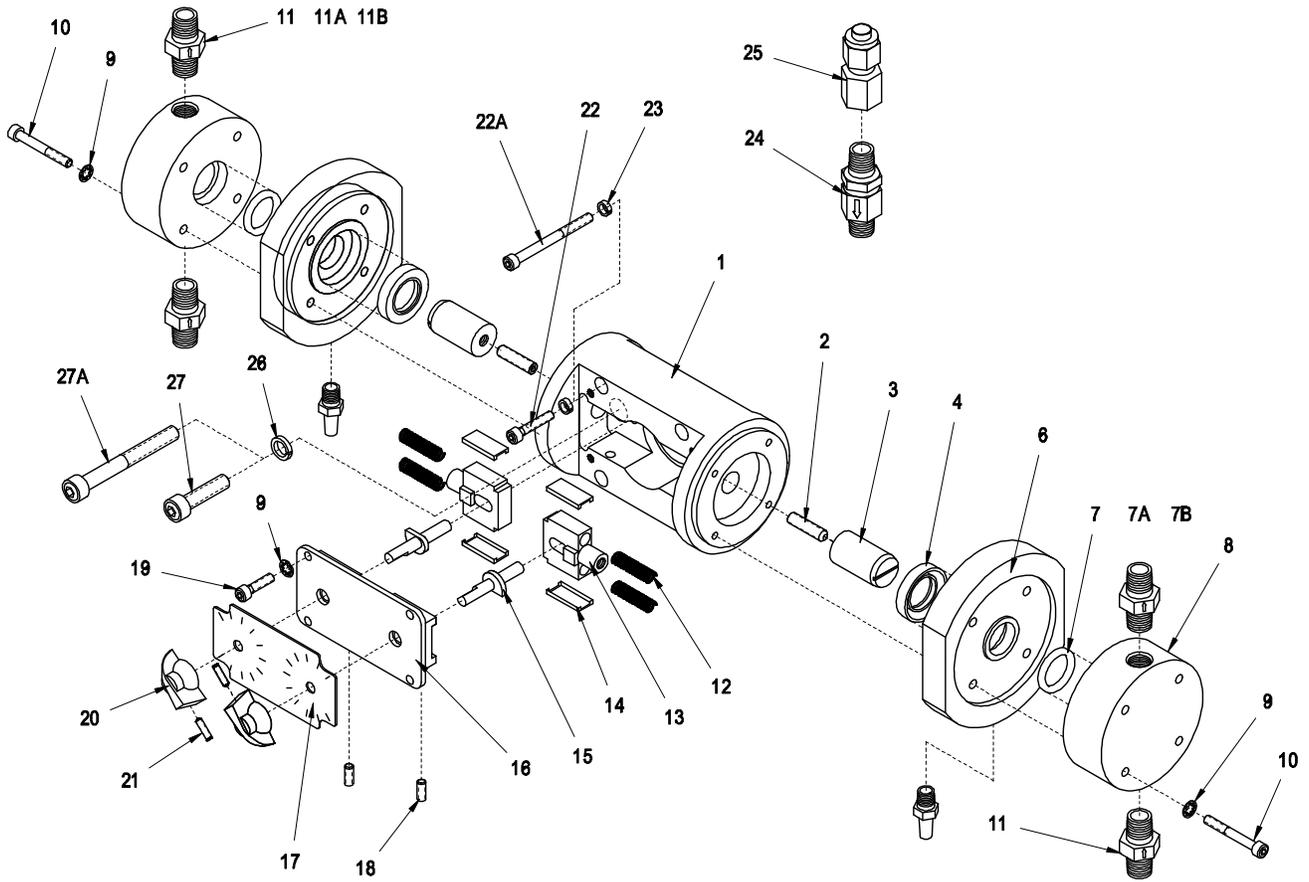


Figure 11. 1P7-1P7 SS Pump Sub-Assembly (CI-SDA).

(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

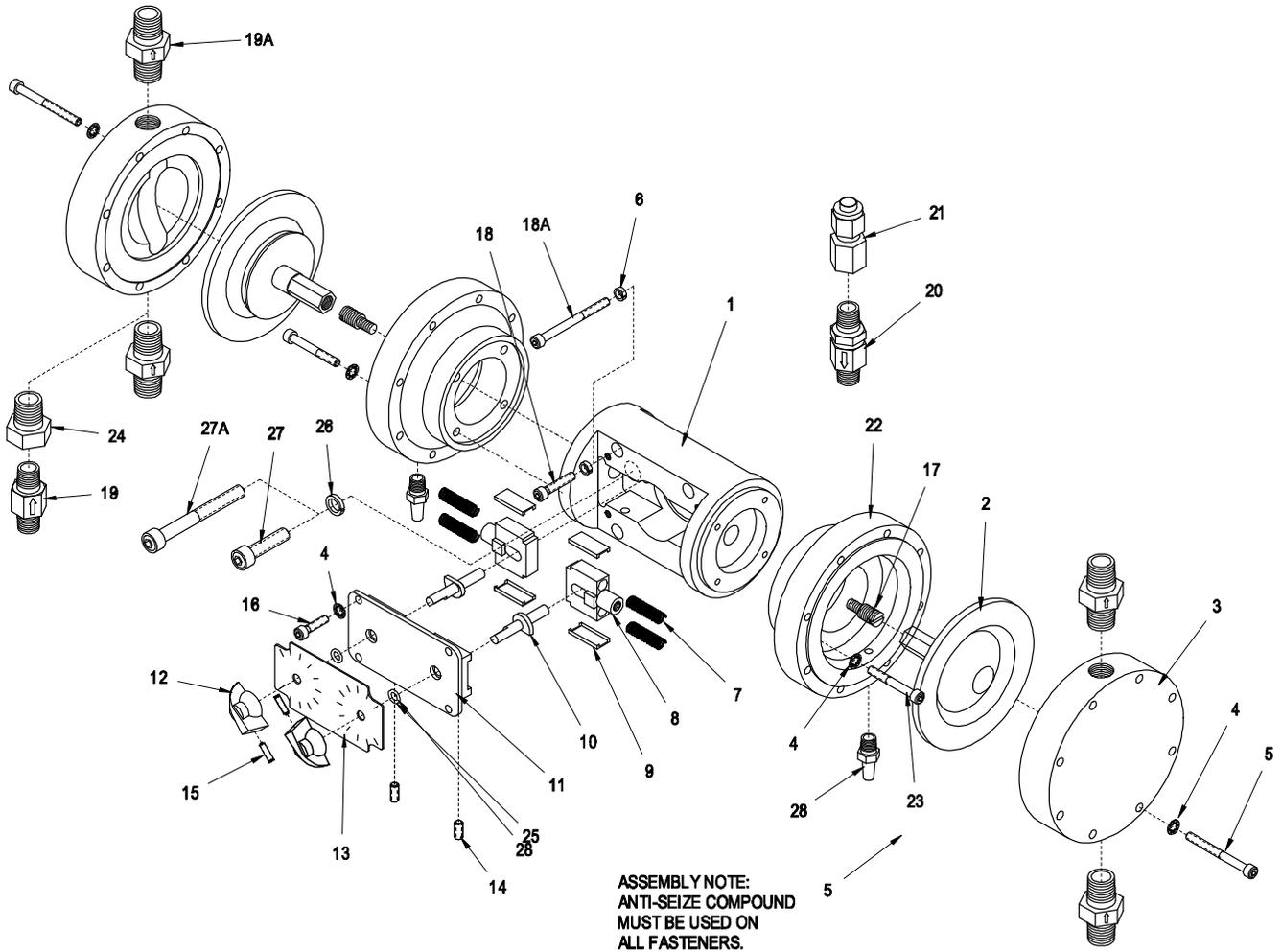


Figure 12. 2L SS Pump Sub-Assembly.

(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 1/4 "	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**

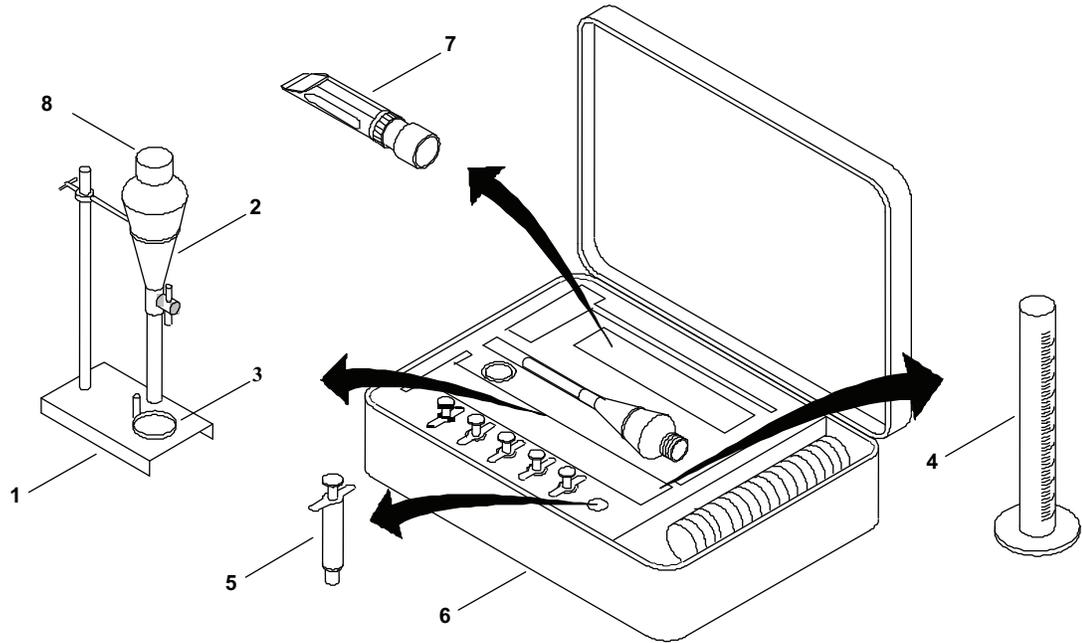


Figure 13. FSII Sample Test Kit, 882378.

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
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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	STOCK NUMBER	FIG.	ITEM
2910-01-543-5241	9	1	4320-01-543-4601	8	8
3020-01-543-3531	10	14	4320-01-543-4601	11	5
3020-01-543-8698	10	16	4320-01-543-4601	12	28
3040-01-543-2655	10	2	4320-01-543-7875	4	4
3040-0-1543-5014	11	15	4320-01-543-7917	4	1
3040-01-543-5014	12	10	4320-01-543-8337	4	15
3040-01-543-8367	4	3	4320-01-543-8346	4	2
3040-01-544-2290	10	12	4320-01-543-8661	11	8
3110-01-543-4597	4	20	4320-01-543-8669	4	13
3110-01-543-5247	4	7	4320-01-543-9147	5	12
3110-01-543-5516	10	10	4320-01-543-9379	5	11
3110-01-543-5516	4	22	4320-01-543-9542	11	1
3120-01-543-4044	4	8	4320-01-543-9542	12	1
3120-01-543-4568	11	14	4330-01-543-4591	6	5
3120-01-543-4568	12	9	4710-01-543-3964	5	*76
3130-01-543-7263	10	7	4710-01-543-3979	5	*80
3130-01-543-8457	4	19	4710-01-543-6074	5	*72
3835-01-543-7977	2	36	4710-01-543-6117	5	*79
3990-01-543-5530	2	3	4710-01-543-7858	5	*78
3990-01-543-8347	2	4	4710-01-543-8061	5	*77
4010-01-543-4617	3	11	4710-01-543-8644	5	*73
4010-01-543-4617	9	8	4710-01-543-9538	5	*71
4010-01-543-8407	2	12	4710-01-544-5279	3	28
4310-01-543-9123	5	61	4710-01-544-5285	5	*70
4320-01-396-1905	12	2	4720-01-543-3903	2	25
4320-01-460-4807	4	5	4720-01-543-5227	5	*74
4320-01-543-3992	11	16	4720-01-543-7893	5	*75
4320-01-543-3992	12	11	4720-01-543-7926	2	28
4320-01-543-4564	12	3	4720-01-543-7930	2	30

**FIELD MAINTENANCE
NATIONAL STOCK NUMBER INDEX**

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4720-01-543-8354	2	10	4730-01-543-7911	5	13
4720-01-543-8354	3	30	4730-01-543-7919	3	29
4720-01-543-8354	5	19	4730-01-543-7919	5	18
4720-01-543-8381	2	23	4730-01-543-7923	3	8
4720-01-543-8735	2	26	4730-01-543-7923	9	3
4720-01-543-8739	2	29	4730-01-543-8000	3	9
4720-01-543-8745	2	24	4730-01-543-8000	9	4
4730-01-543-3916	3	7	4730-01-543-8084	5	57
4730-01-543-3916	9	2	4730-01-543-8319	5	25
4730-01-543-3921	3	33	4730-01-543-8349	3	34
4730-01-543-3933	5	22	4730-01-5438-366	3	16
4730-01-543-4522	3	3	4730-01-543-8366	5	34
4730-01-543-4583	8	7	4730-01-543-8366	8	11
4730-01-543-4588	8	5	4730-01-543-8397	3	39
4730-01-543-4610	3	10	4730-01-543-8397	5	35
4730-01-543-4610	9	5	4730-01-543-8397	8	12
4730-01-543-5152	5	29	4730-01-543-8435	3	20
4730-01-543-5152	7	6	4730-01-543-8435	5	53
4730-01-543-5168	3	6	4730-01-543-8435	8	9
4730-01-543-5173	3	27	4730-01-543-8451	3	32
4730-01-543-5186	5	24	4730-01-543-8451	5	43
4730-01-543-6034	4	17	4730-01-543-8463	5	15
4730-01-543-6057	3	36	4730-01-543-8549	5	31
4730-01-543-6063	3	37	4730-01-543-8642	5	23
4730-01-543-6063	5	42	4730-01-543-8664	12	24
4730-01-543-7843	11	25	4730-01-543-8702	3	26
4730-01-543-7843	12	21	4730-01-543-8702	5	14
4730-01-543-7902	5	41	4730-01-543-8716	3	14
4730-01-543-7905	5	44	4730-01-543-8716	5	21
4730-01-543-7909	5	17	4730-01-543-9525	5	54

**FIELD MAINTENANCE
NATIONAL STOCK NUMBER INDEX**

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4730-01-544-5274	3	22	5306-01-543-5616	5	50
4730-01-544-5274	5	56	5306-01-543-5693	5	52
4730-01543-5152	4	16	5306-01-543-7366	12	5
4810-01-543-7870	11	13	5306-01-543-7881	12	23
4810-01-543-7870	12	8	5306-01-543-7889	10	18
4820-01-543-3953	5	40	5306-01-543-7898	5	55
4820-01-543-6040	3	17	5306-01-543-7914	5	6
4820-0-543-6040	11	24	5306-01-543-7956	2	19
4820-01-543-6040	12	20	5306-01-543-8023	5	45
4820-01-543-6068	5	16	5306-01-543-8031	11	27
4820-01-543-7906	5	36	5306-01-543-8031	12	27
4820-01-543-7906	11	11	5306-01-543-8042	10	6
4820-01-543-7906	12	19	5306-01-543-8043	11	22
4820-01-543-8361	2	8	5306-01-543-8043	12	18
4820-01-543-8385	3	21	5306-01-543-8344	4	11
4820-01-543-8385	5	32	5306-01-543-8662	11	19
4820-01-543-8385	8	10	5306-01-543-9627	11	20
4820-01-543-8399	5	37	5306-01-543-9627	12	12
4930-01-543-5102	2	9	5306-01-544-2774	5	5
5305-01-543-4012	11	21	5306-01-544-2796	2	17
5305-01-543-4012	12	15	5307-01-543-4018	12	17
5305-01-543-4055	5	39	5307-01-543-7945	3	4
5305-01-543-4570	10	3	5310-01-543-4023	2	22
5305-01-543-5587	3	24	5310-01-543-4580	10	5
5305-01-543-5587	5	58	5310-01-543-5553	4	6
5305-01-543-5717	11	2	5310-01-543-5607	5	7
5305-01-543-8010	11	18	5310-01-543-5734	11	23
5305-01-543-8010	12	14	5310-01-543-5734	12	6
5306-01-543-4001	11	10	5310-01-543-7915	2	20
5306-01-543-4562	12	16	5310-01-543-7927	11	26

**FIELD MAINTENANCE
NATIONAL STOCK NUMBER INDEX**

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5310-01-543-7927	12	26	5340-01-543-5594	5	4
5310-01-543-7931	5	51	5340-01-543-5724	11	6
5310-01-543-7939	3	25	5340-01-543-5740	13	1
5310-01-543-7939	5	38	5340-01-543-8330	5	3
5310-01-543-7939	11	9	5340-01-543-8425	2	11
5310-01-543-7939	12	4	5340-01-543-8648	6	1
5310-01-543-7986	5	9	5340-01-543-9138	7	1
5310-01-543-8339	4	12	5340-01-543-9172	10	1
5310-01-543-8637	5	10	5340-01-543-9543	2	2
5310-01-543-8726	2	18	5340-01-544-5790	2	1
5310-01-543-8726	5	8	5360-01-543-8045	11	12
5310-01-543-9616	5	46	5360-01-543-8045	12	7
5325-01-543-4603	10	11	5365-01-543-4026	3	12
5325-01-543-4603	4	23	5365-01-543-4026	9	7
5325-01-543-7921	10	8	5365-01-543-4046	4	21
5325-01-543-8453	4	9	5365-01-543-4059	10	9
5330-01-395-7688	3	5	5365-01-543-4577	10	17
5330-01-543-4621	8	3	5365-01-543-4594	3	13
5330-01-543-5712	8	4	5365-01-543-4594	4	18
5330-01-543-7947	11	4	5430-01-543-9624	8	1
5330-01-543-8036	10	13	5975-01-543-6229	2	5
5330-01-543-9656	12	22	5975-01-543-6600	2	16
5331-01-395-7686	7	3	6625-01-543-8458	9	6
5331-01-395-7687	6	3	6680-01-383-7453	7	4
5331-01-543-7885	11	7	6680-01-396-0270	6	4
5331-01-543-7984	4	10	6680-01-396-0271	7	5
5331-01-543-9548	5	27	6680-01-543-5766	7	2
5331-01-543-9637	11	28	6680-01-543-5771	5	20
5331-01-543-9637	12	25	6680-01-543-5777	5	33
5340-01-543-4049	5	2	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	PART NUMBER	FIG.	ITEM
101007	11	12	101230	5	32
101007	12	7	101230	8	10
101021	3	38	101284	5	44
101023	5	22	101337	5	27
101032	3	15	101379	5	28
101032	5	30	101490	11	7
101034	5	24	101612	11	20
101038	11	23	101612	12	12
101038	12	6	101615	11	21
101045	4	23	101615	12	15
101045	10	11	101659	11	16
101068	5	23	101659	12	11
101069	3	20	101670	11	17
101069	5	53	101670	12	13
101069	8	9	101685	5	26
101070	3	14	101749	4	24
101070	5	21	101749	8	8
101088	11	25	101749	11	5
101088	12	21	101749	12	28
101091	5	54	101774	11	1
101095	5	25	101774	12	1
101128	3	27	101833	3	12
101141	3	34	101833	9	7
101152	11	14	101869	2	13
101152	12	9	101880	11	7B
101180	5	40	101895	2	12
101205	5	16	102192	11	3
101226	11	7A	102193	11	8
101230	3	21	102278	8	1

**FIELD MAINTENANCE
PART NUMBER INDEX**

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
102285	5	37	102509	5	78
102460	8	3	102510	5	79
102463	5	36	102511	5	80
102463	11	11	102512	5	81
102463	12	19	102513	3	28
102469	5	11	102514	3	35
102470	5	12	102515	2	2
102471	5	1	102516	2	16
102472	5	3	103381	4	9
102473	5	4	103383	4	6
102474	11	6	103403	12	19A
102475	5	59	103409	4	10
102476	5	60	141036	4	5
102477	5	61	151001	7	4
102478	5	62	151002	7	3
102480	11	28	151005	4	16
102480	12	25	151005	5	29
102482	8	4	151009	6	4
102484	5	63	151010	6	3
102485	2	8	152002	7	5
102486	2	9	152005	7	6
102490	2	15	152011	5	33
102501	5	70	152020	5	20
102502	5	71	152025	6	5
102503	5	72	152074	7	1
102504	5	73	152075	7	2
102505	5	74	152080	6	2
102506	5	75	152081	6	1
102507	5	76	161001	3	5
102508	5	77	162119	2	11

**FIELD MAINTENANCE
PART NUMBER INDEX**

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
162120	2	7	271130	3	36
162128	2	14	271131	3	29
184004	4	8	271131	5	18
184011	4	15	271249	4	17
184037	4	19	271353	5	31
184038	4	1	271498	3	3
184047	10	1	282001	12	3
184048	10	2	282004	12	2
184081	4	3	282005	12	17
184093	4	4	282016	12	22
184166	4	2	282042	11	13
184167	4	13	282042	12	8
190011	10	16	282043	11	15
190012	10	14	282043	12	10
212048	10	12	401952	5	49
271094	5	17	700089	8	5
271095	5	13	881024	10	13
271097	5	15	881037	5	39
271111	12	24	881045	11	2
271112	3	32	881083	10	5
271112	5	43	881084	10	18
271113	3	13	881089	11	19
271113	4	18	881117	3	11
271122	3	33	881117	9	8
271123	3	26	881119	10	8
271123	5	14	881120	10	7
271125	3	16	881126	12	16
271125	5	34	881157	4	22
271125	8	11	881157	10	10
271127	5	57	881223	8	6

**FIELD MAINTENANCE
PART NUMBER INDEX**

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
881247	12	5	881725	9	5
881249	3	4	881740	3	6
881259	5	10	881765	11	4
881260	3	9	881774	5	9
881260	9	4	881882	4	20
881301	11	22	881970	11	11B
881301	12	18	881999	4	21
881317	11	10	882076	4	12
881318	10	6	882306	2	22
881417	2	18	882333	5	47
881417	5	8	882334	5	48
881419	5	7	882335	5	6
881422	2	17	882336	5	5
881521	10	19	882339	3	22
881545	12	23	882339	5	56
881621	4	11	882341	5	2
881623	4	7	882342	3	39
881630	10	9	882342	5	35
881637	11	11A	882342	8	12
881645	3	24	882343	3	37
881645	5	58	882343	5	42
881670	10	17	882344	2	10
881673	10	3	882344	3	30
881711	5	51	882344	5	19
881714	8	7	882345	2	30
881722	3	8	882347	2	26
881722	9	3	882348	2	23
881724	3	7	882348	2	27
881724	9	2	882349	5	55
881725	3	10	882351	11	27A

**FIELD MAINTENANCE
PART NUMBER INDEX**

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
882351	12	27A	882911	3	17
882352	11	26	882911	11	24
882352	12	26	882911	12	20
882353	2	21	882949	3	25
882354	3	23	882949	5	38
882355	3	31	882949	11	9
882356	2	24	882949	12	4
882357	2	25	883012	2	19
882358	2	29	883170	11	22A
882359	2	28	883170	12	18A
882360	3	19	883189	8	2
882361	3	18	883233	5	50
882362	8	13	883344	5	52
882366	5	64	883578	11	18
882367	5	65	883578	12	14
882368	5	66	883745	3	2
882369	5	67	883863	11	27
882370	5	68	883863	12	27
882371	5	69	2711126	5	41
882372	3	40	??key	4	14
882373	8	14	??key	10	4
882374	9	6	??key	10	15
882376	2	5	102458L	2	3
882377	2	6	102458R	2	4
882378	2	36	1P7-1P7 SS KIT	2	34
882399	9	1	2L SS KIT	2	33
882400	2	1	4TP-4A TOOLS	2	31
882667	2	20	800ER KIT	2	32
882865	5	45	807ER	3	1
882867	5	46	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) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
00	FUEL ADDITIVE INJECTOR ASSEMBLY								
01	SKID SUB-ASSEMBLY								
02	INJECTOR SUB- ASSEMBLY								
0201	CI and SDA Pump Suction Check Valve	Inspect Replace Repair	.5 1.0 1.0				1, 2,		
0202	Fuel Additive Injector Assembly Fluid Motor	Inspect Replace Repair	.5 1.0 1.0				1, 2,		
03	CONTROL PANEL SUB-ASSEMBLY								
0301	HI Volume Sight Indicator (FSII)	Inspect Replace Repair	.5 1.0 1.0				1, 2,	A	
0302	Sight Flow Indicator (CI)	Inspect Replace Repair	.5 1.0 1.0				1, 2,	A	
0303	Sight Flow Indicator (SDA)	Inspect Replace Repair	.5 1.0 1.0				1, 2,	A	
0304	Calibration Gauge	Inspect Replace Repair	.5 1.0 1.0				1, 2,	A	

Table 1. Maintenance Allocation Chart (MAC) – Continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
04	SIX GALLON SS TANK SUB-ASSEMBLY								
0401	Additive tank	Inspect Replace Repair	.5	1.0 1.0				1, 2, 10 A	
07	1P7-1P7 SS PUMP SUB- ASSEMBLY (CI-SDA)								
0701	CI and SDA Injector Pump Lip Seal	Inspect Replace Repair	.5		1.0 1.0			1, 2, 10 A	
0702	CI and SDA Injector Pump	Inspect Replace Repair	.5		1.0 1.0			1, 2, 4, 6 A	
08	2L SS PUMP SUB- ASSEMBLY (FSII)		0						
0801	FSII Pump Check Valve	Inspect Replace Repair	.5		1.0 1.0			1, 2, 4, 6 A	
0802	FSII Injector Pump Diaphragm	Inspect Replace Repair	.5		1.0 1.0			1, 2, 4, 6 A	
0803	FSII Inection Pump	Inspect Replace Repair	.5		1.0 1.0			1, 2, 4, 6 A	

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

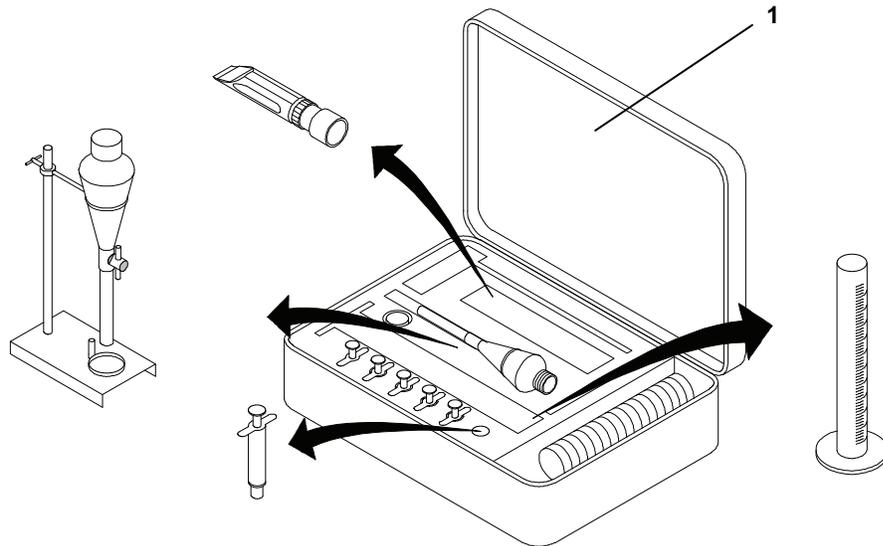


Table 1. Component of End Item (COEI).

(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 882378(47186/62935)		EA	1

COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS – CONTINUED

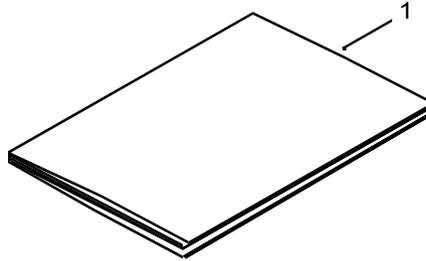


Table 2. Basic Issue Items (BII).

(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 (47186) 4TP-4A TOOLS		EA	1
3		*Repair Kit, 800ER Driver (47186) 800ER KIT		EA	1
4		*Repair Kit, 2L SS Pump (47186) 2L SS KIT		EA	1
5		*Repair Kit, 1P7- 1P7 Pump (47186) 1P7-1P7 SS KIT		EA	1
6		*Repair Kit, 1 HV SFI and 2 SFI (47186) SFI MIL KIT		EA	1
7	5120-00-244-4389	*Wrench, bung 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 35083880(33968)		EA	1
6630-01-347-9670	TESTING KIT, PETROLEUM, aviation fuel contamination (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 MIL-T-5544(80348)	CN
2	C	6850-01-474-2302	Cleaning compound, solvent MIL-PRF-680(81349)	GL
3	H	5330-00-246-0330	Cloth, abrasive, aluminum oxide, 320 grit, 11x9 in. ANSI B74.18(80204)	PG
4	C	7920-00-044-9281	Cloth, cleaning MIRACLEWIPEL001(51200)	BX
5	O	9150-01-117-2928	Grease, ball and roller bearing 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 59359TYII (0N5W4)	EA
7	O	9150-00-250-0926	Petrolatum technical VV-P-236 (81348)	LB
8	C		Tape, teflon 0.75 in. wide, 0.003 in. thick 6802K44 (39428)	RL
9		9150-01-485-7630	Lubriplate grease, 3/8 oz. LUBRIPLATE 105 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

TM 10-4930-364-13&P

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
Secretary

0816906

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE Date you filled out this form.
TO: <i>(Forward to proponent of publication or form) (Include ZIP Code)</i> AMSTA-LC-LMPP / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630						FROM: <i>(Activity and location) (Include ZIP Code)</i> Your mailing address	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 10-4930-364-13&P						DATE 15 July 2008	Title 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).	
						SAMPLE	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE <i>Your Name</i>				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		Signature <i>Your Signature</i>	

TO: (Forward direct to addressee listed in publication) AMSTA-LC-LMPP / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	FROM: (Activity and location) (Include ZIP Code) Your address	DATE Date you filled out this form
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER TM 10-4930-364-13&P				DATE 15 July 2008			TITLE Operator and Field Maintenance Manual for Fuel Additive Injector Assembly	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
SAMPLE								

PART III – REMARKS (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE Your Name	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE Your Signature
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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

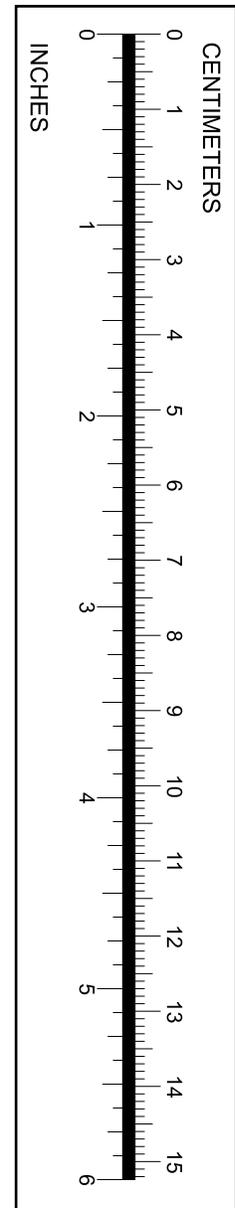
- Degrees Fahrenheit (F) = °C • 9 ÷ 5 + 32
- Degrees Celsius (C) = F° - 32 • 5 ÷ 9
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius

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		
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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