

AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)

MODULE 20
FUEL SYSTEMS

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Career Field Education and Training Plan (CFETP) references from 1 Aug 02 version.

OPR: HQ AFCESA/CEOF
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Supersedes AFQTP 3E0X2-18, 1 Oct 99

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Pages: 29/Distribution F

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

**AIR FORCE QUALIFICATION TRAINING PACKAGES
FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)**

INTRODUCTION

Before starting this AFQTP, refer to and read the “[AFQTP Trainer/Trainee Guide](#).”

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. **It is important for the trainer and trainee to understand** that an AFQTP **does not** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification

Diamond task:

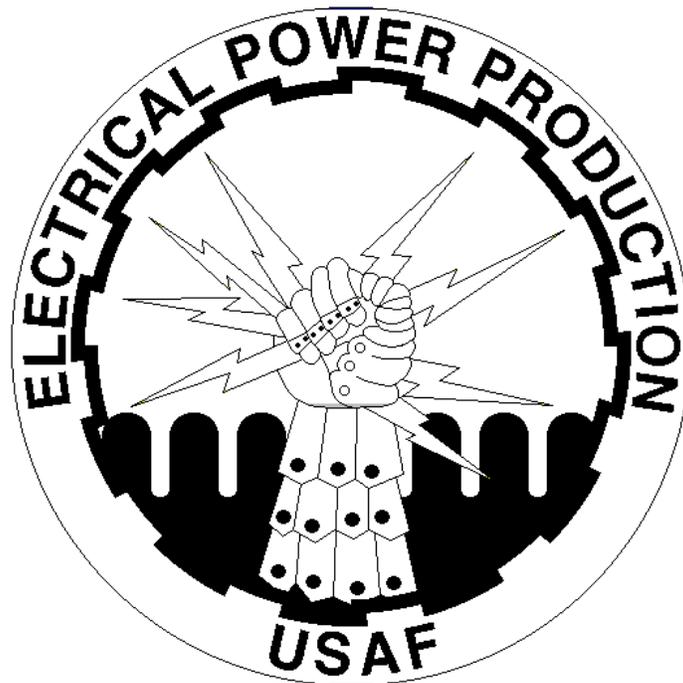
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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FUEL SYSTEMS

REPLACE GASOLINE ENGINE COMPONENTS

MODULE 20

AFQTP UNIT 1

FILTERS/STRAINERS (20.1.4.2.)

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REPLACE GASOLINE ENGINE FILTERS/STRAINERS
Task Training Guide

STS Reference Number/Title:	20.1.4.2., Replace Gasoline Engine Filters/Strainers.
Training References:	<ol style="list-style-type: none"> 1. Technical Order (TO) 38G2-117-3. 2. Career Development Course (CDC) 3E052B, Vol. 1, Unit 1-1, Section 003: <i>Gasoline Engine Components and Tune-up.</i> 3. Manufacturer's manuals. 4. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems.</i> 5. Local procedures. 6. Air Force Occupational Safety and Health Standard (AFOSHSTD) 91-45, Hazardous Energy Control and Mishap Prevention Signs and Tags.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. AFOSHSTD 91-45 for lockout/tag out procedures. 2.2. Applicable TOs or manufacturer's manuals. 2.3. CDC 3E052B, Vol. 1, Unit 1-1, Section 003. 2.4. CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems.</i>
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. General toolbox. 2. Personal safety equipment. 3. Filters and Strainers. 4. Gasoline Engine.
Learning Objective:	How to replace filters/strainers on gasoline engines.
Samples of Behavior:	Trainee will replace filters and strainers on a gasoline engine.
Notes:	
<ol style="list-style-type: none"> 1. To successfully complete this element, follow the steps outlined in the applicable technical order or manufacturer manual exactly—no exceptions. 2. Any safety violation is an automatic failure. 3. Prior to performing any maintenance, technician <u>MUST</u> isolate the starting system, and apply lockout and tag-out procedures. 	

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REPLACE GASOLINE ENGINE FILTERS/STRAINERS

1. Background: Fuel systems on gasoline engines are relatively simple in construction compared to that of a diesel engine. The main components of a gasoline fuel system consist of a fuel pump, carburetor, and filter assembly. For purposes of this AFQTP, the information covered will be focused on smaller units in general, such as, portable gasoline generators and the rewind engine on the BAK-12 Aircraft Arresting Unit. However, most systems are similar in basic theory and operation principles.

1.1. Fuel Pump: Fuel pumps are used on engines that have the fuel tank mounted in such away that a gravity fuel supply system will not operate. Fuel pumps provide constant, pressurized fuel flow to the carburetor under changing conditions.

1.2. Carburetor: The carburetor mixes the air, from the air cleaner and the fuel. It is then delivered to the combustion chamber where it is burned.

1.3. Filter assembly: The filter assembly is used to trap solid impurities in the fuel. Some gasoline engines have a fuel line fitting in the bottom of the tank. A filter screen is placed in the tank fitting or at the end of the pick up line. Older small engines have a filter incorporated in a glass sediment bowl. The gasket, screen, and bowl can be removed for inspection and cleaning.

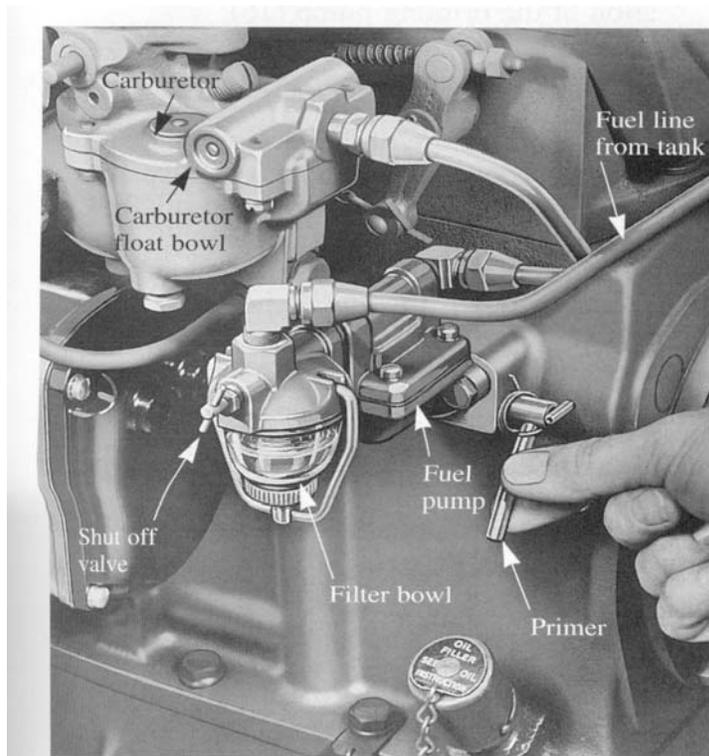


Figure 1. Wisconsin Engine V-465D

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

NOTE TO TRAINER:

The steps have been developed using the Wisconsin Engine V-465D as a model. Equipment may vary slightly, but the procedures are basically the same for replacing filters/strainers on gasoline engines.

2. To perform this task, follow these steps:

Step 1: Isolate the engine from starting using lockout/tag-out procedures.

1.1. Refer to AFOSHSTD 91-45.

Step 2: Replace filter/strainer.

2.1. Refer to applicable TO or manufacturer manual.

Step 3: Re-configure engine for operation.

Step 4: Perform a functional test.

Step 5: Document maintenance on AF Form 719.

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**REVIEW QUESTION
FOR
REPLACE GASOLINE ENGINE FILTERS/STRAINERS**

QUESTION	ANSWER
1. What is the function of the fuel pump on gasoline engines?	a. Provides a constant voltage. b. Provides constant, pressurized fuel to the carburetor. c. Filters particles from the fuel. d. Mixes the air/fuel and delivers it to the combustion chamber.
2. What is the function of the carburetor?	a. Provides a constant voltage. b. Provides constant, pressurized fuel to the carburetor. c. Filters particles from the fuel. d. Mixes the air/fuel and delivers it to the combustion chamber.
3. The purpose of the filter/strainer is to trap sediment and particles from the fuel.	a. True. b. False.

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REPLACE GASOLINE ENGINE FILTERS/STRAINERS

PERFORMANCE CHECKLIST

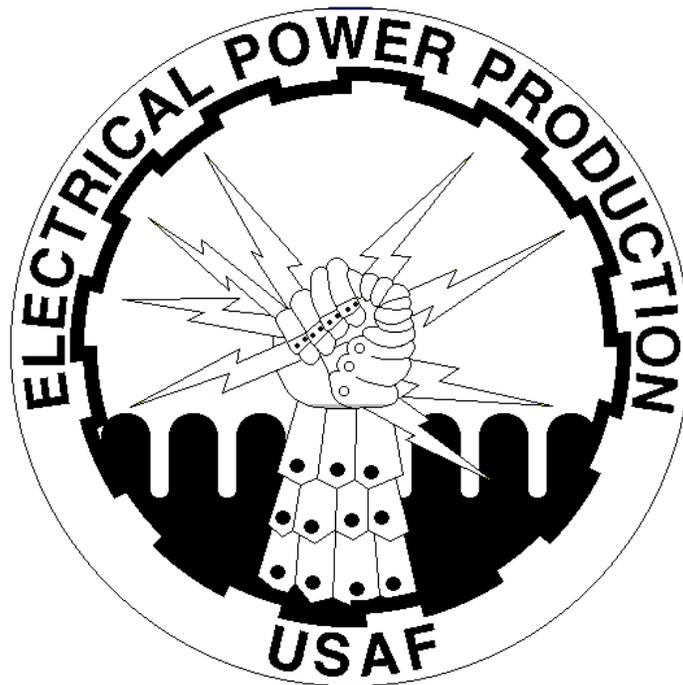
INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE....?	YES	NO
1. Isolate the engine from starting using lockout/tag out procedures		
2. Replace filters/strainers according to applicable TO or manufacturer manual		
3. Re-configure engine for operation		
4. Perform a functional test at operating temperature		
5. Document maintenance on AF Form 719		
6. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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FUEL SYSTEMS

GASOLINE CARBURETOR

MODULE 20

AFQTP UNIT 1

ADJUST GASOLINE CARBURETOR (20.1.5.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

ADJUST GASOLINE CARBURETOR
Task Training Guide

STS Reference Number/Title:	20.1.5., Adjust Gasoline Carburetor.
Training References:	<ol style="list-style-type: none"> 1. Technical Order (TO) 38G2-117-3. 2. Career Development Course (CDC) 3E052B, Vol. 1, Unit 1-1, Section 003: <i>Gasoline Engine Components and Tune-up.</i> 3. Manufacturer's manuals. 4. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems.</i> 5. Local procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Applicable TOs or manufacturer's manuals. 2.2. CDC 3E052B, Vol. 1, Unit 1-1, Section 003. 2.3. CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems.</i>
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. General toolbox. 2. Personal safety equipment. 3. Gasoline Engine.
Learning Objective:	How to adjust gasoline carburetor.
Samples of Behavior:	Using the proper manuals, trainee will be able to adjust gasoline carburetor.
Notes:	<ol style="list-style-type: none"> 1. To successfully complete this element, follow the steps outlined in the applicable technical order or manufacturer manual exactly—no exceptions. 2. Any safety violation is an automatic failure.

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ADJUST GASOLINE CARBURETOR

1. Background: In this career field, you will see many different makes, models, and types of carburetors. They will range in use from small portable generators to the lawnmower or weed eater in your shop. Although, they may differ in construction, the theory and principles are the same.

1.1. A carburetor's primary purpose is to produce a mixture of fuel and air to operate the engine. It does this by vaporizing the fuel and mixing it with air in the proper proportion for a variety of conditions, such as cold or hot starting, idling, acceleration and high-speed operation.

1.2. Air enters the top of the carburetor and is mixed with liquid fuel, which is fed through carburetor passages and sprayed into the air stream. This mixture is forced into the intake manifold by atmospheric pressure and burned in the combustion chamber of the engine. Note, that the amount of air needed for combustion is far greater than the amount of fuel required. The average ratio is 15 parts air to 1 part fuel. When the mixture enters the combustion chamber, the swirling motion and the sudden increase in temperature due to the compression stroke complete the vaporization of the fuel.

2. Some of the basic components of the carburetor include; the float, choke system, throttle system, load adjustment, acceleration system, and idling circuit.

1.1. Float: The float is a small sealed vessel normally made of brass or plastic. The purpose of the float is to maintain a constant level of fuel in the float bowl. The float rises and falls with the fuel level. As the float lowers with the level of fuel, it unseats a needle valve, which allows fuel to enter the bowl. As the float rises, it seats the needle, thus shutting off the fuel.

1.2. Choke: The choke is a round disc, mounted on a shaft located at the intake end of the carburetor. When the choke is closed, it provides a rich mixture of air/fuel that is necessary for cold starting. As the engine warms, less choke is required.

1.3. Throttle: The throttle is a round disc mounted on a shaft, located beyond the main fuel nozzle. The main purpose of the throttle valve is to regulate the amount of air/fuel mixture entering the cylinders.

1.4. Load adjustment: Load adjustment is accomplished by use of a fixed jet or orifice, which allows a preset amount of fuel flow for maximum power and economy. Carburetors equipped with a fixed jet are non-adjustable.

1.5. Acceleration system: This built in system of the carburetor uses a plunger-type system that forces fuel into the carburetor during acceleration.

1.6. Idling circuit: The idling circuit is used during the idling process. It supplies just enough air/fuel mixture to keep the engine running, because the throttle valve is closed during idle.

3. Now that you have a basic understanding of the carburetor, you are better able to make the proper adjustments when necessary.

NOTE TO TRAINER:

The steps have been developed using the Wisconsin Engine V-465D as a model. Equipment may vary slightly, but the procedures are basically the same for adjusting gasoline carburetor.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

4. To perform this task, follow these steps:

Step 1: Adjust the throttle stop screw.

1.1. To obtain the desired idling speed: turning screw in (clockwise) to increase the speed and out (counterclockwise) to decrease the engine speed.

Step 2: Adjust the idle adjusting needle.

2.1. To obtain smooth idling of the engine: turning needle out (counterclockwise) to make the mixture richer, and in (clockwise) to make the mixture leaner.

Step 3: Main jet adjustment.

3.1. For full power of the engine while under load: turning the adjusting needle out (clockwise) makes the mixture richer, and turning the needle in (clockwise) will restrict then flow of fuel and result in a leaner mixture.

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**REVIEW QUESTION
FOR
ADJUST GASOLINE CARBURETOR**

QUESTION	ANSWER
1. The main purpose of a carburetor is to provide the proper air/fuel mixture?	a. True. b. False.
2. Which carburetor adjustment provides smooth idling?	a. Main jet adjustment. b. Throttle stop screw. c. Idle adjusting needle.
3. Which carburetor adjustment obtains the desired idling speed?	a. Main jet adjustment. b. Throttle stop screw. c. Idle adjusting needle.
4. In a carburetor, the average air/fuel weight ratio is?	a. 15:15. b. 25:1. c. 10:15. d. 15:1.
5. What maintains the fuel level in a carburetor?	a. Choke. b. Load adjustment. c. Throttle valve. d. Float.
6. What regulates the amount of air/fuel mixture entering the cylinders?	a. Choke. b. Load adjustment. c. Throttle valve. d. Float.

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ADJUST GASOLINE CARBURETOR

PERFORMANCE CHECKLIST

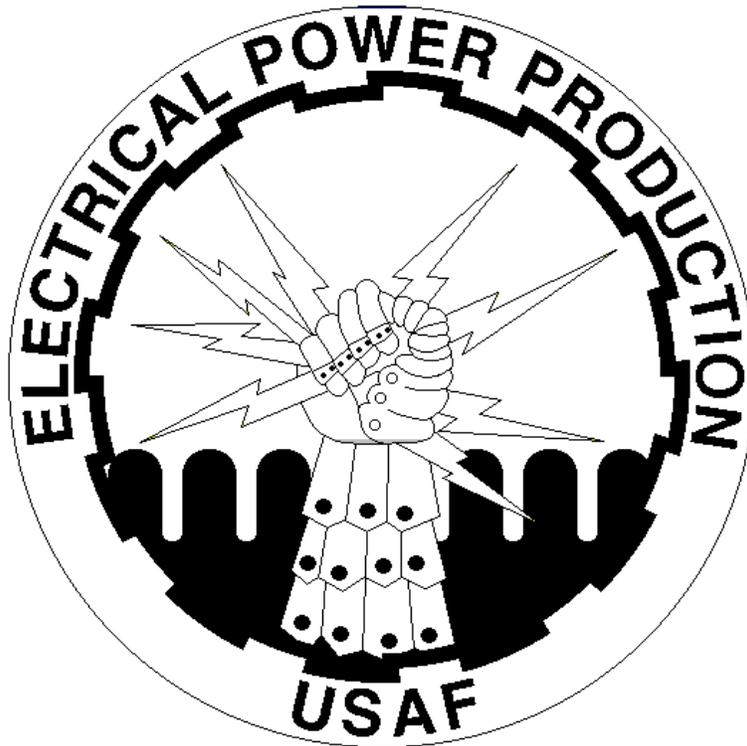
INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE....?	YES	NO
1. Adjust the throttle stop screw on a carburetor		
2. Adjust the idle adjusting needle on a carburetor		
3. Adjust the main jet adjustment on a carburetor		
4. Complete task according to TO or manufactures procedures		
5. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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FUEL SYSTEMS

DIESEL

MODULE 20

AFQTP UNIT 2

TROUBLESHOOT DIESEL FUEL SYSTEMS (20.2.2)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TROUBLESHOOT DIESEL FUEL SYSTEMS
Task Training Guide

STS Reference Number/Title:	20.2.2., Troubleshoot Diesel Fuel Systems.
Training References:	<ol style="list-style-type: none"> 1. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems</i>. 2. Career Development Course (CDC) 3E052B, Vol. 1, Unit 4-1, Section 020: <i>General Maintenance</i>. 3. Manufacturer's Manuals. 4. Local Procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E052 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Applicable manufacturer's manuals. 2.2. CDC 3E052B, Vol. 1, Unit 4-1, Section 020. 2.3. Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support CD-ROM AFQTP. 2. General tool kit. 3. Applicable technical references. 4. Water detecting paste kit. 5. Personal safety equipment.
Learning Objective:	How to troubleshoot diesel fuel system.
Samples of Behavior:	Trainee will identify the causes and solutions to common troubleshooting scenarios.
Notes:	<ol style="list-style-type: none"> 1. To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. 2. Any safety violation is an automatic failure. 3. Trainer must develop an exercise scenario to validate ability of trainee to meet learning objective and samples of behavior.

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TROUBLESHOOT DIESEL FUEL SYSTEMS

1. Background: The primary job of a diesel fuel system is to move fuel from the fuel tank to the fuel injectors. The fuel must be delivered at the proper pressure; it must also be free of dirt, moisture, wax, and air bubbles. The fuel system must also have return lines to vent any unused fuel from the injector back to the fuel tank.

2. The major components of a fuel system include:

- 2.1.** Fuel tank (stores fuel).
- 2.2.** Fuel transfer pump (pushes fuel through the filters and into the injection pump).
- 2.3.** Fuel filter (cleans the fuel).
- 2.4.** Injection pump (times, measures, and delivers fuel under pressure to the injectors).
- 2.5.** Injection nozzles (atomize and spray fuel into the cylinders).
- 2.6.** Return line (vents any unused fuel back to the fuel tank).

3. In order to accomplish effective combustion, the fuel injection pump is critical to the system. Although there are many types of injection pumps on the market, three are typical in our career field. They include the unit injection, pressure-time and distributor type.

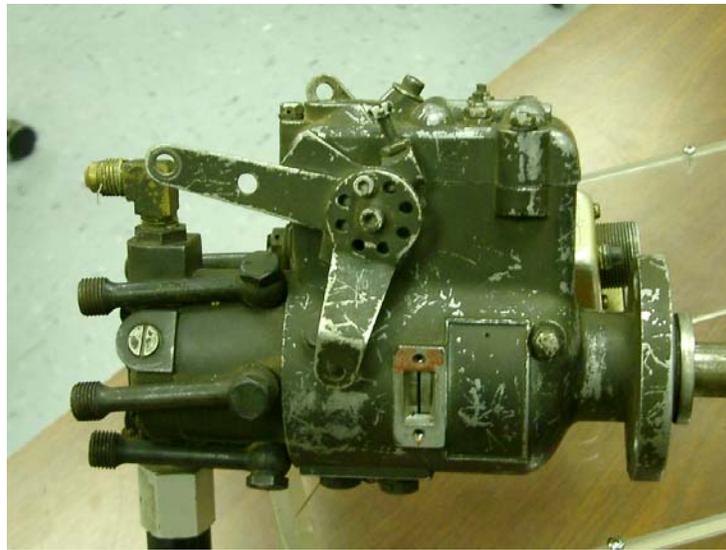


3.1. Unit injection: This system has individual injectors which times, meters, atomizes and pressurizes the fuel within the injector body or unit serving each cylinder.

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3.2. Pressure-time: In this system, the engine speed and fuel pressure controls fuel metering.



3.3. Distributor pump: This system uses a spinning rotor to distribute pressurized fuel to the individual injectors in the proper cylinder firing sequence.

4. Since troubleshooting is a step-by-step procedure, the effectiveness depends on how much you know about the equipment and how much you think while working. The ability to troubleshoot depends on your capability to think and apply knowledge. To troubleshoot effectively, you must follow a systematic procedure. First, study the symptoms of the trouble thoroughly and ask yourself these questions:

- 4.1. What were the warning signs preceding the trouble?
- 4.2. What recent repair has been done?
- 4.3. Has a similar trouble occurred before?

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4.4. Next, follow the basic troubleshooting process:

- 4.1.1. Perform an operational check.
- 4.1.2. Analyze the malfunction.
- 4.1.3. Locate the malfunction.
- 4.1.4. Perform corrective action.
- 4.1.5. Perform an operational check.

5. To perform this task, follow these steps:

NOTE:

Trainer/Certifier must provide equipment and scenario for troubleshooting diesel fuel systems in order to complete task. Use troubleshooting chart on the next page for guidelines if needed.

Step 1: Trainee is provided equipment and fuel problem scenario in which to perform task.

Step 2: Use five-step process in troubleshooting:

- 2.1. Perform an operational check.
- 2.2. Analyze the malfunction.
- 2.3. Locate the malfunction.
- 2.4. Perform corrective action.
- 2.5. Perform an operational check.

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FUEL SYSTEM TROUBLESHOOTING CHART	
MISFIRING AND ROUGH RUNNING	
POSSIBLE CAUSE	CORRECTION
Air in fuel system.	Bleed air from line.
Fuel injection timing incorrect.	Check and make necessary adjustments.
Defective fuel nozzles.	Locate misfiring injector; clean and service as required.
Fuel leakage at nozzle nut or adapter.	Tighten nut to specifications.
ERRATIC ENGINE SPEED	
POSSIBLE CAUSE	CORRECTION
Air leaks in the system.	Check for air leaks and make needed repairs.
Injection pump governor failure.	Check injection pump for damaged or broken springs or other components. Check for governor spring. Install new parts as needed and recalibrate injection pump.
DIFFICULT STARTING (CRANKSHAFT TURNS)	
POSSIBLE CAUSE	CORRECTION
Air in fuel system.	Bleed air from lines.
Water in fuel.	Test for water in fuel. Drain the fuel tank as needed to remove water. Install new fuel filter and fill tanks with clean fuel.
Low fuel pressure.	Check fuel pressure at fuel pump housing.

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**REVIEW QUESTIONS
FOR
TROUBLESHOOT DIESEL FUEL SYSTEM**

QUESTION	ANSWER
1. What is the primary job of the fuel system?	<ul style="list-style-type: none"> a. Move fuel from the fuel tank to the injectors. b. Start the engine. c. Time the engine. d. Lubricate the engine.
2. In the fuel system, where is the fuel stored?	<ul style="list-style-type: none"> a. Fuel transfer pump. b. Fuel filters. c. Fuel Injection pump. d. Fuel tank.
3. What item in the fuel system atomizes and sprays the fuel into the cylinders?	<ul style="list-style-type: none"> a. Fuel tank. b. Fuel injection nozzle. c. Fuel filters. d. Fuel transfer pump.
4. Which type of fuel injection pump fuel metering by engine speed and fuel pressure?	<ul style="list-style-type: none"> a. Unit. b. Pressure time. c. Distributor. d. Single.
5. What troubleshooting process is the most difficult?	<ul style="list-style-type: none"> a. Perform an operational check. b. Locate the malfunction. c. Analyze the malfunction. d. Perform corrective action.

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TROUBLESHOOT DIESEL FUEL SYSTEM

PERFORMANCE CHECKLIST

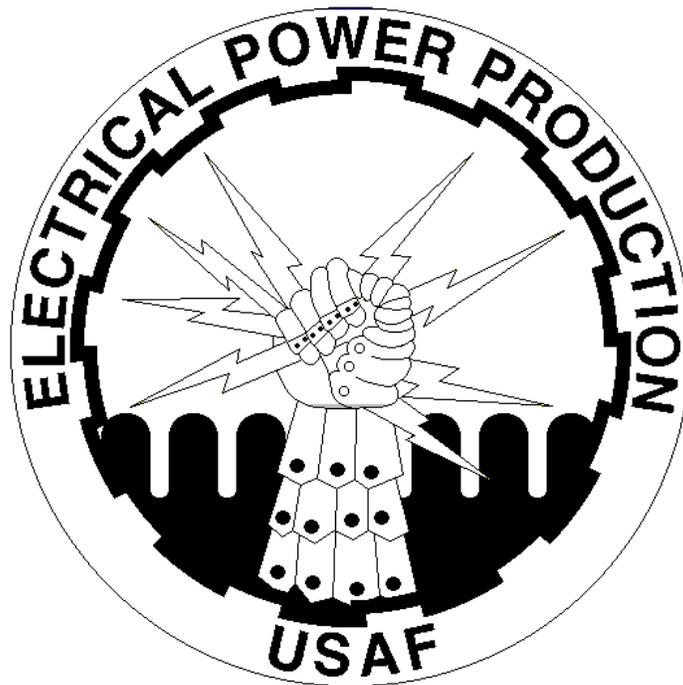
INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE....?	YES	NO
1. Have the proper equipment and scenario to perform task		
2. Perform an operational check		
3. Analyze the malfunction		
4. Locate the malfunction		
5. Perform corrective action		
6. Perform an operational check		
7. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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DIESEL FUEL SYSTEMS
REPLACE COMPONENTS

MODULE 20

AFQTP UNIT 2

FILTERS/STRAINERS (20.2.4.3.)

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REPLACE FILTERS/STRAINERS
Task Training Guide

STS Reference Number/Title:	20.2.4.3., Replace Filters/Strainers.
Training References:	<ol style="list-style-type: none"> 1. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems</i>. 2. 35C2 series Technical Order (TO). 3. Career Development Course (CDC) 3E052B, Vol. 1, Unit 4-1: <i>Fuel Systems</i>. 4. Manufacturer's manuals. 5. Air Force Occupational Safety and Health Standard (AFOSHSTD) 91-45, Hazardous Energy Control and Mishap Prevention Signs and Tags.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. AFOSHSTD 91-45 for lockout/tag out procedures. 2.2. Applicable TOs or manufacturer's manuals. 2.3. CDC 3E052B, Vol. 1, Unit 4-1. 3. Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: <i>Fuel Systems</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support CD-ROM AFQTP. 2. General toolbox. 3. Personal safety equipment. 4. Filters and Strainers. 5. Diesel Engine.
Learning Objective:	How to replace fuel filters/strainers on a diesel engine.
Samples of Behavior:	The trainee will be able to replace fuel filter/strainers on a diesel engine.
Notes:	
<ol style="list-style-type: none"> 1. To successfully complete this element, follow the steps outlined in the applicable technical order or manufacturer manual exactly—no exceptions. 2. Any safety violation is an automatic failure. 3. Prior to performing any maintenance, technician <u>MUST</u> isolate the starting system, and apply lockout and tag-out procedures. 	

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REPLACE FILTERS/STRAINERS

1. Background: In order to prevent contaminants from reaching the fuel system components, fuel filters must be changed or serviced at specific intervals. During normal operating conditions, fuel filters and strainers must be serviced according to the technical order or manufacturers manual. However, they must be serviced more frequently operating under harsh conditions. Dirt and water are two crucial elements that can render an operational unit in-op, which can lead to a unnecessary outage during a critical time. It cannot be overstressed in this AFQTP the importance of keeping the fuel system clean and free of moisture.

1.1. The quantity and size of dirt particles in a diesel system do not have to be large to cause problems. As little as .175 ounces of dirt in 25,000 gallons of diesel can cause serious fuel injection pump wear. Water is also a problem to the fuel system. Water can corrode injection system components as well as can freeze, which will prevent fuel flow. It can also turn into steam damaging the injection nozzles. Water can also can microbial infestation, in which diesel absorbs water.

1.2. Diesel fuel filters must be capable of trapping extremely small impurities. The type of filtering material will determine the size of impurities it can remove. It is necessary to filter impurities in 3 micron diameters of smaller, because this is the size of a typical fuel injector nozzle.

1.3. Two common types of filters are bolt on and spin on. These two types are common among the commercial and military style generators you will work on. Some engine systems have a primary filter along with a secondary filter. The primary filter offers low restriction to fuel flow because it is mounted on the suction side of the pump. The secondary filter is designed to prevent contaminants from entering the injectors. They are mounted on the pressure side of the injection side of the transfer pump and remove fine particles that can cause damage to the injectors.

1.4. Proper maintenance and routine inspections can prevent damage that is unnecessary.

2. Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: Fuel Systems. Upon completion of the above-mentioned CD-ROM properly replace filters/strainers a fuel system using the step-by-step procedures listed below.

NOTE:

The review questions for this material are contained in the above-mentioned CD-ROM.

3. To perform this task, follow these steps:

Step 1: Isolate the engine from starting using lockout/tag-out procedures.

1.1. Refer to AFOSHSTD 91-45.

Step 2: Replace fuel filter/strainer.

2.1. Refer to applicable TO or manufacturer manual.

Step 3: Re-configure engine for operation.

Step 4: Perform a functional test.

Step 5: Document maintenance on AF Form 719.

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REPLACE DIESEL ENGINE FILTERS/STRAINERS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE....?	YES	NO
1. Isolate the engine from starting using lockout/tag-out procedures		
2. Replace fuel filters and strainers according to T.O. or manufactures specifications		
3. Reconfigure engine for operation		
4. Perform an operational check		
5. Document maintenance on AF form 719		
6. Comply with all safety requirements		

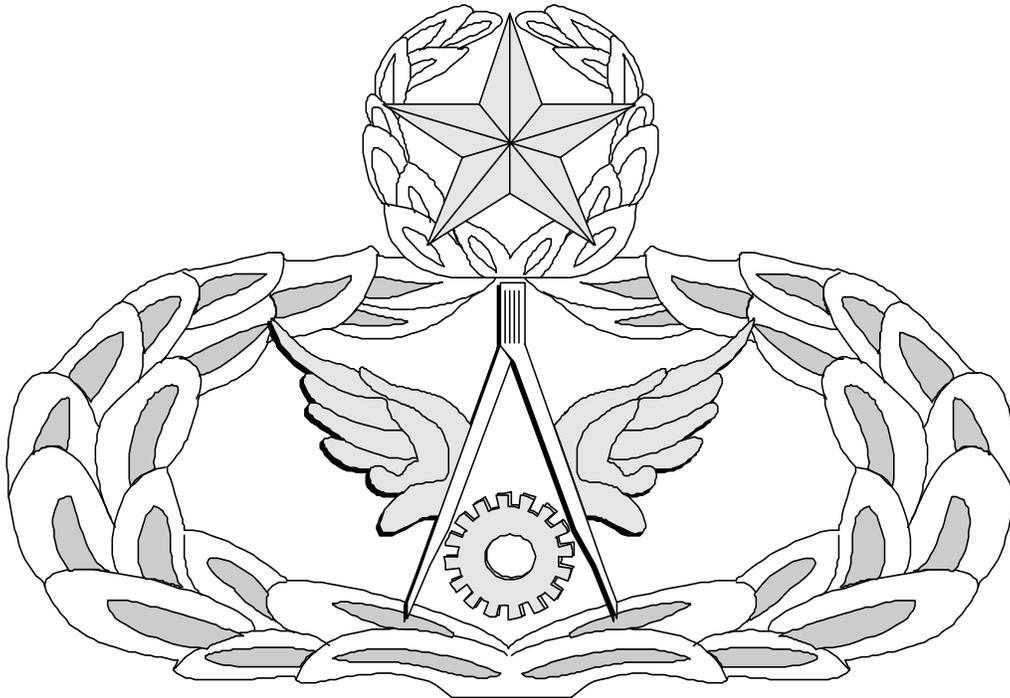
FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)

MODULE 20

FUEL SYSTEMS

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Key-1

**REPLACE GASOLINE ENGINE FILTERS/STRAINERS
(3E0X2-20.1.4.2.)**

QUESTION	ANSWER
1. What is the function of the fuel pump on gasoline engines?	b. Provides constant, pressurized fuel to the carburetor.
2. What is the function of the carburetor?	d. Mixes the air/fuel and delivers it to the combustion chamber.
3. The purpose of the filter/strainer is to trap sediment and particles from the fuel.	a. True.

**ADJUST GASOLINE CARBURETOR
(3E0X2-20.1.5.)**

QUESTION	ANSWER
1. The main purpose of a carburetor is to provide the proper air/fuel mixture?	a. True.
2. Which carburetor adjustment provides smooth idling?	c. Idle adjusting needle.
3. Which carburetor adjustment obtains the desired idling speed?	b. Throttle stop screw.
4. In a carburetor, the average air/fuel weight ratio is?	d. 15:1.
5. What maintains the fuel level in a carburetor?	d. Float.
6. What regulates the amount of air/fuel mixture entering the cylinders?	c. Throttle valve.

**TROUBLESHOOT DIESEL FUEL SYSTEM
(3E0X2-20.2.2.)**

QUESTION	ANSWER
1. What is the primary job of the fuel system?	a. Move fuel from the fuel tank to the injectors.
2. In the fuel system, where is the fuel stored?	d. Fuel tank.
3. What item in the fuel system atomizes and sprays the fuel into the cylinders?	b. Fuel injection nozzle.
4. Which type of fuel injection pump provides fuel metering by engine speed and fuel pressure?	b. Pressure time.
5. What troubleshooting process is the most difficult?	b. Locate the malfunction.

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