

Crimson Engine Study Guide

The purpose of this study guide is to prepare you for the process of becoming a Montgomery County Crimson Engine (aeCAFS) driver. This guide will list and explain the components of the check off process. It's purpose is to combine the multiple sources of information. This guide is mealy notes taken from the source list. If you do not fully understand a concept discussed in this guide it is imperative that you go to the source. The required information for the testing process is not limited to this guide.

The following is the source list for the Montgomery County Crimson Engine testing process:

- PSTA Engine Book (revised 2015)
- MFRI Pump Operators book 1 and 2
- Crimson Engine Study Guide (this book)
- Policy 24-07 AMII
- Policy 808
- FCGO 10-03
- FCGO 14-10
- General knowledge of the specific Crimson Engine that you drive
- Knowledge of the inventory on a Crimson Engine Company and how to use it
- Knowledge of the Pump and capabilities
- Knowledge of the capabilities of the hand lines on a Crimson Engine
- Knowledge of the capabilities of Montgomery County's CAFS systems
- Knowledge of proper preventative maintenance procedures
- Troubleshooting procedures

It is the candidate's responsibility to know what source the information came from.

The PAGS in the back of this book are the same sheets that your test evaluator will use in testing you.

Crimson Engine General Knowledge

-Stock number? _____(unit specific)

-GVW = 47,000 LBS

-Front axle weight = 20,000 LBS

-Rear axle weight = 27,000 LBS

-Vehicle height? _____(unit specific)

-Vehicle length? _____(unit specific)

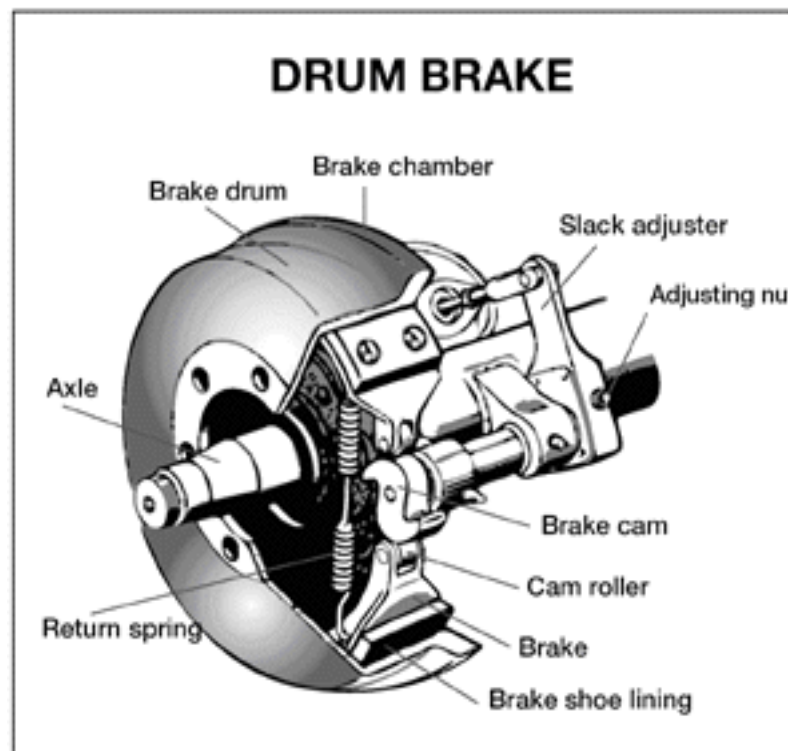
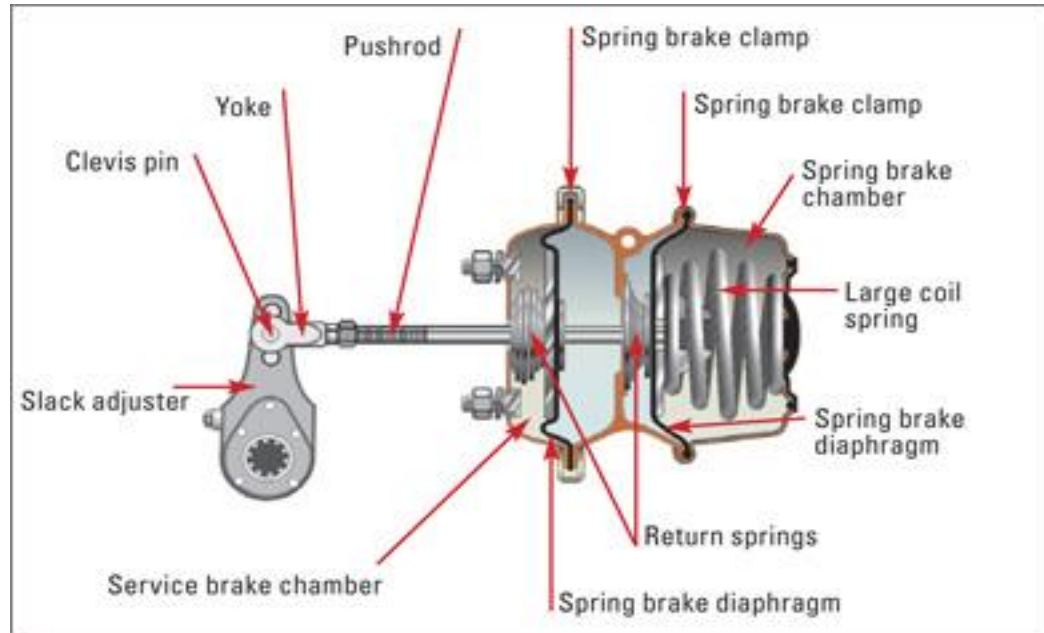
-Vehicle width? _____(unit specific)

-Tire PSI: Front = 120 PSI Rear = 120 PSI

Brakes

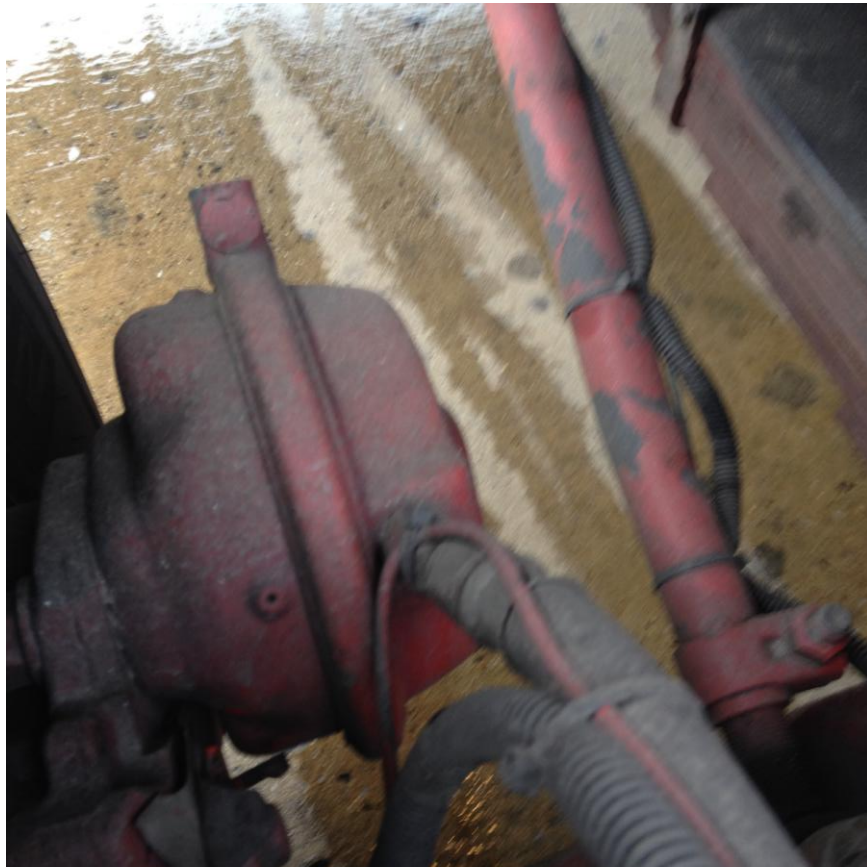
Rear Brakes

- S cam drum brakes
- must have at least 1/4" brake shoe
- dual chamber
- operate off primary air tank



Front Brakes

- disk brakes
- must have at least 1/8" pad each
- single chamber
- when indicator pin is flush, pads need to be replaced



Rotor

- No heat checks greater than half the diameter
- No heat checks that your fingernail will get stuck in
- Free of grease and debris

-spring brake: operates when the APV is pulled, uses air pressure to disengage brakes

-service brake: operates when you push on the brake pedal, uses air pressure to apply the brakes

Treadle Valve

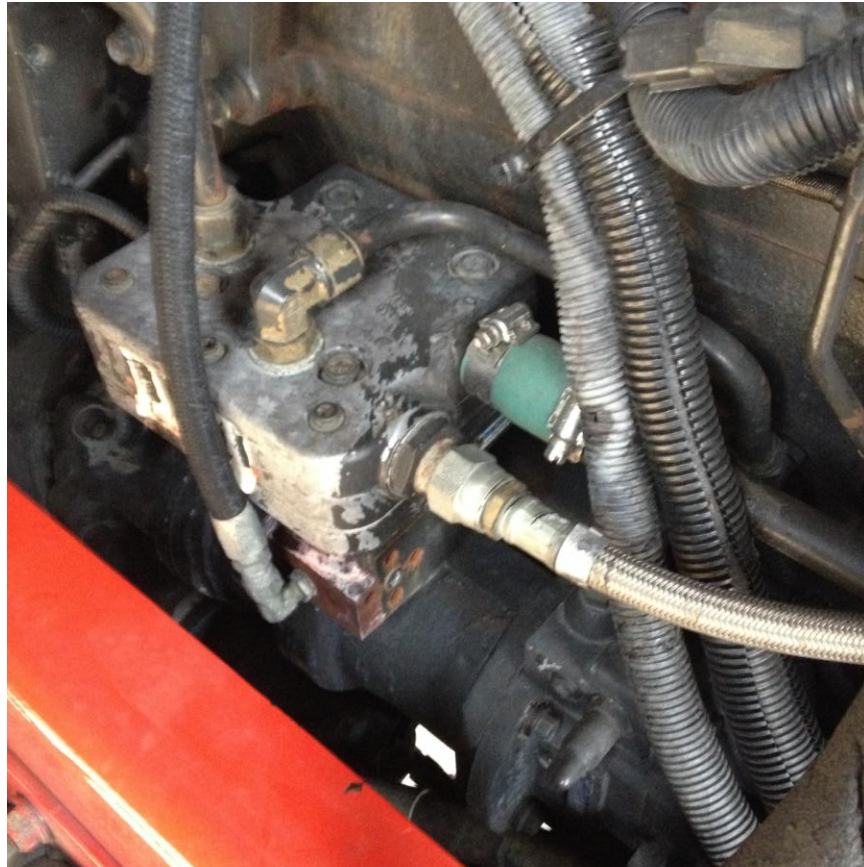
- Controls the air delivered to the brake chambers
- Located on the drivers side at the very front



It is important to recognize the continuous braking over a period of time builds up a tremendous amount of heat. This could cause glazing of the brakes that greatly reduces the braking capacity of the system and could cause brake failure.

Air Compressor

- produces air pressure for brakes and auxiliary applications
- gear driven
- the high pressure air lines are a good way to identify
- located on the drivers side of the engine



Air Dryer

-When air is compressed it heats up. This heating up causes moisture to form. After the compressed air leaves the air compressor it goes to the air dryer where most of the water is removed.

Wet Tank

-From the air dryer the compressed air goes to the Wet Tank. It is called the Wet Tank because it is the first tank back from the Air Dryer. Most of the water from the stored air will collect in this tank.

All Air Tanks

- All air tanks need to be drained of air. This is done through the pull cord. Accumulation of water in the air tanks can cause brake malfunction if it freezes. Water in the air tanks will decrease the volume of compressed air that the tanks can hold.

ABS

- Crimson Engines are equipped with ABS
- Prevents the wheels from locking
- Sensors at each wheel sense when a wheel is about to lock up and pump the brakes to that wheel.
- Allows for steering while braking
- Produces a shorter stopping distance

Jake Brake

- The Jacobs brake is a two stage engine compression brake.
- Allows new air into the cylinders and restricts air from leaving, increasing compression and a reduction of horsepower.
- Can be set to: High, Low or Off
- Turn OFF in slippery conditions
- The Jacobs brake and the Telma retarder can be used in conjunction with each other.

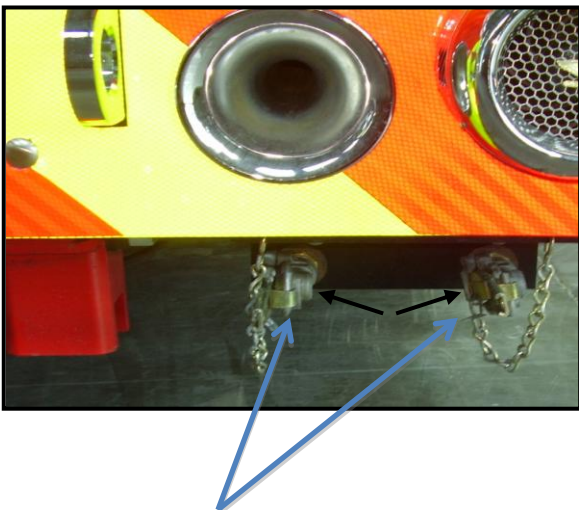
Telma

- 4 stage, frictionless, driveline retarder
- When you lift off the accelerator the first two stages of the Telma engage. As you depress the service brake the next two stages of the Telma engage.
- Turn OFF in slippery conditions



Glad Hands

-Used when the vehicle has to be towed. They allow the tow truck to run air to the brakes on the vehicle being towed.



Glad Hands

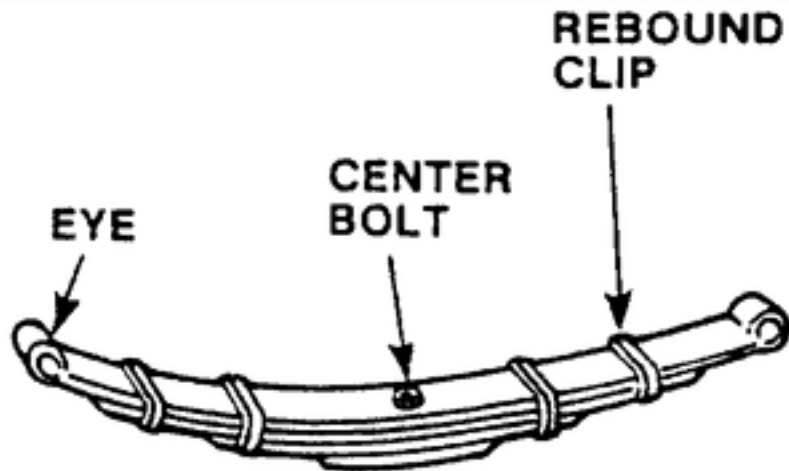
Tow Hooks

-This is where the tow truck will hook up to the Engine



Suspension

- The purpose of the suspension is to keep the wheels on the road and to support the weight of the vehicle.
- Parts of the suspension system:
 - Hydraulic Shocks
 - U bolts- attach Leaf Springs to Axle
 - Shackles- Allow for movement
 - Leaf springs- Any broken or cracked Leaf Spring on a MCFRS vehicle is OOS. If the top or bottom Leaf Spring is cracked or broken The vehicle is OOS and must be towed.



Front Hub Oil

- 85 W 140 / 1 pints
- Check using sight glass
- Do not remove plug to check, there will be oil on the rim in the form of “spin art” if there is a leak.

Rear axle oil

- 85 W 140 / 46 pints
- sealed unit

Engine oil

- 15W 40 / 39 quarts
- The dipstick and oil fill is located behind the officers side front grill.
- Should not be frothy or smell like fuel



Air Filter

- Filters the air before it goes into the engine

**Engine**

- 450 HP

Fuel Tank

- 63 gallons

Starter Motor

-The starter motor engages the motor of vehicle to get it to spin until the motor can maintain its self to keep running. Located on the drivers side of the engine (underneath.)



Radiator

-The Crimsons have a stacked radiator system. The top one cools is the Turbo air cooler. The middle one cools the engine. The bottom one is for the transmission cooler.

Antifreeze

- Extended Life / 41 quarts
- Check with site glass if hot
- Remove cap only if it is cool

Water Pump

-Pumps the coolant. The best way to find the water pump is to follow the large hose coming from the bottom of the radiator. In the picture below you can see the large hose coming from the radiator. Above the 90 degree bend is the water pump. It can be seen from underneath.



FAN

- Cools the radiator fluid when normal passing air is not sufficient.
- Have been retrofitted with clutches.

Transmission

- Fluid = TES-295 / 39 quarts
- Fluid can be checked by holding the up and down arrows in the cab or with the dipstick while engine is running and between 140-160 F.
- Can be checked with the dipstick while the cab is down through the access panel in the doghouse in front of the E5 position.
- Should be reddish in color, not smell burnt and no metal shavings.



- After the D (drive) mode has been selected and 5th gear is desired the operator must depress the mode button.

Transfer Case

Crimsons have a mid-ship split shaft pump. In this set up the fire pump is PTO driven off power delivered from the engine through the transmission, and then through the driveshaft. When you move the shifter in the cab from “road” to “pump” the Transfer Case diverts the power from the rear wheels to the fire pump. Once the transmission is the placed in “D” the pump will be turning.



Hand Throttle

-Located on the pump panel. At the end of each PAG it says to turn the throttle all way down. This is extremely important. When placing the pump in gear if the hand is not turned all the way down (clockwise) the engine will not throttle up. This can be fixed one of two ways. Either push on the foot throttle to allow the RPMs to equal out or manually turn down the hand throttle, take the pump out of gear and then place back in gear.

Pump Cooler

-Takes water from the discharge side of the pump and returns it to the tank. This allows water to be continuously circulating to cool the pump. However, this alone has proven to be insufficient in cooling the pump. Should be kept open for normal operation. Keep closed when drafting.

Engine Cooler

-When open it takes water from the pump to the engine for cooling. Keep closed for normal operation. Only open when engine temperature reaches 200 degrees F. Pictured below is where the tank water enters the upper radiator hose. This is located between the radiator and engine on the topside.



Steering System



Power Steering Pump

-Provides power for the power steering system. Located on the drivers side of the oil pan.



Steering Assist

- Located on the officers side in front of the axle



Power steering fluid :

- Dextron 3 / 5 quarts
- The power steering reservoir is located on the rear of the engine.
- This fluid can be checked with the fluid being hot or cold

Power Steering Reservoir



Fuel / Water Separator

Fuel / Water Separator

-Water in the fuel goes to the bottom of the separator and is drained out using the white plug on the bottom of the separator. This is to be done by CMF only.

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