

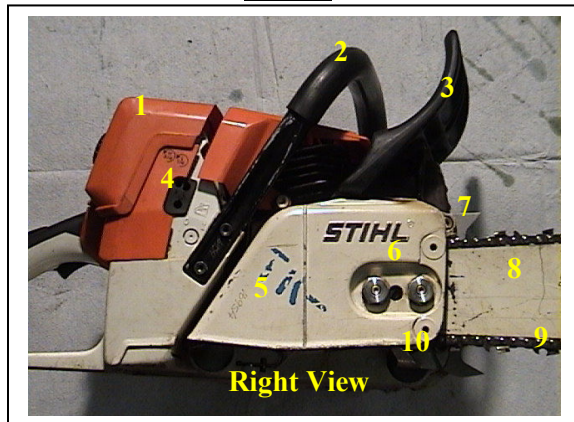


Stihl MS 440 Chainsaw: Verdugo FA Student Handout

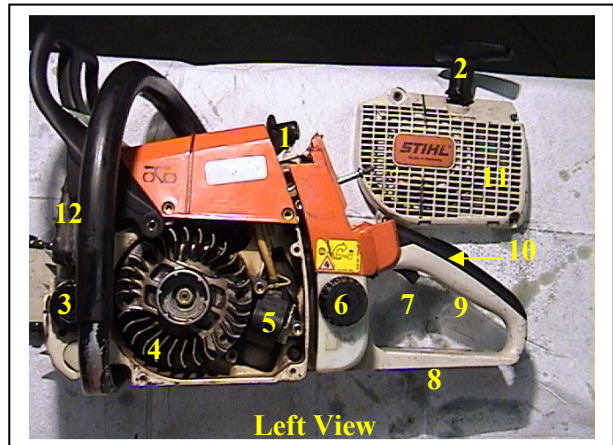
Chainsaws are assigned to all truck companies, brush crews and were needed. This tool has many applications in the Fire Service.

The Stihl "STEEL" chainsaw is considered by many firefighters as the best saw for roof ventilation. When equipped with a carbide tipped chain, it is excellent for use on everything from lightweight roofs to older roofs with heavy construction and many layers of composition. Unlike the rotary saw, the chain saw in the hands of an experienced operator can be used to "feel" the structural members-beneath the roof decking, even though the rate of cutting speed is great. The operator can safely work without random damage to rafters or joists. This equates to greater safety for the operator and the remainder of the ventilation team. Due to its lightweight, the saw is good for use from roof ladders and in places that the heavier rotary saw wouldn't be safe. Cuts can be made from perpendicular to the roof decking to 45° from the perpendicular without bind or stall.

PARTS



1. **Carburetor Box Cover** → Houses the air filter assembly.
2. **Front Handle** → Handle bar for the left hand at front of saw.
3. **Front Hand Guard** → Provides protection against projecting branches and helps prevent the left hand from touching the chain if it slips off the handle bar.
4. **Carburetor Control Adjustment** → Controls the H-high speed jet, L-low speed jet and the LA-low idle jet. One full turnout from bottom for quick adjustment. Electronic Tachometer for accuracy.
5. **Chain Sprocket Cover** → Covers the clutch and the sprocket.
6. **Side Access Chain Tensioner** → Allows saw oilomatic chain to be adjusted through the sprocket cover.
7. **Bumper Spike** → Toothed stop for holding saw steady against wood.
8. **Guide Bar** → Supports and guides the saw chain.
9. **Oilomatic Saw Chain** → A loop consisting of cutters, tie straps and drive links.
10. **Chain Catcher** → Helps to reduce the risk of operator contact by a chain when it breaks or comes off the bar.



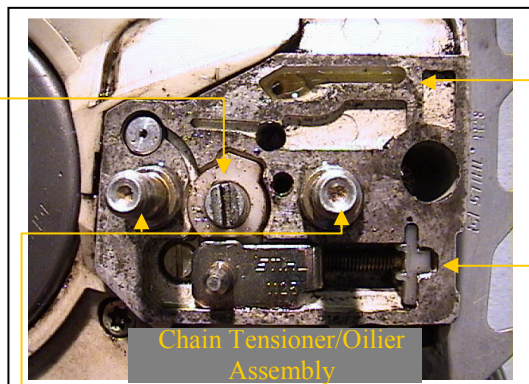
1. **Spark Plug Boot** → Connects the spark plug with the ignition wire.
2. **Starter Grip** → The grip of the starter, for starting the engine.
3. **Oil Filler Cap** → For closing the oil tank.
4. **Flywheel** → Consist of opposing magnetos, which create the electrical charge for combustion and tines which blow air up and through the cooling fins of the cylinder head to cool the motor during operation.
5. **Magneto** → Stationary magnet that carries the electrical charge (40K volts) to the spark plug via the ignition wire.
6. **Fuel Filler Cap** → For closing the fuel tank.
7. **Throttle Trigger** → Controls the speed of the engine.
8. **Rear Hand Guard** → Gives added protection to operator's right hand.
9. **Rear Handle** → The support handle for the right hand located at or toward the rear of the saw.
10. **Throttle Trigger Interlock** → Must be depressed before the throttle trigger can be activated.
11. **Flywheel Cover** → Houses the spring-loaded pawls that lock into the flywheel and covers the flywheel and magnetos.
12. **Muffler** → Reduces engine exhaust noise and directs the exhaust gases.

- (FACTOID; that the Stihl 440 Chainsaw can reach speeds of up to 45mph/20m.s.)
- (FACTOID; Prolonged use of chainsaws or other types of tools that expose the operator to vibrations may produce whitefinger disease (Raynaud's phenomenon) or carpal tunnel syndrome)
- (FACTOID; During probation you will be expected to know all of the information listed on this sheet and more.)



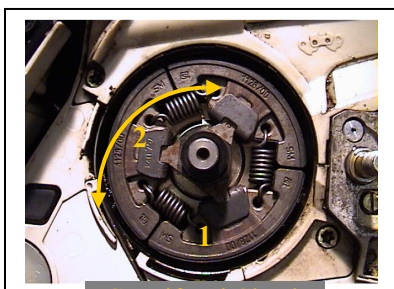
Stihl MS 440 Chainsaw

14,000 RPM; Oilomatic Chain Oilier; .68 Pints Oil; 1.69 Pints Fuel (50:1 Premix); 13 lbs;
5.2 hp 72cc 2 Stroke Engine; 20" Sprocketed Guide Gar; 3/8" P&G

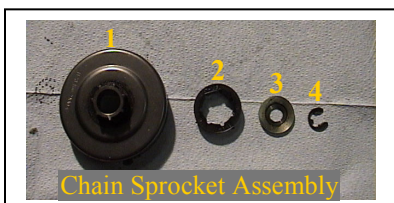


Chain Tensioner/Oiler Assembly

1. **Side Chain Tensioner Screw** → Permits precise adjustment of chain tension. (NOTE: On Stihl 038 Magnums, the CTS is on the front).
2. **Side Chain Tensioner Device** → Actual device that moves the guide bar.
3. **Bolts** → Along with hexagonal nuts that secure the chain sprocket cover along with the guide bar and oilomatic chain to the unit.
4. **Bar Oilier** → Supplies oilomatic chain with sufficient amounts of oil during operation.



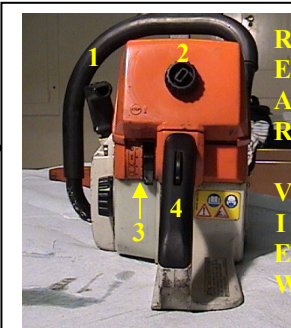
Centrifugal Clutch



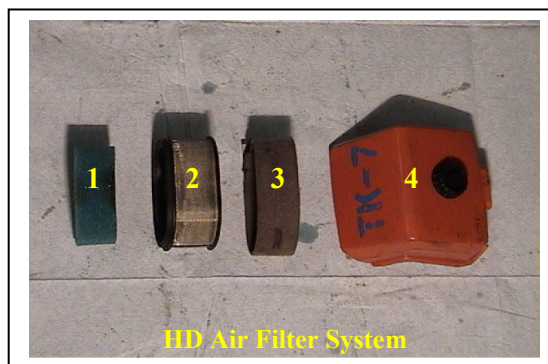
Chain Sprocket Assembly

1. **Centrifugal Clutch** → Engages when centrifugal forces overcome the (1) spring-loaded shoes at 3300rpm, which grabs the clutch drum, which drives the chain sprocket (rim type) and turns the oilomatic chain. (2) Houses chain brake system too.
2. **Chain Sprocket Assembly** → Consists of (1) clutch drum, (2) chain sprocket, (3) washer, and (4) e-clip (NOTE: Chain Sprockets come in two types; Rim & Spur)

1. **Front Handle** → Handle for the left hand at saw.
2. **Twist Lock** → Lock for carburetor box cover.
3. **Master Control Lever** → Lever for choke control, throttle, run and stop switch positions.
4. **Rear Handle** → The support handle for the right hand located at or toward the rear of the saw.



REAR VIEW



HD Air Filter System

1. **Spit Back Protector Element** → Sponge insert that prevents carburetor from saturating HD Filter. Cleaned with mild soap and warm water then dried. No need for diesel.
2. **Heavy Duty Filter** → Main filter for the unit, cleaned the same as the SBPE. 140 Micron rating.
3. **Pre-Filter Element** → Outer most filter, cleaned with soap & warm water then dried, no need for diesel.
4. **Carburetor Box Cover** → Houses the air filters and is the inlet into the carburetor.

- (FACTOID; Formula for Chain Speed Calculation:
 - Take chain pitch and multiply x two.
 - Multiply above number by number of teeth on sprocket of saw.
 - Multiply that number by saw RPM.
 - The number you get will be chain speed in inches per minute. To convert to feet divide by 12. To convert to feet per second divide by 720.
 - Example: 3/8 chain, with 7-tooth sprocket.
 - $3/8 \times 2 = 3/4$ or 0.75
 - 0.75×7 (number of teeth on sprocket) = 5.25.
 - $5.25 \times 14,000$ (saw RPM) = 73,500 inches per minute.
 - 73,500 divided by 12 = 6125 feet per minute,
 - 73,500 divided by 720 = 102.08 feet per second.

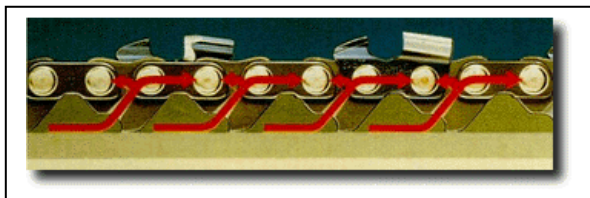


Stihl MS 440 Chainsaw

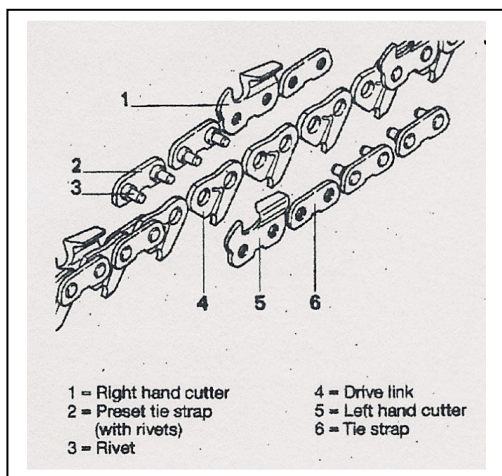
Probationary question?

1. What is the clear looking cap beneath the Oil Filler Cap?

OILOMATIC SAW CHAINS



- **Oilomatic Chain Lubrication System** → Lubrication System is an exclusive selling feature found on all Stihl saw chains. The system features a specialty-engineered groove through which oil is channeled to critical wear areas. The groove picks up oil and channels it directly to the chain rivets. This lengthens chain life, since the rivets serve as bearings to the saw chain.



Three types of Chains:

1. **Carbide Tipped** → The standard chain used by the GASFA. It is known as the "Rapid Duro". Life expectancy is 10x longer than conventional chains. Work by chipping the wood out.
2. **Bullet Chain** → Operates on the filing principal. It is less efficient and more costly.
3. **Standard Chain** → Also known as "Rapid Micro". Used for training only.

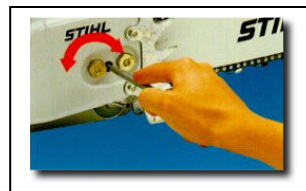


CRITERIA FOR REMOVING CHAIN FROM SERVICE

1. 3 or more damaged teeth in a row
2. 6 or more damaged teeth total
3. Cracked/broken tie straps

CHAIN TENSIONING

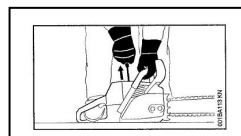
1. Disengage chain brake
2. Drag top of chain freely across bar with rag or glove
3. Grasp bottom of chain pulling down exposing the bottom of one (1) complete drive link.



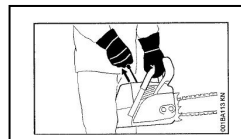
CHAINSAW STARTING PROCEDURES

1. Shake saw to mix fuel and oil
2. Engage manual chain brake (hand guard forward)
3. Depress throttle trigger interlock
4. Place master control lever in the cold start position. (Note: if saw has been running use warm start position)
5. Use one of three methods to pull starter cord until engine starts to fire or coughs

a. Ground Method



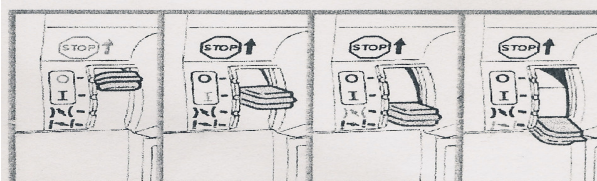
b. Between the Knee's



c. Drop Method (Not recommended by the manufacturer), most commonly used in the Fire Service

6. Move starting lever to WARM START position, continue pulling rope until engine starts
7. When engine starts, release throttle lock immediately

Positions of Master Control lever:
 (O) = Stop
 (I) = Run
 (W) = Warm start (saws without automatic choke*)
 (C) = Cold start (saws without automatic choke*)





Stihl MS 440 Chainsaw

Probation questions?

2. What does the Green and Yellow Sticker on the Saws Front Hand Guard Stand mean?

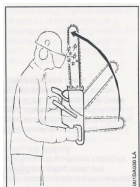
TWO METHODS OF CHAIN BRAKE

ENGAGEMENT

1. **Manually** → Quickstop engaged physically, either by accident or purposefully, would stop the chain.
2. **Inertia (Reactive Forces)** → Where the saw moves with enough force to engage the Quickstop without physical contact.

REACTIVE FORCES

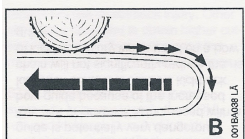
1. **Kickback** → May occur when the upper quadrant of the bar nose is pinched unexpectedly, unintentionally contacts solid material in the wood or is incorrectly used to begin a plunge or boring cut. When a kickback occurs, the guide bar may rotate around the front handle.



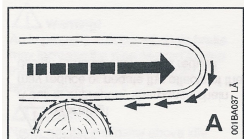
Kickback

- a. The Quickstop will engage if there is enough inertial force acting upon it without physical contact, or
- b. If the cutting position is such that the operator's left hand is gripping the front handle behind the hand guard, and if the left hand rotates around the front handle and makes a sufficiently forceful contact with the front hand guard, which is the Quickstop activating lever, this contact will activate the Quickstop manually.

2. **Pushback** → Occurs when the chain on the top of the bar is suddenly stopped when it is pinched, caught or encounters a foreign object in the wood. The reaction of the chain drives the saw straight back toward the operator and may cause loss of saw control. Pushback frequently occurs when the top of the bar is used for cutting.
3. **Pull-ins** → Occurs when the chain on the bottom of the bar is suddenly stopped when it is pinched, caught or encounters a foreign object in the wood. The reaction of the chain pulls the saw forward and may cause the operator to lose control. Typically occurs when the saw is not engaged at full throttle when entering a cut.



Pushback



Pull-in

DISENGAGE CHAIN BRAKE MANUALLY

1. Set tip of saw on ground, finger off trigger, release chain brake with free hand, or:
2. Hold saw with both hands, finger off throttle, release chain brake with fingers by pulling hand guard back
3. Demonstrate method to check automatic oiler

SHUT -OFF PROCEDURE

1. Bring saw to idle
2. Engage chain brake
3. Move starting lever to STOP position

RETURN SAW TO APPARATUS

1. Refill saw with fuel & oil
2. Lock throttle in open position
3. Move master control lever to COLD START position

MAINTENANCE & CLEANING

1. Check fluid levels daily
2. Inspect saw for loose or damaged areas
3. Start motors every Monday
4. Clean after every use
5. Change out parts as needed

TROUBLE SHOOTING

1. **Saw not starting** →
 - a. Make sure saw is in the proper starting position.
 - b. If flooded, take out of choke position. Pull starter.
 - c. Check your atmosphere. (Smoke)
 - d. Spark plug fouled. (Black carbon)
 - e. Pre-mix could be bad
 - f. Air filter clogged.
2. **Saw starts and stops** →
 - a. Clogged or dirty air filter
 - b. Carburetor jets out of adjustment.
3. **Saw chain turns at idle** →
 - a. Clutch out of adjustment
 - b. LA- low idle adjustment to high.
4. **Dark exhaust** →
 - a. Too much pre-mix in gas.

- (FACTOID: Bioplus oil, another form of bar oil, is made with a vegetable oil base. This means that the oil is less harmful to humans, animals, microorganisms and plants. The oil also offers excellent flow characteristics at low temperatures and has a high flash point. Rated by the Coordinating European Council to be 93.8% biodegradable in only 21 days.

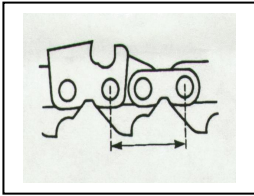


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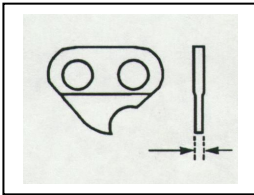


Probationary Question?

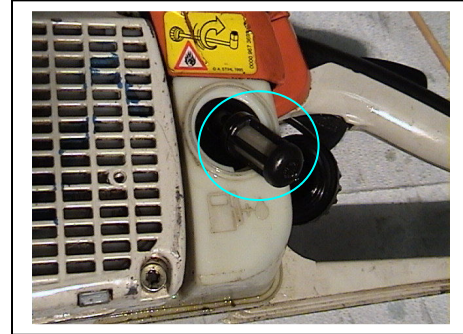
3. What and/or where is the gun sight on the saw?



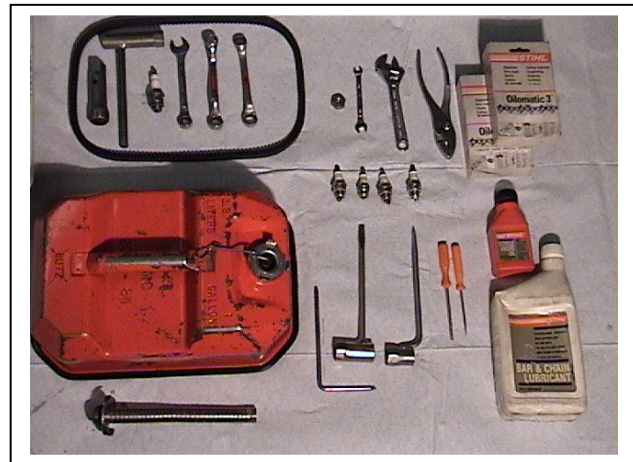
(FACTOID: How to Measure Chain Pitch. The PITCH of a chain refers to the distance between its drive links. It is determined by measuring the distance between any three drive links and divided by two. Example: 3/4" divided by 2 = 3/8". Sometimes pitch is expressed as a fraction: 3/8" and sometimes it is expressed as a decimal: .404". The pitch of the chain, the pitch of the drive sprocket, and the pitch of the bar tip must all match. The measurement itself is a factor that describes the size of the chassis of the chain. Usually a larger pitch indicates a heavier and bigger chain. The most common used by professionals in our market is 3/8". It offers good flexibility, low weight, adequate strength, and good cutting speed when run on today's high RPM pro saws.)



(FACTOID: Why Chain Gauge Is Important! The gauge of a chain refers to the thickness of its drive links. It is determined by measuring the portion of the drive link that fits into the groove of the guide bar. It is usually expressed in thousandths of an inch: .050" or .063". The gauge of the chain and the groove in the bar must match. Gauge is also a factor that influences chain strength. Thicker drive links are usually stronger. But before you call to buy heavy gauge chain, consider that gauge also affects the weight of the chain. Weight affects performance, and to maximize cutting speed, weight should be kept to a minimum. Like most things in life, there are compromises. Pro saw chain is no different. The rule usually is: Run the lightest gauge chain that stays together and gives you decent service life.



(FACTOID: Did you know that the filter within the fuel tank is called a CAPILLARY FILTER. It's designed to absorb fuel and moisture and keep the saw running. This means that the filter doesn't have to be submerged in fuel completely to keep the saw running. It is an all position diaphragm.)



Shown is a full compliment of tools for the K12 Partner Saw & Stihl 440 Chain Saw carried in the United States Marine Corp (USMC) BLITZ can. The top portion of the can carries 1gal of pre-mix. The military carries the USMC BLITZ can in Hummers. Besides having a few tools within, they also carry an M9 Pistol for those sticky situations they need to get out of.