



Colorado Convention Center

Denver, CO | February 5 – 8



Chain Saw Maintenance Operation & Safety

Tyler Windsor & Casey Kralovetz

Chain Saw Maintenance, Operation, and Safety

CONFIDENTIAL

STIHL®

Training Course Topics

- PPE
- Chainsaw Features/Anatomy
- General Inspection
- Fuel/Oil Mix
- Bar Oil
- MotoMix®
- Proper Starting
- Un-Flooding
- Air Filter Maintenance
- Spark Screen Maintenance
- Chain and Guide Bar Maintenance
- Field Service Items
- Sprocket Wear
- Spark Plug Maintenance
- Cylinder Cooling Fins
- Clutch Life

Pleaser refer to the Owners Manual of
Your specific product for further instruction and detail

Personal Protective Equipment (PPE)



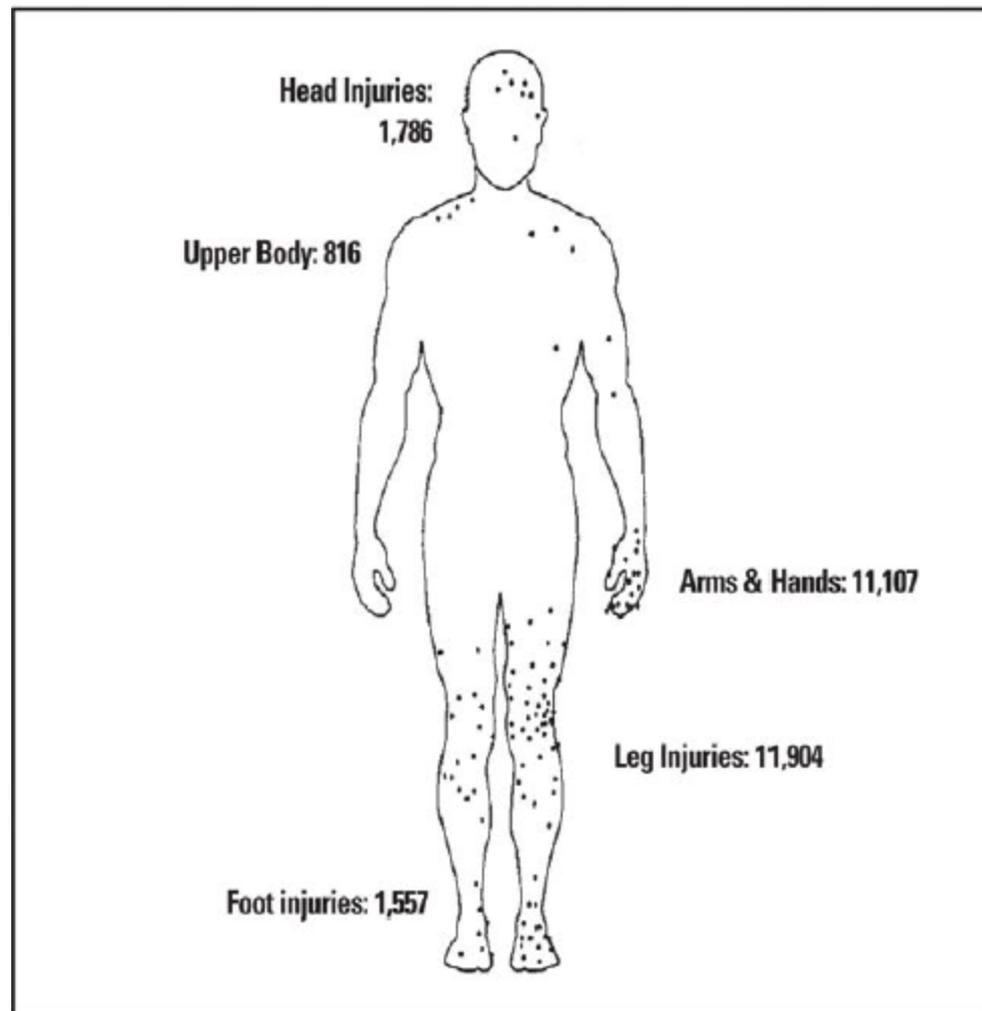
PPE



Chain Saw Accident Location

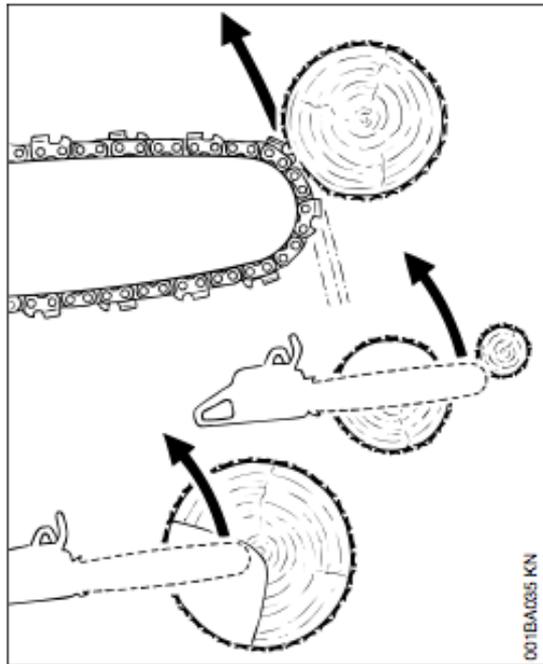
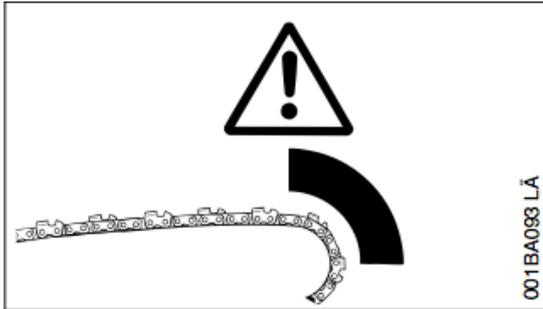
Accident location and frequency as related to chain saw use. Total for 2008: 27,170

Notice the amount of Left sided injuries!

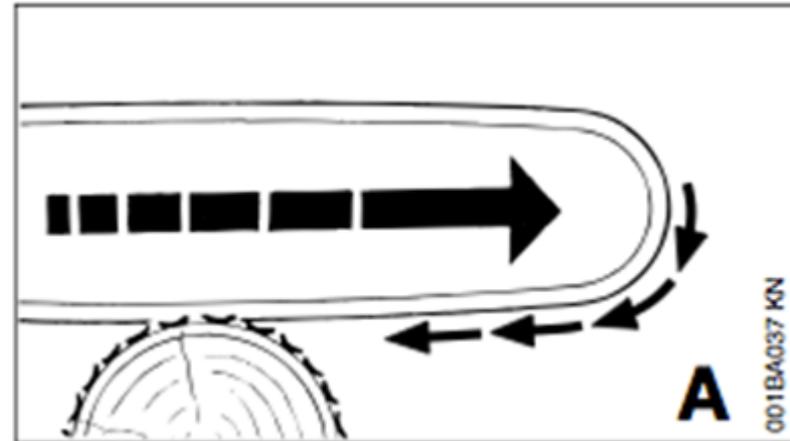


Chain Saw Reactive Forces

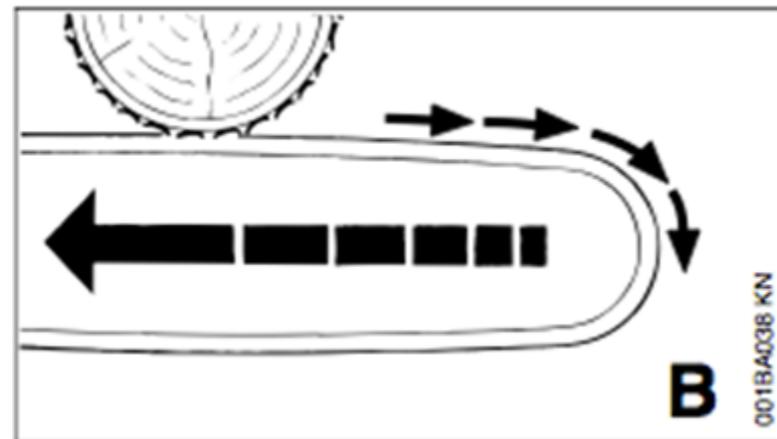
Kickback



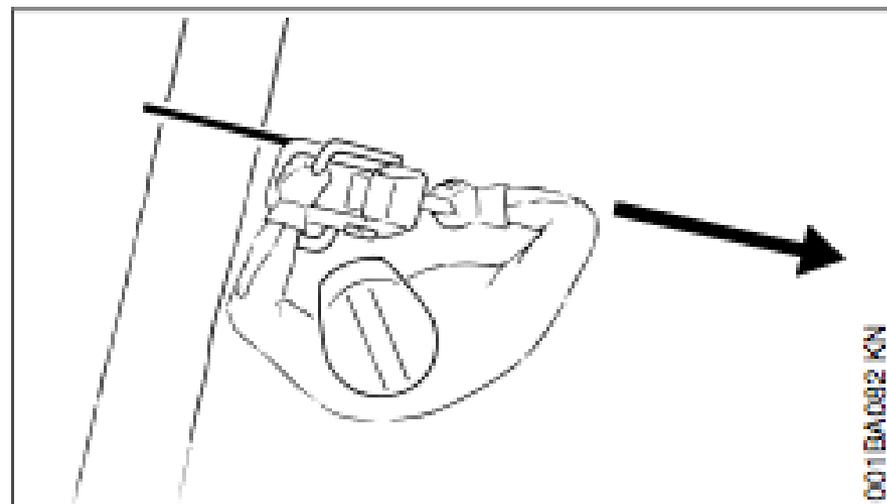
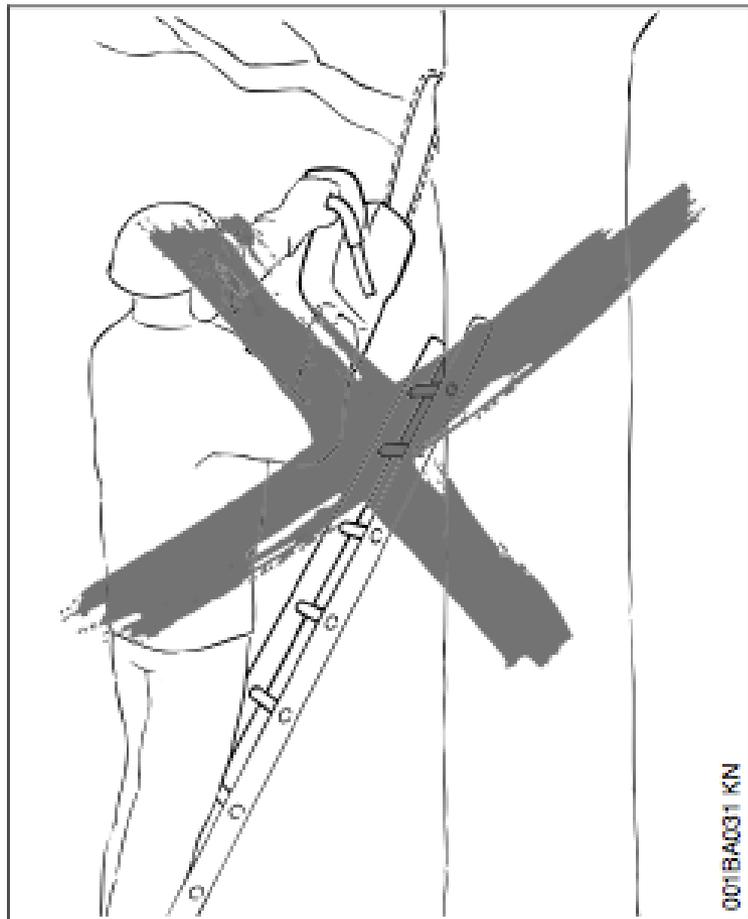
Pull-in



Pushback



Unsafe Use



Why do we wear chaps?

confidential

- At full speed the chain is traveling nearly 60 MPH!
- Over 1000 cutters pass a given point every second



Why do we wear chaps?

- A \$150 pair of chaps is thousands of dollars cheaper than an expensive surgery.



Protective Chaps Video

STIHL[®]



Chain Saw Features/Anatomy



- Anti-vibration system
- Front and Rear Hand Guards
- Chain brake
- Throttle Trigger Interlock
- Master Control Lever
- Chain adjustment
- Chain catcher
- Bumper spikes
- Fuel mix and bar and chain reservoirs
- Decompression valve
- Fuel pump bulb
- Felling sights

Chain Brake System

- A stopping system designed to reduce the risk of injury in certain kickback situations.



WARNING: NO CHAIN BRAKE ELIMINATES ALL RISK OF KICKBACK INJURY

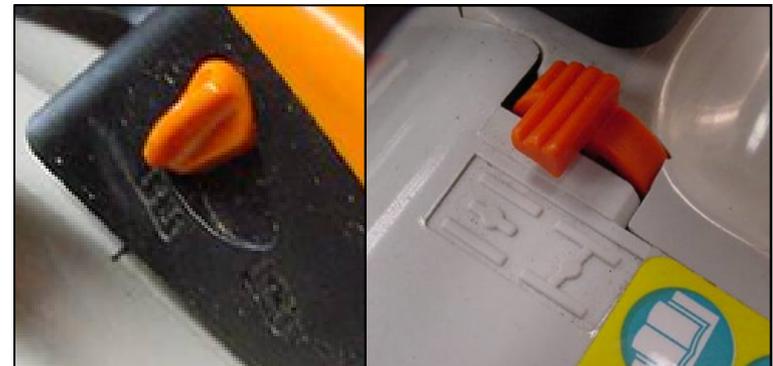
Chain Saw Controls

- **Master Control Lever™**
 - A single lever operating the choke, throttle lock and stop switch.
- **Choke Lever**
 - Some models have a separate manually operated choke lever.

Master Control Lever™



Choke Lever

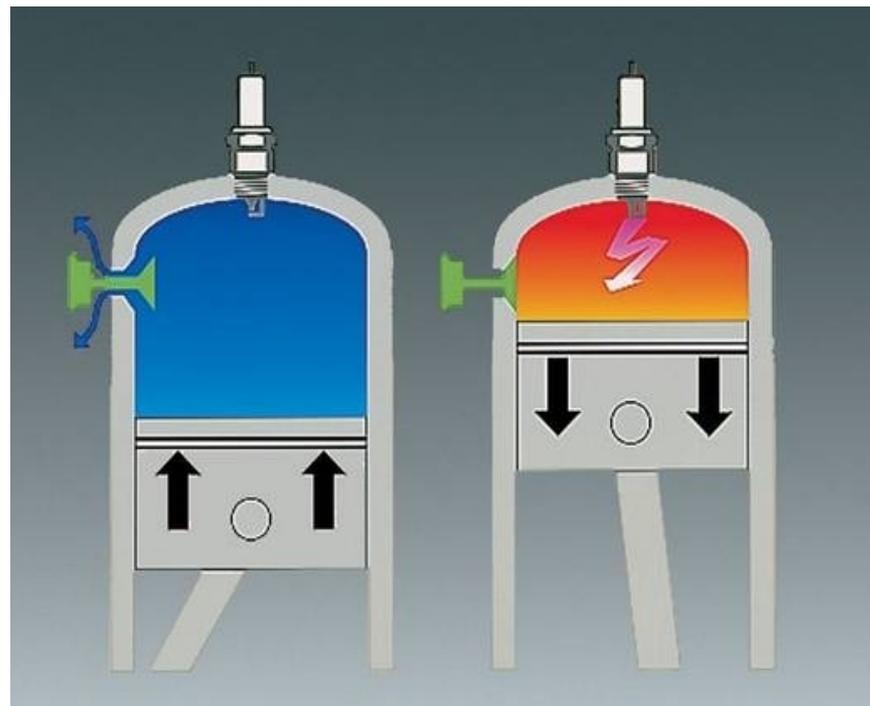


For more detailed information, refer to the model-specific Instruction Manual

Chain Catcher



Decompression Valve



General Maintenance

- Loose or missing fasteners
- Tension and sharpness of chain
- Condition of AV system
- Look of wood chips (or saw dust) present on chain
- Fuel tank and oil tank full or empty
- Compression test
- Condition of shroud
- Condition of starter rope
- Uncleanliness (full of pitch, clogged with saw dust, rewind starter cover blocked off)

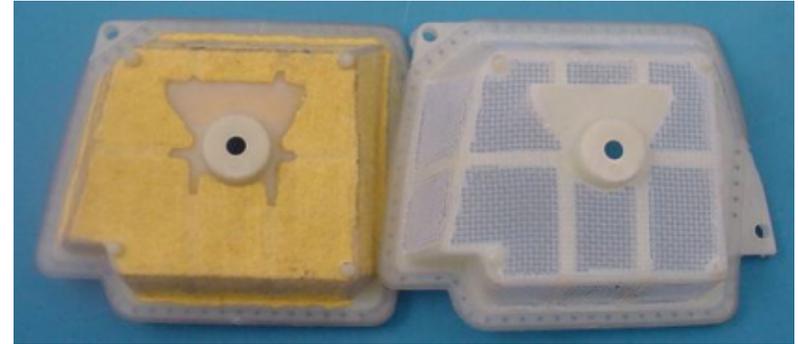


Starter Cover & Rope



Air Filter Maintenance

- There should be no dirt on the clean side of the filter
- The filter should not be damaged



- The filter on the left is for dry dusty cutting conditions and is standard for saws shipped in the U.S.
- The open mesh filter on the right is optional for cold wet cutting conditions; it is standard for Arctic model saws

Air Filter Maintenance

- How often should I clean my filter?
- What should I use to clean my filter?
- What should I NOT use to clean my filter?

Spark Plug Types

Confidential

- Does the machine have the right spark plug in it?
 - Bosch WSR6F
 - Bosch USR6F
 - NGK CMR6H
 - Bosch USR4AC
- Spark plugs should be replaced annually or every 100 hours
- Resistor style spark plugs should be used in all current model STIHL products.



Spark Plug Types: Correct Heat Range?

- The consequences of using the wrong heat range spark plug can cause catastrophic engine damage



- Normal color, normal electrode wear due to high run time
- Plug has served its useful life



- Heavy carbon build-up and oil fouled
- Mix ratio incorrect



- Normal color and wear
- Carbon buildup due to high run time
- Plug has served its useful life



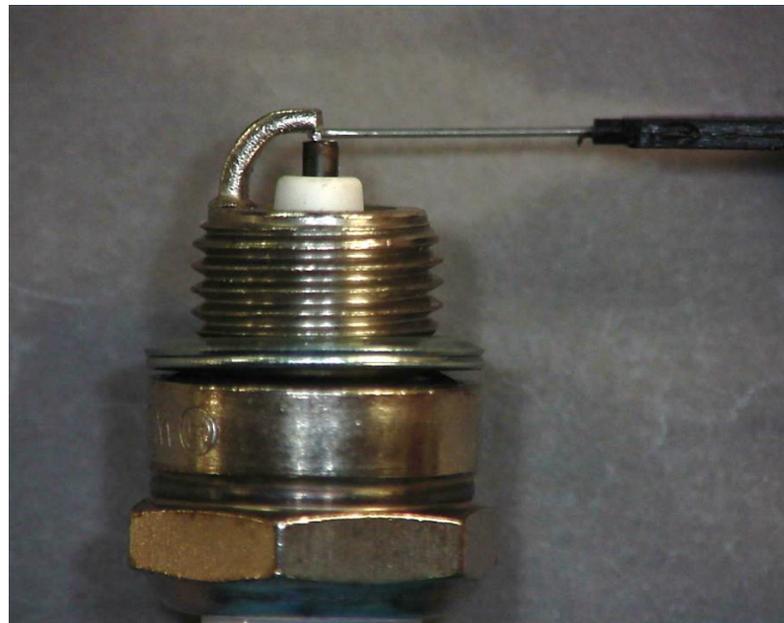
- Black, sooty appearance
- Caused by rich fuel/air mixture



Spark Plug Types: Gapping

Confidential

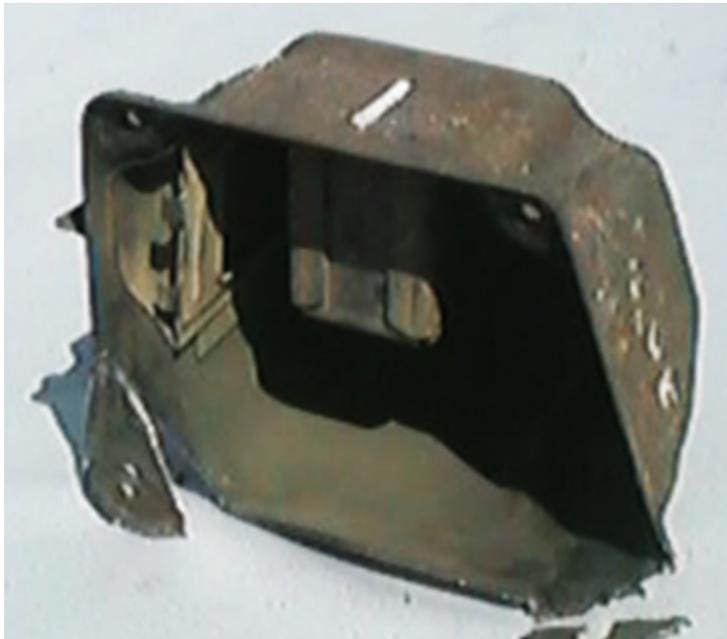
- The spark plug gap for all STIHL products is 0.50mm (.020")
- All spark plugs supplied by STIHL are pre-gapped to factory specifications
- Checking and adjusting the spark plug can easily be performed with a spark plug gap wire gauge tool



Spark Screen Inspection

Confidential

- Check for any physical damage to the muffler, then remove the spark arrestor screen and be sure it is not blocked with carbon deposits or missing



Cooling Fins on Cylinder



Fuel Filter Inspection

- A tool that can also be used to grab rope.
- Pick-up hose hook (especially if wearing gloves!)
 - Used to hook the fuel line and filter out of the tank for inspection without damaging it on models with a long fuel line



Fuel Filter Replacement Steps

Confidential

- Hook tool can also be used to remove fuel filter
- Remove the fuel filter and inspect it for damage and contamination once a year.



■ Replace

■ Okay

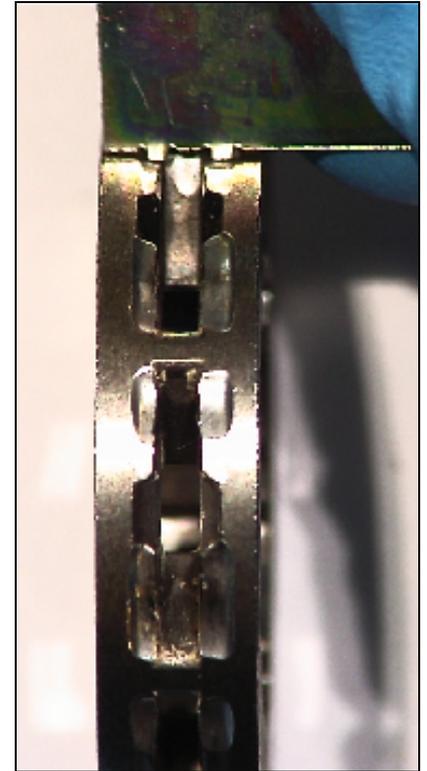
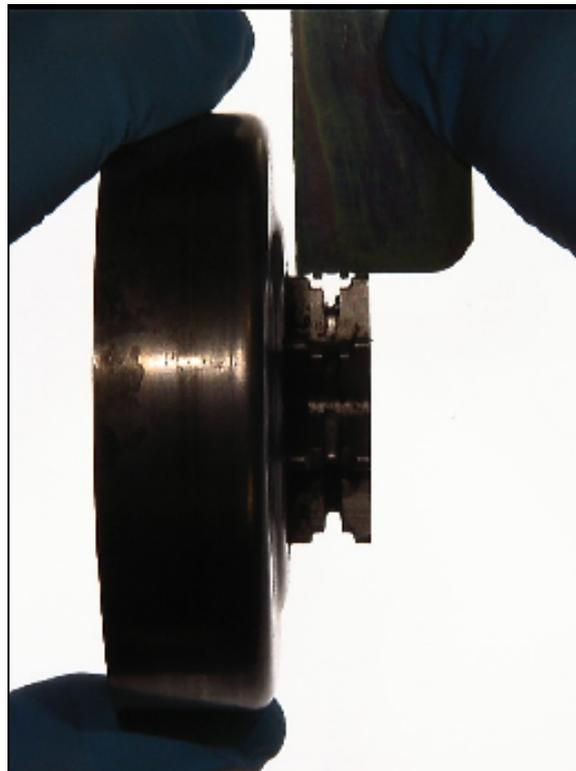
■ New



■ Replace

Chain Sprocket Wear

- Sprocket checking gauge
 - Measures the wear on spur and rim sprockets
 - Sprockets that have exceeded a wear limit of 0.5mm (.020") should be replaced



Chain Sprocket Wear

- Pre-mature sprocket wear due to chain brake



Clutch Life



Saw Chain Installation

Confidential

- Be sure the chain is installed with the cutters forward in the correct direction!
- Saw chain has indicator arrows on the tie straps

Correct Forward Chain Tooth Direction



Incorrect Chain Tooth Direction

Saw Chain Tension



Saw Chain Tension

Correct



Incorrect



Chain Wear

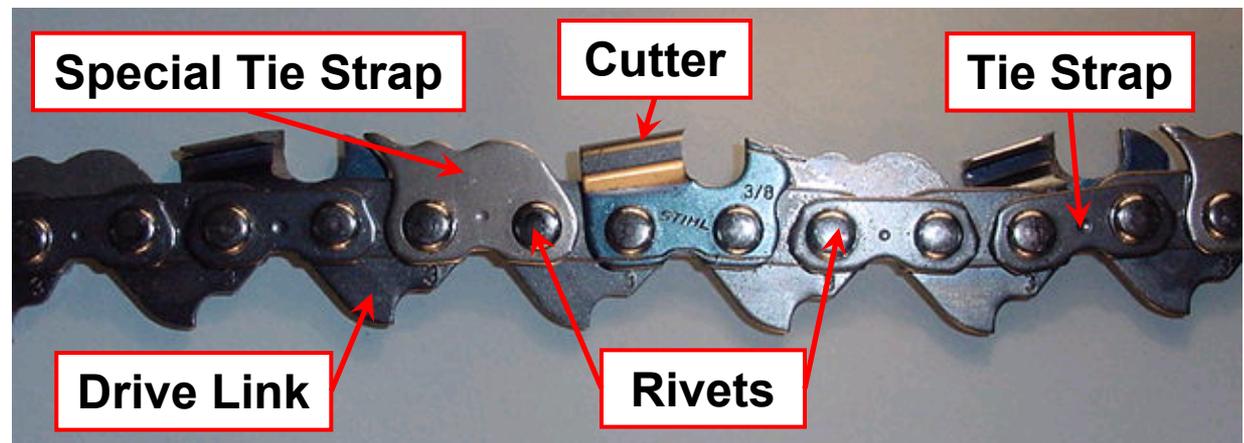
- Incorrect chain tension
 - Bar and sprocket tip will be severely worn
 - Bottom of the chain will be worn and flared out



Bar and Chain Identification

Confidential

- Green marked products are designed to reduce the risk of kickback injury and to comply with the ANSI B175.1 kickback standard.
- Yellow marked products indicate increased risk of kickback injury and are for use only by persons with extraordinary cutting needs and experience and specialized training for dealing with kickback.



STIHL Saw Chain Marketing Number

Pitch	Gauge	Cutter Type	Cutter Shape	Special	Special
6	1	P	M	M	3
3/8" PICCO	.043"	STIHL PICCO™	Micro™	Mini	Single-Humped Drive Link

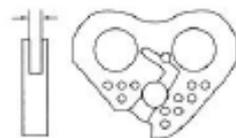
Marked on cutter

Marked on drive link



$$p = \frac{a}{2}$$

- 1 = 1/4"
- 2 = .325"
- 3 = 3/8"
- 4 = .404"
- 6 = 3/8" PICCO
- 7 = 1/4" PICCO



- 1 = .043" (1.1 mm)
- 3 = .050" (1.3 mm)
- 5 = .058" (1.5 mm)
- 6 = .063" (1.6 mm)
- 0 = .080" (2.0 mm)

- R = STIHL RAPID™
- P = STIHL PICCO™

- S = Super (Full Chisel)
- M = Micro™ (Semi Chisel)
- D = Duro (Carbide Tip)



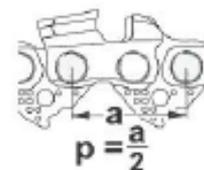
2 = Triple Humped Tie Strap

- 3 = Single-Humped Drive Link
- F = Full Skip
- H = Semi Skip (Half-Skip) or Harvester (i.e. on .404" RMH)
- K = Klassic Cutter Design
- L = Square Ground
- M = Mini
- R = Rescue (RDR chain, especially designed for MS 460 R STIHL Rescue and MS 461 R STIHL Rescue)
- S = Special

Number of drive links in Reels

Type	100 Ft. Reel
1/4", 1/4" PICCO	2400
.325"	1840
3/8"	1640
3/8" PICCO	1640
.404"	1480

Color Code for various Saw Chain Pitches



1/4", 1/4" PICCO	—
.325"	
3/8"	
3/8" PICCO	
.404"	

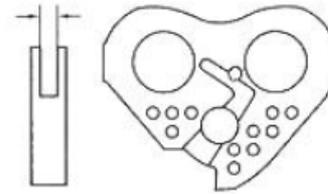
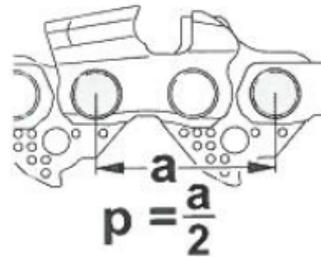
Pitch, Gauge, and Driver Count

- Pitch **MUST** match
 - Saw Chain
 - Guide Bar
 - Sprocket on Powerhead
- Gauge **MUST** match
 - Saw Chain
 - Guide Bar
- Driver Count **MUST** match
 - Saw Chain
 - Guide Bar

Chain Pitch and Gauge Designation

Marked on cutter

Marked on drive link



- 1 = 1/4"
- 2 = .325"
- 3 = 3/8"
- 4 = .404"
- 6 = 3/8" PICCO
- 7 = 1/4" PICCO

- 1 = .043" (1.1 mm)
- 3 = .050" (1.3 mm)
- 5 = .058" (1.5 mm)
- 6 = .063" (1.6 mm)
- 0 = .080" (2.0 mm)



Saw Chain Sharpening

■ Safety First!

- Always wear suitable work gloves and safety glasses when handling the bar & chain

■ Service Intervals

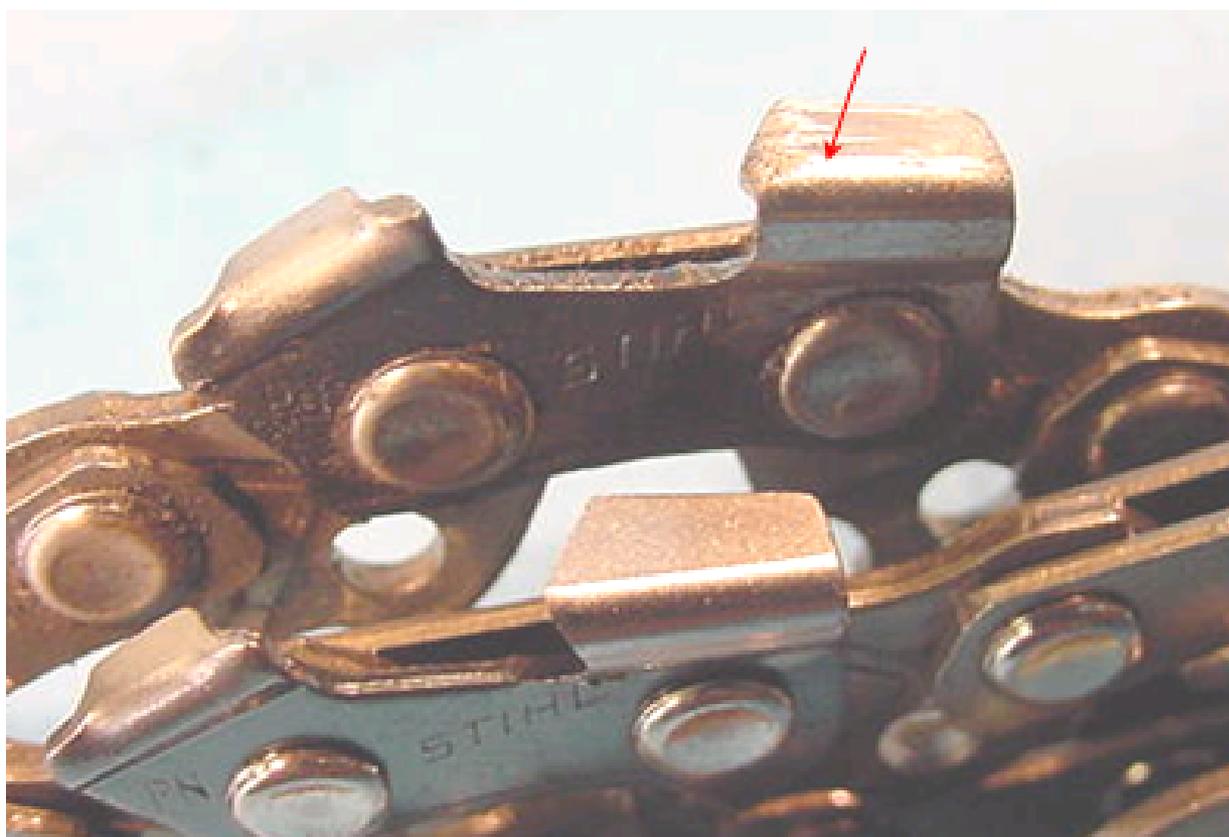
- 4 Saw Chains
- 2 Sprockets
- 1 Guide Bar

■ Tips & Tricks

- Before installing a new chain...
 - Flip the Guide Bar
 - Clean bar rails
 - Grease the sprocket bearing

When does a chain need to be sharpened?

- When you are getting fine sawdust instead of wood chips
- Excessive force is needed to cut through the material



Sharp Chain Results



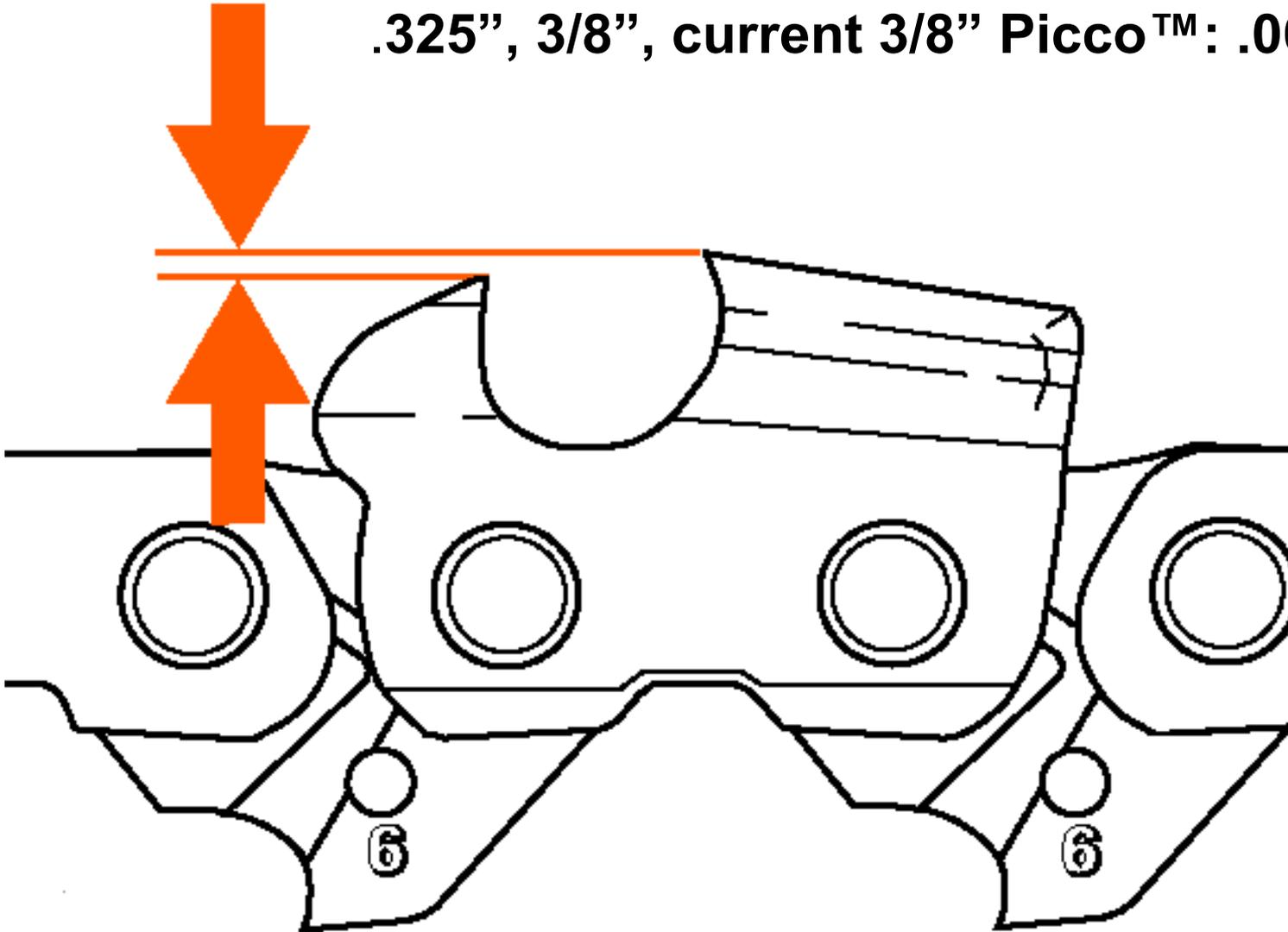
Wear Indicators



Depth Gauge Setting

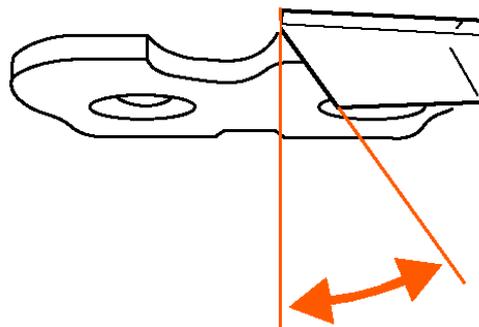
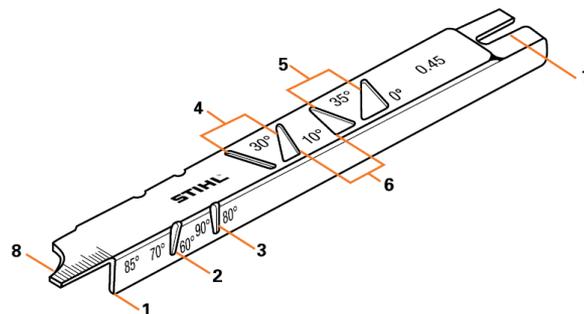
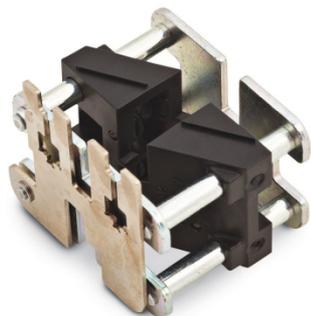
Confidential

.325", 3/8", current 3/8" Picco™: .065mm/.026"



Standard Filing Kit

STIHL®



25° - 35° filing angle

Wide angle = soft woods/summer

Narrow angle = hard wood/winter

Please Refer to the 2015 Full Line Catalog p.152 to p. 163

Bar & Chain Oiler Check



Fuel/Oil Mix and Bar & Chain Lubricant

■ Fuel Mix

- 89 Minimum Octane
- 50:1 Mix Ratio
- HP Ultra Oil
- High Performance

■ Bar and Chain Oil

- Platinum
- Woodcutter
- Winter Grade
- BioPlus™



What is 50:1 Fuel Mix?

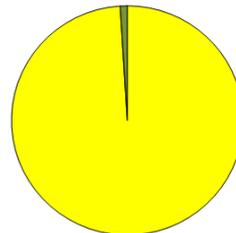
- 50:1 fuel mix is 50 parts fuel (89 octane or higher) to 1 part oil (preferably STIHL Ultra)
 - A lean mixture of fuel to oil (75:1, 100:1, etc.)
 - A rich mixture of fuel to oil (25:1, 40:1, etc.)

- Do not use BIA or TCW rated (two-stroke water cooled) mix oils or other mix oils that state they are for use in both water cooled and air cooled engines

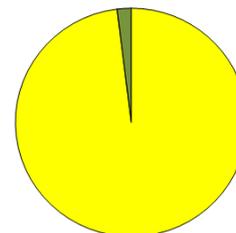


Oil ■
 Fuel ■

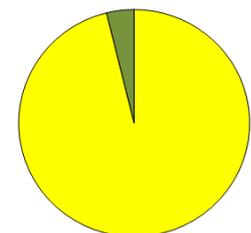
100:1



50:1



25:1



Fuel System Check: Mix Ratios

- 1 gallon mixed fuel 50:1 remaining in can (2.6 oz. oil):
- Fill with 4 gallons fuel and 12.8 oz. oil

42:1 ratio



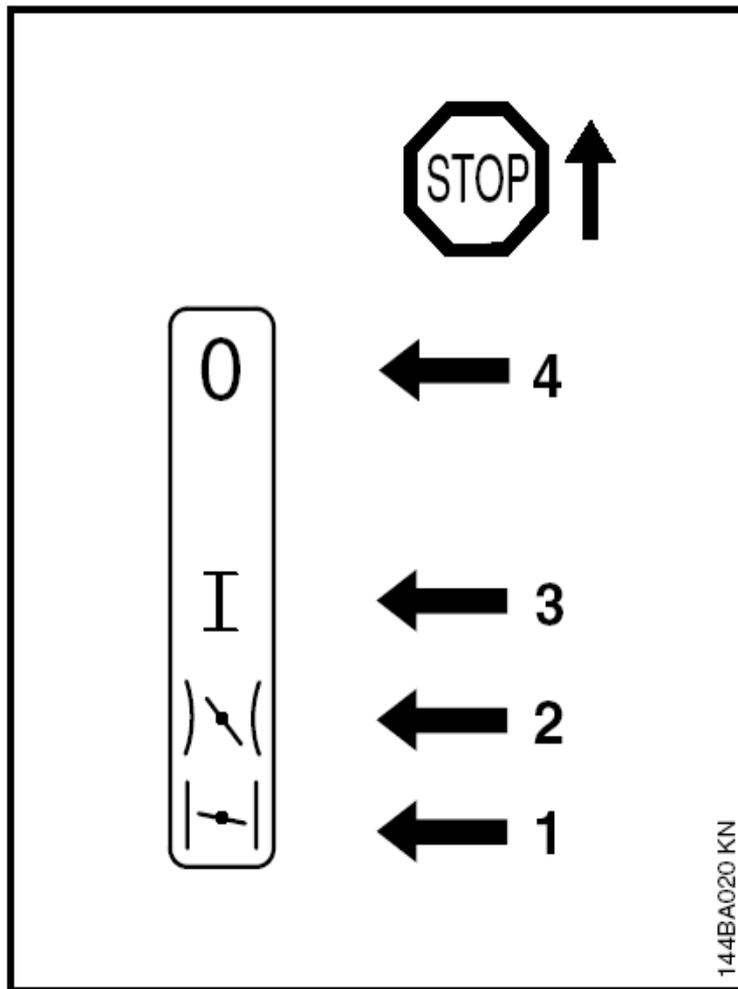
MotoMix®

- Pre-mixed at 50:1 with biodegradable STIHL HP Ultra
- Contains no ethanol – premium quality 92 octane fuel



Starting Procedure (Master Control Lever #1)

Classic Master Control Lever



4 – OFF

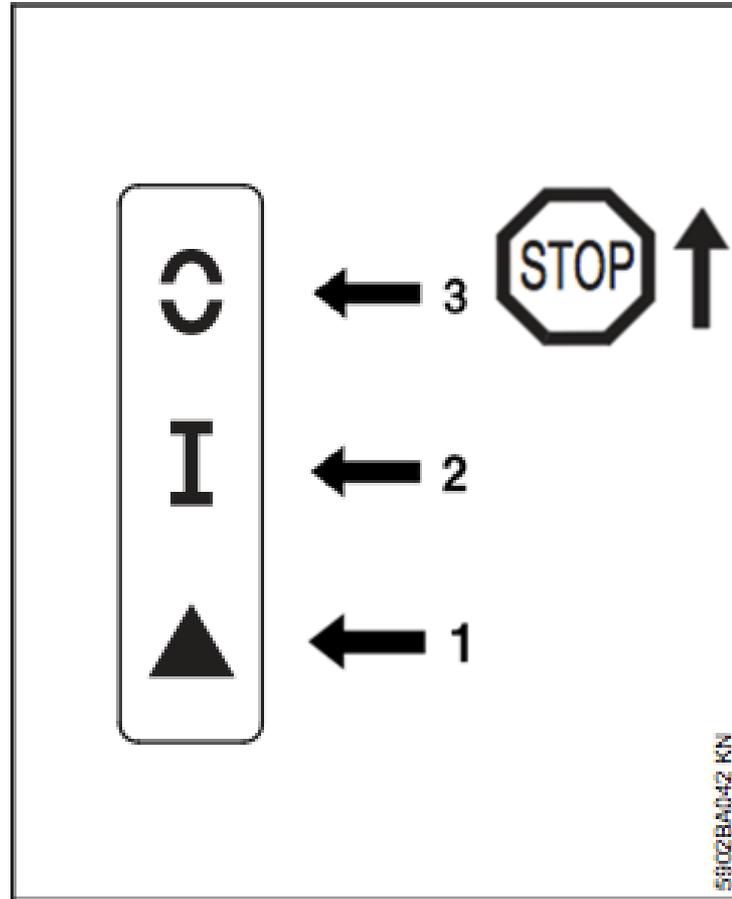
3 – RUN

2 – Half Choke

1 – Full Choke

Starting Procedure (Master Control Lever #2)

STIHL M-Tronic™
Master Control
Lever

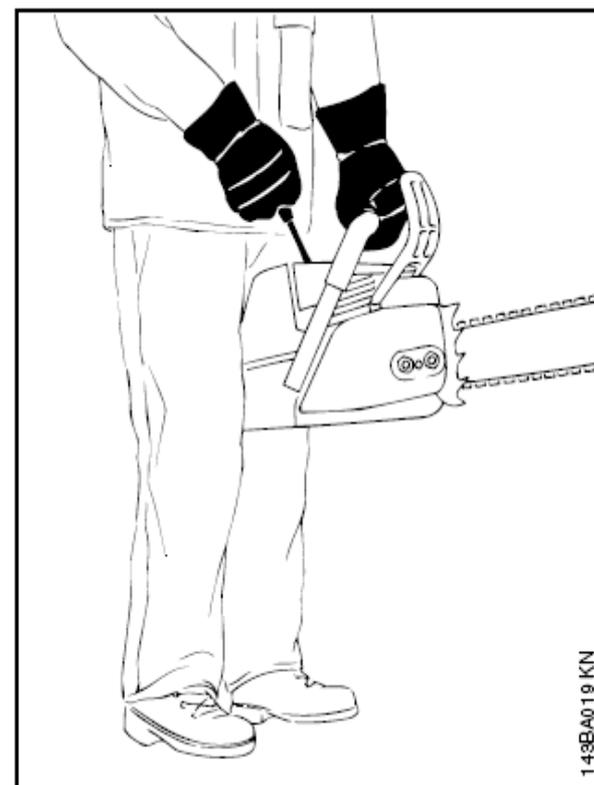
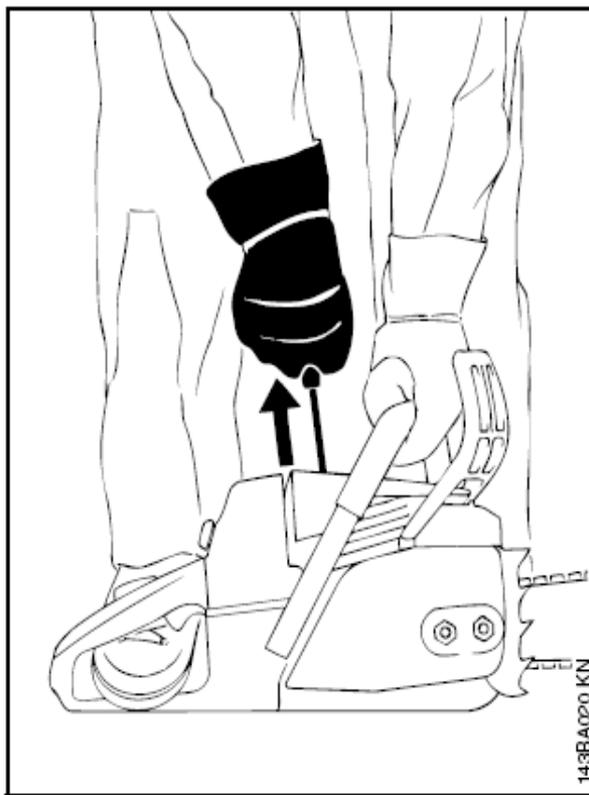
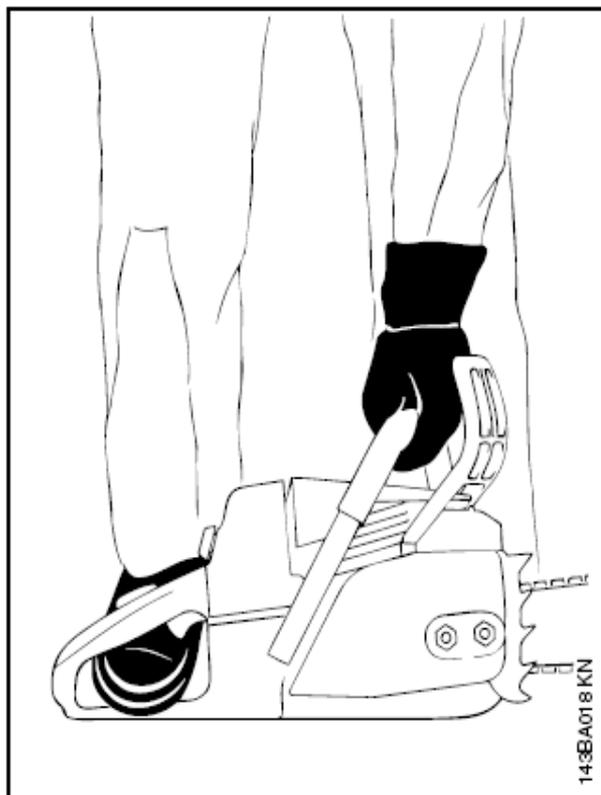


3 – OFF

2 – RUN/WARM
START

1 – COLD START

Never Drop Start or Throw Start



3 Points of Contact

Un-flooding a Chain Saw

- Ensure chain brake is activated
- Place saw on the ground
- Kneel with left knee on saw
- Master Control Lever in the run position
- Left hand squeezing throttle
- Right hand on pull rope

Time to cut wood!

STIHL[®]



Field Service Items

- What do you keep in your chew tin?
 - E-Clip (or 2!)
 - Bar Nut
 - Mini Brush
 - Sprocket
 - Spark screen
 - Rewind starter bolt

- Lacing up boots with starter rope
 - 6 feet per boot
 - 3 feet to spare per side (after removing 3 feet to repair starter rope)

- File handle with spark plug compartment
 - Spare plug with you at all times

???

PRO
GreenEXPO
Colorado Convention Center

Denver, CO | February 5 – 8

Thank you!

STIHL®

Intermountain STIHL

303.340.2787