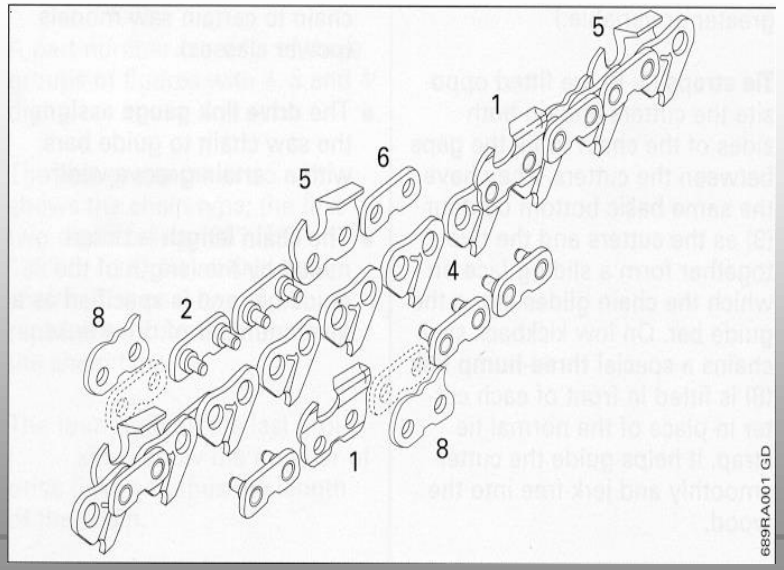
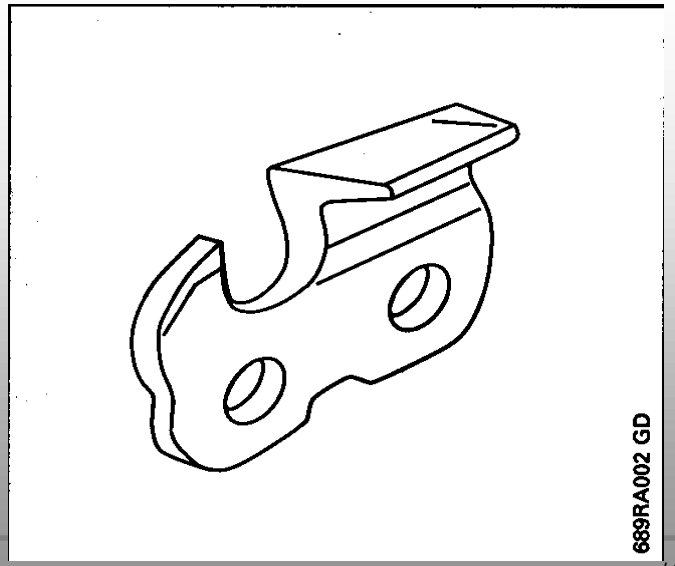
Bar & Chain Maintenance

- **Agenda**
  - **STIHL“Oilomatic” saw chain**
  - **How it cuts!**
  - **Compare to plough**
  - **Sharpening vs. keeping it sharp**
  - **Setting Depth Gauge**
  - **Setting Tension of Chain**

Bar & Chain Maintenance

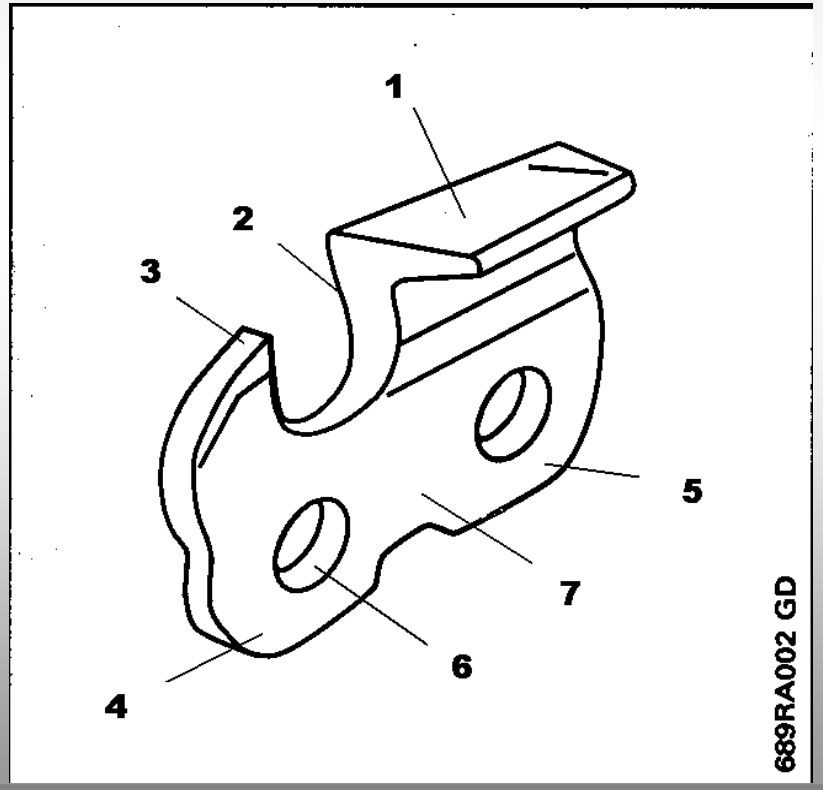
- **Saw chain component functions**
  - ***Cutters (1 & 5)***
  - **alternating left & right hand cutters**
  - **Cutters are the actual the working parts of the chain.**
  - **Design & condition of the cutting edges significantly influence the cutting results**





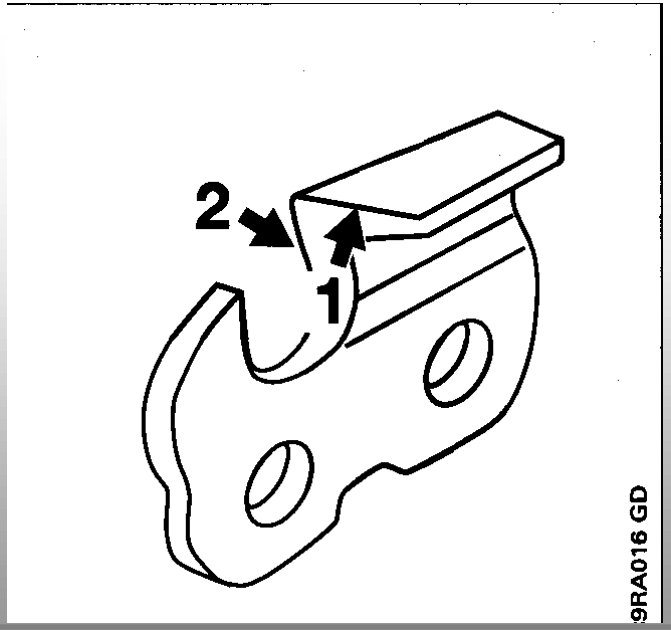
Bar & Chain Maintenance

- **Saw chain** **Cutter components**
  - ***Top plate (1)***
  - ***Side plate (2)***
  - ***Depth guage (3)***
  - ***Toe (4)***
  - ***Heel (5)***
  - ***Rivet holes (6)***
  - ***Chassis (7)***



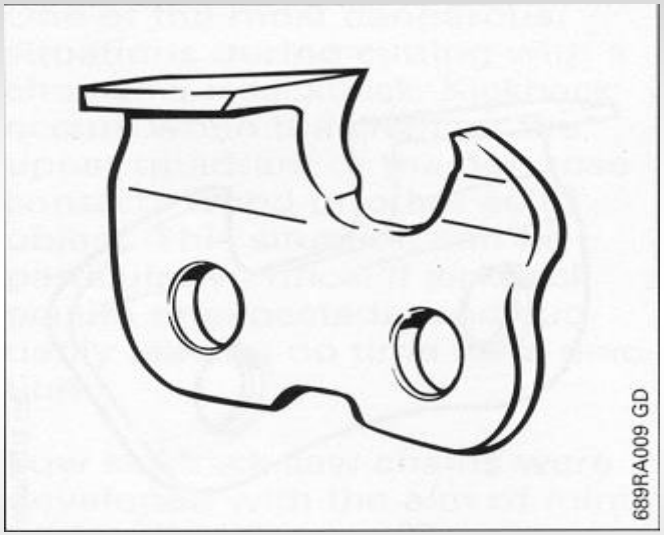
Bar & Chain Maintenance

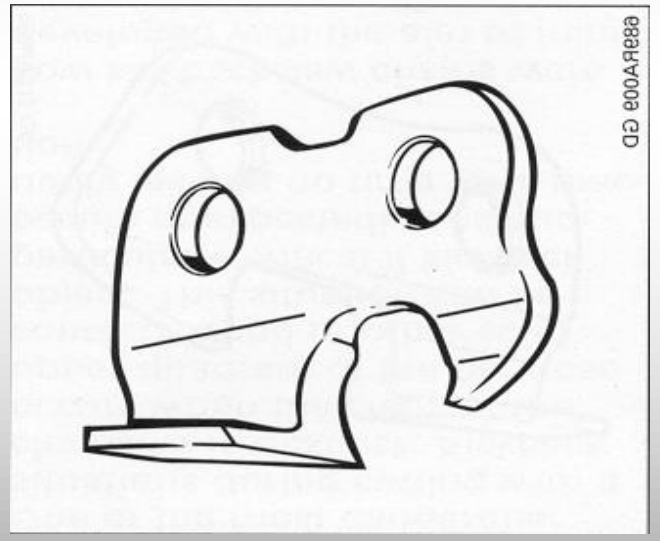
- **Cutter geometry – faces & angles**
  - **1 = top plate cutting edge**
  - **2 = side plate cutting edge**
  - **The top plate and side plate cutting edges have certain angles to achieve optimum cutting performance**



Bar & Chain Maintenance

- **The Cutter is always looked at from above.**

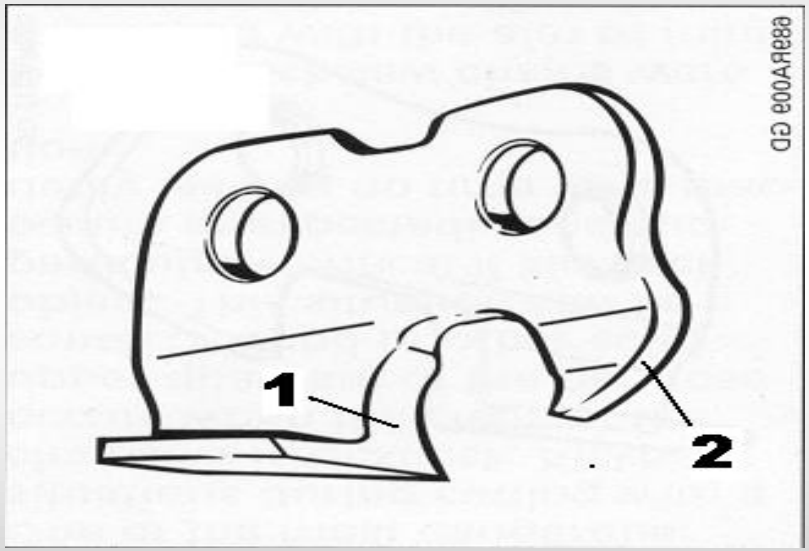


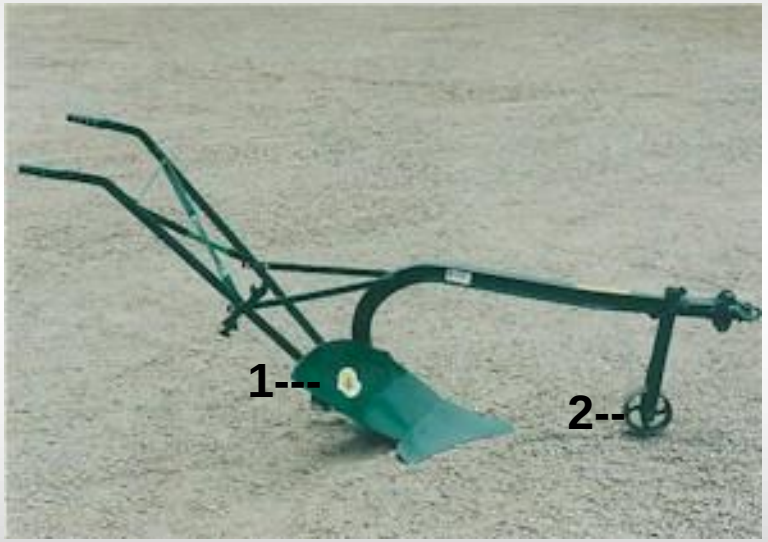


- **Look at the Cutter upside down**

Bar & Chain Maintenance

- **The Cutter can be compared to a <u>PLOUGH</u>**

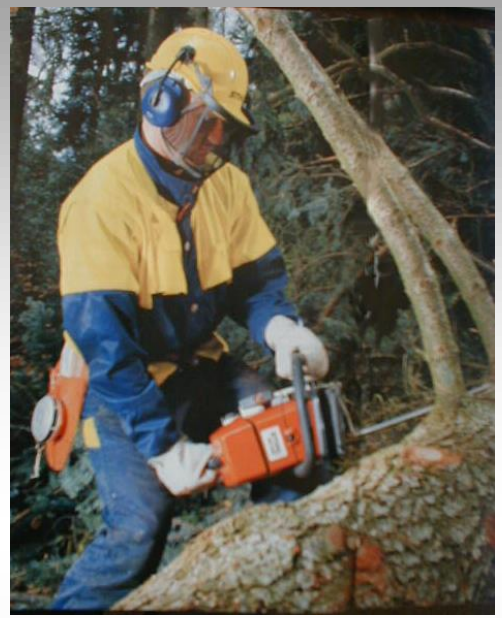




- **Cutter (1) Plough shear**
- **Depth Guage (2) Depth adjustment wheel**

Bar & Chain Maintenance

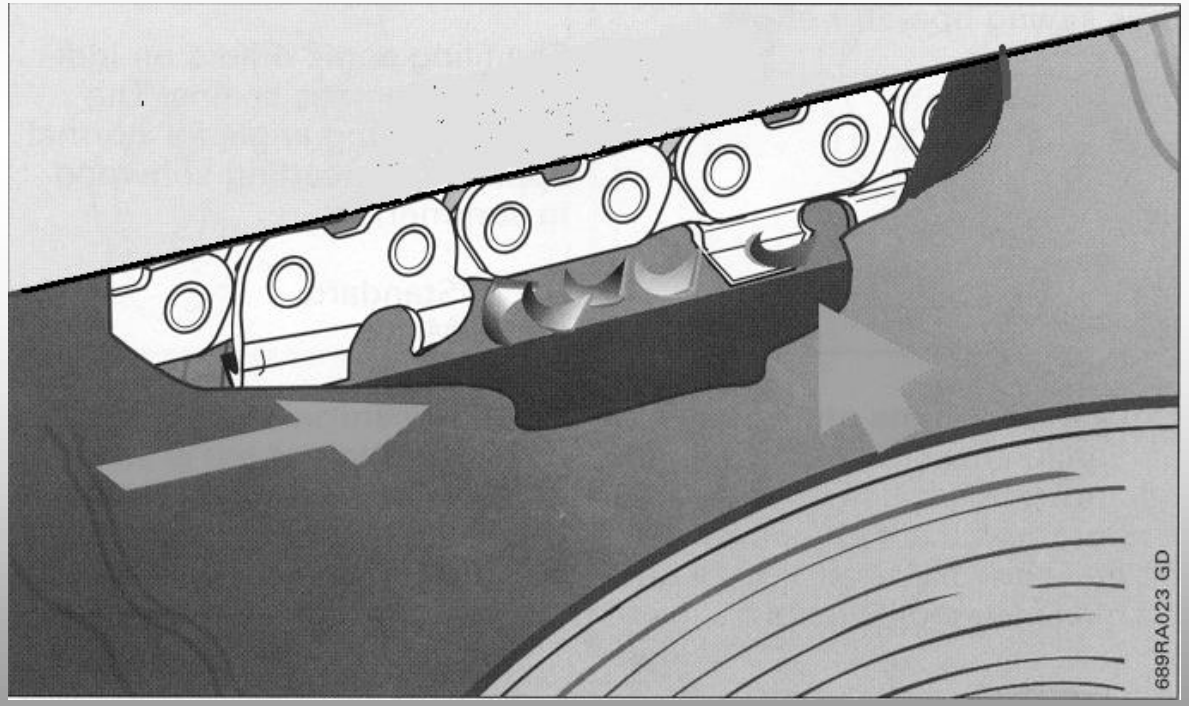
- **Chainsaw operator**



- **Compared to a one man plough**

Bar & Chain Maintenance

- **Chip removal**
  - **Chain shaves through the wood cutting short chips.**
  - **A Plough cuts into the soil and turns it over.**



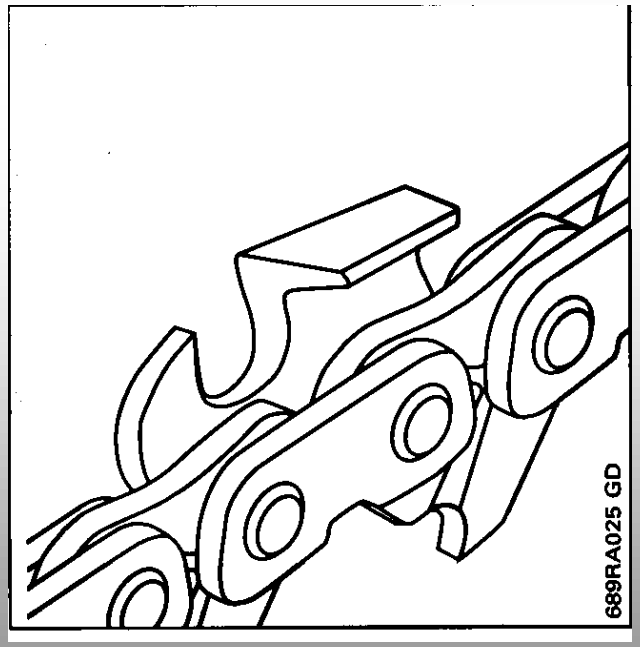
Bar & Chain Maintenance

- **Sharpening STIHL SAW CHAIN**

  - **If you go into a Butcher and ask for a thick piece of rump steak, before he cuts it, he will pick up the knife and the steel and then:**
  - **“A” He sharpens the knife.**
  - **“B” He keeps the knife sharp.**
  - **Answer: He *keeps the knife sharp* and only sharpens when it becomes blunt through damage.**
  - **Possibly the butcher uses a knife only 64 times in a 8 hour day (8 times an hour)**

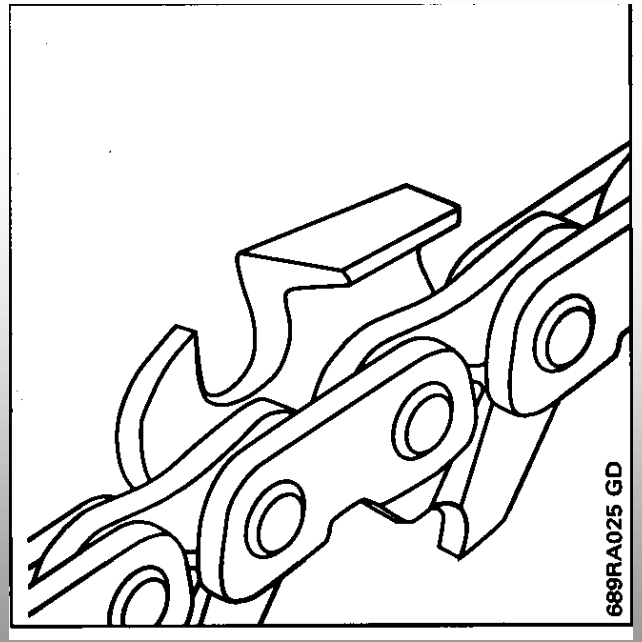
Bar & Chain Maintenance

- **Sharpening saw chain..**
  - **How frequently?**
  - **Average 60 drive link chain length = 1 meter**
  - **Chain speed = 20m/s..**
  - **EASH Cutter enters wood**
  - **20 times per second or**
  - **1200 times per minute or**
  - **72000 times per hour!**
  - **Multiply this by average cutters on a chain = 72000x30**
  - **2.1 million cuts per hour**
  - **How often should we sharpen?**



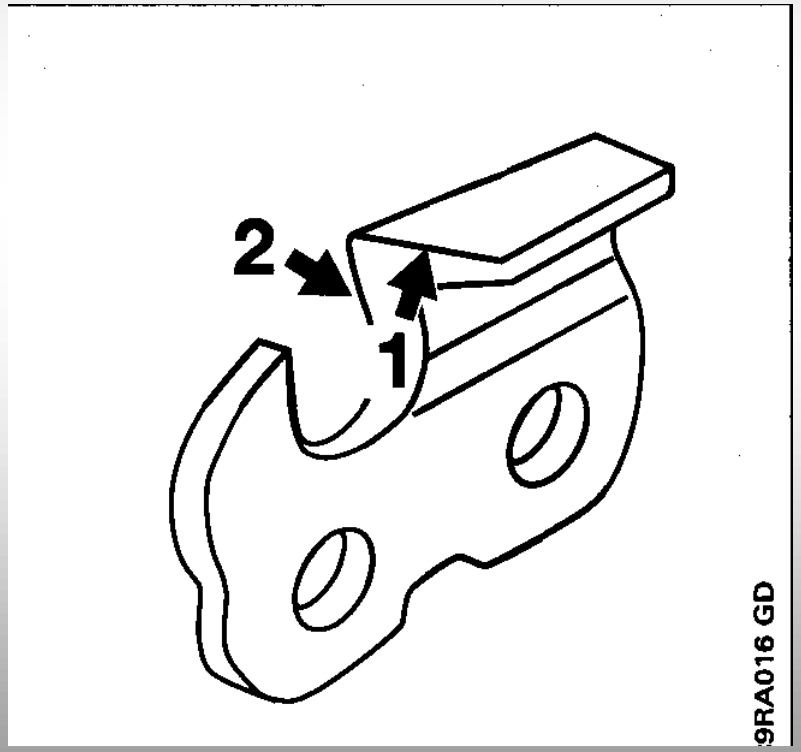
Bar & Chain Maintenance

- **Sharpening saw chain**
  - **Roof of the cutter (TOP PLATE) and side of the cutter (SIDE PLATE) are covered with a Hard Chrome layer**
  - **Serrations on top plate cutting edge and side plate cutting edge is what does the cutting**
  - **As serrations become smooth cutting efficiency is reduced**



Bar & Chain Maintenance

- **Sharpening saw chain**
  - **It is <u>impossible</u> to file Hard Chrome. so how do we sharpen?**
  - **It is possible to FILE AWAY THE SOFTER STEEL on which the chrome layer lies**
  - **Without support the brittle Hard Chrome breaks and forms the sharp serrated cutting edge required.**



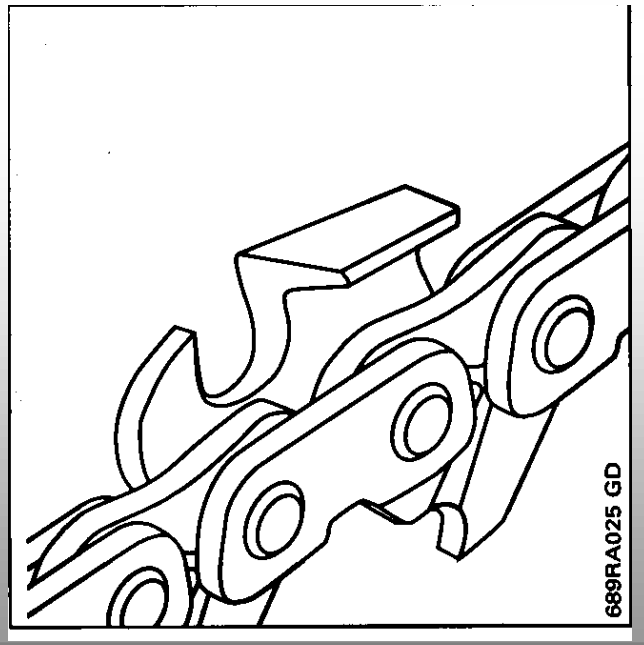
Bar & Chain Maintenance

- **Sharpening saw chain**
  - **Properly sharpened chain pulls itself into the cut when only slight pressure is applied.**
  - **As dullness increases so does the effort required for cutting**
  - **When does chain have to be re-sharpened?.**

1: When it is damaged

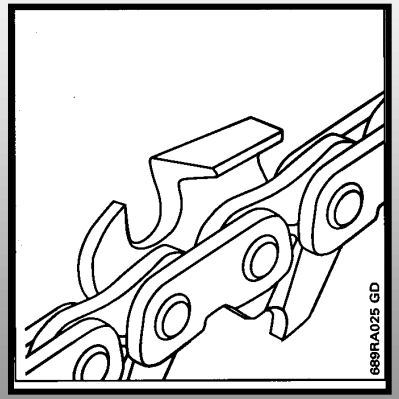
2: When chain has to be forced into the cut.

3: When fine sawdust emerges from the cut instead of chips



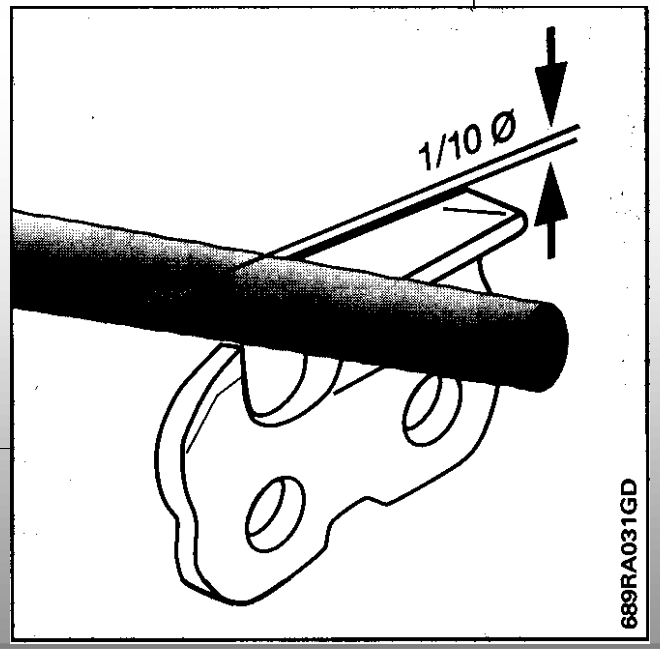
Bar & Chain Maintenance

- **Sharpening saw chain**
  - **There are TWO basic principals to SHARPENING**
  - **Basic rule 1- SHARPENING THE CHAIN when damage has occurred due to:**
  - **Cutting into ground / stones / fence wire / nails etc**
  - **Neglecting to sharpen regularly / cutting very hard wood.**
  - **This requires extensive effort to bring chain back into good condition**
  - **Basic rule 2 – KEEPING THE SAW CHAIN SHARP required at each refueling**
  - **2 strokes of file holder to each cutter**
  - **This requires less effort as less material has to be removed if the cutters are always sharpened before they get dull, this increases the saw chain life**



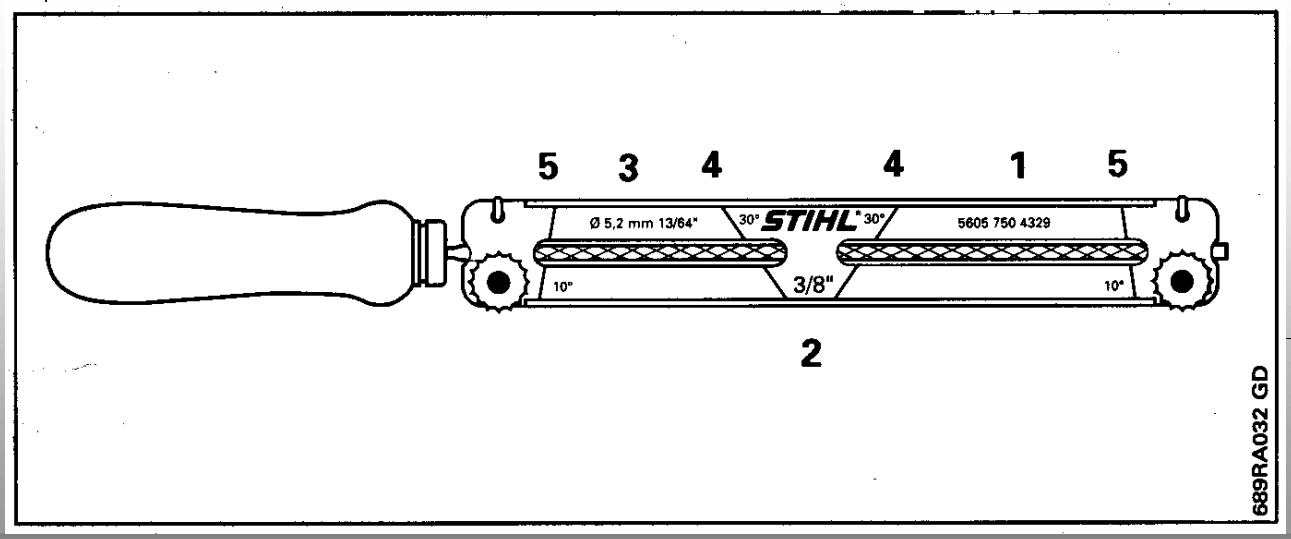
Bar & Chain Maintenance

- **Sharpening saw chain**
  - **File should protrude 1/10 of its diameter above the top plate**
  - **Only a round chainsaw file of the correct diameter mounted in a file holder is suitable for sharpening chain.**
  - **Due to varying sizes of cutters and chain pitches, different file diameters are necessary in order to obtain the specified side and top plate cutting angles**



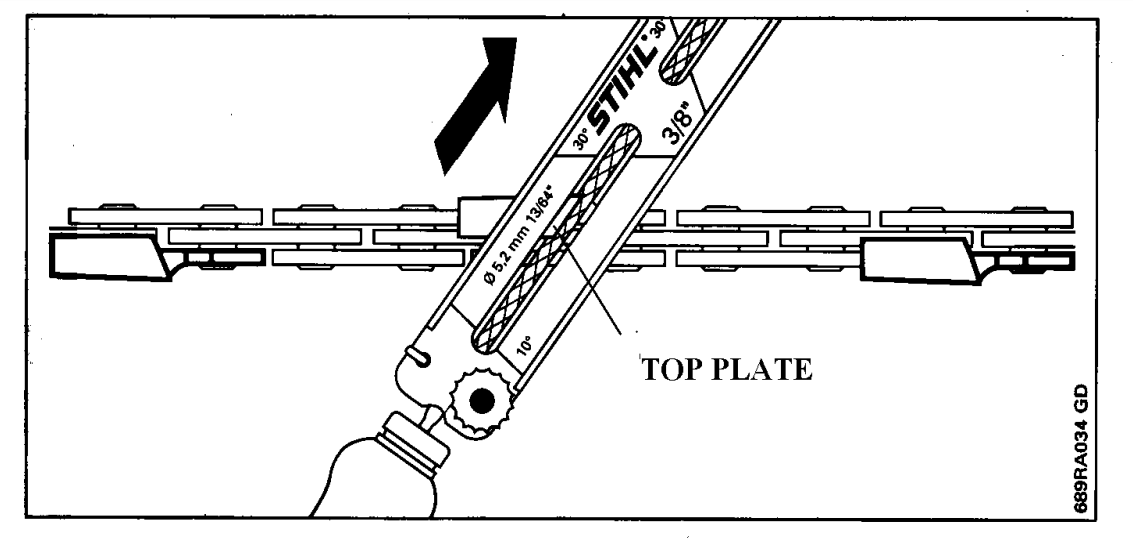
Bar & Chain Maintenance

- **Sharpening saw chain**
  - **The use of a Stihl file holder ensures that the file is kept at the correct height relative to the tooth**
    - **1 = part number of file holder.**
    - **2= chain pitch**
    - **3 = file diameter.**
    - **4 = reference line for 30º angle (general work)**
    - **5 = reference line for 10º angle(ripping only)**



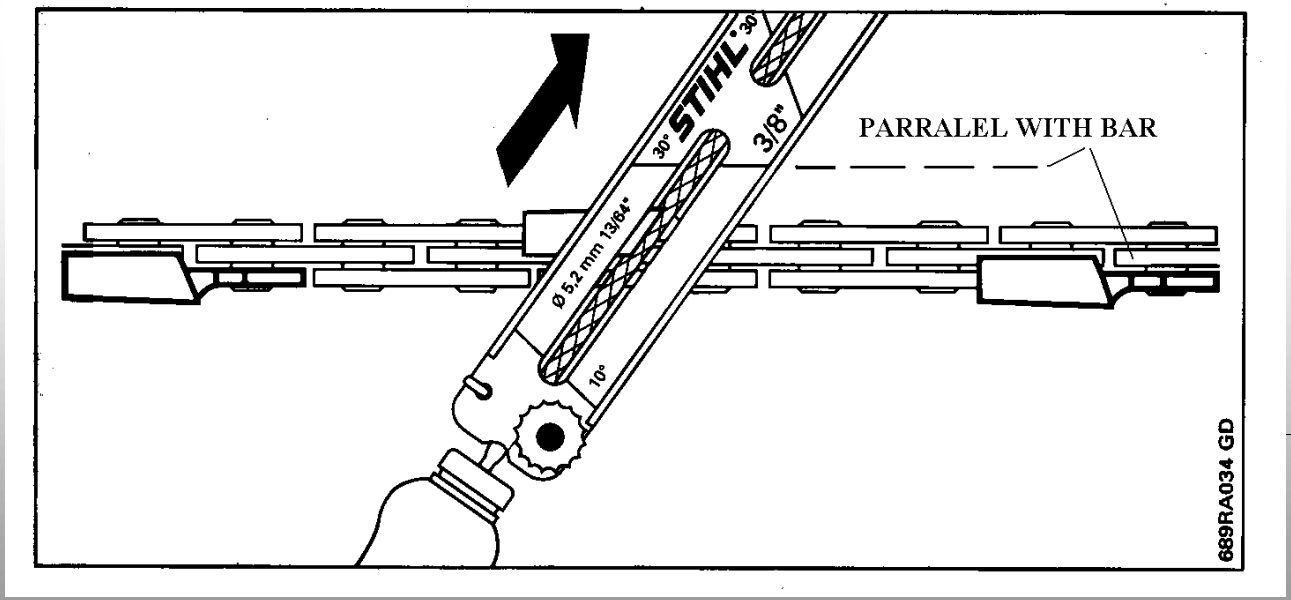
Bar & Chain Maintenance

- **Sharpening saw chain STEP 1**
- **Ensure that the guidebar is held firmly .(ie: bar vise)**
- **Always file cutters on the far side of the guide bar**
- **Place the file holder on the chain so that underside of one side plate rests on depth gauge and the other rests on cutter.**
- **Rest the file on the cutter to be filed so that the cutter top plate edge is visible through the slot in the file holder.**



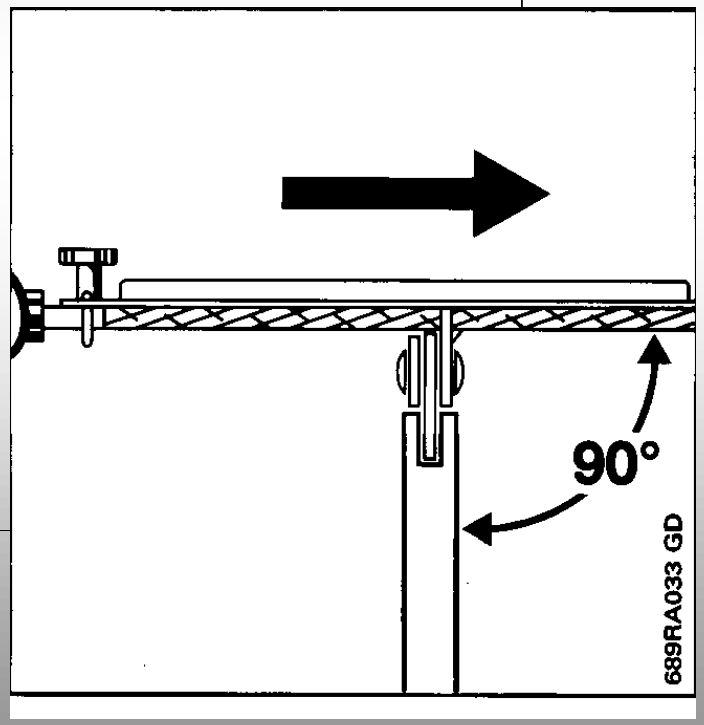
Bar & Chain Maintenance

- **Sharpening saw chain** **STEP 2.**
- **Align the 30 degree reference line on the file plate in line with the cutter bar.**
- **Always file cutters from the non-chrome side**



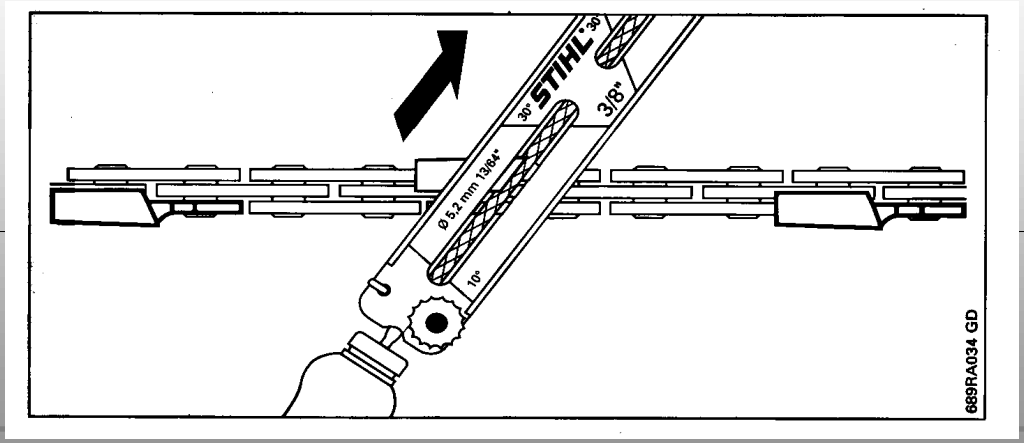
Bar & Chain Maintenance

- **Sharpening saw chain Step 3.**
  - **Hold file holder horizontally in order to obtain the correct side and top plate cutting angles**



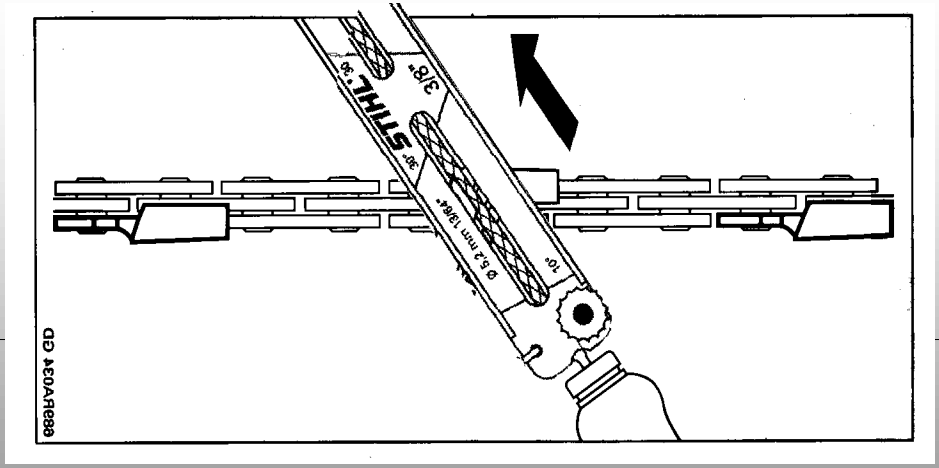
Bar & Chain Maintenance

- **Sharpening saw chain** **STEP 4**
  - **Keeping the angles, move the file-holder to the beginning of the file (use the full length of file)**
  - **NOW FILE EVENLY & STEADILY push only, never pull a file.**
  - **Apply the same pressure throughout stroke.**
  - **Lift out of cut at end of stroke and move to beginning of file, to start new stroke.**
  - **File the same number of strokes on each cutter to ensure cutters of identical length**



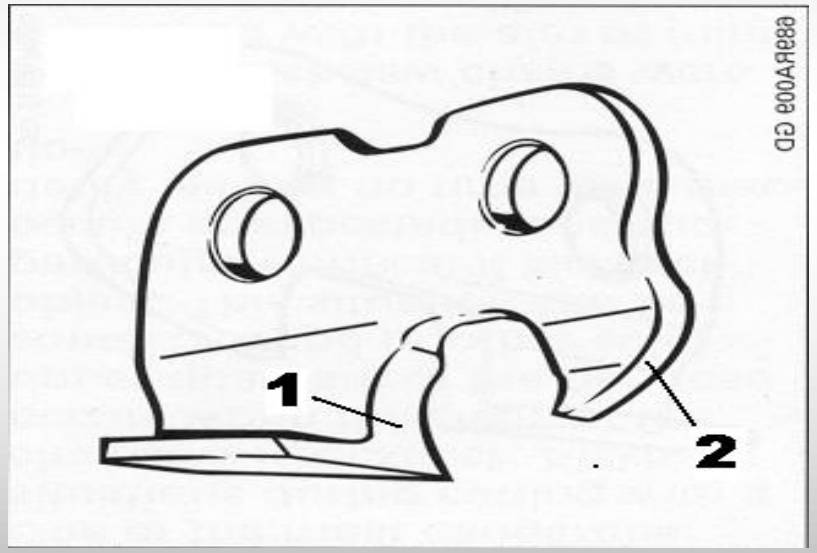
Bar & Chain Maintenance

- **Sharpening saw chain** **STEP 5**
  - **When one side is complete move to other side and begin same procedure as STEP 1.**
  - **Apply the same pressure throughout stroke.**
  - **Lift out of cut at end of stroke and move to beginning of file, to start new stroke.**
  - **File the same number of strokes on each cutter to ensure cutters of identical length**



Bar & Chain Maintenance

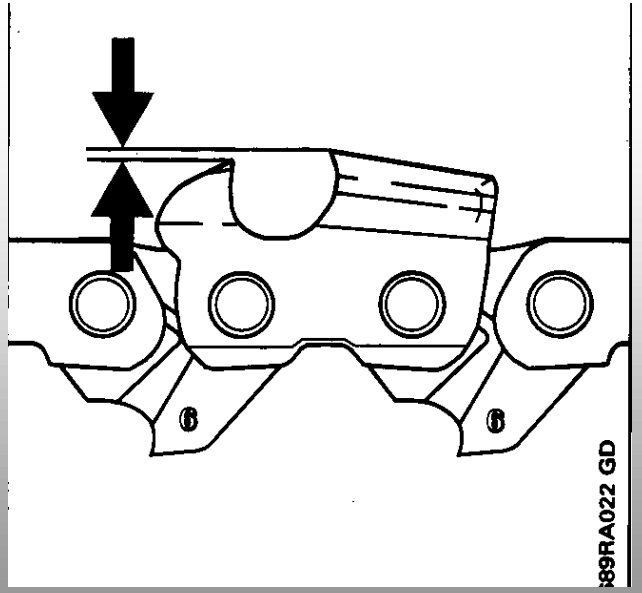
- **Remember the Cutter is compared to a <u>PLOUGH</u>**
- **The wheel (2) needs to be set to give the depth of cut to the shear.**



- **Depth Gauge (2) Depth adjustment wheel**

Bar & Chain Maintenance

- **Depth gauge**
  - **The small projection in front of the gullet and cutting edge**
  - **Depth gauge setting = difference in height between the top of the depth gauge and the top plate cutting edge**
  - **Determines the chip thickness and therefore influences the chain cutting capacity**

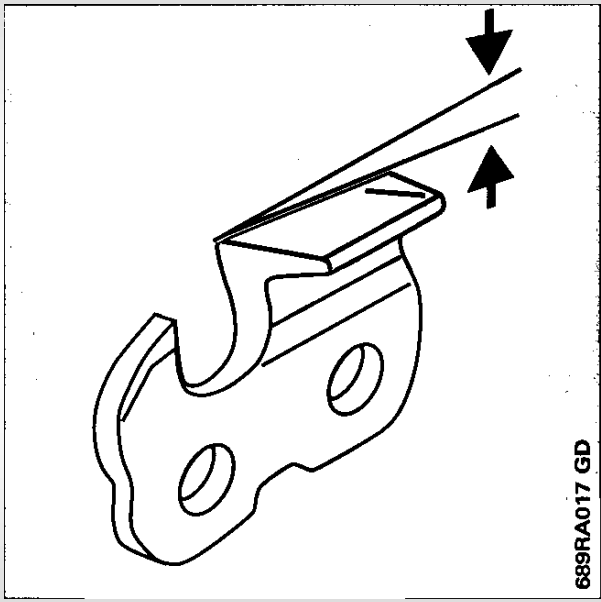


Bar & Chain Maintenance

- **Cutter geometry – faces**
  - **Top plate is inclined to the rear**
  - **The top plate slope forms the clearance angle for the top plate cutting edge to feed into the wood**
  - **Depending on type of chain it is 7 – 9 degrees.**

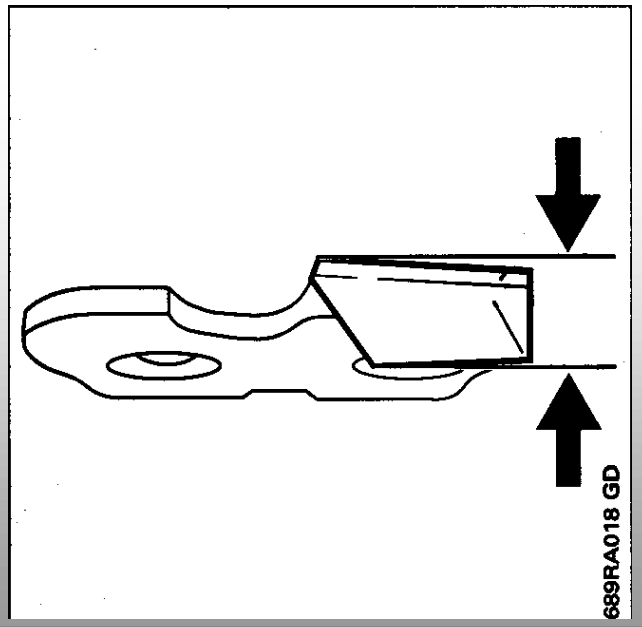
This means that as the cutter is filed away, the top plate becomes the same height as the depth gauge .

The cutter therefore does not take off any material and the depth gauge needs to be reset.



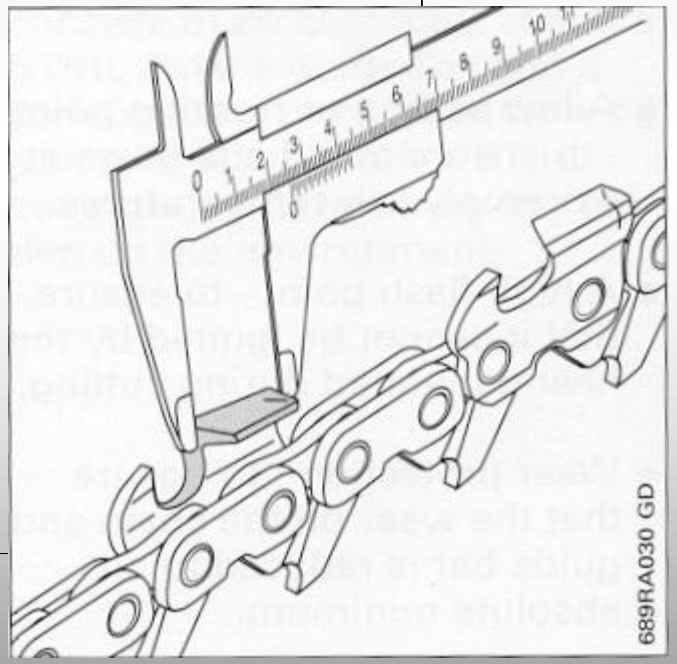
Bar & Chain Maintenance

- **Cutter geometry – faces**
  - **Top plate is tapered to the rear**
  - **= the clearance angle for the side plate cutting edge**



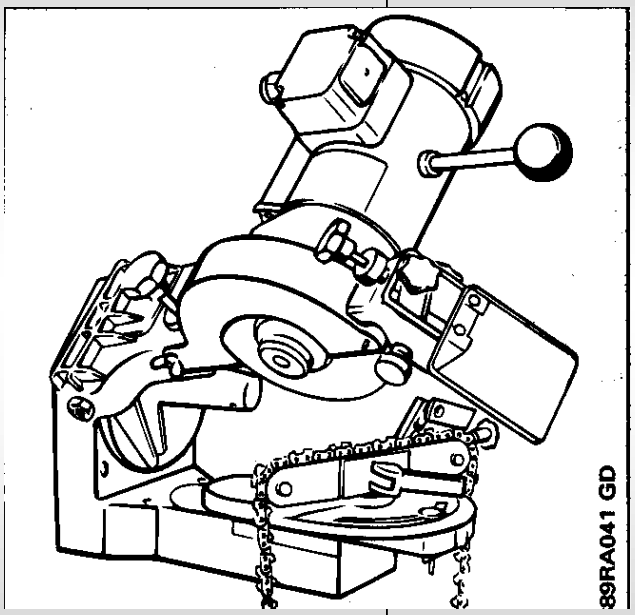
Bar & Chain Maintenance

- **Setting the depth gauge STEP 1**
  - **Identify the cutter with the shortest top plate, Depth gauge also has small vernier for measuring.**
  - **All cutters must be the same length after sharpening**
  - **File back past chrome damage.**
  - **If there is to much damage to the cutters the chain can be taken to a chainsaw dealer who will profile the chain back to shape and ensure the cutters are all the same length.**
    Note : This is not sharpening.



Bar & Chain Maintenance

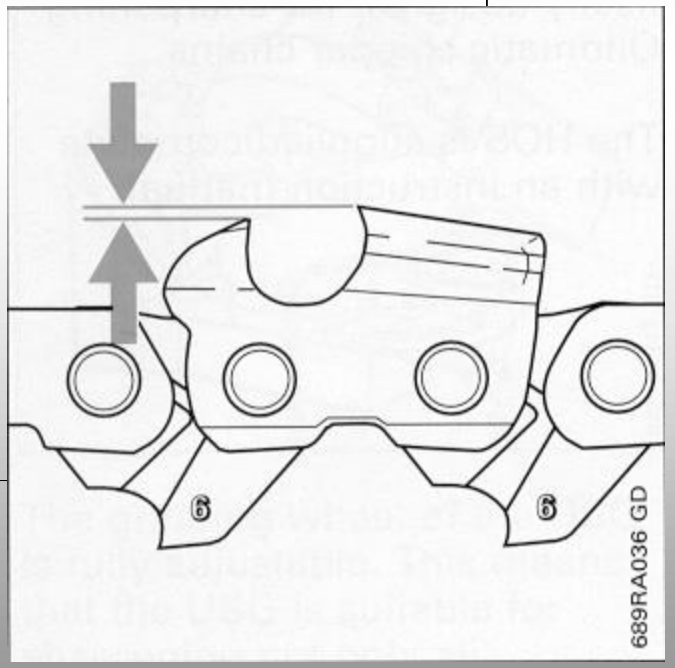
- **Sharpening saw chain**
  - **USG universal electric sharpener**
  - **Is a profiler of chain**
  - **Does not sharpen chain**
  - **Should be used for corrective surgery.**



Has to be used very carefully so as not to overheat cutter and soften HARD CROME of cutter edge.

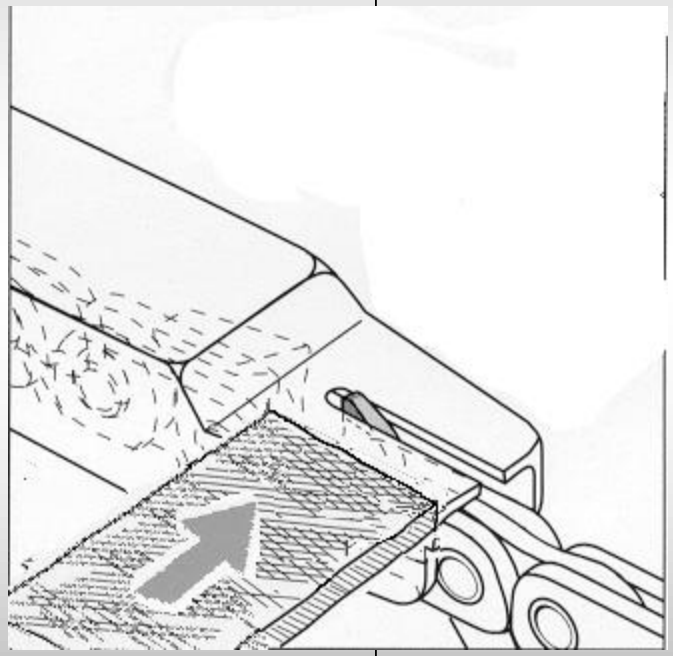
Bar & Chain Maintenance

- **Setting the depth gauge**
  - **Check depth gauge setting every time cutters are re-sharpened**
  - **Settings differ according to chain pitch**
  - **Use appropriate depth gauge tool**



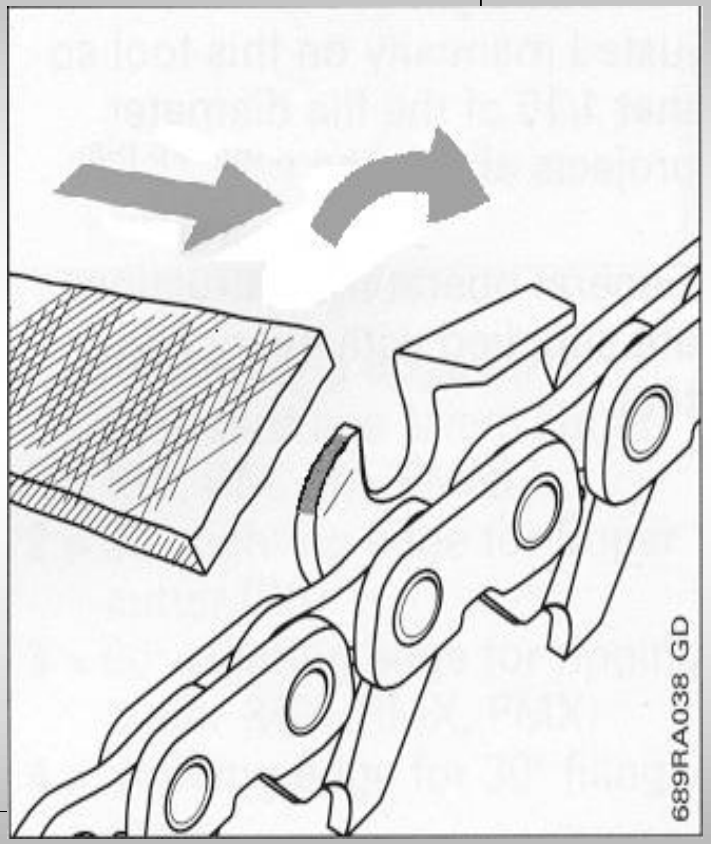
Bar & Chain Maintenance

- **SETTING THE DEPTH GAUGE**
- **Lowering the depth gauge**
- **1: Place depth gauge tool on chain so that depth gauge lies in U shape opening. (vernier on tool to chainsaw side)**
- **2: Should any part of chains depth gauge stick out above tool –file away with flat file untill file touches tool .**



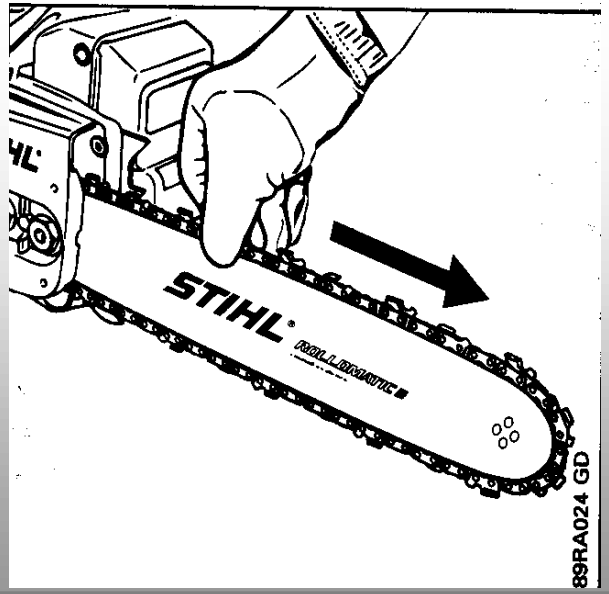
Bar & Chain Maintenance

- **SETTING THE DEPTH GAUGE**
  - **3: After lowering the depth gauge, lift up tool to protect cutter.**
  - **4: Round off depth gauges (flat spot on wheel of plough) by pushing and rolling file at the same time**
  - **5: Set <u>all</u> the depth gauges by filing from the same side of the bar.**



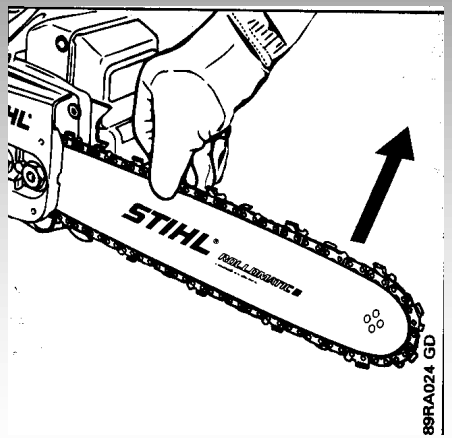
Bar & Chain Maintenance

- **Chain tension**
  - **Correct tension, break-in and lubrication of the saw chain are individually and collectively of great importance o the service life of the chain, guide bar and sprocket. They also have a major effect on the wear life of engine components.**
  - **Demonstrate chain tensioning**
  - **Low outside temperatures!! – slacken chain of after work**
  - **Check chain tensioning at frequent intervals**



Bar & Chain Maintenance

Chain tension

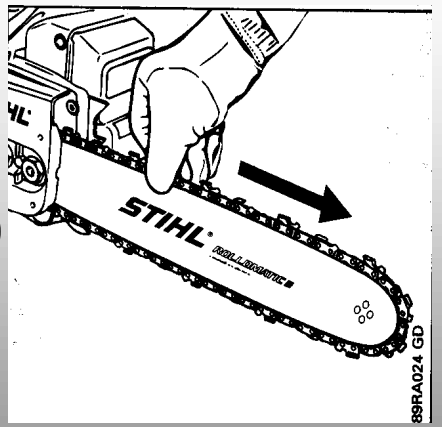


1: Slacken off bar nuts to finger tight.

2: Lift bar up and continue to hold in this position.

3: Adjust tensioner screw until all the tie straps of the bottom chain move up and just touch the bar.

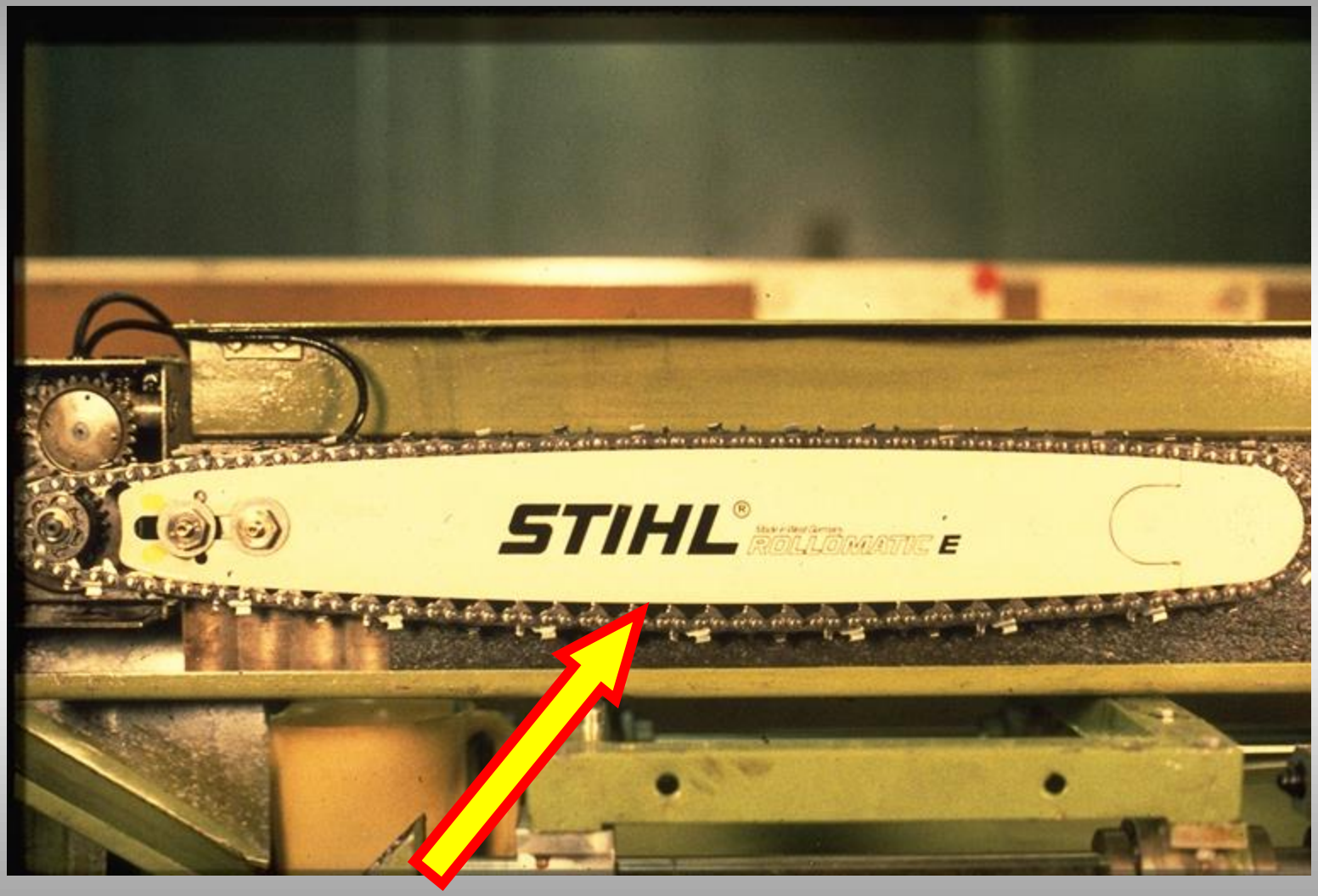
4: Tighten the first bar nut with the scrench.



5: Rotate the chain min. one revolution and check for slackness.(reset if slack from step 1)

6: Tighten bar nuts to correct torque by pushing end of scrench with end of thumb

Why correct chain tension ?

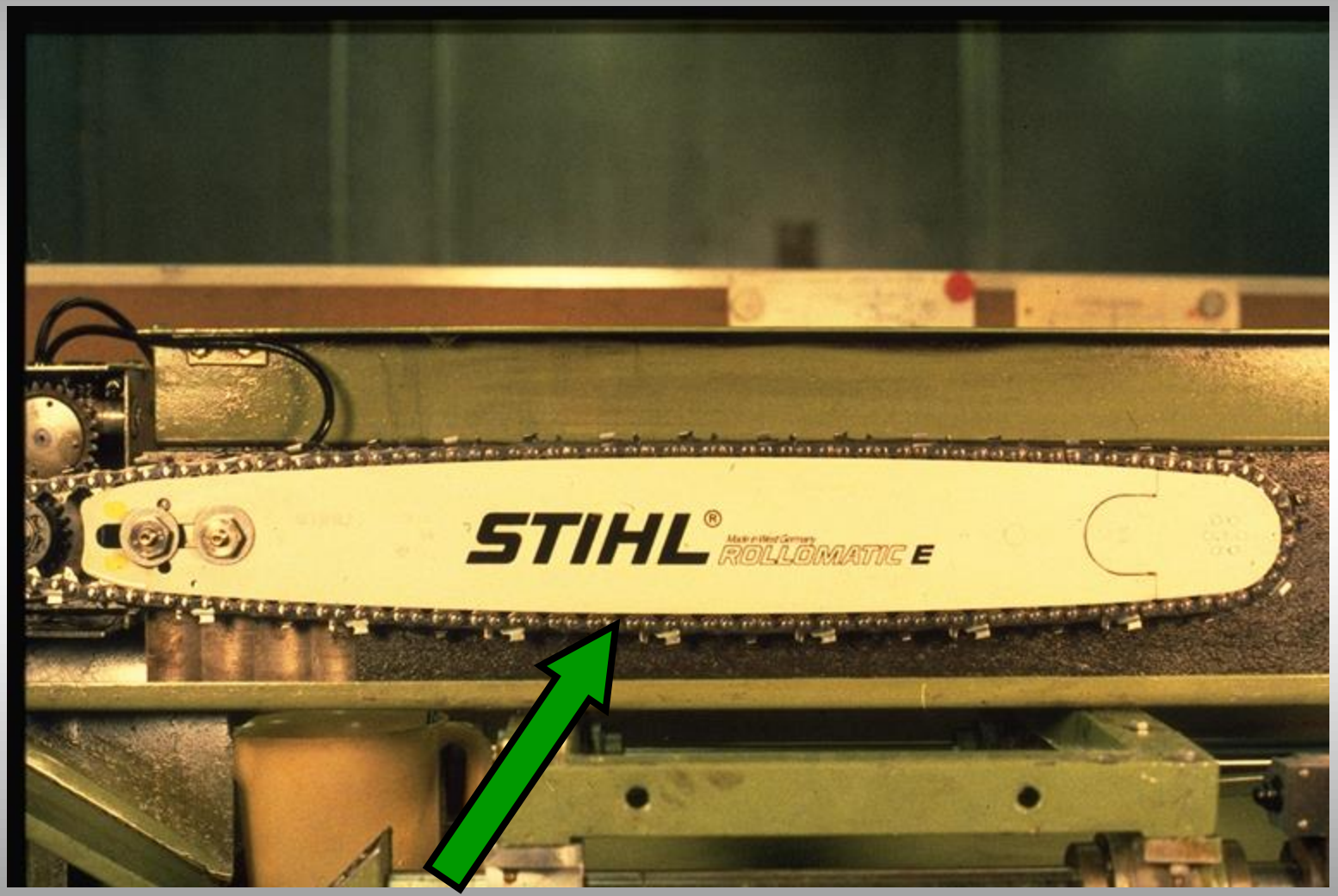


Why correct chain tension ?

Why correct chain tension ?

Therefore !!

Correct chain tension



Correct chain tension

Bar & Chain Maintenance

- **Guide bar maintenance**
  - **Bars wear particularly in the area where most of the cutting is done, usually the underside of the guide bar**
  - **To ensure even wear, turn guide bar every day**
  - **Clean oil inlet holes every day**
  - **Clean bar groove every day**
  - **Use filing gauge for this purpose**