New Tools for Old Saws
Crosscut Saw Tools
New Tools for Old Saws
Crosscut Saw Tools

Bob Beckley
Project Leader
USDA Forest Service
Technology and Development Program
Missoula, MT

2E22A64—Crosscut Saw Sharpening Tools
June 2005

The Forest Service, United States Department of Agriculture (USDA), has developed this information for the guidance of its employees, its contractors, and its cooperating Federal and State agencies, and is not responsible for the interpretation or use of this information by anyone except its own employees. The use of trade, firm, or corporation names in this document is for the information and convenience of the reader, and does not constitute an endorsement by the Department of any product or service to the exclusion of others that may be suitable.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410, or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.
Contents

Introduction ................................................. 1

Maintaining a Crosscut Saw ................................. 2

Jointer ............................................................ 3

Raker/Pin Gauge ............................................... 4

Tooth-Setting Tools ......................................... 5

Adjustable Spider Gauge ..................................... 6

Freestanding Crosscut Saw Vise ............................ 7

Crosscut Saw Handle Brackets .............................. 8

Drawings .......................................................... 9

—Cover photo: Rufus M. Beebe files his saw after felling a cypress tree in 1948.

(Photocourtesy of the Florida State Archives.)
Introduction

Crosscut saws and the tools to maintain them are becoming increasingly difficult to find. The U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center (MTDC) used traditional designs to build prototypes of some common tools needed to maintain crosscut saws. Mechanical drawings for these tools are included in this report. Individuals with the proper skills and equipment may wish to build their own crosscut-saw sharpening tools. Others can take the drawings to a machinist who should be able to build the tools.

When a crosscut saw is used and cared for properly, it shouldn’t need to be sharpened more than once a year. Although chain saws are easier to sharpen than crosscut saws, they are more likely to be dulled when they strike rocks or dirt. If a crosscut saw does need to be tuned up during the season, it can be maintained in the field when the proper tools are available. A crosscut saw that is sharpened properly is an extremely efficient tool.

Crosscut saws have to be used in wilderness areas, where motorized tools are not allowed. But sawyers may find that crosscut saws can play an important role outside wilderness. When crews clear trails, the majority of their time is spent moving material, not cutting wood. Sawyers on trail crews may find that it’s easier to carry a crosscut saw than to carry a chain saw, gas, oil, and the personal protective equipment required to use a chain saw safely. In addition, injuries from crosscut saws are likely to be less severe than those caused by chain saws.
Maintaining a Crosscut Saw

This report explains the basic function of tools for crosscut saw maintenance, but it does not explain how to use them properly. The Lolo National Forest’s Ninemile Wildlands Training Center (406–626–5201) offers a 5-day course in crosscut saw maintenance. Courses are open to anyone. Course information and schedules are available at the Web site: http://www.fs.fed.us/r1/lolo/resources-culture/nwtc/courses.htm.

Jointer (Drawing MTDC–1013)

When a crosscut saw is jointed, the teeth are filed to a uniform height. The jointer (figure 1) includes a crosscut file with its tang (the projection for attaching the handle) broken off. A worn file is better than a new file for use with the jointer. A new file might remove more metal than necessary.

After the file is secured to the jointer, the jointer is run across the saw’s cutting edge until all the teeth are cut down to the same height. When you see a flat or shiny spot on the tip of each tooth, you will know that the teeth have been cut to the same height. Some teeth will be cut down more than others. Longer teeth will be cut down the most. They may have a large flat spot. The shortest tooth will have only a glimmer of a flat or shiny spot.

Traditionally, filers used a short jointer, often combined with the raker gauge. We modeled our jointer after the “Gibbs” long jointer. The traditional peg- (tooth) and-raker saws used in the Forest Service were built with an arc-shaped design. The arc is important, because the arc determines how many teeth are cutting at a time. The MTDC long jointer has “two shoes” on either end that adjust to the shape of the saw, helping to maintain the saw’s arc.
A crosscut saw’s rakers remove wood shavings that have been severed by the cutting teeth. To remove the severed wood efficiently, the rakers should be slightly lower than the cutting teeth. If the rakers are too long, they will sever uncut fibers, rather than lifting and removing severed material as they were designed to do. If the rakers are too low, they won’t remove all the cut material and the saw will drag.

The raker depth is determined by the raker gauge (figure 2). The raker gauge has an adjustable slotted steel filing plate, which fits over the two tips of the raker. The filing plate is adjusted to the desired raker depth and the rakers are filed even to the plate. After the rakers have been filed, they need to be shaped.

There are two basic methods of shaping rakers, the straight method and the swaged method. The straight method is relatively simple. The swaged method, although more difficult, produces a chisel-like tip that allows the raker to pick up severed material more easily. Swaging uses a hammer to form the leading edge of the raker. An 8- to 16-ounce upholsterer’s hammer or a tinner’s riveting hammer works well for swaging.

The pin part of the raker gauge (figure 3) is used to compare the height of a raker to an adjacent cutting tooth. When the pin is set to 0.002 or 0.003 inches, the appropriate setting for most wood, the raker will be 0.002 or 0.003 inches shorter than the adjacent cutting tooth.

The rakers on some saws may be too hard. Their tips may break when they are swaged. To reduce the rakers’ hardness, they can be heated with a propane torch. Apply heat only to the rakers, not to the cutting teeth.

Figure 2—A saw raker fits into the slot of the adjustable raker gauge for filing.

Figure 3—The pin on the raker gauge can be adjusted to the desired raker height.
After the saw has been jointed and the rakers have been shaped, the saw is ready for sharpening. Filers typically use a high-quality 7- or 8-inch special crosscut saw file for sharpening. After the saw’s cutting teeth have been sharpened, they must be set.

Setting bends the tip of each cutting tooth slightly away from the plane of the saw. Too little set could cause the saw to bind. Too much set would make a wider kerf, removing more wood than necessary and possibly leading to sloppy or curved cuts. Dry wood or hardwood requires less set than green wood or softwood. There are several ways to set a saw’s teeth. The tools redesigned by MTDC use the hammer and anvil method, the most common method.

MTDC built two types of tooth-setting devices, the crosscut saw tooth-set tool (drawing MTDC–998, figure 4) and the hand-held anvil (drawing MTDC–1018, figure 5). The crosscut saw tooth-set tool is a combination anvil and swinging hammer. The tooth tip is placed in a designated slot and the anvil is placed behind the tooth. The swinging hammer is struck with a hand-held hammer until the tooth has been set properly. When the hand-held anvil is used, it is placed behind the tooth and the tooth is struck with a hammer until the tooth has the proper set.

Choosing which of the two tools to use is a matter of personal preference. Experienced saw filers seem to prefer the hand-held anvil, while less-experienced filers may find that the tooth-set tool gives them better control and reduces the chance that they might strike a glancing blow when setting the tooth. If the hand-held anvil is not available, any similarly shaped flat piece of metal could be used in its place.
The adjustable spider gauge (figure 6) measures the set of the tooth. The spider gauge has three fixed legs and one adjustable leg.

Using a feeler gauge, adjust the spider leg to the desired saw set. To determine the set of a tooth, place the three fixed legs of the spider on the saw’s main body and the longer adjustable leg on the tip of the tooth being set. To change a tooth’s set, use the tooth-setting tool or hand-held anvil, and hammer to strike the tooth’s tip, checking the set frequently with the spider. A set of 0.012 inch is good for most cutting applications. Flat-ground saws require more set to prevent them from binding than do tapered saws.

Adjustable Spider Gauge (Drawing MTDC–1014)
Freestanding Crosscut Saw Vise

Crosscut saw-filing vises (figure 7, drawing MTDC–1044) come in a variety of designs and styles. You can field sharpen your saw with a small or improvised vise, but this usually is done to correct an immediate problem. To properly sharpen your crosscut saw, a vise is needed to hold the entire length of the saw securely. The freestanding saw vise drawing in this report will accommodate up to a 7-foot crosscut saw. The drawing can be adjusted for larger saws. The freestanding saw vise can be adjusted and the vise can be rotated to a comfortable angle for the filer. The drawing includes a shelf for additional crosscut saw maintenance tools.

The freestanding saw vise can be assembled and disassembled quickly.

Figure 7—Freestanding crosscut saw vise.
Crosscut Saw Handle Brackets (Drawings MTDC–1024 and MTDC–1025)

Crosscut saw handles are becoming hard to find. MTDC has prepared drawings of two common styles of handle brackets: the Western style (drawing MTDC–1024) and the Eastern style (drawing MTDC–1025). The Western-style handle has a four-point adjustable hand and knuckle guard. The Eastern-style handle is a straight handle without hand or knuckle guards. Although loop-style handles were fairly common, MTDC prepared drawings of pin-through saw handles. The pin-through handles are easier to build and seem to be preferred by the majority of modern sawyers.
About the Author

Bob Beckley received a bachelor’s degree in political science from the University of Montana in 1982. He began his Forest Service career as a timber technician on the Nez Perce National Forest. Bob was a smokejumper when he came to the Missoula Technology and Development Center in 1990. He is a project leader and the center’s public and governmental relations specialist.

Library Card


Describes eight tools that have been redesigned by the Missoula Technology and Development Center. These crosscut saw maintenance tools are redesigns of traditional tools that are hard to find now. Chain saws can’t be used in wilderness and aren’t as light as crosscut saws. The U.S. Department of Agriculture Forest Service still uses crosscut saws and needs to maintain them. The report includes mechanical drawings of each of the tools. The tools are a: jointer, raker/pin gauge, tooth-set tool, hand-held anvil, adjustable spider gauge, Western-style handle, Eastern-style handle, and freestanding crosscut saw vise.

Keywords: anvils, mechanical drawings, gauges, handles, handtools, jointers, raker gauges, spider gauges, tooth set, traditional tools, vises

Single copies of this document may be ordered from:
USDA FS, Missoula Technology and Development Center
5785 Hwy. 10 West
Missoula, MT 59808–9361
Phone: 406–329–3978
Fax: 406–329–3719
E-mail: wo_mtdc_pubs@fs.fed.us

Electronic copies of MTDC’s documents are available on the Internet at:
http://www.fs.fed.us/t-d/ (Username: t-d, Password: t-d)

For further technical information, contact Bob Beckley at MTDC.
Phone: 406–329–3996
Fax: 406–329–3719
E-mail: rbeckley@fs.fed.us

Forest Service and Bureau of Land Management employees can search a more complete collection of MTDC’s documents, videos, and CDs on their internal computer network at:
http://fsweb.mtdc.wo.fs.fed.us/search/
Crosscut Saw Tooth-Set Tool

This tool is a copy of an early crosscut saw tool.

1. ANVIL
2. ARCH
3. HAMMER
4. SPRING

This is a reduced print.
Crosscut Saw Tooth File Guide

THIS TOOL IS A MODIFIED COPY OF AN EARLY TOOTH FILE TOOL.
Crosscut Saw Adjustable Spider Gauge

This tool is a modified copy of an early spider gauge tool.

Rake Spider Ass'y
2x Scale

1. Rake Spider Ass'y
2. Rocker
3. Legs

Material List

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rake Spider Ass'y</td>
</tr>
<tr>
<td>2</td>
<td>Rocker</td>
</tr>
<tr>
<td>3</td>
<td>Legs</td>
</tr>
</tbody>
</table>

Technological Development Center
Missoula, MT

Traditional Tool Series
Adjustable Spider Gauge

U.S. Department of Agriculture
Forest Service
Technology & Development Center
Missoula, MT

Drawn by: [Name]
Checked by: [Name]
Approved by: [Name]

Date: Jan 2014

Sheet 1 of 1

MTDC-1014
Crosscut Saw
Hand-Held Anvil

This tool is a copy of an early hand-held anvil.

Notes:
SHOW ALL EDGES EXCEPT FACE.
HANDLE SHOULD BE SMOOTH BUT NOT POLISHED SURFACE.

Traditional Tool Series
CROSSCUT SAW
HAND-HELD ANVIL

1 ANVIL
# CROSSCUT SAW RAKER/PIN GAUGE

**Frame**
- 15/16" top
- 3/4" depth
- 4 places

**File Guide**
- 7/16" top
- 1/4" depth
- 4 places

**Bottom Guide**
- 3/8" top
- 1/8" depth
- 2 places

**Raker Gauge Assembly**
- 3/16" top
- 1/8" depth
- 2 places

---

**Material List**

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FRAME</td>
<td>120 T-1 ALUMINUM</td>
</tr>
<tr>
<td>2</td>
<td>GUIDE</td>
<td>120 T-1 STEEL HARDENED</td>
</tr>
<tr>
<td>3</td>
<td>BOTTOM GUIDE</td>
<td>120 T-1 STEEL HARDENED</td>
</tr>
<tr>
<td>4</td>
<td>TOP GUIDE</td>
<td>120 T-1 STEEL HARDENED</td>
</tr>
<tr>
<td>5</td>
<td>PIN GAUGE</td>
<td>1/4&quot; L.R. SOCKET CAP SCREW</td>
</tr>
<tr>
<td>6</td>
<td>SCREW</td>
<td>B-10-32 x 1/4&quot; L.R. BUTTON HEAD SLEEVING</td>
</tr>
<tr>
<td>7</td>
<td>NUT</td>
<td>10-24 THERMAL PLASTIC</td>
</tr>
<tr>
<td>8</td>
<td>NUT</td>
<td>10-24 STAINLESS STEEL</td>
</tr>
<tr>
<td>9</td>
<td>SCREW</td>
<td>1/4&quot; L.R. SOCKET CAP SCREW</td>
</tr>
</tbody>
</table>

---

**Notes**

- This is a reduced print.
- This tool is a modified copy of an early crosscut saw tool.

---

**Traditional Tool Series**

- **CROSSCUT SAW RAKER/PIN GAUGE**

---

**Drawn by:** D. Mccutch

---

**Traditional Tool Series**

- **CROSSCUT SAW RAKER/PIN GAUGE**

---

**Date:** Jan 2003

---

**U.S. Department of Agriculture**

- **Technology & Development Center**

---

**Location:** Missoula, MT

---

**Scale:** Full

---

**Sheet:** 1 of 1

---

**Document Number:** MTDC-1021
Crosscut Saw Western Handle Bracket

THIS TOOL IS A COPY OF AN EARLY WESTERN HANDLE BRACKET

1. HANDLE
2. BACK PLATE
3. FRONT PLATE
4. STAND OFF
5. HAND GUARD
6. THROUGH BOLT

MATERIAL LIST

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HANDLE</td>
<td>3/16 ROUND HARDWOOD</td>
</tr>
<tr>
<td>FRONT PLATE</td>
<td>1 1/4 SCHEDULE 80 STEEL PIPE</td>
</tr>
<tr>
<td>BACK PLATE</td>
<td>1 1/2 SCHEDULE 80 STEEL PIPE</td>
</tr>
<tr>
<td>STAND OFF</td>
<td>5/8 X 1 1/2 STUD HANGER (.flat head, same threads)</td>
</tr>
<tr>
<td>THROUGH BOLT</td>
<td>5/8 ROUND COIL STEEL</td>
</tr>
<tr>
<td>HAND GUARD</td>
<td>1 1/2 RING TWO HOLES, (non-corrosive)</td>
</tr>
<tr>
<td>RING NUT</td>
<td>1 1/2 X 11-1/2 PLATED STEEL, NON-WEATHER DEBUG</td>
</tr>
<tr>
<td>NO SCALE</td>
<td></td>
</tr>
</tbody>
</table>

Traditional Tool Series
CROSSCUT SAW
WESTERN HANDLE BRACKET

U.S. Department of Agriculture
Forest Service
TECHNOLOGY & DEVELOPMENT CENTER
Missoula, MT

Drawn: RDG
Checked: RDG
Approved: RDG
Scale: FULL

DATE: SEP 2003
SHEET: 1 OF 1
MTDC-1024
Crosscut Saw
Eastern Handle Bracket

1. HANDLE
2. BACK PLATE
3. FRONT PLATE
4. THROUGH BOLT

MATERIAL LIST

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>MFG.</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HANDLE</td>
<td>1</td>
<td>1-1/4 ROUND HARDWOOD</td>
</tr>
<tr>
<td>2</td>
<td>BACK PLATE</td>
<td>1</td>
<td>1-1/4 SCHEDULE 40 STEEL, PIPE</td>
</tr>
<tr>
<td>3</td>
<td>FRONT PLATE</td>
<td>1</td>
<td>1-1/4 SCHEDULE 40 STEEL, PIPE</td>
</tr>
<tr>
<td>4</td>
<td>THROUGH BOLT</td>
<td>1</td>
<td>1-1/2&quot; HEADLESS WOOD螺丝</td>
</tr>
<tr>
<td>5</td>
<td>FLAT HEAD HARDWARE SHEET Met.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BOLT</td>
<td>7/16-14 ZINC PLATED STEEL, WASH OFFSET</td>
<td></td>
</tr>
</tbody>
</table>

THIS IS A REDUCED PRINT
Crosscut Saw
Freestanding Saw Vise
FOR 7-FOOT SAW

MATERIAL LIST

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>MFG.</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>STAND ASSEMBLY</td>
<td>PARTS 2-36</td>
<td>10</td>
</tr>
<tr>
<td>17</td>
<td>TAIL BRACKET</td>
<td>PART NO. 2</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>BASE PLATE</td>
<td>PART NO. 3</td>
<td>11</td>
</tr>
<tr>
<td>19</td>
<td>TAIL BEAKY</td>
<td>PART NO. 4</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>TAIL FREEZER</td>
<td>PART NO. 5</td>
<td>13</td>
</tr>
<tr>
<td>21</td>
<td>TRIM NO. 6</td>
<td>PART NO. 6</td>
<td>14</td>
</tr>
<tr>
<td>22</td>
<td>BELT</td>
<td>IT SPRING 9 1/2 IN. ROUND HEAD SQUARE NECK</td>
<td>15</td>
</tr>
<tr>
<td>23</td>
<td>REAR</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>16</td>
</tr>
<tr>
<td>24</td>
<td>WASHING</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>17</td>
</tr>
<tr>
<td>25</td>
<td>NUT</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>18</td>
</tr>
<tr>
<td>26</td>
<td>BOLT</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>19</td>
</tr>
<tr>
<td>27</td>
<td>CAP</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>20</td>
</tr>
<tr>
<td>28</td>
<td>HEAD</td>
<td>1/2 X 1/2 X 1/2 X 1/2 HEAD SQUARE NECK</td>
<td>21</td>
</tr>
<tr>
<td>29</td>
<td>WRENCH</td>
<td>IT SPRING 9 1/2 IN. ROUND HEAD SQUARE NECK</td>
<td>22</td>
</tr>
</tbody>
</table>

THIS IS A REDUCED PRINT

Traditional Tool Series
Freestanding Crosscut Saw Vise
Stand

U.S. Department of Agriculture
Forest Service
Technology & Development Center
Missoula, MT

DESIGNER: J. D. CULLOW
CHECKED: A. W. KAULEY
APPROVED: J. D. CULLOW
DATE: APR 18
SCALE: 1/8

MTDC-1044