

National Association of Watch and Clock Collectors, Inc

Educational Committee Field Suitcase Workshop Programs

FSW Student's Supplied Tools – for Clock Courses

For students taking F101, F102, F103, F104, F110, F200, F201, F202, F500, F501, F510, F511 Courses

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The student must bring the required tools listed, by course below, to class. Those not bringing these required tools may not be allowed to take the class. To simplify orders for some items, part numbers and vendors are given, however it is important to check description, due to vendors switching part numbers.

On Buying Tools: The student should decide the quality of tools they want to buy, however, we do encourage the student to buy good quality tools. A tool is an investment, and the use of poor tools can make your work more difficult and time consuming. When purchasing higher quality hand tools look for brand names such as: Channel-Lock, Bergeon, Dumont, Swanstrom, Lindstrom, Corradi, Grobet, Peer-Vigor & etc. Sears Craftsman brand is also good and guaranteed. Economy tools are usually made in China, Pakistan or India and the steel is soft and quality of these tools is not as good, so beware!

Drills: The drills recommended would be high-speed steel, 118-degree screw machine twist drills; Clock parts vendors do not always have the highest quality drills.

Files: Files should be high grade Swiss, or American. A good file will cost \$10 to \$15. There are two classifications of files to look for:

1. **American files:** American pattern files or shop files come in several configurations acceptable for this course. Look for configurations such as: Flat, Hand, or Mill files. These files are available in single cut or double cut surfaces, and the cutting surfaces are classified as bastard (course), second cut & smooth cut.
2. **Swiss:** Swiss pattern, needle or Jewelers files. These files are classified from #00 to #8 with the #8 having the smoothest cutting surface. These files have all sorts of shapes such as rectangular, round, half-round, triangular, square, etc. Some files have one safe side such as the Barrette, with no cutting surface at all. Approximate equivalences between the Swiss & American systems are: #00=Bastard, #0=Second Cut & #2=Smooth Cut.

Lathes: There are two general types of lathes available; used Jeweler's lathes and new/used micro-lathes. The FSW program recommends not buying a Lathe until the F200 class is taken, where buying instruction is given. See the minimum Lathe configuration needed for the FSW Program in the F200 Outline.

Jeweler's Lathes: The Jewelers lathe are good quality and easy to configure, but COMPATIBLE accessories may have to be bought separately, possibly from different vendors. Jewelers lathe components are not compatible so do not assume just any part will interchange, however some vendors will configure compatible Jeweler's Lathe components, if asked. DC or Universal AC/DC motor should be chosen, with a compatible motor speed control device; Lathe motor rheostats are not recommended. AC/DC motors operating on DC voltage are more efficient and have more torque. The 8mm Lathe with not less than a 12" bed is recommended. A collet holding tailstock is a very good feature. If a Jeweler's Lathe cannot be accessorized with compatible parts it is useless to the student and should not be purchased. Do not buy a lathe with rust, physical damage or mismatched parts.

Micro-lathes: Sherline is a good choice for students wanting micro-lathes and can be purchased new with all accessories from one vendor. Used Sherline Lathes are also available, but the student should beware of these lathe with damages or rusty accessories.

Lathe Split Chucks or Collets: The size of the lathe and its split chuck is designated by the diameter of the bore through the headstock spindle. The most common size to use in clock repair is the 8 or 10 mm. The 6mm and 12mm sizes were also used by the watch & clock industry, but rare and difficult to find. Increment or size of a particular set of split chucks are in fractions (usually 1/64 increments), in millimeters (usually 1/10mm), or in Stubbs' wire gauge as used in some drill sizes. The number on a metric split chuck and on a Stubbs' wire chuck may be the same, but will mean an entirely different size. For example: A #10 metric collet is 1mm. The #10 Stubbs size is 4.9mm or 0.193". Stubbs size range from #1 (.228 inches) to #80 (.0135 inches) with increments of .001" to .007". Metric sizes run from #1 (.1mm) to #80 (8.0mm) with 1/10mm increments. The metric increments are preferred because of the availability. Collets are available new and used.

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Split Chuck Compatibility: There were a lot of different manufacturers of split chucks, and they are not always interchangeable. It is best to try each chuck in the drawbar & headstock before purchase or have an exchange agreement with the seller. Some Moseley chucks are longer; the Boley keyway is shallow; Derbyshire makes a large diameter "8mm" requiring a larger drawbar. The chuck should have no rust, the three slits that separate the jaws should be equally spaced, and the thread and keyway should not be distorted.

Where to Purchase Tools: Students can purchase these tools from the vendors listed on the FSW vendor list. When a vendor is specified, that item is usually available from limited vendors, but is only given as a reference so the item can be found and does not restrict the purchase to that vendor.

Discounts: Some Horological vendors give discounts to NAWCC members if asked, especially if a large quantity of tools are purchased at one time. Discounts are strictly between the buyer and seller and the FSW makes no promises or guarantees regarding discounts on tools.

Vendor Part Numbers: The FSW program does not recommend one vendor over the other, so if you already have the parts or have another source, by all means use them.

For convenience to the student, some vendor part numbers are furnished; vendors that want their part numbers listed on this recommended parts list can do so by submitting them to the FSW program for consideration.

The Student needs to be aware that vendors do change part numbers or switch product for a given number, and the results will be the wrong part. When ordering parts make sure the descriptions are correct

Tools students are required to bring to specific classes:

F101/F102 Student's tools and Materials list:

1. Bench lamp: student's choice, but any high Lumina LED is best
2. Bench Vise, minimum 3-1/2" jaw width (see picture below); or 2-1/2" jaw width drill press vise.
3. Box to hold movement and parts: Maybe a Plastic shoebox with cover or cigar box or similar. A few one gallon size zip lock bags to sort parts in the box would be nice to have.
4. Clamps--to mount vise to table or bench (See picture) 2 each.
5. Extension with 12-foot cord for lamp.
6. Optical hood, 2x to 5x power. Optivisor is a good brand.
7. Files: 4" or 6" set of jeweler's files.
8. Hammer: 4 oz. ball peen hammer.
9. **OPTIONAL** Hammer: Small Brass head.
10. Leather gloves if you have them. Instructor should provide these with spring winder.
11. Mainspring Clamps (sometimes called "C" clamps; need 2 to fit your clock's spring). The flat ones are preferred because the round ones may not fit inside the movement.
12. Movement holder (hanging assembly/post kit). See timesavers.com item #: 13409 for an example.
13. Oiler: With high quality synthetic clock oil (Some brands are: Nye, Moebius or Novostar).
14. Paper towels (roll).
15. Pivot locator: small type with hook on end(s) Optional if you have a good pair of tweezers to help in locating the pivot when assembling the movement.
16. Pliers, small set: flat-smooth nose, long nose and diagonal cutters. (Good to buy quality here)
17. Safety glasses.
18. Screwdrivers: 4-6" long, with approximate blade widths of 3/32", 1/8" & 1/4".
19. Spring letdown key set with handle (7 piece American set is preferred).
20. Clock testing stand appropriate for testing the clock being repaired (can be home made, student's choice).
21. Tweezers: Quality is better.
22. Wrench: 4" crescent type.
23. Digital calipers - cheap is okay here, But quality ones are better.
24. Broaches (5-sided cutting set and smoothing set).
24. **OPTIONAL:** Lathe, Bushing tool, Spring winder. (**DO NOT PURCHASE** these optional items for this class). If you have them and it is convenient you may bring them to class.
25. If you have some spare suspension springs for your clock movement you should bring them also. They will be needed if yours gets damaged or broken.
26. 4" long pry bar set for removing pinions or hands. (Same or similar to TIMESAVERS.COM item # 32796)

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F103 & F104 Student tools: all tools specified for F101 & F102 plus the following.

1. Beat amplifier or clock timer with beat amplifier
2. Clock testing stand compatible with clock brought to class
3. Weights, cables, winding crank, key and pendulum for the clock being repaired and tested.
4. Optional: Lathe, Bushing tool, Spring winder (do not buy for this class)

F110 Student Tools: Same tools as used for F101, F102, F103 & F104

F200 Student's tools: (Important to check description, sometimes vendors switch part numbers)

1. Bench lamp: Student's choice
2. Bench Vise--3-1/2" jaw width & mounted on 3/4" board. (See picture below; must bring) Hardware store
3. Chalk for files, type used on blackboards
4. Clamp--to mount vise to table or bench (See picture)
5. Extension with 12-foot cord for lamp
6. Eye loupe or optical hood, 2x to 5x power. Optivisor is a good brand.
7. File card or Suede shoe brush (to clean files)
8. Files: 4" or 6" set of jeweler's files.
9. File; #4 cut Barrette type. (used to finish metal & pivots).
10. Files: Shop or Flat Bastard files with handles (files must be sharp), 8" to 10" flat double cut-Bastard, 8" or 10" flat single cut-Bastard, and a 6" round taper: Hardware store, ENCO, MSC
11. Hammer, 4-oz ball peen
12. Jeweler's Saw Frame: 1 dozen #4 Herkules brand saw blades: Rio Grande, or Google to find
13. Leather gloves
14. Paper towels
15. Paraffin or Bees wax to lubricate jeweler's saw blade
16. Pin Vise Set (sold as a set of 4) Horological Part Vendors
17. Precision measuring instrument (Student option, choose from below)
18. 1. Digital Caliper with both Inch & mm scale or Horological Part Vendors
19. 2. 6" Caliper in Inch and mm scales or MSC #06410112
20. 3. A Micrometer 0 – 25 mm and a Micrometer 0 – 1" MSC #06392708 & #06400410
21. Safety glasses
22. Scale or ruler: 1/2 x 6in. flexible 5R--Starrett type MSC #86412822, Hardware store

F201 Student tools: A lot of tools are requires for this course with some options for the student.

The minimum Lathe configuration requirements was explained to all students in the F200 class. The student is required to bring to the F201 class either a Jeweler's or a Micro Lathe with the features and accessories described below, no exceptions, please. **AGAIN PLEASE NOTE:** The student should not plan to attend the F201 class without each and every tool in one of the Lathe configurations detailed below, for they will not be able to finish the class without these tools. If the student has questions about this Lathe configuration, please call a FSW instructor or administrator for your answers.

Lathe Mount: It is good to have the Lathe mounted on a board or similar surface that can be attached to the table with a clamp so it is rigid and does not move when being used.

F201 basic tools: All tools specified for F200.

F201 Students with a Jeweler's Lathe are required to have the following:

1. Compatible operational Lathe & bed with foot or base, head-stock, tailstock and draw bar
2. Tool rest
3. Steady rest
4. Universal AC/DC motor
5. Motor speed control with on/off switch (rheostats are not recommended; use an autotransformer or Variac)
6. AC-to-DC converter or full wave rectifier bridge circuit.
7. Jack-shaft or Counter-shaft.

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F201 Students with a Sherline Lathe are required to have the following:

1. Operational Lathe & bed with base, headstock and tailstock
2. Tool rest
3. Steady rest
4. Head-stock collet adapter
5. Tail-stock collet adapter
6. Sherline Jacob's chuck
7. Sherline Motor with speed control & on/off switch.

F201 Students with other type Lathes: Other type Lathes are required to have an equivalent configuration to the Jeweler's or Sherline Lathes outlined above including the accessories. Lathes without collet adapters, tool rests, or steady rests are not recommended bases on past students' experiences who were not able to complete their class.

F201 Collets & chucks needed for any Lathe configuration: It is believed that students doing general clock repair will need, as a minimum, a set of collets #10 through #50 in even numbers. However for the F201 class, with the required 3-jaw independent chuck, only the #16, #32 & #48 collets are needed. (If the student has a Jeweler's Lathe, the Sherline 3-jaw chuck with an 8mm adapter is sold for a fair price and is recommended).

F201 other tools needed: (Important to check description, sometimes vendors switch part numbers)

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|---|---------------|
| 1. #1 thru 60 HSS or Cobalt Drills- <u>Screw machine or stub drills</u> (no imports) | MSC #09233800 |
| 2. Tap 4-40 NC Threads, spiral gun type - HSS | MSC #84810449 |
| 3. Tap 6-32 NC Threads, spiral gun type - HSS | MSC #84811637 |
| 4. Tap 8-32 NC Threads, spiral gun type - HSS | MSC #84811728 |
| 5. Tap wrench | MSC #05041637 |
| 6. Thread die, 8-32 NC Threads - HSS | MSC #88421078 |
| 7. Thread die, 6-32 NC Threads - HSS | MSC #88421060 |
| 8. Thread die wrench | MSC #03720521 |
| 9. Circular saw blade 1¾ x .020, 3/8 bore - HSS | MSC #73292708 |
| 10. Pin Vise Set (sold as a set of 4) | |
| 11. Files: 4" or 6" set of jeweler's files | |
| 12. File: Barrette type (#4 or #6 cut). | |
| 13. Student to bring all materials and tools made in the F200 class. | |

F202 Student tools: all tools specified for F200 & F201 plus the following.

1. Inch Micrometer
2. Collets, no collets are required for this class, but as an option, bring the collets you have.
3. Slide Rest (Cross Slide) with 2 or 3 slides and a tool post that will accommodate a 3/16" x 3/16" tool. The interregnal alignment shoe as used by Levin, Derbyshire, American Watch Tool Company and others is preferred over a saddle type shoe which is separate from the slide rest. If you use a saddle type shoe be insure that it is included and fits your slide.

F500 Student Tools: Same tools as used for F101

F501 Student tools: All tool required for the F101 course plus the following. (Important to check description, sometimes vendors switch part numbers)

1. American Kitchen Clock movement with outside escapement wheel that has been cleaned, oiled and properly bushed as described in the F501 movement document.
2. Cutting Broaches
3. Smoothing Broaches
4. Jewelers Saw
5. Jewelers Saw Blades
6. 6" Flat File
7. Digital Caliper
8. Flat Punches
9. Sharpie Marker (Fine Point)

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10. Rodico or Play-Doh
 11. Diamond coated file set: Timesavers #29029 or #29380 or equivalent
 12. Feeler Gauge; MSC # 59716175 or equivalent, if you have one bring it
 13. Three (3) Verges; Universal blank (3 is minimum needed): Timesavers' #12503, Merritt's #P-629
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F510 Student Tools: Same tools as used for F101, F102

F511 Student Tools: Same tools as used for F101, F102, F103 & F104

See vise picture below

Bench Vise on Mount



**Recommended Bench Vise
Configuration for F200 & F201
Courses**

Mount a bench vise with at least a 3.5" jaw width on a ¾" piece of plywood so it can be clamped to a table or bench.