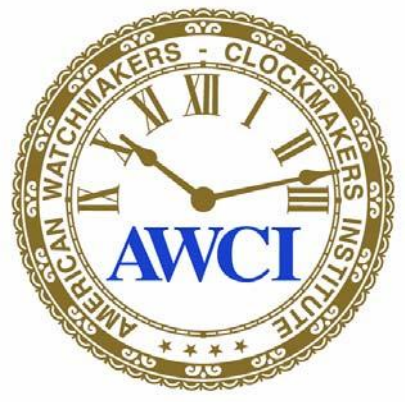
TWENTY FIRST CENTURY CLOCKMAKERS



STANDARDS AND PRACTICES

Version 8, October 2010

Preface

Putting together a set of standards and practices is not an easy task. I applaud the work done here by the Education Committee.

Establishing a set of standards is important in any field, perhaps even more so in clock repairing. Much of our work revolves around timepieces for which there are no factory guidelines to follow, no factory schematics or oiling charts, no field service manuals with the proper steps and procedures recommended for a particular product. Our only previous reference was the knowledge and materials left behind by our past expert members and the little bits of information that have been found from manufacturers now gone.

By developing a set of well documented Standards, we have a measure for judging our methods today and in the future. We can use these to appraise ourselves. Am I using the best methods the correct way? Where might I need additional training? As doctors are sworn to do, so should we first, do no harm? We are stewards of the products that we work with. We must see to it that what we do is best for both the client ***and*** the clock. Some methods may be faster, but are harmful for the long-term survival of the clock causing more expense to the client and more work for future repairmen.

For the individual, these standards give one an indication of what level of skill they need to do quality work, and also what they need to do to improve themselves. For AWCI, these standards give us guidance in what types of courses we need to provide for our members to insure that needed skill information and technology are always available. As the premier professional organization for Clock and Watchmakers, our goal is to help all of our members reach the highest level they are capable of and thus be more productive and more financially secure! For the amateur (one who does it for the love of it and not the money) reaching for these levels is personally rewarding. Even if you only repair your own clocks, you want them to be repaired properly.

AWCI hopes that all members will aspire to grow and develop their skills whatever their level, and strive to become the future experts that help our organization continue on its mission.

Jim Door
President, AWCI

Acknowledgments

Setting standards is perhaps the most difficult challenge that a skilled craft can do for itself. It involves the efforts of many which have the tenacity to work through this type of chore and see it through to the end. In its mission statement, AWCI has dedicated itself "to preserving and promoting the highest standards of workmanship in the horological crafts. It is the role of AWCI to set the standard of excellence to be applied to the quality of instruction for both the repair and restoration practices that are taught worldwide to watch and clock makers." It is through perseverance, commitment, patience and cooperation that this document has arrived at its current form. As the craft and the organization evolve, so will this document. We entrust the safekeeping of these standards to the AWCI membership and its Board of Directors to maintain it. I wish to acknowledge the following, however, for their help in bringing the document to this level today. It is through their sacrifice that this document stands for the quality that is the hallmark of our organization.

Education Committee

Jerry Faier, CMC/AWI, Chairman Vince Schrader CMW/AWCI, Watch Section Chair Michael Gainey, CC/AWI, Clock Section Chair, Brien K. Dews, CC/AWI, John Bryant, CC/AWI, Mark Baker, CMW/AWI, Wes Cutter, CC/AWCI

We also want to thank others that have helped us with suggestions and considerable knowledge.

Mark Butterworth, Butterworth Clocks Peter Lickl, Black Forest Imports Jim DeRosier, Empire Clock JK Nicholas, Chelsea Clock Company Robert Macomber, CMC/AWI Jim Riggs, CC/AWI The Howard Miller Clock Company Helmut Mangold, Hermle ClocksPaul Hoffman, Ridgeway Clocks

And the dozens of others who took their time to help us complete our mission.

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AWCI's Standards of Excellence

The standards of performance expressed in this document represent the agreed upon knowledge, skills, performances, and dispositions required of the clockmaker of the **21st century**, if he/she is to attain certification status and be accorded this designation by the American Watchmakers Clockmakers Institute (AWCI).

In brief, "**KNOWLEDGE**" refers to the content or body of information pertinent to the modern practice of horology. In other words, what should a modern clockmaker KNOW?

"SKILLS" refers to the DEMONSTRATION of the knowledge through various types of performances. Thus, whether we speak of replacing a pivot, resetting a depthing using a bushing, cutting a custom bushing on the lathe, researching information for a historical restoration, or tempering steel, we are referring to what a clockmaker must be able to DO with his/her knowledge.

Finally, "**DISPOSITIONS**" refers to the exhibition of a behavior of **professionalism**, and addresses such topics as ethics, attitudes toward quality of service, cleanliness of workplace, and attitudes consistent with a high degree of professionalism.

In this document, the reader will find the term "**PROFICIENCY**" used quite often. This is a general term often used to itemize or "detail" (break into smaller components) a specific standard, and frequently will involve the combining of knowledge, dispositions, and skill demonstrations in a single statement. One might think of the proficiency statements here as expressions of what a clockmaker should "know and be able to do in a skillful and competent manner."

As an organization that professes to bear the highest standards for clockmaking education, assessment, certification, and ongoing practice, it is imperative that AWCI, through the agreement of its expert members, in concert with business and industry, set forth these standards, and demand that its membership abide by them proudly.

Certification Categories:

This document addresses the following certification categories (and titles for certificates) for its new standards structure.

Clock Associate . Certified Clockmaker . Certified Master Clockmaker . Certified Master of the Institute

Certification Descriptions:

Clock Associate (CA21)

Description: This certificate is for the person who wants to begin working in the world of clock repair as a counter person and/or assistant to a Certified Clockmaker or Certified Master Clockmaker. It is also a stepping-stone to begin the study of clockmaking and to later become a Certified Clockmaker. It is not intended to recognize an individual who "repairs clocks." It will be very useful to those people who want to work as an assistant to a clockmaker, or with the supply of clock materials, as it will acquaint them with the general workings of clocks and their parts.

Certified Clockmaker (CC21)

Description: This certificate is awarded to those who have demonstrated the necessary skills to repair and restore the majority of clock types that are prevalent in the United States including mantel, wall, and floor clocks. The holder of this certificate is urged to progress and continue his/her studies and to qualify for the CMC which encompasses even more technical skills needed for the restoration and conservation of all types of clocks, modern, vintage and antique.

Certified Master Clockmaker (CMC21)

Description: This certificate is awarded for the demonstration of the necessary skills to repair any type of clock, modern or archaic, pendulum or balance wheel. These skills include those demonstrated by the CC plus those necessary to perform services to carriage clocks and other timepieces that use balance wheels as their rate controllers. Certificate holders also must show the needed skills to fabricate any required parts for these clocks. Such skills include but are not limited to the following: gear/pinion cutting, lever and cam fabrication, escapement construction, etc. CMC's should also be familiar with general repairs to clock cases.

Certified Master of the Institute (CMI):

Description: The Certified Master of the Institute is a special award bestowed upon those who are recognized by the AWCI Board of Directors as possessing the professional knowledge to service a wide range of timepieces (e.g. complicated watches, vintage pieces, whether watches or clocks). This individual holds both the CMW and the CMC certificates (either AWI or AWCI). He/She needs to be able to design spare parts and manufacture them. He/She has advanced communication and interaction skills for the purpose of training watch/clockmakers in preparing for either the CC or CW exam. He/She must model AWCI's code of ethics in all of his/her dealings. The Certified Master of the Institute is a **"Steward"** of the science and art of horology, and is dedicated to the highest ideals of the profession and to the care and perpetuation of the American Watchmakers – Clockmakers Institute.

Essential Knowledge, Performances, and Dispositions for 21st Century Clock Certifications:

Clock Associate (CA21) General Commentary:

Requirements: The candidate must complete written/practical tasks as required and submit them to AWCI for review.

Assessment: All scoring of assessments will be “pass/fail” with explanations on failures provided. Candidates will be given the opportunity to retest a failed section until passed.

Procedure: The candidate for this certificate must request materials, one section (of seven) at a time, fill out the proper forms from the AWCI office and pay all fees. To complete this certificate, the candidate must then complete all seven sections, scoring a “pass” to be issued a certificate of completion.

Disclaimer: The candidate must clearly understand this is a program to develop general knowledge and skills and is not an authorization to begin the practice of clock repair. (A waiver will be included in the initial enrollment packet for candidate signature and testifying to this understanding.)

Time: There is no time limit to any particular assessment section BUT if a candidate does not complete the program within one year, without filing a legitimate reason for a time extension (which must be approved by the Board of Assessors), certification procedures must be reinitiated.

Essential Knowledge and Skills

Introduction to Clocks—Their Repair and Restoration:

The candidate will be able to:

1 Label and identify typical clock styles, their period of popularity, and country of origin from the 1800’s to the present.

2 Identify and label the basic components of a variety of clock movement types, including:

A. Time only with simple, compound and torsion pendulums.
B. Time and strike movements—both rack and snail and count wheel/lock plates.

C. Chiming movements

3. Explain the reasons for the following operational problems and know/show what corrective actions are most typically taken for:

A. Bearing/pivotal wear (depthing)
B. Beat errors
C. Power supply problems (mainspring/weight)
D. Lever actions

4. Demonstrate, adjust, describe and/or make drawings of the following processes:

A. Beat setting and self-setting beat mechanism.
B. Determine whether hands can be moved backwards or forwards without difficulty.
C. Correct the synchronization of time and strike and time/strike/chime clocks.
D. Show proper winding procedures for both spring and weight clocks.
E. Make speed adjustments, knowing the differences for long and short pendulums.
F. Set the hammers of a chime clock correctly.

5. Demonstrate the ability to place hands correctly and adjust them correctly to get releases at the quarter hours and enable correct synchronization release at the hour.

6. Demonstrate a written knowledge of the features of a modern grandfather movement including each of the following:
A. Moon dial principles
B. Chime selection and rules for moving selector
C. Hand setting
D. Beat adjustment
E. Night silence feature
F. Handling brass parts
G. Winding
H. Time regulation

7. Identify and describe the proper quality and/or design of the following tools:
A. Screw and nut drivers—what the shape should be to properly fit screw slots and nuts.
B. Pliers - for pin work, adjusting, and shaping, etc.
C. Files, buff sticks, and burnishers
D. Tweezers—designs for specific tasks
E. Jewelers saw
F. Wire bending/adjusting tools
G. Broaches— cutting and smoothing
H. Let-down keys
I. Staking tools, punches, blocks and stumps
J. Bushing reamers and two common systems—Bergeon and KWM
K. Pegwood and pithwood and their uses

Certified Clockmaker (CC21)

Re: Certified Clockmaker (CC21) General Commentary:

Requirements: Complete an examination of 10 components grouped into 3 sections, Box 1, Box 2 and Box 3. Box 1 requires a Mentor to be present when its 4 performances are completed. It is carried out at the candidate's work site while the Mentor observes each task as it is performed and completed.

Box 1 Components:
1. An on-site review of the work area done by *only* the supervising Mentor; 2. A written examination; 3. The replacement of a damaged pivot on an AWCI provided wheel; and 4. The replacement of several teeth on an AWCI provided clock wheel.

Box 2 and Box 3 Components:
Box 2 and Box 3 are composed of 3 performances in each box to be completed. These parts of the CC assessment will not be mentored. In these, the candidate will repair different clock types and complete several other performance items, such as the cleaning of a barrel and spring with the reending of a section of mainspring and the rebuilding of a lantern pinion. (See the complete list of all performances below.) All materials will be submitted to the AWCI Board of Assessors (BOE) for scoring as specified for each section.

Assessment: The examinee must meet minimum performance standards on ***each*** portion of the examination in order to receive certification. Scaling will be adjusted so that the "cut" (passing score) rests at 70% (or a rubric of 4.9). If retesting is requested, it may be allowed (at the discretion of the BOE) if no more than three sections of the entire assessment are below this percentage. To receive the 21st Century Certified Clockmaker Certificate, the candidate MUST pass ***all*** 10 sections with at least minimum passing scores. Scores will NOT be added together and averaged. Any disputes of scores obtained may be submitted to the BOE by following the "Rules of the AWCI Certification Appeals Process." (See pg.52) Failure on any 4 or more performances will result in the examinee being required to retake the entire examination **at his/her own** expense.

NOTE: If retesting for any section of Box 1 is granted, the retest must be observed by the mentor, unless otherwise approved by the BOE. If retesting of any of the other items is allowed, additional costs will be applied as determined at the time the request is granted by the BOE.

Recommended Tooling List For Clockmaker Examination

1 WW style lathe and collet set, tooling (gravers) and burnishers
2 Measuring devices (with both inch and metric)—calipers is essential, micrometer is optional
3 Number drill set
4 Assorted files, buff sticks and abrasives
5 Torch/alcohol lamp with solders and fluxes
6 Jewelers saw and blades
7 Bench pin
8 Let-down keys
9 Mainspring clamps
10. Bushing system tools and bushings (KWM, American or Bergeon)
11. Cutting and smoothing broach sets and handles
12 Assorted hand tools—pliers, screwdrivers, nut drivers, hammers, etc.
13. Staking tool set or punch set and bench blocks
14. Lubricants, oils and applicators
15. Cleaning and drying system—that is safe!
16. Bench vise
17. Assorted tweezers
18. Pegwood, etc. for cleaning pivot holes, etc.
19. Safety goggles or glasses
20. Leather gloves and work protection gloves
21. Brass and steel stock
22. Loupes or optics
23. A variety of movement test stands

Optional Tooling Recommendations

1 Drill press
2 Bench mill
3 Dental burrs or jewelers burrs
4 Mainspring winder
5 Electronic movement timer
6 Ultrasonic cleaner(s)
7 Bushing tool
8 Larger lathe (6” and up with necessary tooling)
9 Step chucks, bezel chucks and drill chucks (even for the WW lathe)

Examination Procedures

The Following Steps Sequentially Describe the AWCI Assessment and Certification Process.

Step 1: Candidate requests material packet from AWCI Central.
Step 2: Candidate submits required documentation and fees.
Step 3: Within 30 days, AWCI will designate a Mentor to supervise the first component (Tier 1) of the examination. The Mentor and the examinee will *jointly* determine the time the exam will begin and the materials will then be forwarded to the Mentor.
Step 4: Box 1: The written portion, on-site performance task, the pivot and wheel performances will be completed and returned to AWCI for grading at the close of the Mentor section.
Step 5: Box 2: At the close of the Box 1 exercises, the Mentor will leave a second box (Box 2) for the candidate to complete and return to AWCI. (On successful completion of the 1161 for scoring (performance #7), movements will be returned to the candidate BUT *Movements may or may not be re-assembled when returned*). Once the Box 2 is given to the examinee, 14 calendar days will be allowed for completion of the tasks and repairs to errors as they have been systematically introduced by the BOE. The materials must be returned to AWCI, postmarked or shipping marked, showing that the work has been completed and shipped not later than 14 calendar days after initial receipt by the examinee. For each day late, (as determined by the verified shipping date), a 10% reduction in score for this task will be given.
Step 6: On receipt of Box 2 at AWCI for scoring, Box 3 will be shipped. This will include a standard 400 day clock movement, an American T/S movement, and a Cuckoo with music to complete. (See the complete list below.) This Box 3 too must be completed within 14 calendar days as above. The completed project is due at AWCI Central, postmarked or shipping marked that shows the work was completed and shipped as above.

Time Limits:
1.) Candidates will have exactly 14 calendar days to complete the required activities on Box 2 and 3 and to return the components to AWCI Central. A 10% reduction in score will be imposed for each day late.
2.) Return packing and shipping are the responsibility of the examinee.

Cancellation Policy:

Any request for cancellation must be tendered to AWCI not less than 20 business days BEFORE the examination is to begin or no refund will be given.

Mentored Components:

In the presence of a BOE approved Mentor, the examinee will perform a pivot project, a toothing project, and take a written examination. The written examination will be "open book." (Candidates may use their own reference materials.) The Mentor will proctor this portion of the examination, which may last no longer than 3 hours. (See Sample Examination Questions at end of this document.) There will be a shop review preformed by the Mentor as the candidate works on the other examination items.

The pivot and toothing performances will be performed with the examinee's equipment in his/her own workshop. (Other arrangements can be made with prior written approval from the BOE.) These projects (pivoting, retoothing, and written examination) must be completed by the end of the initial testing day. This entire first portion (Box 1) should take no longer than 9 hours (including a lunch break.) The Mentor will return all materials to AWCI for scoring.

Shop Review-Performance #1

The candidate's shop must be clean, organized, safe, and secure from accidental damage to customer products as well as from fire risks. The Mentor reserves the right to stop an assessment if he/she feels that unacceptable odors or physical safety risks are present. You can prepare yourself by simply cleaning up and organizing your shop for safety, be sure you have a fire extinguisher nearby, and insure that there are no toxic or strong odors that make working in your shop uncomfortable or unsafe.

Written Assessment-Performance #2

This assessment section asks about your knowledge of 6 major areas of clock work. It is recommended that you consult several of the texts listed in the Bibliography at the end of this document. There are other texts as well that are not listed but if you are unsure of what is "the better way", check out several to give you a broader perspective or contact AWCI. We are assessing the breadth of knowledge that you have acquired. This section is open book and you may have any and all texts you deem necessary out and available to you as you complete the questions.
The sections:

1. History of clocks—is able to identify case styles, makers and historical points as to when certain general styles, makers and when historical firsts occur, etc..
2. General Mechanics—calculation of beat rates and pendulum lengths, gearing, horological electricity, anatomy of depthings, effects of wear, etc..
3. Escapements—master the terms drop, lock, and lift (and be able to discuss them), wear scenarios, correction of wear problems, self-beat correctors, etc..
4. Striking and Chiming—issues of stop, release, and warning, wear scenarios and their corrections, self correction scenarios, hammer actions/sequences, etc..
5. Metallurgy—as it effects horological products, knowledge of the materials and the conditions we subject them to, etc..
6. Springing—calculations, thickness/width/length issues, and replacement issues, etc..

Pivot Exercise-Performance #3

The Candidate will be given a wheel that has 1 pivot end that is badly scored. That end must be replaced with a new pivot that matches the pivot on the opposite end of the same shaft exactly. The new pivot will be scored on its dimensional accuracy as well as the maintenance of the original arbor length, finish quality, security and temper.

Wheel Exercise-Performance #4

You will be given a wheel on which 1-3 teeth have been removed. It is your challenge to replace those missing teeth as exactly as possible to the original ones. You will be scored on dimensional accuracy to the other wheel teeth, as well as plug fit, surface finish and damage to surrounding teeth.

Performance sections and timelines *after* the Mentor visit:

This next phase of the examination will not be monitored. There are two Boxes that will be given/sent to the candidate for completion. He/She will receive the first Box (Box 2) from the Mentor after Box 1 is completed and returned to AWCI for scoring. The **examinee** is responsible for all return shipping and safe packaging of these products. Once AWCI has received Box 2, Box 3 will be sent out for completion by the candidate as well. (Note: Due to inherent movement differences, duplicate testing of some performances may occur across different types of movements. As such, all items listed in the General Movement Servicing sections may be tested more than once.)

Box 2 will consist of:

Barrel and Mainspring Exercise-Performance #5

1.) The candidate must safely remove, clean, lubricate and reinstall a barreled mainspring. The barrel, its cap and arbor must be cleaned and serviced as required. The mainspring must be thoroughly cleaned, lubricated and safely reinstalled in the barrel. This process can be done with a mainspring winder or by hand. Safe handling (and protection of the examinee) must be part of the process. Your work will be scored on the cleanliness of all teeth, arbor pivots, and their pivot holes (even though you are asked not to do any bushing work, here we are looking for cleanliness and finish.). Winding smoothness will be examined as well as the fit of the arbor, barrel cap (as well as the flatness of the cap) and spring flatness within the barrel (re-flatten if necessary).

NOTE: Examinee will not be required to *bush* the barrel in this exercise.

2.) Re-construct the end of a strip of mainspring stock by installing a proper hole like those seen in commercial mainsprings. You will be evaluated on annealing qualities; hole centricity, size, shape, and quality; outside end shape; shape of the end for barrel attachment and ease of installation (as if it were a full length mainspring). Your spring end should match the character of modern products.

Lantern Pinion Exercise-Performance #6

Demonstrate your ability to properly rewire a lantern pinion. Your work will be assessed on how well you maintain the original design specifications, so be very careful to maintain all specifications. You will be evaluated on collar positions, wire size, security of wires and method for doing so as well as overall handling quality.

Floor Clock Movement-Performance #7

Total GMS (see page 19) of a modern floor clock (grandfather clock) movement will be performed by the candidate. Performance tasks will include general movement servicing and *may* include: Pivoting, pivot polishing, tooth work (straightening/retoothing), bushing/redepthing, pivot hole polishing, lever adjusting/repair, escapement adjusting, hammer synchronization/adjustment, warning set-up, hand release position,
suspension/crutch problems, and stopwork alignment, etc.. (See items 1-26 in the GMS section of this S&P.)

Time for Box 2: 14 calendar days will be allowed to complete the tasks assigned by the BOE (from the Standards) for this entire box series. The completed projects are due at AWCI Central, postmarked or shipping marked, showing the work completion and shipping no later than 14 calendar days after initial receipt by the examinee.

Box 3 will consist of:

Modern Cuckoo Clock with Music-Performance #8

Performance tasks may include: All "General Movement Servicing" processes, skills and knowledge may be components of this task including strike, gathering, warning, rack and snail problems. Candidates may be asked to adjust operation levers, music levers, make governor adjustments, comb adjustments and insure proper dampening, adjust striking levers, door control levers and bird levers. Also included may be action/dancer sequences, escapement adjustment, suspension wire problems, bellow repairs, lift wire adjustments, and hand/strike point adjustments.

400-Day Clock-Performance #9

Performance tasks may include: suspension spring service, escapement resetting, beat setting, hand tension and alignment, and pendulum action. Even though candidates will not be asked to do rebushing of these clocks, other skill or task demonstration as outlined in "General Movement Servicing" may be required. Candidates will demonstrate these proficiencies as requested.

American or American Style Time and Strike Movement-Performance #10

This movement will NOT receive General Movement Servicing. There are *NO* errors introduced to pivots, pivot holes or mainsprings. The mainsprings have been serviced enough to allow the Assessors to evaluate the necessary problems without further work. There *will* be a need to do adjustments, fabricate a missing lever, adjust the escapement and get the clock to run *and* strike properly. This product is expected to run (pendulum motion is important—it should meet the properties of this type of escapement) but timing *will not* be evaluated. The clock should strike properly, keeping up with the time indicated by the hands and roughly (plus or minus a minute or so) at

the proper points. Hands will be provided to ensure consistency of results. When returned, the mainsprings should be let down again into the "C" clip "keepers" provided. The Assessor will wind the movement, set it on a test stand, attach a pendulum, set the clock in beat and watch its operation and do the evaluations from that point. It will be evaluated for pendulum action, strike action and smoothness (as well as strike point) and the whole for ease of operation. There are a series of questions that are also included as part of this exercise. The questions provided are to be answered completely and returned along with the clock materials.

Time for Box 3: Same as for Box 2 above.

Certified Master Clockmaker

Clock Certificate: **Certified Master Clockmaker (CMC21)**

Description: The holder of this certificate must be able to demonstrate the skills, knowledge, and dispositions of the Certified Clockmaker, plus have the ability to fabricate parts for any clock of any age, and design, both pendulum and balance wheel types. They must also demonstrate the ability to service a pocket watch movement, doing general adjustments to timing and balance action.

There are several ways to demonstrate the qualities needed to be awarded this certificate. They include: (See Pathways section for further details.)

A. Standard test examination and skill demonstration as described below;

B. Submission of an alternative program to the BOE for its approval (See Pathways section for further details);

C. Submission of plans, procedures and skill lists of techniques used to fabricate a clock movement and case. A BOE approved Mentor will need to verify the authenticity of work completed.

Procedures: Since the options vary with this certificate, situation specific procedures will result from the program selected and the directions of the BOE. In the case of special programs, all steps and results must be documented, photographed and presented to the BOE as specified.

Certified Master of the Institute (CMI)

Requirements:

The Certified Master of the Institute possesses the professional knowledge to service a wide range of timepieces (e.g. complicated watches, vintage pieces, whether watches or clocks). This individual will hold both the CMW and the CMC certificates (either AWI or AWCI). He/She needs to be able to design spare parts and manufacture them. He/She has advanced communication and interaction skills for the purpose of training watchmakers and/or clockmakers in preparing for either the CC or CW exam. He/She must model AWCI's Code of Ethics. The Certified Master of the Institute is a "Steward" of the science and art of horology, and is dedicated to the highest ideals of the profession and to the care and perpetuation of the American Watchmakers – Clockmakers Institute.

Prerequisites:

Candidates must hold both the CMW and the CMC status for three years and have demonstrated skills in the restoration of vintage and complicated watches *and* clocks. Candidates must understand the use of lathe and milling machinery and demonstrate their use in the restoration and/or preservation of timepieces, both modern, and historic.

Procedures:

The CMI may only be achieved by recommendation of the Board of Assessors and approved by the Board of Directors of AWCI. The CMI candidate must submit an application and resume to the BOE showing the following:

1. Photocopies of his/her CMW and CMC certificates from AWI/AWCI.
2. A work resume in horology including any publication materials.
3. Photographs of watch and clock restoration projects with a description of the work performed.
4. Photographs of the work shop area with general equipment used.
5. Mentored review of the work in progress by a representative of the BOE.

CMI Roles and Responsibilities:

The Certified Master of the Institute is:

1. Dedicated to the preservation of horological knowledge.
2. Dedicated to horological education and willing to share his/her knowledge with others.
3. Dedicated to the Standards and Practices of the AWCI, and to the continual growth and improvement of the Institute and its practices.

Essential Performances for All Clockmakers

The Education Committee, after detailed discussions, recognizes that there may be several scenarios that can be used to define what procedure may be the correct one to follow in a given situation. As such, the benchman's dispositions and skills are what create these options. It is the goal of the Standards and Practices to set the "default" guideline in any situation where another option is not a clear, precise choice.

On the issue of replacement:

When it is determined that to implement a "successful" repair, a replacement movement is the best course of action (given customer needs, historic considerations, structural changes needed, and/or costs), it is the AWCI's expectation that a movement of like kind and configuration will be the product used. It is considered inappropriate to replace most clock movements which were manufactured before 1970, after which the aggressive use of plated, leaded steels became common. It must be remembered that AWCI members holding certificates are "stewards" of horology and horological history. As such, they are obligated to strive to maintain the integrity of the original manufacturer's intent.

General Movement Service (GMS):

"General movement service" refers to the complete disassembly and servicing of each component of a timepiece by the Certified Clockmaker. This was once referred to as "putting a clock in good running order (GRO)," or "performing an overhaul." Clockmakers of the 21st Century are aware that during this new age we must make a differentiation among "repair," "restoration," and "preservation/ conservation."

The "repairer" performs services to clocks that succeed in making the piece function effectively. This is done in an ethical and workmanlike manner. However, "repair" may well ***not*** *refer to the concept of "restoration" which implies returning a timepiece COMPLETELY to its original, as new, condition (save the use of bushings, new pivotal material, and other additions/replacements as needed to return the design to its original intent). To the extent possible, 21st Century Clockmakers will endeavor to accomplish restoration to "original specifications" in their repairs, but with the caveat that complete knowledge of all the history of the original design and materials may not be known or completely determinable. It is, however, incumbent on the repairer to avail him/herself to study and learn as much of this history as possible.*

The critical function of performing true restoration and preservation/conservation of timepieces of all types is the ultimate responsibility of horologists AWCI has certified as Certified Master Clockmakers, (CMC), and to Certified Masters of the Institute (CMI). These must be the individuals to whom the stewardship of horological knowledge, skills and practices, must fall. It is hoped that many CC's will aspire to these levels of professional attainment.

Essential Knowledge, Performance, Dispositions and Proficiencies:

The following list of practices is the Education Committee's recommendation for **ALL** Clockmakers, in the general servicing of any movement, as set forth by expert horologists in concert with members of industry and business and for use in education, assessment, certification, and ongoing bench practice.

General Movement Service (GMS) consists of:

1.) Full disassembly of the movement, removing all levers, cams, etc. for proper service work to be completed on each piece. Any marking that should be deemed necessary, should be as unobtrusive as possible.

2.) All parts should be cleaned before work is begun in order to expedite inspection and review of needed repairs. The use of technologically appropriate techniques and equipment in light of conservation or manufacturing recommendations is preferred. (Care should be taken to maintain the quality and integrity of original lacquer coatings when present.) This expedites inspection and review of needed repairs. (Simple procedures – such as "spray" or "dip" for removal of surface contamination are not considered acceptable on their own as a General Movement Servicing for assembled movements.)

3.) All shafts should be reviewed for truth in reference to their pivots and straightened as needed. Care should be taken to prevent surface marring during the straightening process.

4.) All pivots should be returned to their proper original shape, free of any rutting and gall marks, and burnished brightly. A properly burnished pivot will have a square shoulder, uniformly cylindrical shape (except for such examples as the old Black Forest Cuckoo) and a mirror like finish with no scratches visible to the naked eye and almost imperceptible under 3X loupe. Burnishing is the process of using a hard polisher that renders the finish bright without polishing media. In cases where the pivots are hardened, bright polish is acceptable. Polishing a pivot assumes the use of various abrasive media. Extra care must be taken to ensure that ***none*** of the media can get back into the movement bearings and destroy the entire movement. Shafts with pivots worn beyond acceptable tolerance (beyond structurally safe limits), or broken, should be re-pivoted to the character of their original construction and design. Care must be taken to maintain the original shaft length. This is a measurement from shoulder to opposing shoulder or the length of the shaft not including the length of the 2 pivots (i.e. distance between the plates minus the needed endshakes).

5.) All pivot holes must be checked for smoothness and to see that they maintain the correct **depthing** with the wheels that turn in them. If the holes do not conform to these requirements, friction bushings are the product recommended for repair. Ideally, bushings should be of the same material and hardness as the original plate stock. Where exact heights are not available, the bush should be cut down so that the pivot clears the bushing hole at both extremes of endshake. (Due to the limited availability of bushings of differing brass composition and hardness, brass bushings should be used in brass plates and bronze bushings when replacing bronze bushings.) When pivot material is of poor quality (i.e., plated or soft steel), bronze bushings may be the best choice for repairs. All holes should be burnished to brightness with a smoothing broach**.** The hole that is reamed to receive the bushing should be chamfered on both sides of the plate to reduce the presence of flashing which can throw the bushing off center or tilt it. The bushing should be pressed or tapped into place, maintaining the plate's appearance, without damaging either the bush or the surrounding plate finish. Once the pivot hole is reamed to size, the hole should be burnished with an oiled smooth broach (like the other holes) and a proper oil sink cut to match other oil sinks on the plate. **Soldering, prick punching, add-ons, or screw-in technologies are *not* acceptable practices for the resizing or repositioning of any bearing hole.**

6.) Hole Closing

*On the topic of "**hole closing**:" This is a practice with a long history in clock repair. It is also a practice which has led to severe and frequent abuse of precious timepieces by unskilled or unknowledgeable repair persons. As such, AWCI does not endorse this technique*.

7.) All wheels must be inspected for proper tooth spacing (i.e., all teeth are straight and have equal spacing), flatness, and shape, and corrected as required. Fit of the wheel to its hub or shaft should be tested for security. Should there be a need to replace one or more teeth, the replacement piece(s) must be of similar material, shape and character as the original. There should be no scarring of adjacent teeth to the repair, and the repair should be as invisible as possible to the finish of the rest of the wheel. Gaps filled with solder are not acceptable! If a wheel/pinion needs to be remade for any reason, it is recommended that the tooth count, outside diameter, root depth, tooth width and general ogive shape (tooth addendum) be recorded should the product be lost or destroyed in shipping.

8.) Pinions must be clean and true, and their leaves straight. All collars should be tight to the arbor. Lantern pinion leaves, worn beyond acceptable tolerances, should be replaced with new stock of similar quality and hardness to the original. All wires replaced must be corralled in their collars (i.e. can't be pulled through) and wire holes should be preferably staked rather than held with bonding agents or solder. Care should be taken to maintain the original collar placement and security and if loose, reset to the shaft by knurling is the preferred technique.

9.) Escapements should be returned to appropriate drop, lock and lift angles with the least material removal or repositioning of pieces. Should refinishing be necessary, the drop, lock, and lifts should be returned to their original qualities taking into account case width, pendulum mass, and original manufacturers design. The pallets (specifically their lock and lift faces) should be finished to a mirror bright polish.

10.) Mainsprings should be removed, cleaned, scrubbed thoroughly as needed, and examined for any visible defects or modifications that would require their replacement or repair. If the spring is acceptable, then it should be properly lubricated and reinstalled using appropriate and safe methods. The mainspring should be the correct length, width and thickness for a given movement design. The spring coils should be flat and in the same plane. Barrel pivots and pivot holes are to be treated as 4 and 5 (above). Arbor endshakes must also be maintained. Barrel and arbor hooks should be checked for sound and secure condition. The barrel cap fit to the barrel sleeve must also be carefully checked and corrected if it can be pushed out easily with hand pressure.

11.) The entire ratchet assembly must be examined for proper operation. Loose, weak or cracked click springs must be repaired or replaced. Loose click rivets or screws must be corrected by proper staking or replacement. The working faces of click and ratchet teeth must be free of ruts and burrs, and resurfaced or replaced as needed for proper fit and alignment. Winding squares should be dimensionally uniform. Where multiple arbors are present, their squares should be examined for similar shape and size so that a single key or crank will fit them properly. If a significant difference is observed, squares should be dressed to an equal size and shape and a new key/crank issued to the customer. When the square would be too small for structural safety, a new arbor should be made.

12.) Levers and pins should have all rutting/roughness removed from their work faces, and be readjusted to proper, safe action levels. It is recommended that surfaces that slide over other levers or pins be burnished for smoothest operation. When return springs (thin wires, coil wires, or pin springs) are present or required, they should be of the lightest gauge and tension to just ensure the proper operation of this lever.

13.) Any replacement components should be constructed and finished to match the character of all other movement pieces. The original intent of the manufacturer and considerations of safety for the movement are key points to keep in mind when replacing any part.

14.) All parts should be re-rinsed, prior to reassembly, to insure cleanliness and the removal of any surface contaminants resulting from their restoration.

15.) All pivot holes in plates and collars should be “pegged out” (or suitably cleaned) and carefully blown out to insure the removal any residue from the service and cleaning solutions.

16.) After movement reassembly, no new finger or tool marks should be visible. Any pre-existing coloration or tool marks may be left as found. Any use of date codes or identification markings should be as unobtrusive as possible.

17.) Appropriate types and amount of lubrication should be applied to all wheel and anchor pivot points, hammer arbor pivots, pallet faces, and hammer tails only. Cam faces where lever arms rest and the points of interaction where levers, pins etc. slide against each other, should also be lubricated. Lever arbors should in no case be oiled. When dealing with new products, consult the manufacturer’s recommendations.

18.) In striking or chiming movements, the stop, start, and warning actions should be set to the correct position and lever action adjusted as needed to insure the best conservation of power. In count wheel/lock plate movements, there should be sufficient clearance (~0.010” or 0.03mm) between the stop pin and the stop lever when the count arm is on one of the shallow notches. The same clearance amounts also hold true for rack and snail warnings. At the stop, the pin/cam controlling that motion should safely lock the train’s action while allowing easy release to warning. All hammers should be in a rested state when the gear train is in warning or stopped position. Hammer leathers, pads and inserts should be free of perforations and deterioration, and replaced as necessary.

19.) As assembly is continued, recheck escapement drop, lock and lift and adjust as needed.

NOTE 1: Platform escapements require special handling. The entire mechanism should be disassembled, any cap jewels removed, the balance and hairspring removed from the balance cock, and all pieces treated as above—i.e. cleaned with appropriate technologies, pivots polished, jewel holes carefully pegged clean and cap jewels scrubbed and examined for pitting. Any pitted or worn cap jewels should be either replaced or reground and polished to return the working surface to its original quality. Worn or cracked hole jewels should be replaced, taking care to determine the proper hole size after polishing the pivot that rides in it. All parts should then be rerinsed, dried, reassembled, oiled and adjusted to run and rate properly. High quality watch oil is the preferred lubricant to use. Care should be taken to see that the correct amount of oil is introduced onto the escapement as well as into those pivot jewels with caps before the caps are reinstalled.

NOTE 2: Since the platform escapement is in essence the escapement of a watch, special education for this type of device is essential! It is incumbent on the practitioner who does not possess the necessary skills and knowledge to service these types of pieces to refer them to someone who has those capacities (an AWCI Certified or Certified Master Watchmaker or Certified Master Clockmaker for example). The 21st Century CMC will be required to show all the knowledge and skills necessary to successfully deal with these types of devices.

20.) Suspension parts should be true and appropriate for the type of movement. Suspension springs must be unbent and properly fit. Suspension loops should be free of ruts and well polished or remade/replaced. If regulating chops are present, they should be adjusted to fit the suspension spring properly for best action and timing adjustment. Suspension posts should be secure and square to the plates and fit the suspension spring closely but not tight.

21.) The casement is to be stable and solid. It must be free from any motion or articulation, and dust free inside and out. Gongs, bells and chime rods should be securely fastened to the case and tightened as needed to obtain the best sound. Hinges should also be checked for security and proper door/bezel alignment, and adjusted as necessary. Glass/tablets should be carefully cleaned and checked for security. Extra care should be taken not to remove/chip decals, gold leaf or painted designs from the glass.

22.) The movement must be securely fastened to the case. Where screws have been stripped in their holes or refuse to grab securely, the holes should be plugged with the proper wood and the screws reinserted rather than using larger screws. If screws have been or must be replaced, they should be of the same type and size as the original and appropriate to the age of the clock. When taper-pins are used anywhere in the clock, their ends should be dressed for the safety of the customer and future workman.

23.) All movements must be test run and be able to be adjusted to a minimum accuracy ±60 seconds/day for 30-hour products; ±2 minutes/week for general mass production 8-day products including mantel, wall and floor clocks; ±15-20 seconds/month for Atmos clocks; and ±15-30 seconds/week for precision regulators. When a clock is regulated for accuracy, the rating assembly should ***not*** be set to either extreme of its travel. (In examination for the CC, these rates must be achievable with ease of adjustment by the Assessor.)

24.) Dials should be gently cleaned of dust/debris. Although there are special sealants to stabilize a flaking dial or tablet, it is recommended that this work be referred to a dial specialist.

25.) The hands must be properly formed and parallel to the dial. Release of the strike/chime should occur at or slightly before the center of the 12 o'clock mark.

26.) The client must be instructed on the manipulation of all the movement's features, and the need for further servicing to maintain the work performed. Client education should include information such as:

A. Not transporting clocks, even for short distances, with the pendulum attached or unlocked.

B. The importance of level and secure placement of clock to maintain proper beat.

C. Moving the hands to set the time.

D. The matching of the strike/chime to the hand position; correction mechanisms; night silence; chime selection levers; etc.

E Adjusting hammer position to achieve desired sound.

F. Regulation of the timekeeping.

G. Case care and cleaning instructions.

H. Accessory features: Moon Dials, Calendar, Alarm setting, etc.

I. Proper winding.

J. Conditions of warranty.

K. Specific problems inherent to the clients products, i.e. air motion with exposed pendulums, hand turn-back features, etc. which could create problems for the clocks operation.

Specific Standards of Practice for all Clockmakers in the performance of Home Servicing of Clocks:

A Review with the client the current operational symptoms of his/her timepiece.

B. Examine the clock to gain additional information.

C. Discuss service options with the client.

In Home Service:

1.) Set up, Adjustment: The case should be stabilized solidly and shimmed (or adjusted if levelers are present) as needed to insure that when wound, the case will ***NOT*** move or wiggle. It is recommended that the case be stabilized against a wall or wedged in a corner of a room if at all possible. Due to top heaviness of the case, any motion of the case can lead to the liability of the clock tipping over, or at the least, poor performance or stoppages due to sympathetic vibration. When a situation is encountered that renders total stability not possible, it is the professional's responsibility to ask the client to release him/her from any liability due to the unstable circumstance in which the clock exists, or decline the job.

2.) The clock is to be assembled as required and checked out completely to be sure that all functions are operating as designed. The dial, moon dial, movement and suspension are to be checked out for proper functions and alignment. The chime and strike hammers are to be adjusted to the best quality sound the clock can produce, making minor adjustments for the desires of the client. The professional must also check the operation of all levers to be sure that the action of the movement is at its best.

The client must be educated about all the features of their floor clock and the management of all non-warranted adjustments.

These adjustments should include:

Hammer adjustment, beat adjustment, suspension spring replacement, moon dial index spring adjustment (if present), hand adjustment and setting the time, manual synchronization as well as how the clock synchronizes itself, winding and how far to wind the clock (including stopworks if present), chime selection (as well as night and total silencing of the chimes) and when to move the selector without detriment, fast/slow rating adjustments, and general care of the clock's exterior. Lastly, further maintenance procedures and intervals should also be discussed with the client as well as any warranty information as provided by the professional or the manufacturer.

3) Minor Repair, Adjustment:

Minor repairs or adjustments are those that can be safely made in the client's home without disassembly of the movement or cabinet. When such repairs are complete, perform items in section D (1-7; page 28.) below.

4) Oil, Adjustment: Procedures should include the following:

a. Remove the hands, dial, and etc. from the movement and the movement from the case. Any residue from the old oil should be picked out and wiped off as completely as possible from inside and outside the movement. The pivots should be re-oiled with lubricants that are similar to the original manufacturers or that are the current recommendations of the manufacturer. This type of procedure is based on industry recommendations for movements that are within 10 years of original manufacture and show very little build-up of residue. (It may not be appropriate for vintage or antique clocks or clocks which show a large build-up of residue or debris). In these situations, standard movement servicing would be the preferred choice.

b. Check the operation of all levers and cams to be sure that the action of the movement is at its best, given its age and wear. The moon dial (if present) should be checked and serviced as needed to insure the smoothest and easiest operation of the gears, lift levers or cams, as possible. It may be necessary to adjust the tension and/or the position of the moon dial index spring so that the gathering pin engages the flank of the moon gear tooth, and the dial advances easily with little resistance. NO OIL IS TO BE USED ANYWHERE ON ANY MOON DIAL.

c. Reinstall the movement and other items that were removed. When repairs are complete, perform items as instructed in section D (1-7; page 28.) below.

5) Rinse/Peg-out, Oil, Adjustment: When the build up of unwanted debris is evident in pinions and against pivot shoulders and oil sinks, the use of small amounts of solvent along with aggressive peg out techniques can be used to improve the environment for the new oils. It is important that careful consideration be given to the need for "benching" (standard movement servicing) of this movement if the debris is hard or difficult to remove. If so, it is better to inform the client that "general movement servicing" is a more appropriate choice. It is not recommended that movements be submerged in solvents or cleaners in a client's home. Professionals should follow the procedure above, while using careful application of ANY cleaning materials to complete the task. When repairs are complete, perform items in section D (1-7; page 28.) below.

Warning: AWCI highly recommends that on ALL in-house calls where solvents are used, the professional should incorporate a close review of the above techniques, especially safety concerns, such as fume and odor risk to the client, and related issues.

6) Packing for a move: In general the following procedures should be followed before moving a clock any distance.

a. Secure the pulleys in an effort to keep the cable from fouling on the cable drum or scratching the case. Chains should be tied together and bagged to keep them from falling off the sprockets or scratching the case. Wrap and pack weights, separating them from each other, to protect them from denting, scratching or tarnishing. Never touch brass with bare hands.
b. Check tightness of seatboard screws and movement mounting bolts/screws.
c. Remove the pendulum and secure the leader. The use of any kind of tape to secure a leader is not recommended. The use of a rubber band or spring strap is preferred. Insure coverage to protect pendulum disc from scratching, and pack entire pendulum securely to insure it does not get bent, twisted or dented. Mercurial pendulums require special handling. Contact AWCI Central for the names of experienced professionals who can guide your efforts to pack this type of pendulum.
d. Block up the chime rods securely to eliminate individual rod motion with cardboard or hard Styrofoam which is cut or punched to keep the rods in their original alignment. Taping chime rods together is not recommended. If chime tubes are present, they should be removed, individually wrapped, and packed as a bundle, well secured, then boxed. A notation of tube order should be given to the customer for reinstallation.
e. Hammers should be secured to eliminate their movement during shipping without the use of tape. Rubber bands (the manufacturer's choice, will work well for this purpose).
f. Side panels should be secured to ensure they do not shake loose or fall out during shipping. Any interior glass shelving or glass side panels should be removed, individually wrapped, and packed for careful handling. When side panels are removed, the clock should be appropriately sealed (with consideration to the finish) to keep out dust and/or debris for any long-distance move or storage.
g. Wrap accessories (crank, door key, finials etc.) separately to protect them from damage, but pack the lot together in their own box.
h. Where the door or bonnet security is questionable, it is recommended that a paper belt be wrapped around the clock body and taped (to the paper only) to secure the door from accidental opening.
i. Where the age, weight or quality of the movement dictates, individual packing may be necessary. It is recommended that a piece of paper be inserted between the dial and the hands to prevent scratching of the dial. The movement with its seatboard and dial should be bagged or sealed to prevent the entry of dust and dirt before final packing.
j. Instruct the client to raise leveler feet, if present, into case to protect feet from damage during move. Be sure to include any other written instructions that may be relevant to their specific clock.

B. “Out of Home” Service

1). On the issue of replacement:

When it is determined that to implement a “successful” repair, a replacement movement is the best course of action (given customer needs, historic considerations, structural changes needed, and/or costs), it is the AWCI’s expectation that a movement of like kind and configuration will be the product used. AWCI does not condone the replacement of clock movements manufactured before 1970, unless there is absolutely no other alternative. The later (post 1970) use of leaded, plated steel has resulted in rapid-wearing, inferior quality components which do not have the "nearly eternal" quality of fine steel used prior to this time. This is not to say that some manufacturers will not eventually return to the use of better wearing components, but as of the writing of these standards, this has not happened in mass production.

AWCI members holding certificates are “stewards” of horology and horological history. As such, they are obligated to strive to maintain the integrity of the original manufacturer’s intent; when replacement is complete, perform items in section D. (1-7; page 28, below).

2) General movement service: See *General movement service* heading under Essential Knowledge, Performances, Dispositions and Proficiencies. When repairs are complete perform items in section D (1-7; page 28.) below.

3) Cabinet Repairs: Protect movement from dust and debris. When cabinet repairs are complete, perform items in section D (1-7; page 28.) below.

4). Pack, Move and Setup: See section 6 above (a through j) and section D (1-7; page 28).

C. When work suggestions or estimates ***are refused***, refer to number 9 below in “Shop Practices and Dispositions.”

D. When performing any type of in-home “set-up” such as listed above, either “in-home” or after shop procedures are completed and subsequent “at-home” client education is needed, proceed with the following general guidelines scrupulously.

1) Case should be “square” to surrounding home environment features, and made fully stable.

2) Clients who refuse recommended stabilization should be required to sign a liability release.

3) Check that all movement functions are operational.

4) Insure that cables are correctly wrapped around pulleys and free from friction.

5) Insure that chains are sound, all links tight, including weight hooks.

6) Adjust chime and strike hammers for optimal sound.

7) Educate the client on all pertinent clock features, management, and warranty.

Additional Standards of Practice for Specific Types of Clocks:

400 Day and Torsion Clocks: In these clocks, it is critical that the mainspring, suspension spring and the escapement are carefully set to the original manufacturer's specifications. Escapement action is the key to their timekeeping. For example, the rotation for pendulums of most 400 day clocks should not be less than 270° and there should be NO flutter of the escapement as it operates.

Also, LeCoultre "Atmos" clocks differ from the "typical" 400 day clock and require that factory specifications be followed *exactly*. (See factory technical booklets: Vacheron & Constantin-LeCoultre Watches, Inc. 1952. "How to Repair the Atmos Clock." Jeager-LeCoultre. "Repair Notes" for each caliber.)

Cuckoo Clocks: These timepieces require efficient conservation of power and ease of action of all movement parts. Lift and release levers should be adjusted for the least power use. In any bent wire system, it is critical for any wires that contact each other to do so at the best mechanical advantage angles with the least power demand. "Jerky" motion is an indication of improper adjustment or wear. The bird door should not flutter or slap when the cuckoo is activated. The door should open smoothly and stay open for the duration of the cuckoo action and then close sharply. On those movements with count wheels, the count wheel lever also affects the opening of the bird door. This lever must be adjusted to minimize door bounce. Even minor wear in the suspension loop requires the replacement of the loop for best pendulum action.

> **With music addition:** Music movements should produce minimal extraneous noise and show smooth action during play. Attention to the governor's action and smoothness of operation is critical. Gear to pinion depthing between the governor and the pin barrel main wheel is critical and must be set for the smoothest action. The release levers must be set with the best mechanical advantage and with least power demand. Any denting or wear of operation levers should be treated to insure smoothest action. Comb dampers should be present and properly insulate the action of the comb tooth before the barrel pin (nub) plucks the tooth. Buzzing and clicking of the music as it operates is not acceptable.

Striking and Chiming Clocks: In such clocks, it is critical that the warnings be set with the hammer action in mind. No hammer action can occur until after warning is complete. The balance between hammer action and power use is carefully adjusted to give the best performance and sound possible for a given mechanism.

> **Vienna Style:** Many Viennese and Vienna-style movements and other movements exist without warning mechanisms and require special care. Due to a need for the train to get up to speed before the hammers are raised, it is critical in assembly that attention be paid to the position of the hammer lift tab with regard to the pin that will raise it. Here, the most run
> that is possible is preferred.

Carriage Clocks: Many of these are set similarly to Vienna style movements to aid in the efficiency of the striking action. Here too, care must be taken that 1.) The escapement platform is cleaned and serviced as if it were in a watch movement (The platform should be treated as described in Notes 1 and 2 after #19 in the General movement service.) and 2.) All release levers are set with minimal tension, with their working surfaces smooth and free of wear/ruts.

Chiming Clocks: Not all chiming clocks utilize the same hammer arm sequence in chiming. Careful note must be taken before movement disassembly to insure that the proper sequence is retained when the clock is returned to service. In all cases, the hammers must be set to make the best hit of the rod/tube/gong that results in a clear sound without muting or rebound (stutter). If the hammer faces are leathered, they should be releathered as needed to avoid "metal against metal" impact, and the resulting "metal on metal" sound.

Ships Bell Clocks: These types of clocks have a unique strike sequence and often a unique method of counting those strikes. Both rack and snail and count wheel types are well known in addition to special locking devices to count half-hours. The professional must be familiar with any and all of these actions before any disassembly is started. Again, familiarity with platform escapements is required here as well. See Notes 1 and 2 after #19 in General Movement Service for specific points.

Fusee Clocks of all types: Extra attention must be given to the chain or cord that is used on the fusee. The chain must be cleaned, oiled and inspected for rusty or stiff links. These defects should all be corrected before the chain is reused and the hooks, their pins, and barrel hook holes inspected and repaired as needed for safety. Cords should be carefully inspected and replaced if any indication of wear or fray is suspected.

Electric Clocks of all types:

1) The goal in the repair of AC clocks should be to reduce all possible stress from the time, strike and chime trains and their levers. Tension springs should be set to a minimum pressure to insure that the actions of these levers perform smoothly. Motors and rotors should be thoroughly cleaned and serviced. Where the repairer is not equipped to rebuild a motor or rotor, this should be completed by a specialist whose work will be done according to high standards and who will offer a warranty.

2) The repair of DC voltage clocks requires a solid working knowledge of the construction and operation of "flutter motors," and related "rotor type" winding mechanisms. It also requires knowledge of wear problems associated with the use of contact points in a circuit and how to restore and adjust these points. In such clocks, it is imperative that current consumption be kept as low as possible, consistent with the minimum voltage required of the original design. Increasing the voltage applied is ***not*** a recommended or acceptable method of correcting a circuit or contact problem.

Wooden Works:

Regardless of the country of origin, wooden works timepieces require special care, including, but not limited to, the following:

1.) All pivots should be set as true and centric as possible, with regard to the wheel and pinion on the shaft, and burnished as usual.

2.) Wheels must be reviewed for roundness as well as tooth spacing and structural soundness. In clocks with wooden wheels, it is not uncommon to encounter wheels with as much as 0.025" to 0.030" variation of diameter along the circumference of a given wheel. The key to successful repair is to be sure that wheel to pinion depthing is safe at all points in the rotation of the wheel. If not, slight rerounding (as much as 0.010",) followed by relocation (redepthing) of the pivot hole, may be necessary to restore proper action.

3.) In American wooden movements, when bushing of holes is necessary, the material of choice should be doweling which is made from the same kind of material as the plates of the movement. (Note: In those cases where Ivory bushing material was originally used, either wood doweling or deer antler, taken from the antler tip, should be the choice for replacement material. These bushings should only be installed in those places in which they were originally used and shaped as the original.) Pivot holes should be burnished with a wooden stick (toothpick or pegwood) after the hole is correctly sized. The use of metal bushing materials in American produced wood plate movements is not recommended unless this was the original bushing material as stated on *the clock's label*. Due to the tradition of using metal inserts in wood plates in European movements, using similar materials and/or techniques to what is presented will result in less movement damage, rather than total removal and plate rebuilding with similar wood materials. Keeping the repairs similar in character to the original manufacturer's intent is always the preferred choice.

4.) Damaged wheel teeth should be replaced with a similar wood material (commonly American Cherry) as the original. Care should be taken to obtain the new stock with strong grain (preferably quarter sawn). When repairing pinion stock, the replacement piece should be set with the grain in its strongest orientation. Careful judgment must be used when repairing pinions in considering where in the train the pinion is functioning. If more than one tooth is to be replaced and it is mated with the main wheel, it may be safer to cut a new pinion instead of repairing the old one. Since the typical pinion used a species of Mountain Laurel which now has a limited availability, dogwood is an acceptable substitute for this archaic material.

5.) No lubrication should be used in wood or ivory bushings or wood pivot holes. This material is self-lubricating. Where a brass strip is used to support a wheel pivot (escape wheel bridge), a brass bushing is preferred and the bushing is to be treated as usual.

6.) The escape wheel should be as true as possible and the anchor should be treated as usual. The escapement should be set as in any other clock. When the eccentric is adjusted, it should be resecured as in its original form and not glued in place.

7.) Plate alignment should be checked and stabilized if the movement is to run smoothly. Hot hide glue is the original adhesive of choice. However, in its absence, carpenter's casein resin glue (water soluble type only) is acceptable for most gluing needs. Where there is a space larger than 0.010 of an inch, a wood shim of the same material as the piece being glued should be used with the glue to add to the structure of the repair.

8.) The wooden plates and wheels of the movement should be cleaned using appropriate techniques. (Consult Barlow, Hans, 1979*. The Repair of American Wood Geared Clock Movements,* self published.) Under no circumstances should wooden parts be rinsed or submerged in water or water-based cleaning products.

9.) Metal cables should **never** be used on wooden winding drums or pulleys. Braided nylon or cotton cords are preferable.

Shop Practice Dispositions:

Alth*ough it is not the intent of AWCI to set shop policies, it is the purpose of these Standards and Practices* to establish guidelines which it believes represent the hallmarks of professional practice.

The Clockmaker, who is awarded any AWCI Certification, in adherence to AWCI Professional Standards and Practices, should:

1. Adhere to the AWCI Code of Ethics.
2. Maintain a clean and professional work environment. All benchmen and employees who have contact with the public in that work environment should present a neat and professional appearance.
3. Practice care and safety for environmental concerns and the proper handling and disposal of all toxic solutions and compounds used in the shop. Proper ventilation to remove toxic odors and fumes from the shop area must also be a part of this safe environment.
4. Be committed to systematic shop practices.
5. Be willing to document (including intake client receipts, and a finished summary of work performed) and warrant professional services.
6. Be committed to the advancement of professional knowledge.
7. Be committed to professional standards, and quality horological education.
8. Be committed to stewardship of the client and his/her product(s).
9. Exhibit professional standards and ethics by returning the clock, when work suggestions or estimates are refused, in the state originally presented.
10. Be judicious and careful in the use of adhesives, solders, heat and other chemistries when correcting material defects or damage.
11. When the work is completed and returned to the customer, use a comprehensive educational information program to help the customer properly care for their product.

Escapement Knowledge for the CC21:

The Certified Clockmaker must show a working knowledge of the construction and adjustment (resetting the drop, lock and lift) of the following escapements once refacing/replacing of the pallets has been performed:

1) The deadbeat escapement, solid, adjustable and strap anchors. 2) The half-deadbeat escapement, both solid and strap anchors. 3) The recoil escapement, both solid and strap anchors. 4) The Brocot style escapement anchor. 5) Pin-pallet or “floating balance” type of escapement. 6) The pin-wheel type of escapement.

Escapement Knowledge for the CMC21 and the CMI:

Both the CMC and the CMI must be able to demonstrate the escapement knowledge of the CC (as above) as well as the following:

1) The lever escapement (including the platforms on which they also appear) including Swiss, British and American styles. 2) The cylinder escapement (including the platforms on which they also appear). 3) The pin-pallet—Roskopf style escapement (including the platforms on which they also appear). 4) The chronometer/detent style escapement. 5) The gravity escapement. 6) The barrel or “Lux-Keebler” escapement. 7) The “grasshopper” escapement. 8) Others as determined by the candidate and the BOE.

Pathways to Certification

There are various paths to prepare for AWCI Certification. These are listed as the following:

Clock Associate (CA21)

May be achieved by successful completion of the CA assessment after:

a. Correspondence courses
b. AWCI bench courses
c. Internet/video/DVD correspondence courses
d. On-site training at approved AWCI locations
e. Other media as the programs become available

Certified Clockmaker (CC21)

May be achieved by successful completion of one of the following:

a. Successfully completing the 21st Century Certified Clockmaker examination by demonstrating skills and proficiencies according to these standards.
b. Formal training courses as approved by the AWCI Board of Directors (BOD) as recommended by the Education Committee and Board of Assessors, and passing the 21st Century Certified Clockmaker examination.
c. An apprenticeship program (which has been approved by the Board of Directors as recommended by the Education Committee and the BOE (The program must be consistent with the S&P for Clockmakers) with a CMC, **and** by passing the 21st Century Certified Clockmaker examination.
d. Education in an approved AWCI (REC) school with a curriculum consistent with the AWCI S&P for Clockmakers and approved by the BOD as recommended by the Education Committee and the BOE, **and** by passing the 21st Century Certified Clockmaker examination.
e. A composite of BOD approved (as recommended by the Education Committee and the BOE) AWCI bench courses, AWCI Home Study courses, other modular and distance/media classes which give the student an opportunity to visually, cognitively and manipulatively exercise the skills and knowledge, as described in the AWCI S&P for Clockmakers **and** by passing the 21st Century Certified Clockmaker examination.

Upgrades (moving from current certification status to 21st Century certification) may be achieved as follows:

a. Hold an AWI-CC certificate with two or more years of documentable bench service, and passing the written upgrade examination for the 21st Century Clockmaker Certification. (The upgrade examination will be more comprehensive than the standard examination. It will include questions on chime,

cuckoo, 400-day and American time and strike mantel and wall clock components.)
b. Hold an AWI-CC with 5 or more years of documentable bench experience and working with the Education Committee's Clock Section in the development and testing of the 21st Century Clockmaker Certification for at least 1 year.
NOTE: Upgrades will not be offered after August 2010.

Certified Master Clockmaker (CMC21)

May be achieved by successful completion of one or more of the following paths as long as they show the competencies of the CC21 as well as:

a. Demonstration of service to the profession as determined by the AWCI BOD, and documented through a "service portfolio*" (and/or)
b. Research and publish on a topic approved by the Board of Assessors which moves the Clockmaking profession ahead (and/or)
c. Holding an AWI/CC21 and performing educational services for AWCI (5 or more years) in an approved AWCI program and documented through a "service portfolio" that is approved by the BOE, e.g. HT publications and/or teaching classes approved by the BOE.
d. Developing and implementing a BOE-approved apprenticeship program for potential CC21's that incorporates the S&P standards for Clockmakers and engaging in this process for 2 or more years, with the graduation of at least 2 or more apprentices (who take and successfully pass the 21st Century CC Certification examination).
e. Innovation—the creation and/or development of products or practices that enhance the horological profession (BOE approval and "portfolio" required.)
f. Fulfilling the requirements as stated for the CMC in the AWCI S&P certification category for 21st Century Certified Master Clockmakers and successfully scoring on an assessment designed by the BOE (at or above the 4.9 required rubric.)
g. Submission of an alternative program (one designed by the candidate) to the BOE for its approval, which demonstrates the skills, knowledge, and dispositions of the CC21 with added documentation. This additional material must include the demonstration of the ability to fabricate components for any age or complication of a clock mechanism as well as the ability to service and adjust any type of platform escapement or 16-18 size pocket watch movement.

**Portfolio—a collection of a body of artifacts (documents, videos, movements, articles, publications, etc.), which provide evidence of a candidate's achievements.*

h. Pass the written CMC21 comprehensive examination and submit plans, procedures and skill lists of techniques used to fabricate a clock movement in a simple (but not limited to simple) case. The plans are to be submitted and the examinee must acquire BOE approval ***before*** the project is started. A BOE approved mentor may be required to substantiate the work as it is completed.

"Upgrades" may be achieved as follows. The candidate must:

a. Hold an AWI CMC for at least 5 or more years and show 5 or more documentable years of bench service and work with the Education Committee's Clock Section in the development and testing of the 21st Century Clockmaker Certification for at least 1 year.
b. Hold an AWI CMC with 5 or more years of documentable years of bench service (as determined by the BOE); pass the CMC comprehensive upgrade written examination for the 21st Century CMC, and demonstrate the proper servicing (to the standards and practices set for pocket watches) of a 16-18 size pocket watch.
c. NOTE: Upgrades will NOT be offered after August 2010.

21st Century Certification Assessments

(Performance and Written)

All certification levels of the AWCI must be achieved through a demonstration of knowledge, skills and dispositions as deemed appropriate for each level of certification. The following is a description of the form of assessment by level of certification sought.

1. **Written Assessments:** (Candidates will find sample questions included in this document.)

   CA21: Each proficiency section of the material may require that a written summary of the questions administered to candidates be sent to AWCI for scoring. For selected proficiencies, preprinted materials will be sent to the candidate for completion.

   CC21: The written examination will consist of 40-50 questions to be answered in a three hour time frame. More time may be granted to non-English speaking candidates (with previous approval from the BOE). Written questions will include problem solving, analysis, and knowledge of professional nomenclature.

   The general question format will be "short answer" or essay-style responses, or computational. Some diagram drawing and labeling may also be required. Some questions may combine assessment formats (multi-part). For further information, see the sample questions in the appendices to this document or the *Preparation Manual for AWCI Certification Candidates.* The examination will be built around six (6) conceptual sections as follows (the percentages show the weight each section is given):

   History (5%), covering the general history of clockmaking from the mid-1700's until present (world wide), and include noted manufacturers, as well as case styles.

   General Mechanics (30%), covering general mechanical questions, physics of pendulums and length calculations, beat rates and train calculations, lever mechanics, depthing issues, friction problems and wear issues, terminology, AC and DC voltage, quartz clocks, endshakes, suspensions, etc.

   Escapements (30%), covering terminology, (especially drop, lock, and lift), design basics, proportions of parts, self-beat adjusters, repair problems, diagnostics. Questions may cover all the escapement types listed previously.

   Striking and Chiming (25%), covering parts and terminology (including warning, detents and flirts), designs and their variations,

music barrel and hammer concepts, wear issues and corrections, diagnostics, synchronization, tune characteristics (general order of notes/hammers), etc.

Metallurgy (5%), covering horological metals, their composition (including bronze), hardening and tempering, effect of oils on these metals, etc.

Springing (5%), covering length, width, and thickness calculation, re-ending problems, size selection, and etc.

CMC21: The exam format will vary with the certification "path" the CMC21 candidate has chosen. The "traditional" format will be similar to that of the CC21, but with more complexity of knowledge of craftsmanship required and a greater knowledge of horological principles, and escapements.

CMI: Submission of a portfolio is required, but no examination.

2. Performance Assessments: A description of sample tasks.

Good performance examinations require actual conditions, actual materials, and as much "real-life" quality as can be built into the examinations. Certified Clockmakers must work on real clocks, hopefully with their own tools, in a solid and secure environment, with informed guidance as to the expectations of AWCI. To this end, the clocks used for examination will be selected to emulate the actual demands of the benchman in today's clock-care environment.

(Note: The Board of Assessors will select appropriately equivalent movements for each examination. It is critical that the candidate familiarize him/herself with all current floor clock movements from Hermle, Kieninger, and Urgos, as well as modern cuckoo materials from the Black Forest such as Herr and Regula products. Since the clockmaking craft requires a broad depth of knowledge, candidates should also be familiar with a variety of standard 400 day clock products and have an **in depth** knowledge of historical American time/strike movements from the 1850's to the 1950's, T/O,T/S, and T/S/Chm.)

Assessment Task Performance (CA21): Candidates will complete various "hands-on" demonstrations in the presence of either assigned Mentors or AWCI BOE representatives. Other verification options may be used with the approval of the BOE. These options will be in keeping with the knowledge and skill proficiency demonstration for this certificate.

Assessment Task Performances (CC21): Candidates will perform a wheel tooth, pivot and mainspring/barrel exercise along with a written examination.

1.) They must demonstrate the complete GMS of a modern floor clock movement,
2.) Partial service of a 400 day clock,
3.) Servicing a modern cuckoo clock with music, *and*

4.) Servicing of an American T/S mantel or wall movement along with fabricating part(s).

Final scoring of these clocks will be based on the Standards for General Movement Servicing (GMS).

Included in these requirements, and applied to scoring will be:

(**A**.) The ability to adjust properly the synchronization of chimes (and tune) with the strike—including proper stop, start and warning as well as hammer lift issues.

(**B**.) Correction of depthing problems, as well as pivot finishing and repivoting, toothing and wheel problems, quality bearing/bushing finish.

(**C**.) Lever repair and fabrication of replacements.

(**D**.) The adjustment and correction of escapement problems. (See the list of important escapements for this section.)

(**E**.) The adjustment of hammers to meet needed actions.

(**F**.) Any other performance items as listed in General Movement Servicing above.

Assessment Task Performances (CMC21): This assessment may contain all the components of the CC exam, contingent upon the candidate's prior experience, written proposal, and/or preparation level.

Candidates may also be required to completely fabricate any part listed in the Skills and Proficiencies section of this document, either separately or as part of a clock movement. They will also be asked to show the ability to perform general movement servicing on a 16-18 size pocket watch to demonstrate their ability to service a platform escapement. The candidate will be informed of all tasks prior to the examination and be given a scoring rubric so he/she can thoroughly familiarize themselves with the needed knowledge.

Examination Sites:

CA21: Instruction and examination may be done locally, at REC Schools or other sites as approved by AWCI. Mentors may also be assigned to assist with the completion of this material.

CC21: The written examination, wheel, pivot and barrel exercises will be conducted in the presence of a Mentor in the shop of the candidate's choosing. The remainder of the examination will be completed in the repair facility of the candidate's choosing or another location approved by the BOE.

CMC21: Since there are a number of pathways to this certification, there are also a number of sites that may be used to demonstrate skills and proficiencies. The primary site requirement for this category is that all work and sites be approved by the BOE ***before*** work is begun. Mentors may be required to verify that all work was done by the candidate in accordance with the S&P for Clockmakers.

How Examinations Will Occur:

CA21: Candidates must request a material packet from AWCI Central, fill out the required materials and send in all fees. Once the fees and materials are received, the task list with requirements will be sent and the candidate is to go through these materials sequentially. As assessment tasks are completed, they must be returned to AWCI for scoring. Upon the successful completion of all tasks, a certificate of completion will be issued from AWCI.

CC21: Candidates will request an application material packet from AWCI Central, fill out the required documentation and send in all fees. Once all initial documents and payments are received, a Mentor will be assigned to the examinee. This person (the Mentor) will contact the candidate to make arrangements for the written exam, shop review, wheel, and pivot exercises (Box 1).

Upon completion of the on-site experience (Box 1), all assessment items will be returned and scored at AWCI Central. The candidate will then complete the contents of Box 2, left by the Mentor, and return it to AWCI for scoring. When Box 1and 2 are at AWCI, Box 3 will be sent to the candidate for completion and return as specified below. Box 1 will be returned by the Mentor. Box 2 and 3 are to be returned by the candidate as follows:

Fourteen calendar days will be allowed for completion of the tasks assigned by the BOE (from the Standards) for Box 2 and 14 calendar days for Box 3 materials. The completed Boxes are due at AWCI Central, postmarked or shipping marked, that shows the work was completed and shipped not later than the 14th day after initial receipt by the examinee.

Upon receipt of all assessment artifacts, Assessors will score all components; final scores will be issued and if these equal or exceed the required 70% (an average rubric score of 4.9 or better), a 21st Century Certified Clockmaker certificate will be issued. Remember that **ALL** 10 performances must qualify at this level (or above).

CMC21:

1. The candidate must notify AWCI Central of his/her intent to apply for the 21st Century CMC certification, and a descriptive sheet will be sent out with a list of the options the candidate is to choose from for his/her program (see Pathways above). He/she will submit the program they wish to pursue to achieve the CMC21 to the BOE for approval. They (BOE) will determine the fees and send the information to the candidate.

2. Next, the candidate will submit all required fees, fill out all required forms and select and submit the written program, detailing every step they will follow. The BOE will review the proposal and approve, make additions or corrections to, or recommend an alternative approach for the candidate to follow.

3. Upon BOE acceptance of the final proposal, the candidate will be given a timetable for completion and any appropriate materials will be gathered and sent for the program to begin. The timetable and documents will specify any needed Mentor reviews, photographic documentation, draft designs, notarized documents, etc. to guarantee that the work was performed by the candidate and done in accordance with the AWCI S&P for Clockmakers.

(A formal "face to face" review may be required by the BOE for completion of this certificate.) A scoring rubric will be designed for use with the program that is adopted. The candidate must score at a rubric level of 5.3 or better (a percentage score of 75% or better) to be awarded this certification.

BOE requirements for overseeing the assessment of a candidate: More or less may be allowed as the situation requires.

CA21: One AWCI Approved Assessor.

CC21: A panel of 1-2 Certified Assessors will assess the performance tasks.

CMC21: A panel of 2-3 Certified Assessors of which two are CMC's will assess candidate performance.

Scoring Procedures and Logistics:

Assessors will employ “Scoring Rubrics” (the rules applied to performances that reflect AWCI Standards) as determined by the Board of Assessors (a sample of the scoring sheet employed for the CC21 exam is included with this document).

In short, trained Assessors will rate work performed by candidates. This will be done on a 7 point scale (rubric). The scale will be determined by the type of task-- performance or written.

Sample Rubric

For example, on a performance task, a candidate’s work will fall into one of these categories (remember that a 4.9 is a minimum passing score for the CC21 and 5.3 for the CMC21):

1 Totally unsatisfactory or incomplete.
2 Work partially completed but unsatisfactory.
3 Work completed but unsatisfactory.
4 Work completed and marginally functional.
5 Work completed and satisfactory.
6 Work completed with a high degree of skill and knowledge evident.
7 Exemplary work of the highest quality

Shop Review Performance

The scoring of this review is strictly based on the items listed in the Clock S&P. No scoring will be done on personal traits or behaviors. All points are based on Yes or No responses.

Written Performances

Written performances will be scored with an answer key that uses key identification words where a short answer is required. Optional answers are given in the key to allow partial credit for other solutions. Where mathematical solutions are required, partial credit (1/2) is given, when the answer is not correct, for showing the math work.

Below is a sample score sheet used by the Assessors to score your work. To use this sheet properly, you must have proper Assessor training. However, it is provided to you, to help you understand the detail that we are examining as your work is scored. For example, the diameter accuracy (D.A.) requires that your work fall with the rubric range as follows (remember that 7 is the highest quality and 1 is unsatisfactory): This is correct for D.A., only!

7 = ±0.0005” or 0.013mm
6 = ±0.001” or 0.025mm
5 = ±0.0015” or 0.038mm
4 = ±0.002” or 0.051mm
3 = ±0.0025” or 0.064mm
2 = ±0.003” or 0.076mm
1 = >±0.003”

American Watchmakers-Clockmakers Institute

Certified Clockmaker Examination

Performance 3: Repivoting Project

Section 1

Project completion	Yes	No	Comments
1) The arbor has been repivoted…….			
2) Arbor not cracked or swollen near insertion…….			
3) Pivot in line with shaft w/o magnification……..			

If all answers above are "yes," the project is considered operational for scoring.
If any answer above is "no," the project is considered non-operational and therefore not scorable.

Grades are Yes=1, No=0

Section 2

Pivot Specifications-(Use rubric charts)	weight x grade= score	Comments
1) Diameter accuracy……..5		
2) Length accuracy……..5		
3) Maintenance of original arbor length……..5		
	Total:	

Section 3

Finish quality	weight x grade= score	Comments
1) Shoulder quality.		
a. Shoulder face polished……1		
b. Shoulder edge shape, beveled…….1		
2) Pivot tip quality.		
a. Pivot edge at tip-smoothed over…..1		
b. Pivot tip-rounded/finished……..1		
3) Pivot finish quality. Use gauge (Grade 1-7)…..5		
	Total:	

Section 4

Miscellaneous	weight x grade= score	Comments
1) Temper of pivot-use #6 file. Grade 3, 5, or 7.....2		
2) Pivot anchorage pullout test……1		
	Total:	

Scoring

Score from Section 2
Score from Section 3
Score from Section 4
Sheet total:
Total ÷ factor 22.714285 = Final rubric score:

As you can see, diameter, length, maintenance of arbor length and pivot finish are considered crucial elements to any pivot work.

Board ofExaminers:

Function:

The purpose of the BOE is the oversight of all certification and assessment processes, including construction, administration, and scoring of candidate assessments.

Membership:

- The Board of Examiners (BOE) consists of individuals appointed by the AWCI Board of Directors. The AWCI Education and Certification Committee recommends candidates for the BOE.

- The BOE will consist of 5 members with one individual designated as Chief Examiner (who will be retained for his/her services by AWCI). The remaining 4 Examiners will consist of two assessment/content specialists in clockmaking, and two assessment/content specialists in watchmaking.

- Members of the BOE must be members of AWCI, and have a minimum of 8 years of bench experience as horologists/educators.

- The Board will select, approve and train Mentors to aid in the administration of clock exams.

Duties:

- The Board will meet twice a year to construct and/or review all examinations.

- The BOE will be responsible for training Certified Assessors who will, in turn, conduct regional examinations according to regions, schools, or examination sites assigned by AWCI.

- Examinations will reflect appropriate 21st Century content, skills and proficiencies.

- Examinations will be tested for reliability and validity by the Chief Examiner, or a qualified agent of the Chief Examiner.

- The BOE will approve examinations for use for each testing year, which will coincide with AWCI's fiscal year.

- The BOE will supervise the preparation of examinations, and provide oversight to the exams as they are conducted.

- The Board will select and train Certified Examiners (Assessors), individuals with appropriate background and skills to conduct

assessments in a systematic manner as outlined in the BOE policy and training manual.

. The Board will also select and train Mentors. These individuals will observe and record the Examinee's (candidate's) required activities that are part of the Certifying examination as required by the BOE.

Length of Term:

. Membership on the Board of Examiners will be for five years, with terms to overlap, to guarantee continuity and knowledge transmission.

. The Chief Examiner will serve an indefinite term, as determined by the AWCI Board of Directors, who will conduct a performance or personnel evaluation every two years.

. The person to fill the Chief Examiner position will be recommended to the AWCI Board of Directors for their approval by the Chair of the Education Committee with a 3/4ths majority approval by the Education Committee membership.

Certified Examiners (Assessors):

These individuals will act as agents of the Board of Examiners and represent AWCI in the formal assessment process. They will be trained and empowered to administer various assessments developed by AWCI as these are developed and revised. They may or may not participate in the actual development of these assessments, and also the scoring of candidate performance.

Individuals who may qualify for an Examiner (Assessor) position:

AWCI Certified members
Industry representatives
REC School instructors

Certified Examiners (Assessors) will be appointed by the Board Of Examiners, pending completion of training and recommendation by the Executive Director and/or the AWCI Board of Directors.

Duties of the Mentor (on-site examiner):

. The role of the AWCI Mentor is to verify that all work submitted is done in accordance with the AWCI Standards and Practices.

. His/Her role is to administer the exam materials but **NOT** to score them or discuss or divulge any information to the examination candidates or anyone else.

- He/She will observe the candidates work environment using systematic procedures. These will include evaluating equipment, work processes, and the kind/quality of tools and measuring instruments.

- Mentors are responsible to see that time limits are met for each examination section in Box 1 and that at the close of the day, these materials are collected and returned to AWCI for scoring.

- Mentors may come from a pool of members, certified members of AWCI (regardless of certification date), and others approved by the BOE. They may come from either the Watch section or the Clock section, but in either case must be familiar with horological concepts, and professional and traditional shop practices, and in the mentoring procedure.

RULES FOR AWCI CERTIFICATION APPEALS PROCESS

These Certification Appeal Rules (the "Rules") shall govern the process for any individual wishing to appeal a failing grade on any part of an AWCI Certification Exam. All individuals taking AWCI Certification Exams have previously agreed, as a condition of taking the exam, that this appeals process is the exclusive means by which to seek review of a failing grade. Moreover, all individuals have agreed that this appeals process shall be final and binding upon the individual and AWCI.

1. **Notice of Appeal.** Any individual wishing to appeal a failing grade on any part of the AWCI Certification Exam must file a written Notice of Appeal with the AWCI Executive Director within thirty (30) days of receipt of his or her Certification Exam result. The form of the Notice of Appeal is available at AWCI's headquarter office by calling: 866-367-2924 or (513) 367-9800. The Notice of Appeal must be filled out, signed and received at AWCI's headquarters within the thirty (30) day deadline in order to be effective.

2. **Board of Examiners Review.** Upon receipt of the Notice of Appeal, the Executive Director shall submit an appeals packet to the Board of Examiners (the "BOE") for review. The package shall contain the Certification Exam, but shall not disclose the identity of the individual seeking appeal. Within ninety (90) days of the receipt of the Notice of Appeal by AWCI, the BOE shall review the Certification Exam and vote on whether to uphold or overturn the failing grade. All votes shall be by the majority vote of the Board of Examiners. If a member participated in the same candidate's final initial assessment, that member of the BOE shall not participate in the voting. Candidates will be promptly notified of the results of the Board's vote.

3. **Executive Committee Review.** If any member of the Board of Examiners dissents with the Education Committee's decision to uphold a failing grade, then the individual appealing the failing grade shall be granted a further right to appeal the BOE's decision to the AWCI Executive Board. The notice from AWCI informing the individual of the Board of Examiner's vote in upholding the failing grade shall also notify the individual if he or she has the right to appeal that decision to the AWCI Executive Committee. If the individual is given that right, he or she must exercise it by sending a written notice to the AWCI Executive Director requesting the appeal to the Executive Committee. The Executive Committee shall consider the appeal within ninety (90) days of the receipt of the notice by the Executive Director. The Executive Committee shall uphold the failing grade or overturn it by majority vote. The individual appealing the failing grade shall be promptly notified of the Executive Committee's action once it is taken.

4. **Binding Decision.** Except as noted in Section 3 above, all decisions of the BOE in upholding or overturning a failing grade shall be final and binding upon AWCI and the individual appealing the failing grade. In the event that the individual appealing the failing grade is given a right to appeal to the Executive Committee, then the action of the Executive Committee in upholding or overturning the final grade shall be final and binding upon AWCI and the individual appealing the failing score.

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3. **Executive Committee Review.** If any member of the Board of Examiners dissents with the BOE decision to uphold a failing grade, then the individual appealing the failing grade shall be granted a further right to appeal the BOE's decision to the AWCI Executive Board. The notice from AWCI informing the individual of the Board of Examiner's vote in upholding the failing grade shall also notify the individual if he or she has the right to appeal that decision to the AWCI Executive Committee. If the individual is given that right, he or she must exercise it by sending a written notice to the AWCI Executive Director requesting the appeal to the Executive Committee. The Executive Committee shall consider the appeal within ninety (90) days of the receipt of the notice by the Executive Director. The Executive Committee shall uphold the failing grade or overturn it by majority vote. The individual appealing the failing grade shall be promptly notified of the Executive Committee's action once it is taken.

4. **Binding Decision.** Except as noted in Section 3 above, all decisions of the BOE upholding or overturning a failing grade shall be final and binding upon AWCI and the individual appealing the failing grade. In the event that the individual appealing the failing grade is given a right to appeal to the Executive Committee, then the action of the Executive Committee in upholding or overturning the final grade shall be final and binding upon AWCI and the individual appealing the failing grade.

Educational Development Program (EDP)

It is the goal of AWCI to provide an Educational Development Program (EDP) of study and practice to help those who are up and coming, as well as those who carry current certifications, develop their knowledge, skills and dispositions to maintain their edge. There are currently no requirements for CEU's for clockmakers. Please consult the *Horological Times* or contact AWCI Central for information on any changes to this policy. Please consult the **EDP policy** which follows this Standards and Practices document for details.

Sample Examination Questions

Please note that the % next to the category is the percent that this section will count on the total. Question style will vary but the answers will be in the styles requested here. If an incorrect answer is given to a calculation question, partial credit may be given for work that is shown if the Examiner can follow the math logic given. (see sample rubric above)

Proficiency: History (5%)

1. This clock style (at left) opened the market in the mid-1800's for clock sales with the latest 30 hour brass movement.

a.)Give an approximate range of years over which this clock was sold.

_____

b.) Who was credited with the development of the case and who received the credit for the development of the movement?

c.) Name 5 other companies that sold this style of product.

d.) What was this style called?

2. The concept of a "cottage industry" has been with us for centuries. In Europe, two countries, in particular, have left us products that are very common in our (USA) marketplace.

a.) Name the countries.

b.) One style of clock was a floor clock (there are, however, wall clock examples) and the other country made, and is still making, a large variety of wall clocks. Name these 2 styles of clocks.

c.) Each of these clock styles has a unique striking arrangement. Explain how each of these clock styles strikes the hours.

3. From the late 1600's, the British started and continue through today a very strong clock organization.

a.)Name this historic Guild.

_____

b.)Many famous members came from this group after they became "free men" of the guild. Name two of these men who are credited with inventing clock escapements that are still in use today and give the name of the escapement.

Proficiency: General Mechanics (30%)

1. Given the length of a "Royal" pendulum at Harrison, OH of 39.12" or 99.36cm, what length pendulum is needed to make a clock that shows a beat rate of 180 beats per minute? (Show all your work.)
2. On a clock movement there is a "V" shaped release lever. One arm is 2" long and the other arm that contacts the cannon pinion is 1" long. If we move the shorter arm ¼", how much will the longer lever move? (Show all your work.)
3, There are 3 major sources of friction that can occur between a train wheel and its mating pinion. They are pivotal, tooth engaging and tooth disengaging. Explain what a benchman can do to minimize all 3 of these.
4. Minute wheels often get lost with poor repair handling. Calculate the options for a missing minute wheel and its pinion, given the canon pinion has 16 leaves and the hour wheel has 48 teeth. This is a standard 12 hour dial. (Show all your work.)
5. The average resistance of a 110 AC electric coil is between 500 to 2000 Ohms. If the leads are pulled out of the coil and are repaired by tweezing out the start winding and resoldering new leads, what effect will the loss of 5-10 windings have on the functionality of this coil?
6. Quartz clocks are not usually repaired because of their inexpensive construction and ease of replacement. There are several tests that a clockmaker can use to determine if the movement is useless or just needs the terminals cleaned and a new battery installed. What do the following tests tell us?
    a. microampere consumption,
    b. lower or minimum running voltage,
    c. when will the voltage of a "AA" battery typically lose its ability to move a set of hands on a standard quartz clock?

7. Make a diagram of the mating of a gear tooth and a lantern pinion and label the following terms: Addendum, dedendum, tooth, pitch circle, line of centers, pinion trundle, root, and ogive. Also give a definition of epicycloidal gearing.
8. What is the relationship between suspension spring thickness and time keeping on a given pendulum? Is this true for both torsion and simple pendulums?
9. Endshake and sideshake are essential for the proper running of any wheel train.

    a.) Define these two concepts

    b.) Tell how you determine how much of each is "enough."

10. Pivotal wear is predictable. Explain why pivot holes never wear uniformly round, but only in one direction.

Proficiency: Escapements (30%)

1. Define:
Drop:_____
Lock:_____
Lift:_____
2. On some American and European clocks a "half deadbeat" escapement was used. How can an escapement be "half dead?"
3. Given an escape wheel tooth distance of 0.100" (2.54mm), what is the largest, best size of stock to use to make a Brocot pallet for this wheel? (Hint, what is the size of stock to start with, not the finished pallet width.) Show all your work.

4. "Floating Balance" escapements can pose several problems even when "new out of the box." Explain the effect of the following and how the problem is corrected.
   a.) The fork is too deep (but not bottomed) onto the impulse pins of the balance wheel:

   b.) The outer coil of the hairspring is too close to the next inner coil as it beats:

5. Fluttering is a common problem in 400 day clocks. It most often occurs from 1 or 2 sources—the escapement and/or the fork. Explain the effect of each source and how each is corrected.
6. There are several designs of "self-beat adjusting" clock movements. The principle of their action is similar. How does a clock escapement correct its beat by itself?
7. There are a number of reasons that a clock will go in and out of beat while it is running. Frequently, this problem will not stop the clock. Discuss several reasons for this problem in various clock movements and how each example you give can be corrected. (Give at least 3 examples.)
8. Explain the relationship between pallet thickness and the drop experienced in an escapement. Be sure to discuss both a thinner pallet and how thick a pallet can be before it will not work.
9. When an escape wheel comes in with bent and chipped teeth, it is necessary to straighten the teeth back to their original indexing and then re-round the wheel to insure uniformity of tooth length. If this removes even 0.001"$\pm$ 0.001" (~ 0.10mm), it will affect the efficiency and possibly the running of the escapement. What does this do to the escapement in terms of drop, lock and lift?
10. Anchors and strap pallets frequently show up with deep ruts in their working faces. What effect does removing these ruts have on the escapement in terms of drop, lock and lift?

Proficiency: Striking and Chiming (25%)

1. Warning is a key concept in clocks.

   a) Explain what is meant by this concept.

   b) Explain the necessary amount of warning for both the chime and the strike trains.

2. There are several types of clocks that lack "warning," e.g. Morbiers, Viennese regulators, and some carriage clocks. If "warning" is important, then how do these clocks get around this problem?
3. Define the word "detent" and explain its meaning as used in striking clocks.
4. Explain the differences between the 3 common types of strike counting arrangements seen in clocks: count wheel, lock plate, rack and snail.
5. Explain how to determine which type of striking/chiming clock can have its minute hand turned backwards and which type cannot.
6. In American strap type time and strike movements, the maintenance arm frequently will have a deeply worn groove where it rides against the maintenance cam. What effect will this have on the functioning of the strike as a whole?
7. Explain how a modern Hermle, Kieninger, or Urgos movement is able to synchronize its 4th quarter chime with the minute hand at 12:00, when thrown out of sequence.
8. In a modern floor clock movement, when "things go awry" the clock can chime "on and on and on"….. Explain how this can happen.

Proficiency: Metallurgy (5%)

1. Describe the composition of the following:
   Brass:_____
   Steel:_____
   Bronze:_____

2. Explain how each of the following is affected by heating to a dull red and plunging into cold water.
   Brass:_____
   Low carbon Steel
   (e.g.1020):_____
   High carbon Steel (e.g. 1090 or 01):_____

Proficiency: Springing (5%)

1. Given a barrel with an internal diameter of 2.25", an arbor diameter of 0.250," what is the best length of spring to properly fit this barrel?
2. Describe the effect of
   a.) using a thicker spring:
   b.) using a wider spring:

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AWCI Educational Development Program (EDP)

Philosophy: For any organization to develop, thrive and grow, the participation of its membership is critical. If members do not grow, then neither does the organization that represents them. For the benefit of the total membership, and for the development and/or maintenance of a member's knowledge, skills and dispositions about the horological trades, this program was developed to set the guidelines for the educational programming of AWCI. The mission statement for AWCI sets the goals for the organization and its membership and sets the stage for this program:

"AWCI is the premier professional international organization dedicated to preserving and promoting the highest standards of workmanship in the horological crafts. It is the role of AWCI to set the standard of excellence to be applied to the quality of instruction for both the repair and restoration practices that are taught worldwide to watch and clockmakers."

Purpose: It is the goal of these programs to help the membership acquire the needed skills, knowledge and dispositions that are necessary for success in the bench practice of Horology. Once they (the membership) have acquired these needed skills and materials, they are urged to acquire their particular discipline's (watch or clock, or both) certification endorsement. Because of changes in both the watch industry (with new developments from the manufacturers coming forward all the time) and the clock industry (with the decline of all manufacturers and the shrinking of available materials), there is a need to keep one's skill set up to date and efficient. It is the goal of the Educational Development Program (EDP) to provide the materials and a structured way to achieve the qualities set out in the Watch and Clockmaker's Standards and Practices documents as developed by AWCI.

Definitions: Although this program is designed for the entire Organization's membership, there is a segment of our group who must maintain and demonstrate their skills on a regular basis. In general, all programs completed would add to one's educational development. Those *who wish to receive a letter of completion* or CEU credit must take and pass a written and/or practical exercise at the end of the program that demonstrates to the instructor and AWCI that you have acquired the necessary information. The segment that wishes to maintain their certification and industry standing must achieve a certain number of **Continuing Education Units** (CEU's). Set out below are the requirements and options for these different programs. Since these requirements can change as new technologies and organizational developments change, our members are asked to review the ***Horological Times or www.awci.com education section*** regularly for updates and new course options which may offer even more ways to develop one's knowledge, skills and dispositions about Horology.

Student requirements and credit offerings:

Anyone can take any EDP (or CEU, if there is room). To ensure all credits are properly recorded, the candidate must do the following:

1. You must pass a written and/or practical assessment given for that course. *For certified members, however, this **is** required if they wish to receive CEU credit to maintain their certification.* (NOTE: It is strongly encouraged that all class participants take the class assessment. There is no better way to exemplify your achievement than to receive a letter of completion that shows you demonstrated the knowledge, skills and dispositions of that class.)

2. Only letters of completion and CEU credits will be recorded and kept in the member's records at the AWCI office.
3. It is the **responsibility of the candidate to file this information** with the AWCI Education Coordinator. Because of the alternative options available, the office cannot be held responsible for tracking the courses completed.

GENERAL MEMBERSHIP:

Any member in good standing may take any AWCI course. Non-members may sign up if there is room, but will be required to pay an additional fee for the class as long as they meet the minimum requirements for that class. Classes will be filled on a first-come-first-served basis. Participants are not required to take any assessments unless they wish to do so. If they wish to receive a letter of completion or CEU credit, they are **required** to take, complete and achieve a score of 70% or higher with whatever assessment tool is used for that course at its end.

CLOCKMAKERS:

All clock enthusiasts, professionals and certification holders (past and present) are encouraged to continue their education by taking as many programs as possible. Even though there are no CEU requirements attached to the older (AWI) certifications, all horological enthusiasts, professionals, and certified professionals are urged to develop and follow a plan that will help them grow their bench skills to the fullest and work towards obtaining or maintaining 21st Century certification. See the Clock/Watch Standards & Practices for guidance. The S & P for clockmakers is posted on the AWCI website (www.awci.com/services/certification.php).
For those who carry the current CC21 or CMC21, there are currently no specific requirements for maintaining or renewing credentials. (NOTE: Please keep watching the *Horological Times* for any changes in this policy as the Educational Development Program ((EDP)) moves forward.)

However, all clockmakers are urged to consider performing as many of the following activities as possible every 5 years to demonstrate to consumers, fellow professionals and AWCI that they are serious about professionalism and maintaining peak proficiency. AWCI and the Education Committee members have invested much of their time, efforts and talents into developing the assessments available and would appreciate that effort being returned by continuing to help the trade, and develop and celebrate the horological crafts. Without further involvement, the trade loses precious talent that takes too long to replace. Help build Horology, Clockmaking and AWCI at all levels (Chapter and National).
The Education Committee urges all professional clockmakers to do any/all of the following as opportunities become available:

1.) Keep membership current as this is the only way one can keep current with developments and changes within the craft. Keep watching *Horological Times* for more information.
2.) Help grow interest in Clockmaking and Horology by encouraging one new member a year to join AWCI and/or the local chapter, or help one member get their certification (work as a Mentor).
3.) Help the profession by meeting and talking with any group (or individuals) that have an interest in professional Horology, be it public or private. Give talks at schools, group meetings, etc.

4.) Be proactive with your own development and take bench courses, collegiate or Vocational/Technical school classes (such as business/accounting or CAD work, or formal machine training on the lathe or milling machine) to help expand knowledge and skill bases.
5.) Work to find solutions to bench problems and share them. Either publish them in *Horological Times* or contact AWCI for help in getting them published.
6.) Join an AWCI committee (either local or national), start (or help start) a new AWCI chapter in the local area, and work to grow and build the organization for future generations. This is especially important when encouraging new talent to join the trade. New clockmakers need a supportive place to begin to grow and develop.

WATCHMAKERS:

All watch enthusiasts, professionals and certification holders (past and present) are encouraged to continue their education by taking as many programs as possible. Even though there are no CEU requirements attached to the older (AWI) certifications, all horological enthusiasts, professionals and certified professionals are urged to develop and follow a plan that will help them to grow their bench skills to the fullest and work towards obtaining or maintaining 21st Century certification. See the Clock/Watch Standards & Practices for guidance. The S & P for watchmakers is posted on the AWCI website (www.awci.com/services/certification.php).

If you hold one of the new 21st Century Certification Awards, the following program is designed expressly to help you maintain your credentials and continue to have them recognized by AWCI and industry. Please review the 3 types of CEU's available to you to satisfy these requirements (listed below).

Requirements:

All 21st Century Watchmakers (CW21's and CMW21's) must acquire the given number of CEU's stated below every 5 years. (If you choose NOT to maintain your certification, refer to section below on **Choosing NOT to Maintain Your Certification.**)
Extra CEU's earned within the 5-year period are NOT transferable to the next or future 5-year requirements. All candidates are urged to acquire as many CEU's as their finances and schedules permit.
Those with current 21st Century certificates who have completed their testing on or before December 31, 2011 will have 5 years from January 1, 2012 to complete their CEU's. (CEU's earned prior to January 1, 2012 will not be counted for the 5-year crediting period that begins January 1, 2012.) All future holders will have 5 years from the date on their certificates.

1. Those with CW21 certifications are required to complete a minimum of 6 CEU's within the 5-year period from the date on their Certificate.

   The usual curriculum options for the above are:
   a.) 3-5 CEU's from Type 1 (Practical Bench Experiences) ***and/or***

   b.) 2-3 CEU's from Type 2 (Professional Studies).

It is acceptable to use 1-2 CEU's of Type 3 (General Studies and Professional Work), but not encouraged at this certification level.

2. Those with **CMW21** certifications are required to complete a minimum of 7 CEU's in the same time frame (5 years) with the same distribution of Types. CMW21's are urged, however, to acquire at least 1-2 CEU's from Type 3 options such as participation in an AWCI committee or education work as discussed below from Type 3 CEU's.

3. Those wishing to submit special programs may do so with the form following this document. With the approval of the Education Committee and the Board of Examiners (BOE), as much as 80% of the total CEU requirements may be met with this type. ***However:*** 1.) The program must demonstrate the Candidate's compliance with the Watch S&P and solid horological practices, and 2.) The program must be approved by the Education Committee and the Board of Examiners ***before*** it is begun. See the CEU Qualifications and Approximate Values section below for guidance.

CEU Qualifications and Approximate Values:

There are many items that can receive credit as a CEU. To qualify for CEU credit:

1. The program must be approved in advance by the Education Committee and the BOE. Use the attached form to request a review.

2. The following are typical examples of Types and Credit Values for CEU's. These are only guideline values and *are not limited to these numbers*. If more effort is required, more credit may be awarded.

Type 1: These include:

- AWCI Bench Courses, Academy Courses, Certification support classes for watchmakers.
- International courses/programs or any program that gives the candidate "hands-on," direct experience from a qualified instructor, etc.
- This also includes colloquia/symposia, but they must include *member participation*.

Typically 6-8 hours of classroom time with a qualified instructor would be valued at 1.0 CEU ***with*** *successful completion of whatever evaluation tools are presented.* Multiple days (2 or more days with 6-8 hours of class contact each day) will receive multiple CEU's. Thus, a 5-day course would receive 5 CEU's when evaluations are completed. Before any class is given credit, the amounts will be established and published in *Horological Times (HT)*. If you have a question, contact the AWCI Education Coordinator for further information.

Type 2: The education and projects that qualify include:

- Attend half-day to 1-day seminars and colloquia/symposia (these can include Annual and/or Chapter meetings with prior approval).

- Write and publish materials (book reviews, techniques, restoration work, etc.) for *HT* magazine.
- Complete an approved distance learning program or perform a research project (you must have prior approval) and have it published in *HT*. The subject should be something that helps with a facet of horology.
- Become an assessor *or* an administrator *or* written examination scorer for either the clock or the watch certification programs. You can also receive credit for developing and using (teaching) educational materials to help others with their skill development.

Typically completing 4-6 class hours of class contact, with successful completion of the evaluation tools presented, would be awarded a one-half CEU credit. In most cases, seminars lasting 3 days would qualify for 1 ½ CEU's. Research work or paper presentations must be submitted for credit review and a determination on the credit amount must be made before the work is published. The amounts will be determined on a case-by-case basis by the BOE and Education Committee. Those wishing to submit special programs may do so on the form following this document.

Type 3: It is the philosophy of AWCI to encourage its membership to reach into their communities and help educate our public about horology and its elements, as well as themselves. ***With prior approval from the Education Committee and the BOE*, you may request CEU credit for this community outreach.** There are 4 main types of outreach that qualify: (1) Service to the profession, (2) Service to the Institute, (3) Service to the industry, and (4) Service to the community.

The categories can include:

a.) Mentoring other tradesmen or apprenticing new professionals.

b.) Educational contributions, committee work within AWCI, leadership roles, such as participation in certification assessment procedures or other activities. This could also include the writing of articles for *HT* magazine on the results of personal research work and/or unusual work or techniques performed.

c.) Improving personal qualities through: 1) Completion of educational studies for use in trade practice, 2) Promotion of the craft through various efforts, such as public relations, 3) Developing quality routines for use in the service of various products, and 4) Professionalism.

d.) Volunteerism: Promoting the horological crafts at career day programs or through public conservation programs, such as assisting with local museum work to preserve the horological heritage in a region.

NOTE: All values for Type 3 items will be determined on a case-by-case basis.

You may submit any specific program you feel is CEU-worthy to the BOE for consideration. These could include:

- Micro-milling, lathe or CAD courses from a Vocational or Technical school
- Business management programs that help the candidate succeed in his/her business, etc.

You must submit a request *before* you undertake a program. Submission does NOT guarantee CEU credit. (To submit a program, please see the form attached to this document.)

Choosing NOT to Maintain Your Certification (and Reinstatement):

It is your choice whether or not to maintain your certification. Should you choose ***not*** to do so, your current certificate will not be recalled, but 6 years after its date of issuance, it will be noted as non-current with CEU requirements. After that period, you must re-qualify your credentials and receive a new, updated certification document to be considered for any program or training that requires a current certificate.

Should you wish to renew your credentials, you must submit an application to the BOE at the time reinstatement is desired. The BOE will determine what skills, knowledge and dispositions you need to demonstrate in order to maintain the current required quality peak. This may or may not (at the BOE's discretion) include the retaking of a part or the entire current assessment to guarantee the reissuing of your new certification.

AWCI encourages all members to develop their knowledge, skills and dispositions to their fullest. If not for your own financial gain and satisfaction, consider your customer's confidence level and what your professionalism as a representative of the horological crafts means to them.

Right of Appeals:

Members have the right to appeal any decision on certification from AWCI by filing an Appeal with the BOE. The rules for filing this appeal are contained in both Watch and Clock S&P's and should be consulted if there are questions.

Application for CEU Credit Approval

Your name:_____

Address:_____

City, State/Province/Territory, Country_____

_____

Phone number(s) where you can be reached:_____

Title of program being submitted:_____

Heading Type under which your program would fall (Type 1, 2, or 3):_____

How much credit are you wanting to receive for this program?_____

Please give a brief summary of the program you wish to have considered for CEU credit (you may attach a sheet if you need more space):

_____

_____

_____

_____

_____

Please explain why this program should be awarded the CEU units:

_____

_____

_____

FOR OFFICIAL USE ONLY

Ed Comm recommendations for this program to receive CEU endorsement:

_____

BOE recommendations for this program to receive CEU endorsement:

_____

BOE recommended CEU amount for this program:_____

Ed Comm Approval: Yes_____ No_____