THE

Joseph Bulova

SCHOOL of WATCHMAKING

TRAINING UNITS

TABLE OF CONTENTS

UNIT NUMBER	DESCRIPTION	PAGES
PRELIMINARY		1 to 8
UNIT #1	STAKING BALANCE STAFF	9 to 20
UNIT #2	TRUING BALANCE WHEELS	21 to 36
UNIT #3	BASIC TURNING	37 to 52
UNIT #3A	TURNING BALANCE STAFFS	53 to 76
UNIT #3B	STEM MAKING	77 to 96
UNIT #4	BURNISHING BAL. PIVOTS	97 to 112
UNIT #5	POISING BALANCE WHEELS	113 to 128
UNIT #6	HAIRSPRING TRUING	129 to 156
UNIT #7	HAIRSPRING VIBRATION	157 to 168
UNIT #8	OVERCOILING	169 to 184
UNIT #9	WATCH ASSEMBLY	185 to 196
UNIT #9A	MAINSPRING BARREL ASSEMBLY	197 to 224
UNIT #9B	FRICTION JEWELING	225 to 238
UNIT #10	ESCAPEMENT	239 to 260
UNIT #10A	HOW TO REPAIR ESCAPEMENT	261 to 276
UNIT #11	FINISHING	277 to 296
SUPPLEMENT TO UNITS #10 and #10A		297 to 304
GENERAL REPAIR INFORMATION		305 to 314
ADDITIONAL SUPPLEMENTS TO UNITS #10 AND #10A		315 to 316

PRELIMINARY TRAINING UNIT

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SEVENTH EDITION

BULOVA SCHOOL of WATCHMAKING

MIND TO CONCEIVE

EYE TO PERCEIVE

HANDS TO ACHIEVE

Coordination in Finger Dexterity

PRELIMINARY TRAINING UNIT

The success of almost any pursuit in life depends, to a certain extent, upon a system of coordination between the eye, mind and hands. The ability to coordinate the activities of these three facilities is developed from infancy throughout life.

The successful pursuit of the arts, such as sculpture, music and painting, requires an extremely high degree of coordination between a person's eyes, mind and hands.

It is the high degree to which this coordinative ability must be developed in the watchmaker's trade that makes it so necessary for the student to apply himself to the following Training Unit conscientiously.

This unit is designed to develop finger dexterity and reasonable proficiency in the use of the basic tools of the trade. It is during the performance of this unit that the student forms the correct habits relative to his working position at the bench and its associated equipment.

Practical work . . .	40 hours
Related theory . . .	8 hours

BULOVA SCHOOL *of* WATCHMAKING

PRELIMINARY TRAINING UNIT

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Subject:

Finger Dexterity Exercises.

Objectives:

1. To develop finger dexterity.
2. To develop proficiency in the use of an eye glass, tweezer, and screwdriver.
3. To accustom the student to the bench and the proper working position.

Tools Required:

1 eye loupe (A)	1 balance block (D)
1 screwdriver (B)	1 balance screwdriver (E)
1 pr. tweezers (C)	1 holder (F)

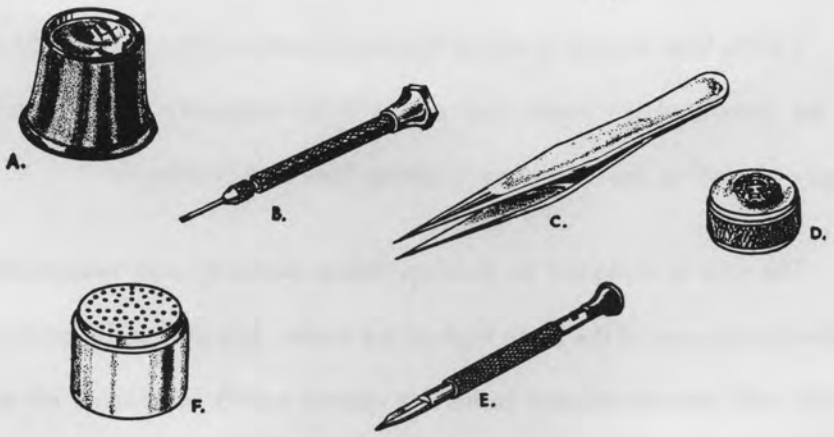

Fig. 1

NOTE: A clean, orderly bench is a prerequisite to neat, accurate work.

Proficient use of tools is of prime importance where good workmanship is desired. There is no substitute for practice in the many operations that are a part of the watchmaking trade. The conscientious application of a student to this training unit will immeasurably improve subsequent work.

OPERATION No. 1

In this operation actual plate screws are used. These screws are to be inserted in pillar plates each containing fifty tapped holes.

Care should be taken in this procedure to assure the formation of proper habits pertaining to the actual use of the tools.

Fig. 2 and 3 illustrate the proper use of tools needed for this operation.

Fig. 4 will serve as a guide in establishing proper habits relative to the working position and the location of the various components which go to make up the watchmaker's working unit.

This entire operation consists of the placement of the screws in the holes with a tweezer and the seating of the screws using a screwdriver of the proper size.

The completed plate will be graded according to:

1. The condition of the finished work, i.e., scratches, burrs, loose screws, etc.

2. The time consumed in the actual performance of the operation.

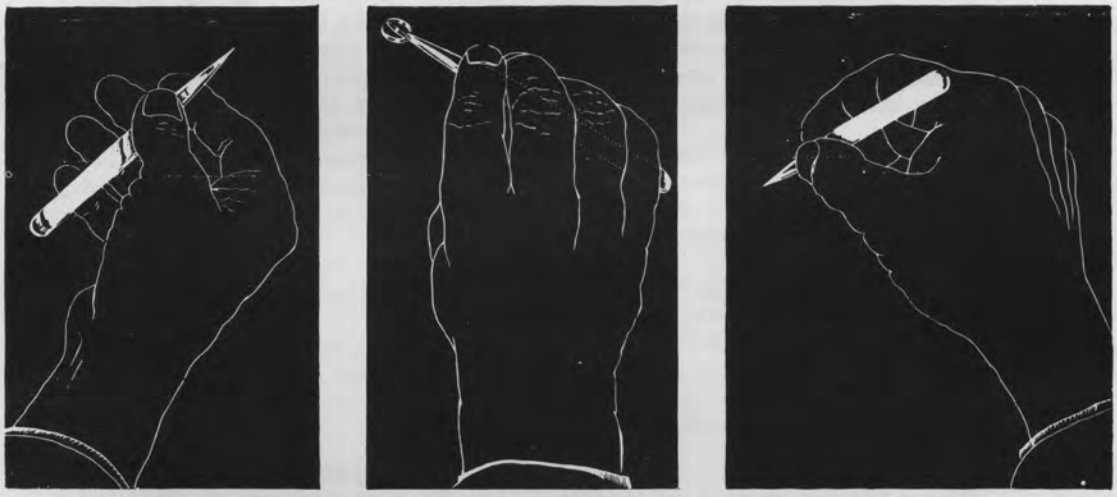

Fig. 2 (Use of tweezers.)

Fig. 3 (Use of Screwdriver.)

Fig. 4

OPERATION No. 2

This operation is performed in the same manner as Operation No. 1, but a smaller screw is used. These screws are actual pallet bridge screws as used in Bulova watches.

The grading of this operation is identical with that of Operation No. 1.

OPERATION No. 3

This operation is again similar to the preceding ones, but this time a still smaller screw is used. These screws are actual stud screws or jewel screws and will be graded on the same basis as Operations No. 1 and No. 2.

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OPERATION No. 4

This operation deals with the insertion of balance screws into bi-metallic balance wheels. All balance wheels will fall into one of two general types. The older type, and a type not often used in newer watches is the bi-metallic or two metal type. As the name implies, this balance is usually constructed of two dissimiliar metals, brass and steel, and has an open or cut rim. These constructional details were used to minimize the effects of temperature change on the hairspring.

In Fig. 5 a typical bi-metallic balance wheel is shown, first without balance screws installed and second, with balance screws in their proper places.

The actual installation of the balance screws is an operation requiring some degree of skill on the part of a student. First, the balance screws are put into the slotted block and the block agitated until the screws are laying in the slots head up. Fig. 6A.

Place a balance wheel on the balance block with the balance arm down. Fig. 7A. Select a screw driver with a blade so ground that a slight wedging action will occur when the blade is pressed into the screw slot. Fig. 6B. The small amount of pressure thus created between the screw slot and blade is enough to support the screw without the aid of any additional mechanical device. Fig. 7B. Pick up a screw from the slotted block as shown in Fig. 6A and insert in the desired hole in the balance wheel. Fig. 7A and 7B.

In order to aid the student in the performance of this operation, the blade of the screw driver should be kept in near perfect condition. If, during the procedure the blade is broken, bent or deformed in any way it should be reground to the proper shape on a number 100 carborundum wheel before any attempt is made to use it further.

Throughout this operation care should be taken that the screw heads or the balance wheels are not marred in any way.

Grading of this operation will be based on the same standards as the previous operations in this unit.

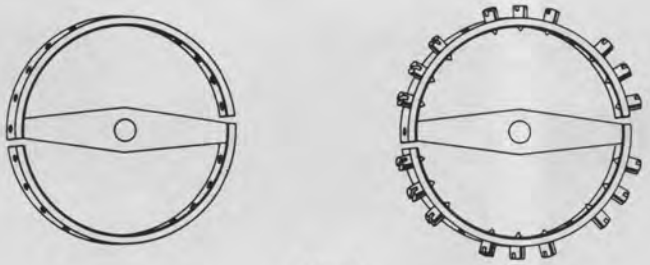


Fig. 5

Bi-metallic Balance Wheel without screws.

Bi-metallic Balance Wheel with balance screws inserted.

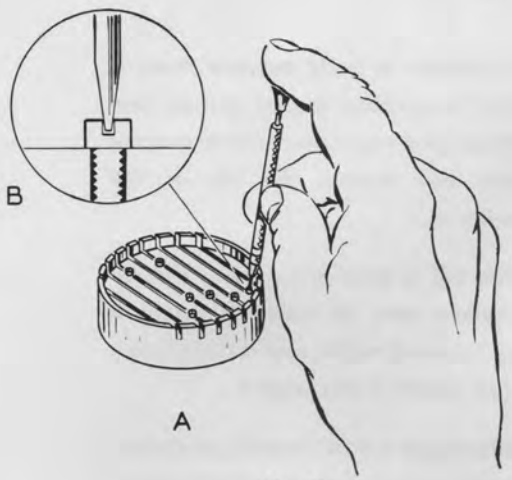


Fig. 6

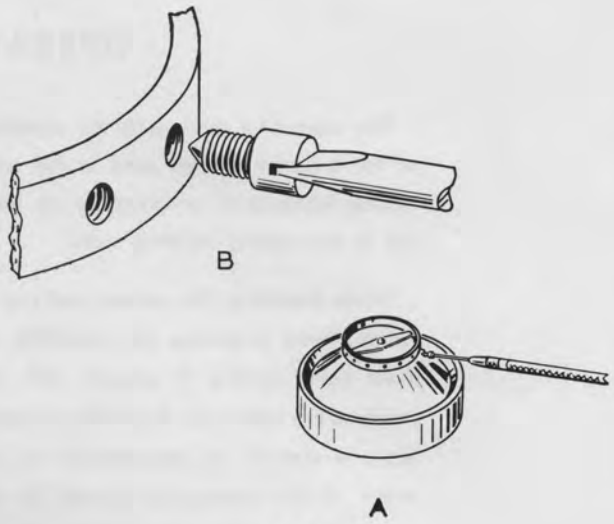


Fig. 7

OPERATION No. 5

This operation is identical with the preceding one, with the exception of the balance wheels used. In this case a Bulova 10-AK, mono-metallic balance wheel is used. This balance is illustrated in Fig. 8 and is shown with and without balance screws installed.

This balance differs from the one previously used in that this rim is solid and constructed of only one metal.

Temperature effects have been minimized through the use of a hairspring whose elasticity remains reasonably constant despite any normal temperature change, there-by eliminating the necessity for the weaker and more unstable construction of the bi-metallic balance wheel.

These balances should be handled in such a manner that warping and distortion is held at an absolute minimum.

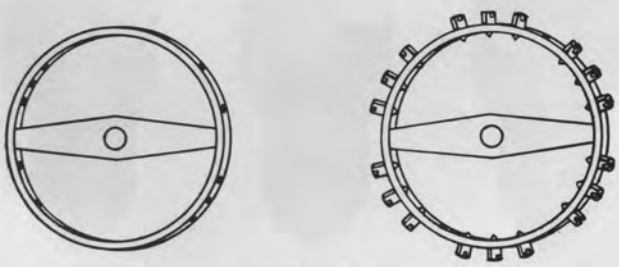


Fig. 8

Mono-metallic Balance Wheel —without balance screws.

Mono-metallic Balance Wheel —with screws inserted.

OPERATION No. 6

This operation deals with the cleaning of the balance wheels used in the preceding operations, preparatory to their use in succeeding training units.

When handling the various parts of a watch, there is always the possibility of these parts coming in contact with the hands of the operator. This will invariably leave a deposit of perspiration on the metal. If this moisture is allowed to dry and remain on the part, actual corrosion will take place with subsequent damage to the piece, thus rendering it useless for further service.

In addition to body moisture there is usually the problem of dust, grease, condensation and vapor reactions to mar the surface and shorten the life of the material.

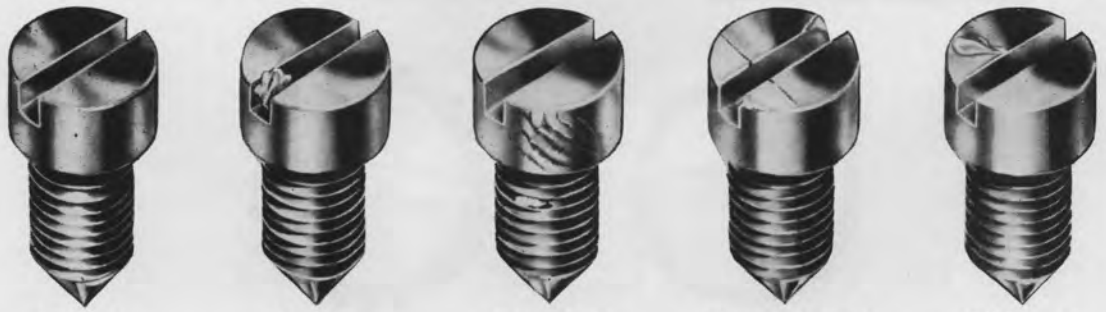
With this in mind it is evident that all precautions must be taken to assure a clean, trouble-free job, and a clean bench will aid greatly in this respect.

Following is a brief cleaning procedure for watch parts in general and for balance wheels specifically. A detailed discussion of the complete cleaning service will be found in Specific Training Unit No. 12.

Cleaning Procedure

1. Dip Parts in Soap Solution
2. Dip Parts in No. 1 Rinsing Solution
3. Dip Parts in No. 2 Rinsing Solution
4. Dry Parts in Box-wood Sawdust

NOTE: When a cleaning machine is used, step No. 4 is eliminated and the parts are spun dry in the machine.



Faultless Screw ***Saw Dust in Screw Slot*** ***Finger Marks on Screw Head*** ***Marred Slot and Scratched Head*** ***Oil Spot on Screw Head***

Examples of dirt, grease, etc. on watch parts.