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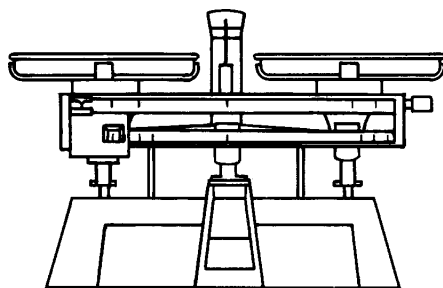
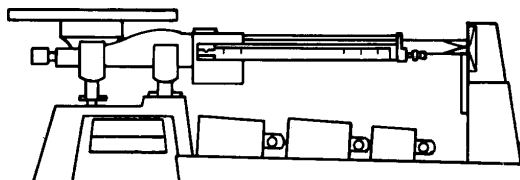
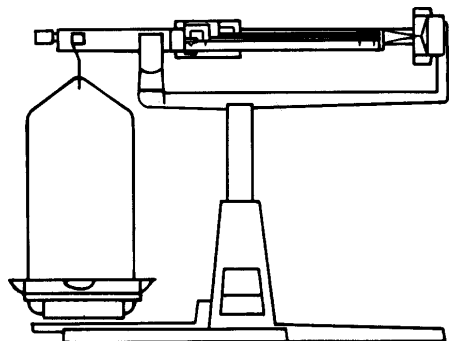
07932-0900

## **MECHANICAL BALANCES**

# **FIELD SERVICE / PARTS MANUAL**

# SERVICE MANUAL

## Mechanical Balances



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## TABLE OF CONTENTS

<b>CHAPTER 1 INTRODUCTION</b>	Page No.
1.1 Introduction .....	1-1
1.2 Service Facilities .....	1-1
1.3 Tools and Test Equipment Required .....	1-2
1.3.1 Standard Tools and Test Equipment List.....	1-2
1.4 Test Masses Required .....	1-2
1.5 Specifications .....	1-2
<b>CHAPTER 2 CARE OF MECHANICAL BALANCES</b>	
2.1 Care of Balances .....	2-1
<b>CHAPTER 3 SERVICING</b>	
3.1 Service of Series 700 Triple Beam Balance .....	3-1
3.2 Service of Models 310/311 Hanging Pan Balance.....	3-3
3.3 Service of Series 1200 School Balance .....	3-3
3.4 Service of Series 1400 and 1500 Harvard Trip Balances .....	3-4
<b>CHAPTER 4 PARTS LISTS</b>	
4.1 Parts Lists .....	4-1

## LIST OF TABLES

TABLE NO.	TITLE	
1-1	Mass Values .....	1-2
1-2	Models 310 and 311 Specifications .....	1-2
1-3	Series 700 Triple Beam Specifications .....	1-3
1-4	Series 1200 School Balance Specifications .....	1-3
4-1	Model 700 Series Parts List .....	4-2
4-2	Model 311 Cent-O-Gram Parts List .....	4-3
4-3	Model 1200 School Balance Parts List.....	4-4
4-4	Model 1400 and 1500 Series Harvard Trip Balance Parts List .....	4-4

## LIST OF ILLUSTRATIONS

FIGURE NO.	TITLE	
5-1	Typical Triple Beam Drawing .....	5-3/5-4
5-2	Models 310 and 311 Balance Drawing .....	5-5/5-6
5-3	Series 1200 Balance Drawing .....	5-7/5-8
5-4	Series 1400 and 1500 Harvard Trip Balance Drawing .....	5-9/5-10



# CHAPTER 1 INTRODUCTION

## 1.1 INTRODUCTION

This manual is not to be considered a service manual for service technicians. This manual is designed to assist the end user for maintenance and making minor repairs. This manual contains information needed to perform routine field maintenance and service on the Mechanical Balances, Models: 310/311 with Hanging pan, Series 700 - Triple Beam, Series 1400 and 1500 - Harvard Trip Balance and Series 1200 - School Balance. The contents of this manual is contained in five chapters and are listed as follows:

**Chapter 1 Introduction** - Contains information regarding service facilities, tools, measuring masses, and specifications.

**Chapter 2 Care of Mechanical Balances** - Contains information on the care of mechanical balances.

**Chapter 3 Servicing** - Contains typical problems and solutions for servicing.

**Chapter 4 Parts Lists** - Contains a partial parts list for each model or series and identifies all field replaceable components.

**Chapter 5 Drawings** - Contains a drawing for each model or series and identifies all field replaceable components. Each item on the drawings contain part numbers which can be ordered.

Before servicing the balance, you should be familiar with the Instruction Manual which is packed with every balance.

## 1.2 SERVICE FACILITIES

To service Mechanical Balances, the service area should meet the following requirements:

- Must be free of air currents or drafts from air conditioning/heating ducts, open windows, people walking by, fans, etc.
- Area must be clean and air must not contain excessive dust particles.
- Work surface must be stable and level.

# CHAPTER 1 INTRODUCTION

## 1.3 TOOLS AND TEST EQUIPMENT REQUIRED

In order to properly service Mechanical Balances, certain test items are required. These items are listed as follows:

### 1.3.1 Standard Tools and Test Equipment List

1. Standard Tool Kit.
2. Mass sets up to 2610 grams are required. Ohaus makes various calibration sets available. Please contact your nearest Ohaus dealer for further details.

## 1.4 TEST MASSES REQUIRED

The masses required to test the Mechanical Balances must meet or exceed the requirements of ASTM Class 4 Tolerance. The mass values are listed in Table 1-1.

TABLE 1-1. MASS VALUES

MODEL	CAPACITY	CALIBRATION MASS	PART NUMBER
310	310g	300g	51035-05
311	311g	300g	51035-05
700 Series	2610g	500g	51055-06
1200-00	2000g	1000g (2 required)	51016-06
1210-00	2000g	1000g (2 required)	51016-06
1400 Series	2000g	1000g (2 required)	51016-06
1500 Series	2000g	1000g (2 required)	51016-06

## 1.5 SPECIFICATIONS

Complete specifications for the Mechanical Balances are listed in Tables 1-2, 1-3, 1-4 and 1-5. When a balance has been serviced, it must meet the specifications listed in the tables. Before servicing the balance, determine what specifications are not met.

TABLE 1-2. MODELS 310 AND 311 SPECIFICATIONS

Model	310	311
Capacity (g)	310	311
Readability (g)	0.01	0.01

## CHAPTER 1 INTRODUCTION

### 1.5 SPECIFICATIONS (Cont.)

TABLE 1-3. SERIES 700 TRIPLE BEAM SPECIFICATIONS

Capacity (g)	610
Capacity (g) with accessory mass set	2610
Readability (g)	0.1
Calibrations:	
Front beam	10g x 0.1g
Middle beam	500g x 100g
Rear beam	100g x 10g

TABLE 1-4. SERIES 1200 SCHOOL BALANCE SPECIFICATIONS

Model	1200-00	1200-50	1210-00	1210-50
Capacity (g)	2000	2000	2000	2000
Readability (g)	0.5*	0.5*	0.5	0.5
Calibrations:				
Beam	-----	-----	10g x 0.5g	10g x 0.5g
Mass set	50g to 1g	-----	50g x to 10g	-----

TABLE 1-5. SERIES 1400 AND 1500 HARVARD TRIP BALANCE SPECIFICATIONS

Model	1450-SD	1550-SD	1560-SD	1510-DO	1454-SD
Capacity (g)	2000	2000	2000	2000	2000
Weigh beam capacity x readability	10g x 0.1g	10g x 0.1g 200g x 10g	10g x 0.1g 200g x 10g	10g x 0.1g 200g x 10g	1oz x 0.01oz 28.4 x 0.2g
Tare range	-----	-----	225g	-----	-----

\* Models 1200-00 and 1200-50 do not have a graduated beam, however, they are sensitive to 0.5 gram.

**CHAPTER 1 INTRODUCTION**



## CHAPTER 2 CARE OF MECHANICAL BALANCES

### 2.1 CARE OF BALANCES

Mechanical balances are precision instruments and as such, they should be handled, treated and cleaned with care. This section briefly outlines some of the preventive handling and storing methods to be applied to mechanical balances.

#### 2.1.1. Keep them clean

- Pans - clean with soap and water, dry thoroughly.
- Beams, graduated strip - a commercially available spray cleaner.
- Knife edges - compressed air or an air syringe - no oils or lubricants.
- Magnets - avoid ferrous (magnetic) material contact - clean with adhesive backed tape.

#### 2.1.2. Always secure beam when handling

- Prevent side -to- side Beam movement - damages and dulls Knife Edges.
- Prevent excessive up-down beam movement - causes premature wear of Knife Edges.
- Never carry Balance by the Beam. Hold beam tightly in place with one hand and carry Balance by placing second hand under the balance base.

#### 2.1.3 Never store balance with zero weight

- Constant oscillation dulls the Knife Edges.
- Causes a jolt when lifted.

#### 2.1.4 Check calibration and linearity periodically

- Use known weights/calibrated masses.

**CHAPTER 2 CARE OF MECHANICAL BALANCES**

### 3.1 SERVICE OF SERIES 700 TRIPLE BEAM

Refer to Figure 5-1 in Section 5 for identification of parts.

**NOTE:** Non-removable Knife Edges, you must replace the Beam

#### A. Non-Repeatability

**Problem:** Damper Vane touching the end of Trig Loop

**Solution:** Loosen the screw holding Trig Loop to Base and move it back.

**Problem:** Bent Damper Vane that is making contact with magnets in Trig Post Assembly

**Solution:** Bend Vane with fingers or needle nose pliers (hold Beam down when performing this operation) or remove the Trig Loop, remove the Vane and hammer straight.

**Problem:** Dull Knives

**Solution:** To check Knives, hold Beam down. Does it return to zero? Hold Beam up. Does it return to zero? If not, replace the Beam. This may also indicate chipped Knife Edges.

#### B. Can Not Zero Balance

**Problem:** Missing Poise (This is the Weight that slides on the Beam.)

**Solution:** Replace new Poise and secure by forcing Check Pin up with a pair of needle nose pliers. (The 100g Poise has the Check Pin, the 500g Poise does not.)

**Problem:** Shot Missing from under Pan.

**Solution:** Set Zero Adjustment at mid point of travel. Set all Poises at zero. Unscrew the Balance Pan and place it upside down on the Balance. Add lead shot or pieces of metal to bring Balance close to zero. Transfer shot to Balance Cup and reassemble Balance Pan.

**Problem:** Chipped Knife Edge: (or dull worn Bearing [notches]). To check, pry off Bearing Covers (these will have to be replaced by new ones). Remove Friction Plates and lift out the Beam.

**Solution:** If Knife Edges are chipped or worn, replace the Beam. If Bearings are worn, slide them up and replace with new Bearings. (NOTE: Balance that does not have repeatability is also a symptom of worn bearings).

#### C. No Beam Movement

**Problem:** Twisted Beam or Vane rubbing.

**Solution:** Refer to Section A.

**Problem:** Foreign Material on Magnets.

**Solution:** Remove with adhesive backed tape or remove Trig Loop and clean magnets.

## CHAPTER 3 SERVICING

### 3.1 SERVICE OF SERIES 700 TRIPLE BEAM (Cont.)

#### C. No Beam Movement (Cont.)

**Problem:** Check Pin Missing

**Solution:** Replace. NOTE: There is a long rod under the Balance that is held in place by 2 pins.

**Problem:** Broken Magnet

**Solution:** Remove Trig Loop and replace Magnet. NOTE: Magnets should attract each other in force.

**Problem:** Rubber stoppers used in shipping at the end of the Beam and under the Pan are still in place.

**Solution:** Remove both.

#### D. Beam Graduations need replacing.

**Solution:** Replace with new Lexan Graduated Strip. The old Graduated Strip will peel off. When replacing, move front Poise completely to the left and line up new Graduated Strip at zero.

#### E. Zero Adjust Knob Replacement

Hold down Leaf Spring with a small screw driver or ball point pen and screw in until flare has passed over the Spring. This is the most common cause of not being able to zero the balance. Check to see if the leaf spring is missing.

#### F. Replacing cracked or broken Balance Cup. NOTE: This is a frequent occurrence when a balance is dropped and lands on the pan edge. Unscrew Balance Pan and remove Counterweights and shot from Balance Cup. Remove screw holding Balance Cup to Parallel Loop Assembly and remove old Balance Cup. Reassemble, adding or removing shot to bring Balance to zero.

### 3.2 SERVICE OF MODELS 310/311 HANGING PAN BALANCE

Refer to Figure 5-2 in Section 5 for identification of parts.

#### A. Non-Repeatability

**Problem:** Bent Damper Vane

**Solution:** Straighten with fingers or needle nose pliers. (Note: Hold down Beam when performing this operation.)

**Problem:** Foreign material on magnets

**Solution:** Remove with adhesive backed tape.

**Problem:** Dull Knife Edges

**Solution:** To check, set Balance at zero, hold down Beam and release. Hold Beam up and release. If Balance does not return to zero, knife edge should be replaced. These parts are replaceable in the field but it is not recommended. Special tools are required to reassemble End Loop, and even though the Knife Edges can be replaced in the field, the alignment technique is difficult without extensive training.

#### B. Can Not Zero Balance

**Problem:** Zero Adjust Knob missing or Leaf Spring missing.

**Solution:** Replace with new assembly. (Note: Hold down Leaf Spring until flare on Knob has passed over the spring. To perform this operation, Beam should be removed from the balance.)

**Problem:** Shot missing from Pan Support assembly

**Solution:** Remove hanging assembly and place it upside down on desk or bench. Remove screws on Pan Support Assembly and all weights and shot. Re-hang Pan and with Zero Knob set at mid point. Set all parts on the Pan (poise at Zero). Add or take away shot until Balance returns to zero. Then re-assemble. (Note: hanging Pan Balances are adjusted with Pans and Balance Serial Numbers matched. Mixing up Pans will cause this problem. When replacing the removable Pan you will have to go through this operation.)

**Problem:** Dial-O-Gram® balance Dial is out of calibration. **Solution:** This is a problem that should be corrected by a trained technician.

### 3.3 SERVICE OF 1200 SERIES SCHOOL BALANCE

Refer to Figure 5-3 in Section 5 for identification of parts.

NOTE: Non-Removable Knife Edges, must replace Beam.

**Problem:** Beam does not move.

**Solution:** Check Beam Dampening Device. (Metal Loop that looks like a paper clip coming out the left side of the Balance Base). Bend so it does not touch Beam when not in use

## CHAPTER 3 SERVICING

### 3.3 SERVICE OF SERIES 1200 SCHOOL BALANCE (Cont.)

**Problem:** Zero adjust does not move.

**Solution:** Turn the balance over. You will see a black horse shoe shaped piece with an endless screw passing through. The horse shoe device must have parallel sides, or the endless screw will jam. This is your zeroing device. Bend with needle nose pliers to make sides parallel.

NOTE: Your balance was adjusted with the red and yellow removable pans that came with your balance. **Do Not Mix Pans** with other balances.

### 3.4 SERVICE OF SERIES 1400 AND 1500 HARVARD TRIP BALANCES

Refer to Figure 5-4 in Section 5 for identification of parts.

Note: Non-Removable Knife Edges, you must replace the Beam.

#### A. **Non-Repeatability**

**Problem and Problem Confirmation Technique:** Dull Knife Edges. To check set Balance at zero. Hold down one Pan and release. Repeat with other Pan. If Balance does not return to zero, Knife Edges are chipped or worn.

**Solution:** Return balance to Ohaus for service.

**Problem:** Bent Damper Vane.

**Solution:** Bend Damper Vane with fingers or needle nose pliers. (Note: The easy way to observe this is to elevate the Balance with the Rod Support.)

**Problem:** Foreign material on magnets.

**Solution:** Remove with adhesive backed tape.

#### B. **Can Not Zero Balance**

**Problem:** Zero Adjust Knob missing.

**Solution:** Replace with proper Zero Adjust Assembly. (Note: hold Leaf Spring down with a screw driver or ball point pen until flare passes over the Spring.)

**Problem:** Shot missing from Pan Support Cup.

**Solution:** Unscrew Pan or Fork Assembly and add metal pieces or shot until balance comes to zero. Note: Make sure all Poises (movable Weights on the Beam) are at zero and tare weight is pushed all the way to the left.

#### C. **Pans vs. Plates**

A Pan is the removable sample Platform that is 6" diameter x 3/4" deep. Pans on Harvard Trip Balances are matched for an individual Balance and when replacing, you will get a matched set. Pans are NOT interchangeable between Balances. The Pan sits in the Fork of the Balances.

A Plate is the flat sample holder and is not removable under normal use. It screws directly into the Balance Cup.

## CHAPTER 4 PARTS LISTS

### 4.1 PARTS LISTS

This section of the manual contains selected replacement parts which are identified in Figures 5-1 through 5-4.

1. In all cases, when a part is replaced on any product, the product must be thoroughly checked to insure accurate performance to factory specifications.
2. Part numbers in the replacement parts lists are only shown for parts which are field serviceable.
3. When a part number is preceded by an asterisk (\*), refer to the note relative to that part located at the bottom of the page.
4. When more than one of each item is used in the manufacture of a product, the quantity will be listed in parenthesis following the description.
5. Some descriptions are followed by the fastener part number and quantity required. Fasteners must be ordered separately.
6. Prices and specifications are subject to change without notice.
7. See last page in this section for a Glossary of Terms.

Approximate restoration fee: Triple Beam (750 Series) \$50 - \$60  
Triple Beam (800 Series) \$75  
310/311 Hanging Pan \$55 - \$60  
Harvard Trip \$70

#### NOTE:

If further technical information is needed, in the United States call Ohaus Aftermarket toll-free 1-800-526-0659 between 8.00 a.m. and 4.00 p.m. EST. An Ohaus factory service technician will be available to provide assistance. Outside the U.S.A., please contact:

Ohaus Corporation  
29 Hanover Road  
Florham Park, NJ 07932, USA  
Tel: (201) 377-9000,  
Fax: (201) 593-0359

## CHAPTER 4 PARTS LISTS

TABLE 4-1. MODEL 700 SERIES PARTS LIST

PART NO.	DESCRIPTION
1008-23	Agate Bearing (4)
1023-10	Balance Cup [L1107-63 Screw]
1034-00	Friction Plate (3)
1035-03	Bearing Cover (4)
1039-02	Pan (Model 710)
1093-00	Check Pin (2)
1097-00	Balancing Slug (3) (Model 750S)
1247-00	Friction Plate with Tab
3045-00	Stainless Steel Scale Plate (Model 750)
3051-00	Check Rod Assembly
3125-10	Graduated Beam Insert, 10g x .1g
3126-10	Graduated Beam Insert, 500g x 100g
3127-10	Graduated Beam Insert, 100g x 10g
3128-00	0-10 gram Poise
3134-02	0-500 gram Poise
3135-10	0-100 gram Poise (pin .125" from edge)
3135-11	0-100 gram Poise (pin .196" from edge)
3225-00	Compensator Spring
3254-00	Damper Vane, [D2202-14 Screws (2)]
3359-00	Compensator Knob
9704-00	Tare Beam Assembly



## CHAPTER 4 PARTS LISTS

TABLE 4-2. MODEL 311 CENT-O-GRAM PARTS LIST

PART NO.	DESCRIPTION
1008-23	Agate Bearing (4)
1034-00	Friction Plate (2)
1035-03	Bearing cover (2)
1097-00	Balancing Slug (3)
3551-01	Dial Assembly
4511-00	1g Poise Assembly
4512-10	200 g Graduated Beam Insert
4513-10	100 g Graduated Beam Insert
4514-10	10 g Graduated Beam Insert
4515-10	1 g Graduated Beam Insert
4516-00	Damper Vane [D-2202-14 (2)]
4519-00	Balance Compensator Spring (D-2202-14)
4529-10	Threaded Rod
4534-00	Balance Compensator
4535-00	10 g Poise Assembly
4536-00	100 g Poise Assembly
4537-03	200 g Poise Assembly
4561-00	Wrench
4600-00	Pan Without Serial Number
6396-00	*Magnet (sold in pairs only)
9702-00	Pan Support Assembly

NOTE: Magnet 6396-00 must be magnetized. Pricing is per pair.

## CHAPTER 4 PARTS LISTS

TABLE 4-3. MODEL 1200 SCHOOL BALANCE PARTS LIST

PART NO.	DESCRIPTION
2743-00	Red Pan
2743-01	Yellow Pan

TABLE 4-4. MODEL 1400/1500 SERIES HARVARD TRIP BALANCE PARTS LIST

PART NO.	DESCRIPTION
1008-23	Agate Bearing (6)
1023-10	Balance Cup (2) (L-1107-63 Screw)
1034-00	Friction Plate (4)
1035-03	Bearing Cover (5)
1071-01	Stainless Steel Pan Set
1097-00	Balance Slug (4) (Pan Model)
1240-00	10 gram Poise, Single Beam
1247-00	Friction Plate with Tab (2)
1316-10	200 gram Graduated Insert
1318-00	10 gram Graduated Insert
1320-00	10 gram Poise (Double Beam)
1322-00	Damper Vane
1325-00*	Magnet (sold in pairs only) (2 pairs required)
3045-00	Scale Plate (2)
3225-00**	Compensator Spring
3359-00	Compensator Knob

### GLOSSARY OF TERMS

Agate Bearing:	The V shaped Bearing that supports the Knife Edge.
Balance Cup:	The Plastic Cup that attaches to the Beam with a bolt and receives the Balance Plate, Cross or Fork.
Bearing Cover:	The Stainless Steel cover that holds the Friction Plate in place. It must be pried off to check Knife Edges and must be replaced with new product when removed.
Compensator Assembly:	Zero Adjust Knob.
Damper Vane:	The Aluminum metal part that is attached to the Beam and moves between the Magnets to slow the Beam movement.  <u>How does it work?</u> The Aluminum Vane is nonferrous and is not attracted to the Permanent Magnet, it is however an electrical conductor. When it moves through a magnetic field, it sets up a magnetic field opposing the magnetic field of the Permanent Magnets. This slows the Beam movement. The faster the Beam moves, the stronger the magnetic field. The speed of the Vane is proportional to the strength of the magnetic field produced.
Fork:	The support mechanism that holds the Scoop.
Cross:	The support mechanism that holds the Balance Pan.
Friction Plate:	This is the black hardened metal piece that keeps the Knife Edge in place.
Pan:	The removable part of the balance upon which the sample is placed (raised edge).
Plate:	The non-removable part of the balance upon which the sample is placed (flat).
Poise:	The Mass or weight that moves along the Beam.

NOTE: On a two Pan Equal Arm Balance, the sample is always placed on the left Pan or plate.

**CHAPTER 4 PARTS LISTS**

### 5.1 DRAWINGS

This section of the manual contains drawings which indicate the field replaceable parts.

**NOTE:**

In all cases where a part is replaced, the balance must be thoroughly checked after the replacement is made. The balance **MUST** meet the parameters of all applicable specifications in this manual.

If further technical information is needed, in the United States call Ohaus Aftermarket toll-free 1-800-526-0659 between 8.00 a.m. and 4.00 p.m. EST. An Ohaus factory service technician will be available to provide assistance. Outside the U.S.A., please contact:

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29 Hanover Road  
Florham Park, NJ 07932, USA  
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Fax: (201) 593-0359

**CHAPTER 5 DRAWINGS**

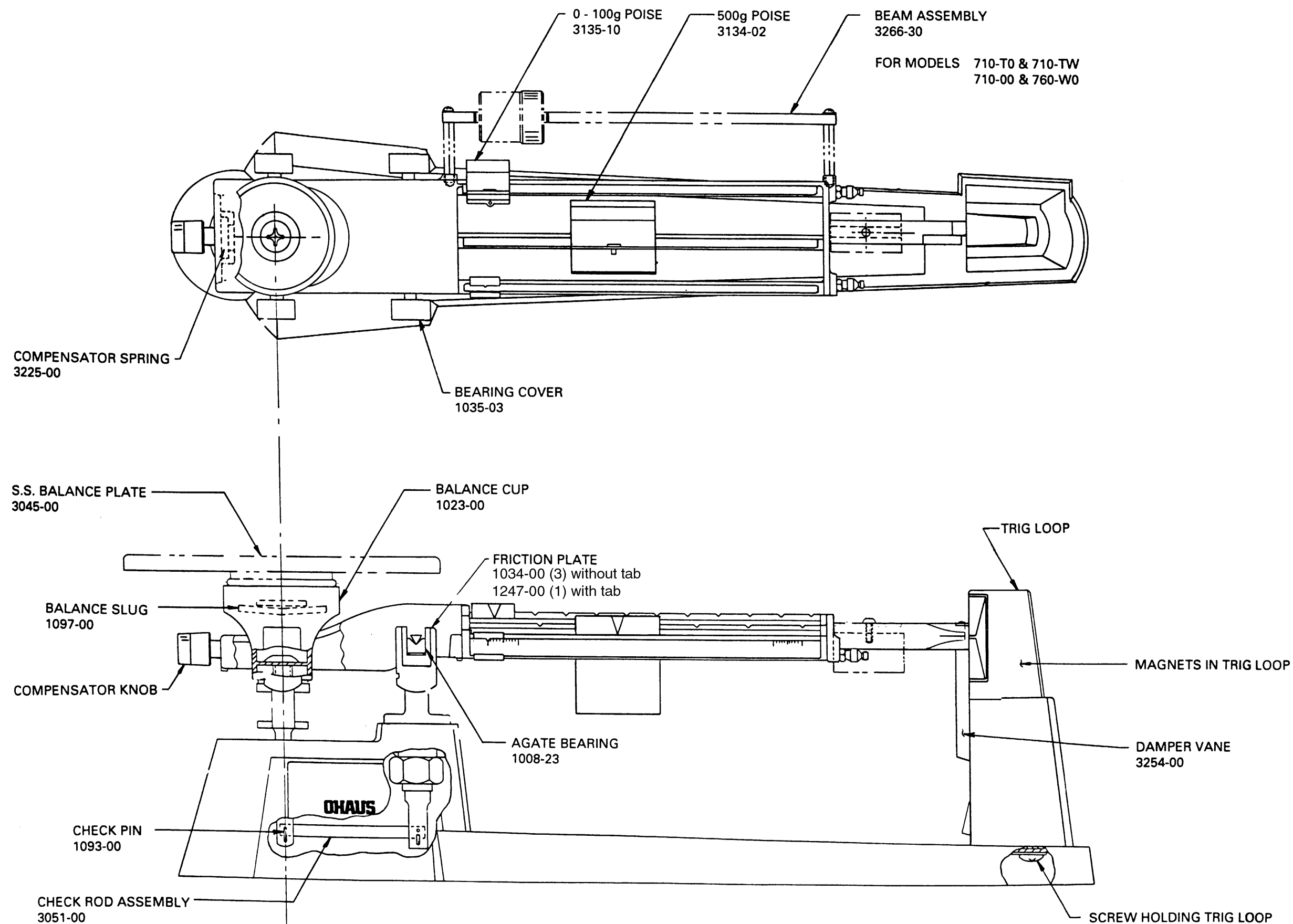


Figure 5-1. Typical Triple Beam Drawing. 5-3/5-4

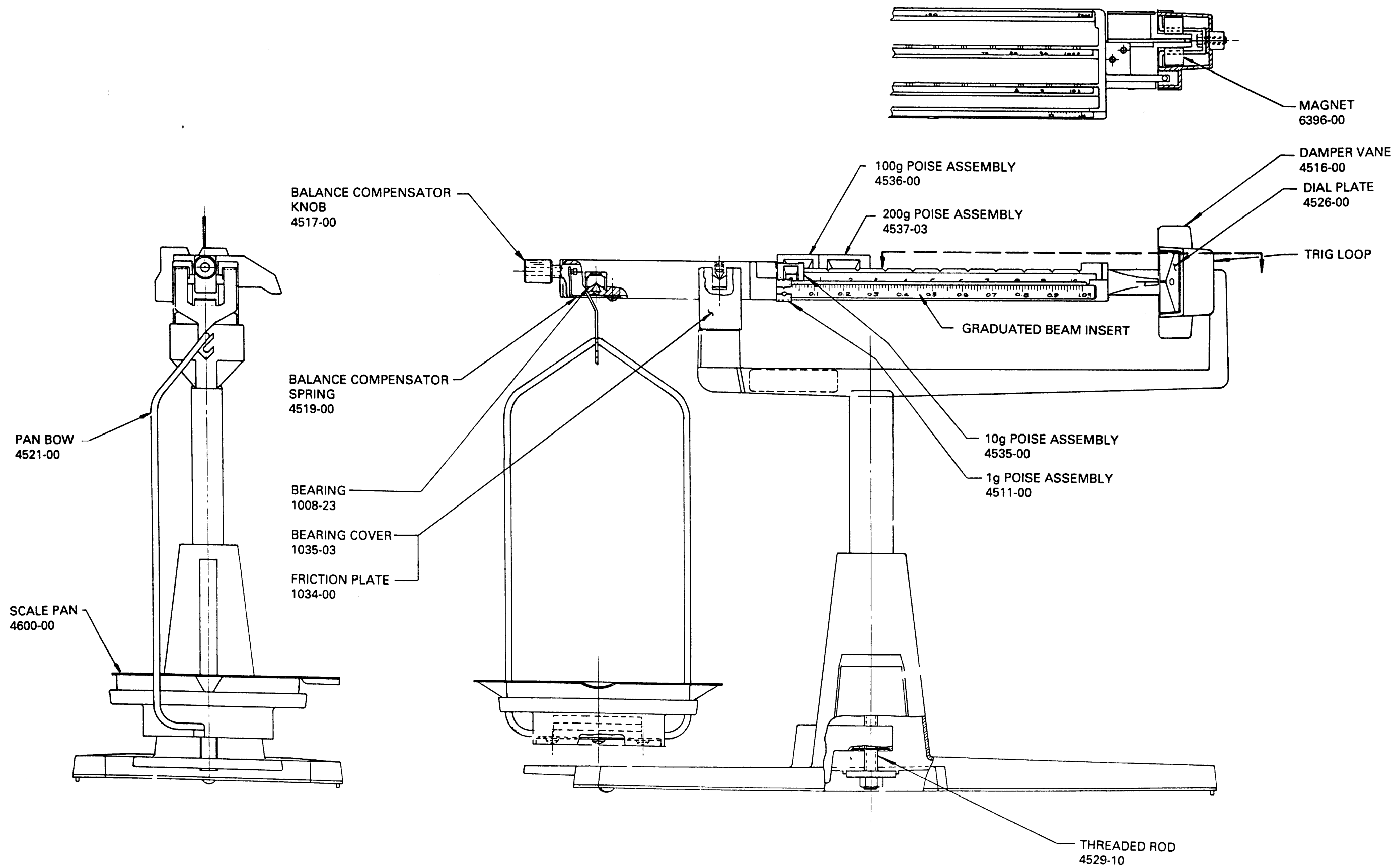


Figure 5-2. Models 310 and 311 Balance Drawing. 5-5/5-6



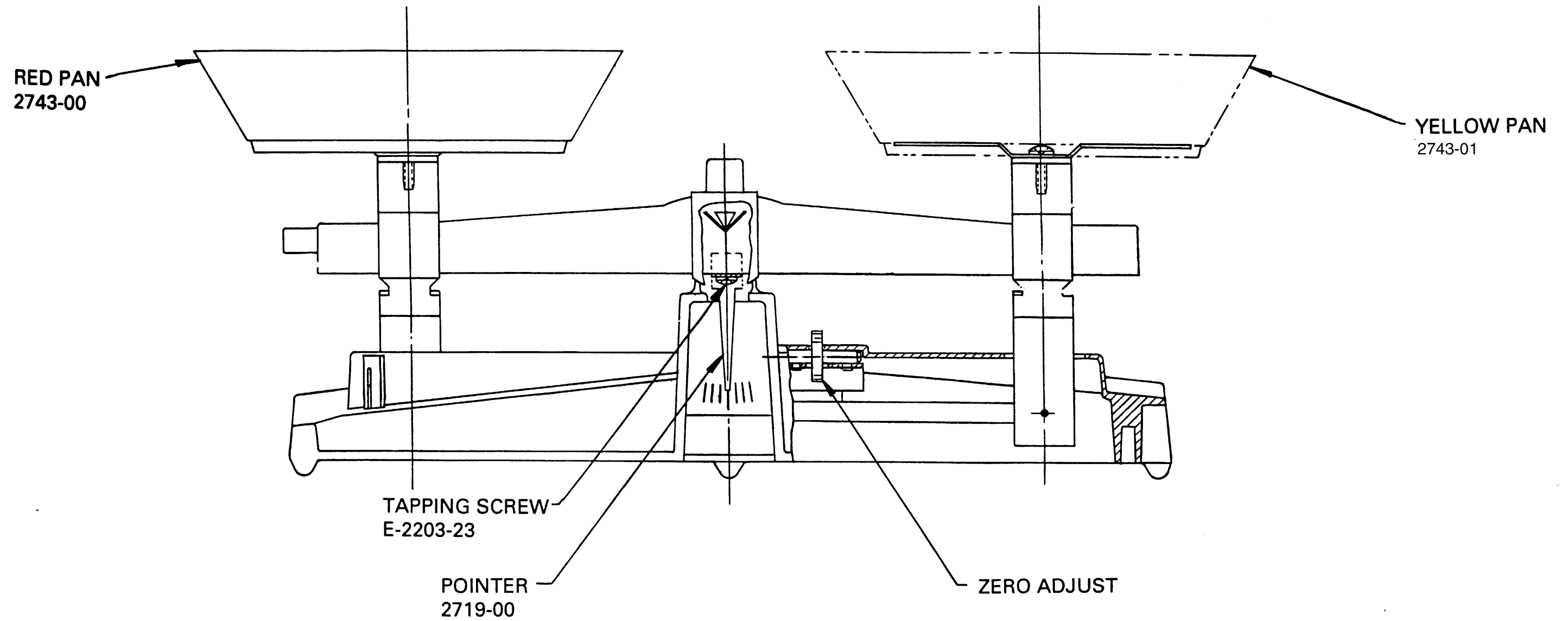


Figure 5-3. Series 1200 Balance Drawing. 5-7/5-8

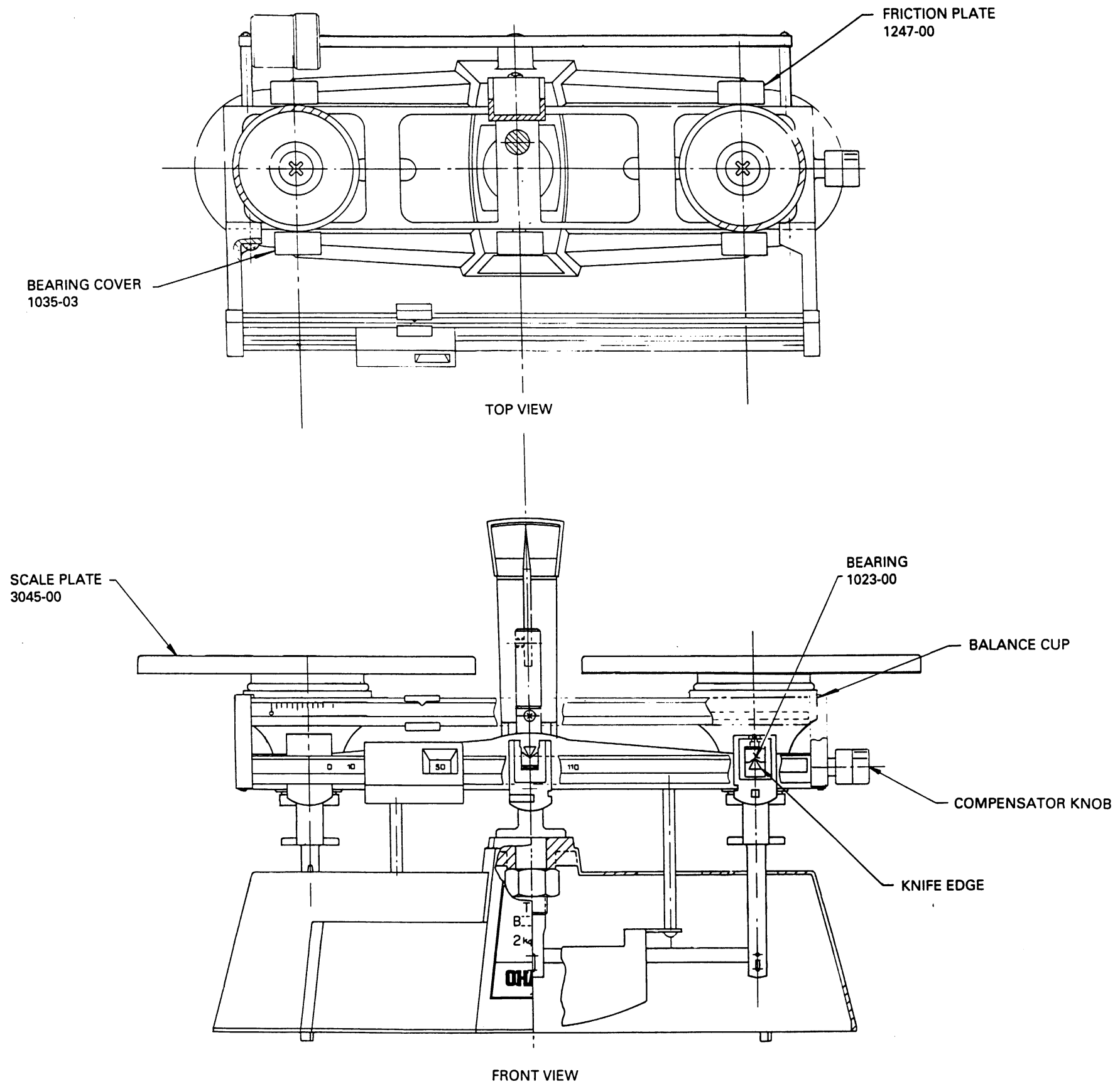


Figure 5-4. Harvard Trip Balance Drawing. 5-9/5-10

