

INSTRUCTION-MANUAL

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Weighing Procedures, Weight Arrangements and Pan Tare Device Information

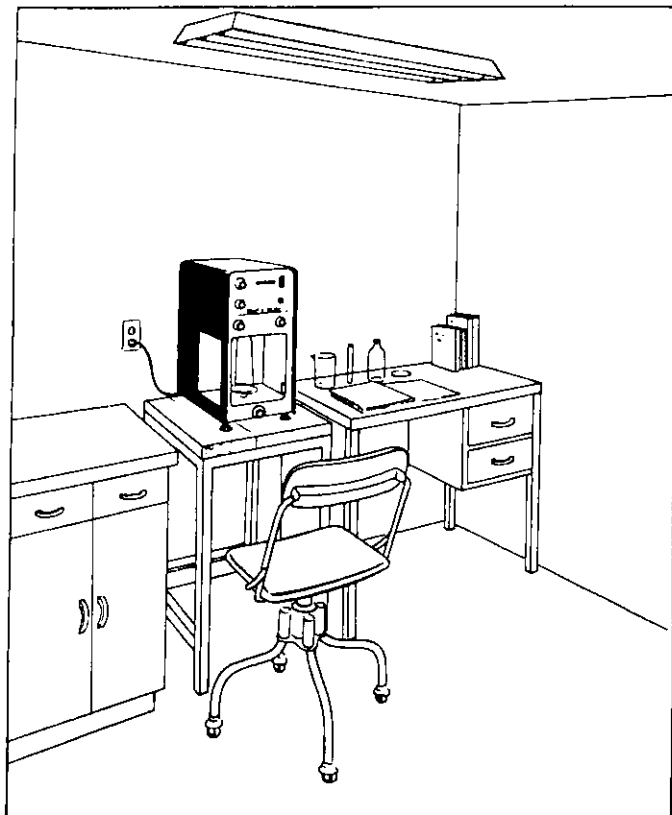
Type SCN	14 & 15
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SELECTING THE PROPER LOCATION FOR YOUR AINSWORTH BALANCE

Decide on a good, permanent location first. The balance will perform much better in a good location. The possibility of damage will be reduced if the balance does not have to be moved after it is set up.

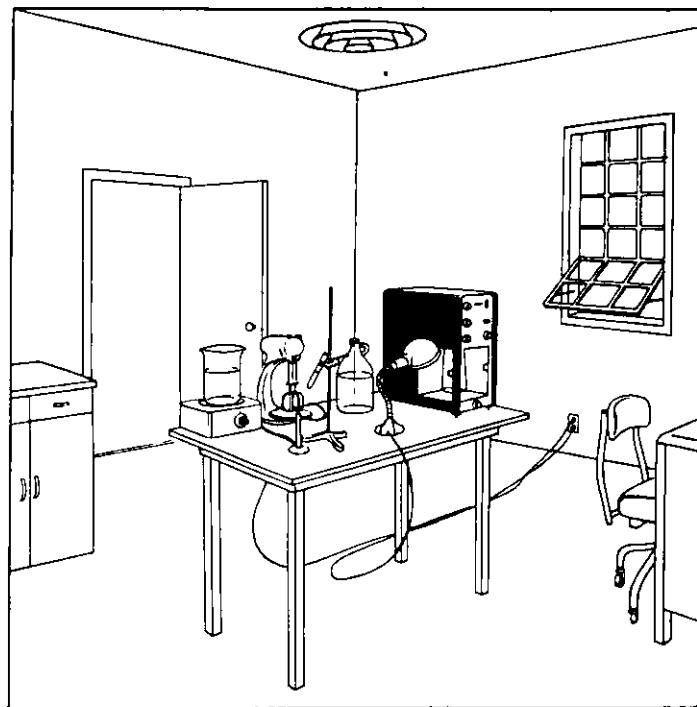
Good Location:

1. In quiet corner of room, away from traffic.
2. Near supporting wall or pillar.
3. Away from windows, heaters, air conditioner outlets, sunlight, doors, lights, motors and other sources of heat and vibration.
4. On separate, heavy solid table made of wood or angle iron.
5. On table not touching or fastened to other tables, and not big enough for other heavy objects.



Poor Location:

1. In middle of room where floor may flex or transmit vibration.
2. Near door, window, ventilator, exposed to air currents, direct sunlight.
3. In line of traffic. Table or balance itself may be bumped or leaned on. Crowded space for operator.
4. Near heat sources like lamp, hot plate, Bunsen burner.
5. On same table with stirrer (vibration).
6. On flimsy, too-large table that will sag when heavy objects (bottle) are placed on it causing zero shift in balance.



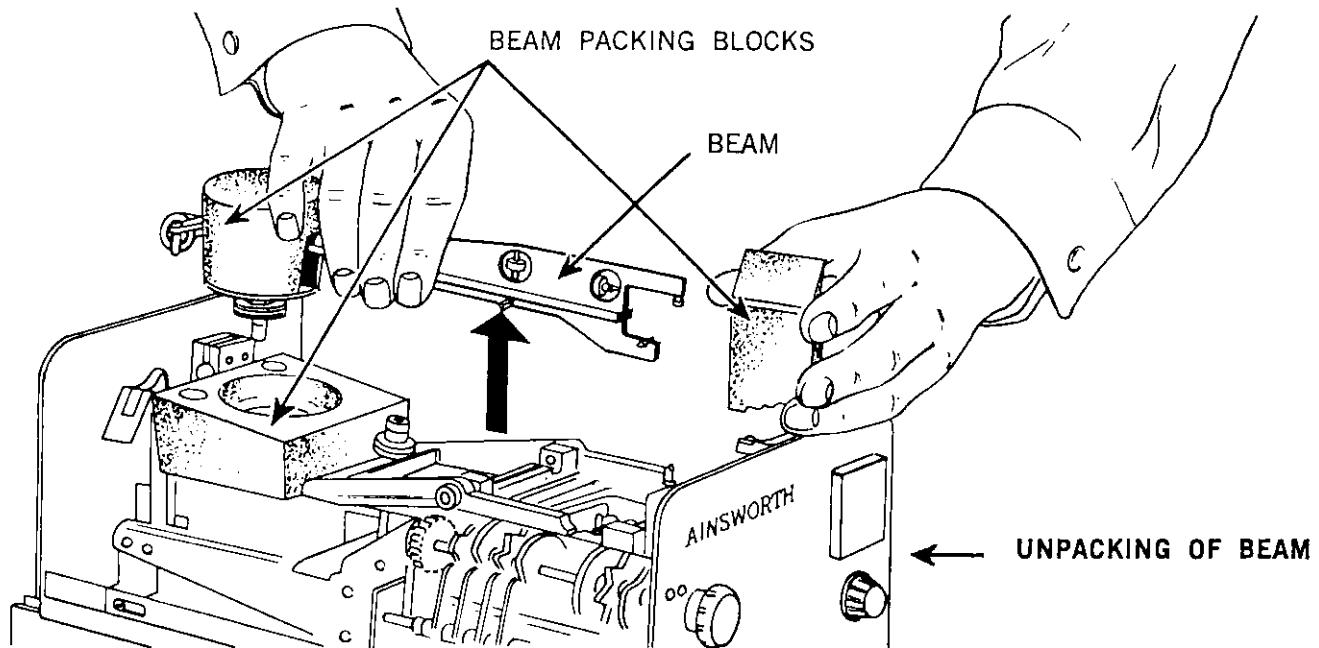
UNPACKING THE BALANCE

1. Open outer carton and remove balance in inner packing.
2. Lay balance in inner packing on flat side. Lift off top half of packing and lift balance out of remaining half of packing. Holding balance by the protruding edges running around the front and back panels.
3. Set balance in its permanent location. If there is the possibility of the metal leveling screws marring the top of the weighing table, the three plastic balance feet may be used.

Never set a balance on a resilient pad of any kind. This would make it difficult to maintain level and might cause zero shift.

UNPACKING THE BEAM

1. Open the balance case top. To do this, slide the trim-strips on both sides forward as indicated by "open" arrows (on all compact types) or unlatch the knurled hold-down screws in the top of the weighing chamber (on all full-size types). Then lift top straight up, holding it by the protruding end edges.
2. Hold beam at its middle and lift out. Take the three foam-plastic packing blocks off the beam and out of the balance. (As illustrated below.)
3. Lay the beam on its "back" (knife edges up) in a safe place.

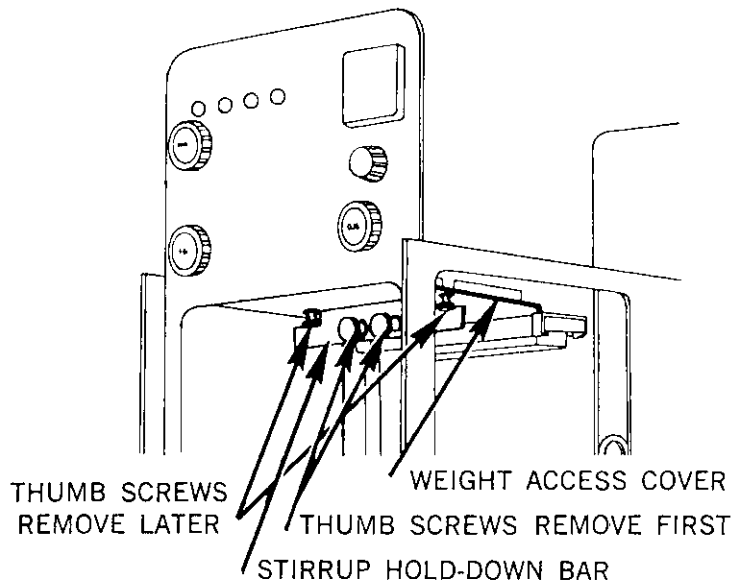


NOTE: Beam and weight packing blocks, stirrup hold-down bar with thumb screws, should be retained for future use in re-locating the balance.

UNPACKING THE WEIGHTS

ALL COMPACT TYPES

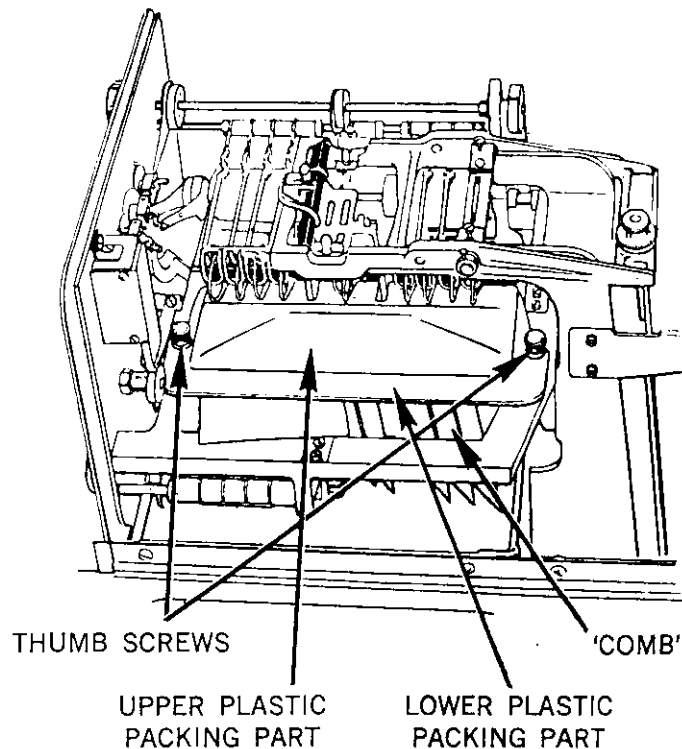
1. Loosen two thumb-screws on stirrup hold-down bar and remove bar.
2. Reach down from top of balance. Take hold of top stirrup bar and lift it up and over the two stirrup support posts and lay it down on the front of the arrestment lever. This lifts all weights out of the foam-plastic packing block. They now hang from the two stirrup weight racks.
3. Remove the two remaining thumb-screws in the top of the weighing chamber. This releases the weight access cover and the packing will fall out.
4. Replace the weight access cover. Note that the cover was mounted at an angle for shipment but that it should be replaced now in a straight position.



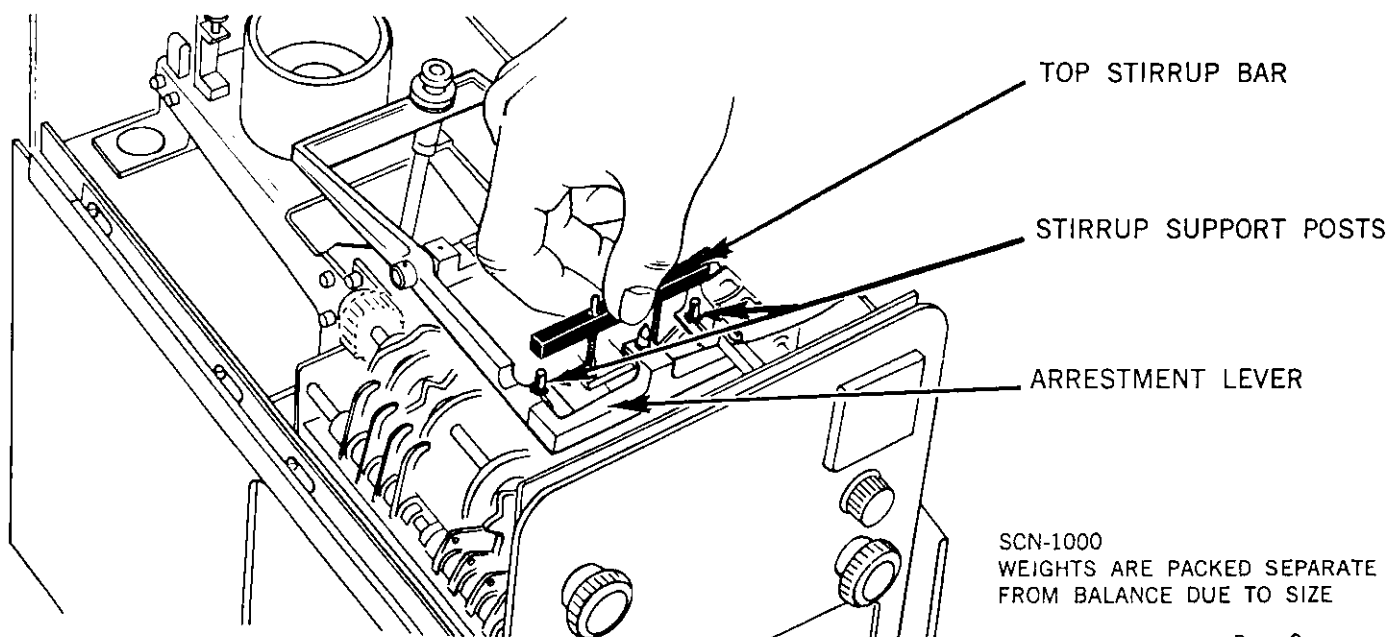
UNPACKING OF WEIGHTS (COMPACT TYPES)

ALL FULL-SIZE TYPES

1. Slowly pull out the cardboard "combs" which hold the lower row of weights.
2. Loosen two thumb-screws that hold plastic packing parts around upper row of weights.
3. Slide upper plastic packing part out first then dial weight knobs to 199.9 g. This lifts all weights out of the lower plastic part and it may now be slid out too.
4. Unfasten top stirrup bar, but leave it laying on the front of the arrestment lever.



UNPACKING OF WEIGHTS (FULL-SIZE TYPES)



UNPACKING OF WEIGHTS (ALL TYPES)

SCN-1000
WEIGHTS ARE PACKED SEPARATE
FROM BALANCE DUE TO SIZE

SET-UP

Installation of Beam

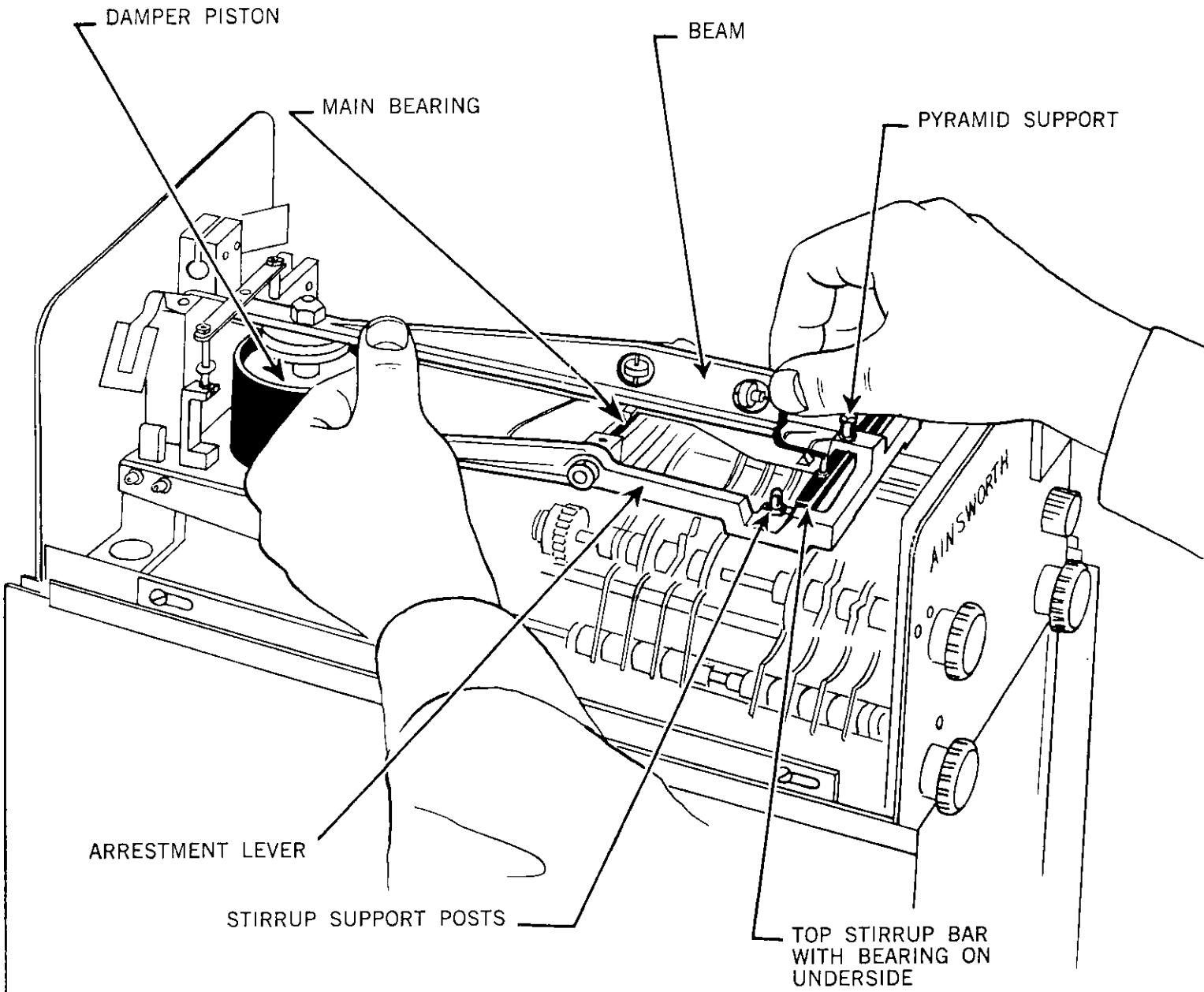
1. Before installing beam, go through the following steps:
 - make sure the arrestment knob points to "arrested".
 - with camel's hair brush supplied, remove any lint and dust from the weights, inside the damper pot, weight lifter arms, optical system and all places where the moving system comes close to other parts and where foreign material might touch and drag. Avoid touching the mirrors with hands. These are easy to smudge and hard to clean later.
 - clean main sapphire bearing (on top of main column) and the other sapphire bearing (on underside top stirrup bar) with lint-free lens paper provided.
 - clean beam with camel's hair brush. Check knife-edges, clean with lens paper and brush.
2. Use both hands to hold beam near both ends. Lower damper piston into dashpot and front end onto pyramid support simultaneously.
3. Lift top stirrup bar over knife-edge and place it on the two stirrup support posts on the arrestment lever.

Installation of Pan

1. Unpack pan, insure that pan tag number and balance serial number are matching numbers before removing pan I.D. tag. Then clean with camel's hair brush.
2. If pan is equipped with taring trays, check the number of discs against the list on pages 16, 18 or 20 depending on type of balance. Be careful not to lose any discs; if set is not complete the balance will not zero properly.
3. Hang the pan from the upper hook in the weighing chamber. The pan should touch the spring-loaded tip of the pan brake, but only very lightly.

Final Installation

1. Rotate weight knobs through several full rotations and observe how the weight lift arms raise and lower the weights. This action will usually straighten out any weights that might have tangled up in shipment or unpacking. If not, one can help the process by gently nudging the weights with the handle of the brush. The correct arrangement of the weights for each type is shown on the back of the "weighing procedure" page in this book.
2. Plug power cord into 115 volt, 50-60 cycle AC outlet. If the outlet has a ground pin, the adapter on the line cord is not used; the balance case is then automatically grounded. If the outlet has only two pins, the adapter must be used, and the balance case has to be grounded by some other means. Grounding reduces static charge problems and may benefit the weighing accuracy. It also reduces the shock hazard.
3. Replace the case top.



INSTALLATION OF BEAM

INSTRUCTIONS FOR TARE BALANCES

1. Location — Reference Page 1 of this manual.
2. Unpacking — Reference Pages 2 and 3 of this manual.
3. Set-up — Reference Pages 4 and 5 of this manual completing all steps of the set-up procedure through steps 1, 2 and 3 of beam installation.

Upon completion of Step 3, dial tare knob (1) located on face of balance, 3 or 4 turns to the right to relax spring tension. Remove felt shipping aligner (2). Remove locking screw (3) from tare spring holder (4) then with extreme care remove tare spring (5) from holder.

Place the jeweled cup (6) over pivot point (7) at the end of the pivot support bar (8).

Insure that the jeweled cup (6) swings freely on the pivot (7) in both directions.

Dial tare knob (1) to the right, approximately ten turns to its stop point.

Complete balance set-up and calibration in accordance with standard procedures. See Pages 1-9.

Note: The zero adjustment nut usually found at the front of the beam (see Page 9) has been omitted as course zero adjust is accomplished through adjusting the position of the tare knob.

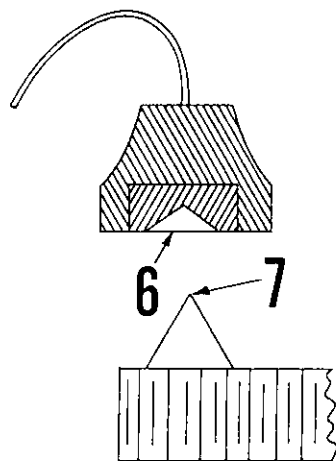
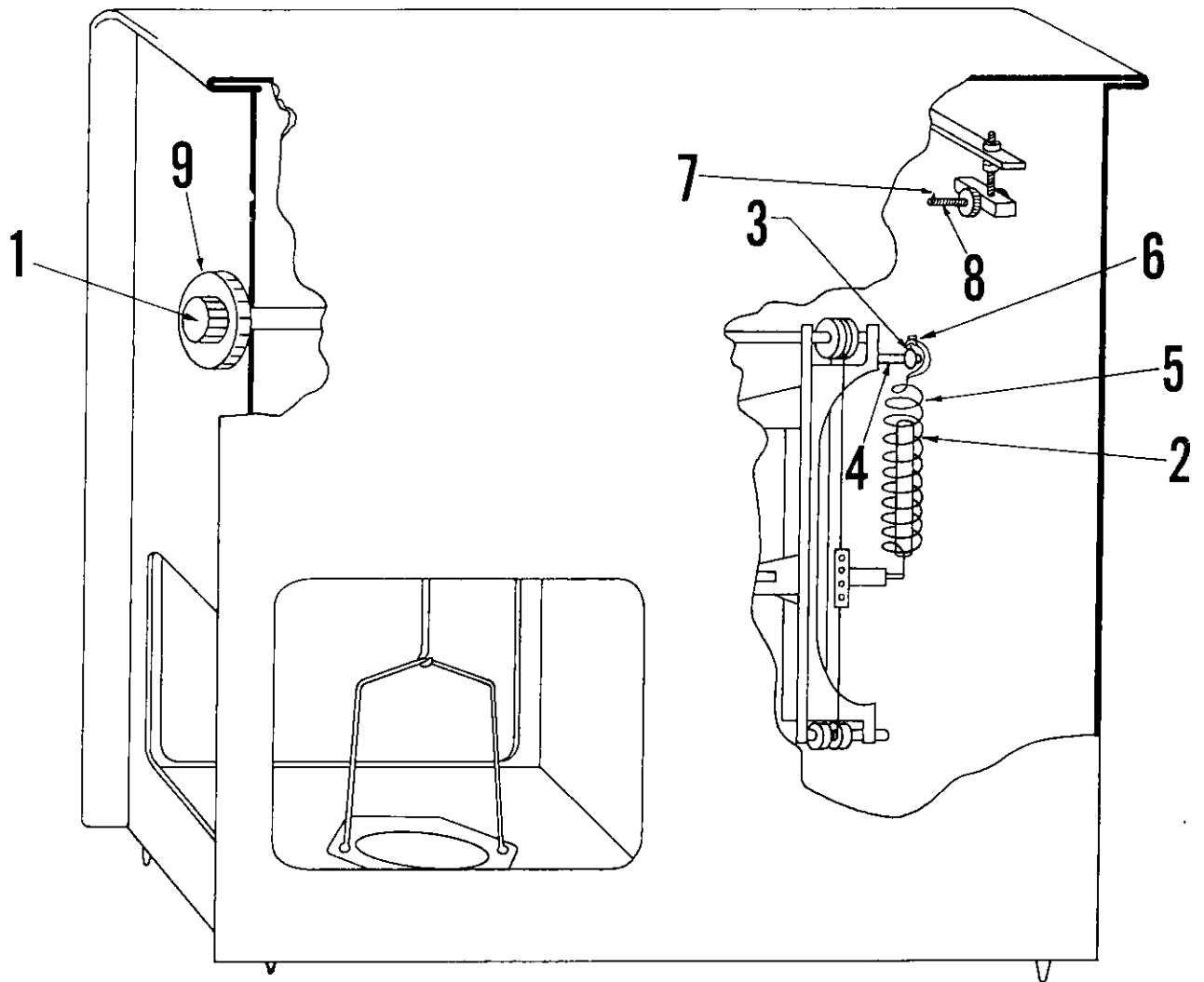
Therefore upon completing the standard balance set-up procedure, balance is level, and doors are closed, the tare knob should be turned slowly to the left to obtain course zero at reference point, using zero adjust knob (9) to make fine adjustment of zero.

4. Use of Tare System.

The tare knob (1) is used to adjust the tension of the tare spring which is attached to the beam.

By dialing the tare knob in a counter clockwise direction (left) approximately 1 mg. to 2 grams of weight (mass) can be tared, or approximately 1 mg. to 2 grams of weight on the pan can be offset to a zero reference point.

The outer knob, zero adjust (9) should always be used to make the fine adjustment to zero when taring.



CALIBRATION

Leveling of Balance

1. Level balance by rotating the two leveling screws under the front of the case until the level bubble in the weighing chamber appears centered when viewed through the front glass.
2. Use the third leveling screw at the rear of case only if necessary.
3. Unscrew the leveling screws as little as possible. This gives the balance the firmest stand.

Setting of Zero

1. Turn arrestment knob to "part. rel." The projection screen will now light up and the optical scale will become visible.
 - On balances with a digitizer drum or micrometer knob, set the drum or knob (next to the optical scale) to "0" (against stop).
2. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap (on digital type balances) or until the zero line of the optical scale coincides exactly with the bottom line of the vernier.
3. If the range of the "zero" knob is not sufficient:
 - Check level, make sure both glass doors and top of case are closed, pan is empty and (on balances with taring device only) that all taring devices are in the trays under pan.
 - Allow enough time for the balance to assume room temperature if it has been stored at another temperature. This may take several hours in extreme cases.
 - If the range is still not sufficient, open balance top. Turn the zero-adjusting nut near the front of the beam. Turning it forward will lower the optical scale; turning it back will raise it.
 - Total range of this nut is about ± 30 mg; $\frac{1}{4}$ turn of the nut will change zero approximately 1 mg. (See Note).

Calibration of Sensitivity

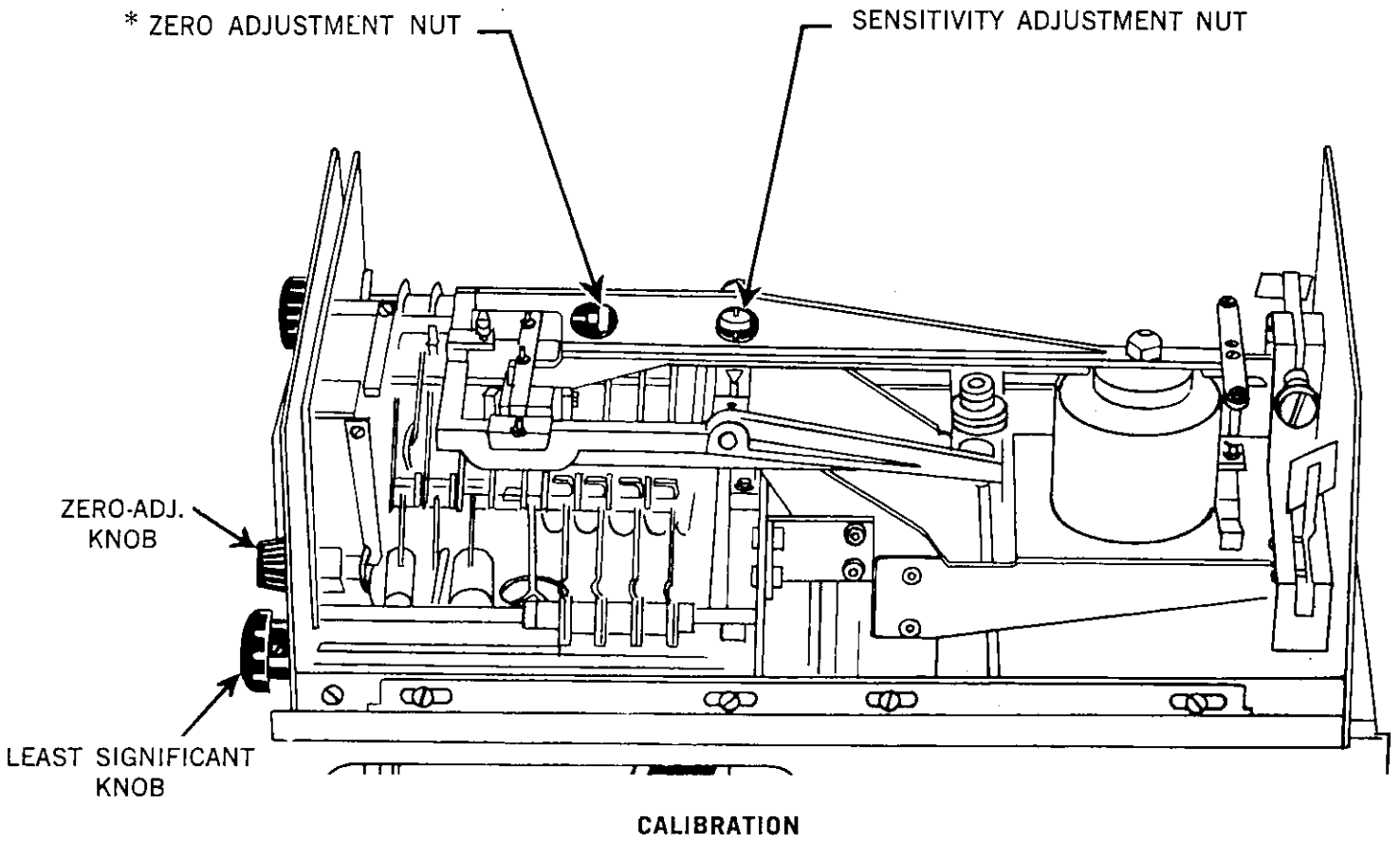
The sensitivity of a balance is the ratio of the change in response to the change in weight. The amount of weight that moves the scale 100 divisions is either 100 mg or 1 g, depending on balance type (see specifications page 2). The sensitivity has to be calibrated after the balance is installed. It should be rechecked periodically, at least after every 10,000 weighings.

1. Place an object with a weight corresponding to approximately 100 scale divisions on the pan. Dial least significant knob back and forth between its zero and one step higher position. This method checks the sensitivity with the smallest built-in class S weight and does not require an accurate external weight.
2. If the scale does not move exactly 100 divisions, the sensitivity needs adjustment. If the scale moves more than 100 divisions the sensitivity is said to be "high"; if it moves less than 100 divisions it is "low."
3. Arrest the beam, open top of case. To raise sensitivity, raise the sensitivity adjustment nut near the middle of the beam; to lower it, lower the nut.
 - The nut has an adjustment range of about +6 to -2 mg; $\frac{1}{4}$ turn of the nut will change the sensitivity approximately .1 mg.

Note: The sensitivity and zero adjustments, if done with the nuts on the beam, will interact slightly. Always check back and forth until both are correct.

For each check the case top has to be placed on the balance to keep air-drafts from interfering.

The balance reading may drift slightly after the beam has been touched for adjustments. Allow time for temperature-equalization.



*Not included on tare balances see page 6.

ADJUSTMENTS

Pan Brake Adjustment

With the pan empty and the beam arrested, the spring-loaded tip of the pan brake in the bottom of the weighing chamber should touch the pan underside lightly.

If the brake does not touch at all, the pan will swing a long time after it is set in motion when loading it. If the brake pushes too hard against the pan, it might make it "jack-knife" and again will cause undesirable oscillations. Turn knurled thumb nut on pan brake to raise or lower it.

Focus Adjustment

Usually a loss of focus results from the beam moving out of place if the balance is shaken or vibrated while the beam is released. The beam will be set back in place and the focus will adjust itself automatically the next time the beam is arrested.

* If the focus is permanently off, adjust by: (a) loosen set screw recessed on top of optical support, (b) rotate slotted screw extending from right side of optical support, (c) when focused, retighten set screw.

Damping Adjustment

The damping is adjusted at the factory. It is constant for all loads. When properly set, a weight, corresponding to 100 scale divisions, will cause the optical scale to overshoot by 1 to 1.5 divisions before coming to rest without further oscillations.

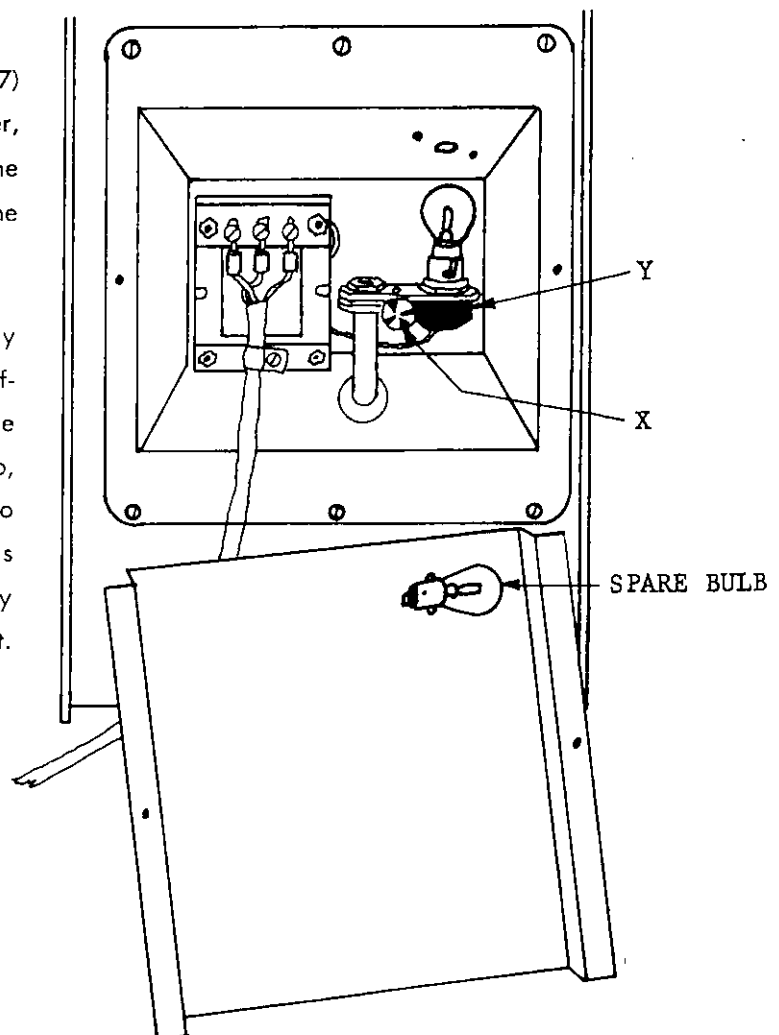
The amount of damping can be adjusted by moving the small vane on the side of the dashpot. This opens or closes an air vent hole.

REPLACEMENT AND ADJUSTMENT OF LIGHT BULB — For Full Size Models

The bulb is a standard auto lamp (Mfrs. No. 87) 6 volt, approximately 10 watt, 15 candle power, with the locking pins at right angles to the plane of the filament. It is accessible after removing the cover on the back of the balance.

After replacing the bulb the projected scale may be dim or dark because the filament is in a different position within the bulb. If so, rotate the bulb 180° in the socket. If this does not help, PART. RELEASE beam, turn knurled screw X to move bulb so that the light on projection screen is brightest. In extreme cases it may be necessary to loosen large nut Y and adjust bulb right or left.

DO NOT MOVE MIRRORS OR LENSES



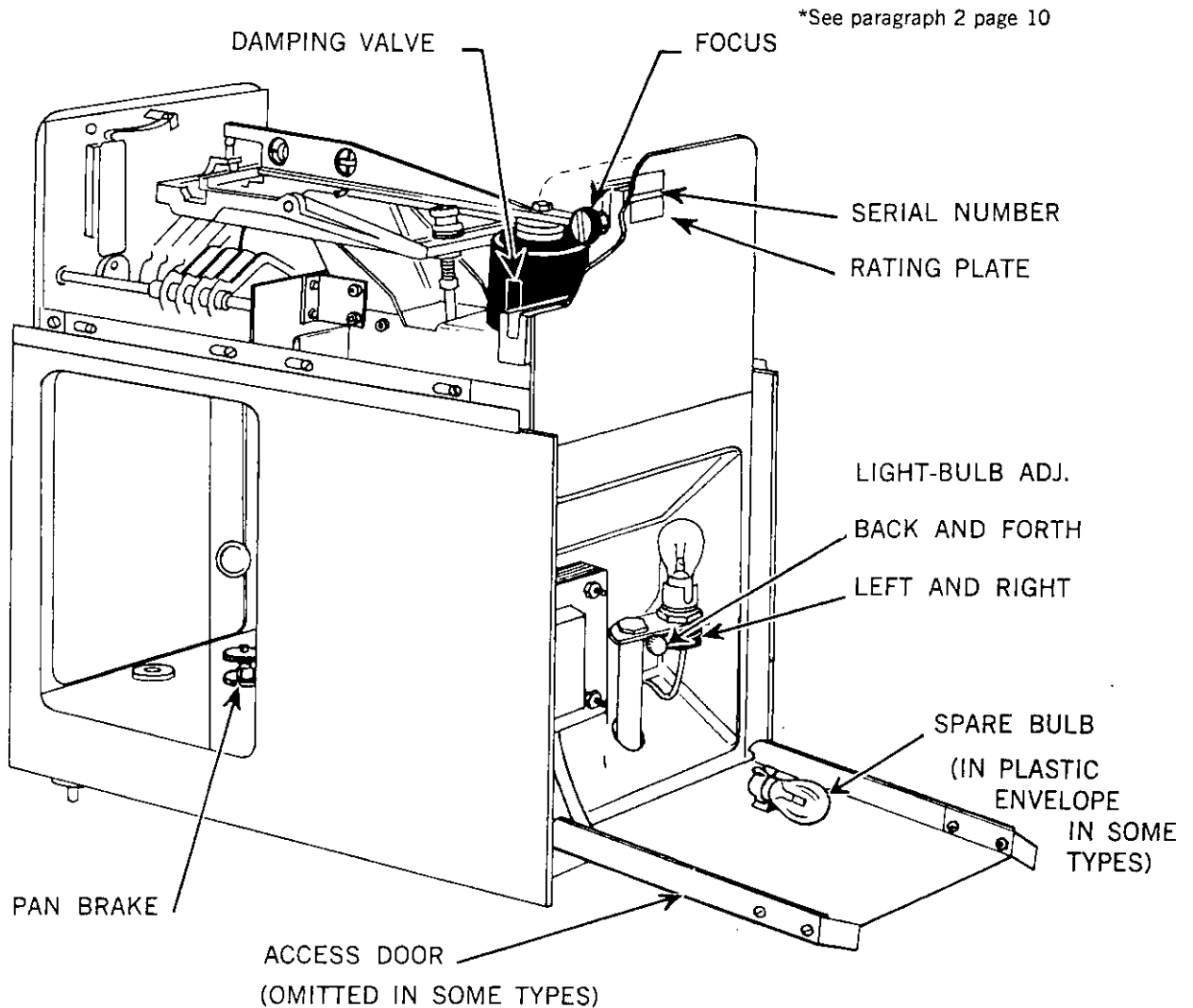
REPLACEMENT AND ADJUSTMENT OF LIGHT BULB — For Compact Models Type 1

One spare bulb is supplied with each balance. If further replacements are needed, only the bulb type as indicated on the rating plate on the back panel should be used.

The light bulb is mounted in a recess on the back of the balance and is accessible from the outside. After replacing the bulb, the optical scale may appear dim or dark on the screen because the filament may be in a slightly different position. Often turning the bulb 180 degrees in its socket will help.

If not, rotate the knurled back-and-forth adjustment screw until the image improves. In extreme cases it might be necessary to loosen the thumb nut and adjust the bulb left and right.

Caution. Do not attempt to move mirrors or lenses.



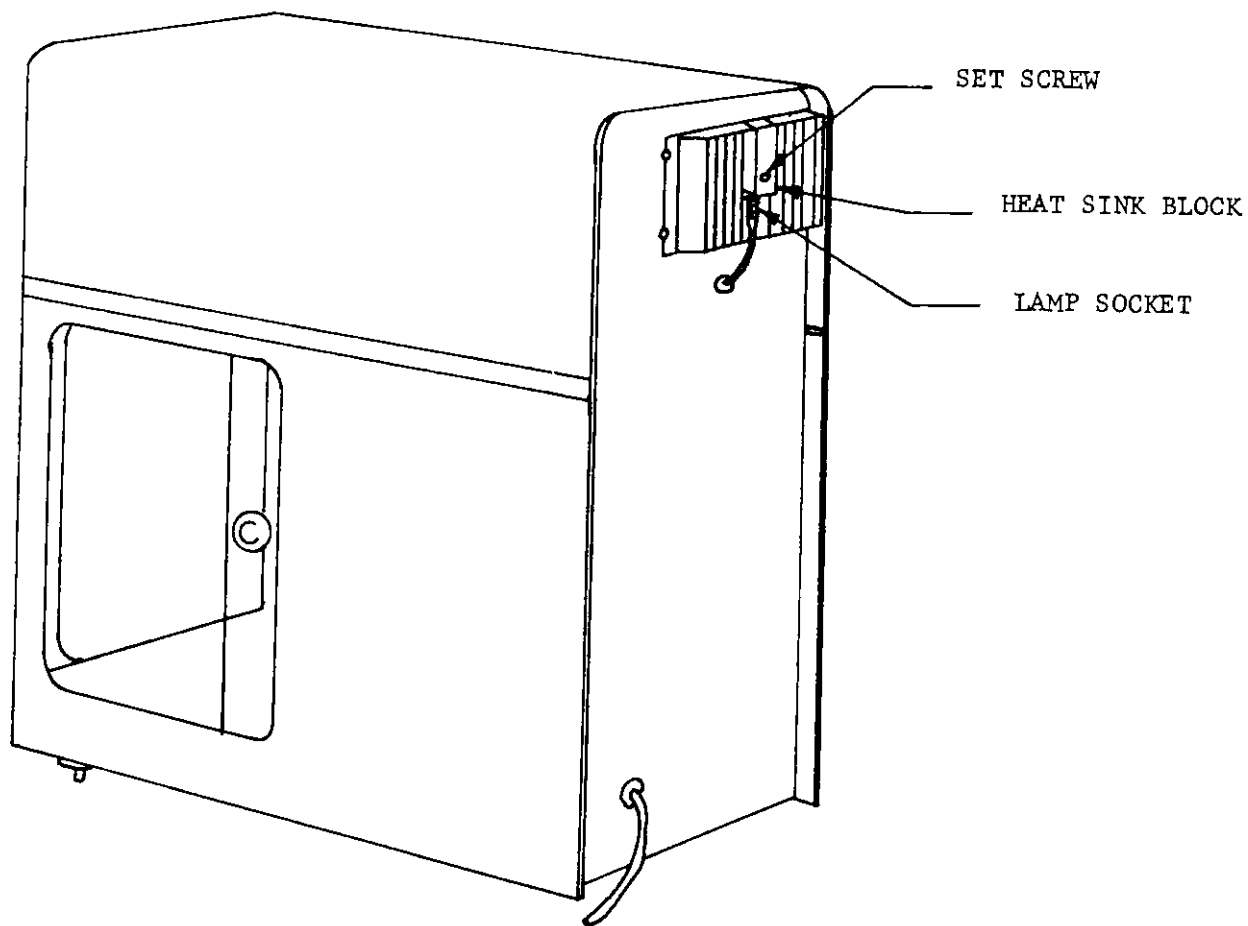
ADJUSTMENTS

REPLACEMENT AND ADJUSTMENT OF LIGHT BULB — For compact Models Type 2

One spare bulb is supplied with each balance. If further replacements are needed, only the bulb type as indicated on the rating plate on the back panel should be used, GE 238.

The light bulb is mounted in the heat sink block with a set screw on the back of the balance and is accessible from the outside.

After replacing the bulb, the optical scale may appear dim or dark on the screen because the filament may be in a slightly different position. Often turning the bulb 180 degrees in its socket will help. If not, loosen the set screw and move the bulb vertically until the image improves. In extreme cases it might be necessary to screw the condensing lens in or out, located in the heat sink block extending through the back panel.



MAINTENANCE

Cleaning of pan

The pan should be kept clean, because any hygroscopic residue on it can cause zero-shift. The same applies to any container that may have been tared and is used for all weighings.

To clean pan, unhook it and remove it from weighing chamber. Wipe it clean with any solvent that does not attack metals. Dry thoroughly and let cool before replacing in balance. Check that no solvent and residue remains in the two tare disc trays on the underside of the pan (on balance types with taring device only).

Cleaning of weighing chamber

Clean front glass, glass doors and glass base (under pan) on inside and outside with mild detergent or window cleaner. Wipe lower door rail (white plastic extrusion) clean. Clean the hidden part of the rail also, by opening case top and reaching down along the sides with long-handled brush or pipe-cleaner. The doors will run much smoother if the rail is clean along its full length.

Cleaning of inside parts of balance

Periodical inspection is advisable, but clean only when necessary, to avoid unnecessary handling of parts and increasing possibility of damage.

1. To clean: open case top, lay stirrup top bar forward on arrestment lever and use both hands to lift beam straight up and out — reversing set-up procedure described on page 6. Lay beam on its "back" (knife-edges up) in a safe place.
2. Dust off inside parts with camel's hair brush supplied. Take special care to clean inside of dashpot and rim of damper piston on beam. Wipe front beam support post, two stirrup support posts and two rear beam support posts with lint-free lens paper supplied and camel's hair brush.
3. Clean sapphire bearings on top of main column and on underside of top stirrup bar with lens paper. If necessary moisten paper with a little alcohol, then wipe dry with dry paper.
4. Clean both knife-edges on beam using the same procedure as for the bearings. Apply some pressure to remove all dirt, but hold beam in such a way that it is not strained or bent. Also clean the three support sockets on the beam (one near front end, the other two near the damper piston).

Cleaning of weights

Under normal conditions it is sufficient to dust the weights off with the camel's hair brush. They can be left in the balance for this.

After long use, however, it is advisable to check the weights against a certified set of standard weights. To do this adjust zero and sensitivity carefully, then place standard weights on the pan and dial the corresponding weights in the balance. The optical scale will then directly indicate the differences between the weights in the balance and the standards (take corrections for standard weights into account if necessary).

If this test indicates deviations in the balance weights that exceed the specifications, the weights have to be cleaned.

1. Take all weights out. Use weight access cover in top of weighing chamber (on compact types) and/or work from side of balance.
2. Clean weights with alcohol. Let dry and cool.
3. Replace weights into balance. After cleaning, the weights should be handled with tweezers or lint-free gloves. Follow the diagram for placement of weights on the back of the "weighing procedure" page for your type of balance.

Lubrication

Lubricate only once per year in normal usage. Use light mineral oil for bearings of arrestment shaft under balance base and for all bearings of weight switching mechanism.

Apply a thin film of grease or wax on the plastic cams operating the weight lift arms, the plastic indexing wheels and the eccentric on the zero adjustment shaft if they squeak when operated.

CAUTION: No oil should ever get onto the sapphire bearings, sapphire knife-edges, beam and stirrup support posts or on the beam, pan, weights or other moving parts.

WEIGHING PROCEDURE (Type SCN)

Check Zero

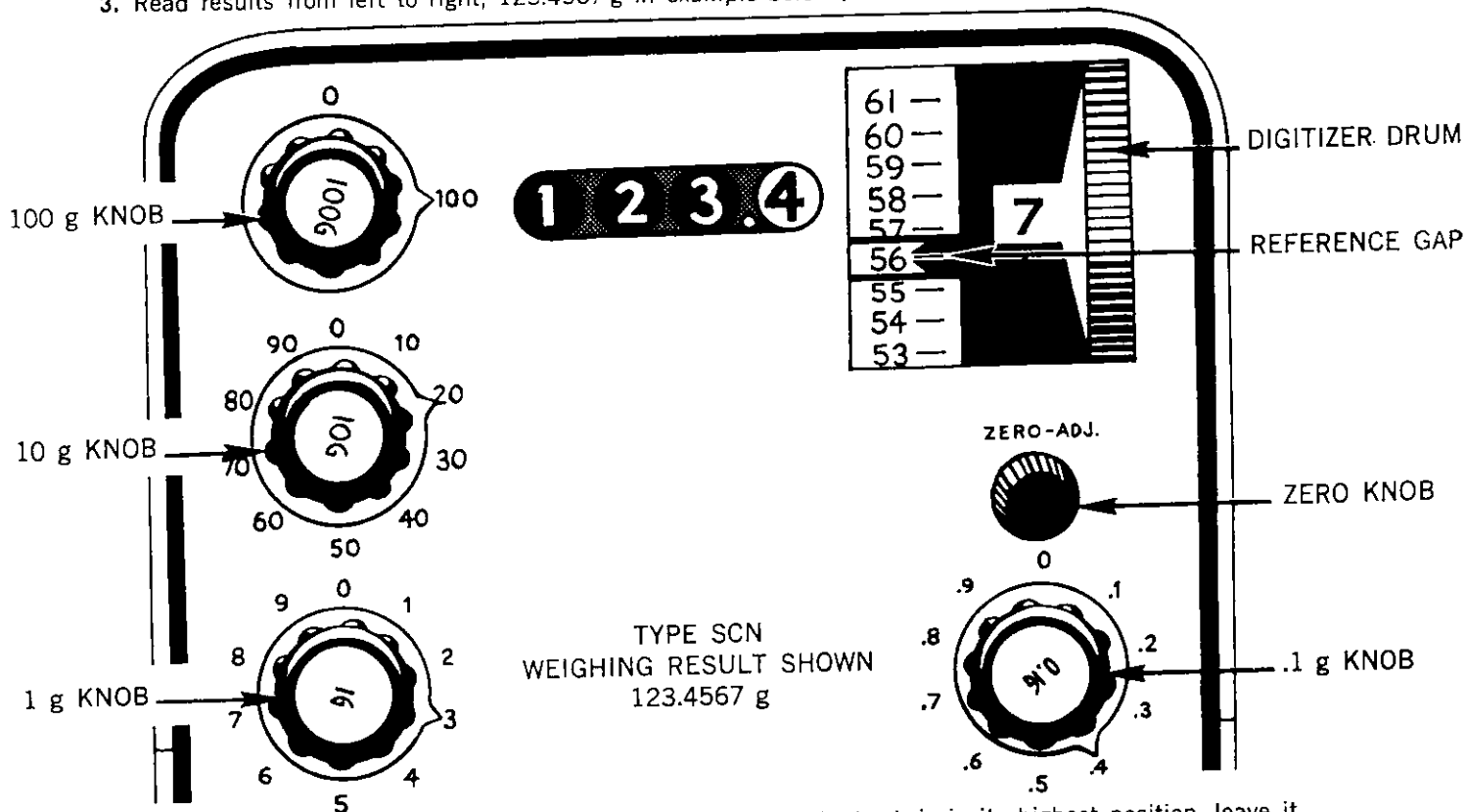
1. All weight knobs at zero, pan empty, doors closed.
2. Turn digitizer drum to "0" (against stop).
3. Push white pan-brake button in center of arrestment knob a time or two to stop pan from swinging.
4. Turn arrestment knob to "released."
5. Turn the "zero-adj." knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Push pan-brake several times until pan stops swinging.
3. Dial 100 g knob to 100.
4. Turn arrestment knob to "part. rel." and observe screen.
5. If "remove weight" appears on the screen, arrest the beam first, then dial 100 g back to 0. (See Note 1).
6. Turn the arrestment knob to "part. rel." Dial the 10 g knob from 0 to 10 - 20 - 30 — until the "remove weight" appears on the screen, then turn back one step. (See Note 1.)
7. Dial the 1 g knob in the same way until the "remove weight" appears and then turn back one step.
8. Dial the .1 g knob in the same way until the "remove weight" appears and then turn back one step.

Read Result

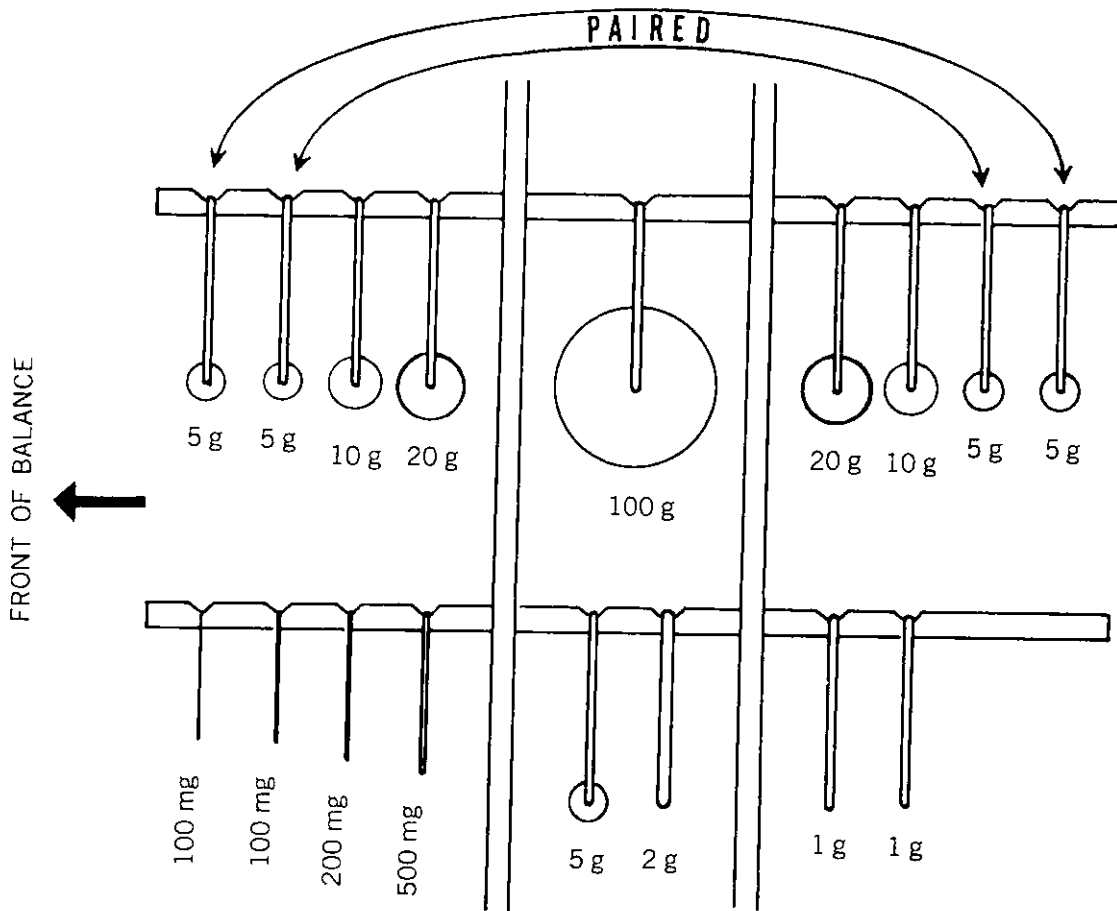
1. Turn arrestment knob from "part. rel." through "arrested" to "released."
2. When the scale stops, turn the digitizer drum slowly until the optical scale line just below the reference gap is centered in the gap. (See Note 2.)
3. Read results from left to right; 123.4567 g in example below (See Note 3).



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows the more into full view. Disregard the minor offset that this may cause on the optical scale.

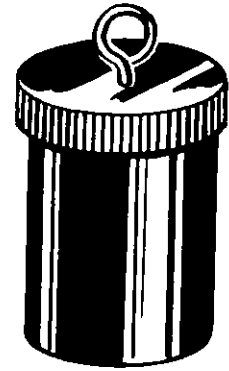
Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.



ARRANGEMENTS OF WEIGHTS (Type SCN)
(view from right side)

TARING DEVICE

Ainsworth part No. F-1570. Optional, order at additional cost.



The taring device permits the user to set the balance readout to zero even with some tare, such as a container, on the pan.

First the container, which may weigh up to 100 g, is placed on the pan. Then the taring device is suspended above the pan and material is removed from it until the combined weight of container and device equals 100 g. The balance will now read 100.0000 g. This is taken as a new zero for all further weighings (using this container) by simply disregarding the first "1" in all readings.

When the tare device is in use the balance capacity is limited to 100 g.

WEIGHING PROCEDURE (Type SCV)

Check Zero

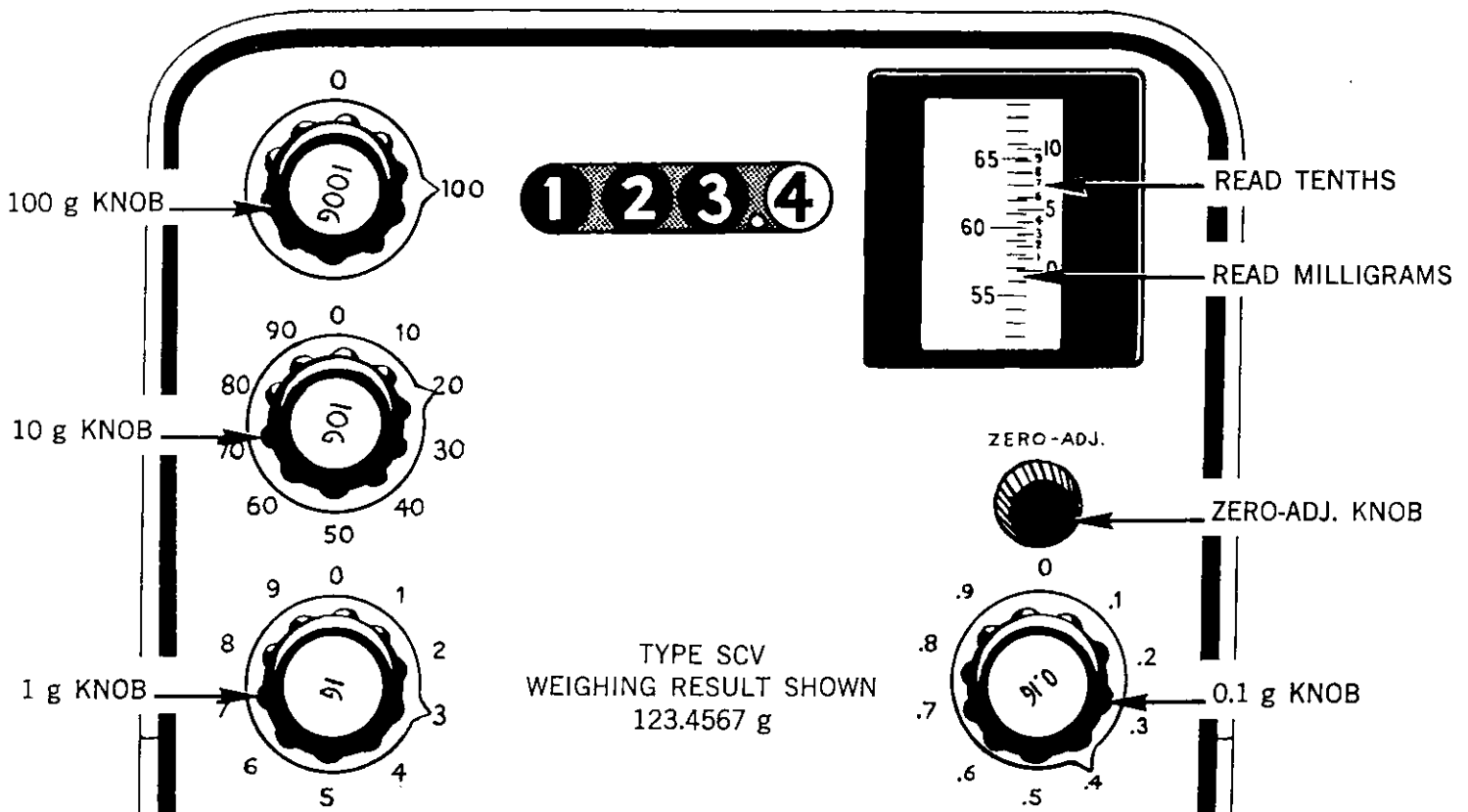
1. All weight knobs at zero, pan empty, doors closed.
2. Push white pan-brake button in center of arrestment knob a time or two to stop pan from swinging.
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the vernier coincides with the zero line of the optical scale.

Weigh

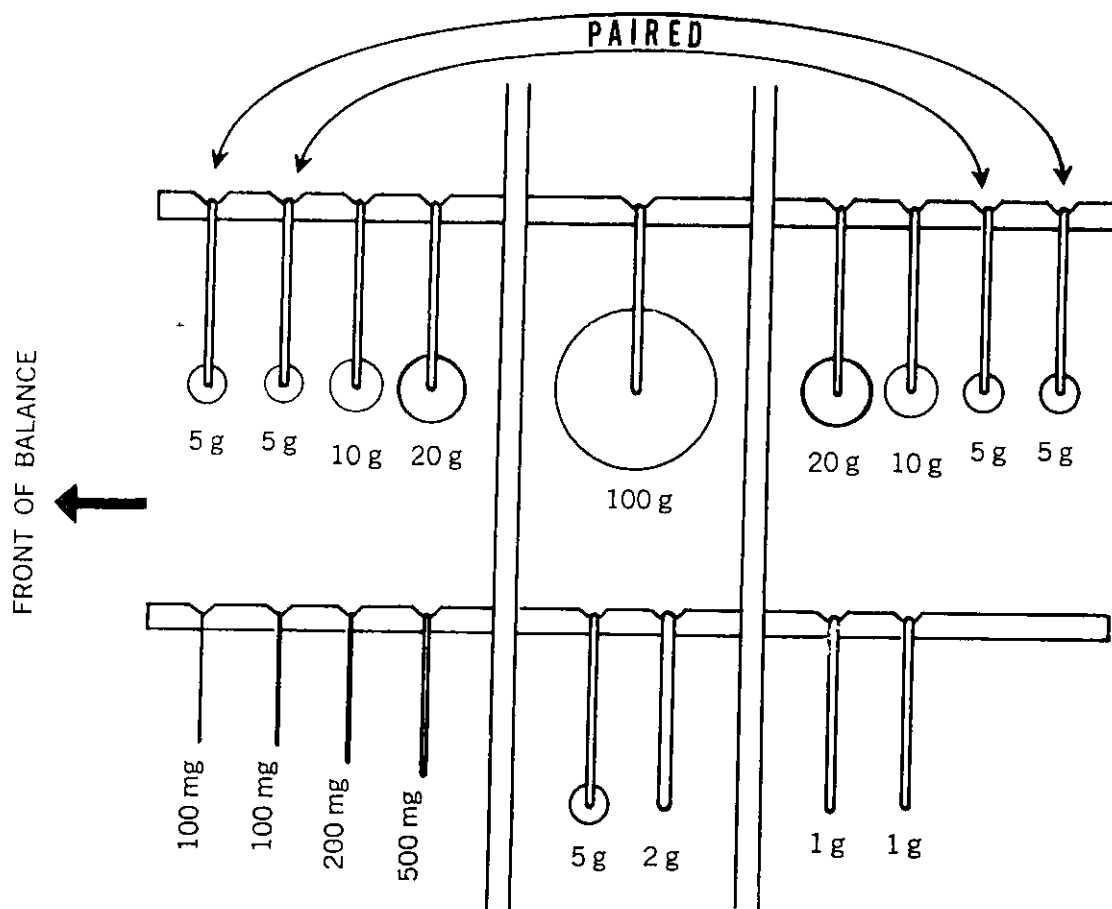
1. Load pan with beam arrested. Close doors.
2. Push pan-brake several times until pan stops swinging.
3. Dial 100 g knob to 100.
4. Turn arrestment knob to "part. rel." and observe screen.
5. If "remove weight" appears on the screen, arrest the beam first; then dial 100 g knob back to 0. (See Note.)
6. Turn arrestment knob to "part. rel." Dial the 10 g knob from 0 to 10-20-30—until the "remove weight" appears on the screen; then turn back one step. (See Note.)
7. Dial the 1 g knob in the same way, turning until the "remove weight" appears and then turn the knob back one step.
8. Dial the 0.1 g knob in the same way until the "remove weight" appears, then turn back one step.

Read Result

1. Turn arrestment knob from "part. rel." through "arrested" to "released."
2. When scale stops, read result from left to right: digits in windows first, optical scale last.
3. Read full milligrams on the optical scale just below bottom line of vernier (56 in example).
4. Read tenths of milligrams on vernier line that coincides with an optical scale line (.7 in example).



Note: If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not go back one step.



ARRANGEMENTS OF WEIGHTS TYPE SCV
(view from right side)

TARING DEVICE

Ainsworth part No. F-1570. Optional, order at additional cost.



The taring device permits the user to set the balance readout to zero even with some tare, such as a container, on the pan.

First the container, which may weigh up to 100 g, is placed on the pan. Then the taring device is suspended above the pan and material is removed from it until the combined weight of container and device equals 100 g. The balance will now read 100.0000 g. This is taken as a new zero for all further weighings (using this container) by simply disregarding the first "1" in all readings.

When the tare device is in use the balance capacity is limited to 100 g.

WEIGHING PROCEDURE (Type 10N)

Check Zero

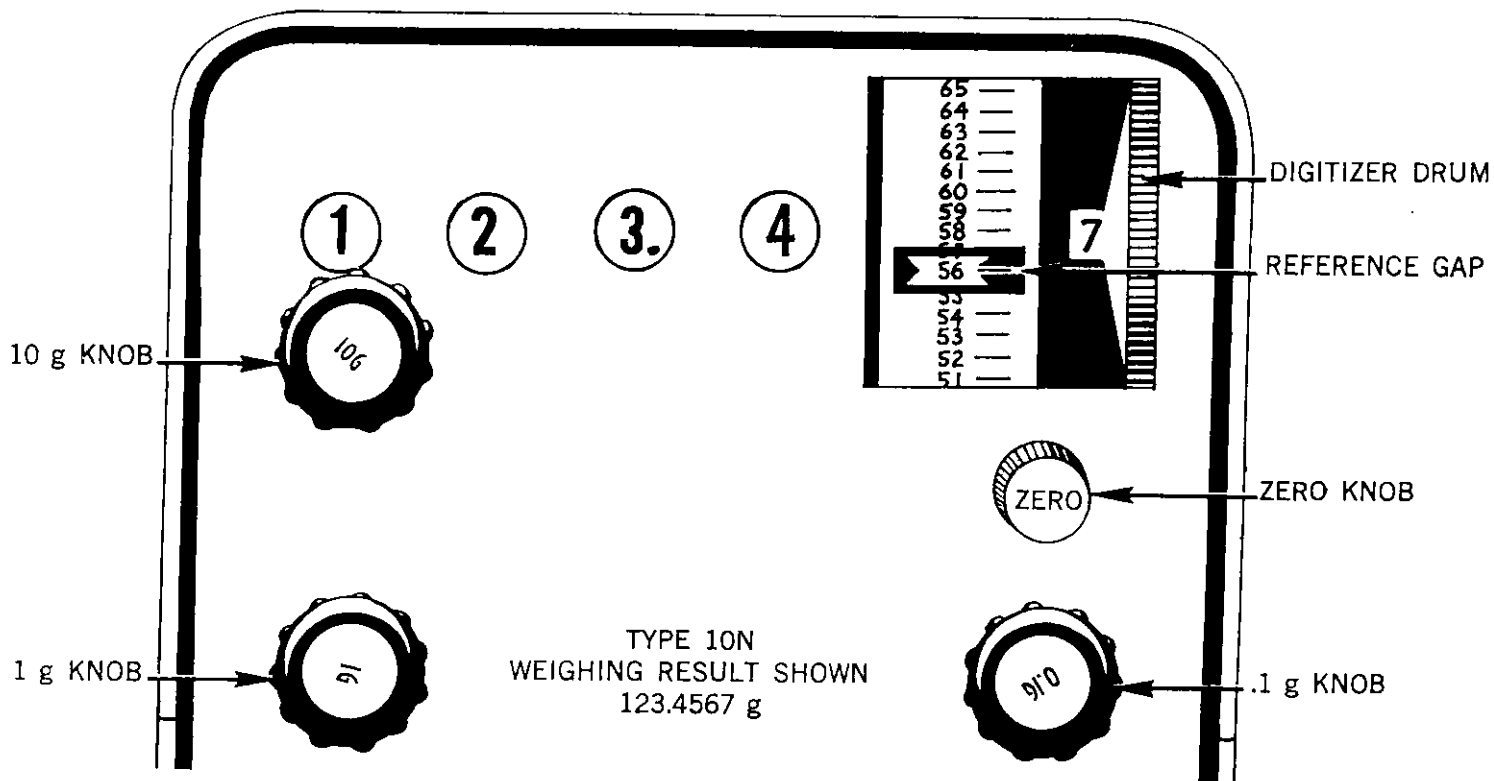
1. All knobs at zero, pan empty, doors closed, complete set of taring discs in trays under pan or tared container on pan.
2. Turn digitizer drum to "0" (against stop).
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until the swinging stops.
3. Dial 10 g knob from 0 to 10-20-30—until the "remove weight" appears on the screen. Stop, turn knob back one step (See Note 1).
4. Dial 1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.
5. Dial .1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.

Read

1. Turn arrestment knob slowly from "part. rel." through "arrested" and to "released."
2. When the scale stops: turn digitizer drum slowly until the optical scale line just below the reference gap is centered in the gap. (See Note 2.)
3. Read result from left to right: 123.4567 g in example below. (See Note 3.)
4. Balance also available with vernier readout (10V) same as instructions page 16.



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows more into full view. Disregard the minor offset that this may cause on the optical scale.

Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.

TARING DEVICE (Type 10N)

Purpose of Taring Device

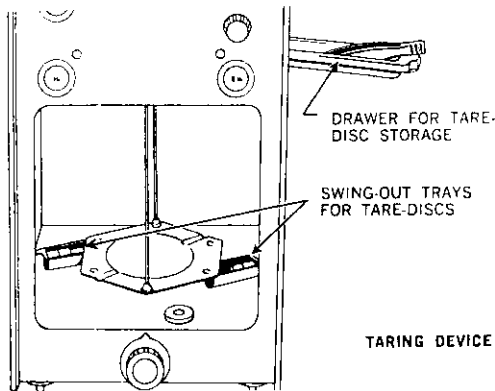
The taring device permits setting the balance readout to zero even with an empty container (tare) on the pan. The readout then indicates directly the net weight of the material placed in the container. It is no longer necessary to make two weighings and to mathematically subtract tare weight from gross weight to arrive at the net weight.

The taring discs are located in small trays under the pan and can be recognized by their relative sizes: 10 gram, 1 gram, 100 milligram, and 10 milligram. The unused tare discs can be stored in the small drawer in the top of the weighing chamber. The number of tare discs supplied for this balance is:

(5) 10 g tares	(10) 100 mg tares
(10) 1 g tares	(10) 10 mg tares

Use of Taring Device

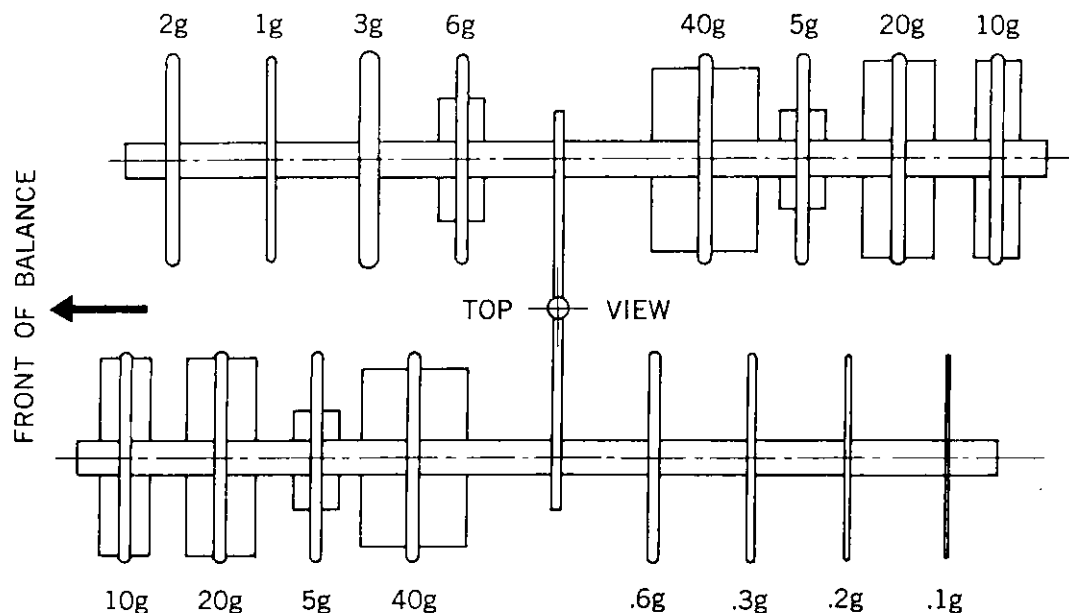
1. Place tare (empty container) on pan and weigh it in the usual manner, to the closest milligram is sufficient.
2. Arrest the balance, swing out two trays under pan.
3. Remove the proper number of tare discs, i.e., the weight of empty container.
4. Reset all weight knobs to zero, close trays and doors.
5. Release beam; optical scale should come near zero.
6. If optical scale does not come within range of "zero" knob, add or remove one or more of the smallest taring discs until scale is within adjustment range.
7. If this is still not possible, carefully and slowly adjust the rear leveling screw under the balance until the scale is in the adjustment range. This zero adjustment should only be used within a range of 10 milligrams as any further adjustment with the leveling screw might tip the balance too much. If properly done, the level bubble in the weighing chamber will still be well centered.



Notes: The container is now tared. From now on the zero is always adjusted with the container on the pan. The zero position with the pan empty is without significance. It cannot and does not have to be adjusted any more.

The tared container becomes "part of the balance." If it changes weight due to hygroscopic behaviour, dirt, etc., it will cause a zero drift just as any part inside the balance would under the same conditions. Be careful not to lose any of the taring discs. Part or all of them have to be used again when another container is to be tared or when weighings are to be made without tare.

ARRANGEMENT OF WEIGHTS (Type 10N or 10V)



WEIGHING PROCEDURE (Type 21N)

Check Zero

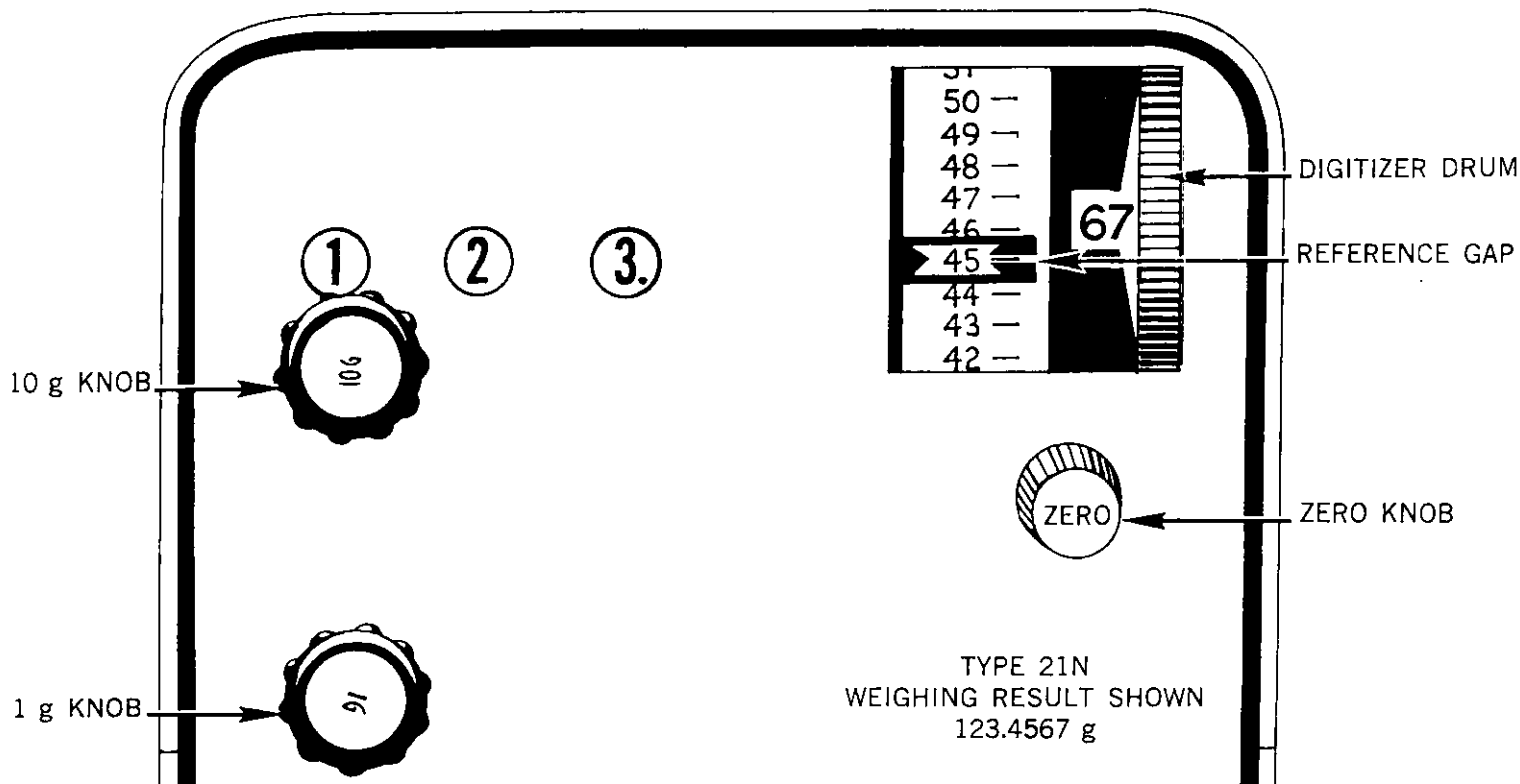
1. All weight knobs at zero, pan empty, doors closed.
2. Turn digitizer drum to "00" (against stop).
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until the swinging stops.
3. Dial the 10 g knob from 0 to 10-20-30 — until the "remove weight" appears on the screen. Stop, turn the knob back one step. (See Note 1.)
4. Dial the 1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.

Read Result

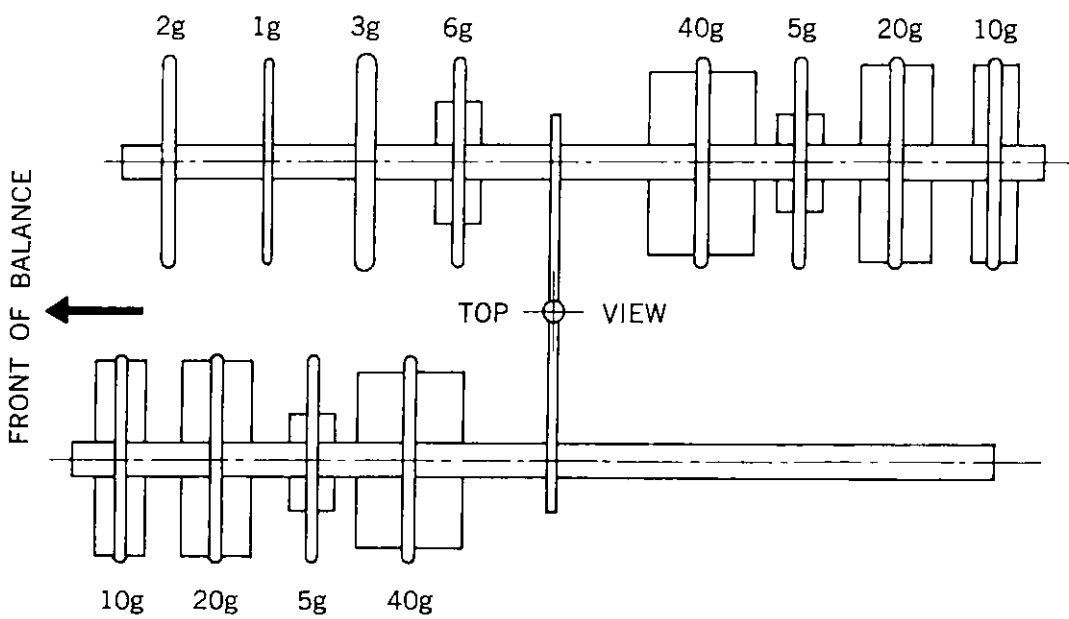
1. Turn arrestment knob slowly from "part. rel." through "arrested" and to "released."
2. When the scale stops: turn digitizer drum slowly until the optical scale-line just below the reference gap is centered in the gap. (See Note 2.)
3. Read result from left to right: 123.4567 g in example below. (See Note 3.)



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows more into full view.

Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.



ARRANGEMENT OF WEIGHTS — TYPE 21N

WEIGHING PROCEDURE (Type 23N)

Check Zero

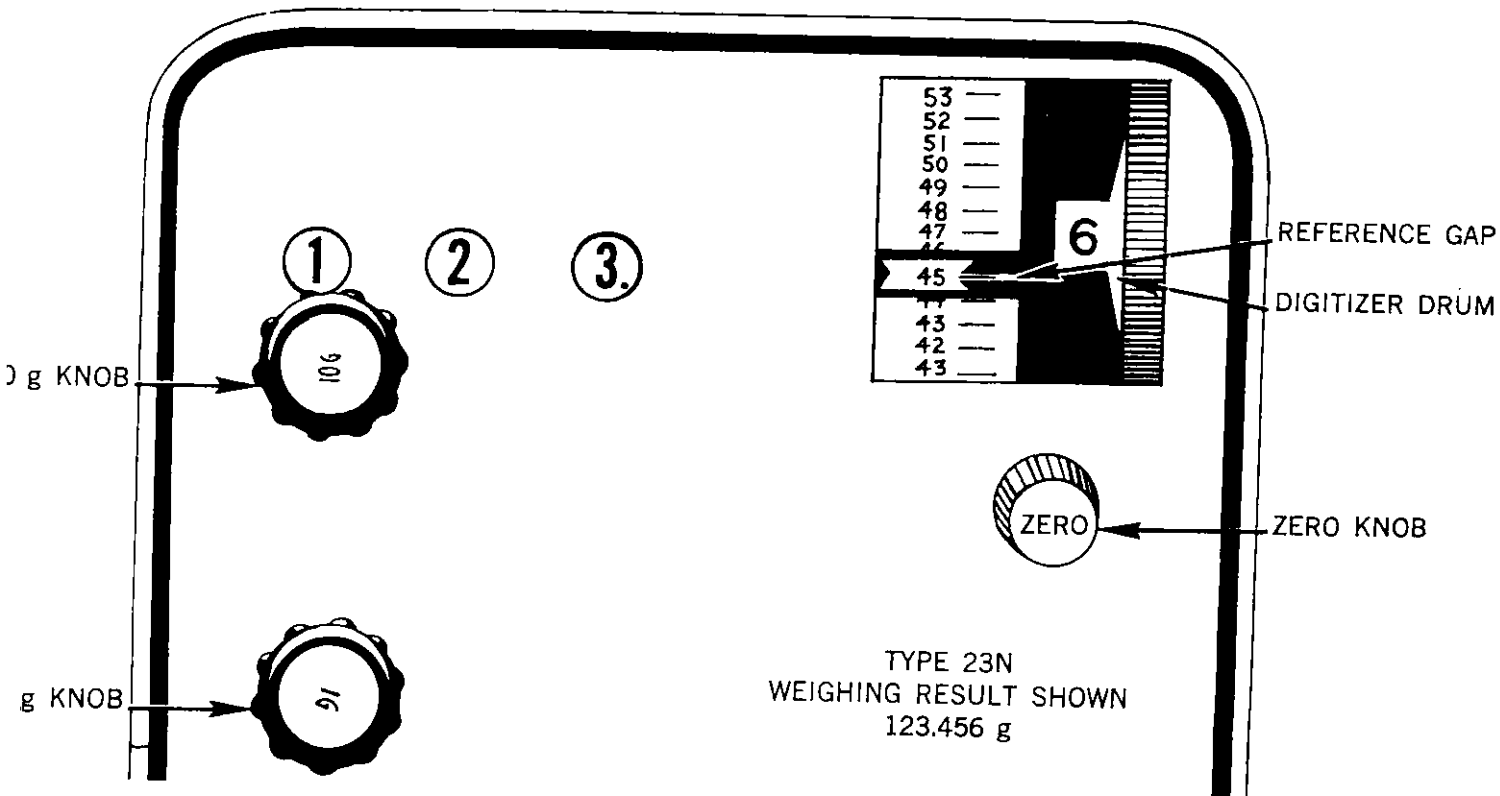
1. All weight knobs at zero, pan empty, doors closed.
2. Turn digitizer drum to "0" (against stop).
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until the swinging stops.
3. Dial 10 g knob from 0 to 10-20-30—until the "remove weight" appears on the screen. Stop, turn knob back one step. (See Note 1.)
4. Dial 1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.

Read

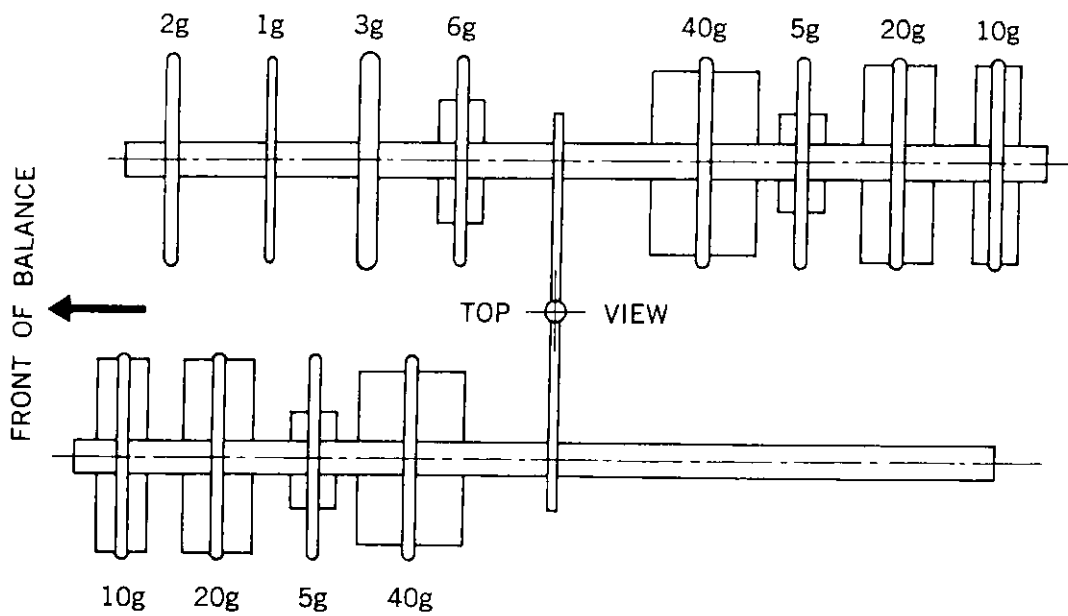
1. Turn arrestment knob slowly from "part. rel." through "arrested" and to "released."
2. When the scale stops: turn digitizer drum slowly until the optical scale line just below the reference gap is centered in the gap. (See Note 2.)
3. Read result from left to right: 123.456 g in example below. (See Note 3.)



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows more into full view. Disregard the minor offset that this may cause on the optical scale.

Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.



ARRANGEMENT OF WEIGHTS — TYPE 23N

WEIGHING PROCEDURE (Type 23V)

Check Zero

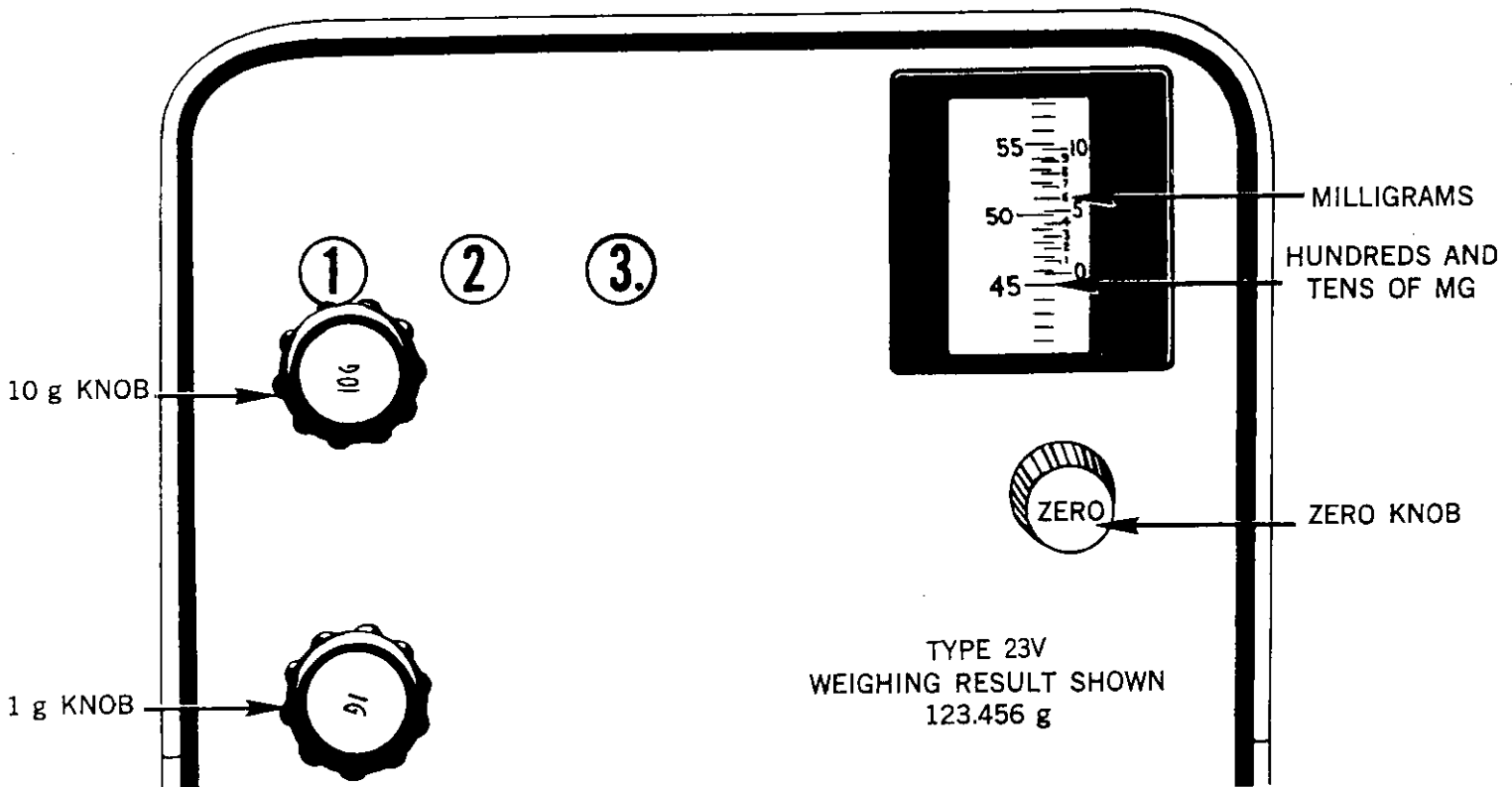
1. All weight knobs at zero, pan empty, doors closed.
2. Turn arrestment knob to released.
3. Turn "zero" knob until the zero line of the optical scale coincides exactly with the bottom line of the vernier.

Weigh

1. Load pan with beam arrested, close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until swinging stops.
3. Dial 10 g knob from 0 to 10-20-30 — until the "remove weight" appears on the screen. Stop, turn knob back one step. (See Note 1.)
4. Dial 1 g knob in same way, turning until the "remove weight" appears and then turning back one step.

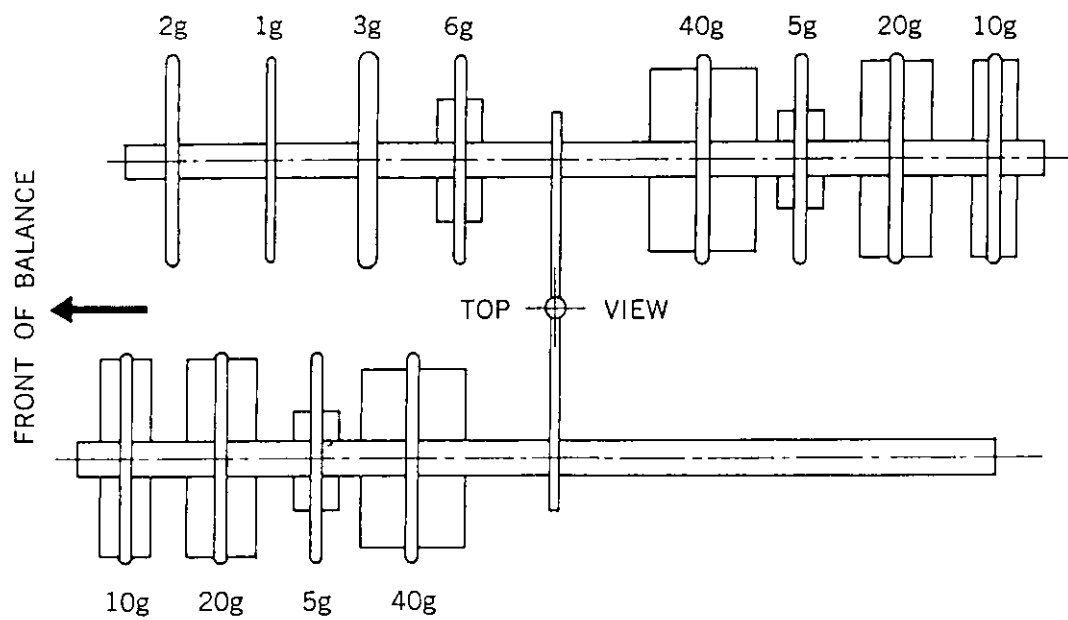
Read Result

1. Turn arrestment knob slowly from "part. rel." through "arrested" to "released."
2. When scale stops, read results from left to right . . . digits in windows first, optical scale last. (See Note 2.)
3. Read tens of milligrams on optical scale just below bottom line of vernier (45 in example).
4. Read milligrams on vernier line that coincides with an optical scale line (6 in example).

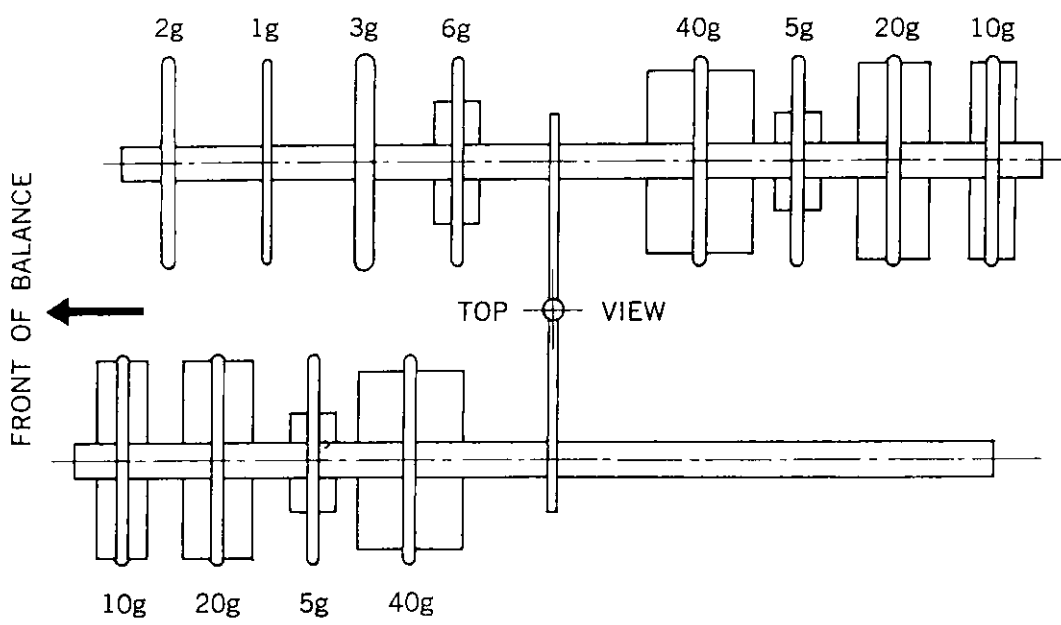


Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. The fact that each line on the optical scale is equivalent to 10 mg (not 1 mg) could conceivably lead to confusion. We recommend to read and jot down the entire 6-digit result going strictly from left to right without paying attention to the significance of each digit (1-2-3-4-5-6 in example, not 123 gram 45? mg).



ARRANGEMENT OF WEIGHTS — TYPE 23V



ARRANGEMENT OF WEIGHTS — TYPE 23V

WEIGHING PROCEDURE (Type 24N)

Check Zero

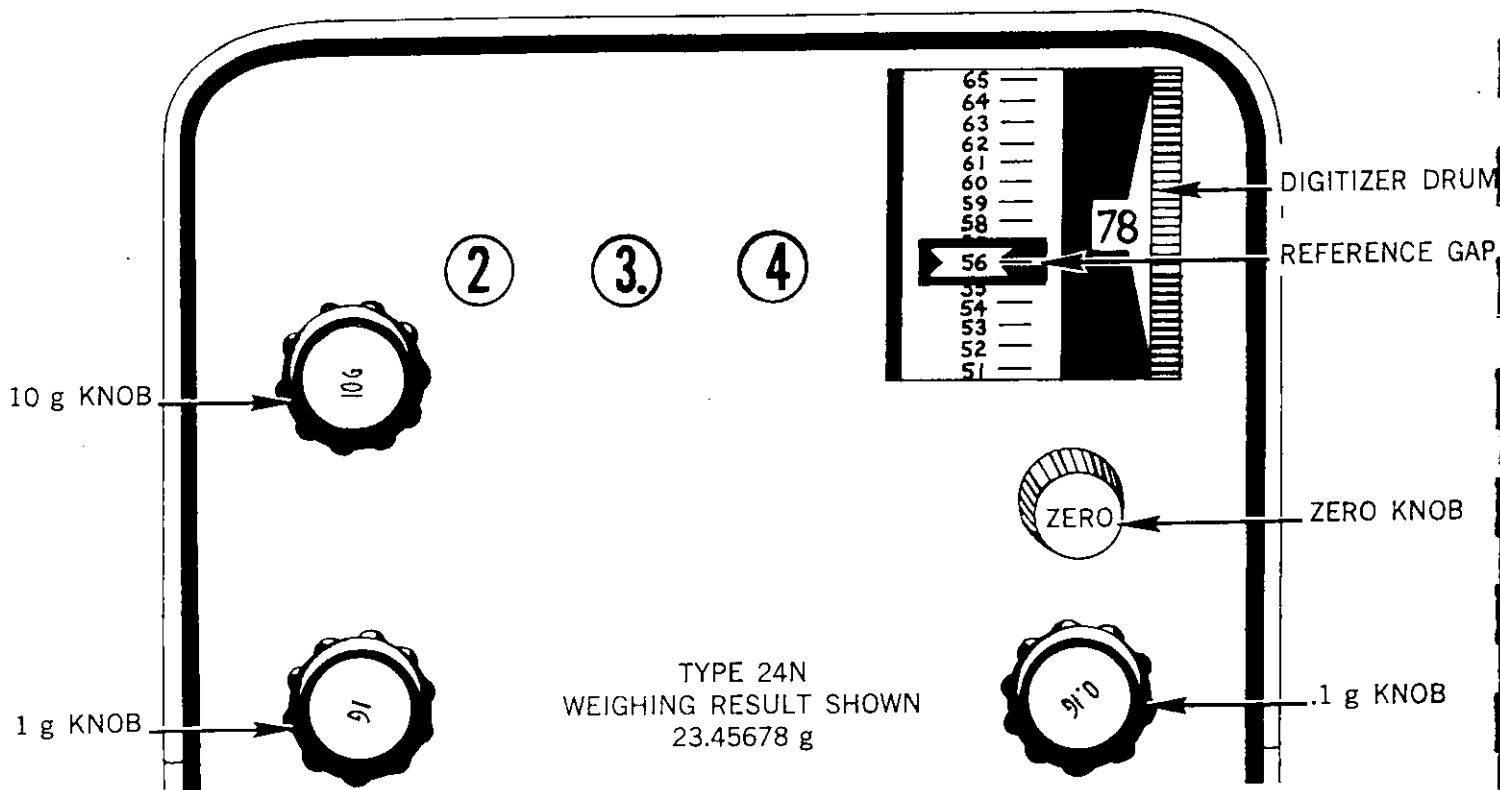
1. All knobs at zero, pan empty, doors closed, complete set of taring discs in trays under pan or a tared container on pan.
2. Turn digitizer drum to "00" (against stop).
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until the swinging stops.
3. Dial 10 g knob from 0 to 10-20-30—until the "remove weight" appears on the screen. Stop, turn knob back one step (See Note 1).
4. Dial the 1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.
5. Dial the .1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.

Read

1. Turn arrestment knob slowly from "part. rel." through "arrested" and to "released."
2. When the scale stops: turn digitizer drum slowly until the optical scale line just below the reference gap is centered in the gap. (See Note 2.)
3. Read result from left to right: 23.45678 g in example below. (See Note 3.)



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows more into full view.

Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.

TARING DEVICE (Type 24N)

Purpose of Taring Device

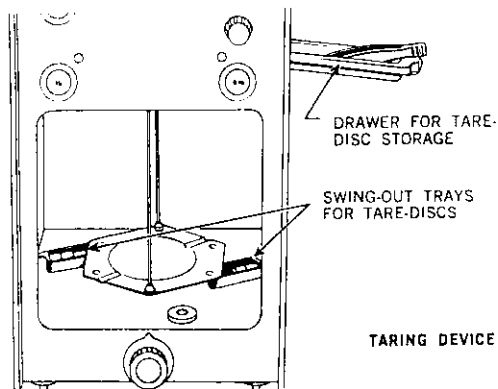
The taring device permits setting the balance readout to zero even with an empty container (tare) on the pan. The readout then indicates directly the net weight of the material placed in the container. It is no longer necessary to make two weighings and to mathematically subtract tare weight from gross weight to arrive at the net weight.

The taring discs are located in small trays under the pan and can be recognized by their relative sizes: 10 gram, 1 gram, 100 milligram, and 10 milligram. The unused tare discs can be stored in the small drawer in the top of the weighing chamber. The number of tare discs supplied for this balance is:

(3) 10 g tares	(10) 100 mg tares
(10) 1 g tares	(10) 10 mg tares

Use of Taring Device

1. Place tare (empty container) on pan and weigh it in the usual manner, to the closest milligram is sufficient.
2. Arrest the balance, swing out two trays under pan.
3. Remove the proper number of tare discs; i.e., the weight of empty container.
4. Reset all weight knobs to zero, close trays and doors.
5. Release beam; optical scale should come near zero.
6. If optical scale does not come within range of "zero" knob, add or remove one or more of the smallest taring discs, until scale is within adjustment range.
7. If this is still not possible, carefully and slowly adjust the rear leveling screw under the balance until the scale is in the adjustment range. This zero adjustment should only be used within a range of 10 milligrams as any further adjustment with the leveling screw might tip the balance too much. If properly done the level bubble in the weighing chamber will still be well centered.

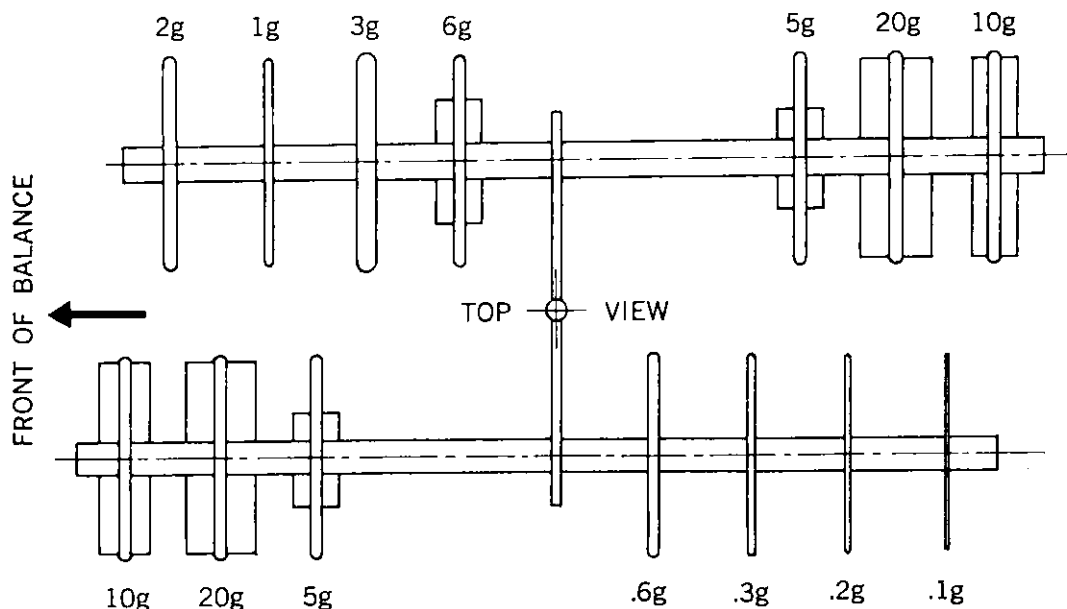


Note: The container is now tared. From now on the zero is always adjusted with the container on the pan. The zero position with the pan empty is without significance. It cannot and does not have to be adjusted any more.

The tared container becomes "part of the balance." If it changes weight due to hygroscopic behaviour, dirt, etc., it will cause a zero drift just as any part inside the balance would under the same conditions.

Be careful not to lose any of the taring discs. Part or all of them have to be used again when another container is to be tared or when weighings are to be made without tare.

ARRANGEMENT OF WEIGHTS (Type 24N)



WEIGHING PROCEDURE (Type 28N)

Check Zero

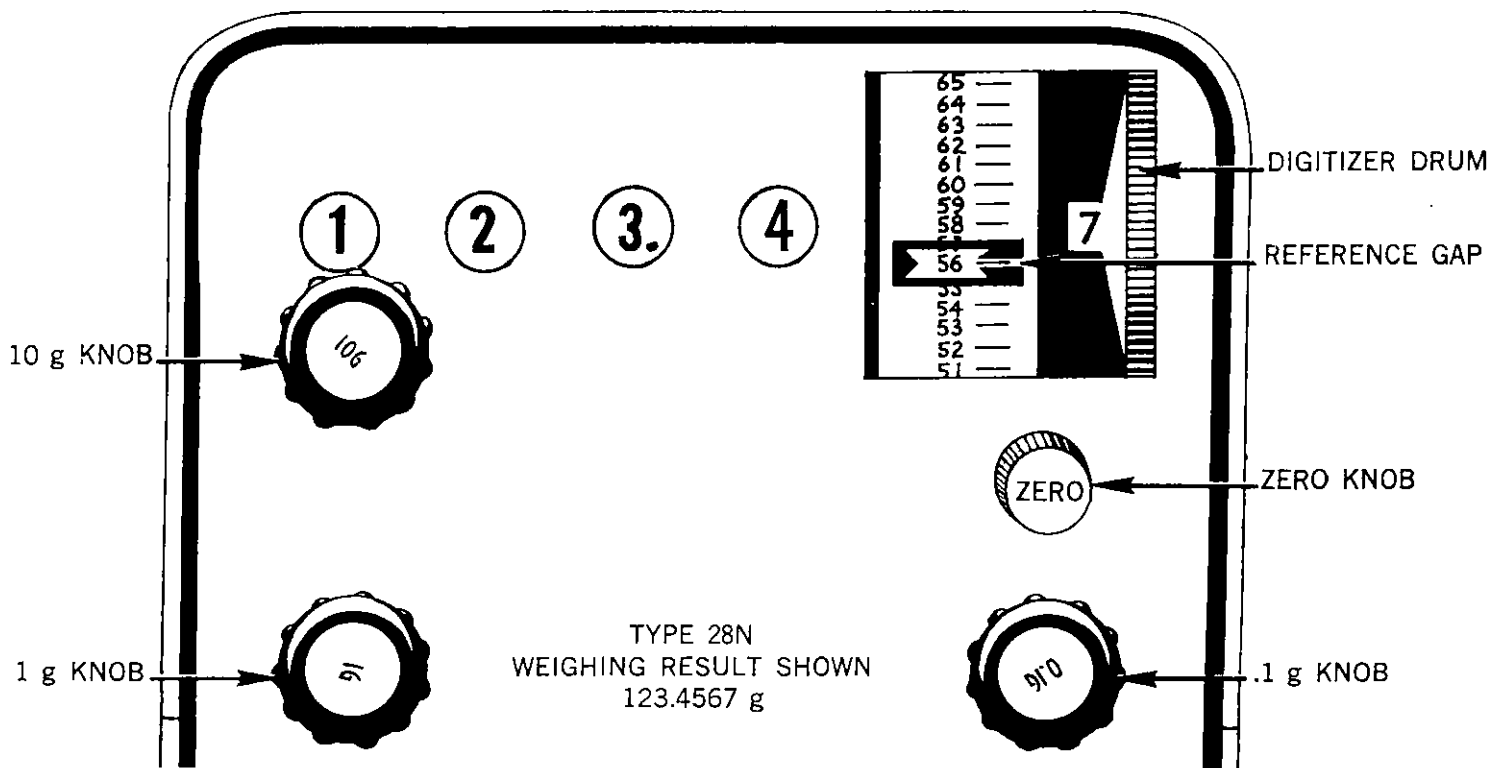
1. All knobs at zero, pan empty, doors closed, complete set of taring discs in trays under pan or tared container on pan.
2. Turn digitizer drum to "0" (against stop).
3. Turn arrestment knob to "released."
4. Turn "zero" knob until the zero line of the optical scale is centered in the reference gap.

Weigh

1. Load pan with beam arrested. Close doors.
2. Turn arrestment knob to "part. rel." If pan swings, turn arrestment knob several times back and forth from "arrested" to "part. rel." until the swinging stops.
3. Dial 10 g knob from 0 to 10-20-30—until the "remove weight" appears on the screen. Stop, turn knob back one step (See Note 1).
4. Dial 1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.
5. Dial .1 g knob in the same way, turning until the "remove weight" appears, then turn back one step.

Read

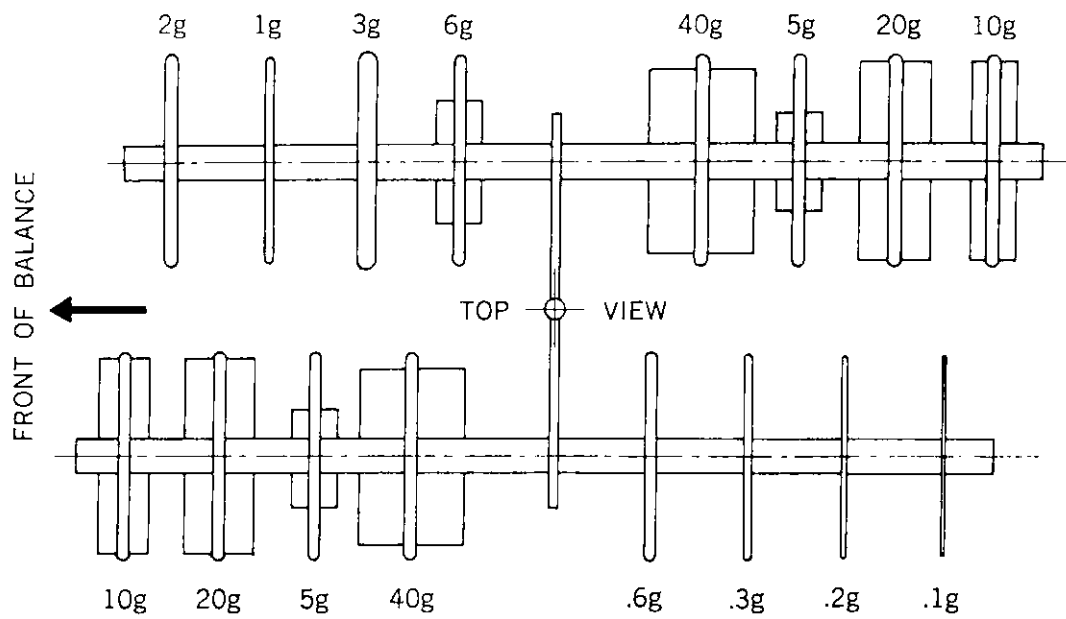
1. Turn arrestment knob slowly from "part. rel." through "arrested" and to "released."
2. When the scale stops: turn digitizer drum slowly until the optical scale line just below the reference gap is centered in the gap. (See Note 2.)
3. Read result from left to right: 123.4567 g in example below. (See Note 3.)
4. Balance available with vernier readout (28V) see instructions page 16.



Note 1. If the "remove weight" does not appear even when the knob is in its highest position, leave it there. Do not turn back one step.

Note 2. If the digitizer drum is between numbers, move the number that shows more into full view. Disregard the minor offset that this may cause on the optical scale.

Note 3. The optical scale is extended beyond 100 divisions for easier weighings near the scale ends. The first "1" of the divisions 100-120 has to be mathematically carried into the digits at the left.



ARRANGEMENT OF WEIGHTS (Type 28N or 28V)

MOVING THE BALANCE

Within the room

Be sure the beam is arrested. Carry balance carefully, keeping it approximately level.

Within building or by car

If stirrup hold down bar, beam and weight packing blocks were retained, repack by reversing the unpacking procedure outlined on pages 2 and 3, or,

Take pan and beam out. Replace case top, lock it.

Carry balance in hands or set on car seat. Do not use cart or hand truck. carry beam and pan separately.

By commercial carrier

Write your dealer or Ainsworth for complete packing material and packing instructions.

After any transportation

Rotate all weight knobs slowly through several full rotations to make sure that weights line up and drop into the notches on the stirrup weight racks.

If some weights should become tangled up, push them apart with a wooden or plastic stick.