

APPENDIX B OPERATOR MANUAL

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APPENDIX B

OPERATOR MANUAL

CAUTIONS

**ALWAYS REVIEW THEM WITH ANY NEW OPERATOR WHO
MAY BE TRAINED IN THE USE OF THE BALANCER.**

- * Always hand rotate the wheel and tire while tightening the wing nut on the balancer. This is the **ONLY** way to be certain the wheel is securely mounted and centered on the centering cone.
- * Especially important!!!! **KEEP CUSTOMERS, ESPECIALLY CUSTOMERS WITH SMALL CHILDREN, AWAY FROM THE BALANCER WHILE YOU ARE DOING ANY BALANCING!** If customer watches you do the job, be absolutely certain they watch from a safe distance. If adults are not restraining their children to prevent them from moving toward the balancer, don't proceed with balancing.

SAFETY OF CUSTOMERS AND CHILDREN SHOULD BE YOUR UTMOST CONCERN!

- * **DO NOT** wear a tie, loose clothing or jewelry when operating this balancer or any other rotating device.
- * Keep hands away from rotating parts while the machine is in operation.
- * Check the wheel and tire for dirt or foreign objects which could be thrown off during the balancing process.
- * **REMOVE ANY OLD WEIGHTS BEFORE BALANCING.**
- * Wear safety goggles when doing balancing.
- * Wheels and tires can be very heavy. **DON'T TRY TO PROVE HOW STRONG YOU ARE! GET HELP IN PUTTING HEAVY WHEELS AND TIRES ON AND OFF THE BALANCING ARBOR!** A heavy wheel and tire can hurt your back, and a dropped wheel and tire can also injure you or other personnel.
- * Always use proper lifting procedures that keeps your back straight to avoid straining your back when lifting any wheel and tire regardless of size or weight.
- * Be certain all shop personnel are standing clear of the balancer when it is in operation.
- * **NEVER** operate the balancer unless the floor around it is **completely DRY**. A floor wet from any cause, including rain runoff, spilled drinks, or snow melt from cars is a known hazard which leads to falls and injury.
- * Observe all cautions in the operator's manual, in particular, always be ready to hit the **STOP** button while the machine is in operation. And if anything should come loose during the balancing process, **DO NOT LIFT THE HOOD**. Be certain the hood stays **DOWN** and then press the **STOP** button.
- * Be sure the machine is kept clean and free from old weights and tools.
- * Be especially aware of damaged wheel rims which can have sharp edges which can cut your hands when mounting wheel on the arbor.
BEST: Use leather gloves when mounting wheels and tires.
- * Always inspect the tread area of steel belted tires. Steel belts can stick out of the tread and injure your hands.
BEST: Use leather glove when mounting wheels and tires.

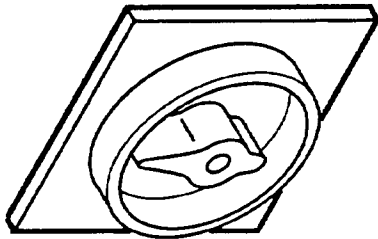
DISCLAIMER

The CWB-1820 Computer Wheel Balancer distributed by Sun Electric Corporation (SUN) is a high-precision electro/mechanical device which is designed to be operated only by trained automotive service personnel in a professional shop environment, and operated only by personnel who have read and strictly follow the instructions contained in this manual.

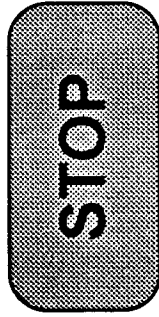
The operator agrees to (a) use and operate the balancer only after installation of the balancer by a qualified Snap-On/Sun Service Technician and familiarization in its use by an authorized Snap-On Sun representative, (b) accept full responsibility for the safe operation of the balancer in a location protected from non-professional personnel and customers and in a manner which is consistent with safe operation, and (c) provide proper care for the balancer and an appropriate environment for its use, including protection from abuse, impact, vibration, excessive heat, moisture, contaminants, electrical or electro-magnetic stress, power surges, and other similar conditions.

Sun makes no claims, representations or warranties regarding the balancer or its use and operation except as specifically stated in Sun's standard published *Limited Warranty*. Sun accepts responsibility for the balancer only under the terms and conditions of its *Limited Warranty*, and otherwise specifically disclaims any liability for claims for damage or injury, including special, incidental and consequential damages, resulting from the use or operation of the balancer.

STANDARD PROCEDURE

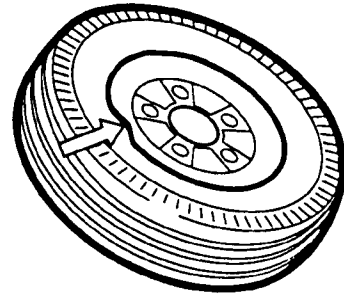


**Press to
stop machine
at any time**

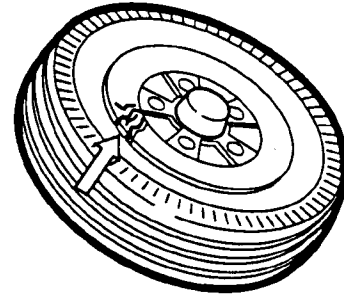


Turn machine "on" or "off"
using switch on left side of
machine base.

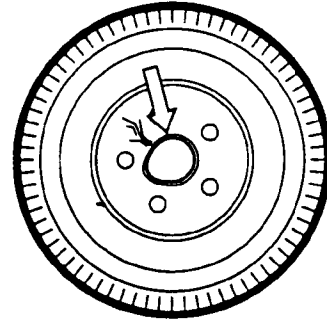
INSPECTING WHEEL



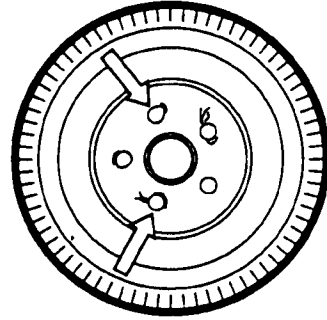
Bent rim



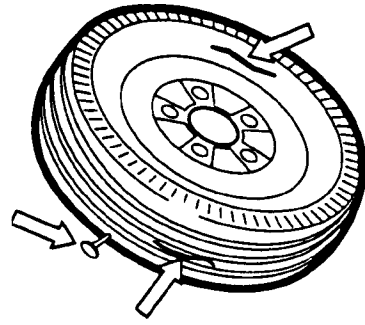
Cracked
mag-type rim



Cracked or
damaged center hole

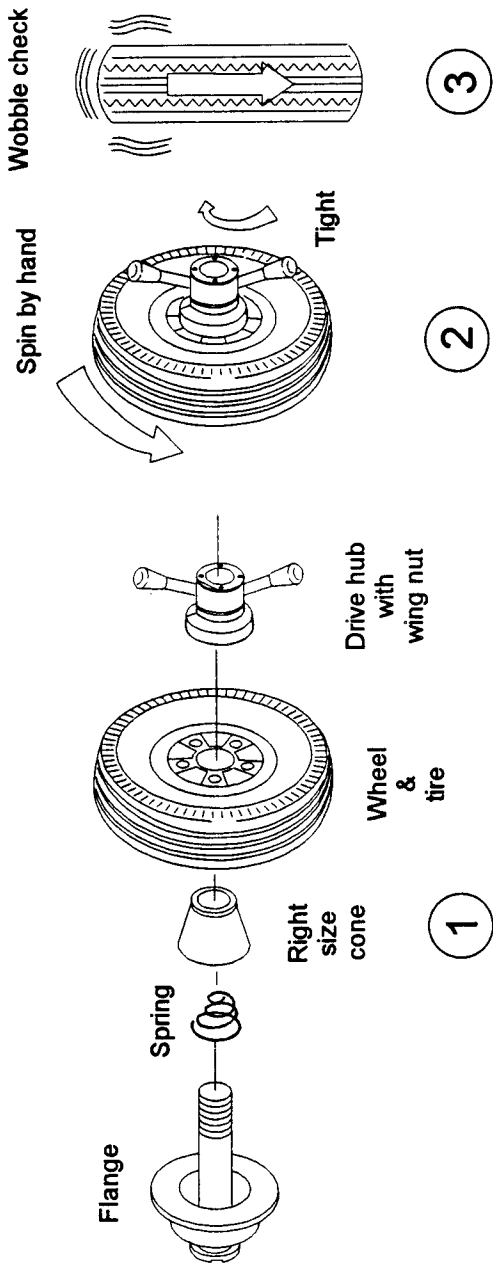


Cracked or
ovalled stud holes

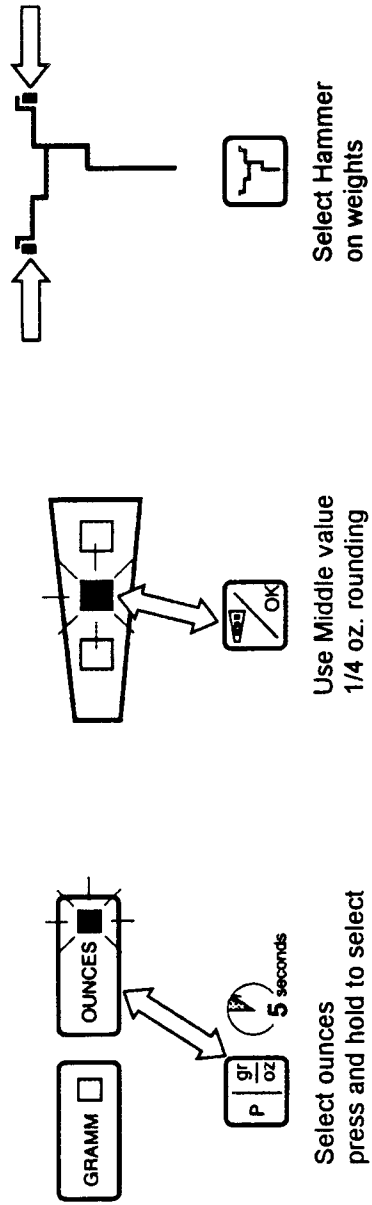


Punctured or
damaged tire

MOUNT WHEEL ON BALANCER

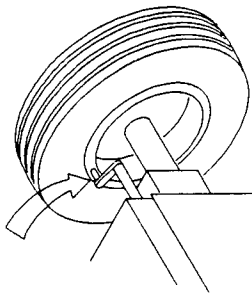


SELECT BALANCING OPTIONS



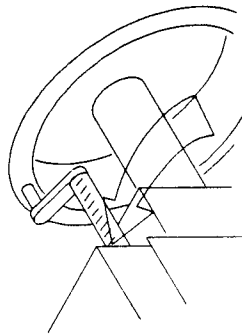
BALANCING

If new wheel?

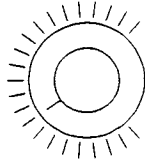


Press to clear old memory

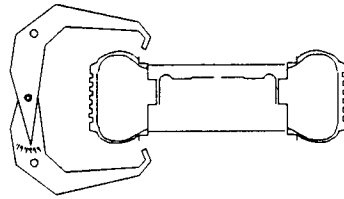
Move distance bar to rim - wait for beep



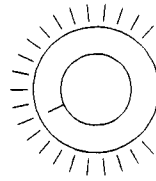
Note number valve on distance bar



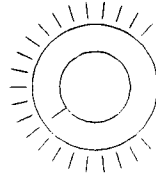
Dial in the number value on wheel distance dial



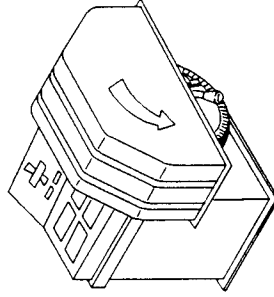
Measure rim width



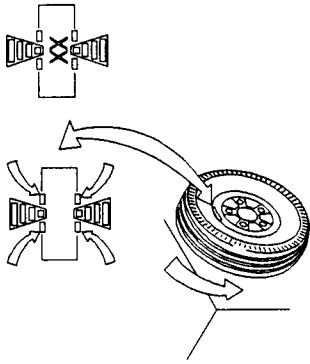
Dial in rim width number



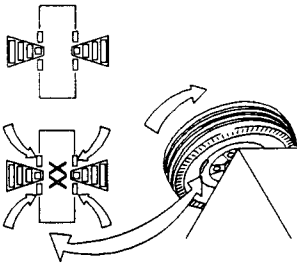
Dial in wheel diameter



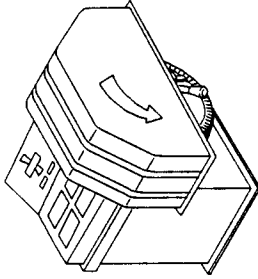
Close Hood



Open hood when wheel stops turn wheel until four indicator lights on outside weight position readout go "green". Install weight at 12 o'clock position on outside of rim



Turn wheel until four indicator lights on inner weight position go "green". Install weight at 12 o'clock position on inside of rim



Close hood, adjust balance by adding weights, if needed, to balance wheel and tire

CHECK YOUR WORK!

NOTE: You can change, "adjust" or "correct" any specification, even after balancing, and the computer will **AUTOMATICALLY** recompute and display the correct weight required for any adjustment of distance, diameter, width or weight position.

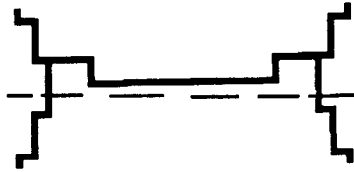
WEIGHTS

WEIGHT SELECTION AND LOCATION

		<p>Hammer ons for all wheels (balancer defaults to this selection whenever it is first turned on</p>			<p>Stick ons, both sides</p>			<p>Stick on inside/stick on center plane, for alloy wheels with "hidden" weights</p>			<p>"Static" stick on</p>
		<p>Stick on inside/hammer on outside</p>			<p>Hammer on inside/stick on outside</p>			<p>Hammer on inside/stick on center plane</p>			

CHECK YOUR WORK!

NOTE: Be sure weights are truly on center plane of wheel for static balance. If weights aren't directly upon the center plane you will NOT balance the wheel and tire to specifications. Again: Always check your work.



Be sure you enter the correct weight scale grams or ounces

NOTE: After balance cycle, you can select other weight locations by pressing weight selection key, and computer automatically adjusts weight values for new weight positions. No need to re-spin the wheel.

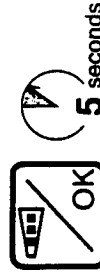
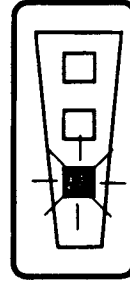
WHEEL ROUNDING

EXPLANATION:

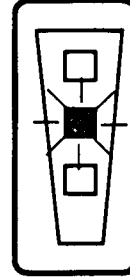
The CWB-1820 has three tolerance levels for weight "rounding". The finest setting, left LED on the tolerance bar, measures in hundredths of an ounce or gram. This setting should only be used for future work, if and when manufacturer tolerances demand it.

The quarter-ounce rounding setting, the middle LED on the tolerance bar, rounds off any weight to the nearest quarter of an ounce or equivalent grams. This setting should be used for 99% of all balancing.

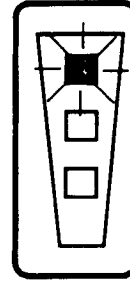
The half-ounce rounding setting, the right hand LED on the tolerance bar, rounds off any weight to the nearest half ounce or equivalent grams. It should be used for extremely large diameter and wide off-road type tires which are "floppy" in nature, and cannot be easily balanced at lower tolerance levels.



Press and hold for "hundredths" tolerance (to be used in future)



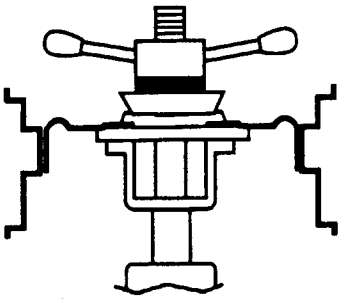
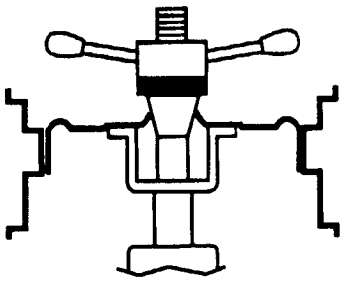
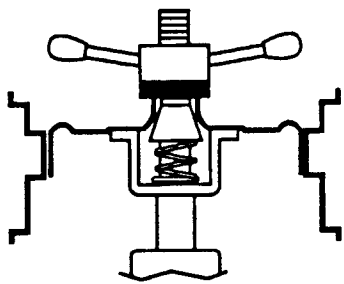
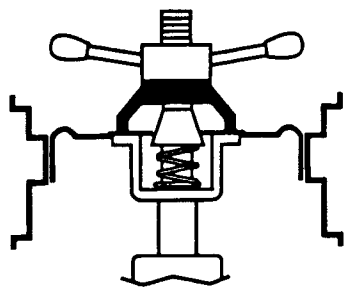
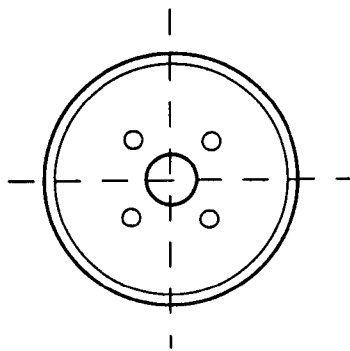
Press for 1/4 oz. rounding for general use



Press for 1/2 oz. rounding for large diameter and wide

WHEEL MOUNTING

CENTER HOLE WHEEL MOUNTING



For wheels designed to be centered through the center hold of the wheel

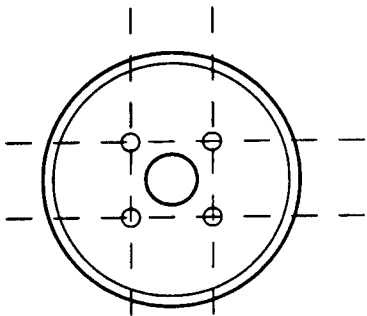
Back cone and drive hub
90% of all American made cars and most imports

Back cone and drive washer,
many styled steel and mag type wheels

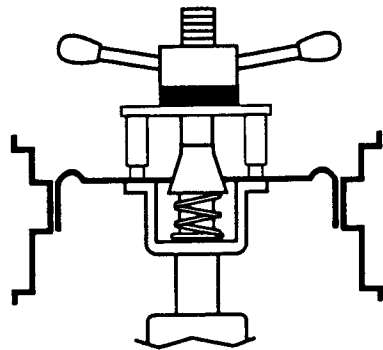
Front cone and washer,
some American wheels and imports

Back spacer, front cone and drive washer, large center hole such as light trucks, trucks, vans, multi-tire axles, etc.

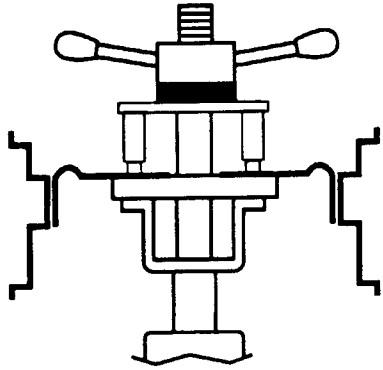
LUG TYPE WHEEL MOUNTING



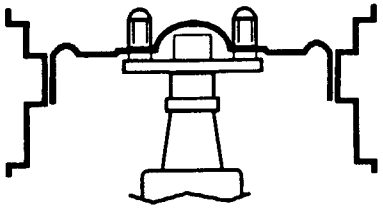
For wheels using mounting studs and lugs for centering or for all closed center wheels



Back cone and drive plate for more accurate balancing, many front wheel drive and imports especially Euro imports

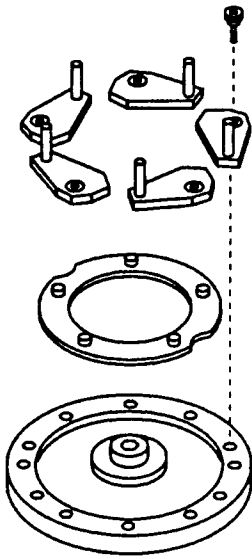


Spacer and drive plate for more accurate balancing, some high offset or deep dish wheels



Universal 3/4/5 lug plate, can be used on any wheel, but on unusual bolt circle dimensions and all closed center wheels (such as Renault, Peugeot, mag-type wheels with center hole too small to fit over arbor, etc.)

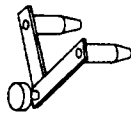
UNIVERSAL 3/4/5 LUG WHEEL FLANGE



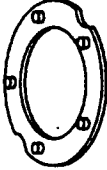
This flange can be used to balance both inch and metric bolt circle wheels which use the studs to locate the wheel on the hub. It must be used for closed center wheels and for highly styled mag-type wheels with very small center holes.



Be careful when tightening lug arm to flange — slot in back of arm must fit easily over the pin on the indexing ring



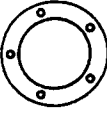
Wheel lug measuring tool



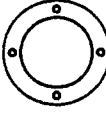
Two-sided, 4/5 pin indexing ring



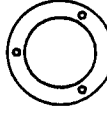
Single sided 3-pin indexing ring



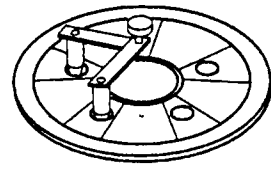
5-lug setup



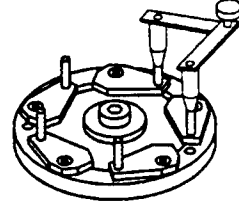
4-lug setup



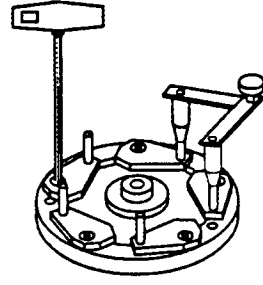
3-lug setup



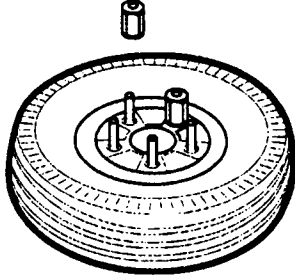
Put tool tips in wheel holes and tighten knob



Use lug hole measuring tool to adjust arm angles



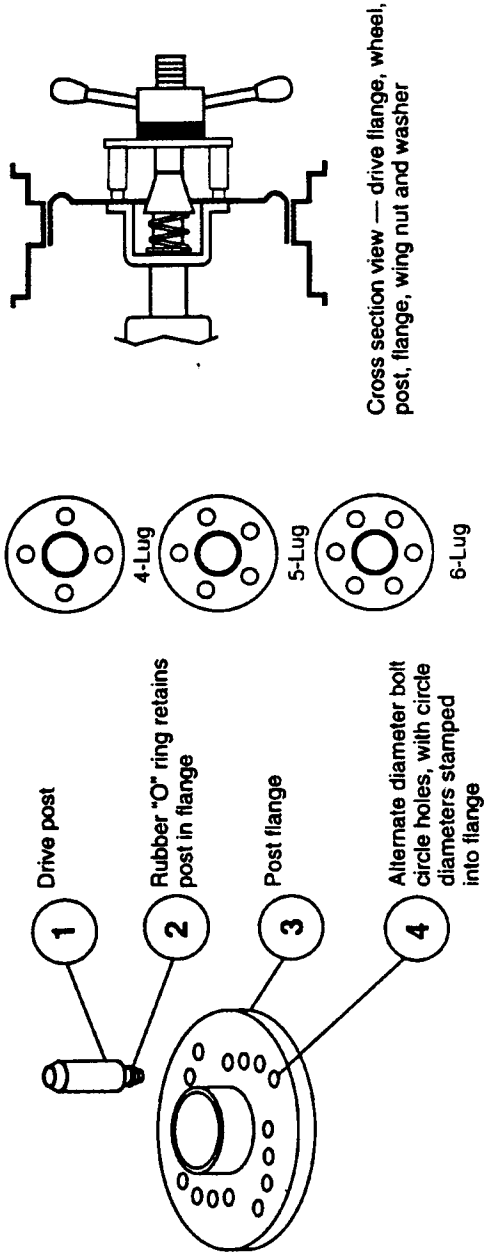
Keep measuring tool in place while tightening all arm screws with T-handle hex wrench



Remove measuring tool, mount wheel on lugs, tighten lug nuts supplied with flange system using a hand wrench. Balance wheel and tire using standard balancing procedure

POST DRIVE PLATES

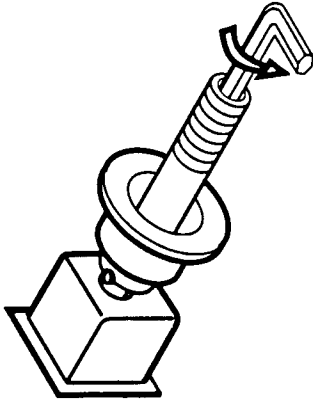
These balancer accessories provide greater balancing accuracy when using the cone drive centering system.



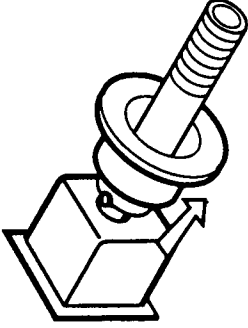
FLANGE INSTALLATION

NOTE: THE FOLLOWING INSTRUCTIONS APPLY TO ALL DRIVE FLANGES USED ON THE CWB-1820.

REMOVING AND INSTALLING DRIVE FLANGES

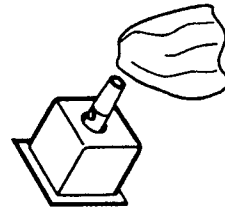


Unscrew hex nut until it is loose



If the flange is so tight on the arbor taper that it cannot be easily removed by hand, mount a wheel and tire on the flange and use the extra leverage of the wheel and tire to wiggle the flange off of the arbor.

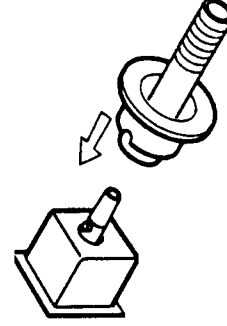
NOTE: NEVER USE A HAMMER OR OTHER IMPACT TOOL TO REMOVE A TIGHT FLANGE! STRIKING THE FLANGE CAN RESULT IN DAMAGE TO THE ELECTRONIC CIRCUITS IN THE MACHINE.



Wipe arbor taper

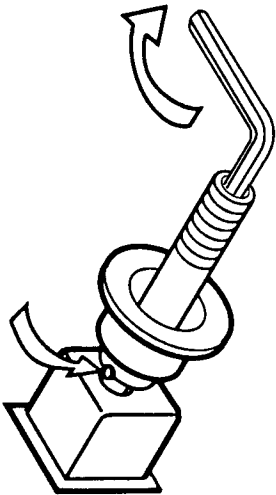


Wipe inside of flange taper



Slide flange over taper, be sure notches in flange line up with drive pins on taper

"FOR REFERENCE ONLY"



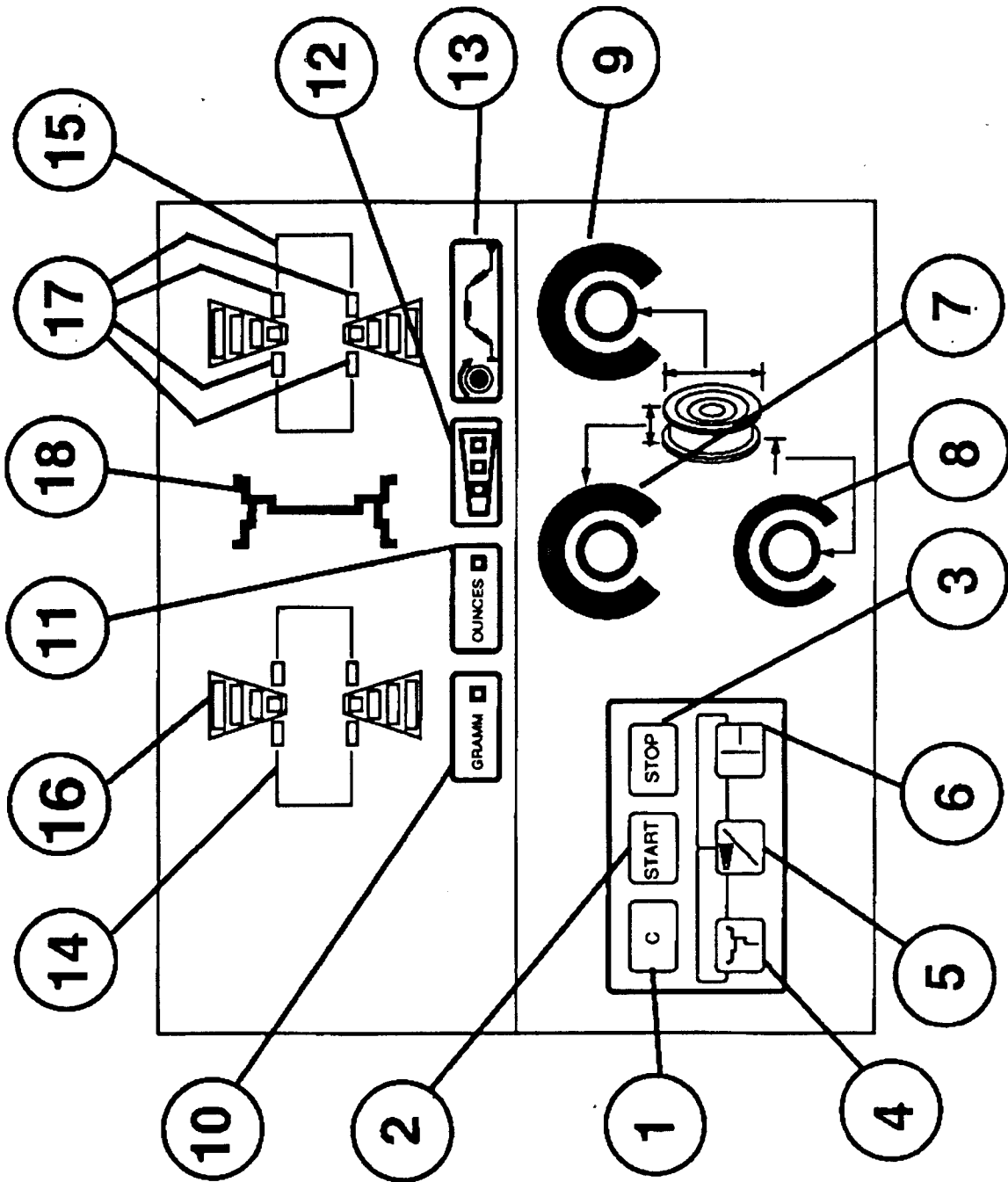
Tighten hex nut
USE ONLY HAND WRENCH SUPPLIED
BY SUN... DO NOT USE ANY OTHER
DRIVE TOOL OR AIR TOOL!

WARNING

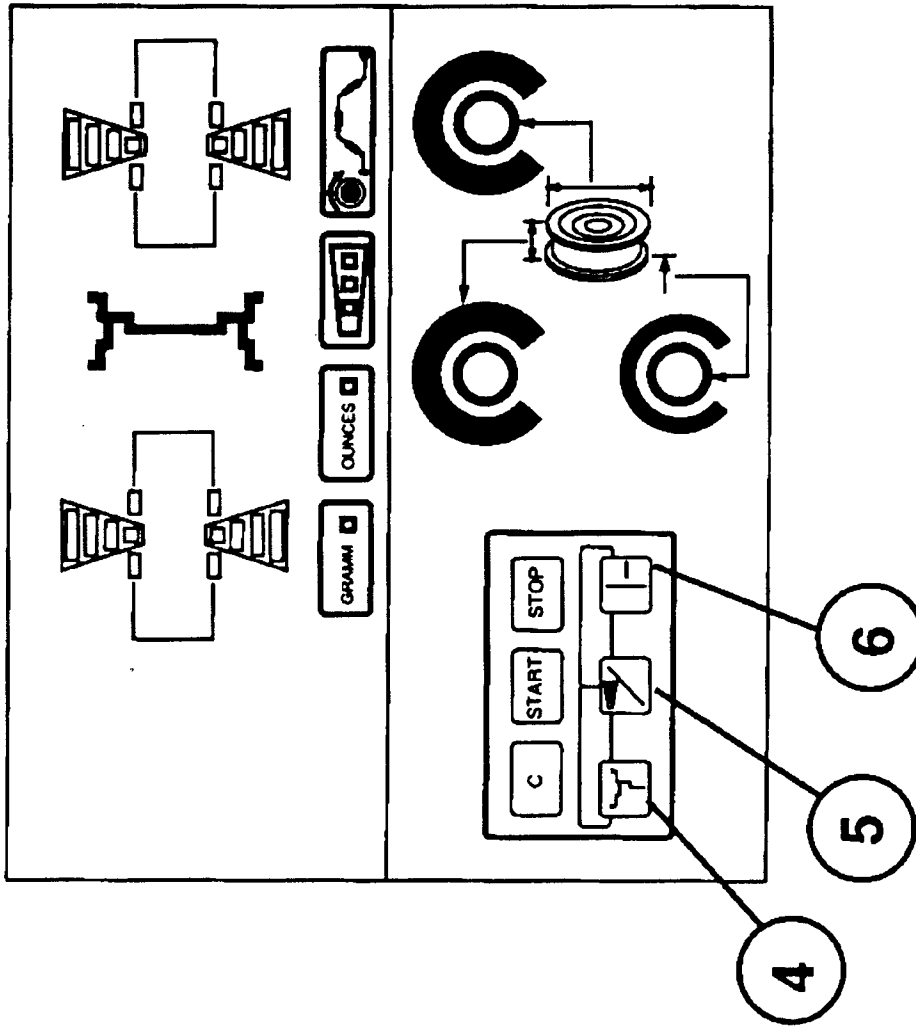
NOTE: Drive flanges must be tightened snugly to prevent flange from loosening from taper. Always check the flange screw for tightness before beginning balancing each day, or if someone besides you has been using the balancer. A loose drive flange can come off the taper, and the spinning assembly can cause injury to personnel (you, perhaps!) or damage to the taper and flange.

Calibrate Flange (See "CAL-000" Section)

PANEL INFORMATION



- FOR REFERENCE ONLY
- | | | | |
|----|--|----|--|
| 1 | Clear key; gives you an empty memory for entry of new data. | 2 | Start key; when the hood is down, this button starts a spin cycle for balancing, machine calibration or tire matching functions |
| 3 | Stop; stops the arbor from rotating, can be pressed at any time, typically used to stop spinning when wing nut is not tightened enough and wheel and tire spins loose on the arbor | 4 | Balance weight position selector key; pressing this key "cycles" through the possible wheel weight positions the balancer can deal with. Selections are shown at LEDs at wheel, (18) |
| 5 | Weight tolerance/OK key; a dual function key: held down for 5 seconds or more, it cycles the weight tolerance readout (12) to the "hundredths" position. When pressed quickly, it moves the tolerance LED to the 1/4 oz or 1/2 oz tolerances and toggles between them. Its second function is to be the OK key when doing tire matching. | 6 | Tire matching or gram/ounce selector key; when pressed and held for 5 seconds or more, it allows the operator to toggle between the ounce and gram scales LEDs (10) and (11) to select a wheel weight scale. When pressed quickly, it shifts the balancer into the tire matching mode. |
| 7 | Wheel width dial; potentiometer used to enter the width of the tire rim. | 8 | Wheel distance dial; potentiometer used to enter the distance to the rim. |
| 9 | Wheel diameter dial; potentiometer used to enter the diameter of the wheel. | 10 | Gram indicator LED; when lit, it tells the operator the balance weight values are given in grams. |
| 11 | Ounce indicator LED; when lit, it tells the operator the balance weight values are given in ounces. | 12 | Weight tolerance scale; three LEDs are used to tell the operator whether he is in "fine", 1/4 ounce rounding, or 1/2 ounce rounding. |
| 13 | Progress indicator; tells the operator when wheel is accelerating, running, and slowing down. | 14 | Inside plane weight readout; this display gives the operator the weight value (in grams or ounces, and at the weight tolerance level specified) for the inside plane of balance. It is also the "prompt" readout for tire matching function and "CAL" indicator. |
| 15 | Outside plane readout; gives information for balance weights on outside plane of tire. Also gives certain balance data information when in tire matching mode and "000" or "60" indicator for calibration modes. | 16 | Wheel turning indicators; tell the operator which way to turn the wheel to get to a balance position (12 o'clock), and when solidly lit, tells the operator he is 180-degrees away from a balance position. |
| 17 | 12 O'clock LEDs; lit GREEN when the wheel is exactly in the 12 o'clock position for the attachment of balance weight. | 18 | Wheel weight position LEDs; lit GREEN to show operator what weight positions he has selected with key (4). |



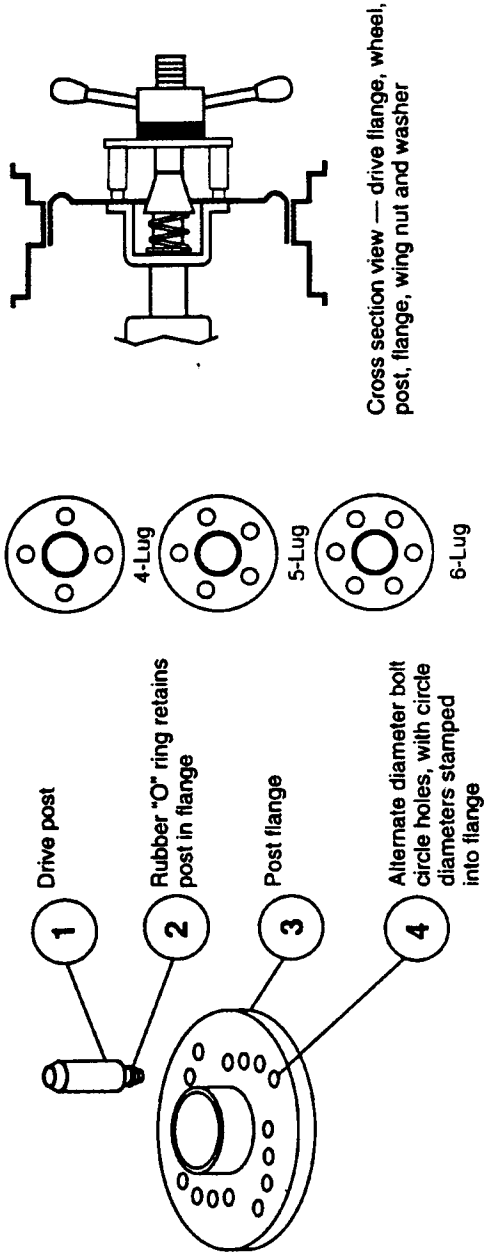
NOTE: Keys (4), (5) and (6) above, also function as "combination keys," which are used to select the "CAL-000" and "CAL-60" calibration functions.

NOTE: After wheel has spun through balance cycle, the operator can select "new" weight positions with key (4). Weight data displays will change values, as needed, to show the correct weight for any position selected. There is no need to rebalance the wheel for a different weight location or after correcting any data inputs.

NOTE: Balancer is very sensitive near balance points. If the operator rushes past balance point, then the indicator LEDs will not go GREEN to signal having reached the exact 12 o'clock position.

POST DRIVE PLATES

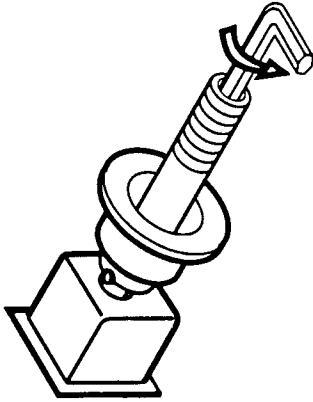
These balancer accessories provide greater balancing accuracy when using the cone drive centering system.



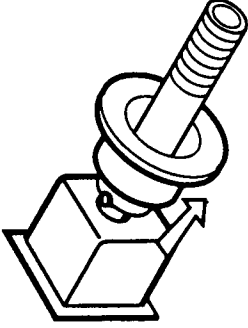
FLANGE INSTALLATION

NOTE: THE FOLLOWING INSTRUCTIONS APPLY TO ALL DRIVE FLANGES USED ON THE CWB-1820.

REMOVING AND INSTALLING DRIVE FLANGES

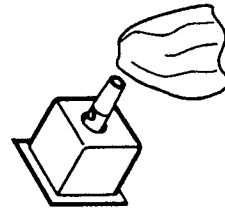


Unscrew hex nut until it is loose



If the flange is so tight on the arbor taper that it cannot be easily removed by hand, mount a wheel and tire on the flange and use the extra leverage of the wheel and tire to wiggle the flange off of the arbor.

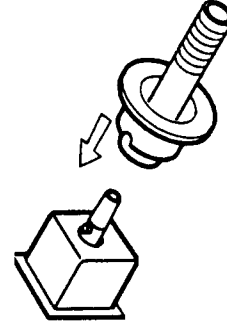
NOTE: NEVER USE A HAMMER OR OTHER IMPACT TOOL TO REMOVE A TIGHT FLANGE! STRIKING THE FLANGE CAN RESULT IN DAMAGE TO THE ELECTRONIC CIRCUITS IN THE MACHINE.



Wipe arbor taper

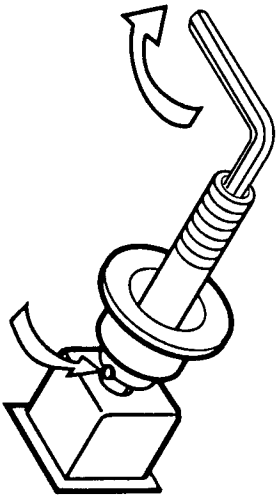


Wipe inside of flange taper



Slide flange over taper, be sure notches in flange line up with drive pins on taper

"FOR REFERENCE ONLY"



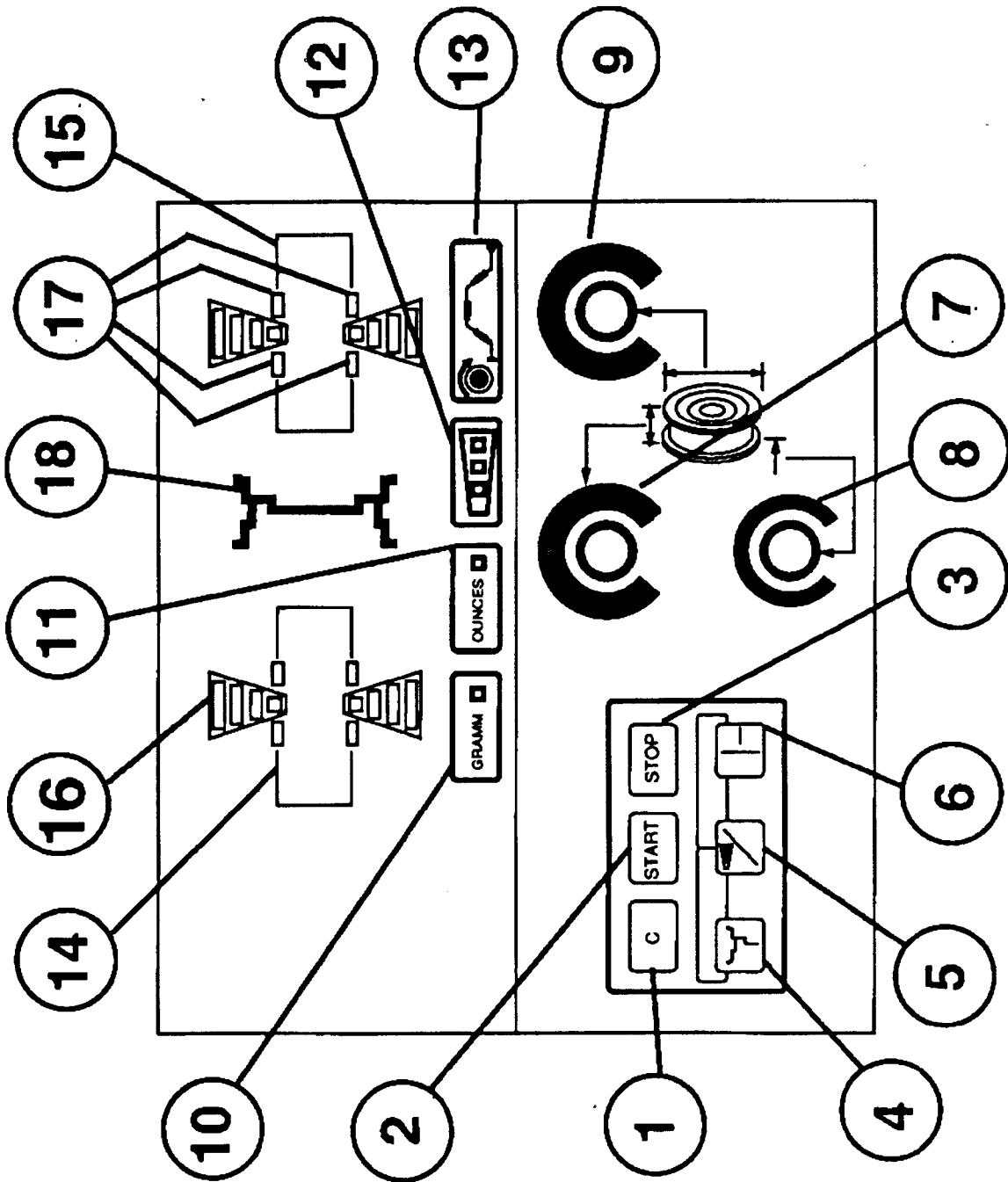
Tighten hex nut
USE ONLY HAND WRENCH SUPPLIED
BY SUN... DO NOT USE ANY OTHER
DRIVE TOOL OR AIR TOOL!

WARNING

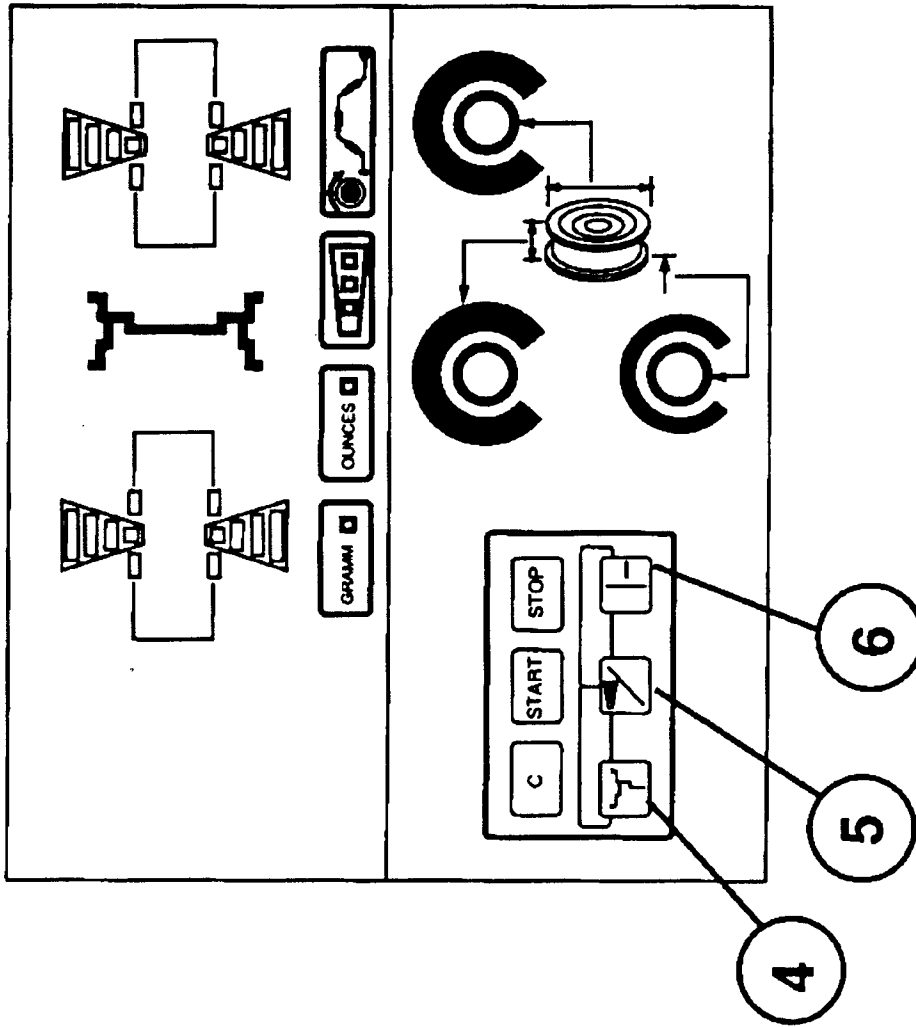
NOTE: Drive flanges must be tightened snugly to prevent flange from loosening from taper. Always check the flange screw for tightness before beginning balancing each day, or if someone besides you has been using the balancer. A loose drive flange can come off the taper, and the spinning assembly can cause injury to personnel (you, perhaps!) or damage to the taper and flange.

Calibrate Flange (See "CAL-000" Section)

PANEL INFORMATION



- FOR REFERENCE ONLY
- | | | | |
|----|--|----|--|
| 1 | Clear key; gives you an empty memory for entry of new data. | 2 | Start key; when the hood is down, this button starts a spin cycle for balancing, machine calibration or tire matching functions |
| 3 | Stop; stops the arbor from rotating, can be pressed at any time, typically used to stop spinning when wing nut is not tightened enough and wheel and tire spins loose on the arbor | 4 | Balance weight position selector key; pressing this key "cycles" through the possible wheel weight positions the balancer can deal with. Selections are shown at LEDs at wheel, (18) |
| 5 | Weight tolerance/OK key; a dual function key: held down for 5 seconds or more, it cycles the weight tolerance readout (12) to the "hundredths" position. When pressed quickly, it moves the tolerance LED to the 1/4 oz or 1/2 oz tolerances and toggles between them. Its second function is to be the OK key when doing tire matching. | 6 | Tire matching or gram/ounce selector key; when pressed and held for 5 seconds or more, it allows the operator to toggle between the ounce and gram scales LEDs (10) and (11) to select a wheel weight scale. When pressed quickly, it shifts the balancer into the tire matching mode. |
| 7 | Wheel width dial; potentiometer used to enter the width of the tire rim. | 8 | Wheel distance dial; potentiometer used to enter the distance to the rim. |
| 9 | Wheel diameter dial; potentiometer used to enter the diameter of the wheel. | 10 | Gram indicator LED; when lit, it tells the operator the balance weight values are given in grams. |
| 11 | Ounce indicator LED; when lit, it tells the operator the balance weight values are given in ounces. | 12 | Weight tolerance scale; three LEDs are used to tell the operator whether he is in "fine", 1/4 ounce rounding, or 1/2 ounce rounding. |
| 13 | Progress indicator; tells the operator when wheel is accelerating, running, and slowing down. | 14 | Inside plane weight readout; this display gives the operator the weight value (in grams or ounces, and at the weight tolerance level specified) for the inside plane of balance. It is also the "prompt" readout for tire matching function and "CAL" indicator. |
| 15 | Outside plane readout; gives information for balance weights on outside plane of tire. Also gives certain balance data information when in tire matching mode and "000" or "60" indicator for calibration modes. | 16 | Wheel turning indicators; tell the operator which way to turn the wheel to get to a balance position (12 o'clock), and when solidly lit, tells the operator he is 180-degrees away from a balance position. |
| 17 | 12 O'clock LEDs; lit GREEN when the wheel is exactly in the 12 o'clock position for the attachment of balance weight. | 18 | Wheel weight position LEDs; lit GREEN to show operator what weight positions he has selected with key (4). |



NOTE: Keys (4), (5) and (6) above, also function as "combination keys," which are used to select the "CAL-000" and "CAL-60" calibration functions.

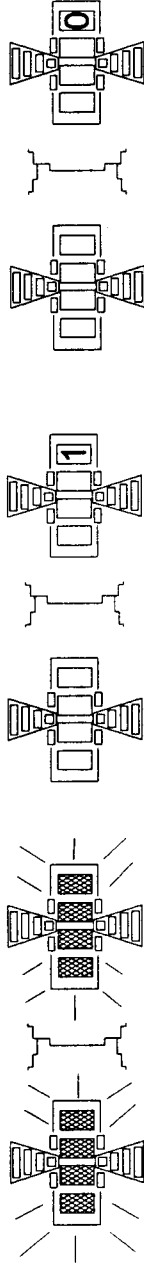
NOTE: After wheel has spun through balance cycle, the operator can select "new" weight positions with key (4). Weight data displays will change values, as needed, to show the correct weight for any position selected. There is no need to rebalance the wheel for a different weight location or after correcting any data inputs.

NOTE: Balancer is very sensitive near balance points. If the operator rushes past balance point, then the indicator LEDs will not go GREEN to signal having reached the exact 12 o'clock position.

TIRE MATCHING

NOTE: Tire matching puts the heaviest part of the tire directly opposite the heaviest part of the wheel. This minimizes the amount of weight which must be used to accomplish tire balance. It is especially beneficial on styled wheels where the customers requires weight to be hidden, and is also a highly professional way of minimizing weight requirements on all wheels and tires. The recommendation that tire matching would benefit the customer is shown by flashing readouts at any time the STATIC BALANCE VALUE exceeds 1 oz. or 30 grams. This feature may be turned off or on using the following procedures.

CONTROLLING THE FLASHING READOUT DISPLAY

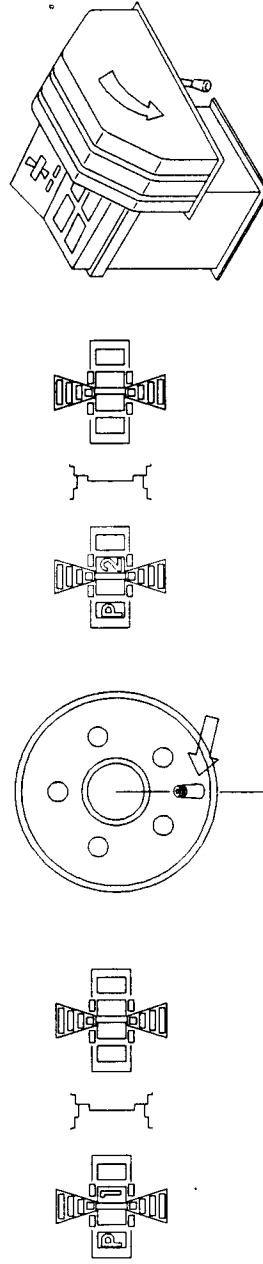


Readouts flash about four times to signal the recommendation for tire matching

Press and hold <Tire Matching>
Press and release Clear Key
Watch for "1" in right readout
for "ON"...then release key.

Press and hold <Tire Matching>
Press and release Clear Key
Watch for "0" in right readout
for "OFF"... then release key.

TIRE MATCHING PROCEDURE

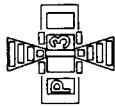


Press <Tire Matching>
P1 shows in left readout

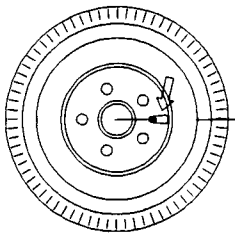
Remove tire from wheel
and mount bare wheel
on arbor. Position tire
valve at EXACTLY 6
o'clock position

Press <OK>, P2
shows in left readout

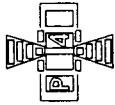
Close Hood to
Start balancer



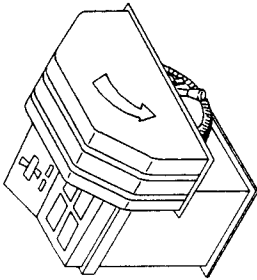
Wait until wheel stops spinning, P3 shows in left readout



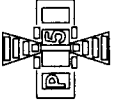
Mount tire on rim. Install on balancer Position tire valve at exactly 6 o'clock



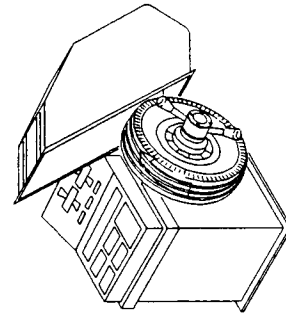
Press <OK>. P4 appears in left readout



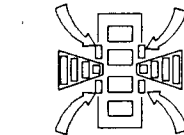
Close hood to start balancer



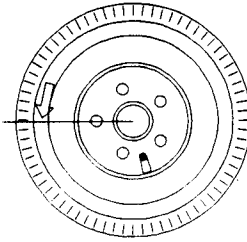
Wait until wheel and tire stops turning. P5 shows in left readout



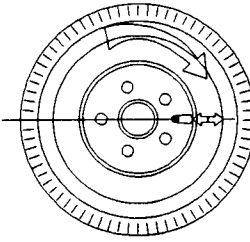
Open hood, rotate wheel until readout turns GREEN

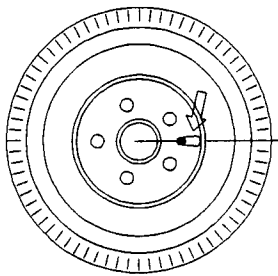


With readout GREEN Mark tire at 12 o'clock position using a tire chalk

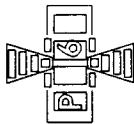


Remove wheel from Balancer break the bead using your tire changing equipment and rotate the tire on the rim until the tire mark aligns with the tire valve.





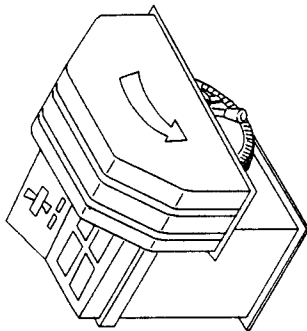
Remount wheel on arbor and turn tire valve to 6 o'clock position



Press <OK>, P6 shows in left readout



Close hood, balancer will now spin and complete the balancing procedure



CHECK YOUR WORK!

NOTE: If balancer cycles back to P5 after you have completed the last step, then the "matched" wheel and tire still has a static imbalance of more than one ounce, and is as matched as you can get it. Cancel tire matching by pressing <C> and balance the wheel and tire using Standard Procedure.

NOTE: Sometimes, very rarely however, when you mount the tire on the wheel you "Accidentally" get the heavy spot of the tire in the correct spot on the wheel. In this rare case, the CWB-1820 "Knows" that you have done this, and proceeds automatically to the last step, thus skipping to the last step.

You will know this, because you will see weight values shown in both readouts instead of the P5 designator.

Lucky you!

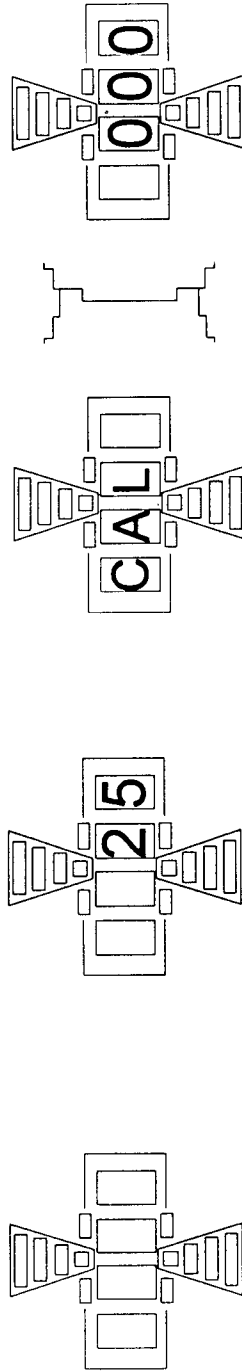
Install the weights indicated and check you work.

CAL 60 CALIBRATION

NOTE: This calibration procedure can be used at any time you suspect the CWB-1820 may be giving you incorrect data. If this procedure as shown results in blank readouts...then the CWB-1820 is properly calibrated. Any problems with balancing after successful calibration can be attributed to failure to mount wheels and tires correctly, or other operator problems. Be sure operators follow instructions as shown in appropriate sections of this document.

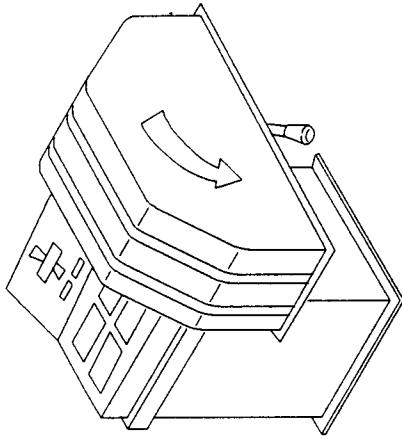
This procedure must be done **VERY ACCURATELY**. Do each step, one step at a time. Doing either more or less than the steps shown here will NOT achieve correct calibration. If, at any time, you know you have failed to do a step correctly, or in the correct order, **START THE CALIBRATION PROCEDURE OVER**.

MACHINE CALIBRATION WITH WHEEL

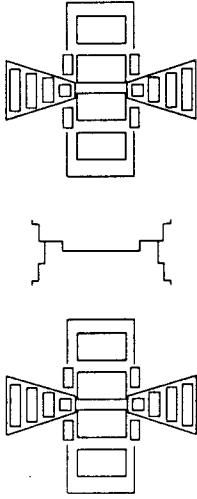


Be sure weight tolerance is in 1/4 oz. or 1/100th oz. mode (not 1/2 oz.). Install a bare, steel wheel with an accurately machined center hole on the arbor. Use the back-cone (standard) mounting procedure. Check the balance of this bare wheel. It must be less than 1/4 ounce out of balance. Otherwise balance the wheel so it is balanced to a value of 1/4 oz. or less.

Press **<WEIGHT POSITION>** and **<OK>** until "CAL-000" appears in readouts

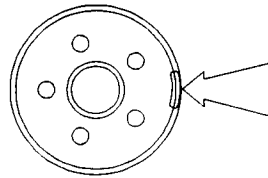


Close hood and press <START>, wait for balancer to stop.

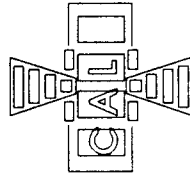


Readouts will go blank to indicate acceptable zero calibration.

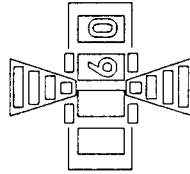
CALIBRATION WITH WHEEL & 2 OUNCE WEIGHT



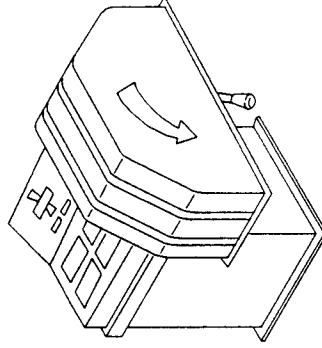
Open hood and hammer on a 2 oz. wheel weight on outside of wheel, then turn the wheel until the weight is located EXACTLY at the 6 o'clock position.



Press <OK> and <TIRE MATCHING> until "CAL-60" appears in left readout.



Close hood and press <START>, then wait until machine stops (2- seconds or so). Blank readouts indicate the balancer is calibrated.

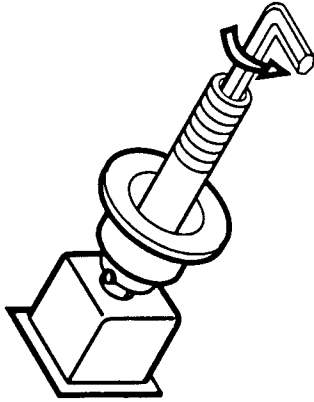


DO a FLANGE CALIBRATION. A Flange Calibration is the final calibration in all CAL procedures. Perform procedures in Flange Calibration section.

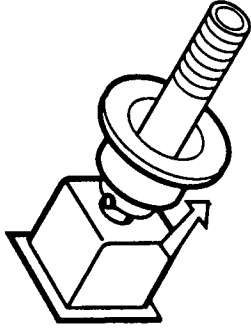
FLANGE INSTALLATION

NOTE: THE FOLLOWING INSTRUCTIONS APPLY TO ALL DRIVE FLANGES USED ON THE CWB-1820.

REMOVING AND INSTALLING DRIVE FLANGES

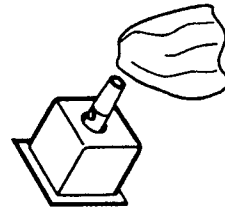


Unscrew hex nut until it is loose



If the flange is so tight on the arbor taper that it cannot be easily removed by hand, mount a wheel and tire on the flange and use the extra leverage of the wheel and tire to wiggle the flange off of the arbor.

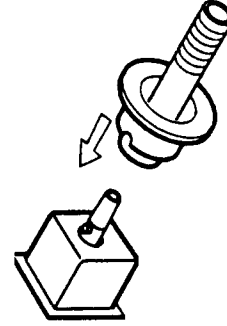
NOTE: NEVER USE A HAMMER OR OTHER IMPACT TOOL TO REMOVE A TIGHT FLANGE! STRIKING THE FLANGE CAN RESULT IN DAMAGE TO THE ELECTRONIC CIRCUITS IN THE MACHINE.



Wipe arbor taper

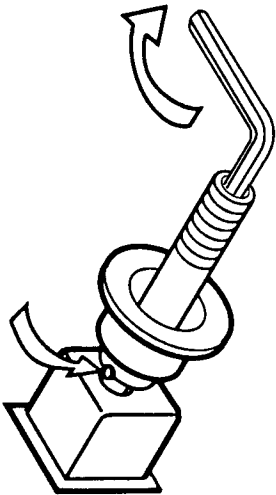


Wipe inside of flange taper



Slide flange over taper, be sure notches in flange line up with drive pins on taper

"FOR REFERENCE ONLY"



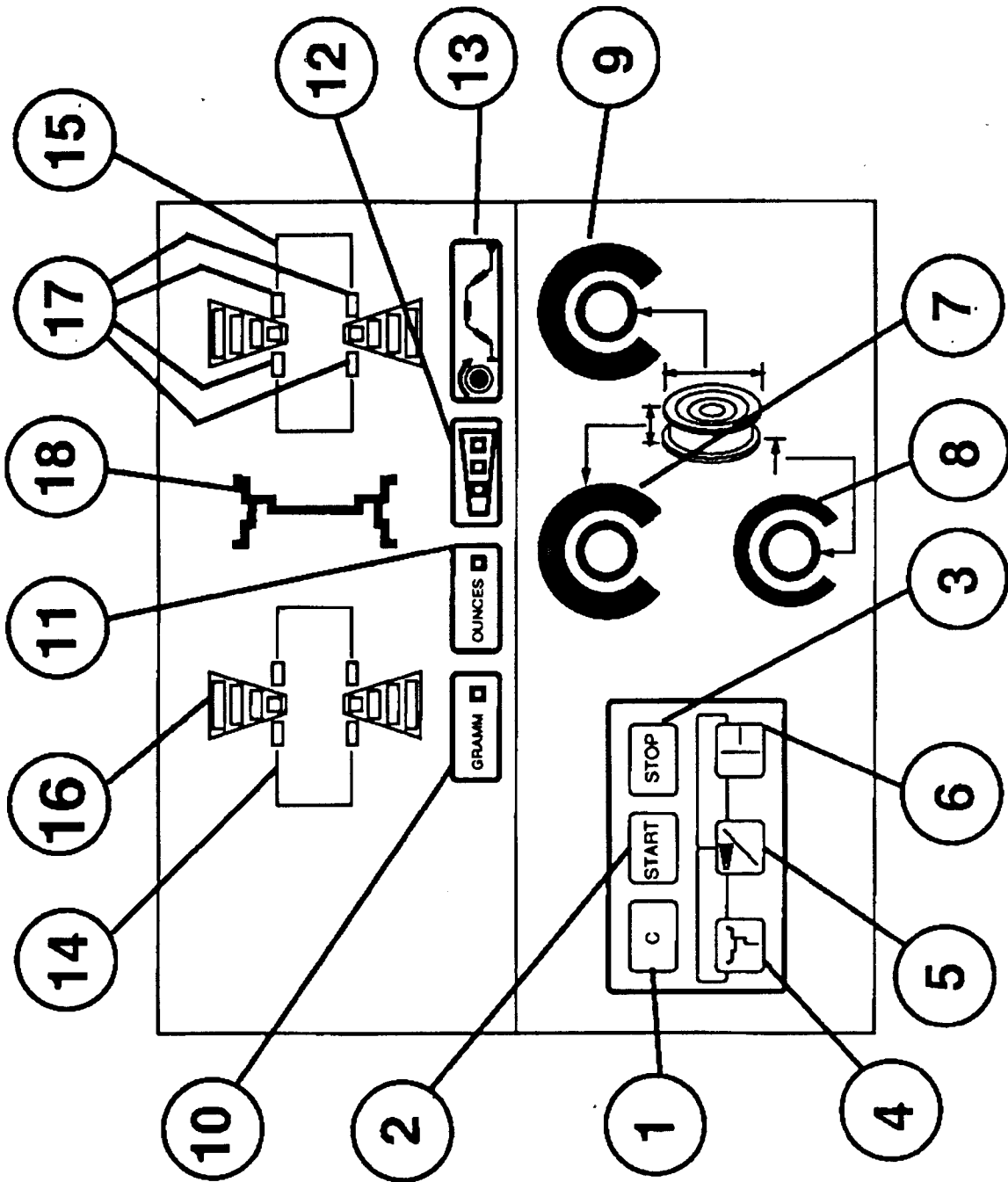
Tighten hex nut
USE ONLY HAND WRENCH SUPPLIED
BY SUN... DO NOT USE ANY OTHER
DRIVE TOOL OR AIR TOOL!

WARNING

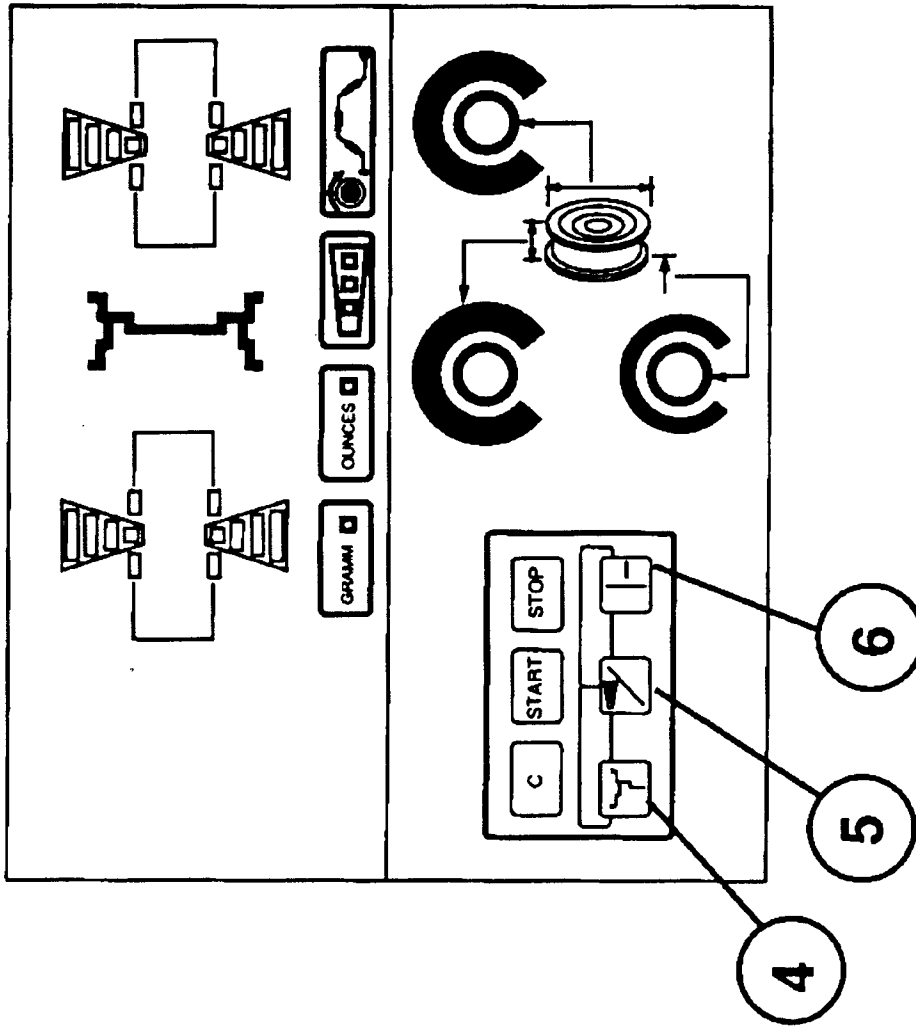
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Calibrate Flange (See "CAL-000" Section)

PANEL INFORMATION



- 1 Clear key; gives you an empty memory for entry of new data.
- 2 Start key; when the hood is down, this button starts a spin cycle for balancing, machine calibration or tire matching functions
- 3 Stop; stops the arbor from rotating, can be pressed at any time, typically used to stop spinning when wing nut is not tightened enough and wheel and tire spins loose on the arbor
- 4 Balance weight position selector key; pressing this key "cycles" through the possible wheel weight positions the balancer can deal with. Selections are shown at LEDs at wheel, (18)
- 5 Weight tolerance/OK key; a dual function key: held down for 5 seconds or more, it cycles the weight tolerance readout (12) to the "hundredths" position. When pressed quickly, it moves the tolerance LED to the 1/4 oz or 1/2 oz tolerances and toggles between them. Its second function is to be the OK key when doing tire matching.
- 6 Tire matching or gram/ounce selector key; when pressed and held for 5 seconds or more, it allows the operator to toggle between the ounce and gram scales LEDs (10) and (11) to select a wheel weight scale. When pressed quickly, it shifts the balancer into the tire matching mode.
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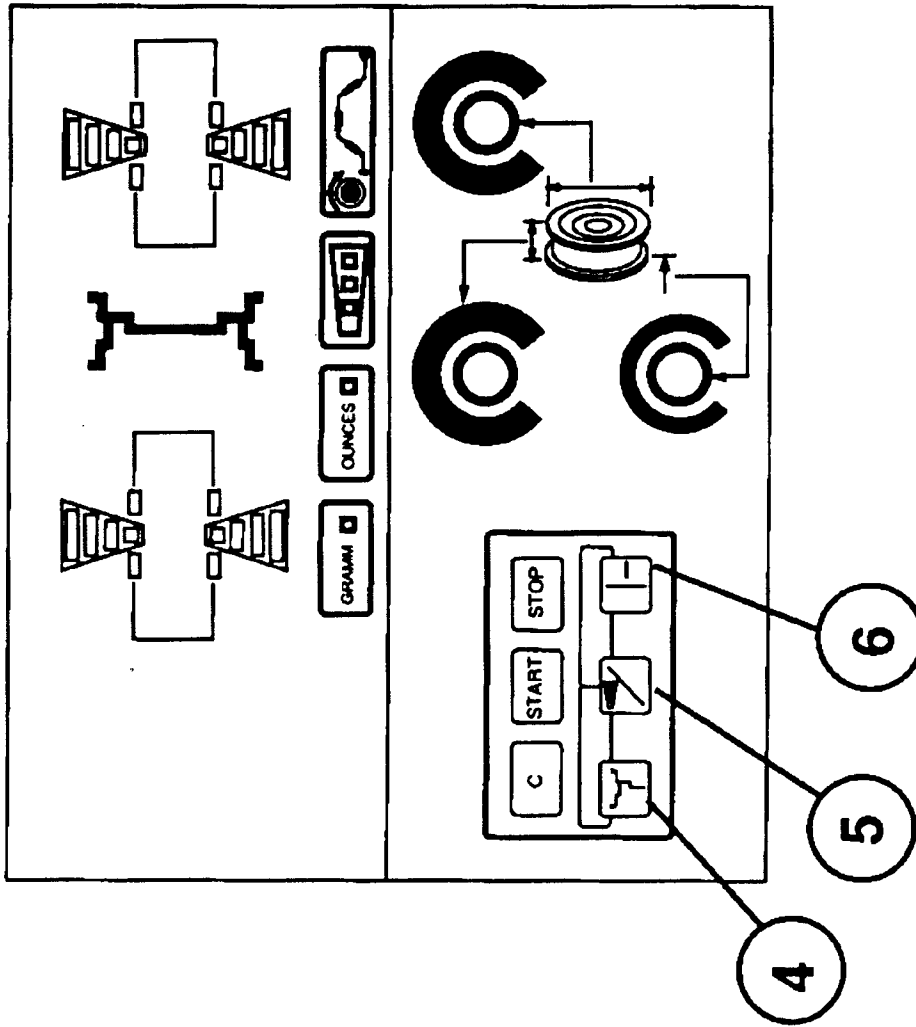


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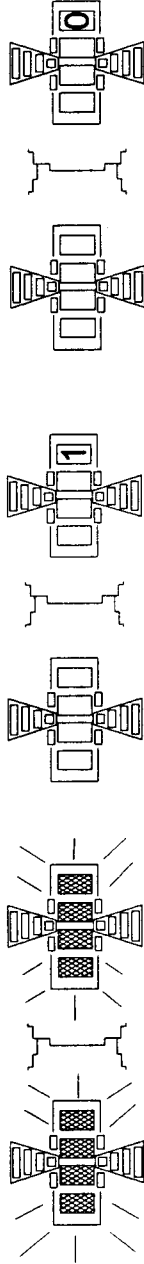
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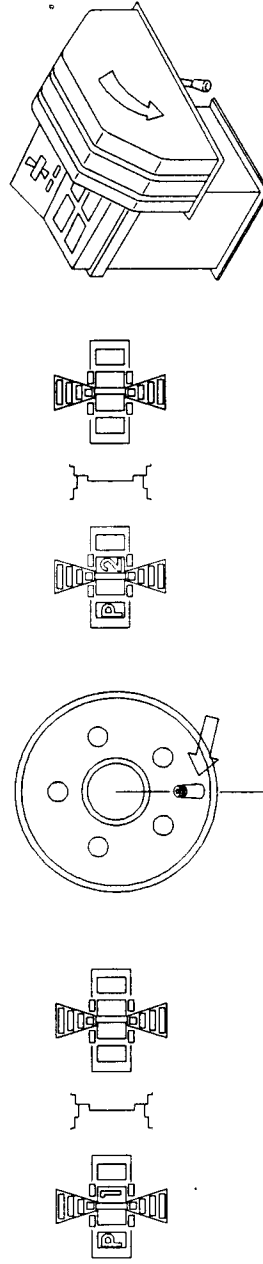


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Press and release Clear Key
Watch for "1" in right readout
for "ON"...then release key.

Press and hold <Tire Matching>
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TIRE MATCHING PROCEDURE

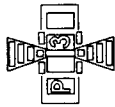


Press <Tire Matching>
P1 shows in left readout

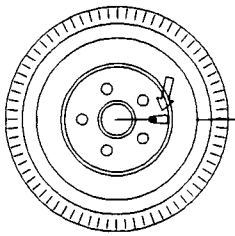
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on arbor. Position tire
valve at EXACTLY 6
o'clock position

Press <OK>, P2
shows in left readout

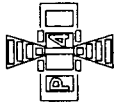
Close Hood to
Start balancer



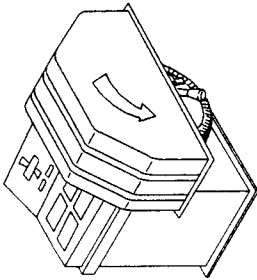
Wait until wheel stops spinning, P3 shows in left readout



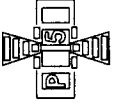
Mount tire on rim. Install on balancer. Position tire valve at exactly 6 o'clock



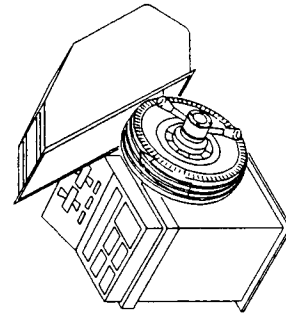
Press <OK>. P4 appears in left readout



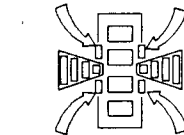
Close hood to start balancer



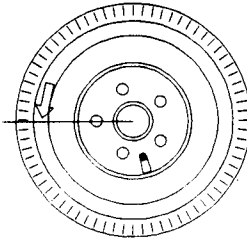
Wait until wheel and tire stops turning. P5 shows in left readout



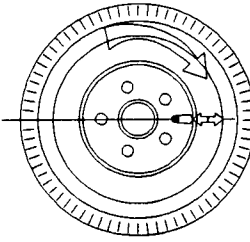
Open hood, rotate wheel until readout turns GREEN

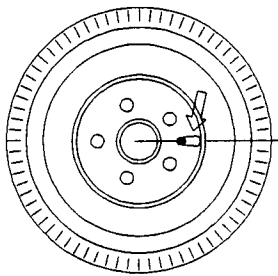


With readout GREEN Mark tire at 12 o'clock position using a tire chalk

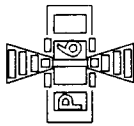


Remove wheel from Balancer break the bead using your tire changing equipment and rotate the tire on the rim until the tire mark aligns with the tire valve.





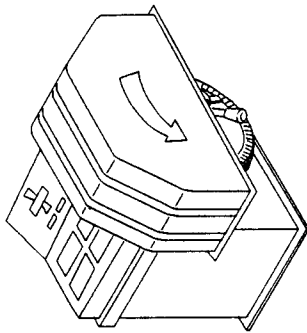
Remount wheel on arbor and turn tire valve to 6 o'clock position



Press <OK>, P6 shows in left readout



Close hood, balancer will now spin and complete the balancing procedure



CHECK YOUR WORK!

NOTE: If balancer cycles back to P5 after you have completed the last step, then the "matched" wheel and tire still has a static imbalance of more than one ounce, and is as matched as you can get it. Cancel tire matching by pressing <C> and balance the wheel and tire using Standard Procedure.

NOTE: Sometimes, very rarely however, when you mount the tire on the wheel you "Accidentally" get the heavy spot of the tire in the correct spot on the wheel. In this rare case, the CWB-1820 "Knows" that you have done this, and proceeds automatically to the last step, thus skipping to the last step.

You will know this, because you will see weight values shown in both readouts instead of the P5 designator.

Lucky you!

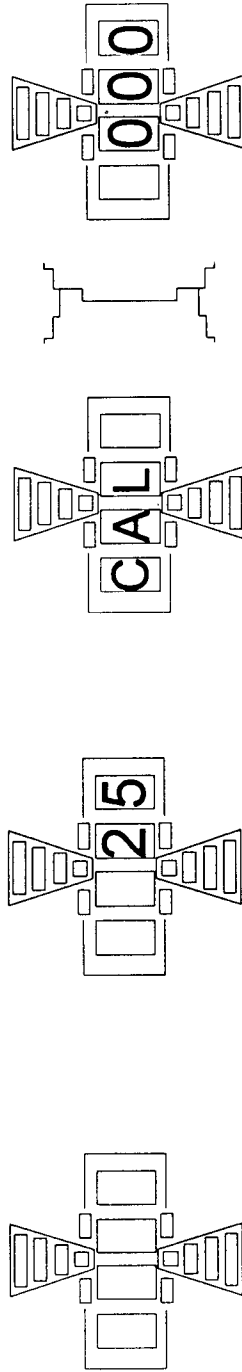
Install the weights indicated and check you work.

CAL 60 CALIBRATION

NOTE: This calibration procedure can be used at any time you suspect the CWB-1820 may be giving you incorrect data. If this procedure as shown results in blank readouts...then the CWB-1820 is properly calibrated. Any problems with balancing after successful calibration can be attributed to failure to mount wheels and tires correctly, or other operator problems. Be sure operators follow instructions as shown in appropriate sections of this document.

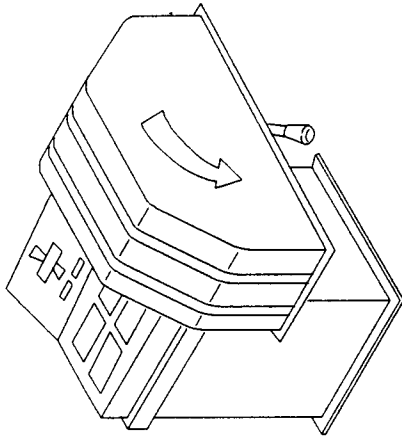
This procedure must be done **VERY ACCURATELY**. Do each step, one step at a time. Doing either more or less than the steps shown here will NOT achieve correct calibration. If, at any time, you know you have failed to do a step correctly, or in the correct order, **START THE CALIBRATION PROCEDURE OVER**.

MACHINE CALIBRATION WITH WHEEL

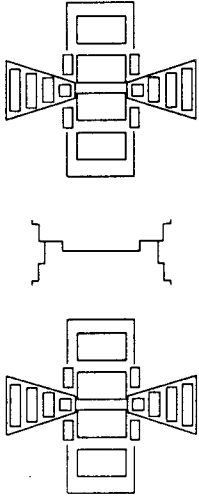


Be sure weight tolerance is in 1/4 oz. or 1/100th oz. mode (not 1/2 oz.). Install a bare, steel wheel with an accurately machined center hole on the arbor. Use the back-cone (standard) mounting procedure. Check the balance of this bare wheel. It must be less than 1/4 ounce out of balance. Otherwise balance the wheel so it is balanced to a value of 1/4 oz. or less.

Press **<WEIGHT POSITION>** and **<OK>** until "CAL-000" appears in readouts

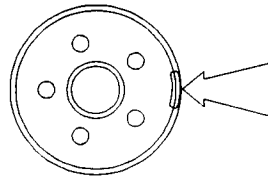


Close hood and press <START>, wait for balancer to stop.

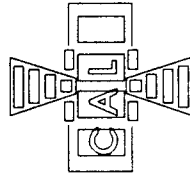


Readouts will go blank to indicate acceptable zero calibration.

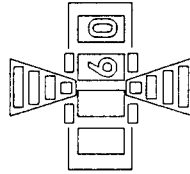
CALIBRATION WITH WHEEL & 2 OUNCE WEIGHT



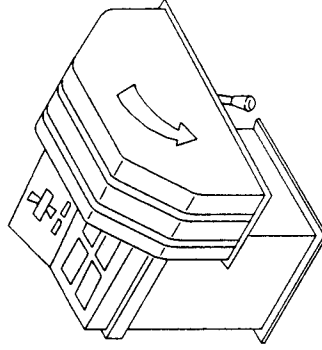
Open hood and hammer on a 2 oz. wheel weight on outside of wheel, then turn the wheel until the weight is located EXACTLY at the 6 o'clock position.



Press <OK> and <TIRE MATCHING> until "CAL-60" appears in left readout.



Close hood and press <START>, then wait until machine stops (2- seconds or so). Blank readouts indicate the balancer is calibrated.



DO a FLANGE CALIBRATION. A Flange Calibration is the final calibration in all CAL procedures. Perform procedures in Flange Calibration section.

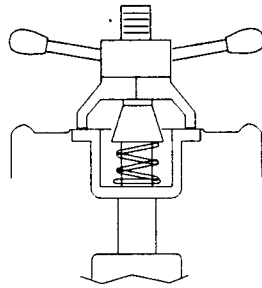
CHECK YOUR WORK!

NOTE: You can check your calibration work by testing the balance of this wheel with the 2 oz. weight. Leave the weight in position and go through a standard balancing procedure. If the balancer now asks for a 2 oz. weight directly opposite the 2 oz. calibration weight, you have calibrated the balancer properly. If not, repeat the procedure as outlined above so the checking procedure results in the request for a 2 oz. balance weight directly opposite the calibration weight.

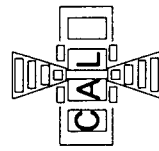
NOTE: If, by mistake, you place the hammered on weight at the 12 o'clock position, the computer memory will "Turn Over" and all following balancing data will be wrong. This is a common calibration error, so be certain to check your work!

FLANGE CALIBRATION

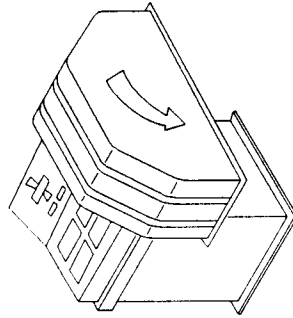
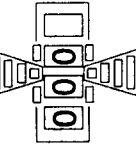
NOTE: This must be done every time a drive flange is removed and replaced on the arbor and after a "CAL-60" calibration.



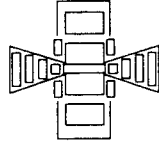
Install flange and tooling, press <CLEAR>.



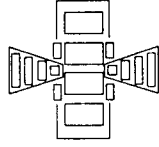
Press and hold <OK> and <WEIGHT SELECT> until "CAL-000" appears in readouts



Close hood



Machine stops and blank readouts indicate that flange is calibrated.



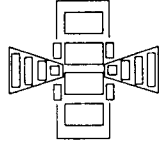
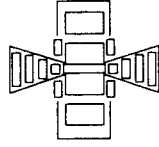
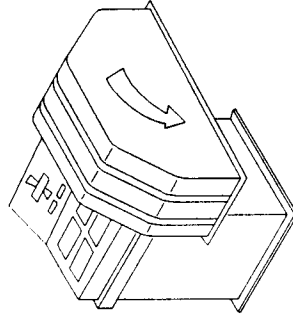
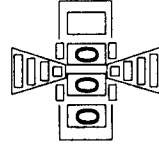
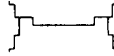
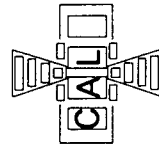
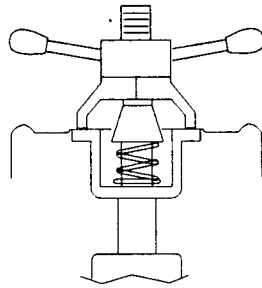
CHECK YOUR WORK!

NOTE: You can check your calibration work by testing the balance of this wheel with the 2 oz. weight. Leave the weight in position and go through a standard balancing procedure. If the balancer now asks for a 2 oz. weight directly opposite the 2 oz. calibration weight, you have calibrated the balancer properly. If not, repeat the procedure as outlined above so the checking procedure results in the request for a 2 oz. balance weight directly opposite the calibration weight.

NOTE: If, by mistake, you place the hammered on weight at the 12 o'clock position, the computer memory will "Turn Over" and all following balancing data will be wrong. This is a common calibration error, so be certain to check your work!

FLANGE CALIBRATION

NOTE: This must be done every time a drive flange is removed and replaced on the arbor and after a "CAL-60" calibration.



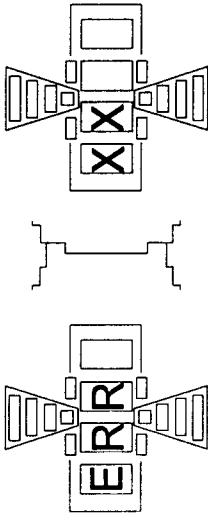
Install flange and tooling, press <CLEAR>.

Press and hold <OK> and <WEIGHT SELECT> until "CAL-000" appears in readouts

Close hood

Machine stops and blank readouts indicate that flange is calibrated.

ERROR CODES



When the computer senses an error, the left hand readout reads "ERR" and a number, from 1 to 14 is displayed on the right hand readout.

OPERATOR CORRECTABLE CODES:

4, 5, 12, 13, and 14, tells the operator something is wrong which can be corrected by him to allow balancing or calibrating to proceed.

SUN SERVICE REQUIRED CODES:

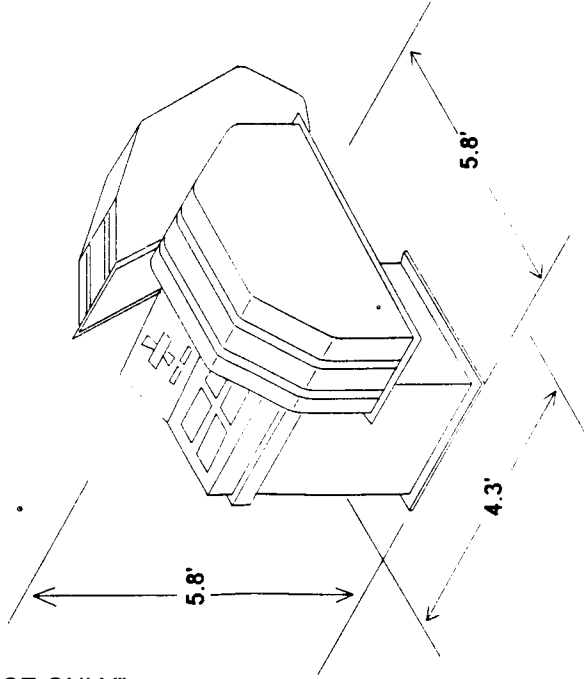
1, 2, 3, 6, 7, 8, 9, 13, results from the sensing of a problem INTERNAL TO THE BALANCER during the self-test mode when the machine is first turned on. These codes require you to phone your SUN service representative to schedule professional diagnostic and repair service for the balancer.

ERROR CODES	CORRECTIVE ACTION TO TAKE
1 Drive/Light Barrier defective.	Call SUN Service.
2 Unstable wheel speed.	Call SUN Service.
3 Incorrect rotation direction (this can occur when the balancer is incorrectly wired, typically only at initial installation).	If you move the balancer and connect it to a new service outlet, this condition again has a chance to occur. Call SUN Service.
4 Excessive residual imbalance; this means there is more than 1/4 ounce of imbalance in a wheel being used for calibration.	The operator should rebalance and check the imbalance.
5 Sensor/adjusting weight outside of tolerance; this means your 2 ounce weight (CAL 60 mode) is not 2 ounces.	Check weight on a postage scale, or use a more accurately made 2 ounce weight.
6 Amplification channel outside tolerance or A/D converter defective.	Call SUN Service.
7 NV RAM defective.	Call SUN Service.
8 Adjust distance spot mechanically.	Call SUN Service.
9 CPU RAM defective.	Call SUN Service.
10 Wheel guard not closed.	Close Hood.
11 Potentiometer problem: either the operator has not dialed in a number (in other words, a dial is set at "zero") or the potentiometer is defective	If all potentiometers have a value dialed in, the call SUN Service.
13 Impermissible wheel data; operator is trying to enter data which is outside of the limits for the balancer. Either the wrong data has been taken from the wheel and tire, or the wrong data has been entered by accident, or you are trying to balance a wheel which this balancer is not designed to balance.	See "Specifications" for wheel and tire limits.
14 Impermissible or missing calibration data.	Input values correctly, Potentiometer faulty, or A/D converter bad.

MACHINE DATA

Accuracy and Repeatability:

EQUIPMENT DATA



In general, your CWB-1820 will "zero out" when using either the 1/4 or 1/2 ounce weight tolerances on any specific wheel and tire. If any CWB-1820 balanced wheel is removed and replaced, don't expect repeatability accuracy of closer than 1/4 ounce. Very minor variations in installation accuracy can result in balance "errors" of this magnitude. If, when performing a rebalance, you discover variations of 1/2 ounce or more, you should suspect a damaged wheel center or damaged stud holes. Dirt, moisture, or other material inside of the tire may be causing a problem.

Remember that extremely large and wide off-road tires are typically "floppy" and will usually have less repeatability than more stable tire types.

Remember that some tires (particularly nylon tires) can take a "set" in cold weather. Before balancing these tires, warm them up by driving on them until any "thump" goes away... or by waiting until the tires come up to "room" temperature.

Wheel Diameters 10 in. to 22.5 in. when entered in inches
260 mm. to 560 mm. when entered in millimeters

Wheel Widths 2 in. to 26 in. when entered in inches
50 mm. to 659 mm. when entered in millimeters

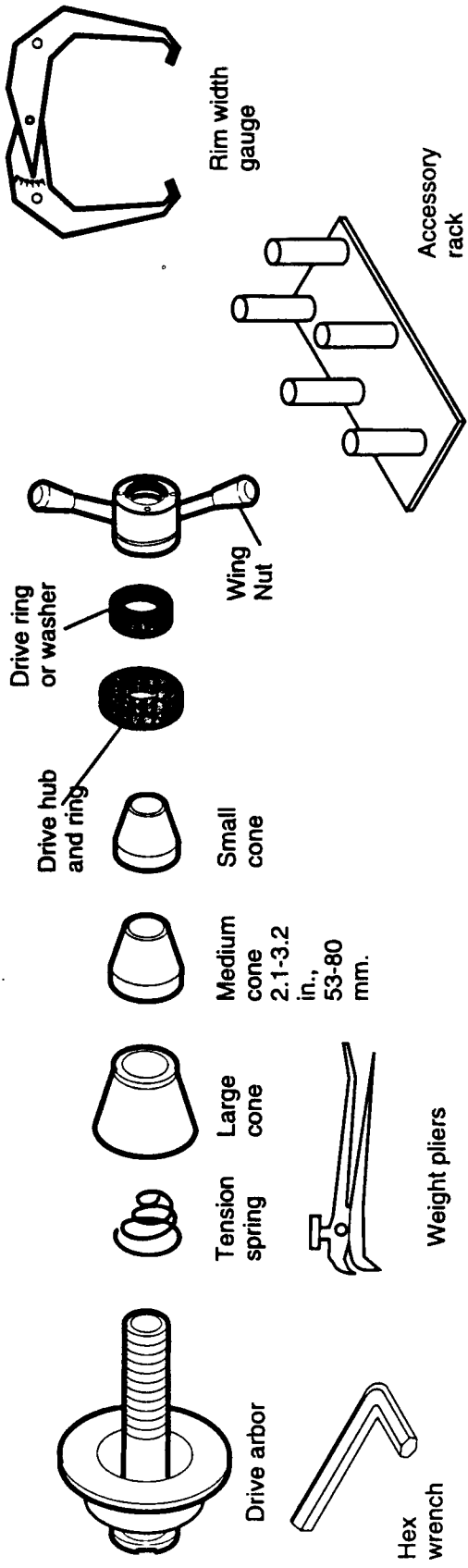
Maximum tire diameter: 42 in. 105 cm.
Maximum wheel/tire weight: 143 lbs. 65 kg.
Power: 115/120 volts, single phase; 220/230 volts 3-phase
Balancing speed: 340 rpm at 60 Hz
Machine weight: 385 lbs. 175 kg.

Balancer "DEFAULT" settings:
gram/ounce and weight tolerance values are "held" from last entry, even if balancer is turned off.

NOTE: Due to the extreme sensitivity of the sensors within the balancer, the balancer must be bolted to the floor in order to eliminate machine movement as a source of imbalance input. Do not try to accomplish balancing with a balancer which has not been bolted to the floor.

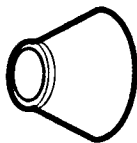
TOOLING

STANDARD ACCESSORIES & TOOLING

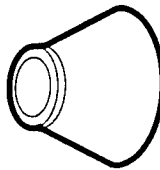


"FOR REFERENCE ONLY"

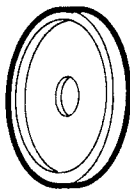
OPTIONAL ACCESSORIES & TOOLING



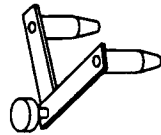
Truck cone 3.6-5.0 in., 95-124 mm.



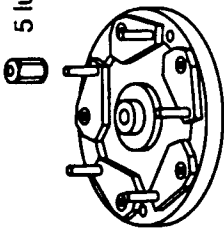
Large truck cone 4.6-6.9 in., 122-170 mm.



Truck spacer



Lug distance measuring tool



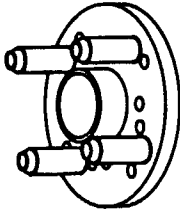
Universal drive flange and tooling



5 lug nuts



T-handle hex wrench

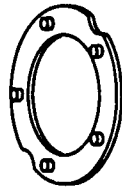


Flange plate adapter (4-post shown)

4-post combination flange plate: for 4x100, 4x110, 4x114.3 and 4x120 mm. bolt circles.

5-post combination flange plate: for 5x100, 5x108, 5x114.3 and 5x120 mm. bolt circles

5/6-post combination light truck flange plate: for 5x139.7, 5x165.1 mm. bolt circles.



3 pin and 4/5 pin indexing plates

NOTE: 3-arm set-up can be used for 6 and 9 lug wheels; 4-arm set-up can be used for 8-lug wheels, and 5-arm set-up can be used for 10-lug wheels, provided any combination of wheel and tire is less the maximum weight of 143 pounds (65 kg) permitted on the CWB-1820 arbor.

DUO SPT expanding collet system for dealer specific markets:

- Basic collet
- BMW 3 series, VW, Audi, Porsche 924 collet
- BMW 4, 5, 6, 7, 8 series collet
- Mercedes Benz Collet
- Porsche 924S, 944, 926 collet

Motorcycle wheel balancing systems:

- Adapter flange with 14 mm. axle bore diameter
- Center sleeve and spacer for BMW K75, D100 and R80gs
- 12 mm. diameter center shaft, spacer, sleeves and securing hardware for Enduro, Honda, Kawasaki, Yamaha, and Suzuki applications

Quick Nut; wing nut with quick release feature

BALANCING INFORMATION

BALANCING - THE FINE ART

Why Balance?

Balance is required to eliminate the up-and-down wheel hop (static imbalance) which wears out tire treads, shock absorbers and springs. It also is needed to eliminate the back-and-forth imbalance forces (dynamic imbalance) which are felt in the steering wheel as a vibration or wiggle, and which also puts enormous stresses on steering components and suspension components, as well as scrubbing off tire tread. Even small vibrations, barely felt by the driver, put destructive vibrations into front wheel bearings and axles, which can result in premature failure of these expensive components.

Even on simple axles such as straight rear axles on front wheel drive cars, these imbalance forces can harm shock absorbers and wheel bearings.

All wheels and tires should be balanced. Not just front wheels and tires.

Why Tire Matching?

Tire matching results in optimum placement of the heaviest part of the tire on the wheel rim; resulting in the least amount of weight required to balance the combination of wheel and tire.

In essence: tire matching computes where the heaviest part of the wheel is, then computes where the heaviest part of the tire is and tells the balancing technician where to put the tire on the rim so the heavy parts are separated by 180 degrees. As much as possible, tire matching "cancels out" some of the imbalance caused by the wheel and tire heavy spots.

Admitted, when using hammer on weights and standard balancing procedures, a well-made wheel and tire can be balanced without using tire matching. The CWB computer is, after all, an extremely capable device!

Why Computer Balance?

Computerized balancing is important for all tire types, but is especially important when using steel belted tires, which have a lot of metal mass at the tread plane of the tire. Only the computer can sense, and compute, where the mass which is causing the vibration is located. Remember, in addition to being located somewhere radially around the wheel and tire, the mass may also be located at a wide distance from the center plane of the wheel. This is the imbalance which causes steering wheel vibration and steering system wear, as well as rapid tire wear.

The computer knows exactly where the tire is imbalanced, and tells the operator exactly where to place weight to eliminate the imbalance.

In addition, only the computer has the power it takes to deal with a variety of weight placements, to compensate for different wheel styles and customer requirements.

However, there are a number of conditions where tire matching is desirable, and some other conditions where it is virtually essential, if you are going to achieve acceptable balance for minimum vibration, maximum tread life and maximum steering and suspension life.

For instance:

Cosmetic reason: some tires can require a lot of balancing weight if tire matching is not performed. Even with a new tire and good wheel, we have seen instances of 4 ounces or more of weight required to achieve balance. This results in enormous (cosmetically) amounts of weight hammered onto the rim. Many customers will want tires matched to avoid this large amount of weight showing. (And, if you sell tires, it can help to make your tire quality look better as well. Remember, steel belts add a lot of rotating mass to a tire, and even a "good tire" may require what looks like excessive balancing weight.)

Functional reason: Car designers go to a lot of effort to reduce the "unsprung weight" of the car for a better ride. It makes no sense to add any more weight than absolutely necessary to the sprung mass, especially on smaller cars. Tire matching minimizes the mass which must be added to the unsprung system.

Functional/Cosmetic: Many customers with highly styled or "mag-type" wheels simply don't want any weight on the outside of the wheel at all. Therefore, they ask you to "hide" the weights. The CWB allows you to do this, up to a point. However, the more the amount of weight needed, the more of a compromise the balance job becomes.

In this case, particularly the styled wheel with hidden weights, tire matching is often essential to come up with balance giving acceptable ride qualities and reasonable imbalance forces on suspension and steering components.



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