

SKYINDEX™

Digital Skinfold Caliper
SYSTEM 2
Instruction Manual
v2.2

SERIAL #: _____

Congratulations

Congratulations on your purchase of the SKYNDEX SYSTEM 2 Electronic Body Composition Caliper.

The SKYNDEX SYSTEM 2 is the fastest and easiest to use skinfold caliper on the market today. By using the newest technology for efficient body composition assessment, the SYSTEM 2 has become an industry standard. SYSTEM 2 records skinfold measurements, then accurately displays the reading on the LCD.

We are sure you will find the SYSTEM 2 to be an invaluable tool in your profession. A foam-lined carrying case has been provided to protect your SKYNDEX SYSTEM 2 for years to come. If you have comments, questions or suggestions on any aspect of body composition assessment, please give us a call.

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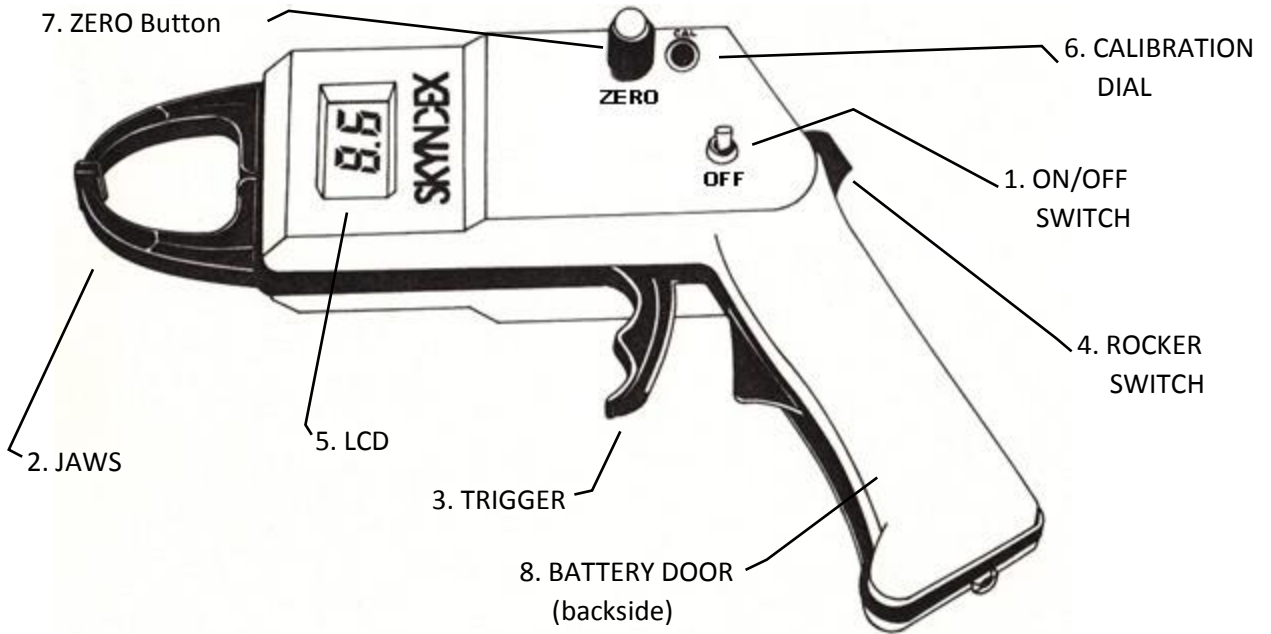
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SKYNDEX SYSTEM 2 Operating Instructions

SKYNDEX SYSTEM 2 is the fastest and easiest to use skinfold caliper on the market today.

Familiarize yourself with all the working parts of the SKYNDEX SYSTEM 2 as described below and pictured on the following page.

1. **ON-OFF TOGGLE SWITCH** on the front panel. Keep this switch OFF when not in use to avoid unnecessary battery drain. Keep finger off of trigger when powering on.
2. Push ZERO button (7) until 00.0 or 000 appears in LCD display (5). It may be necessary to do this several times when first turned on.
3. Make skinfold pinch with thumb and forefinger at the site.
4. Pull TRIGGER (3) to open caliper jaws.
5. Place calipers over the skinfold site and slowly release the trigger.
6. Press the ROCKER SWITCH (4) once in either direction after the LCD display has settled to a near constant value. This “locks” the millimeter value on the LCD display so that the caliper can be opened and the skinfold can be released.
7. Record the skinfold value.
8. Press the rocker switch again to clear the LCD display. Push ZERO button again if necessary.
9. After the final skinfold measurement is taken, add the values to sum the skinfolds.



About Body Fat and Your SKYINDEX SYSTEM 2

Body fat measurement is considered an important factor of health and level of fitness for athletes and the general population. Body fat is much more meaningful than height/weight ratios since the BMI norms do not take into account body composition. For example, many athletes have high muscle mass and low fat levels, yet they can be classified as obese using BMI alone. Conversely, a person with a normal BMI level, may be in the 'Normal' range due to low muscle mass, yet may still have a high percent fat.

While there are many ways by which to estimate body composition, the procedure of underwater (hydrostatic) weighing is generally accepted as the standard against which other methods, including skinfold values, are compared. However, underwater weighing is time consuming, expensive and does not lend itself to mass screening applications. Skinfold measurements represent a viable alternative.

Skinfold equations are derived by taking measurements from a large group of subjects. These data were analyzed to determine the particular skinfold sites and their mathematical relationship which would result in the best estimate of the hydrostatic percent body fat value.

You can use the norm chart to determine your subject's results (ACSM 2009):

Body Composition Norms

| * MEN | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Very Lean | 6.3 | 9.9 | 12.8 | 14.4 | 15.5 | 15.2 |
| Excellent | 10.5 | 14.5 | 17.4 | 19.1 | 19.7 | 20.4 |
| Good | 14.8 | 18.2 | 20.6 | 22.1 | 22.6 | 23.1 |
| Fair | 18.6 | 21.3 | 23.4 | 24.6 | 25.2 | 24.8 |
| Poor | 23.1 | 24.9 | 26.6 | 27.8 | 28.4 | 27.6 |
| Very Poor | 33.3 | 34.3 | 35 | 36.4 | 36.8 | 35.5 |
| *WOMEN | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 |
| Very Lean | 13.6 | 14 | 15.6 | 17.2 | 17.7 | 16.6 |
| Excellent | 16.5 | 17.4 | 19.8 | 22.5 | 23.2 | 24 |
| Good | 19.4 | 20.8 | 23.8 | 27 | 27.9 | 28.6 |
| Fair | 22.7 | 24.6 | 27.6 | 30.4 | 31.3 | 31.8 |
| Poor | 27.1 | 29.1 | 31.9 | 34.5 | 35.4 | 36 |
| Very Poor | 38.9 | 39.4 | 39.8 | 40.4 | 40.8 | 40.5 |

**American College of Sports Medicine, Eighth Edition, 2009.*

How to Take a Skinfold

Techniques of the Pinch

A “Pinch” is a fold of skin (skinfold) and underlying fat that is grasped by the thumb and forefinger (FIGURES 1 and 2). The greatest error in assessing body fat using skinfolds is the human error in the way the skinfold pinch is made. To ensure a valid skinfold measurement, certain precise techniques must be consistently used.

Amount of Skin to be Pinched

The amount of skin to be pinched will depend upon the specific site, the thickness of the skin and the underlying tissue. The skinfold should be taken with moderate pressure between the thumb and forefinger to prevent slippage. The force applied to the skinfold should not cause extreme compression of the underlying fat tissue (See FIGURE 1). None of the subjects’ muscle should be included in the skinfold (See FIGURE 2). If you are unsure of the presence of muscle tissue, ask the subject to momentarily contract the muscle. This will assist in separating the tissue and ensure that only the skin and underlying fat is being pinched.

Correct Placement of Thumb and Forefinger

The thumb and forefinger should be placed vertically on most folds (with the exception of the Iliac Crest and Sub-Scapula, which require 45 degree angles). **Note: A greater angle will be required for obese individuals.** A fold is best created by using the thumb and forefinger as a “C” Clamp. (See FIGURE 1 and 2).

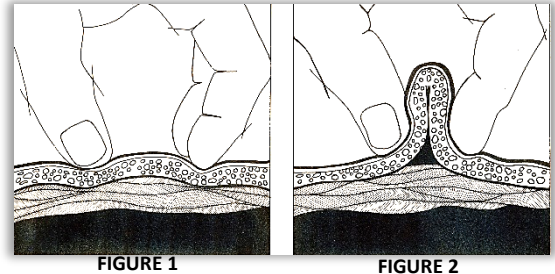


FIGURE 1

FIGURE 2

How to Take a Skinfold Measurement with a SKYINDEX SYSTEM 2

Placement of the Caliper Jaws

Place the caliper approximately 1 cm from the fold created by your thumb and forefinger with the LCD display facing upward (See FIGURE 4). The jaws should be placed directly over the fold (See FIGURE 3). If placed too deep on the underlying tissue, or too high on the crest of the fold, an inaccurately high or low reading will occur. After placing the tips over the fold, allow the numbers on the display to settle down to a constant number or until the variation is less than 0.1mm per second. At this time, press the rocker switch on the rear of the caliper to enter the value into the caliper memory.

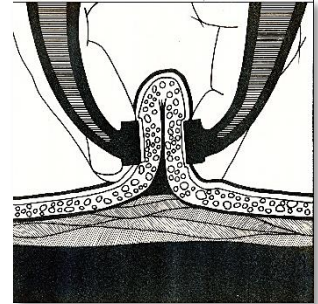
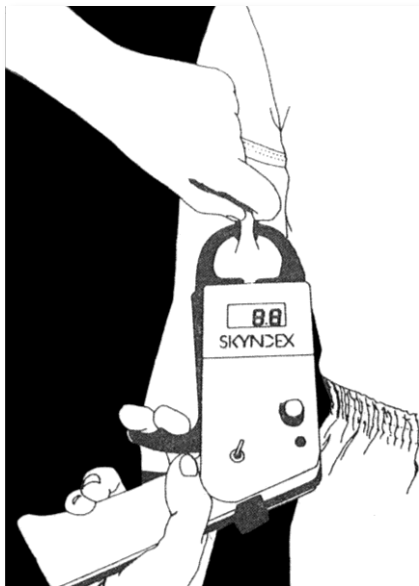


FIGURE 3

Where to Pinch

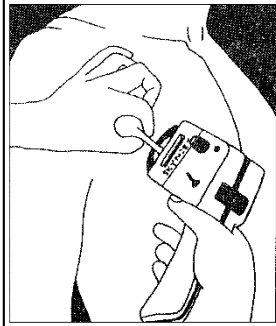
A skinfold site must be precisely located. Refer to following pages for illustrations of those sites which correspond to the body fat formula you are using.



Notice that the caliper tips are approximately 1cm below the thumb and finger.

FIGURE 4

Skinfold Site Descriptions



CHEST

Measure at a 45° angle halfway between the nipple and the axilla (armpit) as high as possible on anterior axillary fold.



BICEPS

Measure vertically over the mid-point of the muscle, at the level marked for the Biceps.



TRICEPS

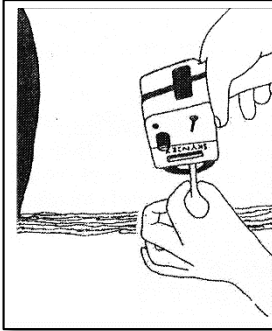
Measure vertically on back of arm midway between top of shoulder point (Acromial Process) and elbow (Olecranon Process).



SUBSCAPULAR

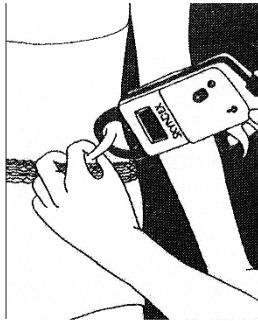
Measure at a 45° angle just below the tip of the Scapula.

Skinfold Site Descriptions



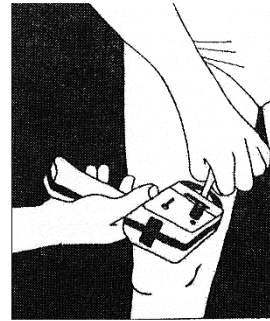
ABDOMEN

Measure 3cm to the side and 1cm below the umbilicus (navel)



SUPRAILIAC

Measure at a 45° angle directly on top of the hip point (Iliac Crest).



THIGH

Measure vertically on front of thigh halfway between patella (kneecap) and inguinal crease (hip fold).

Calibrating the SKYNDEX SYSTEM 2

Your SKYNDEX SYSTEM 2 Caliper has been calibrated at the factory and should not require frequent readjustment. However, if you suspect that it is in-correctly displaying skinfold thickness values, the calibration can be easily checked and corrected.

In calibrating the instrument, you are verifying that the millimeter thickness displayed is, in fact, equal to the caliper opening. This is accomplished by placing the calibrating dowel between the caliper tips and adjusting the instrument until that dimension is displayed.

To check the calibration:

- A.** With the tips closed, switch the SKYNDEX on. A 0.0mm reading should be displayed, if not, turn the unit OFF and ON again.
- B.** Next, place the diameter of the calibrating dowel between the jaws and then release the trigger.
IMPORTANT! Do not clamp the flat ends of the dowel (this is 25.4mm in length).
- C.** The display should show a reading of 15.8 to 16.0mm. If it does not, open and close the jaws on the dowel several times. If you still do not observe these values, readjustment of the internal calibration will be necessary.
To readjust the internal calibration:
 - D.** Slightly turn the calibration adjustment screw until the display reads 15.9mm with the dowel clamped between the caliper jaws.
 - E.** If correctly calibrated, your SKYNDEX will display 0.0mm with calipers closed and 15.8-16.0mm with dowel inserted. Repeat steps A through C to check the calibration.
 - F.** Calibration is now completed. Close the caliper jaws, switch SKYNDEX OFF and return the dowel to its storage location.

SKYNDEX SYSTEM 2 Battery Information

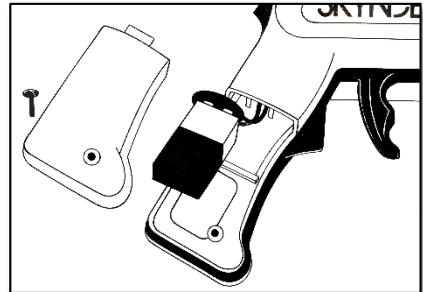
To replace the battery:

1. With a Phillips screwdriver, remove the screw at the lower right rear of the caliper. Do not remove any other screws on the SYSTEM 2. (See Figure 6)
2. Lift out the small door on the right side. Carefully pull out the battery and lift off the connector at its top. Replace the connector on the new battery and insert the battery back into position. Replace the door and screw, being careful not to over-tighten the screw.

Note: An AC power supply is not included with the Skydex System 2. It is recommended to use a 9v battery.

Your SKYNDEX SYSTEM 2 is powered by an ordinary 9-volt battery. Battery life can be extended by:

1. Turn the instrument OFF between subjects.
2. If you leave the instrument switched ON, but idle, it will automatically switch itself off after about one minute.



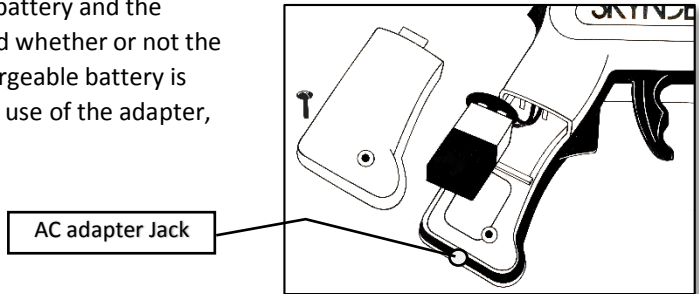
SKYNDEX SYSTEM 2, AC Adapter

The jack for the AC adapter is located on the bottom of the left hand grip. Any adapter may be used which has an **open circuit** (unloaded) voltage of approximately 9 volts DC. AC adapters not meeting this specification may damage your instrument and void the warranty. Radio Shack AC adapter No. 273-0314 is recommended.

Your SKYNDEX has a power jack that is 1/8" in diameter with no center pin, use Radio Shack tip "F" (No. 273-339).

Note: The mating connector must be installed in the adapter with the center pin negative. If the pin is positive, the instrument will not operate, but no damage occurs.

There is no internal connection between the battery and the adapter circuit. Thus, the adapter can be used whether or not the battery is installed. Likewise, if a 9-volt rechargeable battery is used, it cannot be recharged by simultaneous use of the adapter, but must be recharged externally.



JACKSON-POLLOCK FORMULA SPECIFICATION

This section describes the Jackson-Pollock formula. The Jackson-Pollock is named after the authors of the original research study. Each formula was developed from the results of underwater weighing and skinfold data taken from several hundred individuals over a wide range of age, body structure, body composition and exercise habits. Specifically, the formulas are (BD=Body Density):

1. **Men**

$BD = 1.10938 - 0.0008267(Y) + 0.0000016(Y^2) - 0.0002574(\text{Age})$
where Y= sum of Chest, Abdominal and Thigh skinfolds in mm

2. **Women**

$BD = 1.0994291 - 0.0009929(Z) + 0.0000023(Z^2) - 0.0001392(\text{Age})$
where Z = sum of Triceps, Thigh and Suprailiac skinfolds in mm.

- ❖ *Jackson, A.S. and Pollock, M.L. Generalized equations for predicting body density of men. Br.J.Nutr., vol 40:497-504, 1978. (MEN)*
- ❖ *Jackson, A.S. and Pollock, M.L. and Ward, A. Generalized equations for predicting body density of women. Medicine and Science in Sports vol 12:175-182, 1980. (WOMEN)*

DURNIN FORMULA SPECIFICATION

The Durnin is named after the authors of the original research study. Each formula was developed from the results of underwater weighing and skinfold data taken from several hundred individuals over a wide range of age, body structure, body composition and exercise habits. Specifically, the formulas are (BD=Body Density):

| | |
|----------------|--------------------------------|
| 1. Men 17-19 | $BD=1.1620 - 0.0630 \log (SF)$ |
| 2. Men 20-29 | $BD=1.1631 - 0.0632 \log (SF)$ |
| 3. Men 30-39 | $BD=1.1422 - 0.0544 \log (SF)$ |
| 4. Men 40-49 | $BD=1.1620 - 0.0700 \log (SF)$ |
| 5. Men 50+ | $BD=1.1715 - 0.0779 \log (SF)$ |
| 6. Women 16-19 | $BD=1.1549 - 0.0678 \log (SF)$ |
| 7. Women 20-29 | $BD=1.1599 - 0.0717 \log (SF)$ |
| 8. Women 30-39 | $BD=1.1423 - 0.0632 \log (SF)$ |
| 9. Women 40-49 | $BD=1.1333 - 0.0612 \log (SF)$ |
| 10. Women 50+ | $BD=1.1339 - 0.0645 \log (SF)$ |

Where SF = Sum of Biceps, Triceps, Subscapular and Iliac Crest skinfold thicknesses in mm.

The body fat % is calculated from: $\% \text{ Body Fat} = 495/BD - 450$

- ❖ Durnin, J.V.G.A. and Wormersley, J. Body fat assessed from total body density and its estimation from skinfold thickness measurements on 481 men and women aged 16-72 years. Br. J. Nutri., vol. 32:77-97, 1974.

SLAUGHTER-LOHMAN FORMULA SPECIFICATION

The Slaughter-Lohman is named after the authors of the original research study. Each formula was developed from the results of underwater weighing and skinfold data taken from several hundred individuals over a wide range of age, body structure, body composition and exercise habits. The skinfold equations shown below are used to predict body fat in children 8-18 years of age:



CALF

Inside (medial) of the right lower leg at the greatest calf girth.



TRICEPS

Measure vertically on back of arm midway between top of shoulder point (Acromial Process) and elbow (Olecranon Process).

Position 1 (OR 11 if multi-formula unit)

Boys % Body Fat = $0.735 (\text{Triceps} + \text{Calf}) + 1.0$

Position 2 (OR 12 if multi-formula unit)

Girls % Body Fat = $0.610 (\text{Triceps} + \text{Calf}) + 5.1$

SKYNDEX SYSTEM 2 Specifications

| | |
|---------------------|--|
| Tip pressure: | 10g/mm ² |
| Linearity: | +/- 0.5%FS |
| Display: | 0.5 inch digit, Liquid Crystal Display 0.1mm resolution |
| Controls: | POWER ON-OFF toggle switch; FORMULA select switch; COMMAND rocker switch for all other functions. Design permits right or left handed operation. |
| Power Required: | 9v battery with an approximate current drain of 15ma. |
| Outside Dimensions: | 10 ½" x 7 ½" x 2 ¾" (26.7 x 19.1 x 7.0mm) |
| Weight: | 14oz (398 grams) |

Questions & Answers

- 1. What should appear in the display after the SKYNDEX is turned ON with the calipers closed?**
88.88 should appear as a check to show that all numerical segments are functioning properly. After about one second, 0.0 should appear.
- 2. What should you do if the display remains blank after the power is turned ON?**
If the display remains blank, it is likely that the battery has become discharged. Put in a new 9v battery. Turn the power ON. If display still does not show 88.8, followed by 0.0, double check to see if the outlet is “live”. If the outlet is operational, the unit is not functioning properly and must be returned for repair.
- 3. What might cause the display to show an “E” reading?**
The display will show an “E” reading if you applied even the slightest pressure on the trigger as the unit is powered ON. If this occurs, turn the unit OFF and ON again, without holding the trigger.
- 4. How do you determine which FORMULA number to use?**
Skyndex II does not have built in formulas. You need to manually calculate %fat using the values.
- 5. What does it mean if the numbers fade?**
This merely means that the battery is discharged.
**If you still need assistance or additional information,
please call WELLTEC at 855-SKYINDEX (759-6339),
email info@skyndex.com or visit www.skyndex.com**

SKYNDEX SYSTEM 2 WARRANTY

WELLTEC warrants for a period of one year after delivery to the original user-purchaser that this SKYNDEX product is free of defects on workmanship and material with normal use and service. The obligation of WELLTEC, under this warranty is limited to replacement or repair, at the option of WELLTEC, without charge for material or labor, of any part found defective.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ANY REPRESENTATIONS OR PROMISES INCONSISTENT WITH OR IN ADDITION TO THIS WARRANTY ARE UNAUTHORIZED AND SHALL NOT BE BINDING UPON WELLTEC. IN NO EVENT SHALL WELLTEC BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES, WHETHER OR NOT FORESEEABLE.

This warranty shall be void if the product has been subjected to misuse or damaged by negligence or accident, or if it has been repaired or altered by other than authorized agents of WELLTEC.

IMPORTANT

If warranty service should become necessary, please provide a copy of the original sales invoice. The invoice date establishes the beginning of the warranty period. Please visit www.skyndex.com for pricing and return or repair information.

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