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TD312 RF LINK
Calculating Cuff Inflator
Manual

Serial No. _____
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TD312 Calculating Cuff Inflator

General description The TD312 Calculating Cuff Inflator is a uniquely designed powerful cuff inflator with an electronic memory and calculator. It will increase the accuracy of your blood pressure measurements and save you time in measuring segmental limb pressures and calculating pressure indices.

The unit can inflate a vascular cuff to over 300 mmHg. Inflation and deflation are controlled by a single thumbwheel.

There are 12 memory registers in the TD312 which can store pressures from multiple sites. The memory buttons are numbered and coded with letters corresponding to various pressure sites, i. e. LUT = Left Upper Thigh. Once stored, the pressure measurements will remain until changed by the user; values are not deleted from memory when the unit is turned off.

Two versions of the TD312 provide a computer interface. The Data Link version connects to a computer interface with a cable at the top of the instrument. The RF Link version has no connector on top and sends its data directly by radio to a receiver attached to the computer interface.

The unit is powered by ten rechargeable AA nickel-cadmium batteries and will inflate approximately 350 ankle cuffs on one battery charge.

Short form operating instructions

A symbolic form of operating instructions (as pictured below) appears on the bottom of the instrument. After you learn how to use the instrument, these will serve as a helpful reminder how to perform various functions.

TD312 Specifications

Inflate Rate	100 mmHg in 4 seconds with an applied SC10 cuff.
Inflations per Battery Charge	Up to 350 inflations of an SC10 cuff up to 160 mmHg.
Deflate Rate	Continuously variable from 0 to 50 mmHg/sec with an SC10 cuff.
Output Pressure	0 to 350 mmHg.
Memories	Twelve selectable memory locations. Memory is continuous, i.e., it is not lost when the instrument turns off.
Calculator	The value of any memory cell can be divided by that of any other for calculating pressure ratios like the ankle/brachial index.
Power	Ten rechargeable AA nickel cadmium batteries. A wall mounted charging unit will recharge the batteries in 14 hours.
Computer Interface	Serial RS232, 9600 Baud. Data is transferred each time the Store button is pressed. The RF Link version transmits the data through a 418 MHz radio transmitter in the unit at 4800 baud.
Size	10 cm X 28 cm X 4 cm (4 X 11 X 1.5 inches).
Weight	1.0 Kg (2.2 lb.).

TD312 User Instructions

Automatic Zero	When the instrument is first turned on, the display will automatically be set to zero. Sometimes, due to temperature change, the display may drift by 1 or 2 mmHg. If the drift is in the negative direction the unit will automatically re-zero itself when zero pressure is reached. If the drift is positive and the display shows a small value even when no cuff is connected, the user can reset the zero (see instructions under Additional Controls.)
Error Message	An error message of 999 will flash on the display accompanied by a series of beeping tones if the drift of the pressure sensor is perceived by the instrument to be 3 or more mmHg negative. The instrument can be reset by restarting it, but if the error signal continues the instrument is out of calibration and should be returned for repair and calibration.

Inflating a Cuff

Cuffs should always be applied snugly prior to inflation. This will help minimize movement of the cuff when it is inflated and will also shorten the inflation time since less air will be required to reach the desired pressure. The connector furnished with the TD312 is a standard male Luer slip fitting. Slip the connector into the mating female connector on the cuff with a slight twisting motion.

Push the thumbwheel forward against the stop to inflate the cuff. This will turn on the instrument and start the air compressor. The unit will remain on for a period of 5 minutes after the compressor runs or any button has been pressed; then it will automatically turn off to save power. The compressor will run while the thumbwheel is pushed forward until a pressure of approximately 310 mmHg is reached. The maximum value can vary somewhat depending on the size of the cuff because the compressor coasts to a halt. If the maximum pressure is reached the unit cannot be restarted until the pressure drops to approximately 200 mmHg. During inflation the display will show the approximate pressure, and it may be necessary to add or release air to reach a precise pressure value.

Data Storage

The display of the TD312 has two modes, **CUFF MODE** and **MEMORY MODE**. In Cuff Mode the display shows the pressure in the cuff to the nearest mmHg. Memory Mode is indicated by a small arrow in the upper left hand corner of the display. In Memory Mode the display shows the contents of the memory registers or the results of calculations. The **MEM-CUFF** button will toggle the display between the two modes. Starting the unit will automatically reset the display to Cuff Mode to show the pressure in the cuff.

In order to store a pressure in one of the memory registers it is necessary to press two buttons. First you must select the memory register in which you wish to store the pressure. This may be done prior to (or after) inflating the cuff. Pressing the **STORE** button will store whatever pressure is displayed at the moment in the chosen memory register.

Data Trnasmission

Pressing the **STORE** button automatically transmits the pressure data through the data port (Data Link version) or via the RF Link. The pressure is recorded by the NIVP3 computer program. A cable or TD312 Receiver is required to input the data into the computer interface for the NIVP3 software. When the TD312 Receiver is used it receives its power from the computer interface box. It does not need to be turned on or off.

Measuring a Blood Pressure

As an example of how to measure systolic pressure in the right brachial artery, place a Hokanson SC12 cuff around the upper right arm and connect it to the TD312. Press the button labeled **1 RB**. RB stands for right brachial.

Ankle/Brachial Index

Place a Doppler probe on the brachial artery at the level of the elbow and inflate the cuff by pushing the thumbwheel forward and holding it on until blood flow stops as observed by the Doppler. Without moving the Doppler probe, deflate the cuff slowly by pulling back on the thumbwheel until the Doppler detects the resumption of flow. At this point press the Store button. A short beep indicates that the pressure value was stored.

Ankle/Brachial Index

Normally both right and left brachial pressures are measured, and the higher is used in calculating the ABI. Assume that the Left brachial pressure was measured to be 122 mmHg, the Right Brachial pressure was 120, The right ankle pressure was 93. In order to calculate the ABI we would put the TD312 into Memory Mode by pressing the MEM-CUFF button. If you did not already know which brachial pressure was higher you could press the **1 RB** and **2 LB** buttons to reexamine them. Then press **9 RA** to recall the right ankle pressure, then press the **DIVIDE** button followed by the **2 LB** button to recall the left brachial pressure (the higher one). Press the **EQUALS** button and the display will show 0.76 which is the ABI for the right ankle. Normal values for resting ABI are 1.0 or greater.

Segmental Pressures

Segmental blood pressures may be measured by placing cuffs at different levels on the legs. Some laboratories use the same size of cuffs at each site. We recommend continuing an established procedure; but if none exists, we suggest using Hokanson SC10's at the ankle and below the knee and SC12's above the knee and at the upper thigh. The Doppler is placed on either the dorsalis pedis artery or the posterior tibial artery. The site of the pressure measurement is determined by the site of the cuff and not the Doppler. The pneumonics on the storage register buttons refer to the following: **R right; L left; B brachial; A ankle; BK below knee; AK above knee; UT upper thigh.**

Calculations and data recall may be repeated as often as desired. Data is not lost if the instrument turns off. Just turn it back on by momentarily pressing the thumbwheel forward. The calculated index should be between 0 and 19.99. Numbers greater than 19.99 will blank part of the display to show data overrange.

Additional Controls

The TD312 will automatically turn itself off 5 minutes after the last operation (either pressing a button or starting the compressor). The unit may be **turned off manually** by pressing the **BATTERY** button followed by the **STORE** button.

Pressing and releasing the **BATTERY** button will **display the battery** voltage.

It is not necessary to clear the memory registers since writing a new value to a register will replace the old value; however, pressing the **EQUALS** button followed by the **STORE** button will **clear all the registers**.

If the instrument should indicate a small positive pressure when the hose is disconnected it may be forced to zero by pressing the **DIVIDE** button followed by the **STORE** button.

Battery

The TD312 is powered by 10 rechargeable AA nickel-cadmium cells. The battery voltage may be read by pressing the button with the picture of a battery. Pressing another button will restore normal operation. A fully charged battery will have approximately 14 volts. The instrument will operate well until the battery voltage drops to about 11 volts. At this point the batteries should be recharged by plugging in the TD312 CALCULATING CUFF INFLATOR Battery Charger for a period of 14 hours or more.

Nickel-cadmium batteries are not harmed by running them down. As a matter of fact, they will develop a “memory” that limits their capacity if they are repeatedly used very little before recharging. The batteries in the TD312 will inflate a standard ankle cuff approximately 350 times between charges.



An auxiliary battery pack and charging stand is available for users who want to minimize the time the charger needs to be plugged into the TD312. The spare battery pack can be kept on the charging stand until it is needed and then exchanged with the one in the instrument.

The batteries are removable through an access cover on the bottom of the instrument.

In an emergency the rechargeable NiCad cells can be replaced by AA alkaline cells for short term use. **Alkaline cells cannot be recharged** and should be discarded after they are discharged. Attempting to recharge alkaline batteries could damage both the TD312 and its charger. For this reason their use is not recommended except as a temporary measure.

GUARANTEE

All Hokanson electronic instruments carry a FIVE YEAR WARRANTY. Instruments are warranted against defects in parts, workmanship and performance for a period of five years from the date of delivery, provided that they have not been abused or repaired by an unauthorized person. Repair is free of charge when the instrument is returned prepaid. Return shipment will be made at our expense in a manner similar to your shipment to us. Batteries and headphones are excluded from this warranty.

Instruction to the User

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by tuning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or and experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC Regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.