

IMPORTANT

PLEASE READ BEFORE OPERATING SYSTEM

1. Read all of these instructions, and save for future reference.
2. Fill out and return the Warranty Card immediately.
3. Do not remove the cover from the Freedom V, or attempt to service the system. Any service on the Freedom V must be performed by the factory, or by factory authorized technicians. Unauthorized service or part substitutions may impair the operation of the Freedom V and will void the manufacturer's warranty.
4. Slots and opening are provided for the ventilation of the system. To ensure reliable operation and protection from overheating, make sure these vents are not covered or blocked. Make sure that the rear of the system is at least eight (8) inches from a wall or other obstruction. Do not operate the Freedom V in a confined cabinet unless proper ventilation is provided. Never push objects into the ventilation slots.
5. Do not operate the Freedom V on an unstable cart, stand or table. The system may fall, causing injury. Use the system only with a cart or stand, sold or recommended by the manufacturer. Placement of the device on a wall or shelf is not recommended.
6. Stop using the Freedom V and refer servicing to qualified service personnel under the following conditions:
 - If liquid has been spilled into the system.
 - If the system has been exposed to rain or water.
 - If the system does not operate normally by following the operating instructions.
 - If the system has been dropped or the cabinet has been damaged.
 - If the system exhibits a distinct change in its performance.
7. Do not operate the Freedom V with the battery charger inserted into the Freedom V system. The system will operate normally and safely, but may produce erroneous printouts.
8. The Freedom V is not explosion proof. Do not operate this device in high oxygen concentration areas or in the presence of flammable anesthetics or other potentially explosive vapors.

Note: The manufacturer and its agents cannot accept liability for loss, indirect or consequential damages resulting from misuse of, or modification to the device, or from operator negligence.

Because the results of studies are dependent on operator skill, procedures and interpretation beyond the manufacturer's control, the manufacturer or its agents cannot accept any liability arising from operator error or Physician misinterpretation.

It is recommended, in the event of an uncertain diagnosis following a primary testing with the Freedom V, that the patient be referred to an expert vascular practitioner and/or vascular laboratory for further evaluation.

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INTRODUCTION

Congratulations for choosing the new **FREEDOM V** non-invasive vascular instrument. The Freedom V is designed to produce a more comprehensive method of printing patient information by using the latest in microprocessor electronics and thermal printing capabilities.

The **FREEDOM V** offers advanced features, such as:

- Time and date
- Optional patient identification
- Calculation and printing of Ankle/Brachial indices
- Standard test sequences that provide test and location information on every printout
- Autosequencing through standard test sequences which minimizes user intervention
- Automatic selection of probe, modality, gain, baseline and chart speed
- LCD display shows either the active probe and study information or a real-time waveform
- Large digital manometer display

Because the **FREEDOM V** provides so many features, we hope you will take the time needed to become completely familiar with its operation. Please start your familiarization process by reading the **INITIAL SETUP** section contained later in this manual.

INSPECTION

Remove the Freedom V and its accessories (see **PARTS LIST** section) from the shipping carton. Inspect the system for damage that might have been incurred during shipping.

If you find any damage, notify the carrier and Unetixs Incorporated (the manufacturer) Customer Service Department immediately. See the **CUSTOMER SERVICE AND WARRANTY** section of this manual for further information.

IMPORTANT: Save all original packing materials until you have confirmed that the system operates properly. We recommend that you store the packing materials for future use, such as service or moving.

INITIAL SETUP

1. Unpack the Freedom V system and verify that no parts are missing (see **PARTS LIST** section for a complete list of parts). If any parts are found to be missing or damaged, please contact Unetixs Customer Service for further assistance. Fill out the warranty card and return immediately to Unetixs Incorporated. Fill out and save the **FOR YOUR RECORDS** page near the end of this manual. If a service contract is desired, please consult the **SERVICE CONTRACT** section near the end of this manual.
2. Plug in the Doppler cable, PPG sensor and Pneumo hose into their corresponding front panel inputs (see **FRONT AND REAR VIEW OF SYSTEM** section). On those systems with auto-inflate, plug in the auto-inflate remote pneumo & electrical connectors. Plug the footpedal into its input on the rear of the system. Plug in the free end of the Doppler cable into the 8 MHz Doppler probe and place the probe into its holder on the right side of the system console. The connectors for the Doppler and PPG are inserted by aligning the red dot on the male part of the connector with the red dot at the top of the female part of the connector on the system unit and inserting all the way into the system. To remove these connectors, pull away from the system while grasping the finger grip on the male part of the connector.
3. If you have purchased a pedestal for your system, please follow the pedestal assembly instructions contained with the pedestal.
4. Press the **POWER** key on the top left corner of control panel. The Freedom V logo screen will then appear (see **TURNING SYSTEM ON AND OFF** section for more information). After several seconds the "MAIN MENU" screen should appear. If it does not, contact Unetixs Customer Service for further assistance.
5. If the light over the "POWER" button is flashing, then the Freedom V's battery needs to be recharged (see **RECHARGING THE BATTERY** section for more information).
6. Load a roll of thermal paper into the printer (see **THERMAL PAPER** section for more information).
7. Set Date, Time, Facility name, Display contrast and other options to desired settings (see **SETUP MENU** section for more information).
8. Your Freedom V system is now ready to perform patient studies. For information on how to perform a particular study, read the **OPERATING INSTRUCTIONS** section. For information on the function of individual keys at different points during operation, consult the **SOFTWARE INSTRUCTIONS** section. For information on printouts, see the **PRINTER** section.

PARTS LIST

| Quant. | Part Number | Description |
|--------|---------------|---|
| 1 | 10900-0000-01 | System unit with auto-inflate (Freedom V only) |
| 1 | 10901-0000-01 | System unit (Freedom VP only) |
| 1 | 10924-0000-01 | Auto-inflate remote control hose (Freedom V only) |
| 1 | 10923-0000-01 | Pneumo hose (Freedom V only) |
| 1 | 10925-0000-01 | Manual inflation pneumo hose (Freedom VP only) |
| 2 | 10632-0010-01 | SC-10 cuff |
| 2 | 10632-0012-01 | SC-12 cuff |
| 1 | 10633-0025-01 | DC-2.5 cuff |
| 1 | 10921-0000-01 | PPG probe |
| 1 | 10922-0000-01 | Doppler cable |
| 1 | 10314-0000-01 | 5 MHz Doppler probe (NTD-5) (Freedom V only) |
| 1 | 10315-0000-01 | 8 MHz Doppler probe (NTD-8) |
| 1 | 10920-0000-01 | Footpedal |
| 1 | 10337-0000-01 | Charger |
| 1 | 10338-0000-01 | Operator's Manual |
| 1 | 10339-0000-01 | Interpretation Manual |
| 1 | 00000-0000-01 | Warranty Card |
| 3 | 10623-0001-01 | 100 foot roll of Thermal Paper |
| 2 | 10628-0000-01 | Tube of Ultrasonic Gel |

FREEDOM V OPTIONS

- 10932-0000-01 Venous Outflow kit

This kit includes the extra equipment necessary for the venous outflow test:

1. CC-22 Venous Occlusion Cuff
2. Rapid Deflator
3. Manual inflate Dial Sphygmomanometer

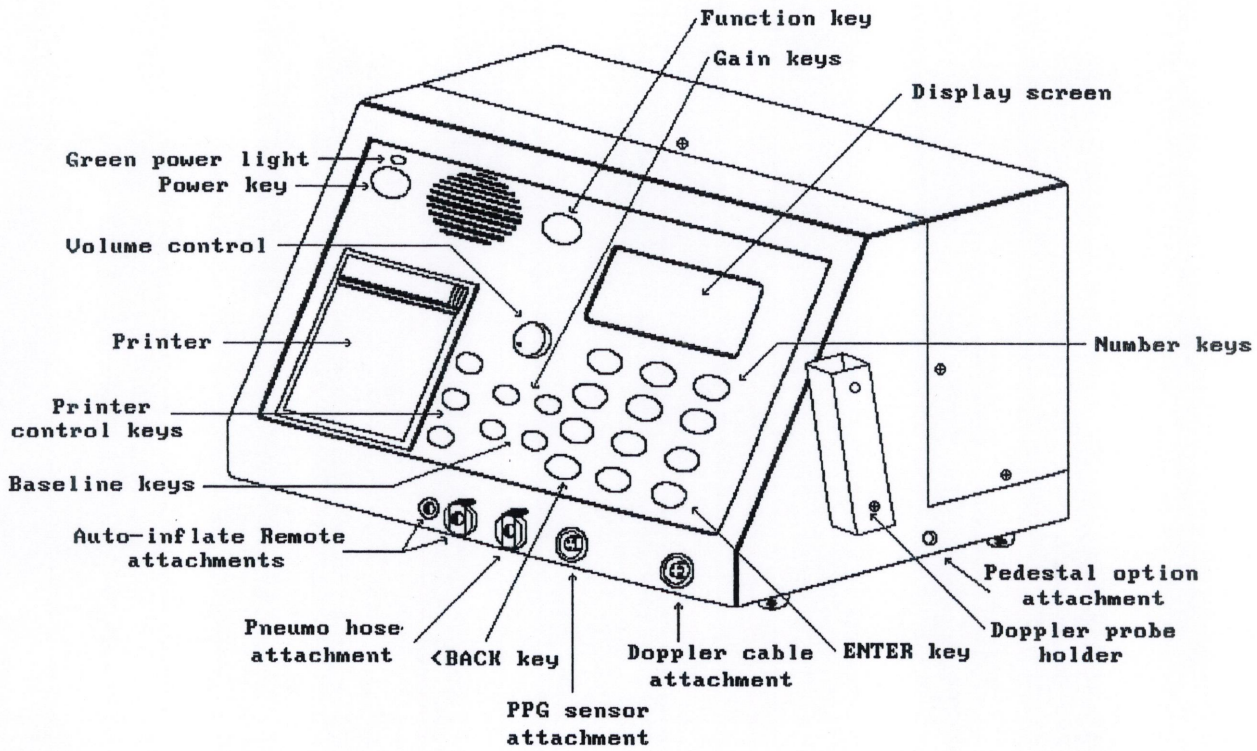
- 10931-0000-01 Pedestal Kit

The Pedestal Kit includes 2 additional accessory clips, footpedal cup, 5 wheel star-legged base and system unit mounting platform (some assembly required).

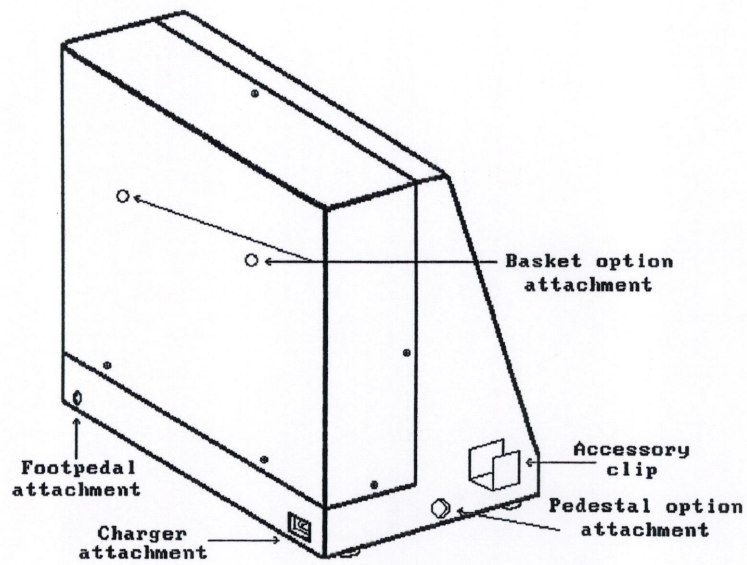
- 10930-0000-01 Accessory Basket Kit

The Accessory Basket Kit includes a basket that mounts upon the back of the Freedom V system unit and its mounting hardware (some assembly required).

FRONT AND REAR VIEW OF SYSTEM



FRONT VIEW



REAR VIEW

OPERATING INSTRUCTIONS

The operating instructions give information on the various patient studies that the Freedom V system can perform. It offers information on patient preparation, study procedure, and minimal software operation instructions. For more complete information on the operation of the software, consult the SOFTWARE INSTRUCTIONS section.

TURNING SYSTEM ON AND OFF

The POWER key on the keyboard of the Freedom V is used to turn the Freedom V system on and off. When the system is on, this key can be pressed (and then released) at any time to turn the system off. Similarly, when the system is off, this key can be pressed (and then released) at any time to turn the system on. When the system is on, a green light should be illuminated above the power key.

The Freedom V comes equipped with an auto-shutoff feature. After an initial 14 minute countdown, the screen will begin to flash indicating that the Freedom V is in a 1 minute countdown to auto-shutoff. If any keyboard key, the footpedal or the remote-red button is pressed, the countdown's are reset giving the user a fresh 15 minutes of uninterrupted operation.

The Freedom V is a battery powered instrument, and the battery will need to be recharged periodically. The green light above the POWER key will begin to flash when the battery is running low. Although the system will continue to operate after the green power light begins to flash, continued use is not recommended as a reduction in the battery's charge capability could result (see RECHARGING THE BATTERY for more information).

RECHARGING THE BATTERY

To recharge the battery, plug the battery charger into a wall socket, and then into the input on the rear of the system (see FRONT AND REAR VIEW OF SYSTEM section). Note the proper direction of the plug as an improper insertion may damage the system or the charger. The red light on the charger should then be lit, indicating that the system is in "FAST CHARGE" mode. When the light is off or flashing, the system reverts to "TRICKLE CHARGE" mode. Although operation is possible after just a fast charge, additional trickle charging will increase battery performance and overall battery life. A charge cycle of 12 or more hours is recommended. A Freedom V battery will typically last about 400 full charges. Some degradation in charge life may be noticed after only 250 full charges. It is acceptable (and recommended) to charge the battery even after limited use. Note that only fast charging the battery or system usage past the battery warning (flashing green light over the POWER key) may degrade the overall battery life performance.

MAIN MENU

The main menu screen will offer the following options:

- I.D.:NOT ENTERED
- 1) SET PATIENT I.D.
- 2) LOWER ARTERIAL
- 3) LOWER VENOUS
- 4) UPPER ARTERIAL
- 5) CAROTID STUDY
- 6) GENERAL TESTS
- 7) PRESSURE RESULTS

The top line of the screen indicates the current patient I.D. that will be shown on all printouts. The rest of the lines show the keyboard key number followed by the function that the key will perform. Each main menu function will be described in its own subsequent section.

ENTERING PATIENT I.D.

If you press the 1 key (SET PATIENT I.D.) on the main menu screen, you will have the opportunity to enter the patient's Social Security or other identifying number by pressing the appropriate number keys. Dashes will automatically be inserted in the 4th and 7th positions. Pressing the ◀BACK key deletes numbers.

LOWER ARTERIAL STUDIES

If you press the 2 key (LOWER ARTERIAL) at the main menu, the lower arterial menu will appear:

- LOWER ARTERIAL
- 1) ABI/SEG PRESSURE
 - 2) PNEUMO WAVEFORM
 - 3) DOPPLER WAVEFORM
 - 4) TOE WAVEFORM
 - 5) TOE PRESSURES
 - 6) COMBINED STUDY

DOPPLER WAVEFORMS

If you press the 3 key (DOPPLER WAVEFORM) at the lower arterial menu you will enter the Doppler waveform study, and the following screen will appear:

- DOPPLER WAVEFORM
- 1) RIGHT DORS PEDIS
 - 2) RIGHT POST TIBIAL
 - 3) RIGHT POPLITEAL
 - 4) RIGHT SUP FEMORAL
 - 5) RIGHT COM FEMORAL
 - 6) LEFT DORS PEDIS
- ENTER) MORE...

If you press the ENTER key (lower right corner of control panel) at this screen, the following screen will appear:

- DOPPLER WAVEFORM
- 1) LEFT POST TIBIAL
 - 2) LEFT POPLITEAL
 - 3) LEFT SUP FEMORAL
 - 4) LEFT COM FEMORAL
- ENTER) MORE...

Pressing the ENTER key at this screen will loop you back to the previous screen.

If you wish to take individual Doppler waveforms at specific locations, press the number key that corresponds to the location of the arterial waveform you wish to obtain. If you wish to take a complete set of waveforms, start by pressing the 1 key (RIGHT DORSALIS PEDIS) when the first location screen is shown. After you capture this waveform, the Freedom V will automatically sequence to the next location, and so on. When the last locations' waveform is captured, the Freedom V will show the main menu screen.

BARGRAPH SCREEN

When you choose a location to obtain a Doppler (or any) waveform, the bargraph screen will be shown. This screen contains the following information:

- TST: This field shows the currently selected study.
- LOC: This field shows the sight to be tested.
- PRB: This field shows the currently active probe.
- GAIN: This field shows the currently active gain setting.
- SPD: This field shows the currently active chart speed in mm/sec.
- MANOMETER: This field shows the current pressure (if any) in mm/Hg.

To obtain Doppler waveforms, the patient should be supine on an examination table. Place the Doppler probe on the artery to be examined (using ultrasonic gel, and holding the probe at a 45 to 60 degree angle to the vessel).

You will notice the bargraph at the bottom of the Freedom V screen will be "pulsing" along with the sound from the Freedom V's speaker (use the volume control on front panel to adjust the volume). The length of this bar from its furthestmost left and right points is the exact size the Doppler waveform will appear on the printout.

Angle the Doppler probe so that you obtain the loudest sound from the speaker, and the greatest movement of the bargraph. If at this point the maximum excursion of the bargraph is only 1/2 inch (less than 20 millimeters) or so, you may wish to increase the gain by pressing the up arrow GAIN key (see GAIN section).

If you prefer to see the Doppler waveform on the Freedom V screen, press the 5 key from the bargraph screen to show a real-time waveform. (NOTE: due to the height of the Freedom V screen, the waveform on-screen will be slightly smaller than it will appear on the printout).

PRINTING DOPPLER WAVEFORMS

Once you have the Doppler probe in the optimum position over the vessel, press the footpedal, remote-red button or RUN key on the Freedom V to start printing the waveform. Once you have obtained 4 or 5 wave complexes, press the footpedal, remote-red button or RUN key again to stop printing. The Freedom V will automatically print both the patient I.D. and location information on the end of each strip. The Freedom V will also autosequence (see AUTOSEQUENCE section) to the next location. Use the ◀BACK key to return to the previous location, or the ENTER key to skip ahead locations.

TOE WAVEFORMS

If you press the 4 key (TOE WAVEFORM) from the lower arterial menu, the toe waveform location screen will appear:

```
TOE WAVEFORM
1) RIGHT GREAT TOE
2) RIGHT TOE 2
3) RIGHT TOE 3
4) RIGHT TOE 4
5) RIGHT TOE 5
6) LEFT GREAT TOE
ENTER) MORE...
```

If you press the ENTER key at this screen, the following screen will appear:

```
TOE WAVEFORM
1) LEFT TOE 2
2) LEFT TOE 3
3) LEFT TOE 4
4) LEFT TOE 5
ENTER) MORE...
```

Pressing the ENTER key at this screen will loop you back to the previous screen.

To obtain PPG toe arterial waveforms, the patient should be supine, and the PPG sensor should be attached snugly (not too tightly) to the toe with Velcro fastener. Note that the red light should be positioned at the end of toe.

If you wish to take individual PPG waveforms at specific toe locations, press the number key that corresponds with the location of the PPG toe waveform you wish to obtain.

If you wish to obtain a complete set of PPG toe waveforms, start by pressing the 1 key (RIGHT GREAT TOE) when the first location screen is shown. After you capture this waveform the Freedom V will autosequence to the next location, and so on. When the last waveform is captured, the Freedom V will show the main menu screen.

PRINTING TOE WAVEFORMS

Adjust the gain (using the GAIN keys) until there is about 20 millimeters of waveform excursion. Adjust the baseline (using the BASELINE keys) if the waveform is off scale on one side. Press the footpedal, remote-red button or RUN key to start printing the waveforms. Once you have obtained 4 or 5 wave complexes, press the footpedal, remote-red button or RUN key again to stop printing. The Freedom V will automatically print both the patient I.D. and location information on the end of each strip. The Freedom V will also autosequence (see AUTOSEQUENCE section) to the next location. Use the ◀BACK key to return to the previous location, or the ENTER key to skip ahead locations.

PNEUMO WAVEFORMS

If you press the 2 key (PNEUMO WAVEFORM) from the lower arterial menu, you will show the first Pneumo waveform location screen which looks like this:

```
PNEUMO WAVEFORM
1) RIGHT ANKLE
2) RIGHT BELOW KNEE
3) RIGHT ABOVE KNEE
4) RIGHT HIGH THIGH
5) LEFT ANKLE
6) LEFT BELOW KNEE
ENTER) MORE...
```

If you press the ENTER key at this screen you will show the following location screen:

```
PNEUMO WAVEFORM
1) LEFT ABOVE KNEE
2) LEFT HIGH THIGH
3) RIGHT GREAT TOE
4) RIGHT TOE 2
5) RIGHT TOE 3
6) RIGHT TOE 4
ENTER) MORE...
```

If you press the ENTER key at this screen you will show the final location screen:

```
PNEUMO WAVEFORM
1) RIGHT TOE 5
2) LEFT GREAT TOE
3) LEFT TOE 2
4) LEFT TOE 3
5) LEFT TOE 4
6) LEFT TOE 5
ENTER) MORE...
```

Pressing the ENTER key at this screen will show the first location screen.

To obtain Pneumo Waveforms on the legs, place SC-10 cuffs at the ankle and below the knee, and SC-12 cuffs above the knee and at the high thigh, ensuring that the cuffs are snug as possible. Patient should be supine for this study.

Press the 1 key (RIGHT ANKLE) from the first location screen, and attach the Pneumo hose to the right ankle cuff. Using the inflation bulb (or by pressing the remote-black button) while observing the manometer on the screen, inflate the cuff to 65 mm/Hg (use the bleed valve to decrease the pressure if needed).

PRINTING PNEUMO WAVEFORMS

With 65 mm/Hg indicated on the Freedom V screen, the bargraph will indicate the size of the waveform that will appear on printout (remember, by pressing the 5 key at the bargraph screen, you can view the real-time waveform). Adjust the gain (see GAIN section), and move the baseline left or right if necessary (using left and right BASELINE keys) and print a waveform by pressing the footpedal, remote-red button or "RUN" key.

Every time you print a waveform, the Freedom V will autosequence (see AUTOSEQUENCE section) to the next location (use the ◀BACK and ENTER keys to go back or skip forward locations). Move Pneumo hose to cuff location indicated on Freedom V screen and repeat the process (all leg cuffs should be inflated to 65 mm/Hg).

TOE PNEUMO WAVEFORMS

After obtaining Pneumo waveforms at all 8 leg locations, the Freedom V will return to the main menu. To obtain Pneumo waveforms of the toes you must press the 3 key (RIGHT GREAT TOE) from the second Pneumo Waveform location screen.

Use the DC-2.5 digit cuff for the toes, and inflate the cuff to 40 mm/Hg, instead of the 65 mm/Hg used in the leg cuffs.

NOTE: It is more common to use the PPG (not pneumo) probe to obtain both toe and finger waveforms.

ABI/SEG PRESSURE

NOTE: ABI is an acronym for of Ankle/Brachial Index, and SEG is short for Segmental, read further for details.

If you press the 1 key (ABI/SEG PRESSURE) at the lower arterial menu, you will show the ABI/segmental pressure location screen:

- | ABI/SEG PRESSURE ¹ | ABI/SEG PRESSURE ² |
|-------------------------------|-------------------------------|
| 1) RIGHT BRACHIAL | 1) RIGHT BRACHIAL |
| 2) LEFT BRACHIAL | 2) LEFT BRACHIAL |
| 3) LEFT ANKLE | 3) LEFT ANKLE D.P. |
| 4) RIGHT ANKLE | 4) LEFT ANKLE P.T. |
| 5) RIGHT BELOW KNEE | 5) RIGHT ANKLE D.P. |
| 6) RIGHT ABOVE KNEE | 6) RIGHT ANKLE P.T. |
| ENTER) MORE... | ENTER) MORE... |

If you press the ENTER key at this screen, you will show the following screen:

- | ABI/SEG PRESSURE ¹ | ABE/SEG PRESSURE ² |
|-------------------------------|-------------------------------|
| 1) RIGHT HIGH THIGH | 1) RIGHT BELOW KNEE |
| 2) LEFT BELOW KNEE | 2) RIGHT ABOVE KNEE |
| 3) LEFT ABOVE KNEE | 3) RIGHT HIGH THIGH |
| 4) LEFT HIGH THIGH | 4) LEFT BELOW KNEE |
| ENTER) MORE... | 5) LEFT ABOVE KNEE |
| | 6) LEFT HIGH THIGH |
| | ENTER) MORE... |

Pressing the ENTER key at this screen will loop you back to the previous screen.

ANKLE BRACHIAL INDEX (ABI)

The Ankle/Brachial Index is used as a barometer to judge arterial circulation in the legs. The ABI is obtained by dividing the ankle pressure by the higher of the two brachial pressures. When the TWOABI option is set (see SETUP MENU for more information on the TWOABI option), the higher of the two ankle pressures is used to calculate the ABI. In patients with normal circulation, the ankle pressures should be equal to or greater than the highest brachial pressure ($ABI \geq 1.00$).

¹TWOABI option **not** set (see SETUP MENU section for more information)

²TWOABI option set (see SETUP MENU section for more information)

OBTAINING ABI PRESSURES

If you press the 1 key (RIGHT BRACHIAL) from the first ABI/segmental pressure location screen, the Freedom V will show the bargraph screen with the RIGHT BRACHIAL as the indicated location. With the patient supine, snugly attach an SC-10 cuff to the right biceps area and attach the Pneumo hose to the cuff. Using ultrasonic gel, locate the Right Brachial Artery with the 8 Mhz Doppler probe (use the 5 Mhz probe for heavy-set patients). Adjust the volume using the rotary control knob on the front panel of the Freedom V (see FRONT AND REAR VIEW OF SYSTEM section) and angle the Doppler probe to obtain the loudest Doppler signal.

Once a clear Doppler signal is obtained, inflate the arm cuff with the black inflation bulb or with the remote-black button until any audible Doppler signal ceases (when the pressure in the arm cuff exceeds the Brachial systolic blood pressure, the Brachial Artery will occlude, and no sound will be heard from the Doppler probe). Slowly bleed pressure from arm cuff using the bleed valve on the Pneumo bulb until the Doppler sounds reappear. Upon hearing the first audible Doppler pulse (sound), capture the pressure by pressing the footpedal, remote-red button or RUN key. This will capture and store the arm pressure into the Freedom V's memory, and autosequence to the next location (this will be the LEFT BRACHIAL). Attach an SC-10 cuff to left biceps area, and repeat the procedure with Doppler located on the Left Brachial Artery.

After the Left Brachial pressure is obtained, the Freedom V will autosequence to the Left Ankle location (as indicated on Freedom V screen). Attach an SC-10 cuff to the Left Ankle and attach the Pneumo hose to the cuff. Using the 8 Mhz Doppler Probe, locate the Posterior Tibial Artery (located between the ankle and heel on the inside of the foot). Inflate the ankle cuff until the Doppler sound disappears, and capture the pressure upon the return of sound. Repeat the procedure on the Right Ankle. If the Posterior Tibial Artery signal is weak, consider using the Dorsalis Pedis Artery to obtain a better Doppler signal. When the TWOABI option is set (see SETUP MENU section for more information), the Freedom V will ask for ankle pressures using both the Posterior Tibial Artery and the Dorsalis Pedis Artery.

Some physicians will not want to perform further pressure studies if the ABI is normal. If you wish to end the study after only taking the ankle and brachial pressures, press the FUNCTION key so that the captured brachial and ankle pressures will appear on the Freedom V screen along with the calculated ABI. Press the footpedal, remote-red button or RUN key to print the pressures.

OBTAINING SEGMENTAL PRESSURES

Lower arterial segmental pressures are obtained by placing pressure cuffs at the below knee, above knee and high thigh locations. Use the SC-10 cuffs for the below knee locations, and the SC-12 cuffs for above knee and high thigh locations. As with taking ABI pressures, use the Posterior Tibial Artery and 8 Mhz Doppler as a rule of thumb, and attach the Pneumo hose to the cuff at the location indicated on the Freedom V screen. Follow the inflation/capture procedure for obtaining ABI pressures (see OBTAINING ABI PRESSURES section).

Once the last segmental pressure has been obtained, the Freedom V will autosequence to the pressure results screen (see PRESSURE RESULTS section). Here the captured pressures will be shown and can be printed by pressing the footpedal, remote-red button or RUN key.

TOE PRESSURES

If you press the 5 key (TOE PRESSURES) from the lower arterial menu, you will bring up the toe pressures location screen:

- TOE PRESSURES
- 1) RIGHT GREAT TOE
 - 2) RIGHT TOE 2
 - 3) RIGHT TOE 3
 - 4) RIGHT TOE 4
 - 5) RIGHT TOE 5
 - 6) LEFT GREAT TOE
- ENTER) MORE...

If you press the ENTER key at this screen, the following screen will appear:

```
          TOE PRESSURES
1) LEFT TOE 2
2) LEFT TOE 3
3) LEFT TOE 4
4) LEFT TOE 5
ENTER) MORE...
```

Pressing the ENTER key at this screen will loop you back to the previous screen.

If you press the 1 key (RIGHT GREAT TOE) at this screen, the bargraph screen will appear, with the Right Great Toe as the indicated location.

To obtain toe pressures, position the DC-2.5 digit cuff around the base of the Right Great Toe and attach the Pneumo hose to the digit cuff. Using the velcro strip, attach the PPG sensor to the toe with the red light at the end of the toe. The bargraph at the bottom of the Freedom V screen should now be pulsing back and forth. Adjust the gain as necessary to make bargraph pulse easily visible (see GAIN section). Slowly inflate the digit cuff (NOTE: do **not** use the auto-inflate remote-black button for inflating the digit cuff, as the small bladder may burst) until the pulsing on the bargraph ceases. Slowly bleed pressure from the cuff, using the bleed valve, and capture the pressure at which the pulsing resumes using the footpedal, remote-red button or RUN key. Repeat this procedure, as necessary, on the other toes. (NOTE: see the FINGER PRESSURES section for more details.)

COMBINED STUDY

The combined study (#6 on the lower arterial menu) is a combination of the Pneumo waveform (see PNEUMO WAVEFORM section) and the ABI/segmental pressure (see ABI/SEG PRESSURE section) studies. If you start at the beginning of the combined study, the Freedom V will indicate that the user should first obtain a pressure at the Right Brachial location and then at the Left Brachial location (NOTE: you will **not** be taking Pneumo waveforms at the arm locations, only pressures). The Freedom V will then autosequence to the Left Ankle location, where it will show:

```
TST: PNEUMO WAVEFORM
```

The Freedom V is indicating that the Pneumo input is active, thus prompting the user to obtain a Pneumo waveform at the Left Ankle (see PNEUMO WAVEFORMS section).

Inflate the Left Ankle cuff to 65 mm/Hg and obtain the Pneumo waveform. After the Pneumo waveform has been printed, the Freedom V screen will still show:

```
LOC: LEFT ANKLE
```

but the test line will show:

```
TST: ABI/SEG PRESSURE
```

The Freedom V is indicating that the user should take a pressure at the Left Ankle. Deflate the ankle cuff, apply the Doppler probe to the Posterior Tibial Artery and obtain the Left Ankle pressure (see OBTAINING ABI PRESSURES section). After the pressure is captured at the Left Ankle, the Freedom V will prompt the user to obtain a Pneumo waveform at the Right Ankle location and then a pressure at that location, etc...

After the last pressure has been obtained, the user will have printed Pneumo waveforms at the 8 leg locations and the pressure results will be shown on the screen (see PRESSURE RESULTS section). Print the pressures by pressing the footpedal, remote-red button or RUN key and the combined study will be over.

LOWER VENOUS STUDIES

If you press the 3 key (LOWER VENOUS) from the main menu, the lower venous menu will appear:

- LOWER VENOUS
- 1) RIGHT VEN OUTFLOW
 - 2) LEFT VEN OUTFLOW
 - 3) RIGHT VEN. REFILL
 - 4) LEFT VEN. REFILL

VENOUS OUTFLOW STUDY

This study **requires** the optional Venous Outflow Kit (see PARTS LIST section).

If you press the 1 key (RIGHT VEN OUTFLOW) from the lower venous menu, you will be ready to perform a Venous Outflow study on the Right Leg. To perform this study, the patient should be supine, with the foot of the leg to be examined raised 8" above heart level (by use of pillows or foam position supports). The knee of the leg to be examined should be flexed and externally rotated (have patient turn to side of limb being examined and place a pillow under the thigh, if necessary, to ensure that the limb is relaxed).

With patient properly positioned, place an SC-10 cuff around the maximum circumference of the calf and attach the Pneumo hose to the cuff. Position the CC-22 occlusive thigh cuff to the high thigh area. Attach the rapid deflator to the wide bore CC-22 occlusive thigh cuff hoses (push the cuff hoses firmly into the inlets of the rapid deflator). Attach the manual inflate dial sphygmomanometer to the side of the rapid deflator and pull the plunger on the rapid deflator as far away from the rapid deflator as possible (closed position).

Inflate the SC-10 calf cuff to a pressure between 12 and 14 mm/Hg, as indicated on the Freedom V screen. Press the 0 key on the Freedom V's keyboard to set the baseline when the pressure in the calf cuff has stabilized. Press the footpedal, remote-red button or RUN key to activate the printer, which begins the study. Once the printer has been activated, inflate the CC-22 occlusive thigh cuff to a pressure of 60 mm/Hg as indicated on the manual inflate dial sphygmomanometer. The Freedom V screen at this point will show a timer, counting down from 140 seconds. When the CC-22 occlusive thigh cuff is inflated to 60 mm/Hg it will occlude the veins in the high thigh area. When this happens, the arterial flow of blood into the leg will cause the calf to swell, displacing air from the SC-10 calf cuff back into the internal pneumoplethysmograph in the Freedom V and registering as a rise from the baseline on the printout (**NOTE:** if after 30 seconds it appears that the tracing is going to go "off the chart" or is not showing much of a rise, press footpedal to abort; the ◀BACK key to return to the same location; and use the up and down GAIN keys to increase or decrease the size of the waveform as necessary).

The Venous Outflow study is concluded by pressing the footpedal, remote-red button or RUN key while **simultaneously** pressing the plunger on the rapid deflator. Conclude the study when a plateau is reached on the printout (10 or more seconds with no further rise of trace), or when the timer on the Freedom V reads 20 or less seconds.

VENOUS REFILL STUDY

If you press the 3 key (RIGHT VEN. REFILL) at the lower venous menu, you will be ready to perform a Venous Refill Study on the Right Leg. The Venous Refill Study is used to determine if the valves in the veins are competent. To perform this study, the patient should be sitting on an exam table with his legs hanging over the side of the table (the feet should **not** be touching the floor). Attach the PPG sensor to the interior aspect of the leg between 2 and 4 inches proximal to the Medial Malleolus, using gauze type tape to firmly attach the sensor to the leg (DERMACELL[tm] tape works well).

With the patient properly positioned and the PPG sensor attached, you will notice the bargraph moving slightly. Press the 0 key to set the baseline for the study. When the bargraph is stable (you may have to press the 0 key several times to achieve stability), press the footpedal, remote-red button or RUN key to begin the study.

Once the study has begun, allow between 3 and 4 seconds to elapse before instructing the patient to Dorsiflex-Plantarflex his foot 5 times in rapid succession (1 flexion cycle per second is ideal). This will deflect the tracing downward as observed on the paper feeding out of the Freedom V printer.

NOTE: Foot flexions should cause the printer's tracing to deflect downward four or more "boxes" by the 5th foot flexion as shown on the chart feeding from Freedom V. If the tracing does not deflect downward four or more "boxes" on the chart paper, end the study by pressing the footpedal; press the ◀BACK key to return to the same location; and press the up arrow GAIN key to increase sensitivity. Repeat the study.

The Venous Refill Study is concluded when 30 seconds has elapsed from time of the 5th foot flexion. In patients with competent venous valves it should take more than 20 seconds from the 5th foot flexion for the deflected line to return to the upper baseline. Conclude this study by pressing the footpedal, remote-red button or RUN key.

If the patient has arthritis or a limited range of ankle motion and foot flexions do not produce a significant downward deflection from baseline, manual compression can be employed to obtain a more accurate reading of valvular competence. To perform a manual compression, set up the patient as described above. When the baseline is stable, begin the study. Allow between 3 and 4 seconds before starting the compression sequence. Begin the compression sequence by squeezing the patient's foot with one hand (palm on the top of the foot, fingers on the plexus of the foot) and squeezing the calf with other hand 1/2 second later. Perform 5 foot/calf compressions in 5 seconds, release and wait 30 seconds before concluding the study.

UPPER ARTERIAL STUDIES

If you press the 4 key at the main menu, the upper arterial menu will appear:

- UPPER ARTERIAL
- 1) SEG. PRESSURE
- 2) DOPPLER WAVEFORM
- 3) PNEUMO WAVEFORM
- 4) FINGER WAVEFORM
- 5) FINGER PRESSURES
- 6) COMBINED STUDY

UPPER SEGMENTAL PRESSURES

If you press the 1 key (SEG. PRESSURE) at the upper arterial menu, the Upper Segmental location screen will appear:

- SEG. PRESSURE
- 1) RIGHT UPPER ARM
- 2) RIGHT FOREARM
- 3) RIGHT WRIST
- 4) RIGHT INDEX FING.
- 5) LEFT UPPER ARM
- 6) LEFT FOREARM
- ENTER) MORE...

If you press the ENTER key at this screen, the following location screen will appear:

- SEG. PRESSURE
- 1) LEFT WRIST
- 2) LEFT INDEX FING.
- ENTER) MORE...

Pressing the ENTER key at this screen will loop you back to the previous screen.

To perform the Upper Arterial Segmental Pressure study, the patient should be supine, while using SC-10 cuffs on the Right Biceps area, Forearm and Wrist, and the DC-2.5 digit cuff wrapped around the base of the Right Index Finger. Press the 1 key (RIGHT BRACHIAL) from the first upper segmental pressure location screen. Attach the Pneumo hose to the Right Upper Arm cuff and locate the Right Brachial artery with the 8 Mhz Doppler probe. Obtain the pressure (see OBTAINING ABI PRESSURES section). After the Right Brachial pressure is captured, the Freedom V will autosequence to the Right Forearm location. Attach the Pneumo hose to the cuff at the Right Forearm and locate the Radial Artery with the 8 Mhz Doppler probe. Obtain the pressure. Repeat this procedure for the Right Wrist location.

For information on how to obtain the Right Index Finger pressure, see the FINGER PRESSURES section. (NOTE: you must press the 6 key at the Right and Left Index Finger bargraph screens in order to activate the PPG sensor to obtain the Index Finger pressures.)

UPPER DOPPLER WAVEFORMS

If you press the 2 key (DOPPLER WAVEFORM) from the upper arterial menu, the Doppler location screen will appear:

- DOPPLER WAVEFORM
- 1) RIGHT ULNAR
 - 2) RIGHT RADIAL
 - 3) RIGHT BRACHIAL
 - 4) RIGHT AXILLARY
 - 5) RIGHT SUBCLAVIAN
 - 6) LEFT ULNAR
- ENTER) MORE...

If you press the ENTER key at this screen, you will show the following location screen:

- DOPPLER WAVEFORM
- 1) LEFT RADIAL
 - 2) LEFT BRACHIAL
 - 3) LEFT AXILLARY
 - 4) LEFT SUBCLAVIAN
- ENTER) MORE...

Pressing the ENTER key at this screen will loop you back to the previous screen.

To do a complete set of upper arterial Doppler waveforms, press the 1 key (RIGHT ULNAR) from the first Doppler location screen. With patient supine, locate the Right Ulnar artery using the 8 Mhz Doppler probe and ultrasonic gel (see DOPPLER WAVEFORMS in the lower arterial section for more information). Print a waveform, and repeat at the Radial, Brachial, Axillary and Subclavian arteries, as indicated on the Freedom V screen. (NOTE: if you press the 5 key from the bargraph screen, a real-time waveform will be visible on the Freedom V screen. When printing waveforms from this screen, the Freedom V will autosequence to the next location, but new locations will not be visible from the waveform screen. Press the 5 key again to view new locations on the bargraph screen if you need a reminder of the current location.)

UPPER PNEUMO WAVEFORMS

If you press the 3 key (PNEUMO WAVEFORM) from the upper arterial menu, the Pneumo waveform location screen will appear:

- PNEUMO WAVEFORM
- 1) RIGHT WRIST
 - 2) RIGHT FOREARM
 - 3) RIGHT UPPER ARM
 - 4) LEFT WRIST
 - 5) LEFT FOREARM
 - 6) LEFT UPPER ARM
- ENTER) MORE...

To obtain Pneumo waveforms of the arms, the patient should be in a supine position with an SC-10 cuff snugly wrapped around the patient's Right Wrist. (NOTE: since it is the air displaced from the cuff that generates the waveforms, it is very important to make sure cuffs are not loosely applied.) Attach the Pneumo hose to the Right Wrist cuff and press the 1 key (RIGHT WRIST) from the Pneumo waveform location screen.

Inflate the cuff to 65 mm/Hg as indicated on the Freedom V screen. Allow several seconds for the pressure to stabilize. Monitor the waveform on either the bargraph or waveform screen, adjust for gain and baseline, and then print. Move the cuff to the next indicated location and repeat the procedure (see PRINTING PNEUMO WAVEFORMS section). Use SC10 cuffs at the Wrist, Forearm and Upper Arm.

FINGER WAVEFORMS

If you press the 4 key (FINGER WAVEFORM) at the upper arterial menu, the finger waveforms location screen will appear:

- FINGER WAVEFORM
- 1) RIGHT THUMB
 - 2) RIGHT FINGER 2
 - 3) RIGHT FINGER 3
 - 4) RIGHT FINGER 4
 - 5) RIGHT FINGER 5
 - 6) LEFT THUMB
- ENTER) MORE...

If you press the ENTER key at this screen, the second location screen will appear:

- FINGER WAVEFORM
- 1) LEFT FINGER 2
 - 2) LEFT FINGER 3
 - 3) LEFT FINGER 4
 - 4) LEFT FINGER 5
- ENTER) MORE...

Pressing the ENTER key at this screen will loop you back to the previous screen.

To perform a finger waveform study, the patient should be supine, with the PPG sensor attached to the plantar aspect of the Right Thumb and the red light towards the end of the thumb. Press the 1 key (RIGHT THUMB) from the first finger waveforms location screen. Adjust for gain and baseline, then print (see PRINTING TOE WAVEFORMS section). Repeat this procedure on the other fingers.

FINGER PRESSURES

If you press the 5 key (FINGER PRESSURES) at the upper arterial menu, the finger pressures location screen will appear:

- FINGER PRESSURES
- 1) RIGHT THUMB
 - 2) RIGHT FINGER 2
 - 3) RIGHT FINGER 3
 - 4) RIGHT FINGER 4
 - 5) RIGHT FINGER 5
 - 6) LEFT THUMB
- ENTER) MORE...

If you press the ENTER key at this location screen, the second location screen will appear:

- FINGER PRESSURES
- 1) LEFT FINGER 2
 - 2) LEFT FINGER 3
 - 3) LEFT FINGER 4
 - 4) LEFT FINGER 5
- ENTER) MORE...

Pressing the ENTER key at this screen will loop you back to the previous screen.

To obtain a full set of finger pressures, press the 1 key (RIGHT THUMB) from the first finger pressures location screen. With the patient supine, attach the DC-2.5 digit cuff to base of the Right Thumb, and attach the PPG sensor to the Plantar aspect of the Right Thumb with the red light towards the end of the finger. The bargraph at the bottom of the Freedom V screen will be pulsing back and forth, representing arterial blood flow. Adjust the gain settings to make the arterial pulse easily visible. Slowly inflate the cuff (do **not** use the auto-inflate remote-black button as the small bladder may burst) until the bargraph ceases pulsing. Slowly deflate digit cuff using the bleed valve on the inflation assembly until the pulsing on the bargraph resumes. Capture the finger pressure upon the resumption of the bargraph pulse.

NOTE: By pressing the 5 key at the bargraph screen, the Freedom V will show a real-time waveform. Finger pressures can be obtained (even though manometer pressure is not visible) by slowly inflating the DC2.5 cuff until the wave tracing goes 'flat', and then deflating the cuff until a reappearance of the waveform, and capturing the pressure upon the reappearance of the waveform. Pressing the 5 key again will return you to the bargraph screen (see BARGRAPH SCREEN section).

COMBINED STUDY

The combined study is a combination of the upper segmental pressures (see UPPER SEGMENTAL PRESSURES section) and upper Pneumo waveforms (see UPPER PNEUMO WAVEFORMS section) studies. If you press the 6 key (COMBINED STUDY) at the upper arterial menu, the combined study location screen will appear:

```
      COMBINED STUDY
1) RIGHT UPPER ARM
2) RIGHT UPPER ARM
3) RIGHT FOREARM
4) RIGHT FOREARM
5) RIGHT WRIST
6) RIGHT WRIST
ENTER) MORE...
```

If you press the ENTER key at this screen, the following screen will appear:

```
      COMBINED STUDY
1) RIGHT INDEX FING
2) RIGHT INDEX FING
3) LEFT UPPER ARM
4) LEFT UPPER ARM
5) LEFT FOREARM
6) LEFT FOREARM
ENTER) MORE...
```

If you press the ENTER key at this screen, the final location screen will appear:

```
      COMBINED STUDY
1) LEFT WRIST
2) LEFT WRIST
3) LEFT INDEX FING
4) LEFT INDEX FING
ENTER) MORE...
```

Pressing the ENTER key at this screen will loop you back to the first location screen.

To perform a combined study, the patient should be supine with an SC-10 cuff fastened around the Right Upper Arm. Press the 1 key (RIGHT UPPER ARM) to begin the study. The Freedom V screen will show:

```
TST: PNEUMO WAVEFORM
LOC: RIGHT UPPER ARM
```

Attach the Pneumo hose to the Upper Arm cuff, inflate to 65 mm/Hg, and print a Pneumo waveform (see PNEUMO WAVEFORMS in Lower Arterial section for more information). After printing a Pneumo waveform, the Freedom V will autosequence to the next test, and the screen will show:

```
TST: SEG. PRESSURE
LOC: RIGHT UPPER ARM
```

This is indicating to the user to take a pressure reading at the Upper Arm location. With the cuff already in place, locate the Brachial artery with the 8 Mhz Doppler probe and obtain its pressure (see UPPER SEGMENTAL PRESSURES section). Repeat the waveform/pressure procedure at subsequent locations, as listed on the Freedom V screen. Use the SC10 cuff at all locations of the combined study.

NOTE: The most common procedure for an Upper Arterial exam would be to take Upper Arm Pressures, and Doppler Waveforms - items #1 and #2 on the upper arterial menu.

CAROTID STUDY

If you press the 5 key (CAROTID STUDY) from the main menu, the Carotid study location screen will appear:

- CAROTID STUDY
- 1) RIGHT CAROTID
 - 2) LEFT CAROTID

To perform the Carotid artery study, the patient should be supine with head turned towards the left; thus exposing the Right Common Carotid Artery. Attach the 5 Mhz Doppler probe to the Freedom V and press the 1 key (RIGHT CAROTID). Locate the Right Common Carotid artery between the Clavicle and Adam's apple with the Doppler probe pointing **toward** the head (**NOTE:** the Freedom V internally inverts the signal for the Carotid study). Maintain the proper Doppler probe angle (between 30 and 60 degrees) and maneuver the probe to obtain the maximum audible Doppler sounds, with no venous sounds (venous flow is heard as a steady, non-pulsatile "Whoosh"). The Doppler signal strength can also be determined by the movement of the bargraph on the bargraph screen or by pressing the 5 key to view a real-time waveform. The movement of the bargraph can be adjusted with the GAIN keys (see GAIN section). The baseline cannot be changed (from 5 mm above the bottom of the chart) in the Carotid study. This allows the Peak Systolic Frequency (PSF) and the End Diastolic Frequency (EDF) to be printed on each carotid waveform trailer.

Repeat the process on Left Common Carotid artery. (NOTE: this study can also be performed on the Internal and External Carotid arteries if desired.)

GENERAL TESTS

If you press the 6 key (GENERAL TESTS) at the main menu, the general tests menu will appear:

- GENERAL TESTS
- 1) DOPPLER WAVEFORM
 - 2) PPG WAVEFORM
 - 3) VENOUS PPG
 - 4) PNEUMO WAVEFORM

This menu allows the user to choose any of the Freedom V's modalities to perform studies that are not on the Freedom V's menu.

PRESSURE RESULTS

Pressing the 7 key (PRESSURE RESULTS) from the main menu will show the pressures that the user has captured and will allow editing of those pressures. To edit captured pressures, move the underline cursor to the location to be edited (using the ENTER and BACK keys) and raise or lower the pressure (using the up and down GAIN keys). Use the footpedal, remote-red button or RUN key to print the pressure results and then press the FUNCTION key to return to the main menu. To clear all the captured pressures from memory, select a new test and then press the ENTER key when the pressure warning screen appears.

SOFTWARE INSTRUCTIONS

SYSTEM START-UP

When you first turn on the Freedom V system, it performs an internal memory test. If the test fails, the message:

MEMORY FAILURE
PRESS ANY KEY

will appear on the screen. After pressing a key on the keyboard, the Freedom V will attempt to continue as if nothing had happened. A power cycle (see TURNING SYSTEM ON AND OFF section) is recommended after the receipt of this message. If this problem persists, contact Unetixs customer service for assistance. Normally, this screen should **never** be shown.

After the memory test, the keyboard is checked to see if either the FUNCTION or ENTER keys are pressed. If the FUNCTION key is pressed, the system will proceed to the setup menu (see SETUP MENU section). If the ENTER key is pressed, the system will proceed to the diagnostics menu (see DIAGNOSTICS MENU section). If no keys are pressed, the system will show the Freedom V logo screen:

freedom v

by:
UNETIXS
PRESS ANY KEY V1.55

This screen shows the Freedom V's software version (V1.55) in the lower right hand corner. If the FREOUT option is set (see SETUP MENU section), then the system will automatically advance to show the main menu (see MAIN MENU section) after 6 seconds. If the FREOUT option is not set, then a key must be pressed to continue on to the main menu (see MAIN MENU section). This should be the only time that the Freedom V logo screen is shown. To re-show the Freedom V logo screen, a power-cycle of the system is required (see TURNING SYSTEM ON AND OFF section).

BATTERY MONITORING

The Freedom V's battery capacity is monitored whenever the Freedom V system is turned on. When the battery capacity decreases past a full charge, the green power light (above the POWER key) will flash at a rate of once per second.

AUTO-SHUTOFF

After 14 minutes of no keyboard, footpedal, or remote-red button activity, the screen will begin to flash at a rate of about twice per second. If no activity persists for an additional minute, the Freedom V will turn itself off. Note that even though the screen is flashing, the system will continue to operate normally. To clear the flashing screen and/or reset the 14 minute activity countdown, activate the keyboard, footpedal or remote-red button (**NOTE:** this activation will have its normal affect on system operation).

The Freedom V system also has a software self-check built into itself. If an internal software error occurs, the system may turn itself off without warning. If this appears to occur repetitiously, contact Unetixs customer service for assistance.

MAIN MENU

The contents of the main menu are as follows:

I.D.:NOT ENTERED

This shows the current patient I.D. that will be placed on all printouts. Use main menu option #1 to change the patient I.D.. Note that the I.D. will be 'NOT ENTERED' whenever it is empty.

1) SET PATIENT I.D.

This selection will allow you to modify the patient I.D.. Pressing the 1 key will cause the screen to show the following:

I.D.:NOT ENTERED
BACK) BACKSPACE
FUNCTION) EXIT
ENTER) CLEAR

Pressing then ENTER key will clear any entered I.D. information and restore the I.D. to 'NOT ENTERED'. The FUNCTION key will return to the main menu. The number keys (0, 1, 2, 3, 4, 5, 6, 7, 8 or 9) will each enter itself as one number into the patient I.D.. The ◀BACK key will remove the last entered number. When the first number key is pressed, the 'NOT ENTERED' message will disappear and the entered number will be shown in its place. It is possible to remove all numbers with the ◀BACK key. **NOTE:** If the IDFORM option is set (see SETUP MENU section), then a '-' character will automatically be inserted into (or deleted from) the fourth and seventh positions of the patient I.D.. A maximum of eleven numbers or '-' characters may entered into the patient I.D..

2) LOWER ARTERIAL

This selection will advance you (see STUDY SELECTION section) to a menu of patient study sequences that test the arterial system of the patient's legs.

3) LOWER VENOUS

This selection will advance you (see STUDY SELECTION section) to a menu of patient study sequences that test the venous system of the patient's legs.

4) UPPER ARTERIAL

This selection will advance you (see STUDY SELECTION section) to a menu of patient study sequences that test the arterial system of the patient's arms.

5) CAROTID STUDY

This selection will advance you (see STUDY SELECTION section) to a menu of patient study sequences that test the patient's carotid arteries.

6) GENERAL TESTS

This selection will advance you (see STUDY SELECTION section) to a menu of probe selections.

7) PRESSURE RESULTS

This selection will attempt to show the pressures that have been captured and allow editing of those pressures (see PRESSURE RESULTS section). Pressing the 7 key will have no effect unless one of the pressure studies has been selected (see STUDY SELECTION section).

Other keyboard keys that are active when the main menu is shown are:

- FUNCTION key

The FUNCTION key (see FUNCTION KEY section) will attempt to show either the bargraph (see BARGRAPH SCREEN section) or waveform (see WAVEFORM SCREEN section) screens depending on the setting of the SCRDEF option (see SETUP MENU section). Note that if no study is selected, the screen:

NO STUDY SELECTED.
PRESS ANY KEY

will be shown. This is to remind the errant user to use the #2-6 options of the main menu first. When this screen is shown, the user must then press a perfunctory key to return to the main menu.

- FEED key

The FEED key will attempt to feed paper until all keys are released.

- GAIN keys

The GAIN keys will temporarily adjust the screen's contrast. To permanently set the contrast, use the setup menu (see SETUP MENU section).

PRESSURE RESULTS

The pressure results screen can be shown in three ways:

1. Pressing the 7 key from the main menu.
2. Capturing the last pressure in a pressure study sequence.
3. Pressing the FUNCTION key during a pressure study sequence.

Pressures that have a value of zero will not be shown or printed (shown with blanks). Pressing the FUNCTION key will cause the main menu to be shown (see MAIN MENU section). Pressing the RUN key, footpedal or remote-red button will cause the pressures to be printed with header information (see PRINTER section). Pressing the FEED key will attempt to feed paper until all keys are released. The four pressure result screens are:

1) Lower arterial segmental pressures (right side is with the TWOABI option set)

| RIGHT | | LEFT | RIGHT | | LEFT |
|-------|------------|------|-------|------------|------|
| 300 | BRACHIAL | 300 | 300 | BRACHIAL | 300 |
| 300 | HIGH THIGH | 300 | 300 | HIGH THIGH | 300 |
| 300 | ABOVE KNEE | 300 | 300 | ABOVE KNEE | 300 |
| 300 | BELOW KNEE | 300 | 300 | BELOW KNEE | 300 |
| 300 | ANKLE | 300 | 300 | ANKLE D.P. | 300 |
| 1.00 | ABI | 1.00 | 300 | ANKLE P.T. | 300 |
| | | | 1.00 | ABI | 1.00 |

2) Lower arterial toe pressures

| RIGHT | | LEFT |
|-------|-----------|------|
| 300 | GREAT TOE | 300 |
| 300 | TOE 2 | 300 |
| 300 | TOE 3 | 300 |
| 300 | TOE 4 | 300 |
| 300 | TOE 5 | 300 |

3) Upper arterial segmental pressures

| RIGHT | | LEFT |
|-------|------------|------|
| 300 | UPPER ARM | 300 |
| 300 | FOREARM | 300 |
| 300 | WRIST | 300 |
| 300 | INDEX FING | 300 |

4) Upper arterial finger pressures

| RIGHT | | LEFT |
|-------|------------|------|
| 300 | THUMB | 300 |
| 300 | INDEX FING | 300 |
| 300 | FINGER 3 | 300 |
| 300 | FINGER 4 | 300 |
| 300 | FINGER 5 | 300 |

There is an underline cursor that is shown on all four screens. It can be moved, using the ◀BACK and ENTER keys, to any of the pressure locations on the screen. The pressure at the cursor can be changed with the up or down GAIN keys. The range of a pressure is 0 (blank) to 300. All pressures in the Freedom V are shown in mm/Hg (millimeters of mercury).

There is a right and left ABI (see ANKLE BRACHIAL INDEX section) that is shown with the lower arterial segmental pressures. The ABI for a particular side is only shown when both brachial pressures and at least one of the ankle pressures for that side are all not 0. If any one of the three pressures is 0 then the respective ABI will not be shown (shown with blanks). The ABI is calculated by dividing the ankle pressure by the larger of the two brachial pressures. The showable range of the ABI is from 0.00 to 2.55. If the ABI is more than 2.55 then *.* is shown in its place. Changes in the ABI are immediately shown when any of the pertinent pressures are changed.

Any captured pressures will remain intact until new pressures are captured over the old ones or until a new study is selected (see STUDY SELECTION section). For purposes of pressure results, the upper and lower arterial combined studies are the same as their respective individual segmental pressure studies.

STUDY SELECTION

When any one of the 2 through 6 keys are pressed from the main menu, this means that the user desires to begin a new patient study. But, if the previously selected study was a pressure study and there is at least one pressure that is non-zero, the following message will be shown:

```
      ** WARNING **  
      CAPTURED PRESSURES  
      MAY BE ERASED.  
      FUNCTION) EXIT  
      ENTER) CONTINUE
```

If this screen appears, the user must press either the FUNCTION or ENTER key. If the FUNCTION key is pressed, then study selection is aborted and the main menu will be shown (see MAIN MENU section). If the ENTER key is pressed, then the menu originally selected from the main menu will be shown and study selection will continue. If the previous study was not a pressure study, then the selected menu will be immediately shown.

Once any study selection menu is shown, there are no longer any studies that are considered selected nor any captured pressures. A study selection menu consists of a header line at the top of the screen, up to six menu items, and possibly the line 'ENTER) MORE...' at the bottom of the screen. The 'ENTER) MORE...' line is only shown for those menus that have more than six items. If a menu has more than six items, pressing the ENTER key will allow the user to cycle through all menu items. Currently the maximum number of items for any menu is 20 items (4 different screens for the same menu). Note that it is necessary to press the ENTER key to select items that are not shown on the screen; i.e. you can only select from the six items that are currently shown on the screen.

Pressing the FUNCTION key while any selection menu is shown will automatically return you to the main menu (see MAIN MENU section). Note that at this point the user will be at the main menu with no study selected. (see FUNCTION key description in the MAIN MENU section).

The six (or less) menu items are each shown with the numbers 1 through 6 [1), 2), etc...] on their left. Pressing any one of the 1 through 6 keys will engage the response listed for that key. If the response is another menu then that menu will then be shown. Note that the previous menu will no longer be accessible except by first returning to the main menu. The only other number key response is to go to either the bargraph (see BARGRAPH SCREEN section) or waveform (see WAVEFORM SCREEN section) screen depending on the setting of the SCRDEF option (see SETUP MENU section).

Before either of the bargraph or waveform screens are shown, a study location group, probe, default speed, and default gain are selected (see STUDY PROFILES section). The Doppler probe (if selected) is set to normal (not inverted) and to 8 MHz (instead of 5). The baseline is set to an appropriate place for the selected study. Note that the 5 MHz probe and inversion are set for the Carotid study (the 5 MHz cannot be changed).

Default baseline settings (paper is 40 mm wide) are:

- Carotid Study at 5 mm from the bottom of the chart and cannot be changed.
- Venous Outflow study at 5 mm from the bottom of the chart.
- Venous Refill study at 5 mm from the top of the chart.
- All other studies at 10 mm from the bottom of the chart.

STUDY PROFILES

On this and the following pages, each box represents the study location group that is selected for the bargraph (see BARGRAPH SCREEN section) or waveform (see WAVEFORM SCREEN section) screens. Also shown is the location selection number, the active probe, the default gain, the default speed and whether or not the location is for capturing a pressure. The default gain and speed are **only** used when the study group is first selected (see STUDY SELECTION section). Note that any changes that the user makes to the gain, speed and baseline will remain in effect until a new study is selected. Double bar lines separate different study location screens. Pressure study locations are shown as having two probes that can be selected (the secondary probe is shown in parenthesis). The location group boxes are:

LOWER ARTERIAL DOPPLER WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|---------------------------|---------------|-------|------|
| 1 | RIGHT DORSALIS PEDIS | 8 MHz Doppler | 25 | 4 |
| 2 | RIGHT POSTERIOR TIBIAL | 8 MHz Doppler | 25 | 4 |
| 3 | RIGHT POPLITEAL | 8 MHz Doppler | 25 | 4 |
| 4 | RIGHT SUPERFICIAL FEMORAL | 8 MHz Doppler | 25 | 4 |
| 5 | RIGHT COMMON FEMORAL | 8 MHz Doppler | 25 | 4 |
| 6 | LEFT DORSALIS PEDIS | 8 MHz Doppler | 25 | 4 |
| 1 | LEFT POSTERIOR TIBIAL | 8 MHz Doppler | 25 | 4 |
| 2 | LEFT POPLITEAL | 8 MHz Doppler | 25 | 4 |
| 3 | LEFT SUPERFICIAL FEMORAL | 8 MHz Doppler | 25 | 4 |
| 4 | LEFT COMMON FEMORAL | 8 MHz Doppler | 25 | 4 |

LOWER ARTERIAL PPG TOE WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|-----------------|--------|-------|------|
| 1 | RIGHT GREAT TOE | PPG AC | 25 | 4 |
| 2 | RIGHT TOE 2 | PPG AC | 25 | 4 |
| 3 | RIGHT TOE 3 | PPG AC | 25 | 4 |
| 4 | RIGHT TOE 4 | PPG AC | 25 | 4 |
| 5 | RIGHT TOE 5 | PPG AC | 25 | 4 |
| 6 | LEFT GREAT TOE | PPG AC | 25 | 4 |
| 1 | LEFT TOE 2 | PPG AC | 25 | 4 |
| 2 | LEFT TOE 3 | PPG AC | 25 | 4 |
| 3 | LEFT TOE 4 | PPG AC | 25 | 4 |
| 4 | LEFT TOE 5 | PPG AC | 25 | 4 |

LOWER ARTERIAL PNEUMO WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|-----------|-------|------|
| 1 | RIGHT ANKLE | Pneumo AC | 25 | 4 |
| 2 | RIGHT BELOW KNEE | Pneumo AC | 25 | 4 |
| 3 | RIGHT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 4 | RIGHT HIGH THIGH | Pneumo AC | 25 | 4 |
| 5 | LEFT ANKLE | Pneumo AC | 25 | 4 |
| 6 | LEFT BELOW KNEE | Pneumo AC | 25 | 4 |
| 1 | LEFT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 2 | LEFT HIGH THIGH | Pneumo AC | 25 | 4 |

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|-----------------|-----------|-------|------|
| 3 | RIGHT GREAT TOE | Pneumo AC | 25 | 4 |
| 4 | RIGHT TOE 2 | Pneumo AC | 25 | 4 |
| 5 | RIGHT TOE 3 | Pneumo AC | 25 | 4 |
| 6 | RIGHT TOE 4 | Pneumo AC | 25 | 4 |
| 1 | RIGHT TOE 5 | Pneumo AC | 25 | 4 |
| 2 | LEFT GREAT TOE | Pneumo AC | 25 | 4 |
| 3 | LEFT TOE 2 | Pneumo AC | 25 | 4 |
| 4 | LEFT TOE 3 | Pneumo AC | 25 | 4 |
| 5 | LEFT TOE 4 | Pneumo AC | 25 | 4 |
| 6 | LEFT TOE 5 | Pneumo AC | 25 | 4 |

LOWER ARTERIAL TOE PRESSURES

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|-----------------|------------------------|-------|------|
| 1 | RIGHT GREAT TOE | PPG AC (8 MHz Doppler) | 10 | 4 |
| 2 | RIGHT TOE 2 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 3 | RIGHT TOE 3 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 4 | RIGHT TOE 4 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 5 | RIGHT TOE 5 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 6 | LEFT GREAT TOE | PPG AC (8 MHz Doppler) | 10 | 4 |
| 1 | LEFT TOE 2 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 2 | LEFT TOE 3 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 3 | LEFT TOE 4 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 4 | LEFT TOE 5 | PPG AC (8 MHz Doppler) | 10 | 4 |

LOWER ARTERIAL ABI/SEGMENTAL PRESSURES (TWOABI option not set)

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|------------------------|-------|------|
| 1 | RIGHT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ANKLE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 4 | RIGHT ANKLE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 6 | RIGHT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | RIGHT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 4 | LEFT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |

LOWER ARTERIAL ABI/SEGMENTAL PRESSURES (TWOABI option set)

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|------------------------|-------|------|
| 1 | RIGHT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ANKLE D.P. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 4 | LEFT ANKLE P.T. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT ANKLE D.P. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 6 | RIGHT ANKLE P.T. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | RIGHT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | RIGHT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | RIGHT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 4 | LEFT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 6 | LEFT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |

LOWER ARTERIAL COMBINED STUDY (TWOABI option not set)

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|------------------------|-------|------|
| 1 | RIGHT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ANKLE | Pneumo AC | 25 | 4 |
| 4 | LEFT ANKLE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT ANKLE | Pneumo AC | 25 | 4 |
| 6 | RIGHT ANKLE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | RIGHT BELOW KNEE | Pneumo AC | 25 | 4 |
| 2 | RIGHT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | RIGHT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 4 | RIGHT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT HIGH THIGH | Pneumo AC | 25 | 4 |
| 6 | RIGHT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | LEFT BELOW KNEE | Pneumo AC | 25 | 4 |
| 2 | LEFT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 4 | LEFT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT HIGH THIGH | Pneumo AC | 25 | 4 |
| 6 | LEFT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |

LOWER ARTERIAL COMBINED STUDY (TWOABI option set)

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|------------------------|-------|------|
| 1 | RIGHT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT BRACHIAL | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT ANKLE | Pneumo AC | 25 | 4 |
| 4 | LEFT ANKLE D.P. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT ANKLE P.T. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 6 | RIGHT ANKLE | Pneumo AC | 25 | 4 |
| 1 | RIGHT ANKLE D.P. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | RIGHT ANKLE P.T. | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | RIGHT BELOW KNEE | Pneumo AC | 25 | 4 |
| 4 | RIGHT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 6 | RIGHT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | RIGHT HIGH THIGH | Pneumo AC | 25 | 4 |
| 2 | RIGHT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT BELOW KNEE | Pneumo AC | 25 | 4 |
| 4 | LEFT BELOW KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT ABOVE KNEE | Pneumo AC | 25 | 4 |
| 6 | LEFT ABOVE KNEE | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | LEFT HIGH THIGH | Pneumo AC | 25 | 4 |
| 2 | LEFT HIGH THIGH | 8 MHz Doppler (PPG AC) | 25 | 4 |

LOWER VENOUS

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|----------------------|-----------|-------|------|
| 1 | RIGHT VENOUS OUTFLOW | Pneumo DC | 1 | 4 |
| 2 | LEFT VENOUS OUTFLOW | Pneumo DC | 1 | 4 |

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|---------------------|--------|-------|------|
| 3 | RIGHT VENOUS REFILL | PPG DC | 2 | 8 |
| 4 | LEFT VENOUS REFILL | PPG DC | 2 | 8 |

UPPER ARTERIAL DOPPLER WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|------------------|---------------|-------|------|
| 1 | RIGHT ULNAR | 8 MHz Doppler | 25 | 4 |
| 2 | RIGHT RADIAL | 8 MHz Doppler | 25 | 4 |
| 3 | RIGHT BRACHIAL | 8 MHz Doppler | 25 | 4 |
| 4 | RIGHT AXILLARY | 8 MHz Doppler | 25 | 4 |
| 5 | RIGHT SUBCLAVIAN | 8 MHz Doppler | 25 | 4 |
| 6 | LEFT ULNAR | 8 MHz Doppler | 25 | 4 |
| 1 | LEFT RADIAL | 8 MHz Doppler | 25 | 4 |
| 2 | LEFT BRACHIAL | 8 MHz Doppler | 25 | 4 |
| 3 | LEFT AXILLARY | 8 MHz Doppler | 25 | 4 |
| 4 | LEFT SUBCLAVIAN | 8 MHz Doppler | 25 | 4 |

UPPER ARTERIAL PPG FINGER WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|----------------|--------|-------|------|
| 1 | RIGHT THUMB | PPG AC | 25 | 4 |
| 2 | RIGHT FINGER 2 | PPG AC | 25 | 4 |
| 3 | RIGHT FINGER 3 | PPG AC | 25 | 4 |
| 4 | RIGHT FINGER 4 | PPG AC | 25 | 4 |
| 5 | RIGHT FINGER 5 | PPG AC | 25 | 4 |
| 6 | LEFT THUMB | PPG AC | 25 | 4 |
| 1 | LEFT FINGER 2 | PPG AC | 25 | 4 |
| 2 | LEFT FINGER 3 | PPG AC | 25 | 4 |
| 3 | LEFT FINGER 4 | PPG AC | 25 | 4 |
| 4 | LEFT FINGER 5 | PPG AC | 25 | 4 |

UPPER ARTERIAL PNEUMO WAVEFORM

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|-----------------|-----------|-------|------|
| 1 | RIGHT WRIST | Pneumo AC | 25 | 4 |
| 2 | RIGHT FOREARM | Pneumo AC | 25 | 4 |
| 3 | RIGHT UPPER ARM | Pneumo AC | 25 | 4 |
| 4 | LEFT WRIST | Pneumo AC | 25 | 4 |
| 5 | LEFT FOREARM | Pneumo AC | 25 | 4 |
| 6 | LEFT UPPER ARM | Pneumo AC | 25 | 4 |

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|----------------|-----------|-------|------|
| 1 | RIGHT THUMB | Pneumo AC | 25 | 4 |
| 2 | RIGHT FINGER 2 | Pneumo AC | 25 | 4 |
| 3 | RIGHT FINGER 3 | Pneumo AC | 25 | 4 |
| 4 | RIGHT FINGER 4 | Pneumo AC | 25 | 4 |
| 5 | RIGHT FINGER 5 | Pneumo AC | 25 | 4 |
| 6 | LEFT THUMB | Pneumo AC | 25 | 4 |
| 1 | LEFT FINGER 2 | Pneumo AC | 25 | 4 |
| 2 | LEFT FINGER 3 | Pneumo AC | 25 | 4 |
| 3 | LEFT FINGER 4 | Pneumo AC | 25 | 4 |
| 4 | LEFT FINGER 5 | Pneumo AC | 25 | 4 |

UPPER ARTERIAL COMBINED STUDY

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|--------------------|------------------------|-------|------|
| 1 | RIGHT UPPER ARM | Pneumo AC | 25 | 4 |
| 2 | RIGHT UPPER ARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | RIGHT FOREARM | Pneumo AC | 25 | 4 |
| 4 | RIGHT FOREARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | RIGHT WRIST | Pneumo AC | 25 | 4 |
| 6 | RIGHT WRIST | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | RIGHT INDEX FINGER | Pneumo AC | 25 | 4 |
| 2 | RIGHT INDEX FINGER | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT UPPER ARM | Pneumo AC | 25 | 4 |
| 4 | LEFT UPPER ARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT FOREARM | Pneumo AC | 25 | 4 |
| 6 | LEFT FOREARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | LEFT WRIST | Pneumo AC | 25 | 4 |
| 2 | LEFT WRIST | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | LEFT INDEX FINGER | Pneumo AC | 25 | 4 |
| 4 | LEFT INDEX FINGER | 8 MHz Doppler (PPG AC) | 25 | 4 |

UPPER ARTERIAL FINGER PRESSURES

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|----------------|------------------------|-------|------|
| 1 | RIGHT THUMB | PPG AC (8 MHz Doppler) | 10 | 4 |
| 2 | RIGHT FINGER 2 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 3 | RIGHT FINGER 3 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 4 | RIGHT FINGER 4 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 5 | RIGHT FINGER 5 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 6 | LEFT THUMB | PPG AC (8 MHz Doppler) | 10 | 4 |
| 1 | LEFT FINGER 2 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 2 | LEFT FINGER 3 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 3 | LEFT FINGER 4 | PPG AC (8 MHz Doppler) | 10 | 4 |
| 4 | LEFT FINGER 5 | PPG AC (8 MHz Doppler) | 10 | 4 |

UPPER ARTERIAL SEGMENTAL PRESSURE

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|--------------------|------------------------|-------|------|
| 1 | RIGHT UPPER ARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | RIGHT FOREARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 3 | RIGHT WRIST | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 4 | RIGHT INDEX FINGER | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 5 | LEFT UPPER ARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 6 | LEFT FOREARM | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 1 | LEFT WRIST | 8 MHz Doppler (PPG AC) | 25 | 4 |
| 2 | LEFT INDEX FINGER | 8 MHz Doppler (PPG AC) | 25 | 4 |

CAROTID STUDY

| SELECT | LOCATION | PROBE | SPEED | GAIN |
|--------|---------------|-------------------------------|-------|------|
| 1 | RIGHT CAROTID | 5 MHz Doppler(Unidirectional) | 25 | 4 |
| 2 | LEFT CAROTID | 5 MHz Doppler(Unidirectional) | 25 | 4 |

GENERAL TESTS

| SELECT | TEST | PROBE | SPEED | GAIN |
|--------|------------------|---------------|-------|------|
| 1 | DOPPLER WAVEFORM | 8 MHz Doppler | 25 | 4 |
| 2 | PPG WAVEFORM | PPG AC | 25 | 4 |
| 3 | VENOUS PPG | PPG DC | 2 | 8 |
| 4 | PNEUMO WAVEFORM | Pneumo AC | 25 | 4 |

GAIN

The gain controls on the Freedom V allow the user to enlarge or compress waveforms before they are printed. Typically, a waveform's deflection should take up at least half of the waveform area (20 of the 40 mm on the printouts and bargraph). If the gain is set too high, then left or right arrows may appear on the bargraph (see BARGRAPH SCREEN section). If only one of the arrows is shown, the baseline keys may be used to center the waveform. The typical values for gain are 1, 1.5, 2, 3, 4, 6, 8, 12 and 16 (no units). Sometimes, when the Doppler probe is used, the gain values are, respectively, 384, 256, 192, 128, 96, 64, 48, 32 and 24 Hertz of Doppler shift per millimeter of deflection (see DOPGAN option in SETUP MENU section). A waveform printed at gain 8 will have twice as much deflection as the same waveform printed at gain 4. Thus as the gain goes up from 1 to 16 the waveform's sensitivity to change increases by a factor of 16. The gains, in order of increasing waveform size, are:

| | |
|-----|-----------|
| 1 | 384 Hz/mm |
| 1.5 | 256 Hz/mm |
| 2 | 192 Hz/mm |
| 3 | 128 Hz/mm |
| 4 | 96 Hz/mm |
| 6 | 64 Hz/mm |
| 8 | 48 Hz/mm |
| 12 | 32 Hz/mm |
| 16 | 24 Hz/mm |

SPEED

The SPEED key on the Freedom V allows the user to change the chart speed of the printer. The selectable chart speeds are 1, 2, 5, 10 and 25. All chart speeds are shown in millimeters per second (mm/sec.). The grid on printed waveforms (see PRINTER section) is shown with 1 millimeter demarkations. The default chart speed for all waveforms is 25 but 10 is sometimes used for PPG waveforms. The typical chart speed for venous studies is 1 or 2 but sometimes 5 is used. The SPEED key allows the user to change the chart speed from 25 to 10, 10 to 5, 5 to 2, 2 to 1 or 1 to 25.

BARGRAPH SCREEN

The bargraph screen is called such because of the bargraph indicator at the bottom of the screen. This screen and the waveform screen (see **WAVEFORM SCREEN** section) are the only screens from which the user may capture pressures or print waveforms. The bargraph screen also shows a text representation of the current study (test), study location, active probe, probe gain, and printer chart speed. The manometer is also shown in large (easy to read) numbers. The text fields are as follows:

TST: This shows the currently selected study (test).

LOC: This shows the currently active location (see **STUDY PROFILES** section).

PRB: This shows the currently active probe and modality. The possible contents are:

| | | |
|-------------|-----------------|-----------------|
| • PNEUMO AC | • PPG AC | • PNEUMO DC |
| • PPG DC | • 5 MHZ DOPPLER | • 8 MHZ DOPPLER |

GAIN: This shows the currently active gain. See the **GAIN** section for a description of what is shown here.

SPD: This shows the currently active chart speed. See the **SPEED** section for a description of what is shown here.

MANOMETER: This shows the current pressure in the pneumoplethysmograph. Its range is 0-300 mm/Hg. This field is automatically updated twice each second.

TIME: This shows the amount of time left (in a countdown fashion) for the lower venous studies. This is only shown at specific times during these studies.

The bargraph at the bottom of the screen gives the user a visual representation of the pen position on the chart printer. It also shows the baseline of the data as a raised graticule. The width of the bargraph on the screen is the same as the width of the paper (40 mm). Also, there are arrows to the left and right of the bargraph which are shown when the real-time probe data overflows past the edge of the bargraph (and paper too!). Both the bargraph and manometer are constantly being updated whenever the bargraph screen is shown.

The keyboard is active while the bargraph screen is shown. The functions that the keys perform are as follows:

- **GAIN UP** key - This key will cause the active gain to become higher (see **GAIN** section). This key will have no effect at gain 16 (20 Hz/mm). This key has no effect when the printer is running.
- **GAIN DOWN** key - This key will cause the active gain to become lower (see **GAIN** section). This key will have no effect at gain 1 (320 Hz/mm). This key has no effect when the printer is running.
- **BASELINE LEFT** key - This key moves the baseline to the left (or up on the waveform screen). The bargraph screens' bargraph baseline (the raised graticule) may not be visually affected by this key; but the change can always be seen on the printer. This is due to a 3.28 to 1 resolution difference between the display screen and the printer. Thus, it may require up to four presses of this key to visually see the baseline move on the screen. This key can be held down to speed up the movement of baseline to the left (or up). This key will have no effect if the baseline is already all the way to the left (or top). This key has no effect in the Carotid study.
- **BASELINE RIGHT** key - This key moves the baseline to the right (or down on the waveform screen). The bargraph screens' bargraph baseline (the raised graticule) may not be visually affected by this key; but the change can always be seen on the printer. This is due to a 3.28 to 1 resolution difference between the display screen and the printer. Thus, it may require up to four presses of this key to visually see the baseline move on the screen. This key can be held down to speed up the movement of baseline to the right (or down). This key will have no effect if the baseline is already all the way to the right (or bottom). This key has no effect in the Carotid study.
- **FUNCTION** key - This key will cause an exit to either the main menu or the pressure results screen

(see FUNCTION KEY section). If this key is pressed while the printer is running, the RUN key will automatically be pressed for the user before the exit takes effect.

- **FOOTPEDAL, REMOTE-RED BUTTON, or RUN key** - This key controls the running of the printer and the capturing of pressures (see AUTOSEQUENCE section).
- **SPEED key** - This key controls the speed of the printer (see SPEED section). All speeds are in mm/second. Presses of this key can cause the speed to go from 25 to 10, 10 to 5, 5 to 2, 2 to 1, or from 1 back to 25. The speed cannot be changed while the printer is running.
- **FEED key** - This key causes the printer to feed blank paper at 25 mm/second. Paper will continue to feed until the footpedal, remote-red button and all the keys on the keyboard are released. This key will have no effect if the printer is already running.
- **1 key** - This key increases (darkens) the screen contrast a little bit. It must be repeatedly pressed in order to cause dramatic changes in the contrast.
- **2 key** - This key decreases (lightens) the screen contrast a little bit. It must be repeatedly pressed in order to cause dramatic changes in the contrast.
- **3 key** - This key is only active if either the 5 or 8 MHZ arterial Doppler probe is active. When this is true, this key causes the flow directions to be reversed on the screen and printer.
- **4 key** - This key is only active when either the 5 or 8 MHZ arterial Doppler probe is active. When this is true, this key causes the active probe field to toggle between 5 and 8 MHZ. This key will have no effect if the printer is running.
- **5 key** - This key will cause the waveform screen to be shown (see WAVEFORM SCREEN section). Conversely, if the waveform screen is shown, this key will cause the bargraph screen to be shown. If the printer is running, then the RUN key (see RUN key in this section) will automatically be pressed before this key takes effect.
- **6 key** - This key is only active when one of the 4 pressure studies is selected (see STUDY SELECTION and PRESSURE RESULTS section). This key allows the user to toggle between the Doppler and PPG as active probes. Note that any Doppler inversion (see 3 key in this section) will be cleared by this key. Also, the speed will be set to 10 mm/second for the PPG probe and 25 mm/second for the Doppler probe.
- **7 key** - This key sets the baseline at 10 mm from the left (or 30 mm from the right) of the chart (the right side is usually the bottom of a waveform). This key has no effect in the Carotid study.
- **8 key** - This key sets the baseline to the middle of the chart. This key has no effect in the Carotid study.
- **9 key** - This key sets the baseline at 30 mm from the left (or 10 mm from the right) of the chart (the right side is usually the bottom of a waveform). This key has no effect in the Carotid study.
- **0 key** - This key is only active during either of the two lower venous studies (see LOWER VENOUS STUDIES section). Its purpose is to move the current placement of the DC probe data to the current placement of the baseline.
- **ENTER key** - This key will allow the user to advance through the locations of a studies' autosequence (see AUTOSEQUENCE section). The test and location fields may be changed by the pressing of this key. This key will have no effect if the last location of the study is already shown (see STUDY PROFILES section). This key will also have no effect while the printer is running.
- **◀BACK key** - This key will allow the user to back up through the locations of a studies' autosequence (see AUTOSEQUENCE section). The test and location fields may be changed by the pressing of this key. This key will have no effect if the first location of the study is already shown (see STUDY PROFILES section). This key will also have no effect while the printer is running.

WAVEFORM SCREEN

The waveform screen gives the user a visual real-time waveform. Since this requires the entire resources of the display, no text fields can be shown with this screen. Instead, this screen gives a moving visual representation of baseline, printer pen position, and printer speed. The probe's output trace data moves onto the screen from the right side and off the screen on the left side. It moves at a speed equal to that of the printer (see SPEED section). The keyboard for the waveform screen is exactly the same as the bargraph screen's keyboard (see BARGRAPH SCREEN section) except for the 5 key which goes to the bargraph screen instead of this screen. Note that there is a small hesitation in the screen's speed that may be noticed when pressing the footpedal, remote-red button or RUN key to start a waveform printout. There are two important differences between the bargraph and waveform screens:

- **BASELINE keys**

There is a 4 to 1 resolution difference between the display screen and the printer. The bargraph screen has only a 3.28 to 1 resolution difference.

- **Waveform size**

The size for the waveform screen's waveform is slightly compressed from both the bargraph screen's bargraph and the printer. The waveform is only compressed by 17 percent.

VENOUS OUTFLOW STUDY

The venous outflow test has some differences in the way the Freedom V bargraph and waveform screens react to this study. The differences are:

- **Bargraph screen**

This screen is normal until the footpedal, remote-red button or RUN key is pressed for the first time. Once pressed, a 'TIME: 141' field is shown below the manometer field. This field will decrement once a second until the value of 1 is shown. This field is shown to tell the user when to blow the occlusion cuff (A time of two minutes (TIME: 20) of inflow is recommended for this study).

- **RUN key**

When the footpedal, remote-red button or RUN key is pressed for the second time, the printer speed is changed to 25 mm/second and the printer is run for at least 3 more seconds. This is done to print the waveform pattern for at least 3 seconds after the occlusion cuff is blown. Thus the user should press the footpedal, remote-red button or RUN key at the same time as the occlusion cuff is blown.

- **Printout**

After the extra 3 seconds of waveform tracing is printed, a normal waveform information trailer is printed (see PRINTER section) with one exception. The exception is the speed field which will contain the extra text ' THEN 25'. This is done to indicate to the user that the extra 3 seconds of waveform tracing was done at 25 mm/second.

VENOUS REFILL TEST

The venous refill test has some differences in the way the Freedom V bargraph and waveform screens react to this test. The differences are:

- **Bargraph screen**

This screen is normal until the footpedal, remote-red button or RUN key is pressed for the first time. Once pressed, a 'TIME: 71' field is shown below the manometer field. This field will decrement once a second until the value of 1 is shown.

- **Automatic RUN key**

When the 'TIME:' field reaches a value of 1, the RUN key is automatically pressed a second time for the user. Note that the user can still manually press the footpedal, remote-red button or RUN key at any time before the 70 seconds has past.

AUTOSEQUENCE

Each study in the Freedom V is made up of a group of patient locations (see STUDY PROFILES section). Once a single location is selected, the entire group associated with that location is transferred to either the bargraph or waveform screen (see BARGRAPH SCREEN section). In these screens, the ◀BACK and ENTER keys allow the user to change the location within the transferred location group. Also, the footpedal, remote-red button or RUN key may cause the location to advance [autosequence] (like the ENTER key in the bargraph screen). The meaning of the footpedal, remote-red button or RUN key is as follows:

- Pressure studies

The footpedal, remote-red button or RUN key will cause the contents of the manometer (as shown on the bargraph screen or assumed on the waveform screen) to be saved at a specific memory location inside the Freedom V microprocessor for later retrieval by the pressure results screen (see PRESSURE RESULTS section). The location is advanced [autosequenced] every time the footpedal, remote-red button or RUN key is pressed. When there are no more locations to advance to, the pressure results screen will be shown.

- Waveform studies

When first pressed, the footpedal, remote-red button or RUN key will cause the printer to start printing a real-time waveform. When the footpedal, remote-red button or RUN key is pressed a second time, the wave tracing is stopped and an information trailer is printed. After the information trailer, the location is automatically advanced [autosequenced]. When there are no more locations to advance to, the main menu is shown (see MAIN MENU section). (NOTE: to redo the last locations' waveform, press the FUNCTION key until either the bargraph or waveform screens are shown. The last location of the group will still be active.)

- Combined studies

The combined studies are a combination of pressure and waveform studies. The footpedal, remote-red button and RUN key all perform the same as above for the type of test performed. Look at the 'TST:' field at the top of the bargraph screen (see BARGRAPH SCREEN section) to determine if a pressure or waveform location is currently active. At the end of capturing the last pressure, the pressure results (see PRESSURE RESULTS section) screen, **not** the main menu, will be shown.

FUNCTION KEY

The FUNCTION key typically operates as an 'exit' key. Thus, in either the setup (see SETUP MENU section) or diagnostics (see DIAGNOSTICS MENU section) menu, the FUNCTION key can be used at almost any time to exit and restart the system (see SYSTEM START-UP section). From the main menu, the FUNCTION key will try to go to either the bargraph or waveform screens depending upon the setting of the SCRDEF option (see SETUP MENU section). In either of the bargraph or waveform screens, the FUNCTION key will exit to the main menu except during pressure or combined studies where it will go to the pressure results (see PRESSURE RESULTS section) screen instead. The FUNCTION key in the pressure results screen will then exit to the main menu. When selecting a study (see STUDY SELECTION section), the FUNCTION key will always exit to the main menu.

CHARACTER SET

The display screen character set, in selection order, is:

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z , \] ^ _
' a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ■ Ç ù é á à ã ä ç è é ê ì í î ï Ì Å Æ æ Æ ö ö ù ü ÿ ÿ Ü ü Ç ç f P t f
á í ó ú ñ Ñ º ½

All of these characters are mimicked by the character set of the printer. Note that the first character (to the left of the '!') is a blank (space) character.

TIME AND DATE

The clock in the Freedom V is accurate to 1 minute per month at room temperature. The last day of the month is automatically adjusted for months with less than 31 days, and there is a correction for a leap year every 4 years. (**NOTE:** there is a double leap year for the year 2000, and the Freedom V clock will not compensate for this.) The date can be printed in month/day/year or day/month/year format depending upon the setting of the DTFORM option (see SETUP MENU section).

The time can be set to either the AM/PM format or to the 24-hour (military style) time (see SETUP MENU section). In the AM/PM format, the hours will range from 1 to 12; and in 24-hour format, the hours will range from 0 to 23. There is a 3 character time zone field that is printed to the right of the time. This field can be set to any 3 characters (see CHARACTER SET section) via the setup menu.

FOOTPEDAL

The footpedal performs the same operations as the RUN key (see AUTOSEQUENCE section) at all times. Thus the footpedal is only active for the bargraph (see BARGRAPH SCREEN section), waveform (see WAVEFORM SCREEN section), and pressure results (see PRESSURE RESULTS section) screens.

AUTO-INFLATE REMOTE CONTROL

The auto-inflate remote control hose (Freedom V only, see PARTS LIST section) has 4 individual controls as follows:

- **Black inflation bulb**
This control is operated by squeezing the bulb with all fingers except the thumb. The purpose of this is to increase the amount of air pressure in the pneumoplethysmograph.
- **Red deflation trigger**
This control is operated by **gently** pulling the trigger in front of the inflation bulb with the index finger. The purpose of this is to decrease the amount of air pressure in the pneumoplethysmograph. Note that the harder the trigger is pulled, the faster the air pressure is decreased. Also, if the trigger is pulled all the way up, it will lock in an open state. Use the open state to bleed all the air out of a cuff.
- **Black auto-inflate control button**
This control is operated by pushing the black button with the thumb. The purpose of this is to automatically increase the amount of pressure in the pneumoplethysmograph. **NOTE:** do not press this button if the Pneumo hose is attached to a DC-2.5 cuff.
- **Red software control button**
This control is operated by pushing the red button with the thumb. The function that this performs is the same as the footpedal (see FOOTPEDAL section).

MANUAL INFLATION HOSE

The manual inflation hose (Freedom VP only, see PARTS LIST section) has 2 individual controls as follows:

- **Black inflation bulb**
This control is operated by squeezing the bulb with all fingers. The purpose of this is to increase the amount of air pressure in the pneumoplethysmograph.
- **Bleed valve**
This control is operated by **gently** unscrewing the bleed valve in the front of the inflation bulb with the thumb and index finger. The purpose of this is to decrease the amount of air pressure in the pneumoplethysmograph. Note that the more the valve is unscrewed, the faster the air pressure is decreased.

SETUP MENU

To show the setup menu, hold down the FUNCTION key and press (then release) the POWER key with the system off. Keep holding down the FUNCTION key until the contents of the setup menu are shown as follows:

- 1) SET CLOCK
 - 2) SET FACILITY NAME
 - 3) SET OPTIONS
 - 4) SET CONTRAST
- FUNCTION) EXIT

Press the number keys 1, 2, 3 or 4 on the keyboard to select the item to be set. Press the FUNCTION key to restart the system (see SYSTEM START-UP section). Also, the GAIN keys may be used to temporarily adjust the screen's contrast (use option #4 to permanently set the contrast).

SET CLOCK MENU

The contents of the set clock menu is as follows:

- 1) SET DATE AND TIME
 - 2) SET TIME ZONE
- FUNCTION) EXIT

Press the 1 or 2 keys to select the item to be set. Press the FUNCTION key to return to the setup menu.

SET DATE AND TIME

This allows the user to set the time that will be printed on all printouts (see PRINTER section). A screen to allow the user to set the time is as follows:

WAS: MO/DD/YY HH:MI AP

This field shows the time when this screen was first shown.

NEW:

This field shows what will be saved to the clock if the ENTER key is pressed. This field starts out the same as the 'WAS:' field. There will be a flashing underline cursor underneath one of the parameters of the 'NEW:' field at all times.

BASELINE) SELECT

PARAMETER

By using the left and right BASELINE keys, the user can move the underline cursor to the time parameter the user wishes to change. The only parameter that can be changed is the one with the underline under it.

GAIN) CHANGE PARAMETER

By using the up and down GAIN keys, the user can increment or decrement the time parameter at the cursor. The limitations on changing individual parameters are:

MO - The MONTH field may be set from 00 to 12.

DD - The DAY field may be set from 00 to 31.

YY - The YEAR field may be set from 00 to 99.

HH - The HOURS field may be set from 00 to 23.

MI - The MINUTES field may be set from 00 to 59.

AP - The time format field may be set to AM, PM or left blank. A blank field means that the 24-hour time format is to be used. Note that the HOURS field may be corrupted, or look strange, by settings of this and the HOURS field. Incrementing and decrementing have the same effect on the time format field.

FUNCTION) EXIT

Press the FUNCTION key to return to the set clock menu **without** affecting the clock.

ENTER) EXIT AND SET

Set the clock with the information in the 'NEW:' field and return to the set clock menu. It is up to the user to make sure the time in the 'NEW:' field is correct before setting it. It is **necessary** to press the ENTER key to actually save the setting of the time.

SET TIME ZONE

This allows the user to set the 3 characters that will be printed to the right of the time on all printouts (see PRINTER section). A screen to allow the user to set the time zone is as follows:

ZONE:

This field shows the time zone string that will be shown after the AM/PM field of the time in all printouts. The length of the time zone string can be up to a maximum of 3 characters. A flashing underline cursor will always be shown under the letter of the 'ZONE:' field that can be changed.

GAIN) CHANGE LETTER

By using the up and down GAIN keys, the user can change the character (see CHARACTER SET section) shown at the underline cursor. Until one of the GAIN keys is pressed, the underline cursor position will remain empty. Press the ENTER key on an empty position to insert a blank (space) character.

ENTER) STORE LETTER

The ENTER key will move the underline cursor to the right one character, but can only go as far right as the fourth character. Note that at the fourth position, the GAIN and ENTER keys are disabled and only the ◀BACK and FUNCTION keys will work. The ENTER key will insert a blank (space) if the character at the underline cursor is empty.

<BACK) DELETE LETTER

The ◀BACK key will empty the character at the current underline cursor position and move the underline cursor to the left one position. If the underline cursor is already at the first position, then the effect of the ◀BACK key will be to empty the first character position.

FUNCTION) EXIT

This will save the time zone string to permanent storage (see EEPROM MEMORY section) and return to the set clock menu. It is **necessary** to press this key if the time zone string is to be saved.

SET FACILITY NAME

This allows the user to set the 15 characters that will be printed in the 'FAC.:' field on all printouts (see PRINTER section). A screen to allow the user to set the facility name is as follows:

FAC.:

This field shows the facility name string that will be shown on all printouts. The length of the facility name string can be a maximum of 15 characters. A flashing underline cursor will always be shown under the letter of the 'FAC.:' field that can be changed.

GAIN) CHANGE LETTER

By using the up and down GAIN keys, the user can change the character (see CHARACTER SET section) shown at the underline cursor. Until one of the GAIN keys is pressed, the underline cursor position will remain empty. Press the ENTER key on an empty position to enter a blank (space) character.

ENTER) STORE LETTER

The ENTER key will move the underline cursor to the right one character, but can only go as far right as the sixteenth character. Note that at the sixteenth position, the GAIN and ENTER keys are disabled and only the ◀BACK and FUNCTION keys will work. The ENTER key will insert a blank (space) if the character at the underline cursor is empty.

<BACK) DELETE LETTER

The ◀BACK key will empty the character at the current underline cursor position and move the underline cursor to the left one position. If the underline cursor is already at the first position, then the effect of the ◀BACK key will be to empty the first character position.

FUNCTION) EXIT

This will save the facility name string to permanent storage (see EEPROM MEMORY section) and return to the setup menu. It is **necessary** to press this key if the facility name string is to be saved.

SET OPTIONS

This allows the user to set various options that affect the operation and output of the Freedom V system. A screen to allow the user to change the options is as follows:

```
1)          0 5)FREOUT 1
2)TWOABI 0 6)SCRDEF 0
3)AUTOFD 1 7)DOPGAN 1
4)DTFORM 0 8)IDFORM 1
FUNCTION) EXIT
```

Each option can be individually toggled by pressing the key (3 through 8) associated with each option. It is **necessary** to press the FUNCTION key to save the options into permanent storage (see EEPROM MEMORY section) and exit back to the setup menu. Options 1 and 2 are for future use and should be left at 0 (off). The options are:

- **TWOABI** - Two ankle pressures
If 0, only one ankle pressure will be requested for the lower arterial ABI/segmental pressure study. If 1, two ankle pressures are requested (One using the Dorsalis Pedis Artery and the other using the Posterior Tibial Artery).
- **AUTOFD** - Auto-feed paper
If 0, **no** extra paper will be fed out of the printer. If 1, then after every printout, enough extra paper will be fed so that the entire printout will be shown outside of the printer.
- **DTFORM** - Date format
If 0, the date is printed as month/day/year. If 1, the date is printed as day/month/year. Note that this option does **not** effect the order of the day and month fields on the SET DATE AND TIME screen.
- **FREOUT** - Logo screen exit
If 0, the user will be forced to press a key to show the main menu screen after the freedom logo screen has been shown (see SYSTEM START-UP section). If 1, the main menu screen will be shown about 6 seconds after the freedom logo screen has been shown. If the user presses a key during the 6 second timeout, the timeout will be broken and the main menu screen will immediately be shown.
- **SCRDEF** - Screen default
If 0, the bargraph screen (see BARGRAPH SCREEN section) will always be shown first. If 1, the waveform screen (see WAVEFORM SCREEN section) will always be shown first.
- **DOPGAN** - Doppler gain
If 0, the gain for the Doppler probe will be normal (see GAIN section). If 1, the gain for the Doppler probe will be in Hz/mm. For the carotid (unidirectional) Doppler probe, the gain is always shown in Hz/mm.
- **IDFORM** - Patient I.D. format
If 0, dashes will **not** be automatically inserted into the patient I.D.. If 1, dashes will be automatically inserted into the patient I.D. at the fourth and seventh positions.

SET CONTRAST

This allows the user to set the contrast for both the waveform and all other screens. A screen to allow the user to set the contrast is as follows:

```
GAIN) ADJUST CONTRAST
```

Use the up and down GAIN keys to make the screen's contrast darker or lighter.

```
FUNCTION) EXIT
```

The FUNCTION key will save the contrast settings to permanent storage (see EEPROM MEMORY section) and return to the setup menu. It is **necessary** to press the FUNCTION key if the contrast settings are to be saved.

```
ENTER) MODE:
```

The ENTER key will toggle the contrast between the 'WAVEFORM' and 'NORMAL' modes. The contrast for the waveform mode should be darker than for normal mode to compensate for lightened showing of fast moving (25 mm/second) waveforms (see WAVEFORM SCREEN section).

DIAGNOSTICS MENU

To show the diagnostics menu, hold down the ENTER key and press (then release) the POWER key with the system off. Keep holding down the ENTER key until the contents of the diagnostics menu is shown as follows:

- 1) TEST PRINTER
- 2) TEST DISPLAY
- 3) TEST A/D
- 4) TEST CLOCK
- 5) TEST KEYPAD
- 6) SETUP BATTERY
FUNCTION) EXIT

Press the 1, 2, 3, 4, 5 or 6 keys to select the item to be diagnosed. Press the FUNCTION key to restart the system (see SYSTEM START-UP section). Also, the GAIN keys may be used to temporarily adjust the contrast. Use the setup menu to permanently adjust the contrast (see SETUP MENU section).

TEST PRINTER

This allows the printer to print its self-test strip. The self-test strip contains the printer's serial number, its character set, its software version number, a black square (used for optical density checking) and a graphics pattern which is used to check the printhead (for burnt out elements), pinch roller condition and paper tracking (see PRINTER section). If there is a problem, contact Unetixs customer service.

TEST DISPLAY MENU

The contents of the test display menu are as follows:

1) DOT TEST

This test will show all dots set and will then wait for any key to be pressed. Then the screen will be cleared. Again, there is a wait for a key to be pressed. Following the second key press, the test display menu will reappear.

2) CHARACTER SET

This test will show the character set (see CHARACTER SET section) and will then wait for any key to be pressed. The screen will then show the 10 large manometer numbers and all of the pieces of the bargraph screens' bargraph. Again, there is a wait for a key to be pressed. Following the second key press, the test display menu will reappear.

3) MEMORY

This test will cause the screen to be blanked for about 15 seconds while the memory of the display screen is tested. Following this, one of the following two messages:

DISPLAY MEMORY OK
OR
DISPLAY MEMORY BAD

will be shown depending upon how the memory tested. A key press is then required to return to the test display menu. If the display memory is bad, contact Unetixs customer service.

FUNCTION) EXIT

Pressing the FUNCTION key will cause a return to the diagnostics menu.

TEST A/D

The contents of the test A/D (analog to digital converter) screen is as follows:

DATA:

This field shows the current A/D data received from the currently selected A/D input. It is updated twice a second. It is shown as four hexadecimal digits.

PRB:

This shows the currently selected A/D input.

ENTER) SELECT PROBE

The ENTER key allows the user to cycle through all of the 8 different A/D inputs. They are in order as follows:

```
PNEUMO AC  
MANOMETER  
PPG AC  
BATTERY  
PNEUMO DC  
PPG DC  
5 MHZ DOPPLER  
8 MHZ DOPPLER
```

When the '8 MHZ DOPPLER' input is currently selected, the ENTER key will cause the 'PNEUMO AC' input to be selected.

FUNCTION) EXIT

The FUNCTION key will cause a return to the diagnostics menu.

TEST CLOCK

The test clock screen will first show the warning:

```
**WARNING**  
THIS TEST WILL SPOIL  
THE CURRENT TIME.  
PRESS ENTER TO TEST,  
ANY OTHER KEY TO EXIT
```

This screen is shown to tell the user that if the test is performed, the clock will have to be reset in the setup menu (see SETUP MENU section) before it will be accurate. If the user presses a key other than the ENTER key, then the time will remain untouched and the diagnostics menu will reappear. Once the ENTER key is pressed, the following screen **should** be shown:

```
TST:17/37/?? 17:?? PM  
CHK:17/37/?? 17:?? PM  
TST:00/00/00 00:00  
CHK:00/00/00 00:00  
PRESS ANY KEY TO EXIT
```

If the both 'TST:' fields match their following 'CHK:' fields then the clock is functioning properly. If the fields do not match, contact Unetixs customer service. A key must be pressed to return to the diagnostics menu.

TEST KEYPAD

The contents of the test keypad screen are as follows:

KEY:
PRESS FUNCTION KEY
TWICE TO EXIT

The 'KEY:' field will show the last key that was pressed. If the FUNCTION key is pressed twice in succession, then there will be a return to the diagnostics menu. Note that the footpedal and remote-red button are the same as the RUN key. The possible contents of the 'KEY:' field are:

● FN ● RN ● SP ● FD ● BL ● BR ● GU ● GD ● 1 ● 2
● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● BK ● 0 ● EN

SETUP BATTERY

This is actually more of a setup than a diagnostic selection. It is set at Unetixs to compensate for electrical component variances in the battery monitoring circuitry. Its purpose is to match the voltage on the screen with the actual voltage of the battery. This allows the Freedom V to more accurately show the condition of the battery. **UNETIXS RECOMMENDS THAT THE USER NOT MAKE THIS SELECTION.**

BAT VOLTAGE:

This shows what the Freedom V thinks the battery voltage is. This field's range is from 10.00 (1000) volts to 15.11 (1511) volts. This field is shown as four decimal digits. Note that there is an implied decimal point.

GAIN) CHANGE VOLTAGE

The up and down GAIN keys can be used to adjust the shown voltage so that it matches with the actual voltage of the battery.

ENTER) RESET

The ENTER key is used to reset the component variance to 0. This should be the first step during a Freedom V initial battery voltage setup.

FUNCTION) EXIT

This will save the selected battery variance to permanent storage (see EEPROM MEMORY section) and return to the diagnostics menu. It is **necessary** to press this key if the battery voltage variance values are to be saved.

EEPROM MEMORY

The EEPROM (Electrically Erasable Programmable Read Only Memory) memory is of a type that is saved even when the Freedom V is turned off. The EEPROM memory is updated whenever you exit the set options (see SETUP MENU section), set facility name (see SETUP MENU section), set display contrast (see SETUP MENU section), set time zone (see SETUP MENU section) or setup battery (see DIAGNOSTICS MENU section) screens. If there is an error detected while updating the EEPROM memory the following message will be shown:

EEPROM WRITE ERROR
PRESS ANY KEY

This screen means that the setup information was not correctly saved into permanent storage. It is up to the user to recheck the entered data and to reattempt the EEPROM update. A perfunctory key must be pressed after this screen is shown in order to continue.

PRINTER

PRINTER ERRORS

Whenever the printer is running, it is being checked for errors. If an error is detected, the following screen will be shown:

```
A PRINTER xxxx ERROR
IS DETECTED. CLEAR
ERROR CONDITION.
```

where xxxx is:

- SOFT** This indicates a printer software error.
- PAPR** This indicates that the printer has run out of paper.
- DOOR** This indicates that the printer door is open or slightly ajar.
- TEMP** This indicates that the printer's thermal printhead is overheating.
- BATL** This indicates that the power supply to the printer is too weak.
- BATH** This indicates that the power supply to the printer is too strong.
- SERI** This indicates that the printer's serial port is in error.
- HARD** This indicates a printer hardware error.

Once the error is cleared, this screen will be cleared and printing will attempt to continue as if nothing had happened. Certain errors may be impossible to clear. For these errors, the only user option is to power the system down (see **TURNING THE SYSTEM ON AND OFF** section).

PRINTOUTS

There are two types of printouts, those for pressure studies and those for waveform studies. These printouts are described in the following sections:

PRESSURE STUDIES

All four of the pressure study printouts are headed with the following information:

I.D.: The patient I.D. entered by the user (see **MAIN MENU** section).

TEST: The name of the pressure study being performed. The possibilities are:

- **ABI/SEG. PRESS.**
- **TOE PRESSURES**
- **SEGMENTAL PRESS.**
- **FINGER PRESSURES**

DATE: The current date obtained from the clock (see **DATE AND TIME** section).

TIME: The current time and time zone string (see **DATE AND TIME** section) which are set in the setup menu (see **SETUP MENU** section).

FAC.: The facility name string entered in the setup menu (see **SETUP MENU** section).

This information is followed by a mimic of the screen shown on the pressure results screen (see **PRESSURE RESULTS** section). All pressure study text is printed horizontally and upside down as it comes out of the printer. Note that if a pressure is 0, it is not printed (printed as blanks). If the **AUTOFD** option (see **SETUP MENU** section) is set, then enough extra paper will be fed at the end of the printout so that the entire printout will be visible. If the **AUTOFD** option is not set, it may be necessary to press the **FEED** key to see the entire printout.

WAVEFORM TESTS

Waveform test printouts always start with a real-time wave tracing. The tracing is printed vertically along the long (100 feet per roll) stream of thermal chart paper. A 40 mm grid and up to two solid lines are shown. The lines are the probe's output trace data and the current baseline. The baseline in all Doppler waveforms is the zero flow line. The baseline is not printed when either the PNEUMO AC or PPG AC probes are active. When the user stops the real-time waveform (by pressing the footpedal, remote-red button or RUN key), the Freedom V will automatically print a trailing information block containing the following:

I.D.: The patient I.D. entered by the user (see MAIN MENU section).

TEST: The name of the real-time waveform study being performed (see STUDY PROFILES section).

LOC.: The patient location the probe was supposedly applied to when the real-time waveform data was obtained (see STUDY PROFILES section).

PRBE: The probe and modality used to obtain the real-time waveform data. The possibilities are:

- PNEUMO AC
- PPG AC
- PNEUMO DC
- PPG DC
- 5 MHZ DOPPLER
- 8 MHZ DOPPLER

GAIN: The gain for the real-time waveform. See the GAIN section for the possible contents of this field.

SPD.: The chart speed for the real-time waveform. See the SPEED section for the possible contents of this field. Note: for the venous outflow study (see VENOUS OUTFLOW STUDY section), this field will be followed by the text ' THEN 25' to indicate to the user that the last part of the printout was done at 25 mm/sec.

PRES: The pressure in the cuff at the end of the real-time waveform. This field is only shown on pneumo waveform trailers. The pressure is shown in the units of mm/Hg. Note: if the pressure is 0, it is not printed (printed as blank).

PS: ED: The Peak Systolic and End Diastolic frequencies of all of the wave tracing data. This field is only shown on carotid study waveform trailers. The frequencies are shown in Hertz. Note that if a frequency is 0, it is not printed (printed as blank).

DATE: The current date obtained from the clock (see DATE AND TIME section).

TIME: The current time and time zone string (see DATE AND TIME section) which are set in the setup menu (see SETUP MENU section).

FAC.: The facility name entered in the setup menu (see SETUP MENU section).

The information trailer is printed vertically along the stream of the chart paper so that it can be read along side the waveform information trailer. Note that the screen will go blank while the information trailer is being printed. If the AUTOFD option (see SETUP MENU section) is set, then enough extra paper will be fed at the end of the information trailer so that the entire information trailer will be visible. If the AUTOFD option is not set, it may be necessary to press the FEED key to see the entire information trailer.

THERMAL PAPER

The paper is located inside the recorder (see Figure 1). When the door at the front of the printer is opened, it tilts forward revealing a curved paper tray. The paper holder is located at the center of the tray. Paper is loaded between the two round tabs of the paper holder. The sensitive (shiny) side of the paper must be facing the printhead (see Figure 1). When the door is closed, the paper is held against the thermal printhead by a pinch roller (see Figure 2).

RECOMMENDED PAPER

Thermal papers can vary considerably in thermal sensitivity and abrasiveness. Using the proper thermal paper helps to ensure that the print quality will be acceptably dark and reduces printhead wear. Contact your dealer or Unetixs Customer Service directly to purchase the proper thermal paper.

LOADING PAPER

To load paper into the printer, use the following procedure:

1. Open the door at the front of the printer by pushing the paper eject button (see Figure 2). The door should tilt open. If the printer's door does not open completely, pull it towards you until it is completely open.
2. Reach in and remove the spent paper core by pulling it towards you gently.
3. Place a new paper roll between the two round tabs of the paper holder so that when you pull the paper towards the door, the sensitive (shiny) side of the paper is facing up (see Figure 1).
Hint:The paper roll is easier to load if you hold it horizontally with your thumb underneath it and your forefinger and/or index finger on top. Your thumb will hold the loose paper in place.
4. Pull the paper towards you until approximately four inches of paper has been unrolled.
5. Align the paper with the pinch roller attached to the printer door (see Figure 2).
6. While holding the paper against the pinch roller, close the printer door (see Figure 2).
7. To ensure that the paper is aligned in the slot and has not been pinched by the door, pull the loose edge of the paper until a few inches of paper is showing. If the paper will not move, open the door and return to step 5.
8. The printer is now ready to print.

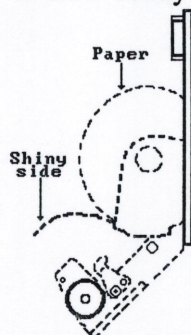


Figure 1
(Side view, door open)

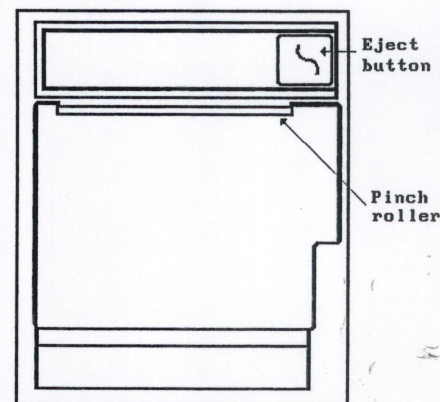


Figure 2
(Front view, door closed)

DOPPLER ACOUSTIC POWER OUTPUT

The Freedom V employs continuous wave Doppler transducers. Below are tables which provide the Spatial Peak Temporal Intensity (Ispta), and the Output power for each transducer frequency. In addition, the tables also give a value for the estimated In-Situ intensity. The estimated In-Situ values were derived from the following formula:

$$I(f) = I(w)e^{(-0.23afz)}$$

- Where:
- I(f) = Estimated In-Situ intensity
 - I(w) = Measured intensity in water at z distance
 - a = Attenuation coefficient in decibels per centimeter megahertz (db/cmMHz), (0.3 db/cmMHz typical)
 - f = Frequency in megahertz (MHz)
 - z = Distance at which I(w) was measured in centimeters (cm) as follows:
 - 1.2 cm for the 10 Mhz probe
 - 1.2 cm for the 5 Mhz probe
 - 0.9 cm for the 8 Mhz probe

| | NTD-5 | NTD-8 | NTD-10 |
|-----------------|------------------------|------------------------|-----------------------|
| Ispta (water) | 124 mW/cm ² | 190 mW/cm ² | 28 mW/cm ² |
| Power (water) | 8.6 mW | 6.5 mW | 0.7 mW |
| Ispta (In-Situ) | 83 mW/cm ² | 117 mW/cm ² | 12 mW/cm ² |
| Power (In-Situ) | 5.7 mW | 4.0 mW | 0.8 mW |

NOTE: The NTD-10 Doppler probe is not included with Freedom V system. It is included here for informational purposes only.

CUSTOMER SERVICE AND WARRANTY INFORMATION

CONTACTING UNETIXS CUSTOMER SERVICE

Contact Unetixs Customer Service for:

- Any questions regarding the operation of the Freedom V system.
- Service and repair information.
- To purchase consumable items (paper, gel, report forms, etc.), accessories, or options.

Do not return the Freedom V system or its accessories to the factory without prior authorization from the Customer Service Manager. Unauthorized returns will be returned to the sender at the sender's expense. To obtain authorization, write or call:

Unetixs Vascular, Inc.
115 Airport Street
North Kingstown, RI 02852
Telephone: (401) 294-7559

Customer service hours are typically between 8:30 am to 5:00 pm East coast time. Please have your model and serial numbers ready before calling.

LIMITED WARRANTY

Your Freedom V system is warranted to be free from defects in both workmanship and in materials for:

1. 12 months of parts
2. 12 months of labor

This warranty period commences from the original date of purchase. The warranty card **must** be returned within 10 days of the date of purchase.

All material found defective within the warranty period will be repaired or replaced at no extra charge by the manufacturer. Unetixs Inc. assumes no liability for service representation. The warranty will be void if the instrument is determined to have been subjected to abnormal environmental conditions, mechanical or physical abuse.

This warranty is exclusive and is in lieu of all other warranties expressed or implied, including but not limited to any implied merchantability or fitness for a particular purpose or use. Unetixs Incorporated will not be liable for any special, indirect, incidental or consequential damages or loss, whether in contract, tort or otherwise.

NOTE: Unetixs Incorporated reserves the right to make improvements in the design, construction and appearance of its products without notice.

SERVICE CONTRACT

This service contract makes provisions for certain services that are not covered under the manufacturers normal 12 month warranty period. Please take the time to review this comprehensive program and if you elect to purchase a service contract, please return the last page of this section to Unetixs Incorporated with proper payment as indicated.

SERVICE COVERED UNDER THE AGREEMENT

RECALIBRATION AND CLEANING

Under the agreement, your system may be returned to the factory for cleaning and recalibration twice annually. This includes:

- Clean and inspect all sensors and probes.
- Clean and align the Thermal printer
- Clean, inspect, and recalibrate the electronics, replacing where necessary any and all components that are marginal in efficiency, including the keypad, LCD display, probes, cables and internal clock/calendar.

Note: This contract does not include the replacement of the Thermal printer mechanism or its associated electronics. It does, however, cover the labor to repair or replace the above. In the unlikely event of a failure which would require the replacement of the printer unit, Unetixs will replace the printer for the cost of the materials alone.

UPDATES COVERED BY THIS CONTRACT

The Freedom V is a microprocessor based system. It is capable of being programmed to provide a variety of reports. If and when new revisions of the software are developed, the service contract will cover (should the customer so desire) the updating of the software to the current revision. Should a software update be desired, it will be performed when the Freedom V system is at the factory for recalibration and cleaning.

RETURN AUTHORIZATION

Under the service contract, a system may be sent back to the factory by calling or writing for an R.M.A. (Return Materials Authorization) number. This R.M.A. number must be clearly marked on the outside of the shipping container or delivery of the package will be refused.

SHIPPING CHARGES

- Unetixs Incorporated will pay return shipping by United Parcel Service ground. Unetixs will ship by any courier specified by the customer. In these cases, costs exceeding the U.P.S. ground rate will be charged to the customer.
- All systems sent to Unetixs Inc. must be sent freight prepaid or a delivery will be refused.
- Note: Applies to continental U.S. only. International customers please contact the factory for details.

SERVICE LOANER SYSTEMS

The factory maintains an inventory of service loaners. With the proper authorization, a loaner may be made available during the time when the customer's system is at the factory. This service is dependent on the availability of loaner units at the factory. Calling the factory, in advance of returning your system, will help to assure the use of one of these systems. In the event of a loaner not being available, the service department will attempt to provide you with an alternate scheduling date.

SERVICE CONTRACT CHARGE

This contract will be valid for 12 months from receipt of payment.

Freedom V non-invasive vascular instrument serial # _____

SERIAL NUMBERS MUST ACCOMPANY THIS CONTRACT

NOTE: If more than one system is in your office, list additional serial numbers at the bottom of this page.

Make check payable to:

Unetixs Vascular, Inc.
115 Airport Street
North Kingstown, RI 02852

PLEASE NOTE: This contract does not cover damage due to abnormal environmental conditions, or mechanical or physical abuse.

Doctor's Name: _____

Clinic Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Signature: _____ Date: _____

USER NOTES

FOR YOUR RECORDS

Record the model and serial numbers of the Freedom V system and its Doppler probes in the spaces provided on the warranty card and return them to Unetixs Incorporated. Also record the serial numbers below.

Freedom V non-invasive vascular instrument Serial Number _____

5 MHz Doppler Probe Serial Number _____

8 MHz Doppler Probe Serial Number _____

Note: The Model and serial number for the Freedom V is located on the underside of the instrument.

The Doppler probe serial # is written on the cable connector end of the probe.

The Freedom VP system comes with only an 8 MHz Doppler probe.

KEYBOARD FUNCTIONS

Following is a list of the functions of the keys for the bargraph and waveform screens:

- POWER:** Turns Freedom V system on and off.
- FUNCTION:** Operates as an "Exit" key, going back to the main menu, except when in a pressures or combined study where it will exit to the pressure results screen.
- RUN:** Starts and stops the printer. Also captures pressures for pressure studies.
- SPEED:** Controls the speed of the Freedom V printer, if you wish to override Freedom V program.
- FEED:** Feeds blank paper from the printer.
- BASELINE:** Moves the baseline left or right to "center" waveforms on chart paper.
- GAIN:** Causes the active probe to be more or less sensitive. UP will increase the sensitivity, DOWN will decrease the sensitivity.
- ◀BACK:** Move back one or more locations. Has no effect on the first location.
- ENTER:** Moves forward one or more locations. Has no effect on the last location.
- KEY #1:** Increases the contrast of the screen. Press repeatedly to make the screen darker.
- KEY #2:** Decreases the contrast of the screen. Press repeatedly to make the screen lighter.
- KEY #3:** Inverts the arterial Doppler waveform. Active on all Doppler waveform studies.
- KEY #4:** Changes the listed Doppler probe frequency. Toggles between 5 & 8 Mhz.
- KEY #5:** Changes from the bargraph screen to the waveform screen, and vice-versa.
- KEY #6:** Changes the active probe in pressure studies. Toggles between the Doppler and PPG sensors.
- KEY #7:** Overrides the Freedom V program and sets the baseline at 10 mm from the left (top) of the chart.
- KEY #8:** Overrides the Freedom V program and sets the baseline in middle of the chart.
- KEY #9:** Overrides the Freedom V program and sets the baseline at 10 mm from the right (bottom) of the chart.
- KEY #0:** Auto-baseline key. Active on the Venous Outflow & Venous Refill studies only.

CLIP AND SAVE KEYBOARD HINTS

The keypad in the waveform and bargraph screens is:

- 1 - Contrast up
- 2 - Contrast down
- 3 - Invert Doppler
- 4 - Change Doppler Frequency
- 5 - Toggle between bargraph and waveform
- 6 - Toggle between PPG and Doppler for pressure
 - 7 - Set baseline at 10 mm from top
 - 8 - Set baseline in the middle
 - 9 - Set baseline at 10 mm from bottom
 - ◀BACK - Go to previous location
 - 0 - Set baseline for venous tests
 - ENTER - Go to next location

THORACIC OUTLET STUDY PROTOCOL

For Unetixs Freedom Series Instruments

From the Freedom Main menu press the #4 key - UPPER ARTERIAL STUDIES

Press the #7 key - THORACIC OUTLET STUDY

Press #1 key - BASELINE

You will now observe the "manometer/location" screen

Press the #5 key to activate "waveform" screen

With patient seated comfortably with hands in lap, connect the PPG sensor to the right index or middle finger with the Velcro strap. Adjust gain up or down to make on-screen waveform covers approximately 50-60% of LCD screen.

Press the Red button on the Auto-Inflate assembly and record 6 - 7 seconds of wave tracing. Press the Red button again to stop printing. This is your baseline tracing.

Ask the Patient to take a deep breath and hold, while turning head to far right. When waveform stabilizes from the maneuver, record 6 - 7 seconds of tracings. This is called the "Adson's Right Position". Ask the patient to exhale and return to baseline position for several seconds, breathing normally.

Ask the Patient to take a deep breath and hold, while turning head to far left. When waveform stabilizes from this maneuver, record 6 - 7 seconds of tracings. This is called the "Adson Left Position". Ask the patient to exhale and return to baseline position for several seconds, breathing normally.

Ask the Patient to take a deep breath and hold, while moving chin towards chest, and moving both shoulders as far back as possible. When waveforms stabilizes from this maneuver, record 6 - 7 seconds of tracings. This is called the "Costoclavicular" or "Military" position. Ask the patient to exhale and return to baseline position for several seconds, breathing normally.

Ask patient to hold Right arm straight out at 90° from body, with palm facing the floor. When waveform stabilizes from this maneuver, record 6 - 7 seconds of tracings. This is called the "Hyperabduction "A" Position".

Ask patient to hold Right arm straight up over head with palm facing forward. When waveform stabilizes from this maneuver, record 6 - 7 seconds of tracings. This is called the "Hyperabduction "B" Position".

Attach the PPG sensor to the Left index or middle finger and record baseline tracings with hands in lap.

If any of the above maneuvers results in the waveform becoming flat-line (non-pulsatile) with the patient experiencing pain, numbness or tingling, consider test positive for Thoracic Outlet Syndrome due to compression of the Subclavian artery.

UNETIXS
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freedom **V**TM
PLUS
MANUAL SUPPLEMENT

A
MULTILAB
2001
PRODUCT

INTRODUCTION

The Freedom Plus is essentially a Freedom V with additional capabilities. Please read the Freedom V operators manual before reading further, to acquaint yourself with the basic instrument functions.

The Freedom Plus incorporates new hardware and internal software from the basic Freedom V, as well as an external software program to be run on a remote PC. The differences from the Freedom V are as follows:

HARDWARE

1. **ONE TOUCH AUTO-INFLATE** - For segmental pressures, one touch of a button inflates cuff to 150 mmHg. For Pulse Volume Recordings, one touch of a button automatically inflates measuring cuff to 65 mmHg.
2. **AUTO-BLEED** - After cuff is inflated, the Freedom Plus will automatically bleed cuff pressure at a steady, controlled rate.
3. **SUPERTWIST BACKLIT LCD SCREEN** - Easier to read screen for menus and real-time waveforms.
4. **INTERNAL MEMORY** - Internal RAM memory to store up to 20 patient studies, for later downloading and printing.
5. **RS-232 SERIAL PORT AND CABLE** - For downloading stored patient data to remote PC.

SYSTEM SOFTWARE

The Freedom Plus internal software is identical to the Freedom V's, with the following differences:

On the Freedom Main Menu, there is an additional category at the bottom of the list called "STORAGE FUNCTIONS". When this item is selected from the Main Menu, the following Sub-Menu will appear:

1. CLEAR MEMORY
2. SEND STORED DATA
3. ENABLE PRINTER
4. TEST MEMORY

Selecting "1. CLEAR MEMORY", will erase data stored in the Freedom Plus' memory. Use this function AFTER data has been downloaded and printed on remote PC system.

Selecting "2. SEND STORED DATA" will send the stored patients studies to the remote PC via the RS-232 port and cable.

Selecting "3. ENABLE PRINTER" will enable or disable the Freedom's internal strip chart recorder. Some may elect to print the strips in addition to storing the data to memory, while others will wish to disable printer to save money on paper. Pressing the "2" key will toggle this switch on and off.

Selecting "4. TEST MEMORY" will test the integrity of Freedom Plus system memory. It will also erase and store data residing in memory. Do not use this feature unless advised by Unetixs service personnel.

At the bottom of this Sub-Menu is a "gas gauge" which indicates amount of memory that is being used and amount that is available.

WWW.UNETIXS.COM

For Additional Help Contact:
Unetixs Vascular, Incorporated
115 Airport Street
North Kingstown, RI 02852

(401) 294-7559
1 (800) 4UNETIX
(401) 294-3893 (Fax)
help@unetixs.com (E-Mail)