



## STRESS ECHOBED® IN-SERVICE GUIDE



### Stress EchoBed® Set-up - Installing the Ergometer

The Stress EchoBed® is easily assembled with the use of the Ergometer Storage Cart and included tracks.

- Lock all Stress EchoBed® wheels
- Remove and safely store the Ergometer Insert
- Level the Stress EchoBed, and lower the to the height of the Ergometer Storage Cart
- After locking the Ergometer Storage Cart wheels gently slide the Ergometer onto the Stress EchoBed tracks and secure with the Ergometer track pin
- Plug Ergometer in and begin testing

### EchoBed® Conversion - Removing the Ergometer

The Stress EchoBed® is easily converted to an EchoBed® for use with resting echocardiograms when not performing stress echocardiograms.

To convert your Stress EchoBed® to an EchoBed® remove the Ergometer for safe storage on the Ergometer Storage Cart and install the Ergometer Insert to cover the Ergometer tracks.

- Lock all Stress EchoBed® wheels
- Level the Stress EchoBed®, unplug the Ergometer and lower the Stress EchoBed® to the height of the Ergometer Storage Cart
- After locking the Ergometer Storage Cart wheels gently slide the Ergometer onto the Ergometer Storage Cart tracks by releasing the Ergometer track pin
- Place Ergometer Insert over the Ergometer tracks and secure with Velcro
- Store the Ergometer in a safe place until next use



## Positioning the Stress EchoBed®

The Stress EchoBed® includes three electric features controlled with the included Hand Controller

### Hand Control Instruction Guide



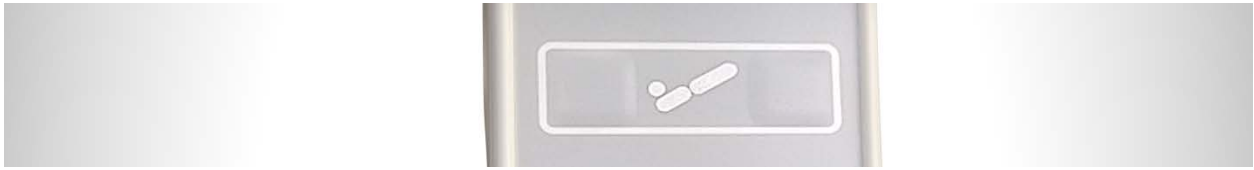
The Stress EchoBed® is fully electric, press and hold hand control buttons to move the Stress EchoBed® to your desired position.



- Electric height adjustability ergonomically accommodates sonographers and patients of varying heights

- 24" - 34"

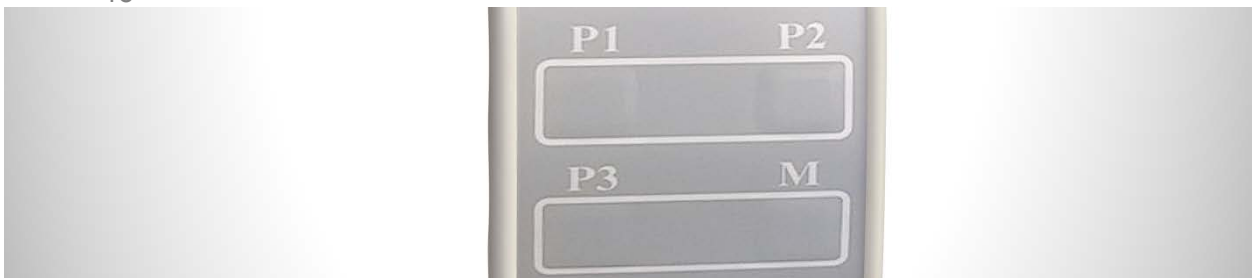
# MPI



- Reverse Trendelenburg/Trendelenburg restores patient blood pressure
  - +/- 15°



- Left lateral tilt improves image acquisition for pre, peak and post images
  - 40°



- Memory positioning allows you to store up to three positions for quick patient positioning
  - Once you've found an optimal imaging position, push and hold down the buttons "P1" and "M" until you hear a beep
  - This will store the selected position in the button "P1". You can then push and hold "P1" when you are ready for the bed to return to that position. The same is true for "P2" and "P3"
  - Memory P1, P2 and P3 buttons can be saved and overwritten as many times as needed



- Position bed to ultrasound unit
  - Left Handed Scanners: Place foot end of bed at an oblique angle (away from sonographer) so there is no risk that the patient's left knee will impact back of sonographer's head when tilted in the left lateral position.
- Lock Wheels - 2 way locking casters
  - All 4 wheels should be locked during bicycle exercise studies to minimize movement of bed.
- Drop Section(s) - one hand release/replacement
  - Imaging Drop Section: Reach under and squeeze lever to open drop section. Replace by simply placing hand underneath and lift. The drop section automatically locks into place. When the Imaging Drop Section is down it provides unhindered access to apex.
  - Sonographer Drop Section and Patient Back Support: Lift up for patient back support (2 positions) and down to sit on bed behind patient when scanning right-handed.
- Sonographer Extension - attaches by sliding the steel cylinder underneath into the bracket mounted to right side of bed
  - This allows extra room for sonographer to sit when scanning right-handed.
- Patient Weight Capacity: 500 lbs

### Positioning Your Patient

- Guide the patient to enter the Stress EchoBed® from the imaging side
- Position patient's hips centered on top of the Patient Safety Belt and straddling the supine Ergometer
  - Position patient's hips on top of the wide Safety Belt. Release the Velcro® strap from the side of the bed - it holds belt in place against the bed when not in use.

Fully extend belt across patient's pelvis and insert into the buckle on the other side to lock securely. Metal clip must be against fabric to extend belt- clip away from fabric is the 'lock' position and extension is not possible. The belt should conform to each individual and form a 'sling' around the patient's hips. A towel may be positioned patient and belt to cushion abdomen, if needed.
  - A belt extender is available as an option for larger patients (>~350 lbs).
- Position patient's feet in boots, heel of foot all the way back (this is the point of contact)



patient pushes against the heel of the boot for proper pedaling. Strap feet into boots with Velcro® straps.

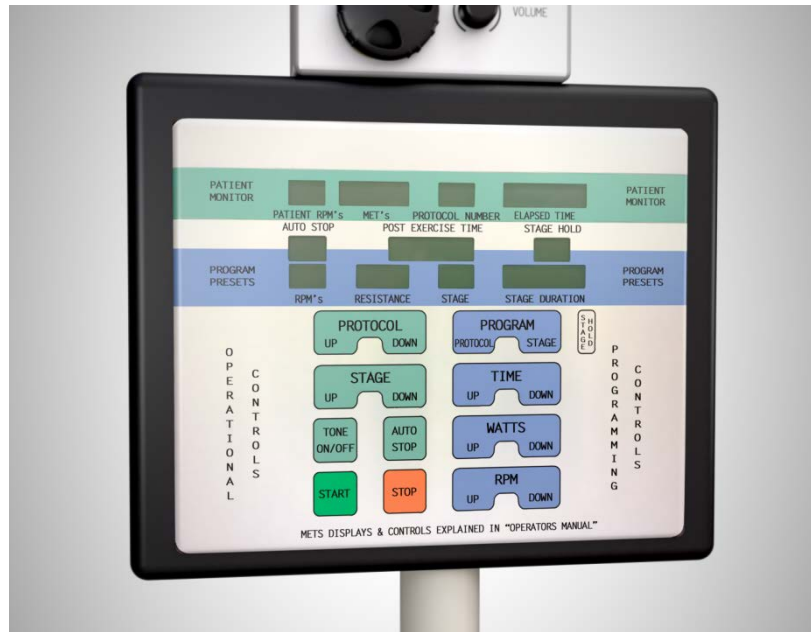
Have patient pedal a few times to check bend of knee (should be some bend, leg should not extend all the way straight to prevent locking knee). A 90° angle (knee to hip) is ideal.

- Position patient's left arm up by head, next to Shoulder Support, with enough space for patient to raise arm, if needed when imaging. Left arm may remain at side during exercise.
  - Position the Shoulder Support against patient's left shoulder for maximum support and comfort, then lock into place.
  - To remove for resting studies, release the adjustable restraint lock; pull out on plunge lock and lift.
  
- Place included Patient Positioning Wedge (SafeTwedge™) in approximately middle of bed at head end. Place underneath patient's shoulders to elevate head.
  - The non-skid surface on bottom of wedge keeps patient from moving towards head of bed as they pedal during exercise.
  
- Adjust the Ergometer to the appropriate height of the patient. Patient's knees should be kept at a 90° angle.
  - Entire track must slide all the way into center- most position on bed - red sign should be completely covered and the track lock pin must 'click' into place. The slide lock is then raised to allow the Ergometer to be adjusted to proper length for patient's legs. Slide lock is re-engaged to ensure no movement of the Ergometer in the slide track during exam.
  
- Tilt patient at rest to prepare them for the imaging procedure. Resting and peak images are done in lateral tilt position.
  - Exercise position is supine, except when acquiring images/Doppler signals.
  
- Allow your patient to practice pedaling in the lateral tilt position, again to prepare them for the procedure.
  - At peak exercise, or at any point when imaging is required, tilt the bed while patient keeps pedaling, acquire images, then have patient stop pedaling. If patient cannot keep pedaling at same RPMs, drop to lower resistance so that exercise continues until acquisition is complete.



## Adjusting and Selecting Stress EchoBed® Protocols - Using the Computer Controller

### Computer Controller Instruction Guide



Initial setup: Attach Computer Controller to top of Ergometer with the DB9 connector. Leave attached to ergometer for use and storage. Computer Controller runs a 10 second self-diagnostic each time it is turned on - do not press any buttons on the controller during this time! Remember to treat the ergometer/controller unit as a computer. Use surge protection if power supply experiences variations.

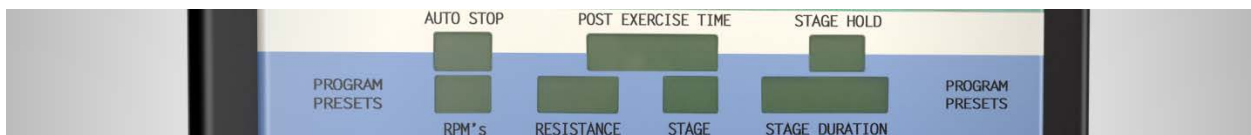


Top Row- Patient Monitor Display - (left to right)

- PATIENT RPM's - Displays the RPM that patient is currently pedaling. 60 RPM is the proper pedal speed - All protocols are pre-programmed at 60 RPM



- If you program a customized protocol, be sure to make the RPM value 60!
- PATIENT MET's - MET's are displayed at the current workload (based on a 70kg patient) Use your EKG system's calculation to get correct METS.
- PROTOCOL NUMBER: 1 -15 - indicates protocol selected. - Protocols 1 - 2 are 1 minute protocols.
  - Protocols 3 through 6 are 2 minute protocols
  - Protocols 7 through 10 are 3 minute protocols
  - Protocols 11 through 14 are programmable
  - Protocol 15 is a 60-minute manual protocol
- ELAPSED TIME - displays the total time the patient has pedaled in minutes/seconds since the protocol in use was started. When protocol is stopped - display stays in place for charting until the ergometer is reset for another study.



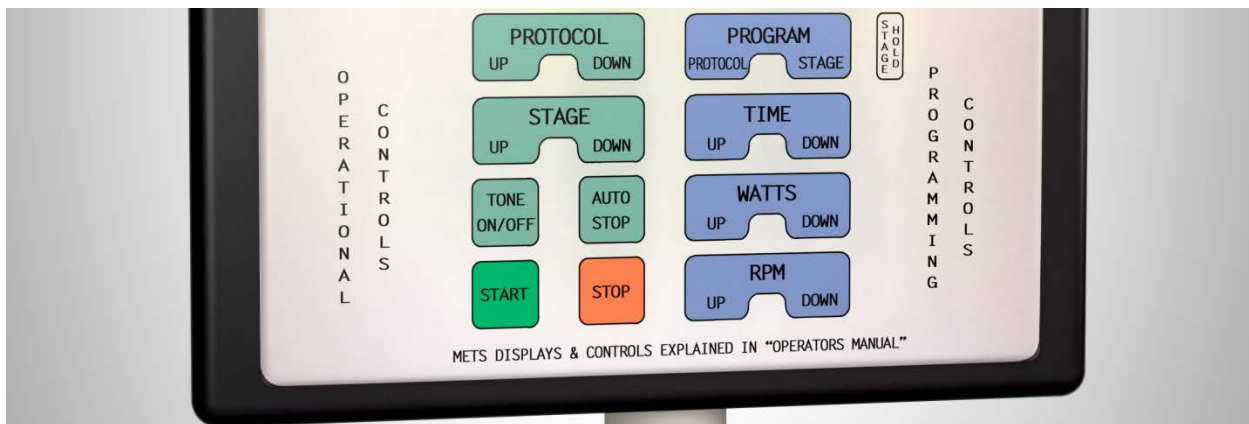
2<sup>nd</sup> Row - Patient Control Display & Program Presets Display - (left to right)

- AUTO STOP - this control allows user the protocol to automatically stop and start post-exercise timing after the patient has ceased pedaling for 10 consecutive seconds. This feature allows user to ignore the controller and begin post-exercise imaging or data acquisition (if desired). ON/OFF - enabled/disabled.
- POST EXERCISE TIME - Displays time in minutes/seconds beginning when the protocol ends or when the patient stops pedaling before ergometer is reset for another study. ('PROG' appears in this window when in PROGRAM MODE)
- STAGE HOLD - Displays ON or NO indicating if the 'stage hold' feature is enabled (ON) or disabled (NO). When engaged - this keeps the ergometer from advancing to the next stage (increase in workload) until disengaged (i.e. at peak exercise)

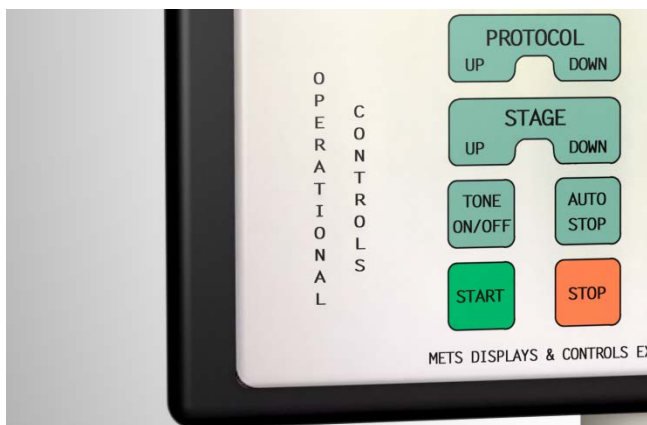
#### PROGRAM PRESETS - (left to right)

- RPMS - Displays RPM value which is programmed for that stage.
- RESISTANCE - Displays watts of resistance programmed for the current stage.
- STAGE - Displays current stage.
- STAGE DURATION - Displays duration in minutes/seconds of current stage while in use. This display serves as a timer, counts backward during the course of the stage.

If in the Programming Mode: These windows will display the value that is currently being programmed into that setting



3<sup>rd</sup> Row - Operational Controls and Programming Controls - (left to right)



Operational Controls - on left hand side of controller

- **PROTOCOL - UP/DOWN** - Select protocol or program/preview. Press and hold (scroll through) or select by pressing one at a time. Can be used anytime the ergometer is turned on, except when a protocol is in progress.
- **STAGE - UP/DOWN** - Select stage, preview or program stage. This can be used anytime the ergometer is on. IF PATIENT CANNOT PEDAL FAST ENOUGH, CAN PUSH STAGE DOWN; HAVE PATIENT KEEP PEDALING AT LOWER RESISTANCE. Calculate your double product and ACQUIRE IMAGES/DATA. If this happens at the start of the protocol, stop, select an easier protocol, and start over.
- **TONE ON/OFF** - Cadence tone - audible coach for patient - on or off. See Patient Coach Guide for additional information.
- **AUTO STOP** - this control allows user the protocol to automatically stop and start post-exercise timing after the patient has ceased pedaling for 10 consecutive seconds. This feature

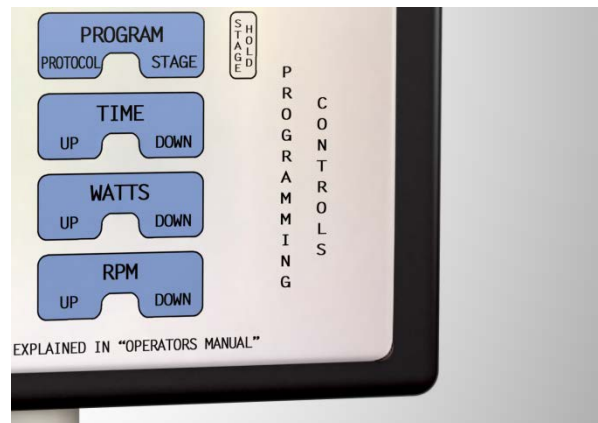




allows user to ignore the controller and begin post-exercise imaging or data acquisition (if desired). ON/OFF - enabled/disabled.

- START - Starts selected protocol.
- STOP - Terminates exercise protocol and starts post-exercise timer. Press a second time to RESET and place controller in READY mode for next procedure.

If in AUTO STOP mode - patient stops pedaling for 10 seconds - same as pressing STOP. User will hear audible 'chirp' 3 times, then in 1-minute intervals after stop.



Programming Controls - on right hand side of controller

- PROGRAM PROTOCOL/STAGE - Select protocol/stage to be programmed.
  - Protocols 1 -10 are fixed - see Protocol Informational Sheet for additional information
  - Protocols 11 - 14 are programmable and rewritable
  - Protocol 15 is MANUAL
- TIME UP/DOWN - Program duration of protocol
  - 30 second increments
- WATTS UP/DOWN - Program resistance in watts for protocol
  - 5 watt increments
- RPM UP/DOWN - Program pedaling rate
  - 5 RPM increments

#### PROGRAMMING INSTRUCTIONS:

- Push Program Protocol button
  - Scroll to protocol you wish to program (11 -14)



- Set desired Stage 1 parameters
  - (RPM/Watts/Time)
- Push Stage -Program button (STAGE HOLD) to advance to next stage
- Repeat setting parameters for each stage
- Scroll forward to stage 1
  - Start protocol for a several seconds, then stop and reset (stop again)
  - Protocol is now in memory. Can be re-programmed in same manner repeatedly
- ERGOMETER STARTS TO SAME PROTOCOL ENGAGED WHEN TURNED OFF

Patient Interaction - Using the Stress EchoBed® Patient Coach

Patient Coach Instruction Guide



Initial setup: Attach Patient Coach to top of Ergometer with included Velcro. Patient Coach may be turned toward patient while the computer controller faces staff. Leave attached to Ergometer for use and storage.



#### Pedal Speed Indicator Lights

- TOO SLOW
  - Amber Light - patient is pedaling at 55 RPMs or less
- CORRECT
  - Green Light - patient is pedaling at proper speed of 60 RPMs
- TOO FAST
  - Amber Light - patient is pedaling at 65 RPMs or more

IT IS OK TO HAVE THE CORRECT & TOO SLOW OR TOO FAST LIGHTS INDICATED AT THE SAME TIME (Green and Amber lights)



#### Volume Controls

- VOLUME
  - Increase/Decrease/Mute cadence tone volume



## Understanding the Stress EchoBed® Protocols and Supine Bike Stress Echocardiography

### Stress EchoBed® Protocol Breakdown

#### Notes:

- Each protocol uses a constant 60 RPM pedal speed
- Maximum of 10 stages per protocol
- Higher wattages may be adjusted by staging up or using manual protocol #15

Protocol #1 1 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	25	50	75	100	125	150	175	200	225	250
METS	2.4	3.7	4.9	6.1	7.3	8.6	9.8	11.0	12.2	13.5
Length of Stage	1	1	1	1	1	1	1	1	1	11
Accumulated Time	1	2	3	4	5	6	7	8	9	20

Protocol #2 1 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	50	75	100	125	150	175	200	225	250	275
METS	3.7	4.9	6.1	7.3	8.6	9.8	11.0	12.2	13.5	14.7
Length of Stage	1	1	1	1	1	1	1	1	1	11
Accumulated Time	1	2	3	4	5	6	7	8	9	20

### De-conditioned Patient Protocol

3 minute stage protocol is #7 on the computer controller  
 2 minute stage protocol is #3 on the computer controller

Use this for patients who can't walk on a treadmill, but can lie on their back, and pedal at a low resistance; someone who might otherwise be a Dobutamine patient.  
 Starts at 15 watts and increases only 10 watts per stage.

Protocol #3 2 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	15	25	35	45	55	65	75	85	95	105
METS	2.0	2.4	2.9	3.4	3.9	4.4	4.9	5.4	5.9	6.4
Length of Stage	2	2	2	2	2	2	2	2	2	2
Accumulated Time	2	4	6	8	10	12	14	16	18	20



Modified Standard Protocol

3 minute stage protocol is #8 on the computer controller  
 2 min. stage protocol is #4 on the computer controller

Use this for patients who would be put on a modified Bruce Treadmill protocol - patients who you don't think can handle the Bruce protocol. This starts at 25 watts and increases 15 watts each stage.

Protocol #4 2 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	25	40	55	70	85	100	115	130	145	160
METS	2.4	3.2	3.9	4.7	5.4	6.1	6.9	7.6	8.3	9.1
Length of Stage	2	2	2	2	2	2	2	2	2	2
Accumulated Time	2	4	6	8	10	12	14	16	18	20

Standard Supine Bicycle Protocol

3 minute stage protocol is #9 on the computer controller  
 2 minute stage protocol is #5 on the computer controller

Use this for patients who would be put on a Bruce Treadmill protocol.  
 This starts at 25 watts and increases 25 watts.

Protocol #5 2 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	25	50	75	100	125	150	175	200	225	250
METS	2.4	3.7	4.9	6.1	7.3	8.6	9.8	11.0	12.2	13.5
Length of Stage	2	2	2	2	2	2	2	2	2	2
Accumulated Time	2	4	6	8	10	12	14	16	18	20



### Conditioned Patient Protocol

3 minute stage protocol is #10 on the computer controller  
 2 minute stage protocol is #6 on the computer controller

Use this for patients who are in good physical shape or work out regularly.  
 This is almost identical to the standard (Bruce) protocol above, except it skips the first stage: it warms up at a higher resistance - 50 watts - and then increases 25 watts each stage.

Protocol #6 2 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	50	75	100	125	150	175	200	225	250	275
METS	3.7	4.9	6.1	7.3	8.6	9.8	11.0	12.2	13.5	14.7
Length of Stage	2	2	2	2	2	2	2	2	2	2
Accumulated Time	2	4	6	8	10	12	14	16	18	20

### De-conditioned Patient Protocol

3 minute stage protocol is #7 on the computer controller  
 2 minute stage protocol is #3 on the computer controller  
 Use this for patients who can't walk on a treadmill, but can lie on their back, and pedal at a low resistance; someone who might otherwise be a Dobutamine patient.  
 Starts at 15 watts and increases only 10 watts per stage.

Protocol #7 3 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	15	25	35	45	55	65	75	85	95	105
METS	2.0	2.4	2.9	3.4	3.9	4.4	4.9	5.4	5.9	6.4
Length of Stage	3	3	3	3	3	3	3	3	3	3
Accumulated Time	3	6	9	12	15	18	21	24	27	30



Modified Standard Protocol

3 minute stage protocol is #8 on the computer controller  
 2 min. stage protocol is #4 on the computer controller

Use this for patients who would be put on a modified Bruce Treadmill protocol - patients who you don't think can handle the Bruce protocol. This starts at 25 watts and increases 15 watts each stage.

Protocol #8 3 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	25	40	55	70	85	100	115	130	145	160
METS	2.4	3.2	3.9	4.7	5.4	6.1	6.9	7.6	8.3	9.1
Length of Stage	3	3	3	3	3	3	3	3	3	3
Accumulated Time	3	6	9	12	15	18	21	24	27	30

Standard Supine Bicycle Protocol

3 minute stage protocol is #9 on the computer controller  
 2 minute stage protocol is #5 on the computer controller

Use this for patients who would be put on a Bruce Treadmill protocol.  
 This starts at 25 watts and increases 25 watts.

Protocol #9 3 Minute/Stage 25 WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	25	50	75	100	125	150	175	200	225	250
METS	2.4	3.7	4.9	6.1	7.3	8.6	9.8	11.0	12.2	13.5
Length of Stage	3	3	3	3	3	3	3	3	3	3
Accumulated Time	3	6	9	12	15	18	21	24	27	30







Protocol #14 _Minute/Stage _WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS										
METS										
Length of Stage										
Accumulated Time										

Manual Protocol

Protocol #15 _Minute/Stage _WATT Increments	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10
WATTS	Any Value From 0 to 300 WATTS									
METS										
Length of Stage	Single Stage - Changes When User Initiates Up To 60 Seconds									
Accumulated Time										

Stress EchoBed® Protocol Selection & Clinical Information  
re: Rate Pressure Product/Double Product

- Exercise Doppler studies are ONLY accurate when done DURING Steady-State Circulatory Physiology
- Stress EchoBed® gives you the ability to obtain images and Doppler signals during every stage of exercise, at peak and during recovery
- Ability to perform true valve assessment and PASP during exercise
- Complex congenital heart disease assessment is feasible - multiple images & Doppler can be captured at each stage
- Diastolic Stress Echo is really possible - only with the Stress EchoBed®
- Metabolic Stress Echo is made easy compared to upright bicycle or treadmill
- Safer than treadmill - patient cannot fall off of SEB with 4-point safety system

For Wall Motion studies

2 minute protocols are sufficient using supine bicycle.

For Hemodynamic Studies, 2 or 3-minute protocols may be used. Acquire Doppler signals during last minute of the stage, when using 3-minute protocol (when steady-state exercise is achieved).

For 2-minute Protocols

Use Stage Hold to allow extra time to acquire Doppler signals - don't let stage advance during acquisition or signals will not reflect accurate pressures.



### Symptoms

Symptoms may appear earlier with supine exercise compared to upright due to decreased perfusion gradient, increased venous return and filling pressures.

### Heart Rate

Heart rate does not go as high with supine exercise as with upright exercise, i.e. treadmill.

Blood pressure (systolic) usually goes higher with supine exercise than with upright exercise therefore double product is similar.

Therefore, it is recommended that you use DOUBLE PRODUCT as your target, instead of Target Heart Rate. DOUBLE PRODUCT IS ALSO CALLED RPP - RATE-PRESSURE PRODUCT.

- DOUBLE PRODUCT (RATE/PRESSURE PRODUCT) = SYSTOLIC BP X HR
- DOUBLE PRODUCT: 20,000 to 25,000 = GOOD STRESS TEST
- DOUBLE PRODUCT correlates better with myocardial oxygen consumption than heart rate alone.
- DOUBLE PRODUCT also correlates with severity of coronary artery disease - the lower DOUBLE PRODUCT when wall motion abnormalities occur, generally translates to more severe coronary artery disease.