Welch Allyn®
ELI® 280

EXERCISE STRESS OPTION

ADDENDUM TO ELI 280
USER MANUAL

Manufactured by Welch Allyn, Inc. Skaneateles Falls, NY U.S.A.

CE 0459

Caution: *Federal law restricts this device to sale by or on the order of a physician.*

The Stress Option for the Welch Allyn ELI 280 is not available in the U.S. or Canada.
The Welch Allyn ELI 280 and Burdick ELI 280 Resting Electrocardiographs are available in the U.S. and Canada.

For patent information, please visit www.welchallyn.com/patents

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TABLE OF CONTENTS

TABLE OF FIGURES

1. NOTICES

Manufacturer's Responsibility

Welch Allyn, Inc. is responsible for the effects on safety and performance only if:

- Assembly operations, extensions, readjustments, modifications, or repairs are carried out only by persons authorized by Welch Allyn, Inc.
- The device is used in accordance with the instructions for use.

Responsibility of the Customer

The user of this device is responsible for ensuring the implementation of a satisfactory maintenance schedule. Failure to do so may cause undue failure and possible health hazards.

This manual must be kept in a safe place to prevent its deterioration and/or alteration. The user and Welch Allyn, Inc. authorized personnel must have access to this manual at any time.

The user of this device must periodically check the accessories, their functionality and integrity.

Equipment Identification

Welch Allyn, Inc. equipment is identified by a serial and reference number on the bottom of the device. Care should be taken so that these numbers are not defaced.

Copyright and Trademark Notices

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WELCH ALLYN, INC. (hereafter referred to as "Welch Allyn") warrants that components within Welch Allyn products (hereafter referred to as "Product/s") will be free from defects in workmanship and materials for the number of years specified on documentation accompanying the product, or previously agreed to by the purchaser and Welch Allyn, or if not otherwise noted, for a period of twenty-four (24) months from the date of shipment.

Consumable, disposable or single use products such as, but not limited to, PAPER or ELECTRODES are warranted to be free from defects in workmanship and materials for a period of 90 days from the date of shipment or the date of first use, whichever is sooner.

Reusable product such as, but not limited to, BATTERIES, BLOOD PRESSURE CUFFS, BLOOD PRESSURE HOSES, TRANSDUCER CABLES, Y-CABLES, PATIENT CABLES, LEAD WIRES, MAGNETIC STORAGE MEDIUMS, CARRY CASES or MOUNTS, are warranted to be free from defects in workmanship and materials for a period of 90 days. This warranty does not apply to damage to the Product/s caused by any or all of the following circumstances or conditions:

a) Freight damage;

b) Parts and/or accessories of the Product/s not obtained from or approved by Welch Allyn;

c) Misapplication, misuse, abuse, and/or failure to follow the Product/s instruction sheets and/or information guides;

d) Accident; a disaster affecting the Product/s;

e) Alterations and/or modifications to the Product/s not authorized by Welch Allyn;

f) Other events outside of Welch Allyn's reasonable control or not arising under normal operating conditions.

THE REMEDY UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT WITHOUT CHARGE FOR LABOR OR MATERIALS, OR ANY PRODUCT/S FOUND UPON EXAMINATION BY WELCH ALLYN TO HAVE BEEN DEFECTIVE. This remedy shall be conditioned upon receipt of notice by Welch Allyn of any alleged defects promptly after discovery thereof within the warranty period. Welch Allyn's obligations under the foregoing warranty will further be conditioned upon the assumption by the purchaser of the Product/s (i) of all carrier charges with respect to any Product/s returned to Welch Allyn's principal place or any other place as specifically designated by Welch Allyn or an authorized distributor or representative of Welch Allyn, and (ii) all risk of loss in transit. It is expressly agreed that the liability of Welch Allyn is limited and that Welch Allyn does not function as an insurer. A purchaser of a Product/s, by its acceptance and purchase thereof, acknowledges and agrees that Welch Allyn is not liable for loss, harm, or damage due directly or indirectly to an occurrence or consequence therefrom relating to the Product/s. If Welch Allyn should be found liable to anyone under any theory (except the expressed warranty set forth herein) for loss, harm, or damage, the liability of Welch Allyn shall be limited to the lesser of the actual loss, harm, or damage, or the original purchase price of the Product/s when sold.

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3. USER SAFETY INFORMATION

WARNING: Means there is the possibility of personal injury to you or others.

Caution: Means there is the possibility of damage to the device.

Note: Provides information to further assist in the use of the device.

***NOTE**: This manual may contain screen shots and pictures. Any screen shots and pictures are provided for reference only and are not intended to convey actual operating techniques. Consult the actual screen in the host language for specific wording.*

WARNING(S)

- Reference the ELI™ 280 user manual for all warnings.
- When the 40 Hz filter is used, the frequency response requirement for diagnostic ECG equipment cannot be met. The 40 Hz filter significantly reduces high-frequency components of the ECG and pacemaker spike amplitudes, and is recommended only if high-frequency noise cannot be reduced by proper procedures.
- Before attempting to use the device, the user must read and understand the contents of the user manual and any accompanying documents. Contact Welch Allyn service for additional training options.

Cautions

- Reference the ELI 280 user manual for all cautions.

4. EQUIPMENT SYMBOLS AND MARKINGS

Symbol Delineation

WARNING The warning statements in this manual identify conditions or practices that could lead to illness, injury, or death. In addition, when used on a patient applied part, this symbol indicates defibrillation protection is in the cables. Warning symbols will appear with a grey background in a black and white document.

CAUTION The caution statements in this manual identify conditions or practices that could result in damage to the equipment or other property, or loss of data.

Alternating current

Protective earth (appears on inside of unit)

Fuse (appears on inside of unit)

Telephone line (modem)

Network (LAN)

USB

Defibrillator-proof Type CF applied part

Input

ON/OFF (power)

Shift key (to enter upper-case text on keyboard)

Do not dispose as unsorted municipal waste. Requires separate handling for waste disposal according to local requirements

Antenna

Meets essential requirements of the European Medical Device Directive 93/42/EC

Non-ionizing electromagnetic radiation

Follow instructions/directions for use (DFU) -- mandatory action. A copy of the DFU is available on this website. A printed copy of the DFU can be ordered from Welch Allyn for delivery within 7 calendar days.

Medical Device

Reorder Number

5. USING THE ELI 280 EXERCISE STRESS OPTION

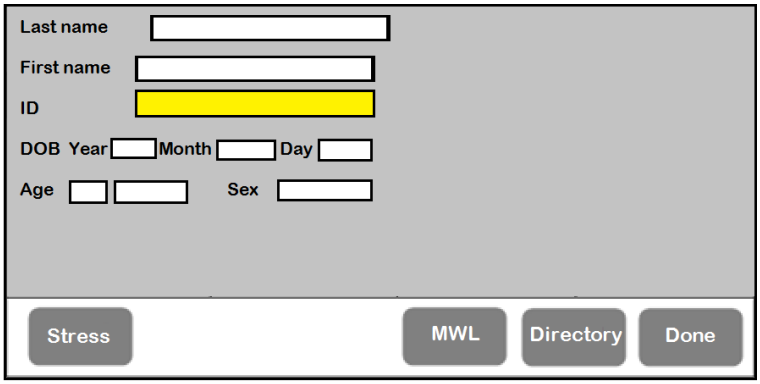
The ELI™ 280 Exercise Stress option is capable of acquiring, viewing, and printing ECG data in a 12-lead stress format.

> ***NOTE**: This manual may contain screen shots. Any screen shots are provided for reference only and are not intended to convey actual operating techniques. Consult the actual screen in the host language for specific wording.*

Starting the Exercise Stress Option

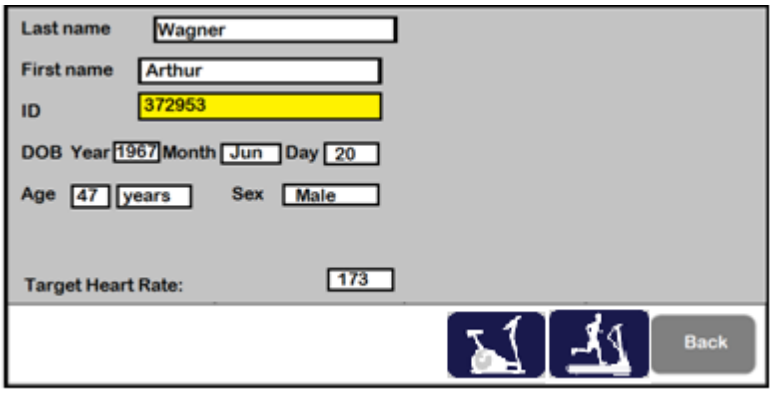
Power the ELI 280 ON. After the ELI 280 startup screen appears, select the Patient Information icon located on the right hand side of the real-time ECG display.

1. Enter patient demographics manually, from the Directory, or from the MWL.



2. After the patient hookup, select the **Stress** button located in the bottom left corner of the display.

3. If an age is entered, the target heart rate is automatically calculated using the formula 220 minus age. The target heart rate field can be manually entered or changed as desired.



4. Select the button for the type of exercise equipment to be used:
   - Ergometer =  . button
   - Treadmill =  button
   - None (Pharmacological) = **Ergom.** button, then select **Ergoselect**, then **None**
   - Return to Patient Information = **Back** button

5. Touch each protocol field selection that you wish to modify.
   - Available choices will be displayed.
   - The keyboard will appear for numeric entries.
   - Changes are saved and available for all future cardiac stress exams.

Ergometer Protocol Settings	Choices	Default Settings
Select Ergometer:	None or Ergoselect	Ergoselect
Pre-Exercise Load (Watts):	Any numeric value in increments of 5 from 10 to 995	10
Exercise Starting Load (Watts):	Any numeric value in increments of 5 from 10 to 995	25
Exercise Stage Time (mm:ss):	Minutes (mm): Seconds (ss) from 0:10 to 10:00	3:00
Exercise Load Increment (Watts):	Any numeric value in increments of 5 from 10 to 995	25
Exercise Auto Print:	No or Yes	Yes
Recovery Load (Watts):	Any numeric value in increments of 5 from 10 to 995	10
Recovery Print Period (mm:ss):	Minutes (mm): Seconds (ss) from 0:10 to 10:00	3:00

Treadmill Protocol Settings	Choices	Default Settings
Select Treadmill:	TrackMaster TMX 428	TrackMaster TMX 428
Select Protocol:	Bruce, Modified Bruce, Naughton, or Balke	Bruce
Units for Speed:	MPH or km/h	MPH
Pre-Exercise Speed:	0.5 to any numeric value	Protocol dependent
Exercise Auto Print:	No or Yes	Yes
Recovery Speed:	0.5 to any numeric value	Protocol dependent
Recovery Print Period (mm:ss):	Minutes (mm): Seconds (ss)	Protocol dependent

Using the Exercise Stress Option

1. Select the **Begin** button to start the pre-exercise phase. Selections will appear similar to those shown in Figure 1-1.

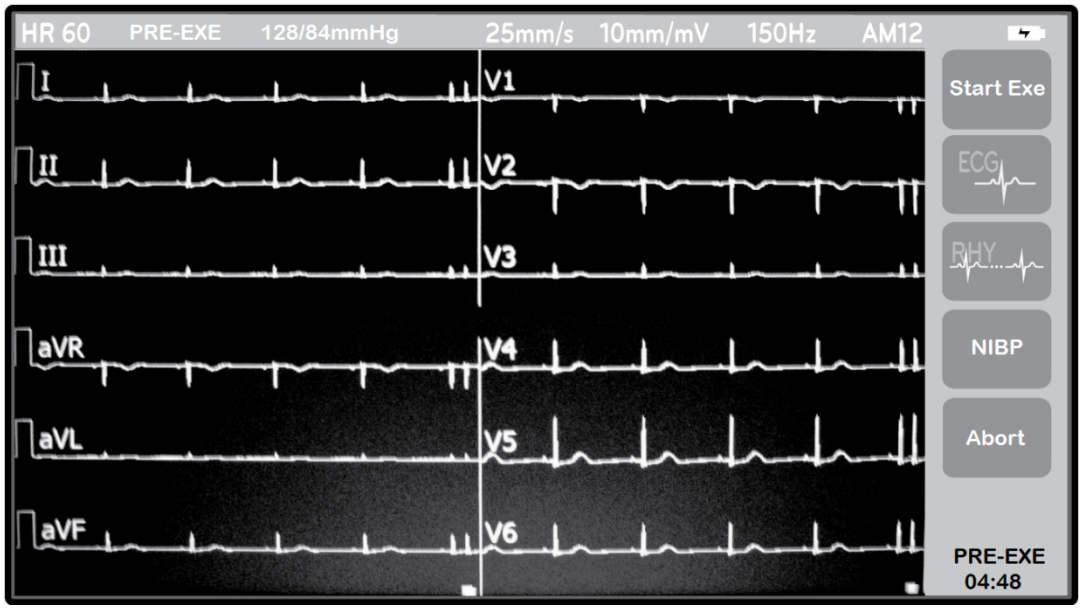
   At the start of an exercise stress test, the ELI 280 will take a few seconds to learn the QRS morphology prior to display of the Start Exe and 12-lead ECG buttons.

   The heart rate, NIBP less than 1-minute old, stage, exercise equipment status, ECG gain, ECG speed, ECG filter, AM12 or WAM, and battery status are displayed in the top portion of each displayed phase.

   > ***NOTE**: Equipment Error is displayed when no treadmill or ergometer is connected and this equipment has been selected for the exam.*

   The PRE-EXE (pre-exercise) phase time (mm:ss) is displayed in the lower right corner of the display.

Figure 1 Pre-Exercise Phase Display



Start Exe: Allows movement from Pre-exercise to the Exercise phase.

ECG: Prints a 12-lead ECG according to configuration format settings labeled MANUAL PRINT.

> ***NOTE**: The Start Exe and ECG buttons will appear after QRS morphology is learned.*

RHY: Begins printing continuous ECG and the button will change to **Stop** to end printing.

NIBP: Allows entry of Systolic and Diastolic numeric values; displayed as mmHg in the display top border .

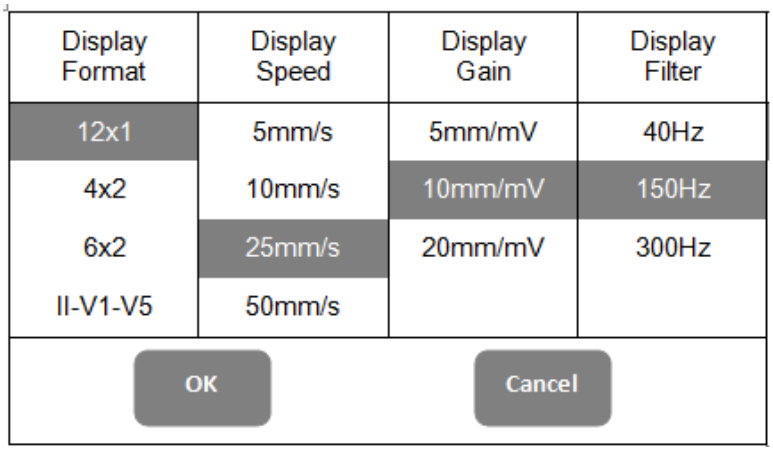
***NOTE**: ECG waveform is not displayed during keyboard SBP and DBP value entry.*

***NOTE**: The NIBP value is displayed and printed on ECG for 60-seconds after entered.*

Abort: Allows pre-exercise cancellation and a return to the Patient Information display.

ECG Display Settings

Touching the displayed ECG waveforms will open a menu allowing configuration of the lead layout, gain, speed and filter settings. Select OK to save changes and return to ECG display. Select Cancel to return to the ECG display without change.



ECG Printout

ECG printouts will use the ELI 280 ECG configuration and lead format from the resting ECG settings.

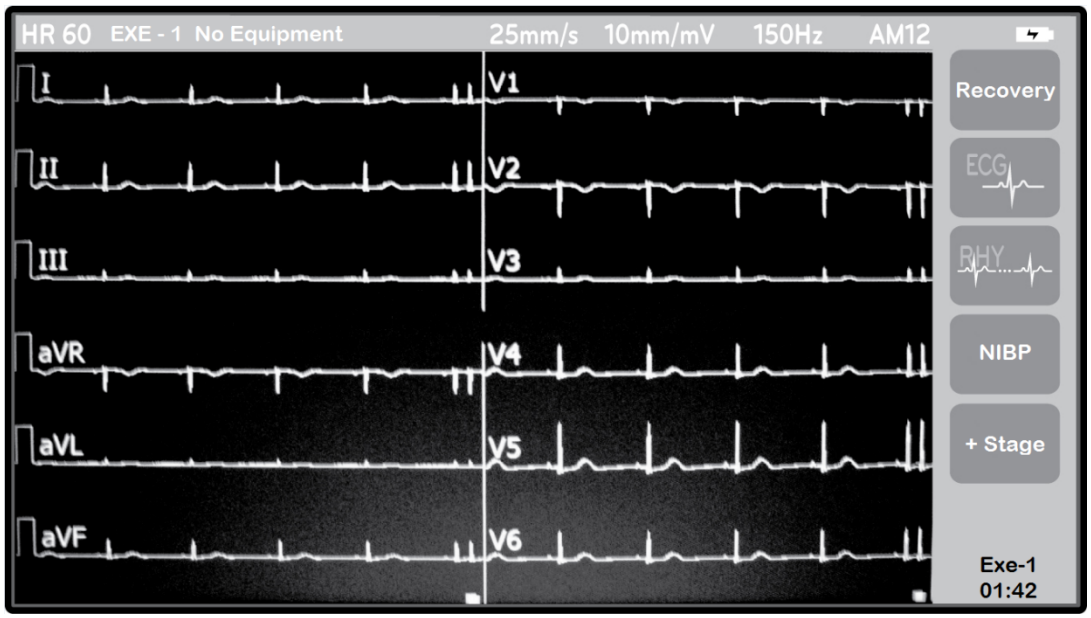
Cardiac stress exam ECG printouts include:

- Patient demographics
- Protocol Name (for treadmill tests)
- Date/Time at start of exam
- Total phase time (PRE, EXE, or REC)
- Stage and stage time
- Workload values
- Heart rate
- Target heart rate
- Non-invasive blood pressure if less than 1-minute old
- Auto/Manual/Peak indication

The ECG footer includes: serial number, site name, site number, cart number, software version, ECG speed, gain, and filter settings.

2. Select the **Start Exe** button to start the exercise phase. Selections will appear similar to those shown in Figure 2-1.

Figure 2 Exercise Phase Display



Recovery: Allows movement from Exercise to the Recovery phase.

ECG: Prints a 12-lead ECG according to configuration format settings labeled MANUAL PRINT.

***NOTE**: The Start Exe and ECG buttons will appear after QRS morphology is learned.*

RHY: Begins printing continuous ECG and the button will change to **Stop** to end printing.

NIBP: Allows entry of Systolic and Diastolic numeric values; displayed as mmHg in the display top border

***NOTE**: ECG waveform is not displayed during keyboard SBP and DBP value entry.*

***NOTE**: The NIBP value is displayed and printed on ECG for 60-seconds after entered*

+Stage: Allows advancement to the next stage of exercise.

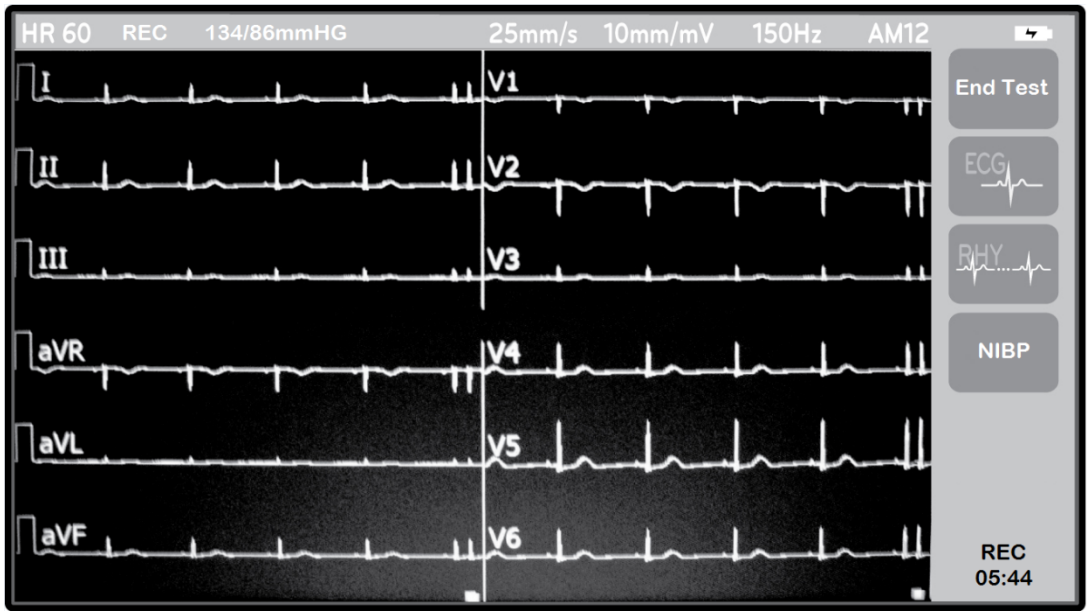
***NOTE**: There is a maximum of 9 treadmill stages with no limit to the number of ergometer stages. Up to 40 stages will print in the final report summary.*

The Exe-1 (exercise) phase time (mm:ss) is displayed in the lower right corner of the display.

Touching the displayed ECG waveforms will display a menu allowing configuration of the lead layout, gain, speed and filter settings.

3. Select the **Recovery** button to start the recovery phase. Selections will appear similar to those shown in Figure 3-1.

Figure 3 Recovery Phase Display



End Test: Ends the Recovery phase and automatically prints the exam summary. Display is returned to the ELI 280 resting ECG functions.

***NOTE**: This button is not functional during 12-lead ECG printing.*

ECG: Prints a 12-lead ECG according to configuration format settings labeled MANUAL PRINT.

***NOTE**: The Start Exe and ECG buttons will appear after QRS morphology is learned.*

RHY: Begins printing continuous ECG and the button will change to **Stop** to end printing.

NIBP: Allows entry of Systolic and Diastolic numeric values; displayed as mmHg in the display top border

***NOTE**: ECG waveform is not displayed during keyboard SBP and DBP value entry.*

***NOTE**: The NIBP value is displayed and printed on ECG for 60-seconds after entered*


: Allows the TrackMaster TMX 428 treadmill to be stopped.

***NOTE**:*  *is only present with a Treadmill protocol.*

Touching the displayed ECG waveforms will display a menu allowing configuration of the lead layout, gain, speed and filter settings.

Final Report Printout

A final report is automatically printed when the End Test button is selected.
The cardiac stress exam final report includes:

- Patient demographics
- Date/Time at start of exam
- Protocol Name (for treadmill tests)
- Summary: Exercise Time, Maximum Heart Rate, and Target Heart Rate
- Comments section for handwritten comments and conclusions
- Signature section
- Exercise table with information for each exercise and recovery stage
    - Stage
    - Stage Time
    - Exercise Time
    - Heart Rate
    - Blood Pressure

  Up to 40 stages will print in the final report summary.

The final report footer includes: serial number, site name, site number, cart number, and software version.

***NOTE**: Should a printer fault occur during report printing, ELI 280 will remain on the REC page allowing 3 attempts to correct the fault and end the exam before returning to the resting ECG function.*

6. CONDUCTING AN EXERCISE STRESS TEST

Patient Preparation

Before attaching the electrodes, ensure the patient fully understands the procedure and what to expect.

- Privacy is very important to ensure the patient is relaxed.
- Explain the method to be taken for skin preparation and electrode application.
- Make sure the patient is comfortable and that the arms and hands are relaxed.
- Once all the electrodes are attached, ask the patient not to talk to assist in good baseline ECG acquisition.

Preparing Patient Skin

Thorough skin preparation is very important. There is natural resistance on the skin surface from various sources such as hair, oil, and dry, dead skin. Skin preparation is intended to minimize these effects.

To prepare the skin:

- Shave chest hair at the electrode sites if necessary.
- Clean skin with alcohol or warm, soapy water to remove body oils, lotion and powder.
- Thoroughly dry the skin.
- Gently exfoliate the skin with an abrasive pad where the gel center of each electrode will be applied.

Patient Hookup

Attach the electrodes to the lead wires on the patient cable or acquisition module before attaching electrodes to the patient.

To Attach the Electrodes

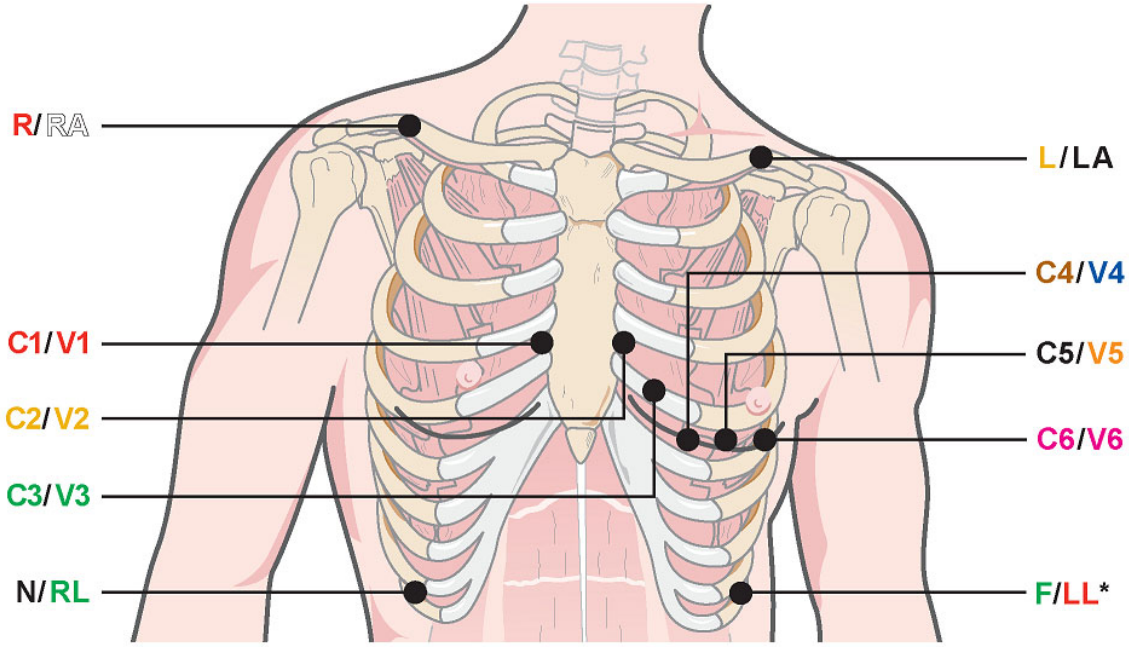
1. Firmly attach each lead wire to an electrode.
2. Place the gel area of the electrode over the center of the prepared area using the positioning illustrated in figure 4; press the adhesive ring into place. Avoid pressing the center of the gel area.
3. Place right arm (RA) and left arm (LA) leads close to the shoulder on the clavicle bone.
4. Place right leg (RL) lead on the sternum. This lead can be placed in another stable location for patient comfort.
5. Place left leg (LL) lead on the lower left side of body, as close to the hip as possible, on the iliac crest (original Mason-Likar position), or on the lowest rib on the left side of the chest (modified Mason-Likar position).
6. Ensure electrodes are securely attached to the skin. To test electrode contact, lightly tug the lead wire to check adhesion. If the electrode moves freely, the site should be prepped again. If the electrode does not move easily, a good connection has been obtained.

***NOTE AND CAUTION**: Proper skin preparation is very important. Poor ECG signal quality is the main cause for incorrect beat and arrhythmia detection. RA and LA are susceptible to muscle interference. LL lead is susceptible to interference from clothing, a belt, and movement.*

Choose the best locations for limb lead placement according to body type. Avoid muscular and loose, flabby skin locations.

Prevent pulling on the lead wires by means of strain relief as needed with use of surgical tape or a stress vest available from most medical supply companies.

Figure 4 Electrode Positioning



IEC	C1	C2	C3	C4	C5	C6	R	L	N	F
AAMI	V1	V2	V3	V4	V5	V6	RA	LA	RL	LL

* ***NOTE AND CAUTION***: *Placement of the Left Leg (LL) electrode in the original Mason-Likar position increases the similarity of the acquired ECG with a standard 12-lead ECG and is therefore recommended; however, clothing may interfere with this position and increase the amount of artifact. The modified position may decrease the sensitivity of inferior ECG leads and cause axis shift with respect to the standard 12-lead ECG. Accurate skin preparation and suitable clothing are the most important factors in excessive artifact prevention.*

NOTE: *The Right Leg (RL) electrode may be positioned in any location least subject to motion artifact according to clinician preference and specific test requirements.*

Patient Hookup Summary Table

AAMI Lead	IEC Lead	Electrode Position
 Red	 Red	On the 4th intercostal space at the right sternal border.
 Yellow	 Yellow	On the 4th intercostal space at the left sternal border.
 Green	 Green	Midway between V2/C2 and V4/C4 electrodes.
 Blue	 Brown	On the 5th intercostal space at the left midclavicular line.
 Orange	 Black	Midway between V4/C4 and V6/C6 electrodes.
 Violet	 Violet	On the left midaxillary line, horizontal with V4/C4 electrode.
 Black	 Yellow	On the left clavicle.
 White	 Red	On the right clavicle.
 Red	 Green	Place on lower left side of body, as close to the hip as possible, or on the lowest rib on the left side of the chest; see ***Note and Caution****.
 Green	 Black	Place on lower right side of body, as close to the hip as possible, or on the lowest rib on the right side of the chest; see ***Note and Caution****.

Strain Relief and Artifact

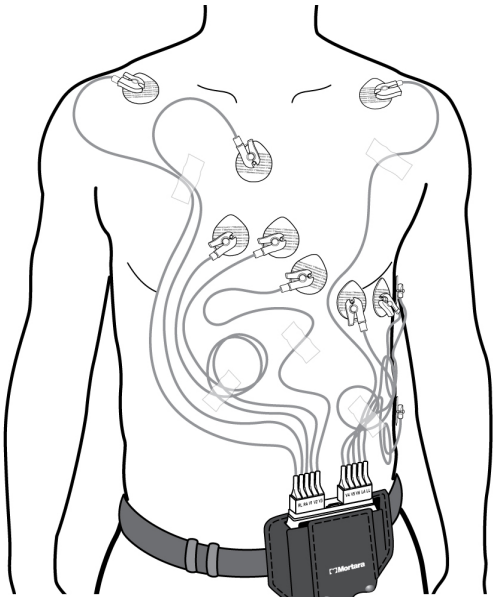
Because the patient is ambulatory and will be exercising, steps must be taken to ensure the best possible ECG quality. The ECG quality may look good at rest but may not when the patient begins to exercise.

Artifact is frequently associated with poor electrode contact, poor skin preparation, and poor lead positioning. Noisy ECG waveform, distortion of ECG complexes, wandering baseline, fuzzy ECG tracing, small ECG complexes, false high heart rate values, and false arrhythmia detection all lead to inaccurate stress testing results.

WAM and AM12 Strain Relief

The wireless (WAM) or wired (AM12) acquisition module leadwires may pull on the electrode sites during exercise if not secured properly.

1. Route the upper body leadwires upward, and then curve downward.
2. Creation of a curve in all remaining leadwires will prevent pulling on each electrode.
3. Affix the leadwires with adhesive skin tape as shown that will not leave a residue on the leadwire.



4. As an alternative, a stress vest available from most medical supply companies may be used.

Conducting an Exercise Stress Test

For each new exercise stress test, the user must select the appropriate profile and protocol. Changes in any protocol can be made in the settings.

1. Select **Patient Information** and then select the **Stress** button.
2. Change the **Target Heart Rate** if necessary.
3. Select the type of exercise equipment to be used and modify settings if necessary.
4. Select **Begin** to start pre-exercise.

   The ECG waveforms are displayed as they are acquired from the patient.

   - Examine the 12-lead rhythm display for artifact (noise) or baseline drift. Re-prep and replace electrodes as necessary to obtain satisfactory tracings.
   - If a lead fail condition exists in any of the displayed leads, square waves appear for leads in fault and the lead labels are displayed in the center of the screen.
5. Select **Begin**. The patient demographics window will appear.

Pre-Exercise Phase

During the Pre-exercise phase, the user should:

1. Enter the patient's baseline BP.
   - Enter three characters in the systolic field, select **Done**, and the display automatically advances the cursor to the diastolic field.
2. Obtain baseline ECGs (i.e., supine, standing, and hyperventilation 12-lead ECGs) as desired.
3. Instruct patient on the proper technique for using the exercise equipment.
4. If desired, change the ECG display by touching the ECG waveform and selecting the desired display options.

Acquiring a Resting ECG

1. Have the patient resting on a bed or exam table. If the exam table is narrow, tuck the patient's hands under his/her buttocks to ensure their muscles are relaxed. Touch the **ECG** button to print.
2. Ask the patient to stand up and move to the treadmill or ergometer. You may need to reposition the electrodes depending upon the 12-lead ECG acquired.

Before beginning the Exercise phase of the test, instruct the patient to follow the appropriate steps below:

For Treadmill

1. Have the patient straddle the belt. (You should turn the treadmill on when the belt has been safely straddled). The treadmill starts at the pre-selected speed and elevation.

2. Patients should place their hands on the handrail for stability and test the speed of the belt with one foot before transferring the other foot to the moving belt.

3. When patients are acclimated to the movement of the belt, remind them to keep their bodies straight and their heads up. They can rest their wrists over the handrail or place their arms by their sides as they would in a normal walking position.

4. Instruct patients to relax and use as little upper body motion as possible, and to stay near the front of the treadmill.

   ***NOTE**: To stop the treadmill immediately, depress the emergency stop button mounted on the handrail of the treadmill.*

For Ergometer

1. Have the patient sit on the seat of the ergometer. The ergometer starts at the pre-selected watts level.

2. Patients should place their hands on the handlebars for stability and test the watts level of the ergometer before proceeding to ensure they are familiar with the functional requirements during the test.

3. When patients are acclimated to the ergometer, remind them to keep their bodies straight and their heads up. They can rest their wrists over the handlebars as they would in a normal riding position.

For Pharmacological

1. Have the patient lie on the table, or sit on the chair (depending on facility policies).

2. Patients should place their hands on the table under their butt cheeks for stability before proceeding to ensure they are familiar with the functional requirements during the test.

3. When patients are acclimated to their surroundings, remind them to keep their bodies still and their heads flat.

Exercise Phase

Enter the Exercise phase of the stress test by selecting the **Start EXE** button. The following two events will occur:

- The stage time clock will start counting from 00:00.
- The treadmill or ergometer advances the workload to the parameters identified for the first stage of exercise.

1. Allow the ELI 280 to acquire and print ECGs at the prescribed times set by the protocol being used.
2. Manually acquire and enter an NIBP value as your policy requires.
3. Enter NIBP values; acquire ECGs or rhythm strips as required throughout the test.
4. Select **Recovery** when the exercise stress test is completed and the Recovery phase is to begin.
5. Select **End Test** when the Recovery phase is complete and the exercise stress test is over.

Recovery Phase

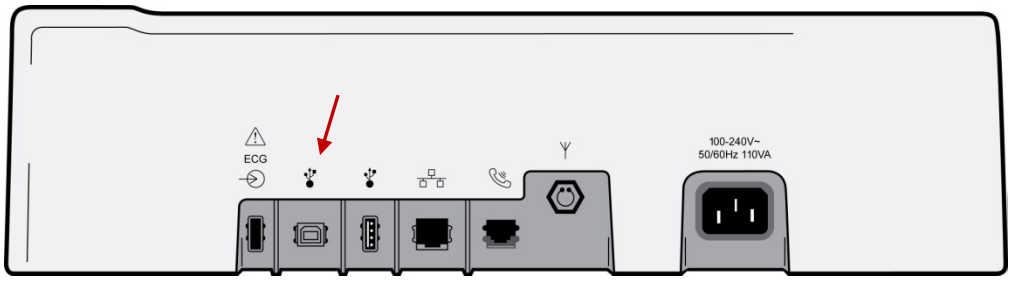
The treadmill or ergometer will change to the specified recovery speed and grade percent or watts level, and then turn off once the recovery period has been completed. The user can manually shut down the treadmill or ergometer by selecting  .

At the start of the Recovery phase, the stage time clock resets to zero and an automatic printout generates (when going from Exercise to Recovery a Peak Exercise printout always generates regardless of settings). Menu items function in recovery same as they did in exercise. The user can enter or acquire BP values and print ECGs as they were entered during the Exercise phase of the test. The ELI 280 generates automatic ECGs if programmed to do so. 12-lead ECGs can be printed at any time by selecting **ECG**. At the end of the Recovery phase, click on **End Test** to print the Final Report.

7. TREADMILL/ERGOMETER HOOKUP

ELI 280 to Treadmill Hookup Instructions

1. Connect one end of the ELI 280 USB interface cable to the USB Device port on the back of the ELI 280, and the other end to the USB connection port on the treadmill.



2. Connect the treadmill power cord to a dedicated circuit as recommended by the treadmill manufacturer.
3. Turn the treadmill power switch **ON**.
4. Turn the ELI 280 **ON**.

ELI 280 to Ergometer Hookup Instructions

1. Connect one end of the ELI 280 USB interface cable to the USB Device port on the back of the ELI 280, and the other end to the USB connection port on the ergometer.
2. Connect the ergometer power cord to a dedicated circuit as recommended by the ergometer manufacturer.
3. Turn the ergometer power switch **ON**.
4. Turn the ELI 280 **ON**.

8. PROTOCOLS

The following protocols are delivered with every ELI 280 with the Exercise Stress option enabled:

- Bruce
- Modified Bruce
- Naughton
- Balke

These sample protocols produce the following operations and conditions:

- An automatic ECG printout at the end of each stage.
- An automatic PEAK EXE printout at the end of exercise.
- In the Recovery phase, an automatic ECG at the programmed time intervals

As an example, the Bruce protocol produces the following operations and conditions:

- A stage change occurs every 3 minutes with an increase in treadmill speed and grade.
- A 12-lead ECG printout is automatically printed at the end of each stage.
- In the Recovery phase, the treadmill slows to the programmed speed and the following reports are automatically printed:
  - Peak Exercise ECG prints immediately.
  - Recovery ECG printouts as programmed

PROTOCOL: BRUCE

STAGE NUMBER	DURATION	SPEED (MPH)	GRADE (%)
PRE-EXE	----	1.2	0.0
EXE-1	3:00	1.7	10.0
EXE-2	3:00	2.5	12.0
EXE-3	3:00	3.4	14.0
EXE-4	3:00	4.2	16.0
EXE-5	3:00	5.0	18.0
EXE-6	3:00	5.5	20.0
EXE-7	3:00	6.0	22.0
REC	----	1.2	0.0

PROTOCOL: MODIFIED BRUCE

STAGE NUMBER	DURATION	SPEED (MPH)	GRADE (%)
PRE-EXE	----	1.2	0.0
EXE-1	3:00	1.7	0.0
EXE-2	3:00	1.7	5.0
EXE-3	3:00	1.7	10.0
EXE-4	3:00	2.5	12.0
EXE-5	3:00	3.4	14.0
EXE-6	3:00	4.2	16.0
EXE-7	3:00	5.0	18.0
EXE-8	3:00	5.5	20.0
EXE-9	3:00	6.0	22.0
REC	----	1.2	0.0

PROTOCOL: NAUGHTON

STAGE NUMBER	DURATION	SPEED	GRADE
PRE-EXE	----	1.0	0.0
EXE-1	2:00	1.0	0.0
EXE-2	2:00	2.0	0.0
EXE-3	2:00	2.0	3.5
EXE-4	2:00	2.0	7.0
EXE-5	2:00	2.0	10.5
EXE-6	2:00	2.0	14.0
EXE-7	2:00	2.0	17.5
REC	3.00	1.0	0.0

PROTOCOL: BALKE

STAGE NUMBER	DURATION	SPEED	GRADE
PRE-EXE	----	1.0	0.0
EXE-1	3:00	3.0	0.0
EXE-2	3:00	3.0	2.5
EXE-3	3:00	3.0	5.0
EXE-4	3:00	3.0	7.5
EXE-5	3:00	3.0	10.0
EXE-6	3:00	3.0	12.5
EXE-7	3:00	3.0	15.0
EXE-8	3:00	3.0	17.5
EXE-9	3:00	3.0	20.0
EXE-10	3:00	3.0	22.5
REC	----	3.0	0.0

PROTOCOL: ERGOMETER – PROGRAMMED AT THE START OF EACH TEST

TIME	STAGE NUMBER	WORKLOAD (WATTS)
Rest/Recovery		10
3:00	1	25
3:00	2	50
3:00	3	75
3:00	4	100
3:00	5	125
3:00	6	150

PROTOCOL: PHARMACOLOGICAL – PROGRAMMED AT THE START OF EACH TEST

STAGE NUMBER	DURATION	SPEED	GRADE
Pre-Exercise	----	0.0	0.0
1	3:00	0.0	0.0
2	3:00	0.0	0.0
3	3:00	0.0	0.0
4	3:00	0.0	0.0
5	3:00	0.0	0.0
6	3:00	0.0	0.0
7	3:00	0.0	0.0
Recovery	----	0.0	0.0

9. TROUBLESHOOTING

Troubleshooting Chart

Screen Message or Problem	Cause	Correction
Baseline drift	Poor skin-to-electrode contact.	Reprep skin and replace faulty electrode.
Squared line(s) display on the multi-lead rhythm display screen or on the screen during the exercise test	Lead fail caused by poor skin-to-electrode contact. Broken lead wire/cable.	Correct faulty lead(s) identified in upper right corner of the screen. Replace patient cable.
Muscle noise	Electrode placed over muscle or fatty tissue.	Find stable electrode site, reprep skin, and apply a new electrode.
Treadmill does not respond to commands from the ELI 280	Equipment powered up in wrong sequence. Treadmill power switch off, or treadmill interface cable not properly attached. Emergency stop switch is engaged.	Turn power to the treadmill OFF. Wait one minute and turn power back ON. Proceed with test. Secure the treadmill to the ELI 280 cable connections. Turn treadmill main power switch ON. (Switch is located at the base of the treadmill hood, left side.) Reset emergency stop switch by turning clockwise one-quarter turn. Reset the ELI 280.
Z-fold writer paper will not feed out Z-fold writer not printing Uneven printing of ECGs or reports	Paper jammed. No paper in tray. Open writer door. Printer head needs cleaning.	Open writer cover and remove jammed paper. Insert new packet of paper in tray. See if writer door is latched. Refer to printer head cleaning instructions in the ELI 280 user manual.
Treadmill belt starts to slip	When loose it can shift.	Tighten adjustment bolts on both sides until slippage stops.
RA/LL/C3/C5 FAIL	One or more leads are in fail.	Connect the electrodes to turn off the warning message.