

DNI NEVADA

Operating and Service Manual

FitTester

Quantitative Respirator FitTester

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Operating and Service Manual

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Chapter 1

General Information

SAFETY CONSIDERATIONS

GENERAL

This instrument and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

SAFETY SYMBOLS

WARNING! The **"WARNING!"** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **"WARNING!"** sign until the indicated conditions are fully understood and met.

CAUTION: The **"CAUTION:"** sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the instrument. Do not proceed beyond a **"CAUTION:"** sign until the indicated conditions are fully understood and met.

MANUAL ADDENDA

CAUTION: Information concerning improvements or changes to the instrument that occur after the printing of this manual will be on an addendum sheet included with the manual. Be sure to review these changes before attempting to operate or service the instrument.

SAFETY INFORMATION

WARNING! There are internal fuses that are to be replaced by trained service personnel only.

INTRODUCTION AND FEATURES

Introduction

This manual is written for...

... industrial hygienists, safety directors, equipment maintenance personnel, and others responsible for conducting personal respirator fit-testing.

It explains...

... the operation and service of the FitTester 3000 Personal Respirator Leak Rate Analyzer.

Fit Tester 3000 measures...

... face-to-facepiece fit of a respirator. With a perfect respirator and fit, all inhaled air is forced through the filter system, thereby, providing maximum respiratory protection for the individual. If the face-to-facepiece seal leaks, unfiltered air bypasses the filter system and enters the individual's lungs during inhalation, thus, reducing respiratory protection.

By design, a respirator should prevent contaminated air in a room or area from entering the lungs of the individual wearing it. If the respirator is in good working order, the only way contaminated air can enter the individual's lungs is through a leak in the face-to-facepiece seal. The FitTester 3000 measures face-to-facepiece seal leakage and then calculates the fit factor (FF) of the respirator being tested.

The Fit Tester 3000 uses...

... the patented *Controlled Negative Pressure (CNP)* technology.

An adapter with a squeeze-bulb-actuated valve replaces the filter cartridge and inhalation valve on the respirator. The individual under test dons the respirator (in accordance with ANSI guidelines or manufacturer's instructions), takes a breath, holds his or her breath, squeezes the bulb to close the adapter valve, and begins the test.

How the Fit Test Works

Closing the adapter valve seals the respirator mask so the FitTester 3000 can develop a negative mask pressure. When the start key is pressed, the FitTester 3000 removes air from the respirator mask until the challenge pressure is reached.

At this point, if there isn't a leak, the FitTester 3000 doesn't remove anymore air from the respirator mask. If there is a leak, air enters the respirator mask and the pressure rises. The FitTester 3000 then removes air from the respirator mask until the challenge pressure returns. This continues for 8 seconds, and then the test ends. The individual under test releases his or her grip on the bulb and breathes normally.

During the fit test, the FitTester 3000 measures exactly how much air it removed from the respirator mask after reaching the challenge pressure. This measurement is used by the FitTester 3000 to calculate the leak rate.

Before beginning the fit test, values are entered into the FitTester 3000 for parameters that determine the challenge pressure and the modeled breathing rate (for the individual being tested).

The modeled breathing rate (in liters per minute, LPM) divided by the leak rate (in cubic centimeters per minute, cc/min) is the fit factor ratio. This is a ratio of the total air breathed in to the contaminated air breathed in.

STANDARD ACCESSORIES

Description	DNI Part #
Squeeze-Bulb Assembly	9503-0024
Dual Tube Assembly #2	9503-0069
Power Cord	3010-0055
RS-232 Cable	3010-0250
9- to 25-pin "AT" RS-232 Cable	3010-0261
Operating and Service Manual	9508-0208
Vinyl Case	9530-0030

Chapter 2

Installation

UNPACKING AND INSPECTION

Follow standard receiving practices upon receipt of the instrument. Check the shipping carton for damage. If damage is found, stop unpacking the instrument. Notify the carrier and ask for an agent to be present while the instrument is unpacked. There are no special unpacking instructions, but be careful not to damage the instrument when unpacking it. Inspect the instrument for physical damage such as bent or broken parts, dents, or scratches.

CLAIMS

Our routine method of shipment is via common carrier, FOB origin. Upon delivery, if physical damage is found, retain all packing materials in their original condition and contact the carrier immediately to file a claim.

If the instrument is delivered in good physical condition but does not operate within specifications, or if there are any other problems not caused by shipping damage, please contact Dynatech Nevada or your local sales representative.

WARRANTY REPAIR

The warranty statement for this Dynatech Nevada product is at the front of this manual.

When shipping an instrument to Dynatech Nevada for repair, complete the Service Return Form and attach to the instrument. Completing this form will help to ensure timely repair of your instrument.

Use the original carton and packaging material for shipment. If they are not available, we recommend the following guide for repackaging:

- a) Use a double-walled carton of sufficient strength for the weight being shipped.
- b) Use heavy paper or cardboard to protect all instrument surfaces. Use non-abrasive material around all projecting parts.
- c) Use at least four inches of tightly packed, industrial-approved shock-absorbent material around the instrument.

CONNECTING THE PRINTER

You can connect any Centronics or IBM PC compatible parallel printer to the FitTester 3000. Dynatech Nevada recommends that you use a standard IBM PC compatible parallel printer cable.

Connect this cable to the "PRINTER" port, a 25-pin (DB25) female connector, on the rear panel of the FitTester 3000.

Chapter 3

Operating Instructions

PREPARING THE FITTESTER 3000 FOR TESTING

Four Steps to Follow

1. LOCATION

- a) Use a room that permits spoken communication between the operator of the FitTester 3000 and the test subject.
- b) Place the FitTester 3000 on a table that is large enough to accommodate it, a printer, accessories, and two seated persons.

2. PRINTER CONNECTION

- a) After you have turned the power off to both the printer and the FitTester 3000, connect the printer to the FitTester 3000 with a standard parallel printer cable. Plug this cable into the "PRINTER" port on the rear panel of the FitTester 3000.
NOTE: Refer to *CONNECTING THE PRINTER* in Chapter 2 for printer compatibility and connector specifications.
- b) Turn the power on to the FitTester 3000; then turn the printer port on. Follow the *Printer Installation Routine* in the *UTILITY MENU* section of this chapter.

3. TEST ADAPTERS

Replace the respirator's filter cartridge (or cartridges) with the appropriate test adapter (or adapters).

NOTE 1: See the next section, *MECHANICAL INTERFACES*, for details about the test adapters.

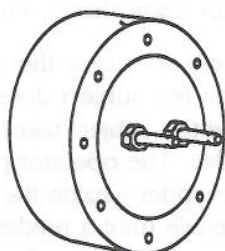
NOTE 2: Test-adapter information for your particular application is available by calling Dynatech Nevada at 702-883-3400 from 8 A.M. to 5 P.M. Pacific time.

4. DUAL TUBE ASSEMBLY CONNECTION

- a) First, attach the dual tube assembly (DNI Part # 9503-0069) to the the front of the FitTester 3000. Use the end of the dual tube assembly that has one male quick-disconnect adapter and one female quick-disconnect adapter.
 - Connect the male quick-disconnect adapter of the dual tube assembly to the female quick-disconnect adapter labeled "FLOW".
 - Connect the female quick-disconnect adapter of the dual tube assembly to the male quick-disconnect adapter labeled "PRESSURE".
- b) Next, calibrate the dual tube assembly. Connect the two female quick-disconnect adapters on the dual tube assembly to either of the male quick-disconnect adapters on the FitTester 3000 front panel labeled "DUAL TUBE CHECK". Follow the *Dual Tube Calibration* procedure in the *SYSTEM MENU* section of this chapter.
NOTE: Dynatech Nevada recommends that you perform a dual tube calibration before you begin a fit-test session, at the start of the day, or when you use a different dual tube assembly.
- c) Finally, connect the two female quick-disconnect adapters (again, orientation does not matter) to the two male quick-disconnect adapters on the test adapter that is on the respirator. One tube monitors the pressure inside the respirator mask and the other tube removes air from the respirator mask at a controlled rate.

Type "B" Test Adapter

The type "B" test adapter has two ports. One port monitors the pressure inside the respirator mask and the other port removes air from the respirator mask at a controlled rate. These ports connect to the dual tube assembly.

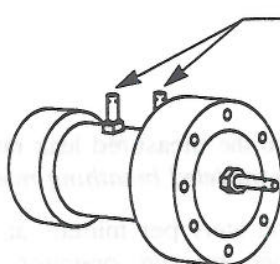


Ports for dual tube assembly connection.
NOTE: Orientation does not matter.

Type "B" Test Adapter

Type "AB" Test Adapter

The type "AB" test adapter has three ports. The ports connect to the squeeze-bulb assembly and to the dual tube assembly.



Ports for dual tube assembly connection.
NOTE: Orientation does not matter.

Port for squeeze-bulb assembly connection.

Type "AB" Test Adapter

GETTING STARTED

Preparing the Respirator for Fit-Testing

1. **SELECT...** the size, brand, and style of respirator that best fits the test subject and is most suitable for the application.
2. **REMOVE...** respirator inhalation valve(s) carefully.*
3. **REPLACE...** filter cartridge(s) with test adapter(s).**
4. **CONNECT...** squeeze-bulb assembly (DNI Part # 9503-0024) to type "A" or "AB" test adapter.**
5. **CONNECT...** dual tube assembly (DNI Part # 9503-0069) to type "B" or "AB" test adapter.**

*NOTE: Upon completion of the fit test, reinstall the respirator inhalation valve(s).

**NOTE: Refer to the test-adapter illustrations in the previous section, *MECHANICAL INTERFACES*.

Instructing the Test Subject

Use the instructions below to teach the test subject...

- ... the procedure for holding his or her breath.
- ... the guidelines to follow during a fit test.

Holding Breath

Have the test subject practice this a few times until comfortable with the procedure.

1. Pretend that you are about to dive into a swimming pool. Take a deep breath and hold it keeping your mouth closed.
2. Now look at your watch or any clock with a second hand. Continue holding your breath for 8 seconds.
3. After holding your breath for 8 seconds, relax and breathe normally.

Have the test subject follow these guidelines during a fit test.

1. Keep your mouth closed.
2. Do not exhale any air through your nose.
3. Do not make any head or facial movements. Sit as still as possible in the position that you have been instructed to hold. Maintain this position for 8 seconds; then resume normal breathing.

2. Press the <=> key again and the following appears:

TEST	EDIT	PROTOCOL	<u>SYSTEM</u>	UTILITY
<u>Set Clock</u> System Reset Dual Tube Cal Zero Pressure				
Set system time and date.				

NOTE: Use the <↑> or <↓> key to select "Set Clock", "System Reset", "Dual Tube Cal", or "Zero Pressure"; then press the <Ent> key to continue. Refer to the *SYSTEM MENU* section for more information.

- "Set Clock" sets the system's time and date.
- "System Reset" reloads all system variables.
- "Dual Tube Cal" calibrates the dual tube assembly.
- "Zero Pressure" removes the offset from the pressure transducer.

3. Press the <=> key a final time and this display appears:

TEST	EDIT	PROTOCOL	SYSTEM	<u>UTILITY</u>
<u>Printer</u> Diagnostics				
Install/Un-Install Printer.				

NOTE: Use the <↑> or <↓> key to select "Printer" or "Diagnostics"; then press the <Ent> key to continue. For more information refer to the *UTILITY MENU* section.

- "Printer" turns the printer port on or off.
- "Diagnostics" runs the FitTester 3000 diagnostic routines, which are
 - Speaker Test,
 - Keyboard Test,
 - Display Test,
 - Printer Test,
 - View Cycle Count,
 - Factory Protocol, and
 - Print Help File.

Use the <Esc> Key to Return to the MAIN MENU

Repeatedly press the <Esc>-ESCAPE key to return to the MAIN MENU from any location within the FitTester 3000 menu system.

NOTE: To activate a menu from the MAIN MENU, press the <←> or <=> key to select TEST, EDIT PROTOCOL, SYSTEM, or UTILITY; then press the <Ent>-ENTER key.

PRETEST

Introduction

The pretest can be used to...

- ... familiarize the test subject with the fit test.
- ... conduct donning exercises. A quick method for the test subject to see how donning affects fit factor.
- ... quickly check fit factors on different sizes and models of masks to determine the best-fitting respirator.

This introductory section contains the following:

- Information shown on the display when running a pretest.
NOTE: See the next section, *Running the Pretest*, for instructions on running the pretest.
- Challenge pressure and respirator mask pressure definitions.
- Explanations of the pretest parameters: inspiratory work rate, respirator mask type, cartridge type, and test subject's gender.
NOTE: The minimum passing fit factor is a parameter for protocols only; therefore, see the *PARAMETERS* section for instructions on how to change the minimum passing fit factor.
When the minimum passing fit factor is changed for protocols, it affects the pretest results. Refer to the *Pretest Results* section.

Follow the steps below to view the first three displays. The third display contains the challenge-pressure value and the respirator-mask-pressure value.

1. From the MAIN MENU, select the TEST MENU. Press the <↑> or the <↓> key to highlight "Pre-Test" on the TEST MENU. The following display appears:

TEST	EDIT PROTOCOL	SYSTEM	UTILITY
Pre-Test	Protocol 3		
Protocol 1	Protocol 4		
Protocol 2	Protocol 5		

Run a single test exercise.

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Next, press the <Ent> key and the display shows:

IMPORTANT: Inhalation valves MUST
be removed from respirator prior
to the fit test.
Press any key to continue.

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

continued on the next page

Before you begin the pretest, use the function keys as listed below to set the parameter values. An explanation of each parameter follows this list.

NOTE: Setting the parameter values during the pretest does not affect the parameter values for the protocol.

- <F2> WR: Select the inspiratory work rate.
- <F3> Msk: Select the respirator mask type.
- <F4> C: Select the cartridge type.
- <F5> MALE/FEMALE Select the test subject's gender.

<F2> WR: The inspiratory work rate has the largest influence on internal respirator mask pressure. It is measured in units of kcal/hr (energy consumed).

When a person expends more energy, he or she breathes harder causing greater air flow through the cartridge. This increased air flow results in a higher pressure drop.

Make an estimate of the work rate that your test subject experiences under normal working conditions. Next press <F2> to set the work rate accordingly.

100 kcal/hr Light - standing still or sitting at ease.

200 kcal/hr Moderate - walking (casual) without a load.

300 kcal/hr Heavy - walking with or moving a light load.

350 kcal/hr Extreme - walking with or moving a heavy load, climbing stairs, digging, etc.

<F3> Msk: The FitTester 3000 tests two types of respirator masks.

FF Full Face or Full Mask.

HM Half Mask.

Because the full-face respirator mask has a CO₂ accumulation in the dead space, the test subject breathes harder, deeper breaths to compensate for the lower oxygen content. Deeper breaths mean a higher instantaneous air flow rate through the filter cartridge.

Challenge pressure, the pressure differential across the filter cartridge, is directly proportional to the air flow rate through the cartridge.

<F4> C: The cartridges are classified into four categories:

Low Dust/Mist Filter.

Medium Chemical or HEPA.

High Combination of Chemical and HEPA.

N/A Respirator masks that do not use cartridges; for example, SCBA and PAPR.

The pressure drop across the cartridge is a function of cartridge resistance and air flow rate; therefore, the higher-density (more resistive) cartridge causes a greater pressure drop across the face-to-facepiece seal.

<F5> MALE/FEMALE Males and females both breathe the same volume of air (for a given work rate). They do, however, have different inhalation rates. A male inhales faster, which causes a higher instantaneous flow rate to occur and results in a higher challenge pressure.

Pretest Results

The pretest results are illustrated below and explained on the next page.

1. If the leak rate of the respirator mask yields a measurable fit factor, the display will look similar to this:

TEST RESULTS			
Fit Factor	=	1408	PASS
Leak Rate	=	75.3	(cc/min)
Test Time	=	8.0	(seconds)
Test-Q	:	GOOD	

CONTINUE MORE HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: If the leak rate is so great that a fit factor cannot be measured, the display will read "NO FIT (fit factor < x)", where x is the lowest fit factor that can be measured for the particular set of parameters. Repeat the pretest (see instructions below).

2. Press <F4>-MORE for additional information as shown below:

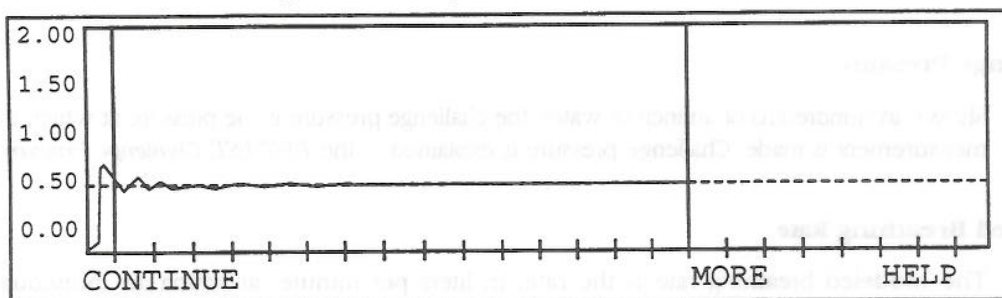
TEST RESULTS (Continued)	
Challenge Pressure	= 1.97 ("H ₂ O)
Modeled Breathing Rate	= 106.0 (LPM)
Min Passing Fit Factor	= 100

CONTINUE MORE HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: To change the minimum passing fit factor, refer to *PARAMETERS, Editing Parameters*.

3. Press <F4>-MORE again, and the pressure trace is shown again:



<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

4. Repeatedly press <F4> to scroll through the above displays.

Repeat the Pretest

It is recommended that you keep repeating (retrying) the pretest until you have achieved successful test results: that is, a "GOOD Test-Q" and a passing fit factor. Press <F1>-CONTINUE to repeat (retry) the pretest. NOTE: It is not necessary to send the test results to the printer.

PROTOCOLS

Now that you have completed several successful pretests, you are ready to begin running a protocol. The protocol is a comprehensive test that accurately measures the fit of a given respirator. Consistent fit-test results are achieved by using a protocol.

The protocol is a sequence of up to 18 fit tests or exercises. The FitTester 3000 stores five custom protocols in nonvolatile memory. After all steps in a protocol have been completed, the fit-test results are combined to calculate an "average equivalent fit factor" for the protocol. The protocol results can be printed.

Viewing a Protocol

To ensure that the protocol is correct, view each step in the protocol as follows:

1. From the MAIN MENU, select the EDIT PROTOCOL MENU; then press the <↓> key to select the protocol to view.

TEST	<u>EDIT PROTOCOL</u>	SYSTEM	UTILITY						
<table border="1"> <tr> <td>Protocol 1</td> <td>Protocol 4</td> </tr> <tr> <td>Protocol 2</td> <td>Protocol 5</td> </tr> <tr> <td>Protocol 3</td> <td>Parameters</td> </tr> </table>				Protocol 1	Protocol 4	Protocol 2	Protocol 5	Protocol 3	Parameters
Protocol 1	Protocol 4								
Protocol 2	Protocol 5								
Protocol 3	Parameters								
Edit, print or view Protocol 1.									

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Press <Ent> and the display changes to this:

*** PROTOCOL #1 ***			
EDIT	PRINT	VIEW	HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

3. Press <F3>-VIEW and the first four steps in Protocol #1 appear.

View Protocol #1			
Step	Type	Description	Duration
1	Test	Face Forward	N/A
2	Test	Face Left	N/A
3	Test	Face Right	N/A
4	Test	Head Up	N/A
ESC=Exit			↑↓ Scroll

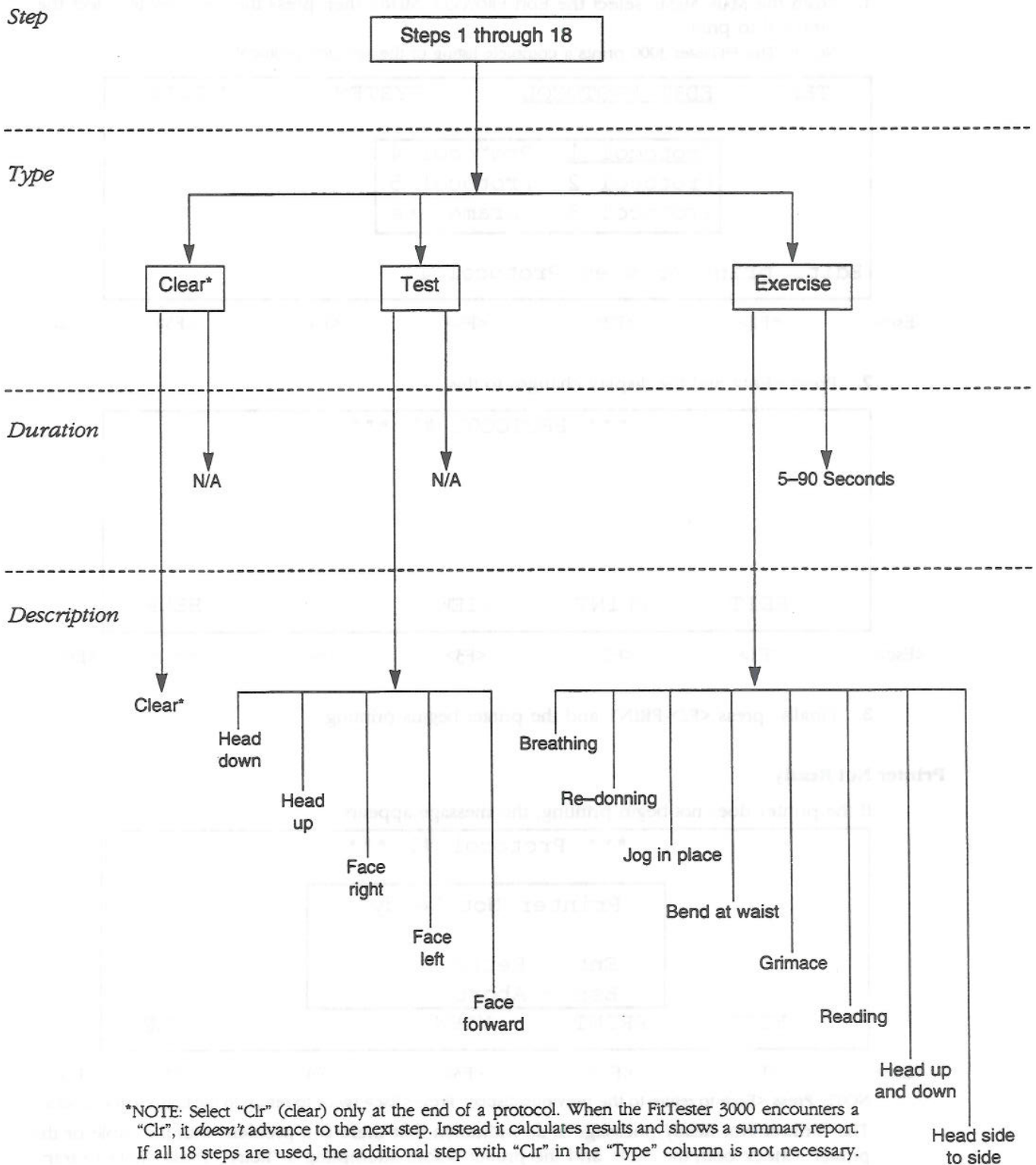
<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: Use the <↑> and the <↓> keys to scroll through the steps. Press <Esc> to return to the previous screen. Press <Esc> twice to return to the EDIT PROTOCOL MENU.

Edit-Protocol Choices

The diagram below lists the choices for you to select from. All choices are available for each protocol step.

REMINDER: Use the <=> or the <=> key to select the column: "Step", "Type", "Dur", or "Description". Then use the <↑> and the <↓> keys to scroll through the choices for the selected column.



*NOTE: Select "Clr" (clear) only at the end of a protocol. When the FitTester 3000 encounters a "Clr", it *doesn't* advance to the next step. Instead it calculates results and shows a summary report. If all 18 steps are used, the additional step with "Clr" in the "Type" column is not necessary.

Running a Protocol

NOTE 1: For a simulated deep breathing exercise, it is recommended that the test subject face forward.

NOTE 2: The FitTester 3000 shows a decrementing-seconds counter when an exercise is required.

NOTE 3: The FitTester 3000 checks for correct zero-pressure offset status. If there is a bad zero-pressure offset, the error message "Zero offset is too large. Testing is inhibited." appears. The offset problem must first be corrected before testing can resume. See *Zero Pressure* in the *SYSTEM MENU* section of this chapter for more information.

Follow these steps to run a protocol:

1. Set parameter values as explained in the *PARAMETERS, Editing Parameters* section.
2. Review the *Holding Breath* procedure, in *GETTING STARTED*, with the test subject.
3. Complete steps 1-4 in *PREPARING THE FITTESTER 3000 FOR TESTING*.
4. Complete steps 1-5 in *GETTING STARTED, Preparing the Respirator for Fit-Testing*.
5. View the protocol and ensure that it is correct. If the protocol is not correct, edit the protocol as described in the earlier section *Building and Editing a Protocol*.
6. Make sure the test subject can perform the different head positions as required by the tests and the different activities as required by the exercises. Before each test or exercise, follow the on-screen prompts that instruct the test subject on which direction to face or which activity to perform.
7. From the MAIN MENU, select the TEST MENU; then press the <↓> key to select the protocol to use.

TEST	EDIT	PROTOCOL	SYSTEM	UTILITY
Pre-Test	Protocol 3			
Protocol 1	Protocol 4			
Protocol 2	Protocol 5			

Perform selected protocol sequence.

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

8. Press <Ent> and the following message appears:

IMPORTANT: Inhalation valves MUST be removed from respirator prior to the fit test. Press any key to continue.

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

TEST AND PROTOCOL RESULTS

There are two types of protocol results: test results and protocol results.

The test results appear on the display only after each test-step is completed.

NOTE: An exercise-step doesn't have a test result.

The protocol results appear on the display after all test-steps and exercise-steps are completed. The protocol results are a combination of each test-step's test results. From this combination of test results, the "average equivalent fit factor" for the test protocol is calculated by the FitTester 3000.

Test Results

Each test result is explained in a previous section *PRETEST, Pretest Results*.

1. If the leak rate of the respirator mask yields a measurable fit factor, the display will look similar to this:

TEST RESULTS				
Fit Factor	=	168	PASS	
Leak Rate	=	632.4	(cc/min)	
Test Time	=	8.0	(seconds)	
Test-Q	:	GOOD		
SAVE	RETRY	ABORT	MORE	HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: If the leak rate is so great that a fit factor cannot be measured, the display will read "NO FIT (fit factor < x)", where x is the lowest fit factor that can be measured for the particular set of parameters. You have several options that are explained on the next page.

2. Press <F4>-MORE and the display changes to this:

TEST RESULTS (continued)				
Challenge Pressure	=	1.97	("H2O)	
Modeled Breathing Rate	=	106.0	(LPM)	
Min Passing Fit Factor	=	100		
SAVE	RETRY	ABORT	MORE	HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

continued on the next page

Protocol Results

1. When you have completed all the test-steps and exercise-steps in a protocol, the protocol results show on the display:

```

                                Avg % Leak = 0.560
                                Equiv FF = 179 Pass
                                Q = Pass

                                VIEW      PRINT
  
```

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Press <F1>-VIEW and the display changes to the following:

```

                                TEST DATE: 11/20/95 06:20:34pm

                                NEXT      PREVIOUS
  
```

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: Press <F2>-PREVIOUS to return to the previous display.

3. Press <F1>-NEXT and the display looks similar to this:

```

                                TEST PARAMETERS
Work Rate      : 350 Kcal/Hr (extreme)
Mask Type      : Full Face
Cartridge Type : Combination (high)
Challenge Pres : 1.97 (in. H2O)
Breathing Rate : 106.00 (liters/min)
Subject Gender : Male
                                NEXT      PREVIOUS
  
```

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

NOTE: Press <F2>-PREVIOUS to return to the previous display.

continued on the next page

PARAMETERS

Editing Parameters

The FitTester 3000 stores parameter values in nonvolatile memory. Follow the instructions below to change a parameter value.

1. First select "Parameters" from the EDIT PROTOCOL MENU as indicated below:

TEST	<u>EDIT PROTOCOL</u>	SYSTEM	UTILITY						
<table border="1"> <tr> <td>Protocol 1</td> <td>Protocol 4</td> </tr> <tr> <td>Protocol 2</td> <td>Protocol 5</td> </tr> <tr> <td>Protocol 3</td> <td><u>Parameters</u></td> </tr> </table>				Protocol 1	Protocol 4	Protocol 2	Protocol 5	Protocol 3	<u>Parameters</u>
Protocol 1	Protocol 4								
Protocol 2	Protocol 5								
Protocol 3	<u>Parameters</u>								
Edit, print or view Parameters.									

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Next press <Ent> and the display changes to this:

**** PARAMETERS ****			
EDIT	PRINT	VIEW	HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

3. Now press <F1>-EDIT and the display looks similar to this:

DEFAULT TEST PARAMETERS			
Work Rate	:	<u>Extreme (350 Kcal/Hr)</u>	
Mask Type	:	FULL FACE	
Male/Female	:	MALE	
Min Passing FF	:	100	
Cartridge Type	:	Hi (Combination)	
SAVE	RECALL	↓ (-)	↑ (+) HELP

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

continued on the next page

Viewing Parameters

1. Select "Parameters" from the EDIT PROTOCOL MENU.
2. Press <Ent>.
3. Now press <F3>-VIEW and the display looks similar to this:

```

                DEFAULT TEST PARAMETERS**
Work Rate       : Extreme (350 Kcal/Hr)
Mask Type      : FULL FACE
Subject        : MALE
Min Passing FF  : 100
Cartridge Type : Hi (Combination)
ESC to exit

```

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

4. Press <Esc> to return to the previous screen, "****PARAMETERS****".

Printing Parameters

Follow the instructions below to print a complete listing of the parameter values.

1. Ensure that a printer is connected and that the FitTester 3000 printer port is turned on as explained in *PREPARING THE FITTESTER 3000 FOR TESTING (2. PRINTER CONNECTION)* at the beginning of this chapter.
2. Select "Parameters" from the EDIT PROTOCOL MENU.
3. Press <Ent>.
4. Next press <F2>-PRINT.

NOTE: The "Printer Not Ready" message is an indication that there is a problem with the cable or the printer. Check both the cable and the printer before attempting a "Retry". Press <Ent> to retry.

System Reset

"System Reset" resets the protocols and parameters to the factory default values, and resets the piston to home position within the cylinder. In the event of a momentary power outage, it is recommended that you reset the system as explained below.

1. Select "System Reset" from the SYSTEM MENU as indicated below.

TEST	EDIT	PROTOCOL	<u>SYSTEM</u>	UTILITY
Set Clock <u>System Reset</u> Dual Tube Cal Zero Pressure				
Re-Load all system variables.				

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Press <Ent> and the following set of messages appear on the display:

"ONE MOMENT PLEASE ... RE-SETTING PUMP.",

"RETRIEVING PRESETS.", and

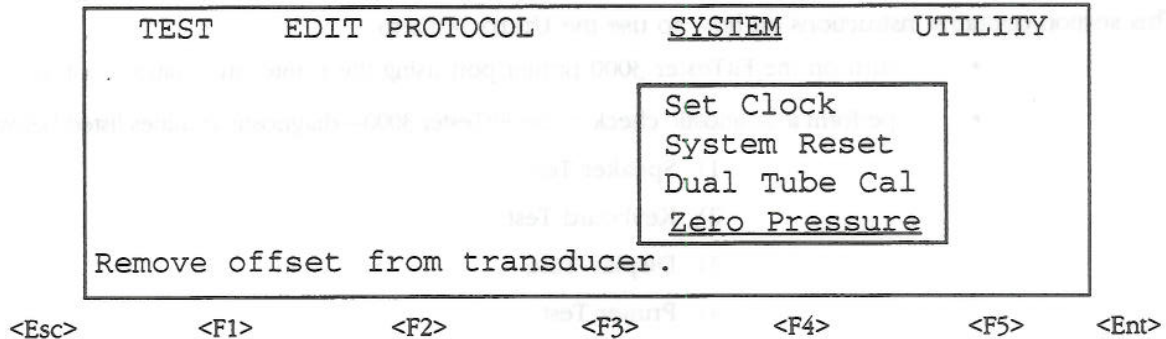
"RESET COMPLETE."*

*NOTE: All system variables are now reset.

Zero Pressure

"Zero Pressure" removes the offset from the pressure transducer.

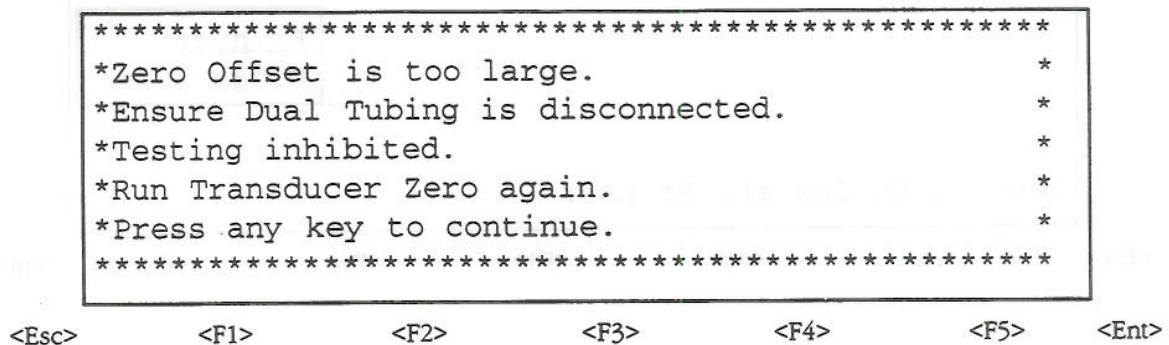
1. First select "Zero Pressure" from the SYSTEM MENU as indicated below.



2. Press <Ent>.
3. Disconnect the dual tube assembly.
4. Press any key and the offset from the pressure transducer is removed.

Error Message

If this procedure is unsuccessful the following display appears:



There is an acceptable range of zero-offset values and exceeding that range of values indicates that the dual tube assembly is connected, or that there is a problem in the pressure transducer or the conversion circuit. Fit-testing is inhibited at this time.

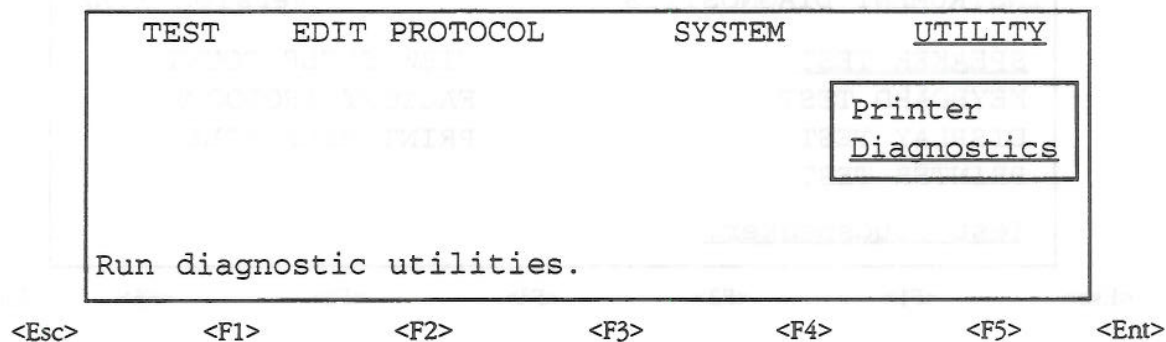
If the dual tube assembly is disconnected and the above-illustrated error message occurs, contact Dynatech Nevada to determine if the FitTester 3000 needs service.

Press any key to return to the SYSTEM MENU.

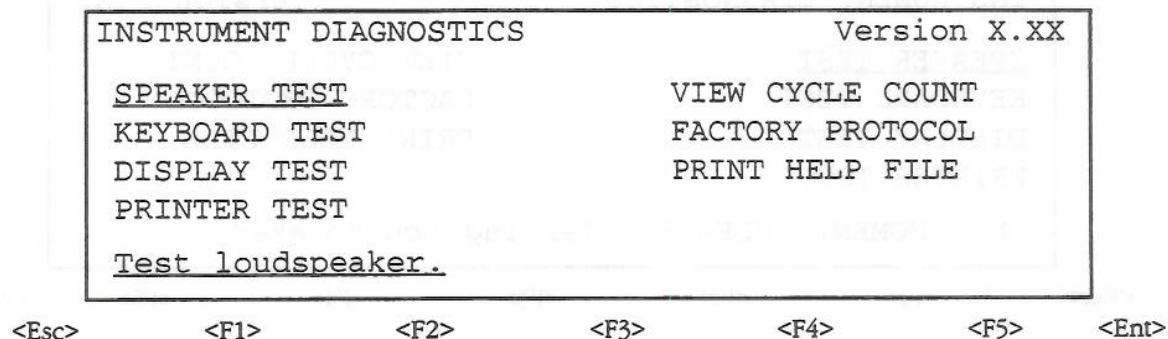
Diagnostic Routines

The seven diagnostic routines enable you to check your FitTester 3000.

1. Select "Diagnostics" from the UTILITY MENU as indicated below.



2. Press <Ent>.



NOTE: The current firmware version is shown in the upper right corner—"Version X.XX".

3. Use the <↑>, <↓>, <←>, or <→> key to select a diagnostic routine from the INSTRUMENT DIAGNOSTICS MENU.

Keyboard Test

1. Press the <↓> key to select "KEYBOARD TEST".

INSTRUMENT DIAGNOSTICS		Version X.XX
SPEAKER TEST	VIEW CYCLE COUNT	
<u>KEYBOARD TEST</u>	FACTORY PROTOCOL	
DISPLAY TEST	PRINT HELP FILE	
PRINTER TEST		
<u>Verify performance of pushbuttons.</u>		

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Press <Ent> and the display shows:

*** Keyboard Test ***	
Keyboard:	

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

During this test, the keypad inputs are echoed to the display. When you press a key, the description of that key should show on the display.

When the <Esc> key is pressed, "Escape" shows on the display and then you are returned to the INSTRUMENT DIAGNOSTICS MENU.

Display Test

1. Press the <↓> key to select "DISPLAY TEST".

INSTRUMENT DIAGNOSTICS		Version X.XX
SPEAKER TEST	VIEW CYCLE COUNT	
KEYBOARD TEST	FACTORY PROTOCOL	
<u>DISPLAY TEST</u>	PRINT HELP FILE	
PRINTER TEST		
<u>Test front panel display.</u>		

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

continued on the next page

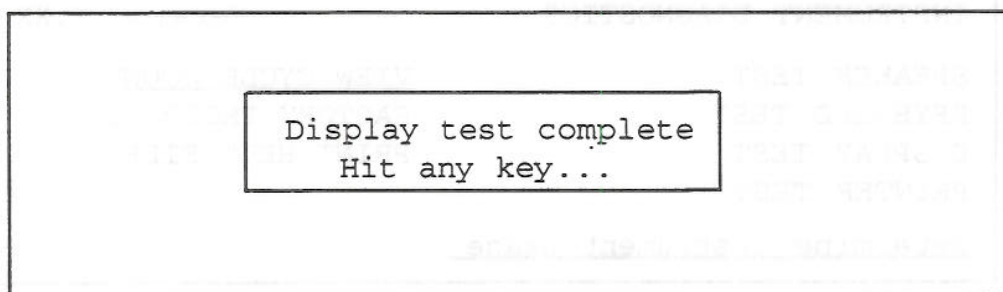
Display Test continued

4. Select "DISPLAY TEST" again from the INSTRUMENT DIAGNOSTICS MENU and press <Ent>. Next, press <F2>-LONG TEST. At the end of the "Long Test" press any key to return to the INSTRUMENT DIAGNOSTICS MENU.

A series of tests is performed in the order shown below:

- Text plane – Even column test
- Text plane – Odd column test
- Text plane – Even row test
- Text plane – Odd row test
- Text plane – Solid fill test
- Text plane – Character test
- Graphics plane – Even vertical test
- Graphics plane – Odd vertical test
- Graphics plane – Even row test
- Graphics plane – Odd row test
- Graphics plane – Solid fill test

This is the last message to show on the display in the "Long Test":



<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

Factory Protocol

1. Select "FACTORY PROTOCOL" from the INSTRUMENT DIAGNOSTICS MENU.

INSTRUMENT DIAGNOSTICS		Version X.XX
SPEAKER TEST	VIEW CYCLE COUNT	
KEYBOARD TEST	<u>FACTORY PROTOCOL</u>	
DISPLAY TEST	PRINT HELP FILE	
PRINTER TEST		
<u>Recall factory preset exercises.</u>		

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

2. Press <Ent>. The FitTester 3000 reloads the factory protocol-Protocol #1 (not the OSHA protocol).

Total Exercises = 6	
Ex1 = Face Forward	Work Rate = Mod.
Ex2 = Face Left	Cartridge = HEPA
Ex3 = Face Right	Mask Type = HM
Ex4 = Head Up	
Ex5 = Head Down	Min Pass FF = 100
Ex6 = Head Forward	
Press ENTER to save factory data.	

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

3. Press <Ent>-ENTER to save the factory protocol and return to the INSTRUMENT DIAGNOSTICS MENU. Press <Esc> to return to the INSTRUMENT DIAGNOSTICS MENU and not save the factory protocol.

Print Help File

1. Select "PRINT HELP FILE" from the INSTRUMENT DIAGNOSTICS MENU.

INSTRUMENT DIAGNOSTICS		Version X.XX
SPEAKER TEST	VIEW CYCLE COUNT	
KEYBOARD TEST	FACTORY PROTOCOL	
DISPLAY TEST	<u>PRINT HELP FILE</u>	
PRINTER TEST		
<u>Print on-line help messages.</u>		

<Esc> <F1> <F2> <F3> <F4> <F5> <Ent>

