Instructions
for
Pressure
Diagnostics
[Program "Press"]

February, 1999 (V2.3)

INTRODUCTION

This software program, "Press," is intended to be used as a diagnostic tool for residential and commercial weatherization and new construction analysis.

Procedures included in this program are:

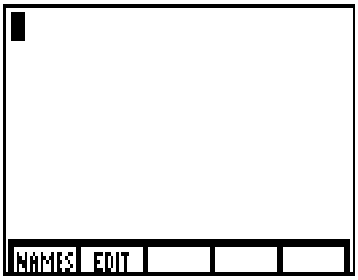
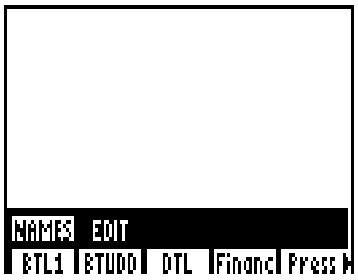
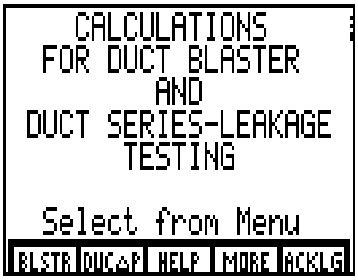
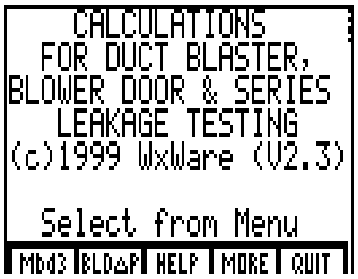
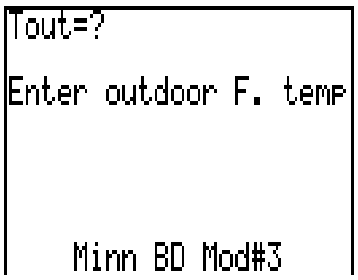
1) Calculation of CFM_{50} for Minneapolis Blower Door®, Model 3. Can't-Reach-Fifty values and temperature adjustments are incorporated into the program.
2) Calculation of Building CFM_{50} Series Leakage Values (Building/Zone, Zone/Outdoors, Total Path):
   - Hole Method.
   - Door Method.
   - Vent Method.
3) Calculation of Duct CFM_{50} Series Leakage Values (Building/Duct, Duct/Outdoors, Total Path):
   - Add-a-Hole Method.
   - Blower-Door-Subtraction Method.
   - Full-Nelson Method.
   - Nelson-with-NFR-Twist Method.
4) Calculation of Minneapolis Duct Blaster® Flow Rates, both older (serial numbers from 0-591) and newer (serial numbers from 592 and up) models.

For more information about these test procedures, consult the following documents:

- *Minneapolis Blower Door® Manual, Model 3,* the Energy Conservatory.
- *Minneapolis Duct Blaster® Manual*, the Energy Conservatory.
- *Pressure Diagnostics,* Michael Blasnik and Jim Fitzgerald.
- *The Airflow Diagnostic Procedure*, John Tooley and Neil Moyer.
- "Building Tightness Guidelines: When Is a House Too Tight?" George Tsongas, *Home Energy*, March/April, 1993

PROGRAM OPERATION

Follow the instructions beginning on page 37. Pictures of the TI-86 screens appear on the left side of pages 37 through 52 with explanations at the right of each picture.

Press-1		Turn the TI-86 calculator on. Press **PRGM** (Programs). You will see this menu on the screen. Press **F1** for "NAMES."
Press-2		You will see this menu on the screen. Press **F1, F2, F3, F4,** or **F5** for the program "Press." The menu key for this program will depend upon the number of programs loaded into the memory of your TI-86 calculator.
Press-3		You will see this menu on the screen. "Mbd3," **F1**, is for the calculation of CFM_{50} with the Minneapolis Blower®, Model 3. "BLD P," **F2,** is for the calculation of Building Series Leakage Testing. This routine includes the hole, door, and vent methods. "HELP," **F3,** lists instructions for this screen. "MORE," **F4,** moves you to the next menu screen.
Press-4		Select "MORE," **F4** and you will see this menu on the screen. "BLSTR," **F1**, calculates Minneapolis Duct Blaster® Flow Rates. "DUC P," **F2**, is for the calculation of Duct Series Leakage Testing. "HELP," **F3**, lists instructions for this screen. "MORE," **F4**, moves you to the previous (main) screen. "ACKLG," **F5,** Acknowledgments selection lists the authors of the program, etc.
Press-5		Select "MORE," **F4** and you will see this menu on the screen. As a demonstration, press "Mbd3," **F1,** for Minneapolis Blower®, Model 3. **Note: This calculation procedure does not work for the Minneapolis Blower Door®, Model 2.**
Press-6		You will see this on the screen. Enter "Tout," the outdoor temperature (F^0). If the temperature is below zero, enter a negative sign in front of the temperature by using the key, **(-),** just to the left of the **ENTER** key. Notice that there is a short prompt instruction on the screen below the prompt line. Notice that "Minn BD Mod#3" is at the bottom of the screen as a reminder

Press- 7

```
Tout=?10
Tin=?

Enter indoor F. temp



    Minn BD Mod#3
```

Enter "Tin," the indoor temperature (F^0).
If the temperature is different indoors than it is outdoors, the blower door CFM_{50} value will be influenced because of the different air densities. The magnitude of the difference is dependent on the degree of temperature difference.
Enter "70" and press **ENTER**.

Press- 8

```
Tout=?10
Tin=?70
Test=?
Enter Test Type:
 Depressurization = 1
   Pressurization = 2

    Minn BD Mod#3
```

You will see this menu on the screen.
Now you must enter "1" for a depressurization blower door test or enter "2" for a pressurization blower door test.
If the CFM_{50} results were not temperature-corrected, this question would not be necessary. See panel explanation "Press-7" just above for a brief explanation.
Enter "1" and then press **ENTER.**

Press- 9

```
BLD△P=?

Enter ACTUAL Bldg. to
Outdoor △P in Pascals



Depressurization Test
```

Enter "BLD P," the pressure difference between the inside and the outside of the building, in units of Pascals.. Although this pressure will usually be negative, do not enter a negative sign before the pressure difference value. If you are not able to reach 50 Pascals of depressurization difference in a building, enter the lower value. This program will automatically extrapolate the answer to a level of 50 Pascals depressurization difference. In other words, the "Can't Reach Fifty" multipliers are incorporated.

Press- 10

```
BLD△P=?35
FAN△P=?

Enter Fan △P
in Pascals


Depressurization Test
```

"FAN P," fan pressure, in Pascals, is prompted next.
Enter a fan pressure of "100" and then press **ENTER.**
Note: If you notice you have made a mistake after you have pressed ENTER, press the "2nd" button, the "QUIT" button (next to the the "2nd" button), and then ENTER. This will return you to the main menu.
Notice that "Depressurization Test" is at the bottom of the screen as a reminder of the routine you are calculating.

Press- 11

```
BLD△P=?35    0=OPEN
FAN△P=?100   1=A-RING
CONFIG=?     2=B-RING
             3=C-RING
Enter Ring Config.


Depressurization Test
```

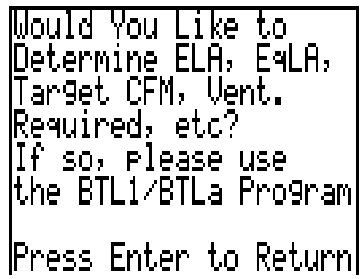
"CONFIG," the Configuration of the blower door fan must be entered now. The four choices are listed on the right side of the screen.
Enter "0" for an open fan configuration (no rings used). Note: If you cannot reach a house pressure difference of 50 Pascals, the "CONFIG" will always be "0."
Press **ENTER.**

Press- 12

```
BLD△P=?35    0=OPEN
FAN△P=?100   1=A-RING
CONFIG=?0    2=B-RING
             3=C-RING
Tin = 70   Tout = 10
  FANFLO ---> 4501
  CFM50 ----> 5675
Depressurization Test
```

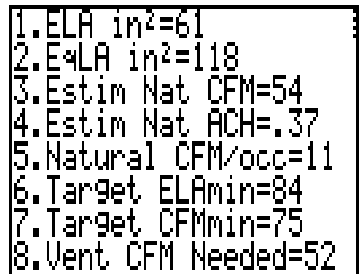
The Fan Flow and the CFM_{50} answers are displayed along with all the data you entered.
The "FANFLO" of 4501 is the CFM_{35}. The extrapolated "CFM50" displayed is 5675 (Can't-Reach-Fifty values are a part of this calculation procedure). Both of these resulting values, CFM_{35} and CFM_{50} are temperature-compensated.
For most purposes, the "CFM50" value is the most important result.

Press-13



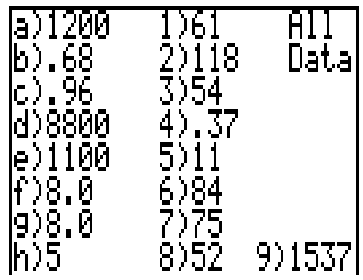
After pressing **ENTER** you will see this display.
This is a reminder that another program included in the ZipTest Two software can calculate these values and others for you. To get to this program, you must exit from the "Press" program that you are now in and go to the "BTL1" program and then to the "BTLa," (**F2** menu item) routine.
When you press **ENTER**, you will be returned to the home screen of the pressure diagnostics program, "Press."

Press-14



[Please Note: this panel does not follow the above Panel Press-13, it is a sample from the BTL1 program/BTLa routine]
With the "BTL1" program/"BTLa" routine you can calculate:
1. ELA, Effective Leakage Area in square inches (see panel BTL1-29).
2. EqLA, Equivalent Leakage Area in square inches. (see panel BTL1-30).
3. Estimated Natural CFM (see panel BTL1- 31).
4. Estimated Natural ACH (see panel BTL1- 31).
5. Natural CFM/occ (see panel BTL1- 32). [continued next panel]

Press-15



[Please Note: this panel does not follow the above Panel Press-13, it is a sample from the BTL1 program/BTLa routine]
6. Target ELA minimum (see panel BTL1- 33).
7. Target CFM minimum (see panel BTL1- 34).
8. Ventilation CFM needed (see panels BTL1- 34 & 35).
9) Target minimum CFM_{50} value (see panel BTL1- 39).
End of sample screens from the "BTL1" program/"BTLa" routine. . .

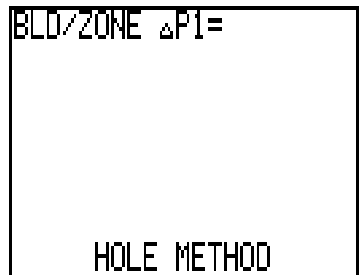
Press-16

Back to the home screen of the pressure diagnostics program, "Press."
Now select, "BLD P," **F2** for "Building Series Leakage Tests."

Press-17

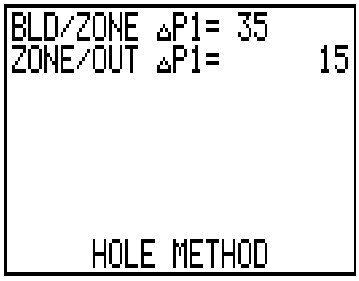
You will see the Building Series-Leakage Tests menu.
"HOLE," **F1**, calculates the Hole Method (creating a measured hole between the building and the zone or between the zone and the outdoors).
"DOOR," **F2**, calculates the Door Method (opening a door between the building and the zone or between the zone and the outdoors).
"VENT," **F3**, calculates the Vent Method, (used primarily for attics).
Press "HOLE," **F1.** for the Hole Series Leakage Method.

Press-18



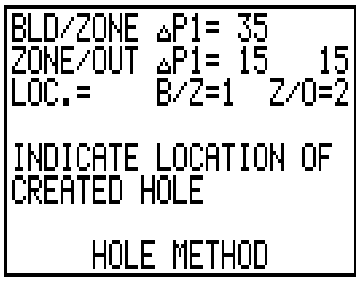
You will see this screen, prompting for building/zone P1. The building should be at 50 Pascals of pressure while the building/zone P1 is measured.
Note: If you are not able to obtain a building pressure difference of 50 Pascals, this procedure will not work.
The Building Hole Method works best when the second measured building/zone or zone/outdoors pressure is 15-35 Pascals and the pressure drop resulting from the creation of the hole is 15-25 Pascals.

Press- 19



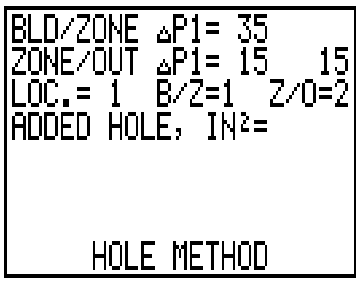
Enter "35" as the "BLD/ZONE P1."
Press **ENTER**.
Now you are prompted to enter the "Zone/Out P1."Notice that the number "15" is displayed at the right. This is the value of the building/zone pressure subtracted from 50 building/outdoors pressure.
Enter "15" as "ZONE/OUT P1."
"BLD/ZONE P1" plus "ZONE/OUT P1" should equal 50, plus or minus 2.

Press- 20



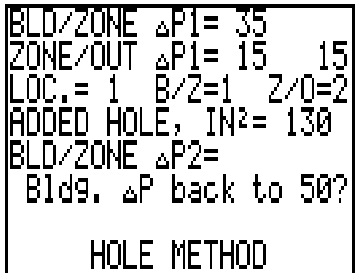
Indicate the location of the measured hole, between the building and the zone or between the zone and the outdoors. It is a good idea to create the hole in the tightest air barrier (that between the building and zone or that between the zone and the outdoors). This is because we should drop the pressure across the barrier in which the hole is created by 15 or more Pascals. For our example, it is best to create a hole from the building to the zone where we have a P1 of 35 Pascals.
Enter "1" and press **ENTER**.

Press- 21



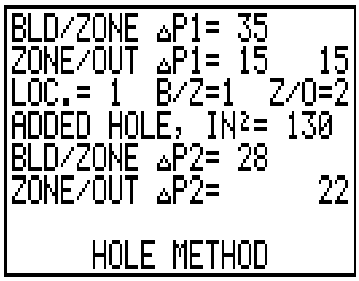
Enter the square inches of the added hole.
For our example, we will use 130 square inches.
Press **ENTER**.

Press- 22



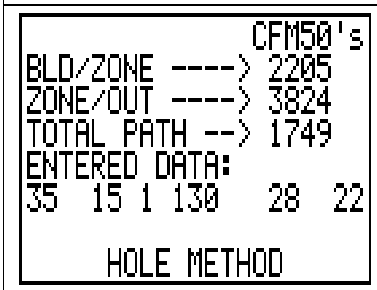
Enter the new (after-hole) building to zone pressure, "BLD/ZONE P2."
NOTE: It is very important that the *building to outdoors* pressure be brought back up to 50 Pascals after the creation of the hole and before the P2 readings are taken. There is a reminder on the screen.
If you are not able to get the building to outside pressure back up to 50 Pascals, make the hole smaller. If you are still not able to get the building to outside pressure back to 50 Pascals, this method is not workable.

Press- 23



Enter the new (after-hole) zone to outdoor pressure, "ZONE/OUT P2."
Notice that to the right of "ZONE/OUT P2" the suggested pressure is displayed. Your measured "ZONE/OUT P2" should be within 2 Pascals of this displayed number.
Enter "22" and press **ENTER**.

Press- 24



The CFM_{50} "BLD/ZONE, ZONE/OUT," and "TOTAL PATH" values are displayed.
Notice that the "ENTERED DATA" is displayed in the order in which it was entered on the previous screen. Refer to Panel Press-29 for the input labels.
Dividing the "BLD/ZONE" CFM_{50} by 10 yields the approximate square inches of leakage between the building and the zone, for this example 220 in^2. This may also be done for the zone-to-outdoor CFM_{50}.
The TOTAL PATH will always be less than the CFM_{50} values of the BLD/ZONE and ZONE/OUT. Press **ENTER**.

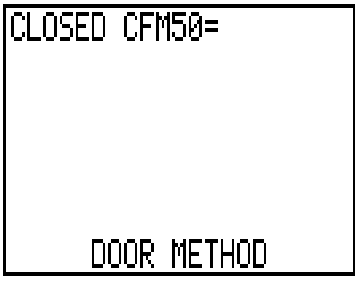
Press- 25

The main menu is displayed.
Press "BLD P," **F2**, for Building Series Leakage Tests.

Press- 26

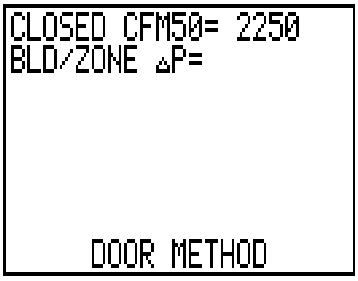
Press "DOOR," **F2**, for the Door Method.
For this test, a door or other openable panel is closed for the first set of pressure readings and opened for the second set of pressure readings. The size of the door or openable panel does not need to be measured.
If the initial, closed pressure readings are close to 50 or 0, this method may not work well.

Press- 27



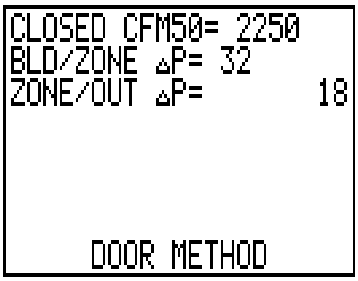
Enter the Closed building CFM_{50}. This is a value that you might already know if you have done a single- or multi-point blower door test on the building.
This initial CFM_{50}. should be 200 and preferably 400 or more for this test to work well.
Enter "2250" and press **ENTER**.

Press- 28



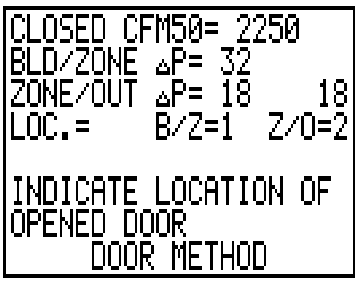
Measure the building-to-zone pressure, "BLD/ZONE P."
Enter "32" and press **ENTER**.

Press- 29



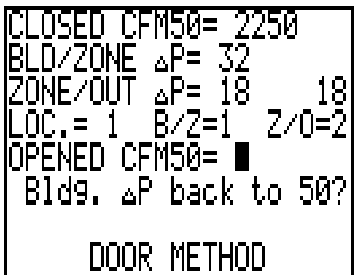
Measure the zone-to-outdoors pressure, "ZONE/OUT P."
Notice that the suggested "ZONE/OUT P" pressure is displayed at the right. Your measured "ZONE/OUT P" should be within 2 Pascals of this displayed number.
Enter "18" and press **ENTER**.

Press- 30



Indicate the location of the opened door or panel, between the building and the zone or between the zone and the outdoors. It is a good idea to open a door, window, or panel in the tightest air barrier (that between the building and zone or that between the zone and the outdoors). For our example, it is best to create a hole from the building to the zone where we have a P of 32 Pascals.
Enter "1" and press **ENTER**.

Press- 31



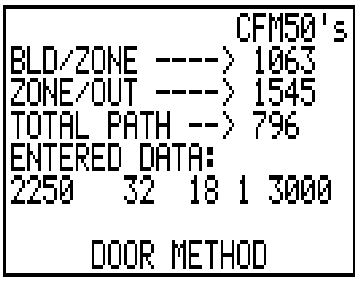
Now enter the opened CFM_{50}.

NOTE: It is very important that the *building to outdoors* pressure be brought back up to 50 Pascals after the door, window, or panel is opened and before the opened CFM_{50} reading is taken.

The pressure across the barrier in which you created the opening should be less than one (1) Pascal, otherwise the method will not be accurate.

Measure the building CFM_{50} with the door, window, or panel opened .

Press- 32



The CFM_{50} "BLD/ZONE, ZONE/OUT," and "TOTAL PATH" values are displayed.

Notice that the "ENTERED DATA" is displayed in the order in which it was entered. See panel "Press-37" for the order of entry.

Dividing the BLD/ZONE CFM_{50} by 10 yields the approximate square inches of leakage between the building and the zone, for this example 106 in^2. This may also be done for the zone-to-outdoor CFM_{50}.

The "TOTAL PATH" will always be less than the CFM_{50} values of the "BLD/

Press- 33

The main menu is displayed.

Press "BLD P," **F2**, for Building Series Leakage Tests.

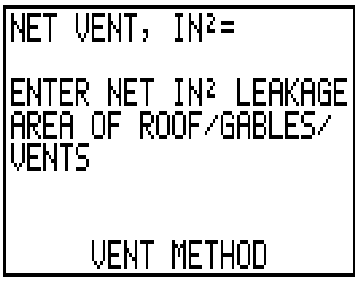
Press- 34

Press "VENT," **F3**, for the Vent Method.

For this test, the openings in the attic are measured or estimated. The building-to-zone and the zone-to-the outdoor pressures are measured. This method is weak because of the difficulty of measuring the openings in most attics (zone to outdoors). However, this method is faster than the other two—"HOLE" or "DOOR."

The pressure across the ceiling (building-to-zone) should not be much less

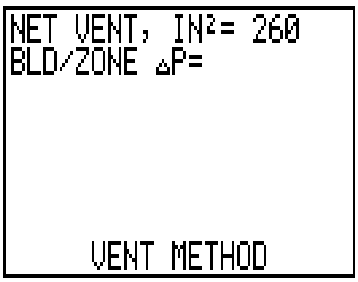
Press- 35



"Enter net square inches of leakage area of roof/gables/vents. This is often difficult to measure or estimate. Do the best you can.

For the example, enter "260" and press **ENTER**.

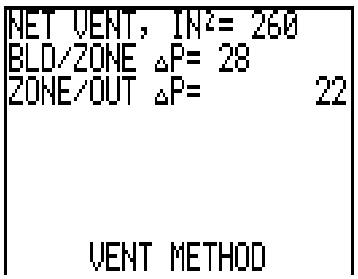
Press- 36



With the building to outside pressure at 50 Pascals, measure the building to zone pressure difference. This pressure should be close to 50 Pascals.

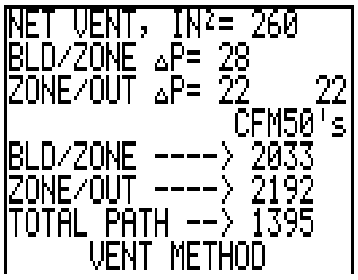
For the example, enter "28" and press **ENTER**.

Press- 37



Enter the zone-to-outdoor pressure difference.
The measured zone-to-outdoor pressure should be within 2 of the pressure difference displayed at the right on the screen.
Enter "22" and press **ENTER.**

Press- 38

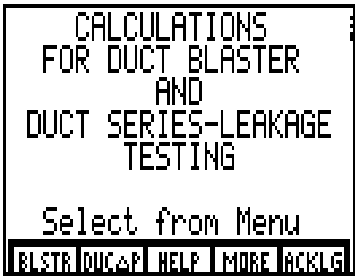


The CFM_{50} values are displayed for building-to-zone, zone-to-outdoors, and total path.
The Total Path value for the vent method, the hole method, and the door method will always be less than the building-to-zone or the zone-to-outdoor CFM_{50} values. The Total Path figure includes the combined air-flow resistance of the building-to-zone barrier and the zone-to-outdoor barrier.
This ends the Building Series Leakage examples.

Press- 39

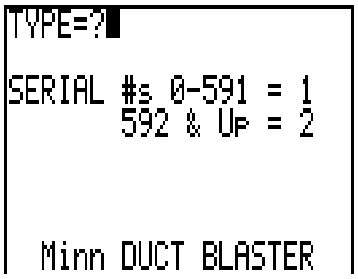
You will see the main screen displayed.
Press "MORE," **F4**, to move to the other primary menu.

Press- 40



Press "BLSTR," **F1**, for Minneapolis Duct Blaster® Flow Rate calculations.
The Duct Blaster is a calibrated air flow measurement system used to test the airtightness of forced air distribution systems. See the *Minneapolis Duct Blaster® Operation Manual* for discussion of proper use of the Duct Blaster®. The Duct Blaster® may also be used as a powered flow hood and as a small blower door. The Duct Blaster is manufactured by The Energy Conservatory.

Press- 41

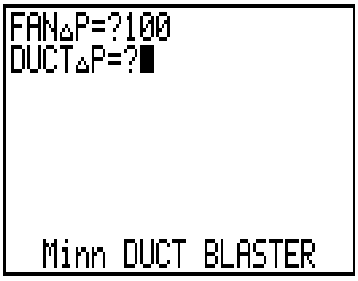


As of March 1995, The Energy Conservatory (TEC) began producing a duct blaster with a different calibration than the original. The WxWare ZipTest software can calculate flow rates for both types.
Serial numbers 0 - 591 are designated in the ZipTest program as Type 1 (these are white in color), serial numbers from 592 and higher are Type 2 (TEC calls these "series B" duct blasters). They are black in color.
After you enter the Type number, press **ENTER** to move to the next screen.

Press- 42

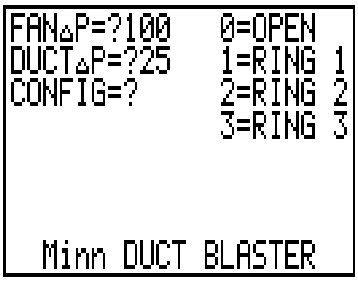
Enter the Duct Blaster® fan pressure.
For the example, enter "100" and press **ENTER.**

Press- 43



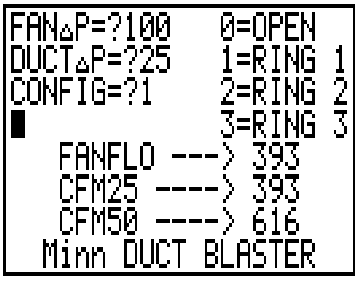
Now enter the duct pressure. The reference pressures for testing usually are 25 Pascals, 50 Pascals, or the average actual operating pressure of the duct system.
If you are not able to reach 25 Pascals, enter the value that was reached. The program will calculate the CFM_{25} from the data that you provide. (The program assumes the flow exponent, n=0.65).
Enter "25" and press **ENTER.**

Press- 44



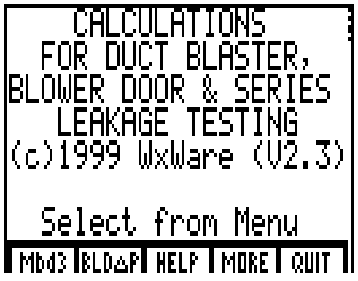
Finally, enter the Duct Blaster® configuration that you used.
Enter "1" for this example and press **ENTER.**

Press- 45



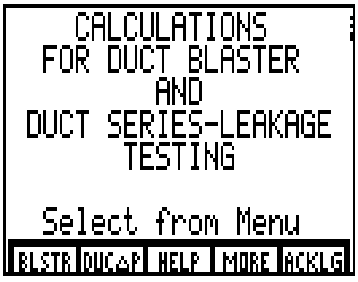
The flow of the Duct Blaster® fan is given and the CFM_{25} and CFM_{50} of the duct system tested.
Press **ENTER.**

Press- 46



Once again, back to the main menu.
Press "MORE," **F4**, to go to the other primary menu.

Press- 47

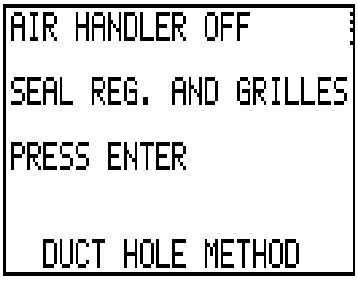


Press "DUC P," **F2**, for the Duct Series Leakage Tests menu.

Press- 48

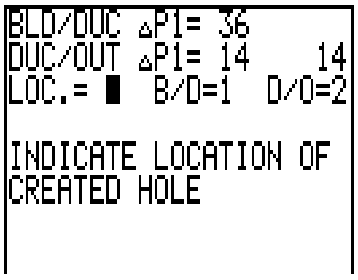
"HOLE," **F1**, calculates duct leakage using the Add-a-Hole Method.
"MODBD," **F2**, calculates duct leakage using the Blower-Door-Subtraction Method.
"NELSN," **F3**, calculates duct leakage using the Full-Nelson Method.
"TWIST," **F4**, calculates duct leakage using the Nelson-with-NFR-Twist Method (NFR is Natural Florida Retrofit).
The last two methods are experimental at this time (Feb. 1995)

Press- 49



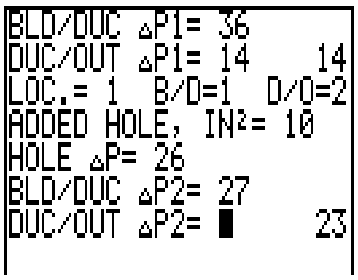
This screen displays instructions for Add-a-Hole Method.
This method is similar to the Building Hole Method.
The method works best when the duct leakage is less than 200 CFM_{50} and there is little leakage to the building.
The area of the added hole should be less that 50% of the cross-sectional area of the smallest duct in the path between the hole and the air handler.
Press **ENTER**.

Press- 50



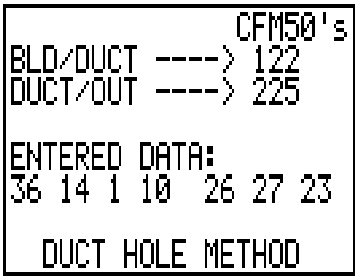
Enter the building-to-duct pressure difference, "36" for our example.
Enter the duct-to-outdoors pressure difference, "14" for our example.
Indicate the location of added hole, building-to-duct or duct-to-outdoor, "1" for the example.

Press- 51



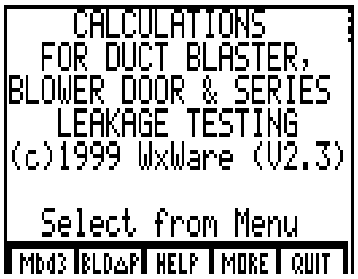
Enter the size of the added hole. For our example "10" square inches. The hole can be created in a seal that was applied to a register or grille.
Measure and enter the hole pressure, "26" for the example.
Measure and enter the "BLD/DUC P2," the building to duct pressure after the hole is made. For the example "27."
Measure and enter the "DUC/OUT P2," the duct to outdoors pressure after the hole is made. For the example "23."

Press- 52



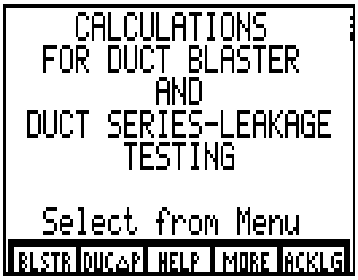
The Building to Duct CFM50 and the Duct to outdoors CFM50 are displayed.
Notice that the "ENTERED DATA" is displayed in the order in which it was entered. Refer to Panels Press-50 and Press-51 for the labels for the entered data.
Press **ENTER**.

Press- 53



The main menu is displayed.
Press "MORE," **F4,** for another example of Duct Series Leakage testing.

Press- 54

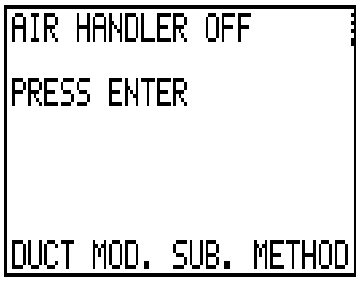


The other primary menu is displayed.
Press "DUC P," **F2**, for the Duct Series Leakage menu.

Press-55

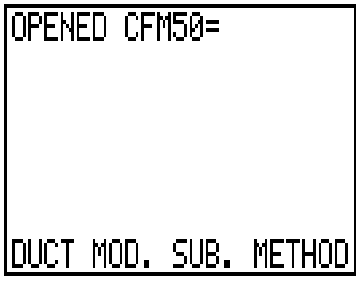
The Duct Series Leakage menu is displayed.
Press "MODSB," **F2**, for the Duct Modified Subtraction Method calculation.
The method works best when the duct leakage is less than 200 CFM_{50}

Press-56



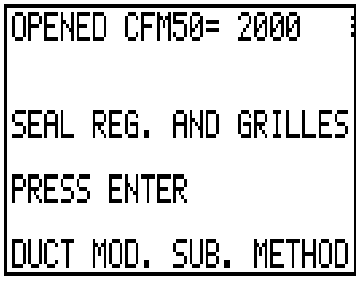
Air handler should be off.
Press **ENTER**.

Press-57



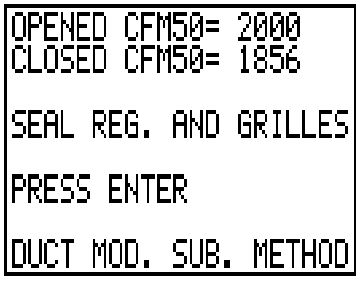
With the blower door, measure the CFM_{50} with the duct system open to the building, i.e. not taped or sealed.
For the example, enter "2000" and press **ENTER.**

Press-58



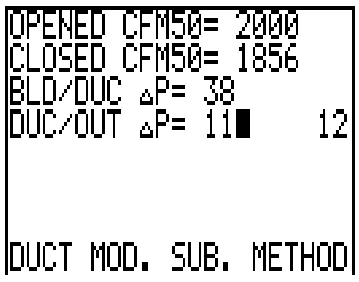
Now seal registers and grilles and measure the CFM_{50} with the blower door.
Press **ENTER.**

Press-59



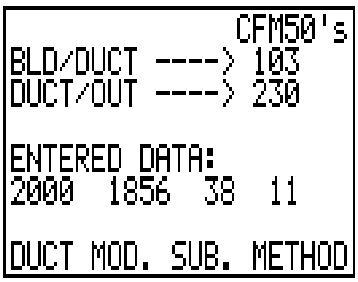
Now enter the Closed CFM50 (registers and grilles sealed). For the example enter "1856."
Press **ENTER**.

Press-60



Enter the building-to-duct pressure difference with the registers and grilles sealed. For the example, enter "38."
Press **ENTER**.
Enter the duct-to-outdoor pressure difference with the registers and grilles sealed.
Press **ENTER**.

Press- 61

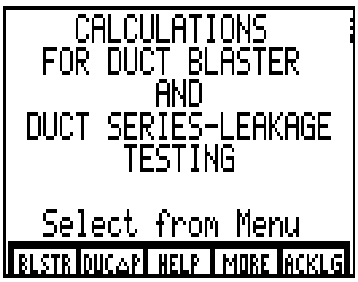


The CFM_{50} values for the building-to-duct and the duct-to-the outdoor are displayed.
Notice that the "ENTERED DATA" is displayed in the order in which it was entered. Refer to Panels Press-59 and Press-60 for the input labels.
Press **ENTER**.

Press- 62

Back to the main menu.
Press "MORE," **F4**, and we will try another example.

Press- 63

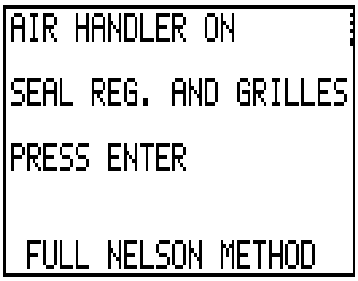


Press "DUC P," **F2** for Duct Series Leakage Tests.

Press- 64

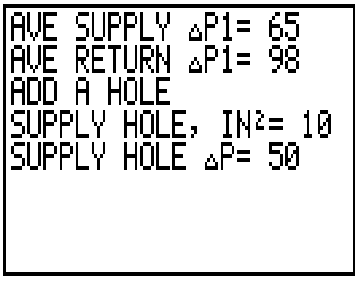
Press "NELSN," **F3,** for an example of the Full-Nelson Method.
This method is still experimental. Act accordingly with the results. This method provides insight into the relative leakiness of the return and supply sides of the duct system in terms of CFM_{50}.

Press- 65

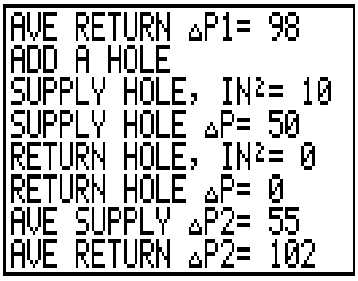
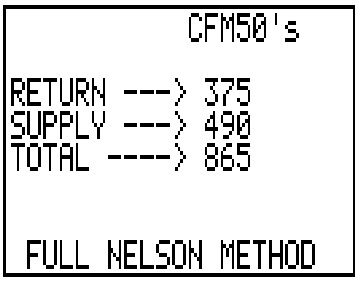
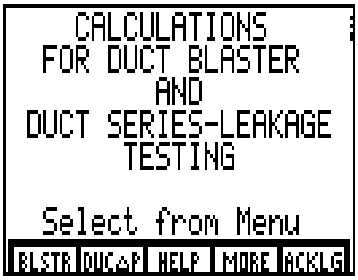
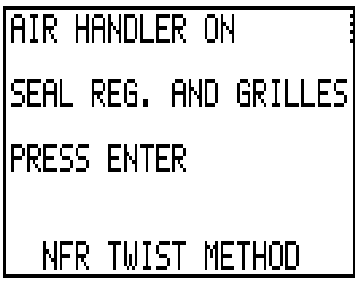


Instructions for Full-Nelson Method are displayed.
Note that high pressures may be created in the duct system. These pressures could damage the duct system.
Press **ENTER.**

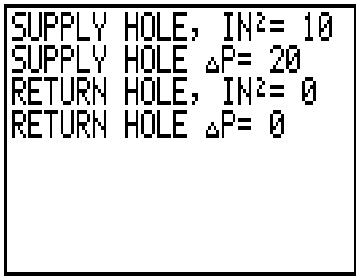
Press- 66



Enter the average supply duct pressure, for the example, "65" Pascals.
Enter the average return duct pressure, for the example, "98" Pascals.
Add a hole to either the supply side or the return side.
Enter the Supply Hole size, for the example, "10" square inches.
Enter the Supply Hole Pressure Difference, for the example, "50" Pascals.

Press- 67		Enter the return hole size, for the example, no return hole is made, so "0" is entered. Enter the return hole pressure difference. If no return hole is added, the return hole pressure difference will be "0." Enter the average supply pressure, "AVE SUPPLY P2" after the hole is made. For the example enter "55." Enter the average return pressure, "AVE RETURN P2" after the hole is
Press- 68		The return duct CFM_{50}, supply duct CFM_{50}, and the total CFM_{50} are displayed. Press **ENTER**.
Press- 69		Back to the main menu. Press "MORE," **F4**, for one last example.
Press- 70		The other primary menu is displayed. Press "DUC P," **F2**, for Duct Series Leakage Tests.
Press- 71		Press "TWIST," **F4,** for an example of the Nelson-with-NFR-Twist Method (NFR is Natural Florida Retrofit). This method is still experimental. Act accordingly with the results. **Note: If you make a mistake while entering data before you press ENTER, use the arrow buttons to move the cursor over the erroneous entry and type the correct entry. If you notice you have made a mistake after you have pressed ENTER, press the "2nd" button, the "QUIT" button (next to the "2nd" button), and then ENTER. This will return you to the main menu.**
Press- 72		Instructions for the Nelson-with-NFR-Twist Method are displayed. Note that high pressures may be created in the duct system. These pressure could damage the duct system. This method is similar to the Full-Nelson method, except a hole is added to relieve pressure in the ducts. Press **ENTER.**

Press- 73



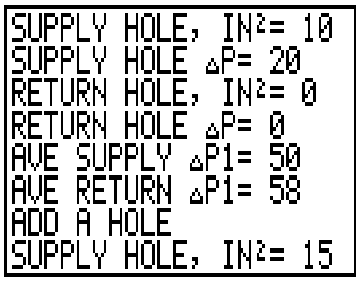
Enter the initial added supply hole. For the example, enter "10" square inches.

Enter the pressure across the supply hole. For the example, enter "20."

Enter the return hole. In the example, a return hole is not added, so enter "0."

Enter the return hole pressure difference. If no return hole is added, the pressure difference across the hold is "0."

Press- 74

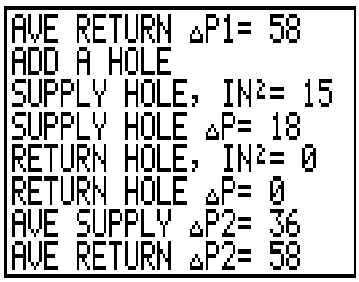


Enter the average supply pressure difference, "AVE SUPPLY P1" for the example is "50."

Enter the average return pressure difference, "AVE RETURN P1" for the example is "58."

Add a hole to either or both sides of the duct system. For the example a supply hole is added, "15." Note that the supply hole went from the initial 20 square inches to 15 square inches. Use the actual hole size, not the change

Press- 75



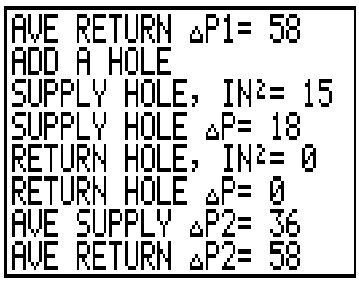
(The screen has been scrolled up five lines).

Enter the pressure across the supply hole, "SUPPLY HOLE P." For the example enter "18."

Enter the return hole size. For the example, enter "0."

Enter the return hole pressure difference. If no hole is made, the return hole pressure difference is "0."

Press- 76

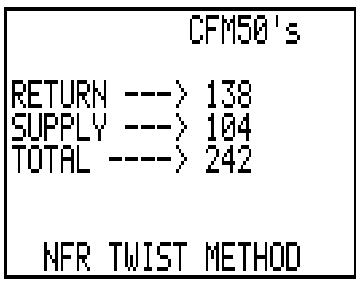


Enter the average supply pressure difference after the second hole is added, "AVE SUPPLY P2." For our example this is "36."

Enter the average return pressure difference after the second hole is added, "AVE RETURN P2." For our example this is "58."

Press **ENTER**.

Press- 77



The return duct CFM_{50}, supply duct CFM_{50}, and the total CFM_{50} are displayed.

This ends the Duct Series Leakage Test examples.

Press **ENTER**.

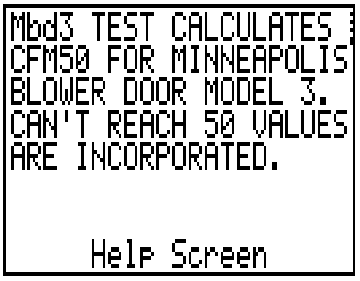
Press- 78

Once again, back to the main menu.

Press "HELP," **F3.**

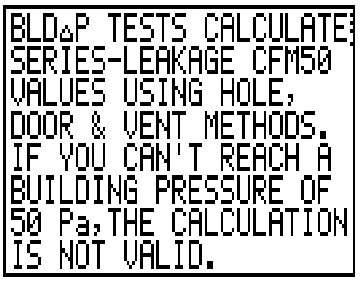
This feature gives simple help messages for the main menu shown at the left.

Press- 79



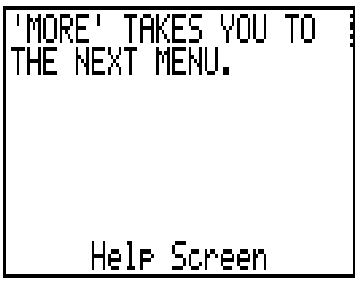
The "Mbd3," **F1**, menu item.
Press **ENTER**.

Press- 80



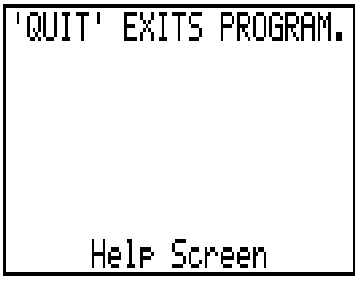
The "BLD P," **F2**, menu item.
Press **ENTER.**

Press- 81



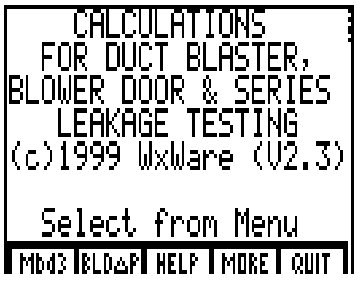
The "MORE," **F4**, menu item.
Press **ENTER**.

Press- 82



And the "QUIT," **F4**, menu item.
Always exit this and other TI-86 programs by pressing the "QUIT" menu key. This resets the decimal place to "float" so that you can perform accurate calculations with the calculator functions of the TI-86.
Press **ENTER.**

Press- 83

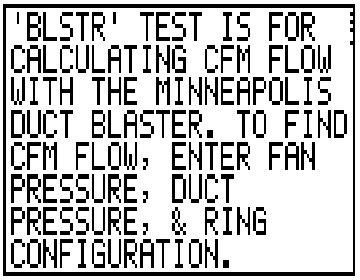


And, back to the main menu screen.
Press "MORE," **F4,** for the other primary menu screen.

Press- 84

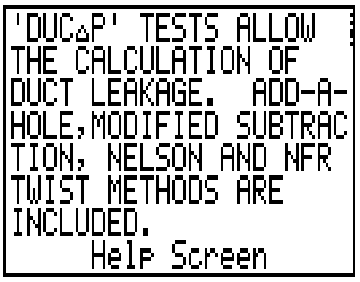
There is a "HELP," **F3**, button on this menu also.
Go ahead, press it.

Press- 85



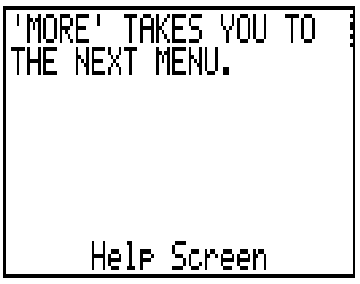
The "BLSTR," **F1**, menu item.
Press **ENTER**.

Press- 86



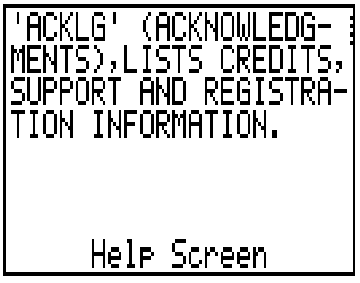
The "DUC P," **F2**, menu item.
Press **ENTER**.

Press- 87



The "MORE," **F4**, menu item.
Press **ENTER.**

Press- 88



The "ACKLG," **F4,** menu item.
Press **Enter.**

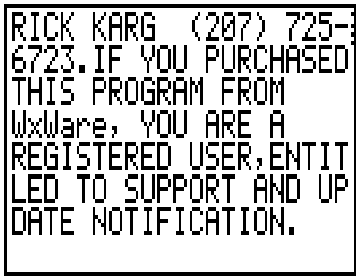
Press- 89

Now we are back to one of the primary screens.
Press "ACKLG," **F5**. This is the acknowledgments section.

Press- 90

This is the first acknowledgments screen.
Press **ENTER**.

Press- 91



This is the second acknowledgments screen.
Press **ENTER**.

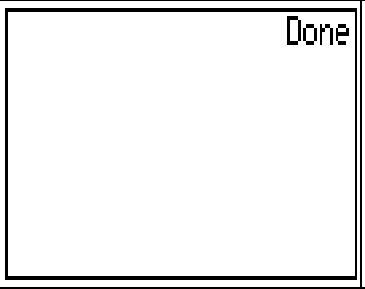
Press- 92

This is the third acknowledgments screen.
Press **ENTER.**

Press- 93

Once again, back to the main menu screen.
Press "QUIT," **F5**.
Note: Always exit the program by pressing QUIT; this automatically resets the decimal place for calculator use.

Press- 94



You have now exited from the program.
If you want to get back to the program quickly after pressing "QUIT," simply press **ENTER.**
Note: The TI-86 automatically shuts off after two minutes of non-use. When you turn it back on, you will be able to pick up right where it shut off.

Press- 95

Press- 96