



eScan-AC User's Guide

February 2003

**Enalasys Corporation
250 Avenida Campillo
Calexico, California, USA 92231**

866-372-2622

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eScan-AC User's Guide

SECTION 1: General Information

Introduction

It is recommended that the reader have an eScan-AC system to refer to while reading this User's Guide. That makes it easier to learn the various parts, their relationship to each other, and how they are applied in actual field use. The physical application of the eScan-AC is straightforward and the software makes testing and analysis user friendly.

Purpose

The purpose of this Guide is to provide a quick and simple reference for setup and operation of the eScan-AC. The guide is divided up into five sections: Section 1 covers general information about the eScan-AC, Section 2 covers assembly of the Data Collection Units, Section 3 covers setup and testing, Section 4 covers the eScan-AC software, Section 5 covers the settle-down display in detail, Section 6 covers field care and maintenance, and Section 7 covers troubleshooting

Product Description

The eScan-AC is a computer controlled, real-time diagnostic system for central forced-air heating and air conditioning systems. The eScan-AC consists of the following main components:

eScan-AC Base Station

- Laptop Computer
- Software Program
- Printer with cable
- RF Receiver with cable
- Padded Carrying Case

Condenser Data Collection Unit (CDCU)

- Collection Ring
- Manifold
- Condenser Sensor Board
- Skirt
- Elastic Skirt
- Motor Cone
- Crossbar
- Battery

Pressure Data Collection Unit (PDCU)

- Sensor Board
- Probe Assembly
- Battery

Return Data Collection Units (Small & Large RDCU)

- 2 Collection Rings
- 2 Manifolds
- 2 Return Sensor Boards
- 2 Skirts
- 2 Expandable Pole Handles
- 1 Remote Switch
- Battery

Supply Data Collection Unit (SDCU)

- Collection Ring
- Manifold
- Supply Sensor Board
- Skirt
- Expandable Pole Handle
- 24"x 24" Skirt
- Battery

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution:

changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.**
- Increase the separation between the equipment and receiver.**
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- Consult the dealer or an experienced radio/TV technician for help.**

SECTION 2: Assembly of the Data Collection Units

Important Note: The fabric used in the Airflow Hoods is a tightly woven man-made fiber that is virtually airtight. While this fabric is tough enough to withstand day-to-day handling, it is readily damaged by sharp objects or heat sources such as matches or cigarette ashes. It is recommended that technicians do not smoke while working with DCU's.

Supply Collector Assembly and Setup Instructions

1. Inventory



Take an inventory to insure that all parts for the Supply Collector are present and in good repair: Carrying Case, Supply Power Ring, Supply Airflow Hood (residential), Supply Sensor Board, Supply Manifold, Antenna, Battery, and Conversion File Disk.

2. Attach Antenna to Sensor Board



The first step is to attach the antenna to the Supply Sensor board. This is accomplished by first locating the antenna and the antenna mount. The antenna mount is located on top-center of the Supply Sensor board. The antenna is screwed into the mount in a clockwise motion and unscrewed in a counter clockwise motion. Use a firm twisting motion and do not force the antenna, as this may result in damage to the antenna and/or the circuit board.

Note: The Supply Sensor Board will be labeled "Supply DCU" along with the board number.

3. Attach Sensor Board to Manifold

The Supply Sensor Board must now be attached to the Supply Manifold. Place the cylinder end of the Sensor Board assembly into the open cup side of the Manifold. The fit should be exact, but not tight. Twist the DCU until the notches in the side of the cylinder align with the two folding clips on the manifold. Next, firmly slide the clips up until they seat firmly into the notches in the Sensor



Board cylinder. Apply firm pressure to the clips to get them to seat, but do not force, as this may cause damage to the Manifold and/or Sensor Board. If done correctly, the Sensor Board and Manifold will be firmly attached to one another and will not easily separate.

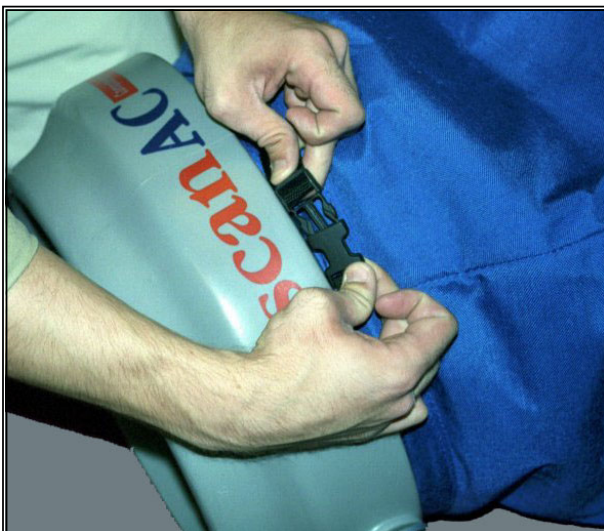
Note: The Supply Manifold will be labeled "Supply Manifold." Each Supply Manifold is matched and calibrated at the factory with a particular Supply Sensor Board. These units **SHOULD NOT** be mixed in the field, as this will lead to inaccurate readings.

Important: If the Supply Sensor Board and the Supply Manifold both have a mark on the edge where they meet when connected, those marks should be aligned to maintain proper calibration.

4. Attach Airflow Hood to Power Ring



Now the Supply Airflow Hood must be attached to the Supply Power Ring. This is done by fitting the circular end of the hood over the bottom lip of the ring. The correct orientation of the Power Ring is indicated by the logo, which should be upright and readable.



The fabric skirt should fit very snugly around the ring. Now close the two fasteners on the sides of the hood to insure a very tight fit between hood and ring.



Next the assembly needs to be turned upside down so that the rectangular end of the Airflow Hood is facing up. Locate the four notches on the inside edge of the Power Ring. The hood needs to be twisted while keeping the ring stationary until the four brace rods line up with the notches in the ring (do not insert rods into notches yet). Make sure that the long sides of the hood match with the knobs on the U-shaped yoke.



Next, pull the hood's fabric skirt up so that it fully extends. With the skirt fully extended, fit the ends of the four brace rods into the four notches in the Power Ring that they align with. Very firm pressure must be applied to the brace rods to get them to fit in the notches. When properly fitted, the brace rods should bend slightly. This will result in a fully extended Airflow Hood. The fabric should be under tension and stay firmly extended.

5. Attach Sensor Board / Manifold Assembly to Airflow Hood / Power Ring Assembly



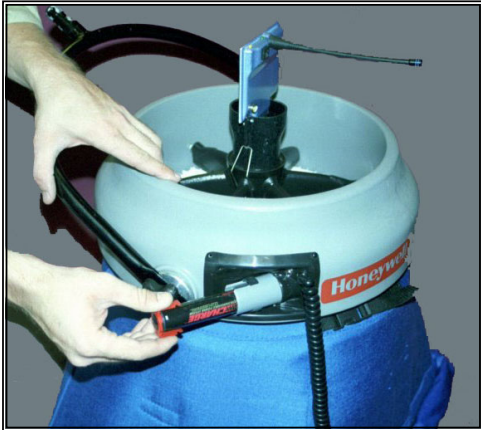
Next, the Supply Sensor Board / Manifold assembly must be attached to the Supply Airflow Hood / Power Ring assembly. Stand the Airflow Hood assembly upright so that the rectangular side is on the floor and the Power Ring is on top. Locate the battery slot on the Power Ring. Lower the Manifold into the Power Ring until it rests on the plastic grid in the center of the Power Ring.

Locate the four mounting studs on the interior of the Power Ring. Note that while the Supply Manifold has six arms, only four have mounting slots. Align the arms with mounting slots with the mounting studs on the interior of

the Power Ring. Position the mounting arms under the mounting studs. Once everything is properly aligned, firmly lift up on the manifold until the mounting studs snap into their respective slots on the manifold.

Important Note: Make sure the Antenna is on same side of the Power Ring as the battery slot. However, the antenna does not align exactly with battery slot when manifold is properly aligned.

6. Power Up the DCU



The final part of the physical setup of the Supply DCU is powering up the Sensor Board. First, insert the battery into the Power Ring. The battery will only fit one way into the battery slot. DO NOT force battery, as this can damage the battery and/or the

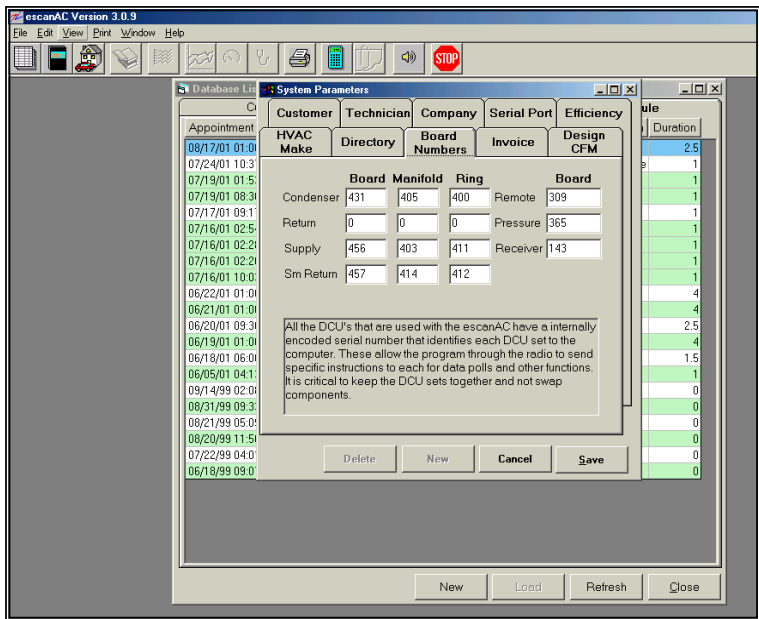
Power Ring. After the battery is inserted, plug the power cable (located next to the battery slot) into the Sensor Board. The power cable will only fit one way into the board. DO NOT force the plug, as this can damage the circuit board.



To insure that the Sensor Board is powered and functioning correctly, a “flicker test” must be performed. Press the Transmit Button (the yellow stud on the top edge of the Sensor Board). This should cause the Transmit LED to flicker in response. (The Transmit LED is a green LED on the top edge of the Sensor Board.) A dead battery or malfunctioning circuit board are the most likely causes of a flicker test failure.

7. Configuring the eScan-AC Software

A computer disk with a numerical conversion file should have been supplied with the matched Supply Sensor Board / Manifold. The eScan-AC software needs the conversion file to properly interpret the readings it receives from the DCU. Copy the conversion file into the same directory as the eScan-AC software. The default directory for the eScan-AC is C:\AT2020 (version 2.0.xx).



Now, start the eScan-AC software and select System Parameters from the Edit Menu. In System Parameters, select the Board Numbers tab. The Board Numbers tab will display a list of all the DCU board numbers that the eScan-AC is configured to use. In the Board Number field for Supply, enter the board number of the Supply DCU. This board number should be located on a sticker on the DCU board. If for some reason, there's no board number sticker on the DCU board, call 866-eScan-AC for assistance. DO NOT use the serial number, which is on a separate sticker.

Note: The conversion file only needs to be copied once, and the eScan-AC only needs to be configured the first time the Supply DCU is used with the system. The eScan-AC software will need to be reconfigured any time the Supply DCU is changed.

SECTION 3: Setup and Conducting a Test

(Note: This description does not cover customer interaction; it only covers the setup and conduct of an eScan-AC test.)

To Start

Upon arrival at the service location, turn the customer's thermostat to the **OFF** position. The fan switch should be moved to the **ON** position. Place the Supply and Return Data Collection Units in place on their respective registers to allow them to settle to ambient conditions within the test site. Allow the fan to operate continuously to warm and dry the evaporator coil while performing the set-up procedures as outlined below.

Important Note: During the airflow test, it is very important that the blower fan operate at the same speed as when it is in the cooling mode. If in doubt, the easiest way is to cut power to the condenser and then place thermostat in cooling mode. With package units, it may be necessary to pull common from the compressor at the contactor.



At the Condenser

Pressure Data Collection Unit

Place the pressure DCU next to the condenser with the probe assembly laid out. The pressure probes should be attached to the liquid and suction lines in the same manner that manual gauges would be attached. The caps are removed and the probes threaded on the valves until an airtight seal is made. The liquid and suction line temperature probes are taped onto the liquid and suction lines with insulated tape. Place the condenser temperature-in sensor next to the face of the condenser coil, out of direct sunlight. Deploy the ambient air temperature sensor as far as possible from the condenser unit, also out of direct sunlight. It should be placed at the full extension of the attached cord.



Note the following changes to setup when testing a heat pump in heating mode: The suction line pressure gauge and temperature probe must go on the TRUE suction line, between the reversing valve and the compressor. In addition, the ambient temperature sensor must be installed on the discharge line as close to compressor as possible. In this case, the ambient temperature probe is being used to measure discharge superheat instead of condenser air recycle (feedback).

Condenser Data Collection Unit

Prior to installing the condenser DCU, be sure that the refrigerant and air temperature sensors are properly attached. Place the DCU over the exhaust grill, making sure that the center of the DCU is aligned with the center of the exhaust flow. Check to see that a firm seal is made between the top of the condenser housing and the padded base of the DCU.



Inside the Home

Computer Boot-up and Site Survey



Set up the computer at a convenient location central to the test area. A kitchen table or bar often works well. The eScan-AC components can communicate up to 100 feet, depending on the construction details. Open the case and place the radio receiver as far from the computer as the cord permits, thus reducing potential interference. It is important to place the radio so that the laptop screen will not be directly in the signal path during the test.

Switch on computer. While the software loads, begin taking the site survey. Note the make, model and serial number, metering device and tonnage of each condenser, furnace and/or air handler. Then write down the location of each supply and return register. Begin at the front door and move room-to-room in a clockwise manner. Once the site survey is complete, enter the data into the eScan-AC software. A step-by-step walkthrough can be found in Section 4.

Remote Data Collection Unit

Place the Remote DCU in the space occupied by the major portion of the ducting system (attic, crawl space, or unheated basement).

Airflow Test

Collector Placement

When taking airflow readings, pay particular attention that the hood covers the entire register or grill. Minor adjustments may be necessary to center the DCU within the airflow. It is also important that the hood's padded base rests flush against the wall or ceiling, creating an airtight seal. In some situations, achieving a good seal may require a bit of ingenuity. For example, foam blocks can be used to seal a toe-kick register. When using the handle, make sure to orient it in such a way that neither the handle nor yoke will obstruct the airflow.



Taking Supply and Return Readings

Begin the airflow test by placing the Return DCU over the first return register listed on the Airflow Test Screen (as entered from the site survey). Center the DCU as described above, verifying the integrity of the seal between hood and grill. To start the reading, press the button on the sensor board. It takes less than 30 seconds for the readings to stabilize and register on the Airflow Test Screen.

The Return DCU is then moved to the next return register listed on the Airflow Test Screen, and so forth. Once all of the returns have been sampled, continue the airflow test by sampling each supply register in sequence.

An extendable prop pole is included to facilitate testing ceiling registers. After attaching the pole to the yoke, raise the DCU into position – carefully centering it over the grill. While using firm upward pressure, extend the pole to the floor to secure the DCU into position. The prop pole includes a remote trigger, since the button on the sensor board is likely to be beyond reach. Alternatively, readings can be initiated from the laptop.

Finishing the Airflow Test

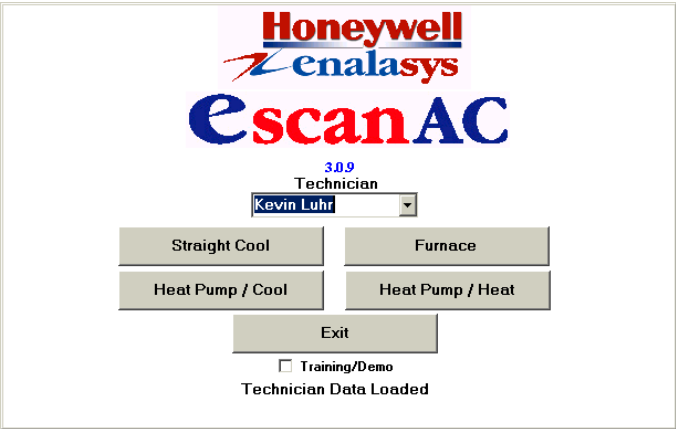
Once every register has been sampled, the airflow test is complete. However, before proceeding to the cooling (or heating) test, the Supply DCU and Return DCU must be re-positioned on the designated supply and return registers, as indicated by the software at the end of the airflow test. This enables eScan-AC to evaluate the enthalpy of the supply and return air during the cooling test. Now click the “Test Complete” button. This will update the database for the unit under test. After reviewing the information, click “Done” to proceed to the cooling test.

Settle-Down Period



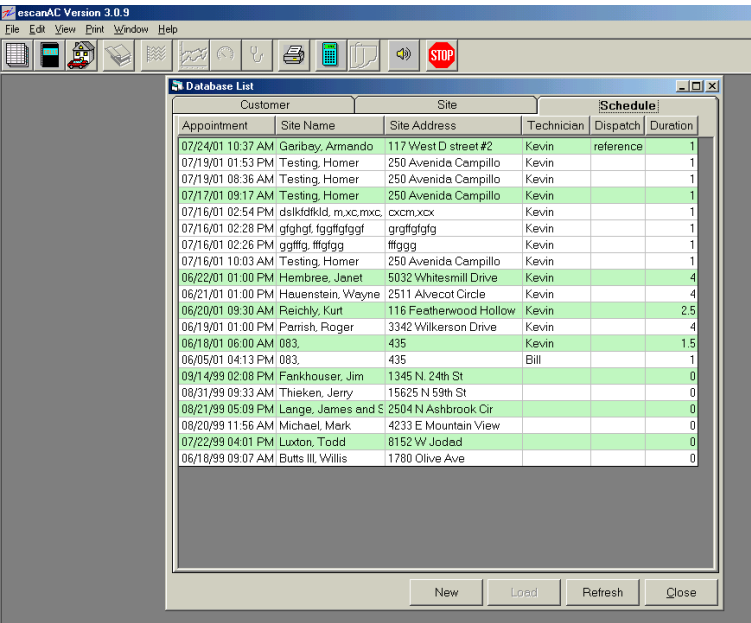
It is now time to turn on the compressor. After doing so, the system must be allowed to operate under load for at least 15 minutes. This is generally enough time for the unit to achieve steady-state operation. During this “settle-down” period, system parameters should be checked, noting any obvious problems. The settle-down process, described in more detail later, can be monitored from the laptop on the Settle Graph Display.

SECTION 4: Software Walkthrough



Splash Screen

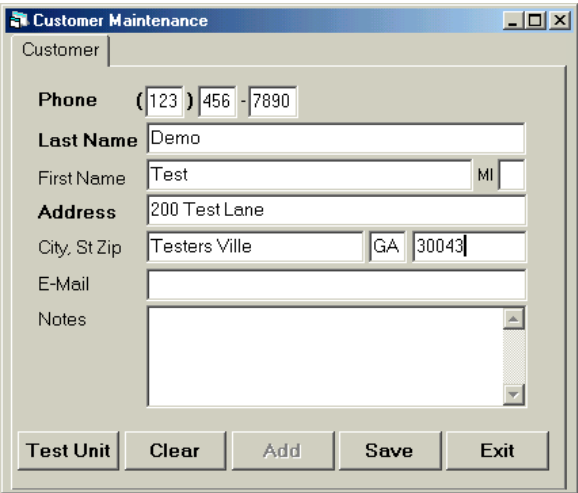
Double-click the eScan-AC icon on the Windows Desktop. The first screen that appears is referred to as the Splash Screen. This is where the type of test is selected. For this example, select the Training/Demo box (a check mark should appear), and then click the “Straight Cool” button.



eScan-AC Desktop

The eScan-AC Desktop should now be onscreen with the Schedule Screen open. This screen lists all customers that have been tested by this particular eScan-AC system. To access data for a previous customer, click on the row with the customer’s data. To enter data for a new customer, click the "New" button, found at the bottom of the customer list frame. For the purposes of this tutorial, click on the customer “Test Demo.”

Note: The Desktop portion of the screen will be omitted from the remaining examples, for clarity.



Customer Maintenance Screen

After clicking on the line containing the customer “Test Demo,” the data is read from the disk and displayed in text boxes (fields) on the Customer Screen. Had the “New” button been clicked on the previous screen, the fields would be blank, ready for new data to be entered. Data may be edited by clicking on an individual field. Pressing the “Tab” key on the computer keyboard advances the cursor to the next field. Click on “Test Unit” to move to next screen.

Selecting HVAC Unit

Select HVAC Unit								
	Cond	Cond	Cond	Cond	Air Hand	Air Hand	Air Hand	Motor
	Make	Model	Serial	Tons	Make	Model	Tons	HP
Unit 1	CARRIER C	38CK048320	4992E02287	4	ER CORPOR	58PAP100-JC	4	1/2
Unit 2	CARRIER C	38YCC018300	1098E26119	1.5	ER CORPOR	FB4ANF024	1.5	1/4

New A/C Unit

This screen lists all units that have been recorded on previous visits to the selected Service Site. If the unit to be tested isn't listed, click "New AC Unit." Select the first unit listed by clicking on it.

HVAC System Information		
Condenser Make: TRANE COMPANY Model: XY220001 Serial #: 0987654321 Compressor: Refrigerant: RF22 Tons: 3	System Type ☒ Split ☐ Package ☐ High Efficiency Unit ☐ Blow Through Condenser ☒ Air Cool ☐ Water Cool ☐ Air/Water ☒ Straight Cool ☐ Heat Pump ☐ Single Speed ☐ Variable Speed ☒ Multiple Speed Cond. Evap. ☐ Expansion Valve ☒ Capillary Tube ☐ Check Flow Regulator	Power Cost Per KWH: 0 Efficiency Manufacturer EER: Manufacturer SEER: Avg. Annual Cooling Hours: Comments
Air Handler Make: TRANE COMPANY Model: ABC2001 Coil: 123098 Tonnage: 3 HP: 1/3 ☐ Air Hand In Cond Space?	Done	

HVAC System Information

The system contained in the demo is an air conditioner. The data for this unit is read from the disk and displayed in text boxes (fields). Had the "New A/C Unit" button been clicked on the previous screen, the fields would be blank, ready for new data to be entered. Data may be edited by clicking on an individual field. Pressing the "Tab" key on the computer

keyboard advances the cursor to the next field. Note: the Power and Efficiency fields on the right side of the screen are optional. Click "Done" to move to the next screen.

Cooling Air Flow For: LENNOX HS27-042-1P - This is a test							
Supply							
#	X	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain
1		Laundry room	8	80.4	62.9	-8	0
2		Master bath	41	79.9	63	-1	0
3		Master bedroom	162	77.4	63.8	-3.4	0
4		Dining room	185	76.2	64.6	-4.6	0
5		Bathroom	12	78.1	65.6	-2.5	0
6		Office	56	77.4	64.7	-3.2	0
7		Bedroom # 2	52	77.9	65.6	-2.8	0
8		Dining room # 2	0	78.7	66.5	-1.9	0
9		Living room	226	76.6	67	-4.1	0
10		Kitchen	74	77.1	67.4	-3.6	0
11		Laundry room	8	80.4	62.9	-8	0
12		Master bath	41	79.9	63	-1	0
13		Master bedroom	162	77.4	63.8	-3.4	0
14		Dining room	185	76.2	64.6	-4.6	0
15		Bathroom	12	78.1	65.6	-2.5	0
Return							
#	X	Return Location	CFM	Temp	Humidity		
1		Hall	130	83.8	48.9		
2		Master bedroom	82	83.3	51.2		
3		Dining room	463	81.4	51.8		
4		Hall # 2	156	81.5	51.9		
Remote							
Supply/Return	#	Temperature	Humidity				
Supply	1	102	40				
Supply	2	102.5	39.9				
Supply	3	102.5	40.6				
Supply	4	102.5	40.6				
CFM Totals							
Supply	13264		☐ Air Flow Test				
Design	1400						
Return	936		☒ Remote				
Previous		HP 07/30/01 03:38 PM					
Use Locations		Use Test		New Test			

Airflow: Selecting Test

The Airflow Test Screen is now displayed. If prior tests have been conducted on this unit, the data from the most recent test is displayed. To display a previous test, click the down arrow on the box at the bottom of the Airflow Test Screen and click on the desired test. Tests are referenced by date and

time. When a prior test exists, the locations may be reused, thus eliminating the need to retype them (click on "Use Locations"). There may be situations where it is desirable to use the airflow data from a prior test. In this case, click on the "Use Test" button. If no data exists for the selected unit, then the test automatically proceeds as a "New Test." Note: If the "Airflow Test" box is checked, the cooling test will be skipped.

Cooling Air Flow For: LENNOX HS27-042-1P - This is a test

Supply							Return						
#	X	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain	#	X	Return Location	CFM	Temp	Humidity
1			0	0	0	0	0	1			0	0	0
2			0	0	0	0	0	2			0	0	0
3			0	0	0	0	0	3			0	0	0
4			0	0	0	0	0	4			0	0	0
5			0	0	0	0	0						
6			0	0	0	0	0						
7			0	0	0	0	0						
8			0	0	0	0	0						
9			0	0	0	0	0						
10			0	0	0	0	0						
11			0	0	0	0	0						
12			0	0	0	0	0						
13			0	0	0	0	0						
14			0	0	0	0	0						
15			0	0	0	0	0						

Remote			
Supply/Return	#	Temperature	Humidity

CFM Totals
 Supply: 0 ☐ Air Flow Test
 Design: 1400
 Return: 0 ☒ Remote

Return Mode Comment Clear Test Complete Exit

Airflow: New Test

This is what the Airflow Test Screen looks like if the Service Site or the unit is new, or if the “New Test” button was selected on the previous screen.

Cooling Air Flow For: AMANA REFRIGERATION, INC. 298876662 -

Supply							Return						
#	X	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain	#	X	Return Location	CFM	Temp	Humidity
1		Master bedroom	0	0	0	0	0	1		Hall	0	0	0
2		Marks room	0	0	0	0	0	2			0	0	0
3		Gregs room	0	0	0	0	0	3			0	0	0
4		Kevins room	0	0	0	0	0	4			0	0	0
5		Bathroom	0	0	0	0	0						
6		Kitchen	0	0	0	0	0						
7		Hall	0	0	0	0	0						
8		Dining room	0	0	0	0	0						
9		Den	0	0	0	0	0						
10			0	0	0	0	0						
11			0	0	0	0	0						
12			0	0	0	0	0						
13			0	0	0	0	0						
14			0	0	0	0	0						
15			0	0	0	0	0						

Remote			
Supply/Return	#	Temperature	Humidity

CFM Totals
 Supply: 0 ☐ Air Flow Test
 Design: 1200
 Return: 0 ☒ Remote

Supply Mode Comment Clear Test Complete Exit

Airflow: Entering the Locations

During the site survey, the location of each supply and return register is noted on paper. These locations become the names for each supply and return register, and are entered as such into the appropriate “Location” column on the Airflow Test Screen. As

the names are entered, the software will anticipate the most common names by supplying a completed name. To accept this name, press “Enter” on the keyboard or click outside the field with the mouse. Once all the locations have been entered, the airflow test is ready to begin.

Note: If the air handler and most of the ductwork are outside of conditioned space (e.g., attic, crawlspace or unconditioned basement), the Remote DCU should be used to monitor ambient conditions near the air handler. The “Remote” box on the bottom right of the Airflow Test Screen should only be checked when a Remote DCU is used, otherwise the airflow test will not proceed.

Cooling Air Flow For: AMANA REFRIGERATION, INC. 298876662 -

Supply							Return						
#	X	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain	#	X	Return Location	CFM	Temp	Humidity
1		Master bedroom	0	0	0	0	0	1		Hall	176	73.1	51.6
2		Marks room	0	0	0	0	0	2			0	0	0
3		Gregs room	0	0	0	0	0	3			0	0	0
4		Kevins room	0	0	0	0	0	4			0	0	0
5		Bathroom	0	0	0	0	0						
6		Kitchen	0	0	0	0	0						
7		Hall	0	0	0	0	0						
8		Dining room	0	0	0	0	0						
9		Den	0	0	0	0	0						
10			0	0	0	0	0						
11			0	0	0	0	0						
12			0	0	0	0	0						
13			0	0	0	0	0						
14			0	0	0	0	0						
15			0	0	0	0	0						

Remote			
Supply/Return	#	Temperature	Humidity
Return	1	71.8	100

CFM Totals
 Supply: 0 ☐ Air Flow Test
 Design: 1200
 Return: 176 ☒ Remote

Return Mode Comment Clear Test Complete Exit

Airflow: First Return Reading

Begin the test by placing the Return DCU over the Hall return register and then press the transmit button on the DCU sensor board. After about 30 seconds, the program voice will announce that a return reading has been

received. CFM, temperature, and relative humidity will appear in the appropriate fields on the return side of the Airflow Test Screen. If the Remote DCU is being used, the ambient temperature and humidity in the attic or crawlspace will also appear.

Supply						
#	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain
1	Master bedroom	576	71	54.1	-2.1	0
2	Marks room	0	0	0	0	0
3	Gregs room	0	0	0	0	0
4	Kevins room	0	0	0	0	0
5	Bathroom	0	0	0	0	0
6	Kitchen	0	0	0	0	0
7	Hall	0	0	0	0	0
8	Dining room	0	0	0	0	0
9	Den	0	0	0	0	0
10		0	0	0	0	0
11		0	0	0	0	0
12		0	0	0	0	0
13		0	0	0	0	0
14		0	0	0	0	0
15		0	0	0	0	0

Return				
#	Return Location	CFM	Temp	Humidity
1	Hall	176	73.1	51.6
2		0	0	0
3		0	0	0
4		0	0	0

Remote			
Supply/Return	#	Temperature	Humidity
Supply	1	71.5	100
Return	1	71.8	100

CFM Totals
 Supply: 576 ☐ Air Flow Test
 Design: 1200
 Return: 176 ☒ Remote

Buttons: Supply Mode, Comment, Clear, Test Complete, Exit

has been received. CFM, temperature, and relative humidity readings will appear in the appropriate fields on the supply side of the Airflow Test Screen. The temperature difference between the supply and return temperature also appears. The “BTUH Gain” column reflects the impact of this temperature difference.

Supply						
#	Supply Location	CFM	Temp	Humidity	T/D Return	BTUH Gain
1	Master bedroom	262	72.9	54.8	-1.6	0
2	Marks room	76	72.2	56.2	-1.3	0
3	Gregs room	46	71.9	53.1	-1.6	0
4	Kevins room	43	71.8	53.1	-1.7	0
5	Bathroom	33	71.9	52.5	-1.6	0
6	Kitchen	26	71.9	52.4	-1.6	0
7	Hall	23	71.6	52.1	-1.9	0
8	Dining room	27	71.8	52.2	-1.7	0
9	Den	40	71.9	52.1	-1.6	0
10		0	0	0	0	0
11		0	0	0	0	0
12		0	0	0	0	0
13		0	0	0	0	0
14		0	0	0	0	0
15		0	0	0	0	0

Return				
#	Return Location	CFM	Temp	Humidity
1	Hall	301	73.5	64.9
2		0	0	0
3		0	0	0
4		0	0	0

Remote			
Supply/Return	#	Temperature	Humidity
Supply	1	72.4	100
Supply	2	72.4	100
Supply	3	72.5	100
Supply	4	72.5	100

CFM Totals
 Supply: 576 ☐ Air Flow Test
 Design: 1200
 Return: 301 ☒ Remote

Buttons: Supply Mode, Comment, Clear, Test Complete, Exit

End Air Flow Test

You have taken 1 RETURN and 9 SUPPLY readings.
 Are you sure you want to complete the Air Flow Test?

When you perform the cooling test,
 the supply collector should be placed on Duct 1
 and the return collector should be placed on Duct 1

Buttons: Yes, No

between total supply and return CFM. Before proceeding to the cooling test, it is important to take a few minutes to review the information on this screen. Click “Done” to proceed to the cooling test.

Airflow: First Supply Reading

To start the supply readings, click the “Return Mode” button at the bottom of the screen. It will change to read “Supply Mode.” Now place the Supply DCU on the Master bedroom supply register and press the transmit button. Again, after a brief delay, the program voice will announce that a reading

Airflow: Remaining Supply Readings

Continuing the airflow test, place the Supply DCU over the Master Bath supply register and press the transmit button. Repeat for registers 3 thru 9. To end the airflow test, click the “Test Complete” button.

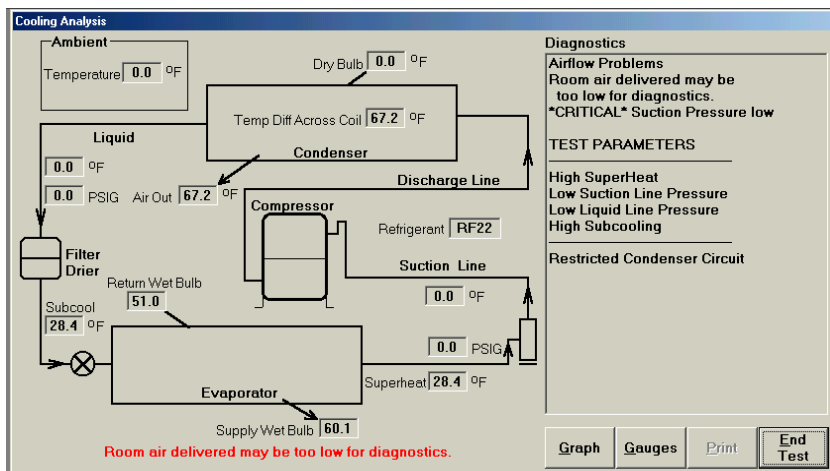
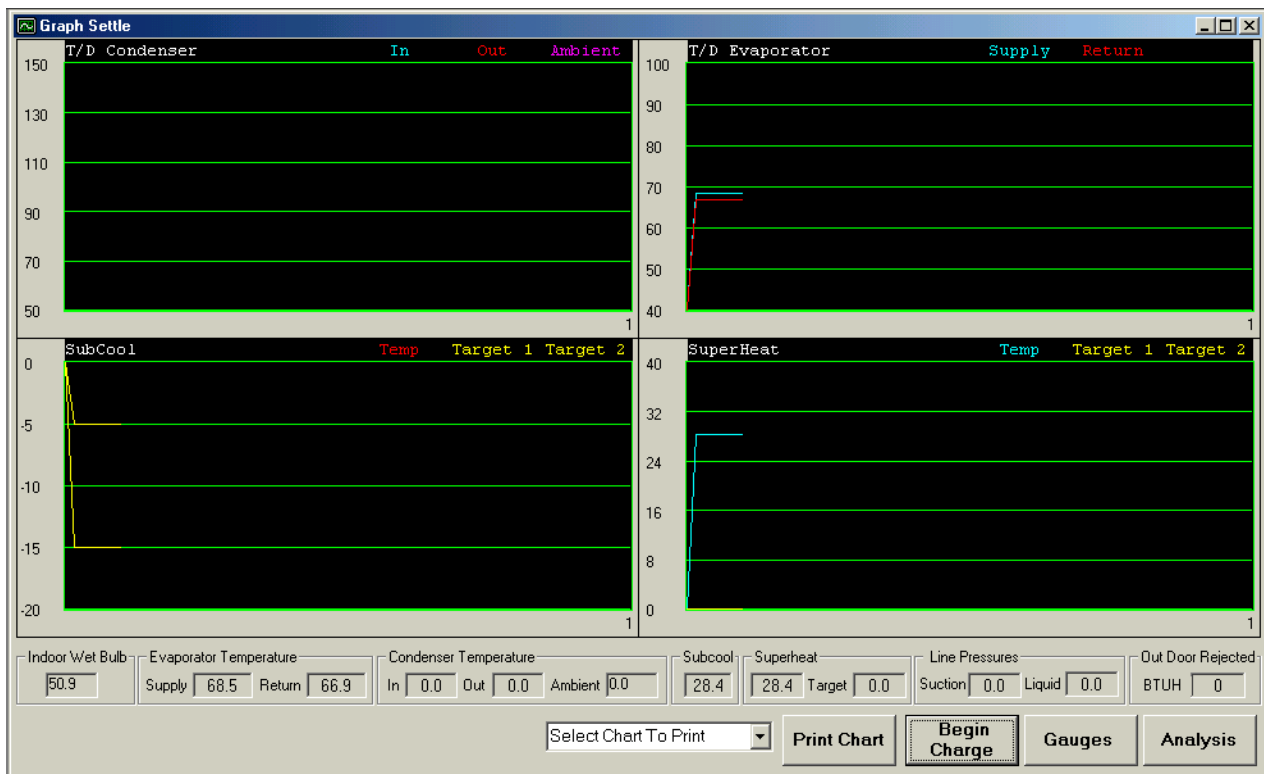
Airflow: “End Airflow Test” Message

This brings up a message box that confirms the number of readings taken, and designates which registers are to be monitored during the cooling test (in this example, Master Bedroom supply register and Hall return register). Click “Yes” to conclude the airflow test. The Airflow Test Screen will refresh, this time with the calculated difference between

Cooling: Settle Graphs and Cooling Test

The Settle Graph Display should now be visible. Begin the cooling test by putting the thermostat in the cooling mode and lowering the setpoint so that the unit will not cycle. Allow the unit to reach steady-state operation. This process usually takes less than 15 minutes and can be monitored from the Settle Graph Display. Once the unit is operating under load at steady-state conditions, any problem with the refrigeration system is usually apparent from the graphs. Refer to Section 5 for a detailed description of the Settle Graph Display. Click the “Analysis” button to proceed.

Note: It is usually a good idea to end the test before making any modifications or repairs. This allows the conditions to be recorded prior to making any changes. The software can then be brought quickly back to this screen for further analysis.



Cooling: Analysis Screen

The Cooling Analysis Screen depicts the refrigeration system as a line drawing. The pertinent readings are displayed in the appropriate location within the system. A list of diagnostics appears on the right side of the screen, as suggested by the readings. Click “Print” to print the reports. To exit the test,

click the “End Test” button.

SECTION 5: Settle Graphs

Settle Graph Display

The Settle Graph Display is one of eScan-AC’s most powerful features. It allows the technician to view real-time plots of the actual sensor readings while the unit is under test. Four graphs can be viewed at one time. The user can control which data is plotted on each graph, based on the type of test being conducted (see chart below). In addition, the Settle Graph Display includes a series of text boxes along the bottom of the screen with the most important measurements.

The graphs appear as strip charts with each data element plotted as a continuous line across the width of the chart. Data elements within each chart appear in contrasting colors. The graphs display up to 30 minutes of data. After 30 minutes, the first 10 minutes is dropped so that an additional 10 minutes can be charted. This process repeats itself as required.

Any of the graphs can be printed at any time during a test.

Test Type	Chart Type	Plot 1	Plot 2	Plot 3
Air Conditioning or Heat Pump in Cooling Mode	T/D Evaporator	Supply	Return	n/a
	Subcool	Subcool	High Target	Low Target
	Superheat	Superheat	High Target	Low Target
	Line Pressure	Suction	Liquid	n/a
	BTUH Output	Total	Design	Sensible
	T/D Attic	T/D From Start	Start Temp.	n/a
	Sensible Heat Ratio	Ratio	n/a	n/a
Heat Pump in Heating Mode	T/D Condenser	Intake	Exhaust	n/a
	T/D Evaporator	Supply	Return	n/a
	Subcool	Subcool	High Target	Low Target
	Superheat	Superheat	High Target	Low Target
	Line Pressure	Suction	Liquid	n/a
	BTUH Output	Total	Design	Sensible
	T/D Attic	T/D From Start	Start Temp.	n/a
	Line Temperatures	Suction	Liquid	Hot Gas
	Discharge Superheat	Temperature	n/a	n/a
Furnace	BTUH Output	Total	Design	Sensible
	T/D Heat Exchange	Supply	Return	n/a
	T/D Attic	T/D From Start	Start Temp.	n/a
	Ambient Temperature	Temperature	n/a	n/a

SECTION 6: Field Care and Maintenance

Care and Cleaning

The eScan-AC is a precision instrument designed for field use and should be handled with reasonable care. The components should be kept clean, and when not in use, should be disassembled and stored in their protective containers or cases. The eScan-AC is designed and built to be relatively free of routine maintenance during normal use. As with any precision instrument, careless handling can cause damage.

The collection rings are constructed of injection-molded plastic and require no maintenance other than an occasional wipe-down with a damp cloth. The manifold assemblies are constructed of durable vacuum-cast plastic. They should be stored inside the collection rings when not in use to prevent damage. Care should be taken to avoid damage to the manifold when it is in the operating position and not protected by the collection ring. Do not allow foreign matter of any type to fall into the manifold arm openings. This matter could lodge inside the arm and disrupt the airflow. The manifolds require no maintenance other than an occasional wipe-down with a damp cloth.

The electronic components of the eScan-AC are water-resistant but not waterproof. Care should be used when operating the eScan-AC in rainy conditions. Some exposure to rain can be expected during routine field use. A minimal amount of moisture will not adversely affect the collection rings and skirting, provided they are allowed to dry thoroughly after such use. Do not use the eScan-AC under conditions where corrosive liquids or gases are present.

Due to the composition of the skirt material, exposure to high heat sources can damage the fabric. Therefore, smoking should not be permitted around the collectors. The skirt fabric may also be damaged by contact with sharp objects, which can affect the accuracy of the measurements. A periodic inspection of the components should be performed each time the eScan-AC is assembled. The skirts may be washed periodically with water and mild detergent and allowed to air-dry.

The eScan-AC is a sensitive instrument and, while it can withstand the high temperatures found in a vehicle during the summer, prolonged storage under those conditions will cause deterioration of components, as well as shorten battery life.

Battery Charging

The eScan-AC comes with a set of batteries and a pair of battery chargers. We recommend that the batteries be charged and used in sets. Also, once a month, each set should be allowed to run all the way down and completely re-charged.

Factory Calibration

The eScan-AC should be returned to the factory for periodic calibrations as set forth in the maintenance agreement. When no maintenance agreement is in effect, customary labor charges will apply.

SECTION 7: Troubleshooting

Computer-based Help Files

Computer-based help files are accessible from within eScan-AC by clicking Help on the menu bar. Then select the appropriate topic or sub-topic from the drop-down menu. Note that many of the topics have hot links to other topics, making navigation and cross-reference easy.

Program Updates

You will be notified when program updates are available. If you are unsure of whether you have the latest version, contact the Customer Service using one of the methods listed below. Before contacting Customer Service, write down the current version of your software. The version number is displayed on the opening “Splash” screen. Once inside the program, the version number appears on the blue bar at the top of the eScan-AC desktop.

Customer Service and Support Hot Line

If you experience a problem you cannot resolve, or you have questions about the eScan-AC, please call the Customer Service and Support Hot Line at 1-866-eScan-AC (**866-372-2622**). Technicians are on duty from 5 AM to 5 PM Pacific Time, Monday through Friday. A message service is active on this number after hours.

You may also submit questions or comments through our e-mail server at support@enalasys.com.

Statement of Professional Conduct

eScan-AC Certification License

I _____(name), having successfully completed the eScan-AC Certification Training, affirm that I will perform all eScan-AC diagnostics and analysis in accordance with the standards, policies, and protocols established by Enalaysys Corporation. I will perform all eScan-AC tests in a professional and ethical manner. All diagnostics will be conducted without altering, manipulating, or changing the operation or procedures that may influence the data or results.

I will not alter, manipulate, or tamper with the eScan-AC equipment in any way. As a professional technician, I will fully disclose all information to the customer that is pertinent to the efficient operation of the system. I will not use the eScan-AC equipment, data, or reports to create a false impression of the HVAC system status that would lead the customer to have repairs made that are not necessary or needed.

I will accept as common practice industry standards established by this equipment unless used in specially designed systems. I will fully document any deviation from the standard practices if this equipment is used in a special application.

Failure to comply with the above statements will result in the loss of my eScan-AC Certification License.

Technician Signature Date

Enalaysys Official Date

Certification Training Location

Training Dates

Contractor University Evaluation

The continued improvement of our training program is very important to us. We appreciate you filling out the following evaluation. Your comments are be valuable in helping us create a world-class experience for you as part of the Contractor Network now and over the years.

Name: _____ **Company:** _____ **Date:** ____/____/____

Scale: 0 no value – 10 extremely valuable

What was the overall value of the program to you? 0-10 _____

How would you rate the ability of the trainers? 0-10 _____

Additional comments: _____

What three things did you find most valuable to you in the training program?

1. _____

2. _____

3. _____

What are three things you would like to see improved in the training program?

1. _____

2. _____

3. _____

What would you like us to follow-up on to ensure your membership in the Contractor Network has concrete value for your business?

Please share your thoughts about the eScan-AC system and how you plan to use it in your business?

What would you like to see our R&D team focus on related to EscanAC or other technologies to help you in your business?

Please share any additional comments and feedback below...

☐ *Please check this box to give us permission to use your comments in our marketing and sales materials.*