



TRI-COUNTY
REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

Diagnosing Heating and Cooling Comfort Problems in Homes

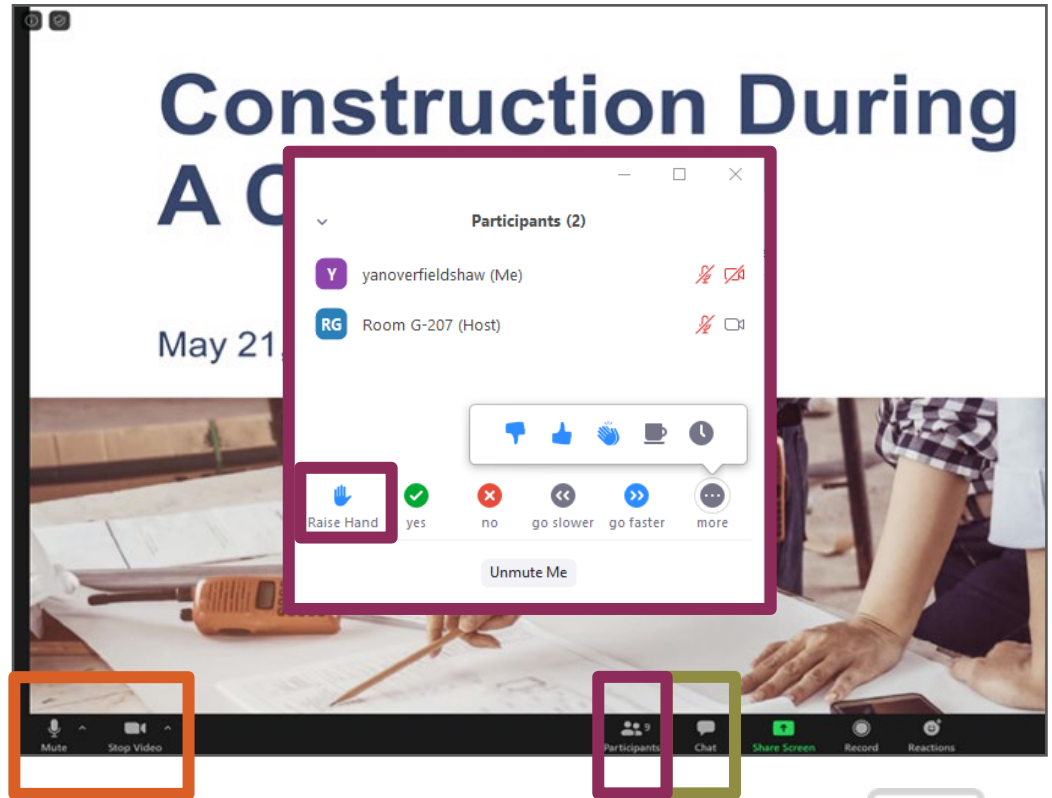
Russ King – Coded Energy

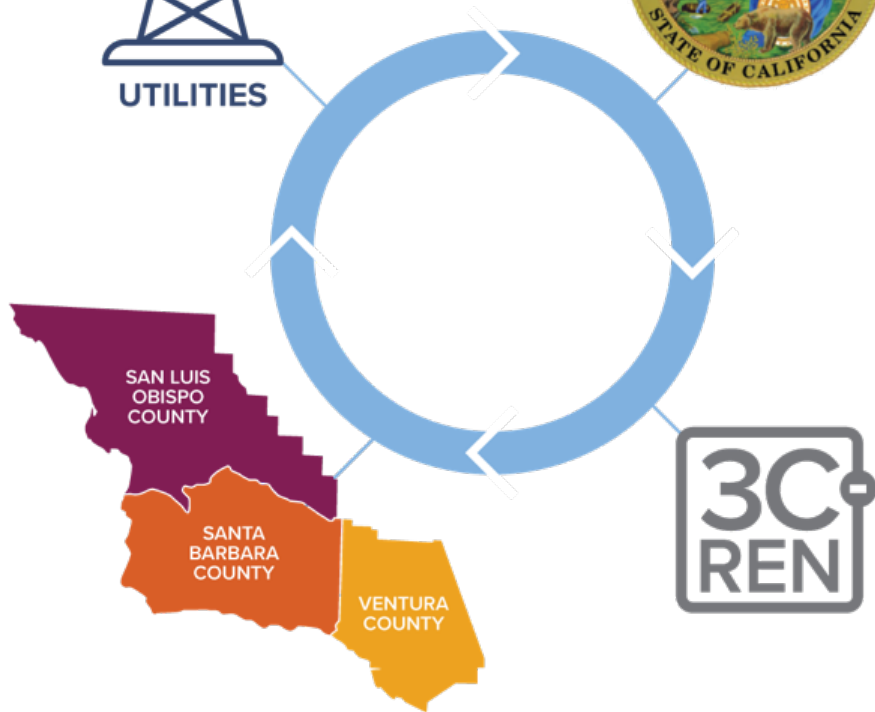
March 18, 2025



Zoom Orientation

- Add an **introduction** in the chat. Be sure **full name** is displayed.
- Did you call in? Please **share** first and last name with us.
- Please **mute** upon joining
- Use the **"Chat"** to share questions or comments
- Under **"Participant"** select **"Raise Hand"** to share a question or comment verbally
- Session may be **recorded** and posted to 3C-REN's on-demand page
- Slides/recording are **shared** after most events





Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region



Our Services

Incentives



HOME ENERGY SAVINGS

3c-ren.org/for-residents
3c-ren.org/multifamily



COMMERCIAL ENERGY SAVINGS

3c-ren.org/commercial

Contractors can enroll at
3c-ren.org/contractors

Training



BUILDING PERFORMANCE TRAINING

3c-ren.org/events
3c-ren.org/building



ENERGY CODE CONNECT

3c-ren.org/code

View past trainings at
3c-ren.org/on-demand

Technical Assistance



AGRICULTURE ENERGY SOLUTIONS

3c-ren.org/agriculture

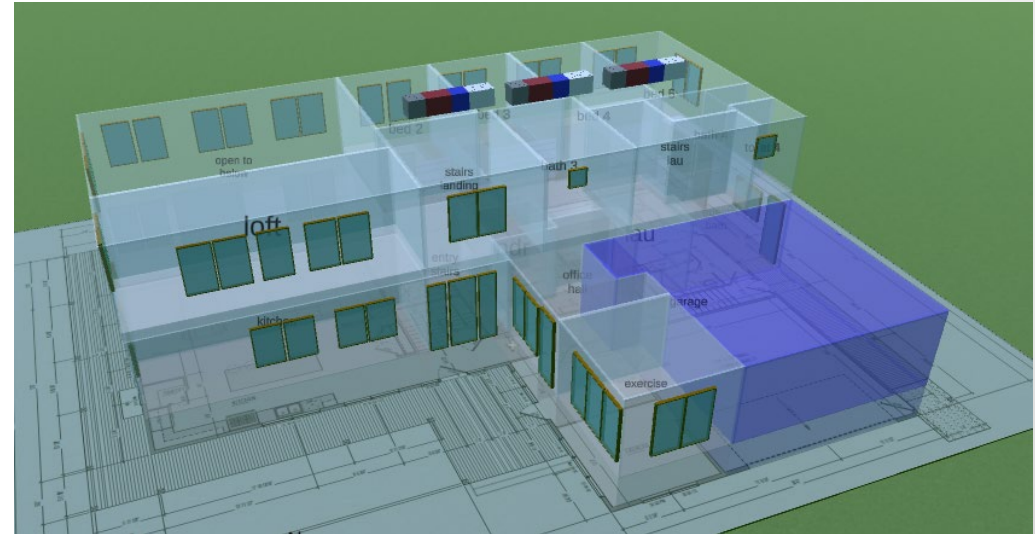
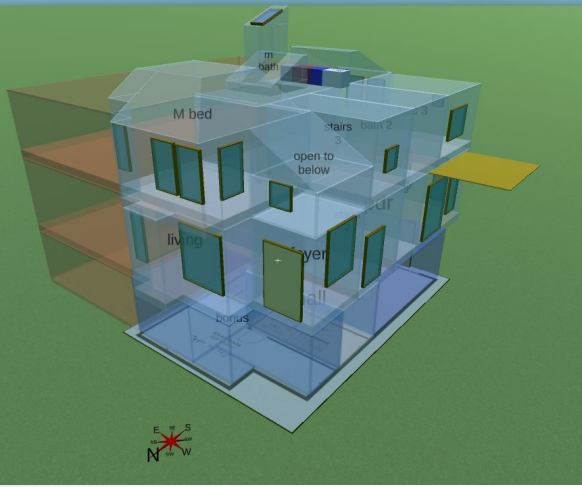


ENERGY ASSURANCE SERVICES

3c-ren.org/assurance

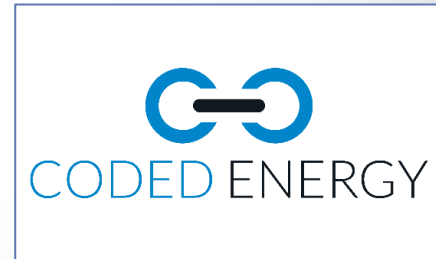


Diagnosing Heating and Cooling Comfort Problems in Homes



By Russell King, ME
CEO, Coded Energy, Inc.

- Instructor – [Russell King, M.E.](#)
- Licensed Mechanical Engineer (3 states)
- CEO of [Coded Energy, Inc.](#) (Developers of [Kwik Model 3D](#) HVAC design software)
- 35+ years experience with residential HVAC design and energy efficiency
- russ@coded.energy
- HVAC Blog: www.russellking.me



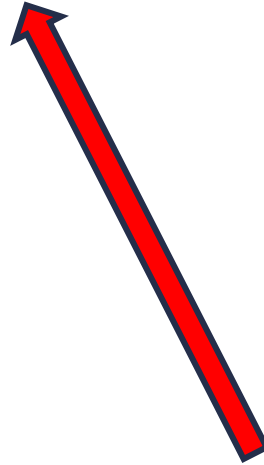
Types of Comfort Problems and Their Symptoms

- Temperature issues
- Humidity issues
- High energy bills
- Noise
- Dust



Types of Comfort Problems and Their Symptoms

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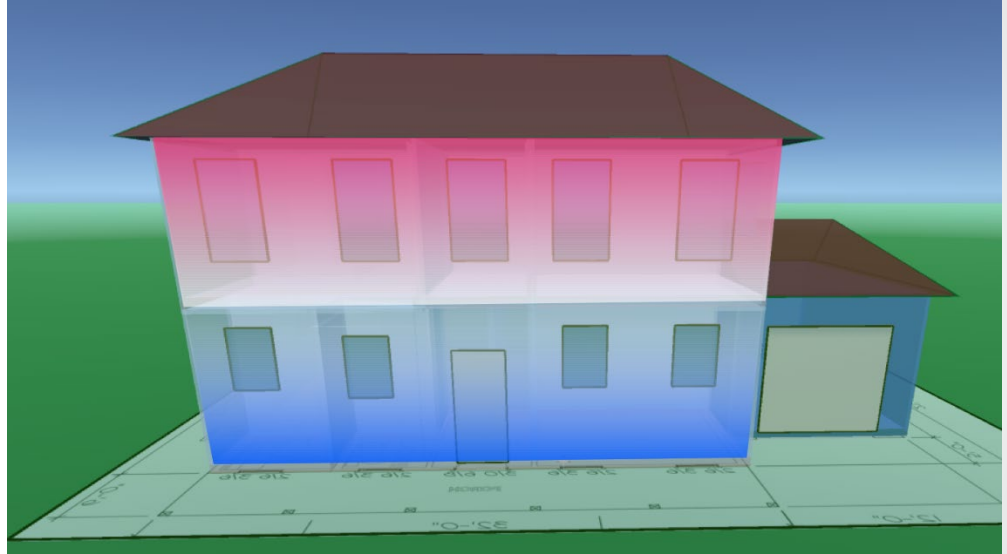


Today's Focus

Temperature Issues - Symptoms

Uneven temperatures
floor to floor

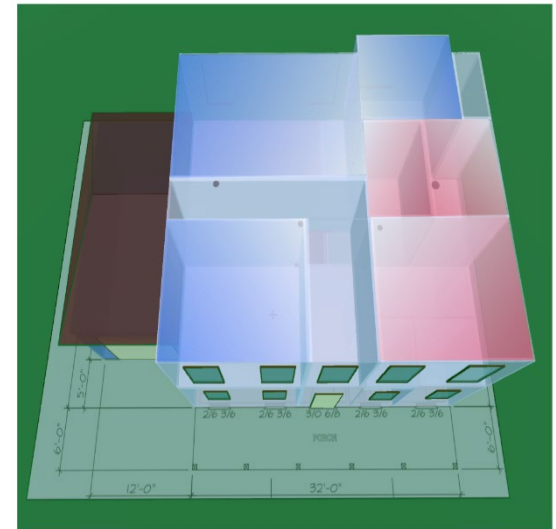
- Hot upstairs, cold downstairs
- Stratification – “Hot air rises”



Temperature Issues - Symptoms

Uneven temperatures room to room

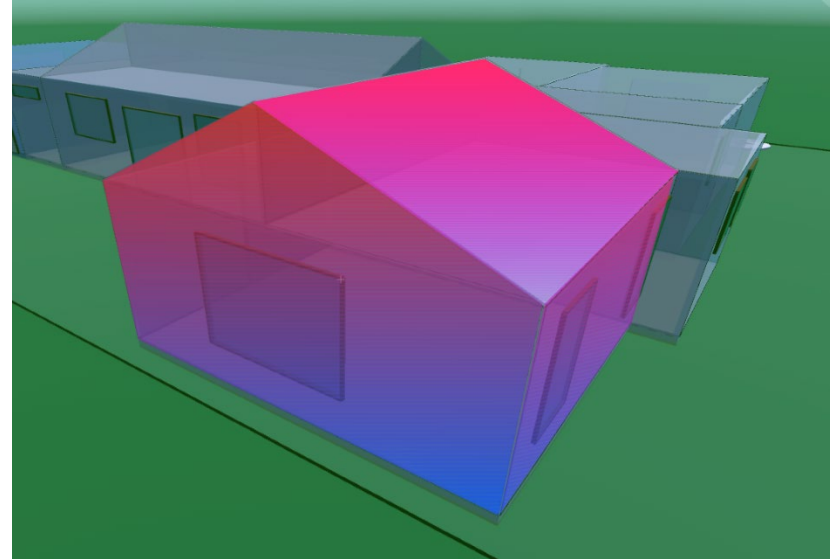
- Some rooms are hotter or colder than others, even on the same floor
- Bedrooms above the garage
- “The baby’s room is always freezing.”
- “The family room is like an oven in the afternoon”



Temperature Issues - Symptoms

Stratification within a room

- Cold at the floor but hot near the ceiling
- Bunk beds
- Vaulted Ceilings
- Lofts



Temperature Issues - Symptoms

System doesn't maintain set temperature

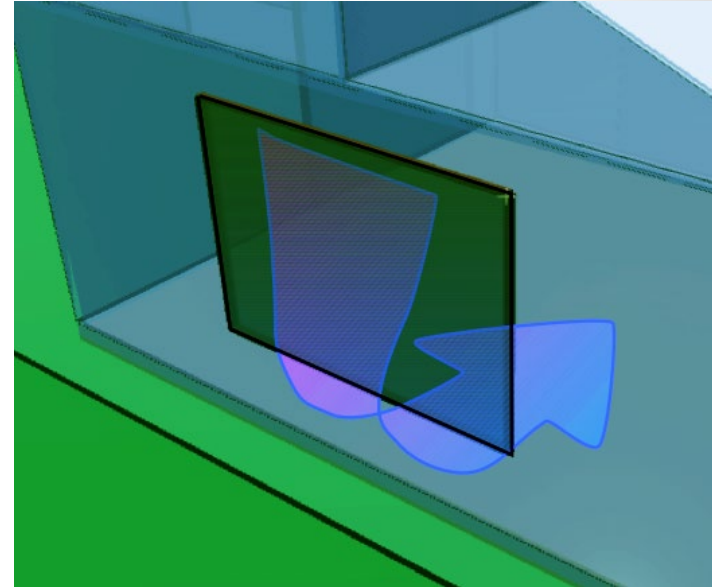
- Summer: System runs and runs but never **cools** off
- Winter: System runs and runs but never **heats** up



Temperature Issues - Symptoms

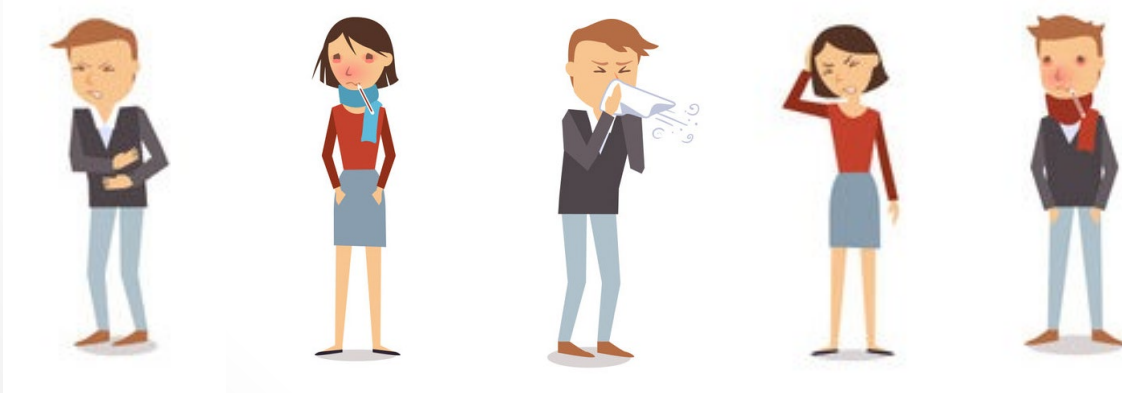
Drafts

- Cold air moving across one's body
 - Windows
 - Doors
 - Vaulted ceilings
 - Supply registers
 - Heated air feels too cold or too hot
 - Cooled air feels too hot or too cold



How to Interview the Homeowner

- It helps to have a set of interview questions prepared.
- Identify the symptoms of the problem before trying to identify the problem.
- Use precise terms when identifying the how they feel
 - Do you feel warm, cold, muggy, sticky, sweaty, dry nose/throat



How to Interview the Homeowner

- Ask them what seems to resolve the complaint
 - Sun goes down
 - Closing the drapes
 - Putting on a sweater
 - Closing off vents
- Find out what rooms in the house are the *most* comfortable.



How to Interview the Homeowner

- Identify **when** the problems occur
 - Heating or cooling season
 - System on or system off
 - Mild days or extreme days
 - What time of day
 - Behavior related causes (watch for signs of poor t-stat operation)
- Identify **where** in the house the problems occur



Problems Caused by Poor Design

- Diagnosing comfort problems has to happen **after** all equipment issues have been resolved.
- In other words, the equipment is performing as it should, but the occupants are still not comfortable.



Problems Caused by Poor Design

- Once faulty equipment has been ruled out there are really only three things that cause the vast majority of comfort problems
 1. The occupants are behaving detrimentally to the performance of the system (leaving windows open, operating the t-stat wrong)
 2. The load of the house is higher than it should be (insulation has been removed, leaks have been added, wrong windows installed)
 3. The system is not designed well.
- The vast majority of comfort problems are caused by **poorly designed systems.**

Problems Caused by Poor Design

- The good news is that design problems are fairly easy to diagnose.
- If you do an **after-the-fact design** on the house based on the basic existing layout (e.g., register locations), you can use that to see where the differences are between the ***expected*** performance of the “good design” and the ***actual***, installed system:
 - Equipment size
 - Duct sizing and airflows
 - Duct layout, register locations

How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Doing a *proper* design on a house is an important investment of time.

However, it is possible to do a quick-and-dirty evaluation, using basic design principles to determine the rough total airflow capacity of the system.



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Assuming that “Good” airflow is believed to be around 400 cfm/ton, let’s use this as target.

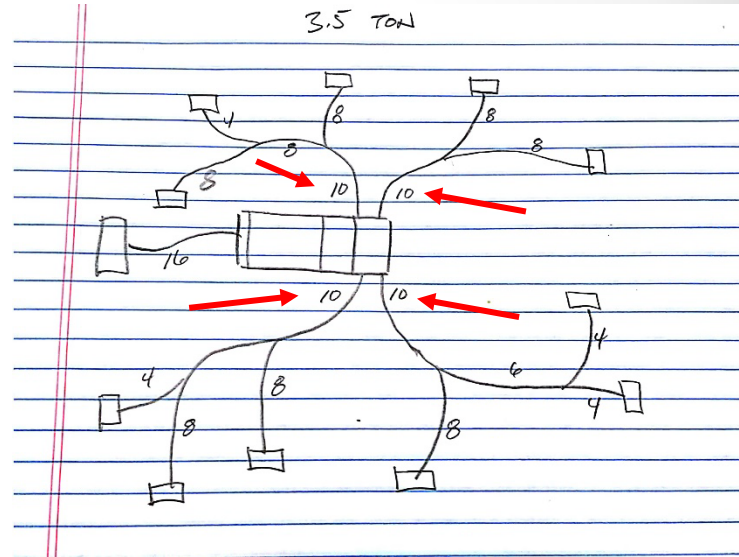
Note: In humid climates lower airflow per ton may be desirable.



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Consider this simple sketch of a duct system.

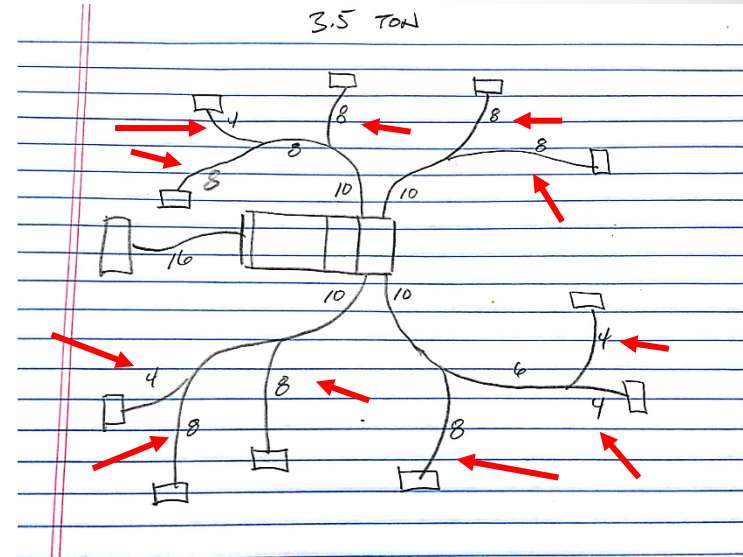
- Using a duct slide rule (aka, duct-u-lator) you can estimate the airflow capacity of the ducts.
- There are three important sets of ducts that affect overall airflow:
 1. Main supply trunks at the plenum
 2. Supply branches serving the registers
 3. Return ducts



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Consider this simple sketch of a duct system.

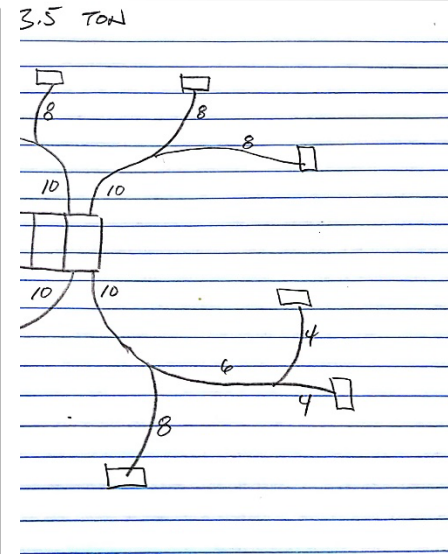
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How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- This table was created with a duct slide rule and shows the maximum airflow of various sizes of flex duct at a friction rate of 0.1 iwc/100'

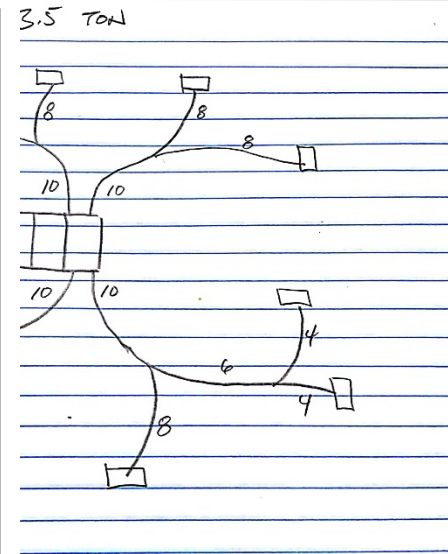
Duct Diameter	Air Flow CFM
4"	20
5"	50
6"	80
7"	120
8"	170
9"	230
10"	300
12"	500
14"	740
16"	1050
18"	1400
20"	1875



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- 0.1 iwc/100' is a commonly used friction rate for examples, but the actual friction rate should be calculated for each design.
- Friction rate is discussed in more detail in another blog article called, "***Friction Rate Explained – Maybe***"

Duct Diameter	Air Flow CFM
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How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- List all of the main trunk sizes and the airflow capacity of the ducts.
 - Then add them up
- Do the same for the supply branches.
- Do the same for the return side

Handwritten calculation on lined paper:

MAIN TRUNKS

10" - 300
10" 300
10" - 300
10" - 300

1200 X

Duct Diameter	Air Flow CFM
4"	20
5"	50
6"	80
7"	120
8"	170
9"	230
10"	300
12"	500
14"	740
16"	1050
18"	1400
20"	1875

How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- List all of the main trunk sizes and the airflow capacity of the ducts.
 - Then add them up
- **Do the same for the supply branches.**
- Do the same for the return side

<u>SUPPLY BRANCHES</u>	
8"	170 CFM
4"	20
8"	170
8"	170
8"	170
4"	20
4"	20
8"	170
8"	170
8"	170
4"	20
<hr/>	
X 1270 CFM	

Duct Diameter	Air Flow CFM
4"	20
5"	50
6"	80
7"	120
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How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

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- **Do the same for the return side**

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RETURN: 16" - 1050 CFM

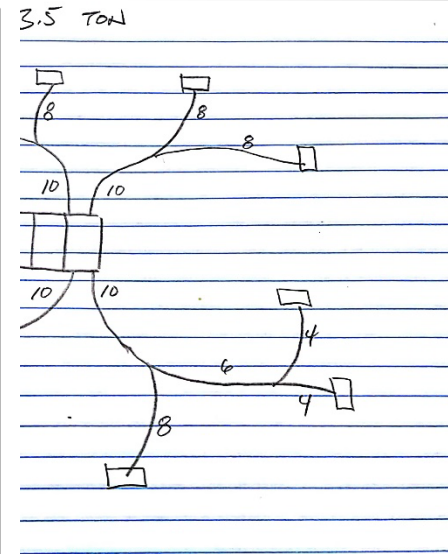
How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Compare those to the desired total.
We'll use 400 cfm/ton as a target, but you could use 350.

$3.5 \text{ tons} \times 400 = 1400 \text{ cfm}$

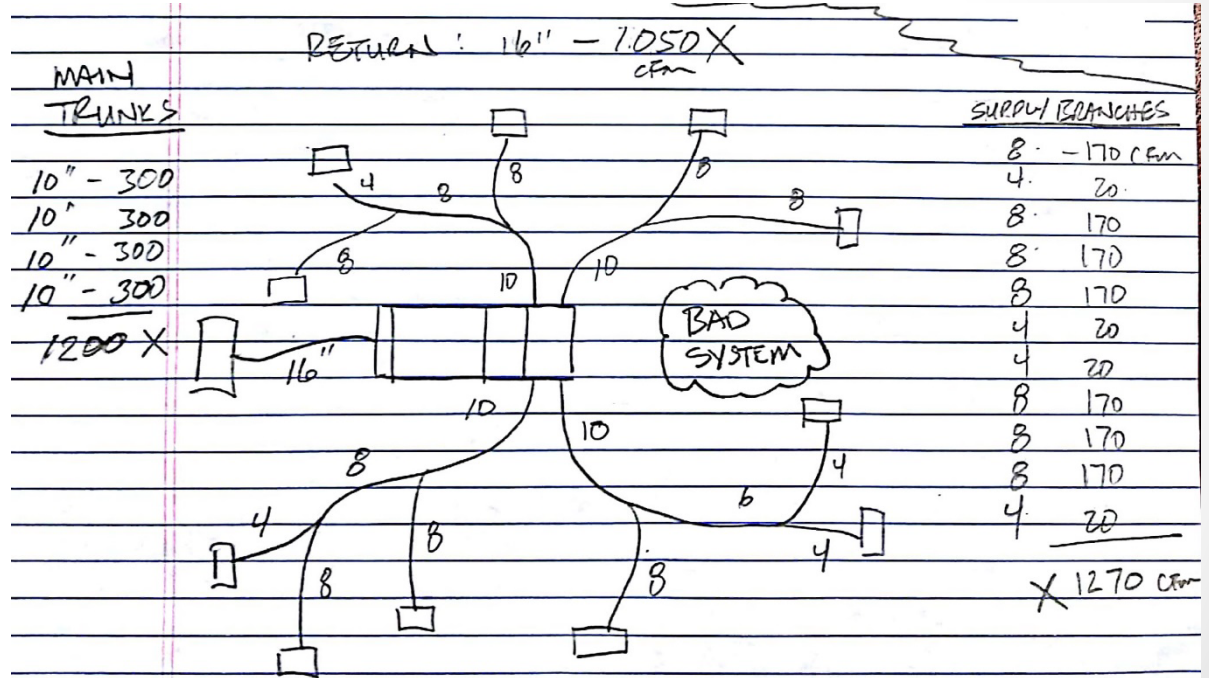
$3.5 \text{ tons} \times 350 = 1225 \text{ cfm}$

Duct Diameter	Air Flow CFM
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7"	120
8"	170
9"	230
10"	300
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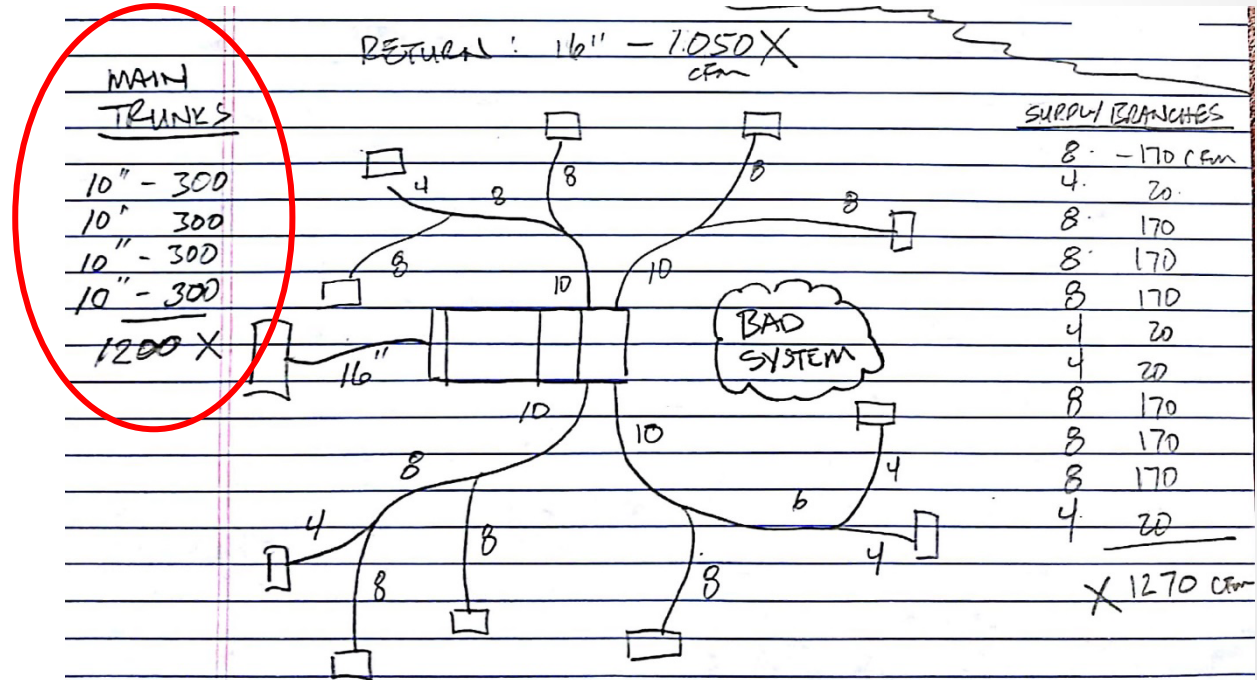
How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

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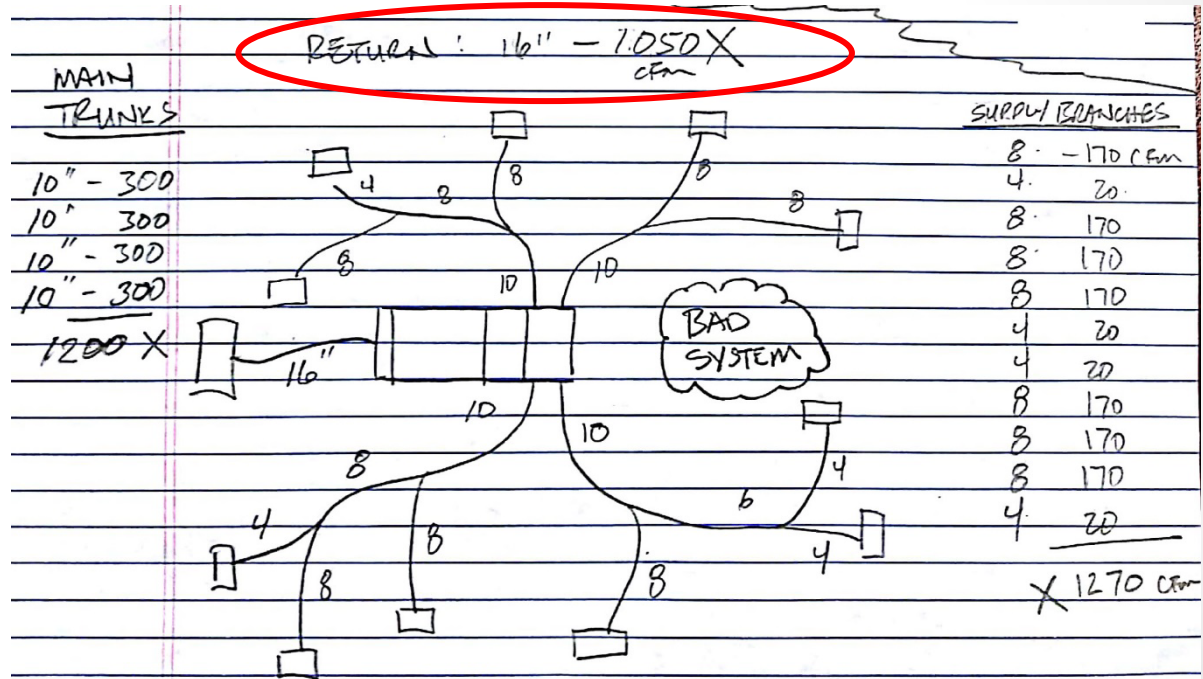
How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

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How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

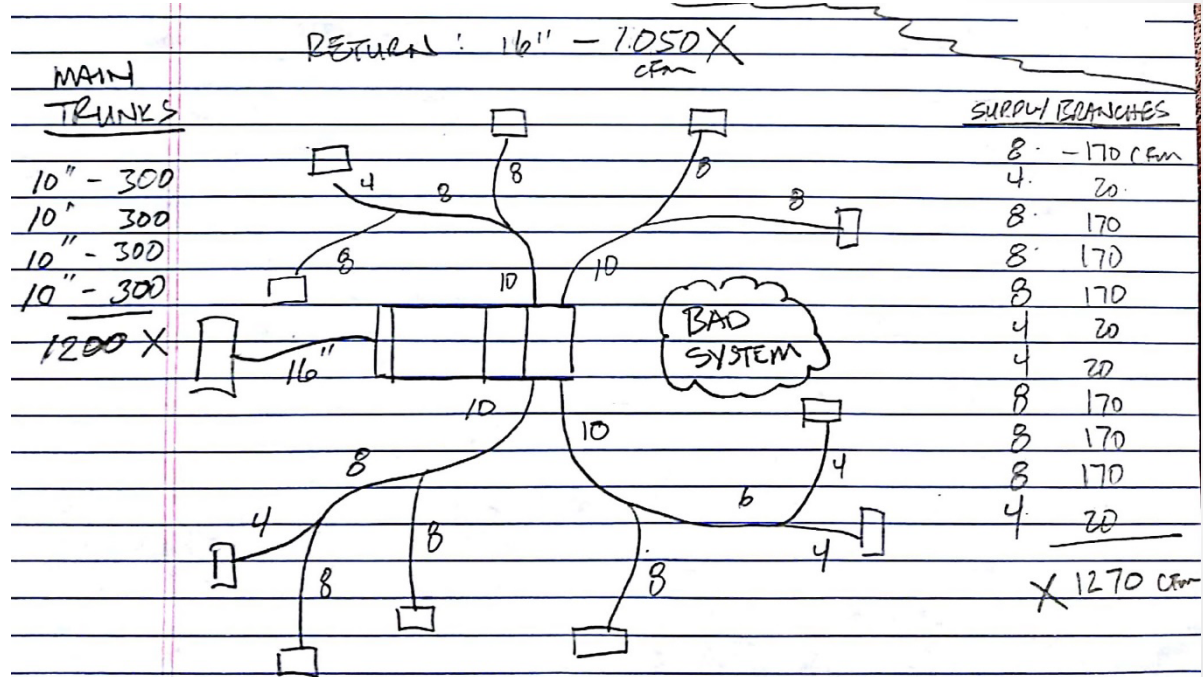
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How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

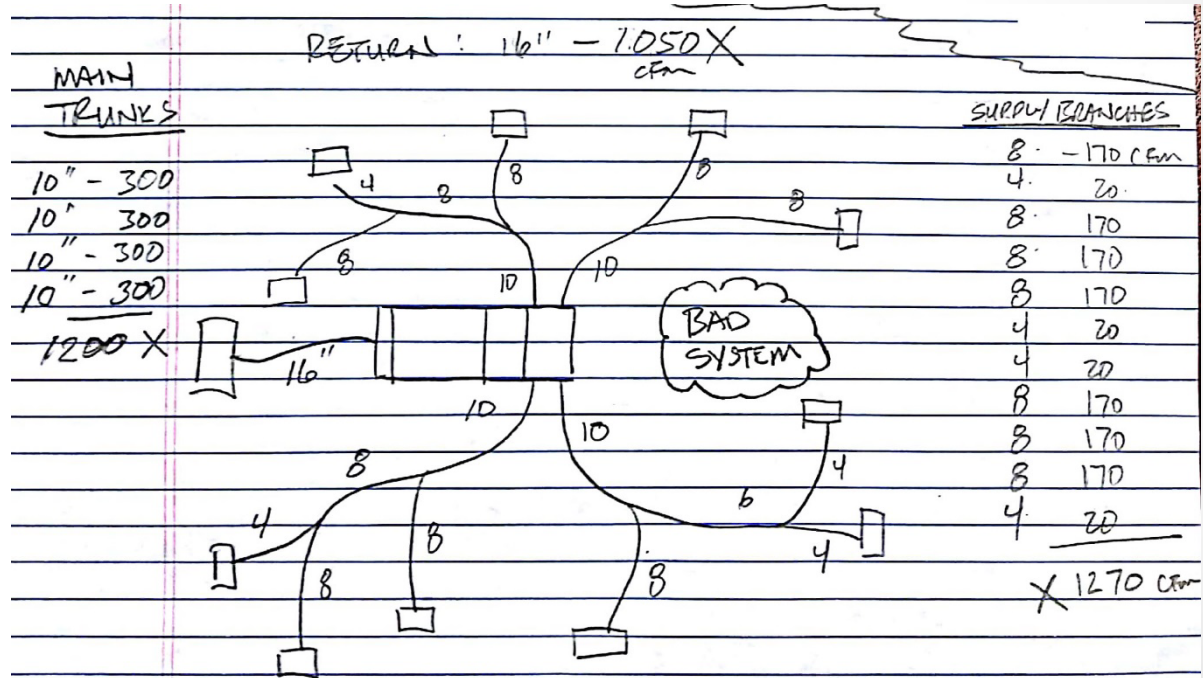
As you can see, the ducts are well undersized for a target of 400 cfm/ton: 1400 cfm

This is especially true for the return, which is a common problem.



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

A simple fix of increasing return capacity will make the system barely meet 350 cfm/ton.

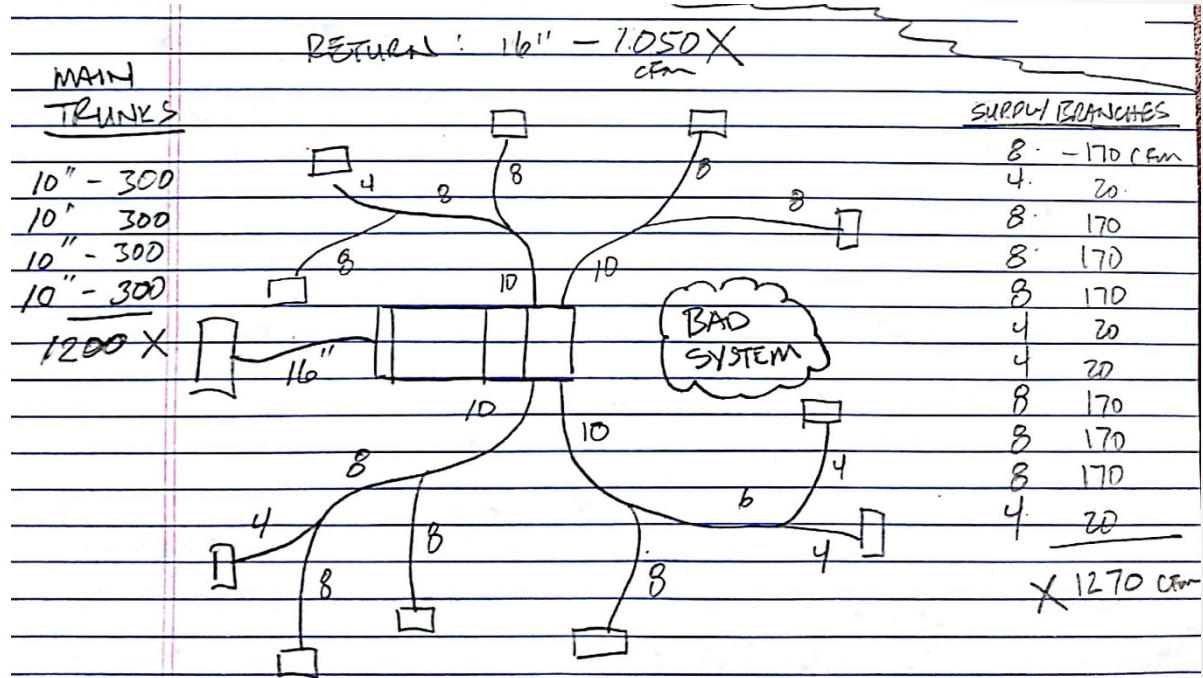


How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Note that this does not address room by room air balance.

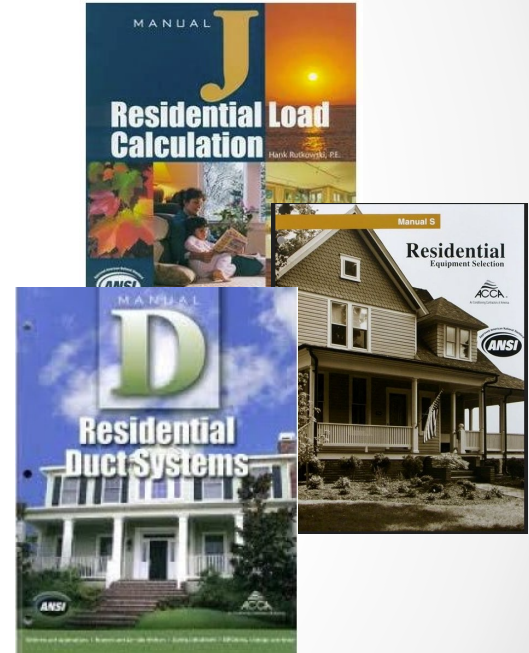
To do that, you need to do room by room load calculations.

To do that, you need to learn ACCA's Manuals J, S, and D



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- Basic Design Manuals
 - Manual J – Residential Load Calculations
 - Manual S – Equipment Selection
 - Manual D – Duct Design
- Other Related Manuals
 - Manual RS – Residential System Design (overview)
 - Manual T – Terminal Selection (registers)
 - Manual H – Heat Pumps
 - Manual LLH – Low Load Homes
- Other Standards and Checklists. (QI, QM, etc.)
- www.acca.org



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Load Calculations are critical to properly sized heating and cooling equipment.

For **Air Conditioners**:

- ***Undersizing*** may cause house not to cool (or heat) well on very hot (or cold) days.
- ***Oversizing*** can cause excess stratification, uneven temperature distribution. Plus, higher electric bills and shortened equipment life.

How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- The negative impacts of ***Oversized Equipment*** can be reduced by using multi-stage or variable capacity units.
- The negative impacts of both ***Oversized and Undersized Equipment*** can be reduced with good duct design and good system airflow.

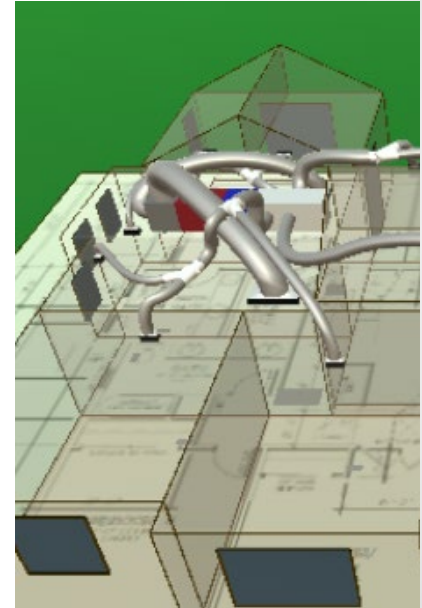
How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- Historically, the most common method of equipment sizing was rules of thumb and trial and error.
- This almost always led to oversized equipment (and undersized ducts).

How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

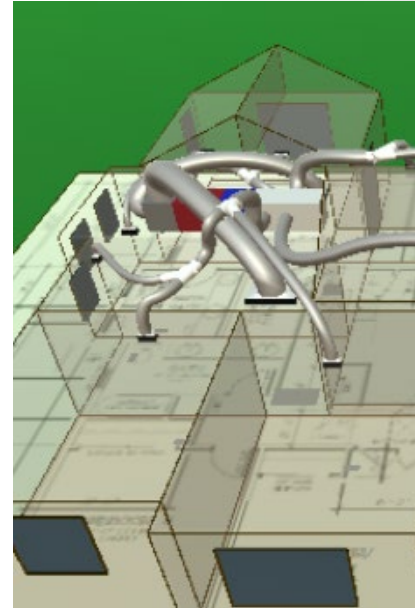
The Importance of Good Design: Duct Sizing

- Since the temperature of the ***entire house*** (or zone) is determined by ***one location*** (at the thermostat) it is important for even temperature distribution that conditioned air be distributed evenly throughout the home.
- This is done by sizing the ducts to deliver the **proper airflow** to each room (register).



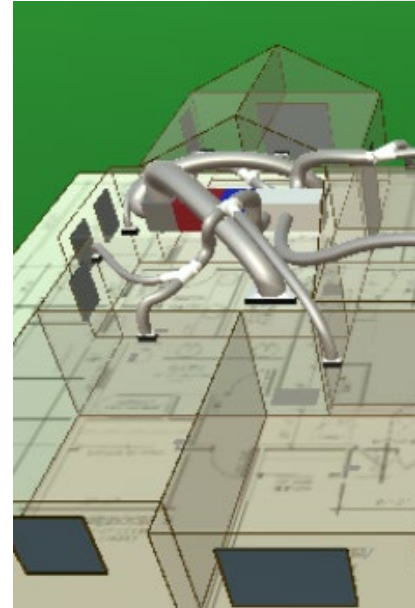
How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- Target room airflows need to be determined from **room-by-room loads** – you need to know what the load of a room is relative to other rooms.
- Overall undersizing of all ducts, especially return ducts, will reduce total system fan flow, which will reduce capacity and efficiency of system.



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

- Undersizing one or two ducts relative to the other ducts in the house will cause poor **air balance**.
- This will result in uneven temperature distribution in the house (some rooms warmer or cooler than others)
- This is made even worse by low overall airflow.



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Remember:

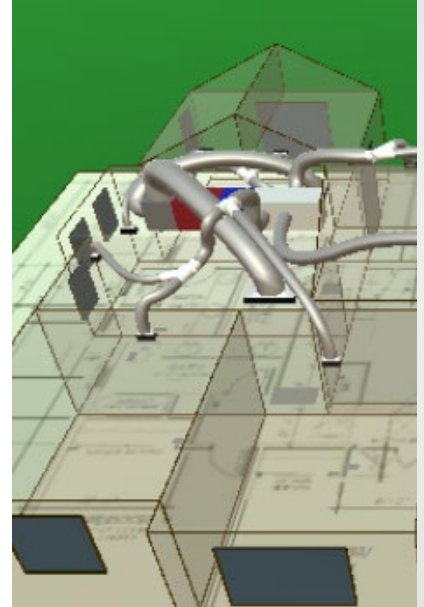
- Equipment cannot be properly sized unless you know the **load** of the house. (Demand)
- **Manual J**
- Equipment cannot be properly sized unless you can accurately determine the **capacity** at design conditions. (Supply)
- **Manual S**



How to Evaluate an Existing System for Proper Equipment Sizing and Duct Sizing

Remember:

- Individual **ducts** cannot be properly sized unless you know how to distribute the air.
- To know how to distribute the air, you need **room by room** load calculations.



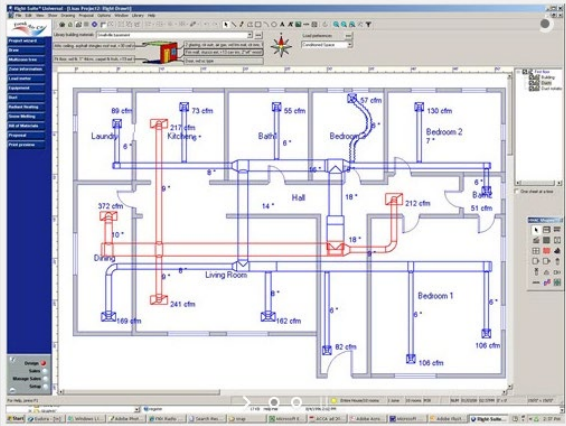
Diagnostic Testing: Room-by-Room Airflows

- To obtain the load calcs, you will need to take a Manual J class and learn how to use some (ACCA certified) load calculation software.
- There are several ACCA approved ***software programs*** available to help you through this process.

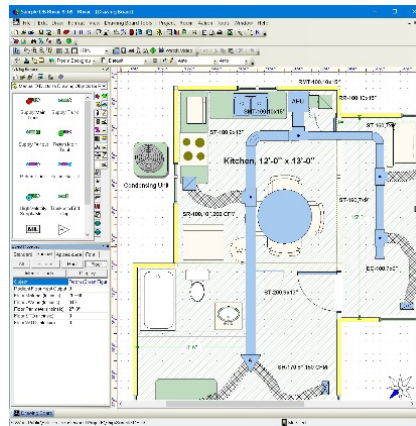
Diagnostic Testing: Room-by-Room Airflows

Examples:

Right-Suite® by
Wrightsoft



RHVAC by
Elite Software



Kwik Model® with
EnergyGauge Loads

The screenshot displays a 3D perspective view of a building model with a complex HVAC duct system overlaid. A data table titled 'EnergyGauge Loads' is visible in the upper right corner, providing room-by-room energy load data. The table includes columns for Room Name, System/Block, Zone, Floor Area, Volume, Room Type, Number of Occupants, Heating Load, Heating Fraction, Heating CFM, Cooling Load, and Cooling Fraction. The software interface includes a toolbar at the top and a sidebar on the left with various tool icons.

Room Name	System/Block	Zone	Floor Area	Volume	Room Type	Number of Occupants	Heating Load	Heating Fraction	Heating CFM	Cooling Load	Cooling Fraction
inbed	Sys/Block 1	Zone	317.75	2987.5	Other	0	7479	0.218	218	5431	0.229
inbath	Sys/Block 1	Zone	66	660	Other	0	1664	0.058	58	1634	0.069
inbkg	Sys/Block 1	Zone	136	1293	Other	0	1456	0.042	42	1139	0.048
inbed1	Sys/Block 1	Zone	186	1488	Bedroom	0	4016	0.117	117	2220	0.093
inbed2	Sys/Block 1	Zone	190	1410	Bedroom	0	3960	0.113	113	2064	0.090

Diagnostic Testing: Room-by-Room Airflows

Measuring Actual Airflows

- Supply and return airflows must be measured.
 - Passive Flow Hood
 - Powered Flow Hood
 - Velometer
 - Plastic Bag and stop-watch
 - Other
- See “LBNL 47382” regarding supply measurements.
- For air balance, it’s more important to be accurate **relative to each other.**

Diagnostic Testing: Room-by-Room Airflows

Identifying Balance Problems

- Should we compare actual measured **flows** to target **flows**?
- Only if the measured **total** flow and target **total** flow the same. This is usually not the case.
- Instead, compare measured **percent of totals** to target **percent of totals**.
- Example . . .

Equipment and Airflow Report

System name: Upstairs		this system # 2 of 2 systems in this house			
Equipment Info	FAU Make	Coil Make		Condenser Make	
Describe location and configuration:	Carrier	ADP		Carrier	
attic mounted	FAU Model	Coil Model		Condenser Model	
horizontal	58MXA040-12	HDD03336D		38BRC036	
	FAU Type	Coil Type		Condenser Type	
	horiz gas furnace	horiz cased w/TXV		split AC	
Sub-Zone name:		this sub-zone # 1 of 1 sub-zones in this system			
		Cooling Mode			
Room Name-Register #	Measured CFM	% of total	Target CFM	% of total	variance
stairs	0	0.0%	257	21.4%	-100.0%
gameroom	195	19.7%	186	15.5%	27.3%
bed 2	163	16.5%	160	13.3%	23.7%
bath 3	34	3.4%	20	1.7%	106.5%
bed 3	196	19.8%	179	14.9%	33.0%
bonus (2)	215	21.8%	230	19.2%	13.5%
bed 4	153	15.5%	158	13.2%	17.6%
bath 2	32	3.2%	10	0.8%	288.7%
Total	988	100.0%	1200	100.0%	

Notice
Difference!

Equipment and Airflow Report

System name: Upstairs		this system # 2 of 2 systems in this house			
Equipment Info	FAU Make	Coil Make		Condenser Make	
Describe location and configuration:	Carrier	ADP		Carrier	
attic mounted	FAU Model	Coil Model		Condenser Model	
horizontal	58MXA040-12	HDD03336D		38BRC036	
	FAU Type	Coil Type		Condenser Type	
	horiz gas	horiz cas		split AC	
Sub-Zone name:				of 1 sub-zones in this system	

Measured
% of total

Target
% of total

Room Name-Register #	Measured CFM	% of total	Target CFM	% of total	Variance
stairs	0	0.0%	257	21.4%	-100.0%
gameroom	195	19.7%	186	15.5%	27.3%
bed 2	163	16.5%	160	13.3%	23.7%
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bed 3	196	19.8%	179	14.9%	33.0%
bonus (2)	215	21.8%	230	19.2%	13.5%
bed 4	153	15.5%	158	13.2%	17.6%
bath 2	32	3.2%	10	0.8%	288.7%
Total	988	100.0%	1200	100.0%	

Equipment and Airflow Report

System name: Upstairs		this system # 2 of 2 systems in this house			
Equipment Info	FAU Make	Coil Make		Condenser Make	
Describe location and configuration:	Carrier	ADP		Carrier	
attic mounted	FAU Model	Coil Model		Condenser Model	
horizontal	58MXA040-12	HDD03336D		38BRC036	
	FAU Type	Coil Type		Condenser Type	
	horiz gas furnace	horiz cased w/TXV			
Sub-Zone name:		this sub-zone: 1 this system			
		Cooling Mode			
Room Name-Register #	Measured CFM	% of total	Target CFM	% of total	variance
stairs	0	0.0%	257	21.4%	-100.0%
gameroom	195	19.7%	186	15.5%	27.3%
bed 2	163	16.5%	160	13.3%	23.7%
bath 3	34	3.4%	20	1.7%	106.5%
bed 3	196	19.8%	179	14.9%	33.0%
bonus (2)	215	21.8%	230	19.2%	13.5%
bed 4	153	15.5%	158	13.2%	17.6%
bath 2	32	3.2%	10	0.8%	288.7%
Total	988	100.0%	1200	100.0%	

Compares
% of total

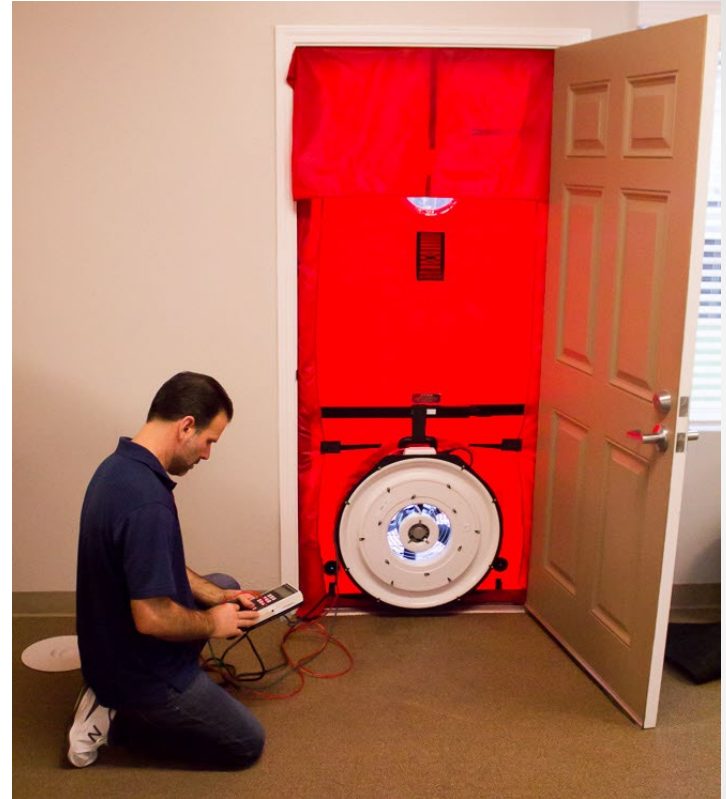
One system serving multiple floors

Equipment and Airflow Report					
System name: Entire house			this system # 1 of 1 systems in this house		
Equipment Info	FAU Make		Coil Make		Condenser Make
Describe location and configuration:	Goodman				Goodman
	FAU Model		Coil Model		Condenser Model
attic mounted	GMP075-4				CKT42-A
horizontal	FAU Type		Coil Type		Condenser Type
	horiz gas furn.		horiz cased		split AC, 3.5 ton
Sub-Zone name: Downstairs		this sub-zone #1 of 2 sub-zones in this system			
Room Name-Register #	Measured CFM	% of total	Target CFM	% of total	variance
LIV	132	9.2%	230	14.4%	-36.0%
FAMILY	196	13.7%	181	11.3%	20.8%
KIT	263	18.3%	317	19.8%	-7.4%
BED4	91	6.3%	110	6.9%	-7.7%
BA3	71	5.0%	17	1.1%	366.0%
LAU	39	2.7%	7	0.4%	521.6%
Total	792	55.2%	862	53.9%	
Sub-Zone name: Upstairs		this sub-zone # 2 of 2 sub-zones in this system			
Room Name-Register #	Measured CFM	% of total	Target CFM	% of total	variance
BONUS	128	8.9%	221	13.8%	-35.4%
MBED	157	10.9%	155	9.7%	13.0%
MBATH	78	5.4%	85	5.3%	2.4%
BA2	77	5.4%	36	2.3%	138.6%
BED2	114	7.9%	98	6.1%	29.8%
BED3	88	6.1%	143	8.9%	-31.3%
Total	642	44.8%	738	46.1%	
Zone Total	1434	100.0%	1600	100.0%	

Upstairs

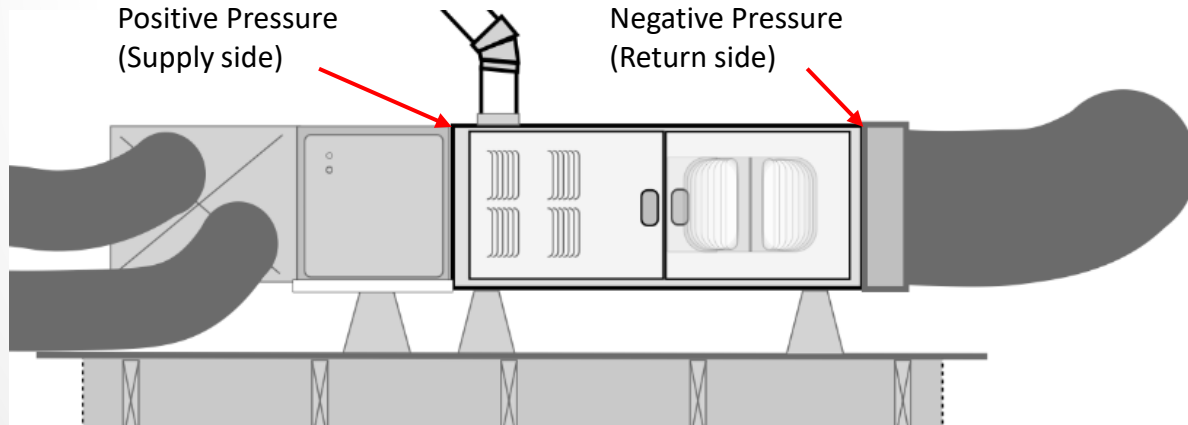
Diagnostic Testing

- There are many very useful diagnostic tests.
- Some of them require fairly expensive equipment, but none are extremely difficult.
- Without testing, you are just guessing.
- Diagnosing problems by **trial and error** is more expensive and time consuming in the long run.



Diagnostic Testing: Static Pressure

- Static pressure across the air handler fan, often referred to as “external static pressure” (ESP), is one of the easiest diagnostic tests to do and for the effort, one of the most informative.
- It gives a good indication of duct sizing and system airflow.



Diagnostic Testing: Duct Leakage

- Duct leakage can have a dramatic impact on the heating and cooling loads that a system must deal with.
- It also directly reduces the amount of heating and cooling delivered to the home.



Diagnostic Testing: Blower Door Test

- Infiltration is the leakage of unconditioned air into a home and the corresponding leakage of conditioned air to the outside.
- To measure infiltration, we induce a known pressure on the house using fans. Actual infiltration is caused by much smaller natural pressure differentials (wind and temperature).



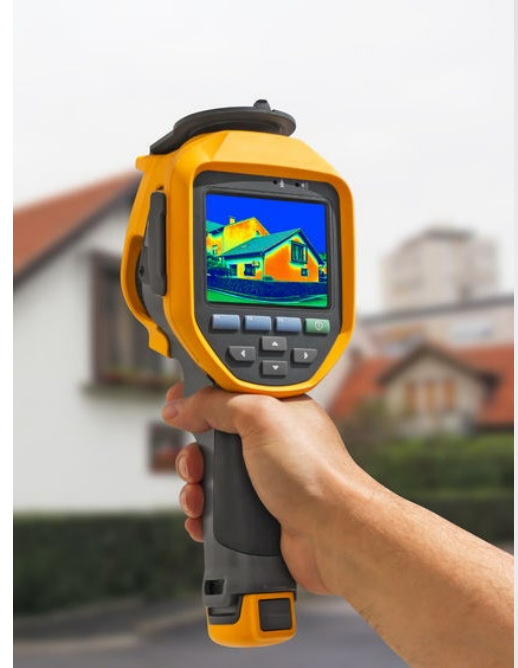
Diagnostic Testing: Blower Door Test

- Infiltration can have a huge impact on house load, especially in older homes.
- Infiltration is measured using a diagnostic tool called a “blower door”.



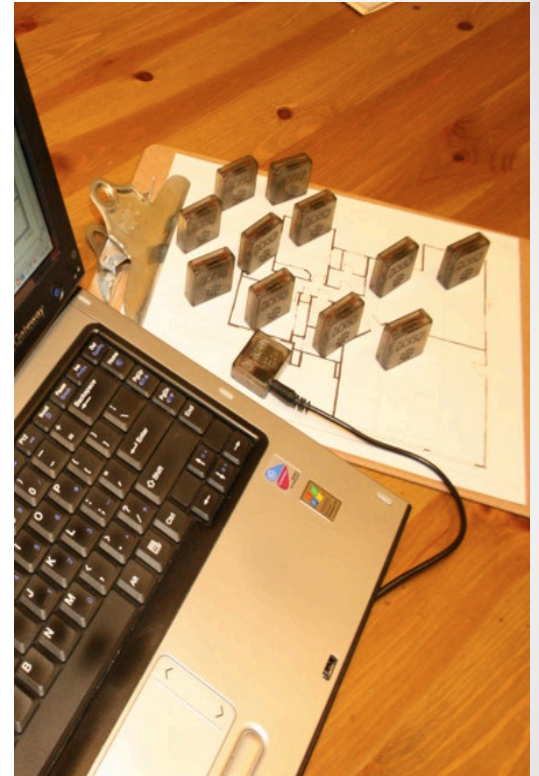
Diagnostic Testing: Infrared Camera

- Infrared thermography is a way to see temperature differences. I
- It is a very impressive visual tool, however.
- It can be used to find locations of air or water leaks.
- It can be used to find missing or poorly installed insulation.
- It can be used to confirm hot ceilings caused by poor attic ventilation.
- The limitations include that it should be used during more extreme conditions (very cold or very hot) for best results.



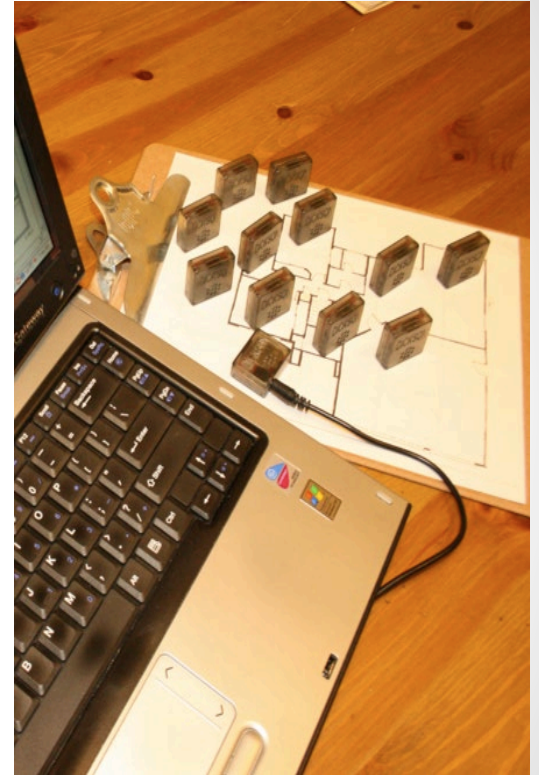
Diagnostic Testing: Data loggers

- Data loggers are small devices that record temperature and or humidity at specified intervals over a specified period of time.



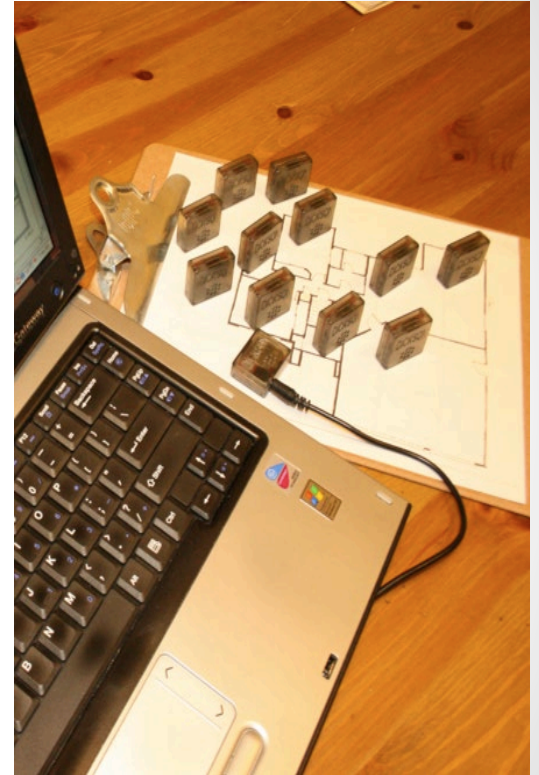
Diagnostic Testing: Data loggers

- With this information, you can diagnose:
 1. Equipment sizing relative to load
 2. Air balance
 3. Occupant behavior
- The limitations include that they must be used during extreme conditions for best results.



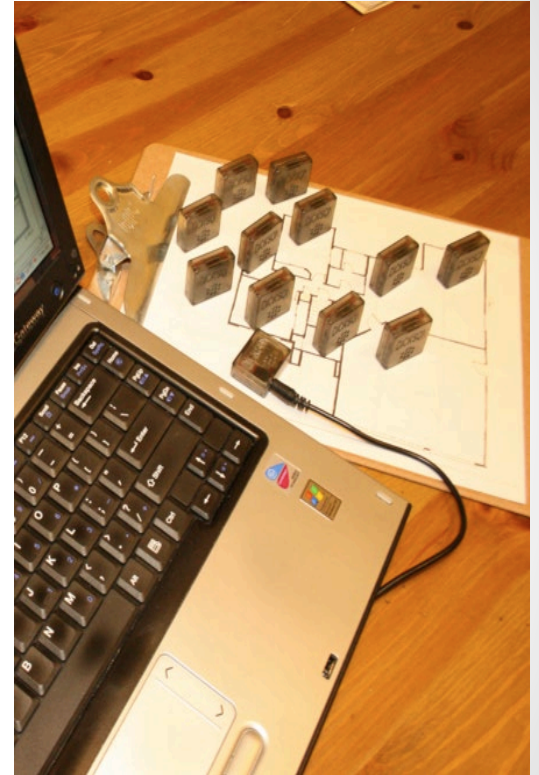
Diagnostic Testing: Data loggers

- For best results, data loggers should be placed in the following locations:
 1. Outside the house, on the north side or in the shade. This is to measure outdoor temperature.
 2. Right next to the thermostat.
 3. On a supply register. This will tell you when the system turns on and off.
 4. In at least one “comfortable” room, about 5’ from the floor out of any direct sunlight or supply air streams. This will be the reference for comparing the problem rooms to.
 5. In several “uncomfortable” rooms



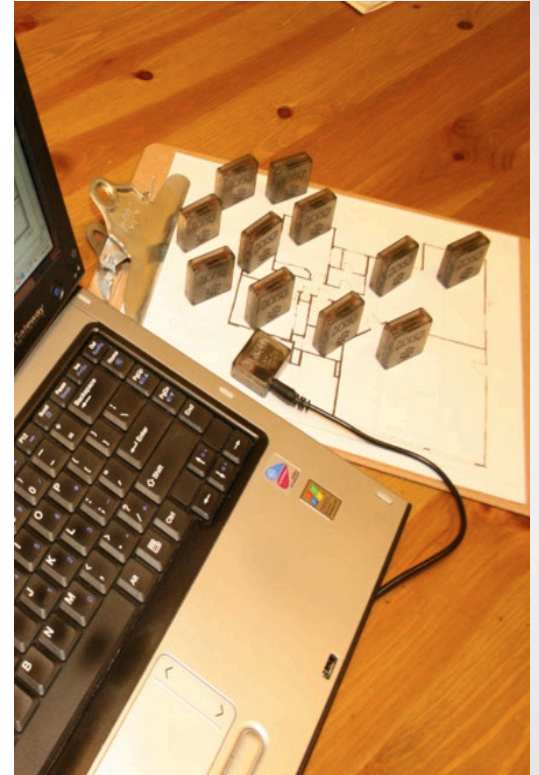
Diagnostic Testing: Data loggers

- Have the homeowners agree to and sign a set of instructions saying that:
 - They will leave the thermostat at an agreed to setpoint, unless it gets really uncomfortable.
 - They will not tamper with the data loggers or cause unusual temperatures near them.
 - They will operate doors, windows, window coverings, and exhaust fans normally

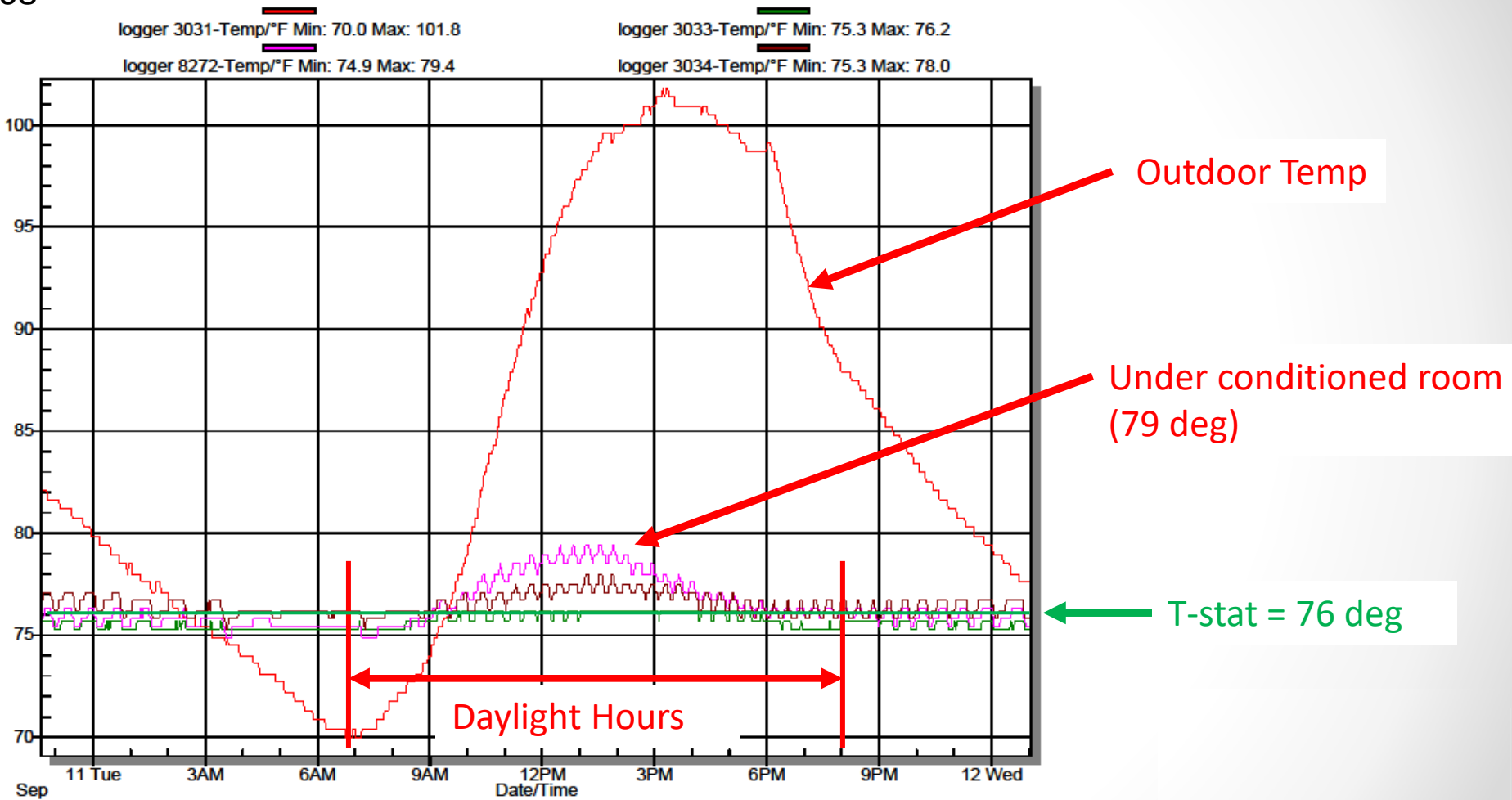


Diagnostic Testing: Data loggers

- Try to monitor the house for about a week.
- When done, collect the loggers, compile and graph the data from all data loggers onto a single graph.
- Good software will allow you to turn certain data on and off and change the time periods and scale of the graph.
- Examples . . .



Temperature Data Logger Results (24 hrs)



Temperature Data Logger Results (24 hrs)

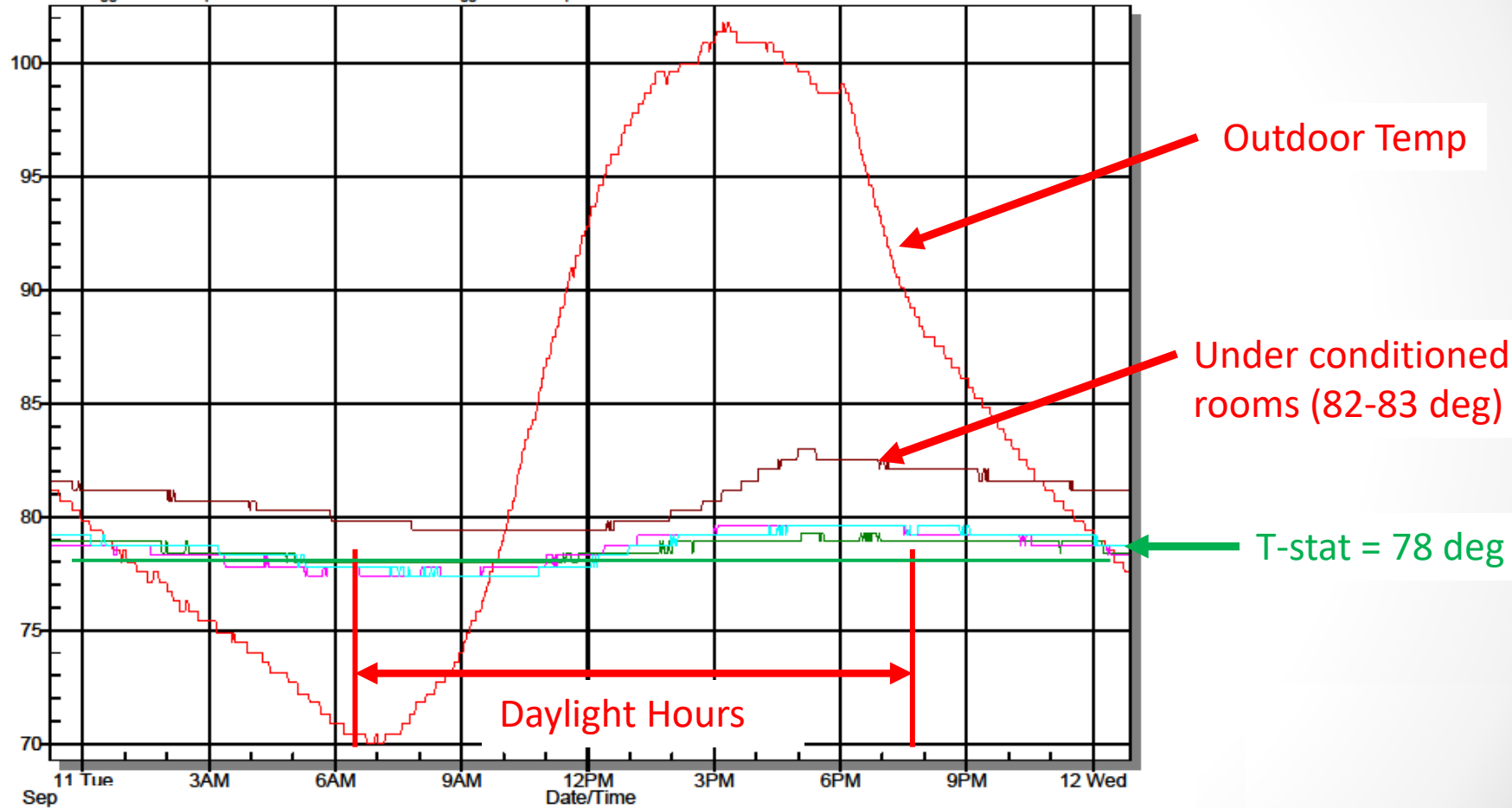
logger 3031-Temp°F Min: 70.0 Max: 101.8

logger 3022-Temp°F Min: 78.0 Max: 79.3

logger 7194-Temp°F Min: 77.4 Max: 79.6

logger 3019-Temp°F Min: 79.4 Max: 83.0

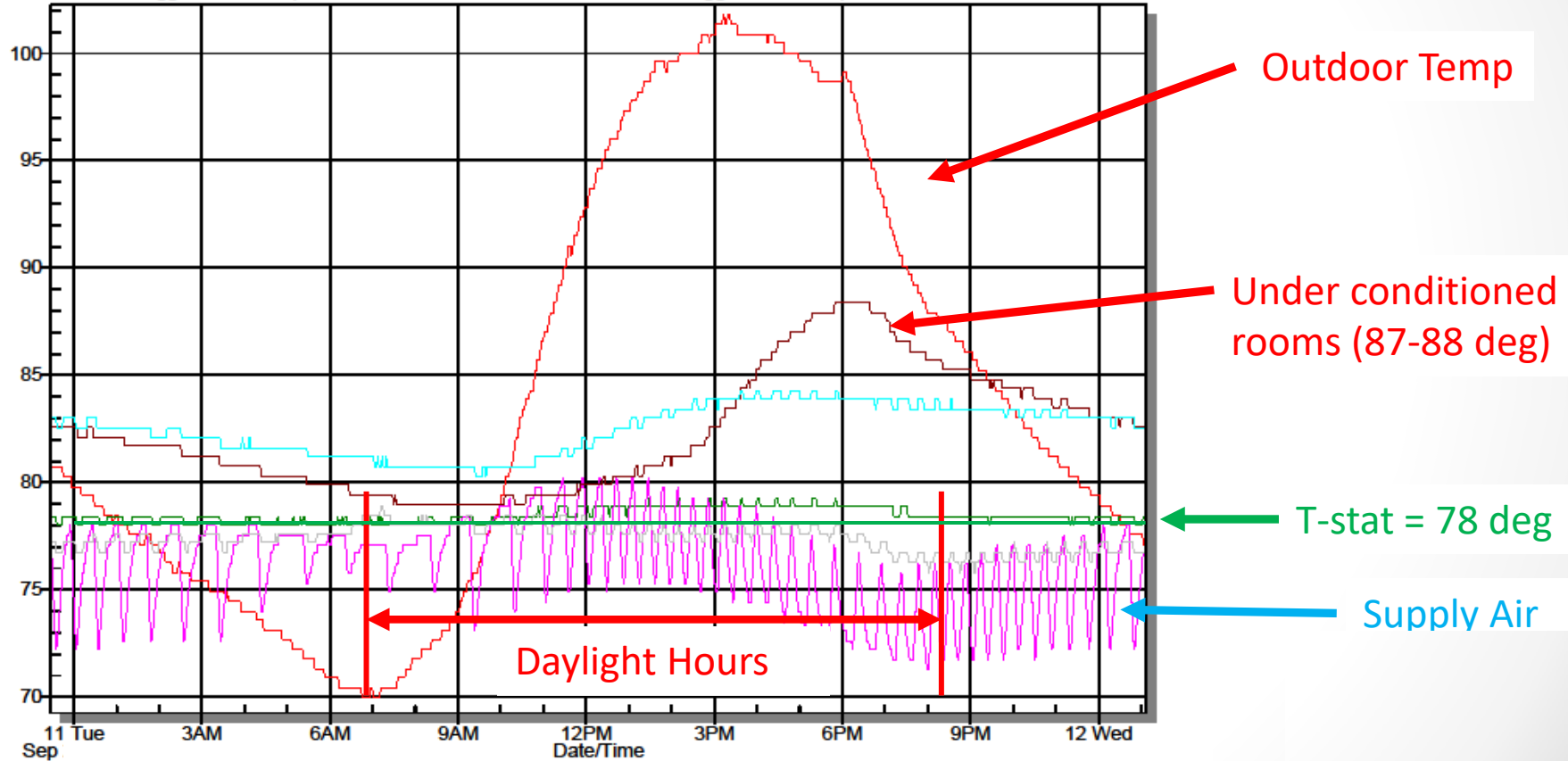
logger 7197-Temp°F Min: 77.4 Max: 79.6



Temperature Data Logger Results (24 hrs)

logger 3031-Temp/°F Min: 70.0 Max: 101.8
logger 4229-Temp/°F Min: 71.3 Max: 80.2
logger 3024-Temp/°F Min: 80.3 Max: 84.3

logger 3021-Temp/°F Min: 78.0 Max: 79.3
logger 0181-Temp/°F Min: 79.0 Max: 88.4
logger 3023-Temp/°F Min: 75.8 Max: 78.9



Conclusions From This Training

- There is an entire arsenal of diagnostic tests that can be used to identify comfort problems.
- **The most important “tool” is an understanding of the design process.**
- Carefully and precisely identifying the symptoms that are causing the homeowner complaints is critical.
- Once the symptoms have been identified, the source can be confirmed using the appropriate diagnostic tests.
- Tests take time, but having real, tangible measurements is far more convincing to homeowners to take your recommended repairs and can be cheaper for them in the long run.
- The knowledge and skills to do these tests will set you apart from your competition.



The End

Thank you

russ@coded.energy

Questions about Title 24?

3C-REN offers a *free* Code Coach Service



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3c-ren.org/code

Call:
805.781.1201

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.



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Upcoming Courses:

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- Apr 8 – Panel Detectives – Electrical Panel Assessments for Heat Pump Installers
- Apr 9 – Certified Passive House Designer/Consultant Pacific Spring Cohort
- Apr 9 – Single Family: Energy Code Implementation Series, with 2025 Updates
- Apr 22 – Load Calculation Site Survey Essentials

Any phone numbers who joined? Please share your name!



Thank you!

More info: 3c-ren.org

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