CMHC FILE NO. 176-4-31

APPENDIX 3 TO MAIN REPORT

STUDY OF APPLE HILL
ENERGY EFFICIENT HOMES

TASK D - THERMOGRAPHIC SCANNING

Prepared for:

The Policy Development and Research Sector

of

CANADA MORTGAGE AND HOUSING CORPORATION

BY

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FEBRUARY 1984

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1.0 INTRODUCTION

Thermography, as defined by the CGSB provisional standard 149 -GP -5MP, is the determination and representation of apparent surface temperature distributions by measuring the apparent radiance of a surface. Thermography utilizes an instrument which is capable of sensing infrared radiation. For the purposes of this study, an AGA 750 thermovision Scanner/Camera was used to identify thermal anomalies in a sample of Apple Hill Homes.

Thermography is a very sensitive tool which can quickly pinpoint suspect thermal areas of the building envelope. It is possible to identify the location of missing or ineffective insulation, voids and with additional investigation, to identify thermal bridges, convective loops and air leakage, especially when thermography is used in conjunction with a door fan. The door fan artifically creates low pressure within the house. Cold air entering the house is easily sensed, so one can "see" leaky areas in the building. The fan also allows all scanning to be done from inside the house which improves the speed accuracy of the test. It may also be possible, subject to interpretation and further testing, to identify potential areas of moisture accumulation in the envelope using thermography.

In all cases, a secondary inspection is needed to proceed further, eg. a smoke pencil for air leakage, moisture probe for moisture accummulation, optical fibrescope for voids. This report presents the results of thermographic scanning on 18 of the Apple Hill Homes

conducted during the late winter and early spring of 1982.

2.0 OBJECTIVES

To identify by thermographic scanning anomalies caused by air leakage, moisture accumulation, insulation voids and thermal bridges which may influence the energy consumption, operation, life cycle or comfort of the home.

To test the applicability of the draft CGSB Thermographic Standard for new house testing.

To evaluate the relative energy efficiency of the building envelope, and relate obvious anormalies to general problems in building design, construction, materials or operation.

3.0 METHODOLOGY

The thermographic scans were completed while the houses were depressurized for airtightness testing. No significant variation in the thermal image was observed as the pressure fluctuated from negative 20 to negative 60 pascals as the air tightness tests were conducted.

The thermographer scanned the building from the inside, room by room; while a second person recorded ambient conditions, drew a floor plan, noted the locations of the thermographs, took visual photographs to accompany each thermograph, and locate air leakage areas using a smoke pencil.

The first few thermographic tests required considerably more time to accomplish. Many unusual thermal expressions had to be investigated (checking under attic insulation, ajusting isotherms, probing behind the header insulation, and checking problem areas with smoke pencils, or surface temperature probes). After the first 5 or 6 houses, an image pattern emerdged. This allowed the possiblity of concentrating on only the most obvious anomalies.

The thermographer also developed an excellent conception of the building assemblies and construction details. Thus, the time for testing was reduced from a high of 120 minutes (the first few houses tested) to an average time of 60 to 90 minutes.

THERMOGRAPHIC TEST TIME BREAKDOWN

Two Persons	Minutes
set-up	5
calibration	5
testing	40
discussion with the homeowner	0 to 30
sketch/report data	10
	60 to 90

NOTE: travel time or data reporting time is not included.

The general procedure for the thermographic scanning is as follows:

1. The door fan and the I.R.S. camera are set up and the house is prepared for an air tightness test. Some discussion and an interview may occur at this time with the householder.

2. A floor plan is drawn by the thermographer's assistant. Ambient conditions are noted, as well as a building description. Reference photographs and temperatures are recorded.

3. With the fan in operation, the thermographer conducts a room-by-room survey beginning in the basement.

4. The thermographer's assistant accompanies the camera, noting the location and angle of shots on film record, and confirms air leakage sites with the use of an air current tester, and an air leakage checklist.

5. For each anomaly, visual photographs are taken by the

assistant, while thermogaphs are taken by the thermographer.

A detailed Standard for "Infrared Thermography Survey, Interior On Stud Frame Residental Building, For Insulation Voids (149-GP-5MP) can be found in Appendix 3-A.

The equipment used for the thermographic scanning was;

- AGA 750 THERMOVISION SCANNER with 20 degree LENS, ISOTHERM function, and portable monitor.
- Polaroid Photorecording in black and white, 35 mm photorecording in color.
- Tungsten light and 35 mm film for visual image recording.
- IMC digital surface temperture thermistor probe for reference temperatures.
- Retrospectors Door Fan depressurization apparatus.
- Draeger air current tester

A descripiton of some of the equipment can be found at the end of Appendix 3-A.

4.0 TEST RESULTS

Thermographic scans were completed on eighteen homes. The following is a list of house numbers in which the test was performed.

Regent:	1,2,3,5,7
Russet:	11,13,14,16
Cortland:	20,21,22,23,24
York:	31,32
Fireside:	34
Westfield:	37

Individual house reports are presented in Appendix 3-B, with pictures of scans and their locations in the house. Thermographic scanning is capable of identifying problem areas such as air leakage, condensation, insulation voids and thermal bridges. Highlights of problem areas in each category are presented in Table 4.1 to Table 4.4 with an indication of probable cause and frequency. In some instances figures are listed (Figure 4.1 to 4.4) to visually describe the problems identified by the thermographic scan.

TABLE 4.1

SUMMARY OF THERMOGRAPHIC FINDINGS OF AIRLEAKAGE

PROBLEM	FREQUENCY	POSSIBLE CAUSE	FIGURE
WINDOW - FRAME & CHANNELS (ON SLIDERS)	COMMON	MANUFACTURERS DETAIL	
- TRIM	OCCASIONAL	LIKELY A/V BARRIER NOT WELL SEALEED AT THIS POINT	
BASEBOARDS	COMMON	LEAKAGE DUE TO AIR INFILTRATION GETTING INTO WALLS. A/V BARRIER DETAIL AT HEADERS ALTHOUGH LAPPED AROUND HEADER MAY NOT BE SEALED AND IS TORN IN MANY PLACES	
ELECTRIC PANEL	COMMON	CONSTRUCTION DETAIL-NOT WELL ENOUGH SEALED IN PLACES	
FIREPLACE-WALL & CEILING JOINT	COMMON	CONSTUCTION DETAIL-NOT WELL SEALED	4.2
INTERIOR WALL CAVITIES	RARE	CONSTRUCTION DETAIL-WALL CEILING JOINT OR WALL/WALL JOINT FROM INTERIOR TO EXTERIOR TO SURFACE	
JOIST HEADER	ALWAYS	CONSTRUCTION DETAIL-NOT A SEALED A/V BARRIER	4.3
CEILING LIGHT FIXTURES	OCCASIONAL	CONSTRUCTION DETAIL A/V BARRIER HAS BEEN PENETRATED	4.1
CEILING (BETWEEN 1ST & 2ND FLOOR)	OCCASIONAL	CONSTRUCTION DETAIL-AIR LEAKAGE AT PLATE DUE TO INEFFECTIVE A/V BARRIER	4.1
ATTIC HATCH	COMMON	CONSTRUCTION DETAIL-A/V BARRIER IS NOT SEALED AND HATCH IS NOT TIGHT	
FURNACE ROOM	COMMON	CONSTRUCTION DETAIL-TOO MUCH AIR INTAKE AND ROOM IS NOT SEALED PROPERLY (DOOR LEAKS)	
OUTLETS	COMMON	CONSTRUCTION DETAIL AT JOIST HEADER	

TABLE 4.1 (CON'T)

SUMMARY OF THERMOGRAPHIC FINDINGS OF AIRLEAKAGE

PROBLEM	FREQUENCY	POSSIBLE CAUSE	FIGURE
FIREPLACE HEATILATORS	COMMON	CONSTRUCTION DETAIL IN FIREPLACE ALLOWS CONSIDERABLE AIR LEAKAGE EVEN WITH DAMPER CLOSED AND FIREPLACE SEALED	4.2
1 BEAMS (BASEMENT)	ALWAYS	1 BEAMS EXTENDS THROUGH A/V BARRIER ALLOWING CONSIDERABLE AIR LEAKAGE (DIFFICULT TO SEAL EVEN IF ATTEMPTED WHICH IT HASN'T)	4.3
PIPES, DUCTS, & PLUMBLING PENETRATTIONS	COMMON	AIR LEAKAGE OCCURS BECAUSE THERE HAS BEEN INSUFFICIENT ATTEMPTS TO SEAL THE A/V BARRIER AROUND THE PENETRATING OBJECTS. ALSO AIR SEAL IN PIPING SEEMS INSUFFICIENT ALLOWING TOO MUCH AIR INTAKE INTO THE DUCTS, ETC.	4.4
DOORS	COMMON	CONSTRUCTION DETAIL-NOT SUFFICIENTLY WEATHER STRIPPED	

TABLE 4.2

SUMMARY OF THERMOGRAPHIC FINDINGS OF MOISTURE CONDENSATION

PROBLEM	FREQUENCY	POSSIBLE CAUSE	FIGURE
CEILING @ PLATE	OCCASIONAL	INEFFECTIVE A/V BARRIER	
ATTIC HATCH	COMMON	CONDENSATION IN INSULATION AROUND HATCH CAUSED BY A/V BARRIER AND STRAPPING ALLOWING INFILTRATION ACROSS CEILING	
CONFIRMED BY PHYSICAL INSPECTION			
JOIST/HEADER DETAIL	ALWAYS	CONSTRUCTION DETAIL-NOT FULLY SEALED A/V BARRIER COMBINED WITH HIGHER R VALUE INSIDE BARRIER THAN IS OUTSIDE BARRIER	4.3
CONFIRMED BY PHYSICAL INSPECTION			
WALLS (EXTERIOR)	RARE	CONSTRUCTION DETAIL OF INEFFECTIVE A/V BARRIER	
SPECULATE		CAUSED CONDENSATION TO OCCUR IN WALLS A/V BARRIER IS LIKEY TORN OR CUT IN CERTAIN PLACES AND MAY BE MISSING IN OTHERS	
VENT PIPES	COMMON	A/V BARRIER IS NOT SEALED AT VENT PIPES	4.4
CONFIRMED			
CEILING	OCCASIONAL	AS WELL AS PROBLEMS	4.1
SPECULATIVE		ATTIC HATCH ETC. CONDENSATION PROBLEMS APPEAR LIKELY DUE TO INEFFECTIVE A/V BARRIER	

TABLE 4.3

SUMMARY OF THERMOGRAPHIC FINDINGS OF INSULATION VOIDS

PROBLEM	FREQUENCY	POSSIBLE CAUSE	FIGURE
WALL AND CEILING VOIDS	RARE	FOUND IN A FEW HOUSES. VOIDS ARE LIKELY DUE TO POOR INSTALLATIION OF INSULATION IN A WALL OR CEILING. ONE PROBLEM WAS NOTED IN AN AREA WHERE A VENT HAD TO BE INSTALLED AND THEN MOVED, THE HOLE BEING PATCHED BUT OBVIOUSLY NOT WELL.	4.3
ATTIC HATCH	OCCASIONAL	NO INSULATION CONSTUCTION DETAIL IN ALL CASES THERE IS NOT ENOUGH INSULATION IN THIS AREA.	

TABLE 4.4

SUMMARY OF THERMOGRAPHIC FINDINGS OF THERMAL BRIDGING

PROBLEM	FREQUENCY	POSSIBLE CAUSE	FIGURE
I BEAMS (BASEMENT)	ALWAYS	CONSTRUCTION DETAIL - 1 BEAM EXTENDS THROUGH THE A/V BARRIER TO FOUNDATION WALL IS NEITHER PROTECTED OUTSIDE BY A A/V SEAL OR INSULATION	4.3
FIREPLACE	COMMON	CONSTRUCTION DETAIL - FIREPLACE SHOULD NOT BE LOCATED ON OUTSIDE WALL	4.2
PIPE/DUCT, ETC.	COMMON	CONSTRUCTION DETAIL - MANY PROTRUSIONS WOULD BE UNNESSARY IF AN AIR TO AIR HEAT EXCHANGER WAS USED TO EXHAUST FROM THE HOUSE	4.4
METAL STUDS INTERIOR MORE FRAMING	ALWAYS	APPEAR VERY COOL-COLDER THAN WOOD WOULD IN A SIMILAR SITUATION	

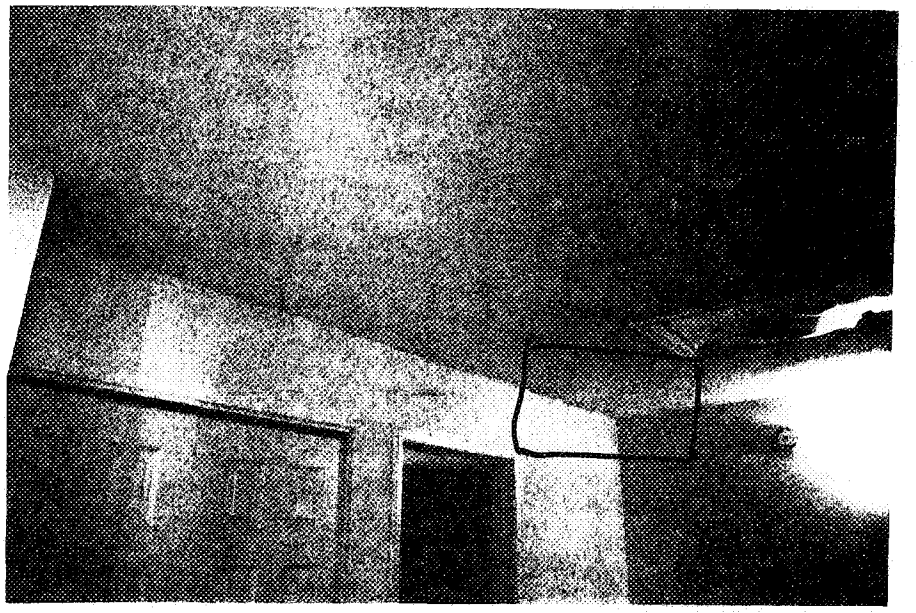
Figure 4.1

Thermographic Scan

VISUAL

LOCATION:

Second Floor Ceiling



THERMOGRAM

THERMOGRAM

PROBLEM:

Cold details in ceiling indicate possible air or condensation. The result of a poor A/V Barrier.

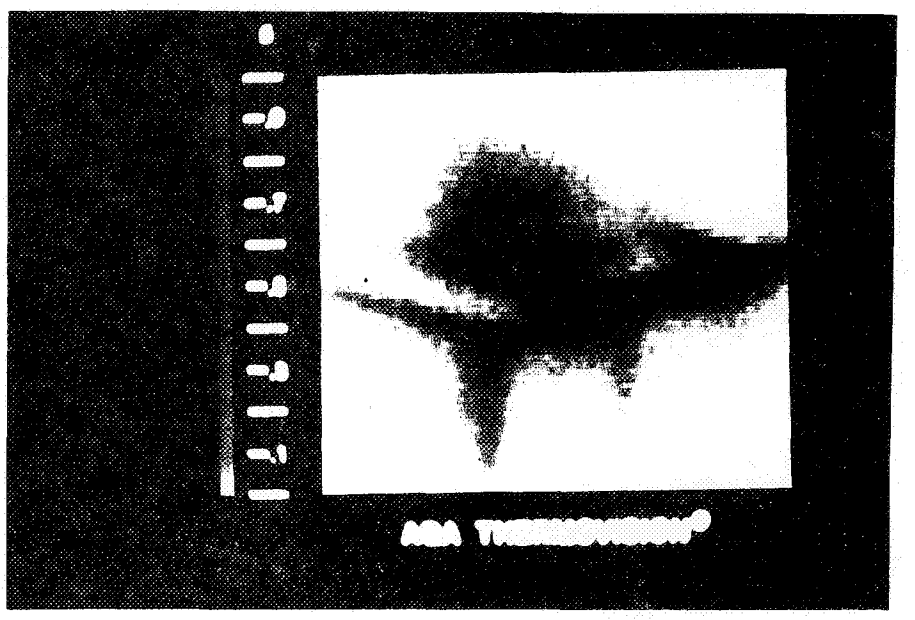


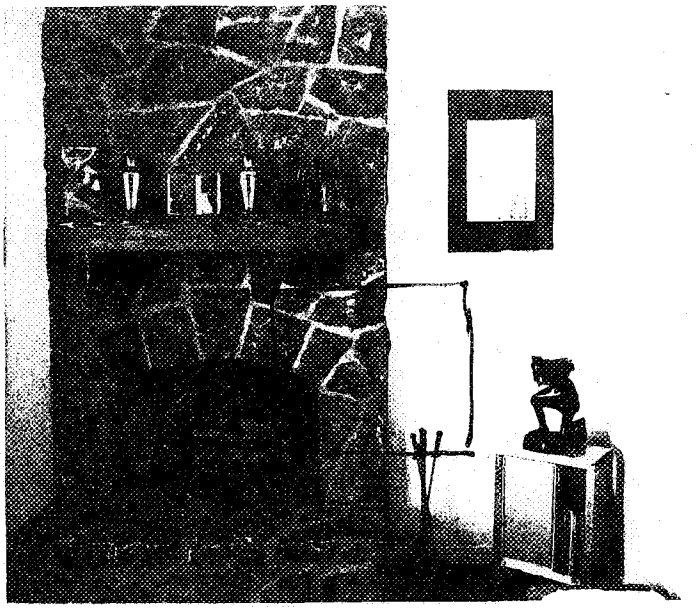
Figure 4.2

Thermographic Scan

VISUAL

LOCATION:

Living Room wall/Fireplace



PROBLEM:

Air leakage at fireplace-wall joint, probably due to poor A/V barrier seal where wall meets fireplace

THERMOGRAM

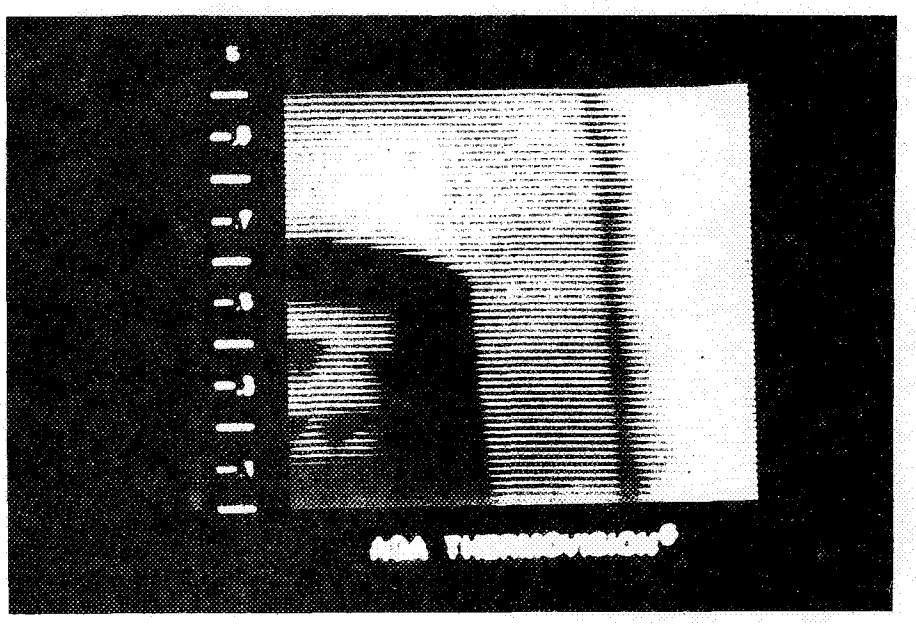
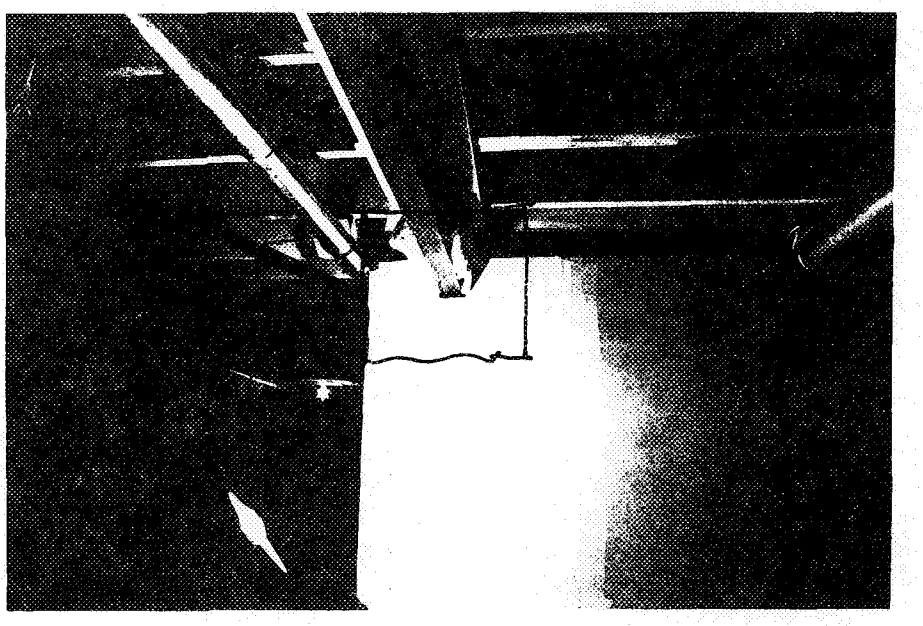


Figure 4.3

Thermographic Scan

VISUAL

LOCATION:
I-Beam into basement wall



THEROGRAM

PROBLEM:

Cold spot at I-Beam intersection with basement wall is the result of insufficient insulation and no air/vapour barrier seal.

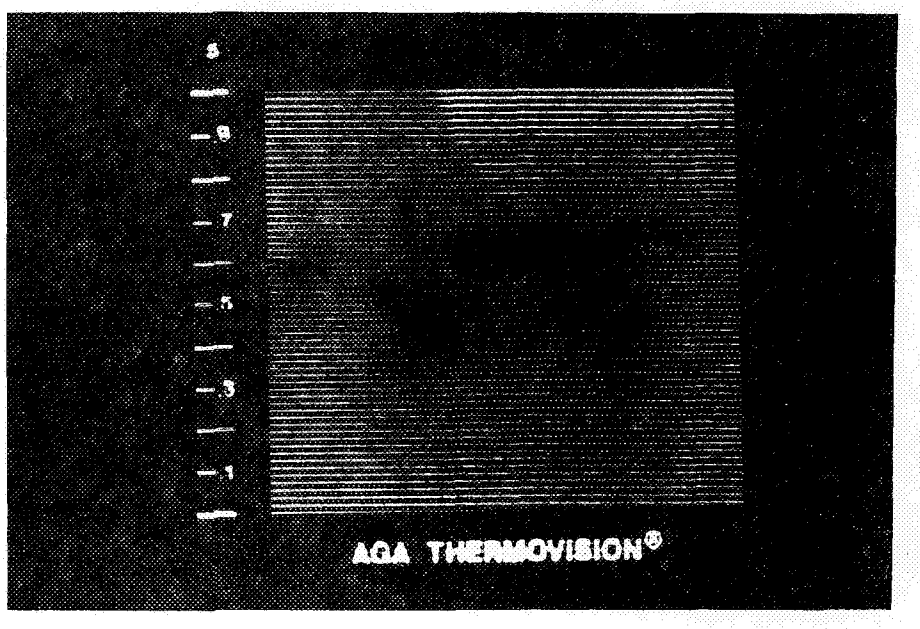


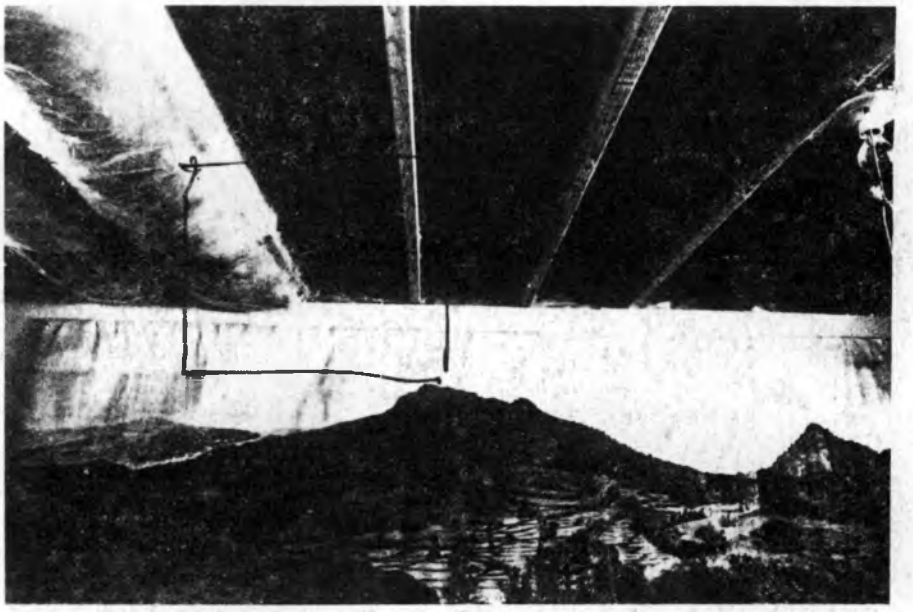
Figure 4.4

Thermographic Scan

VISUAL

LOCATION:

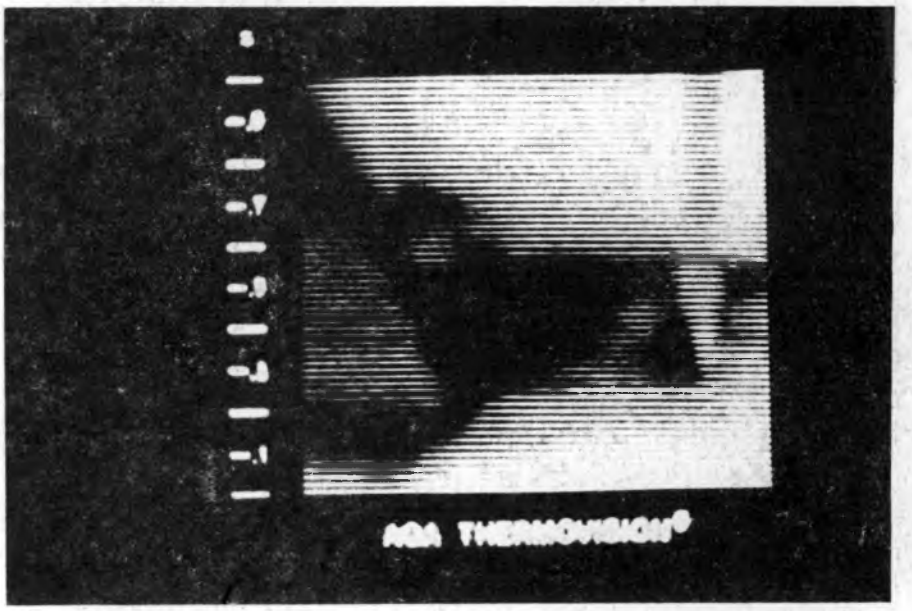
Basement Header



THERMOGRAM

PROBLEM:

Cold spots at insulated vent and joist header resulting from poor A/V Barrier seal.



5.0 DISCUSSION

The procedure employed by the thermographer corresponded with the requirements of the CGSB 149-GP-5MP provisional standard for I.R. thermogrpahic survey work in studying frame residential buildings. An exception to this standard was necessary in the case of section 3.4.2 which specifies that a building of light construction shall have no direct solar radiation for a period of three hours immediately prior to the survey. During the course of the scan, the house was constantly depressurized as to maintain a minimum pressure of 20 pascals. This depressurization, combined with a temperature difference of not less than 20 degrees celcius, helped offset the effect of solar radiation on the scans. Some exterior scans were performed, but with notably poor success. The residual solar effects on the brick veneers distorted the thermal image even after an eight hour cooling period following sunset. The bricks glowed, indicating heat loss, while many of the airleaks and voids visible from the interior thermographic scan, were no longer visible. In some cases, the exterior scan did provide information on structural design flaws that would otherwise have been missed by an interior scan. Some examples of this are failing brickwork or ties under a windowsill.

For the objectives outlined previously, the interior scanning with depressurization is certainly far superior as a diagnostic technique. The synergistic effect between a door fan and a I.R. scanner was extremely useful. The negative pressure created by the

door fan accelerates the air leakage into the house, thereby exhancing the contrast and "visibility" of most thermal expressions. Moreover, the door fan ensures that all air leakage is infilrating; otherwise, approximately half of the air leakage would consist of warm air leakage out of the house. Exfiltration is impossible to see on the infrared scanner with an interior scan because there is no temperature difference; it also serves to partially warm the building envelope and thereby warm the cavities and building materials regardless of their thermal resistance.

This is an especially dangerous trap in new house inspections, where most of the anomalies involve some amount of air leakage. The focus should not be on settling or voids in insulation materials, but on air leakage, thermal bridging, moisture and structural problems. As a general rule, infrared analysis of houses is best combined with the use of a door fan and an interior inspection.

In several test houses the building was pressurized with the door fan while the thermographer conducted an infrared inspection from the attic space. This technique did not prove very useful because of the large amount of loose fill insultaion in the attics (approximately 400 mm) each the loose insulation filtered and diffused air leakage, thus obscuring most or the leakage problems or anomalies. For example the "stripes" across the ceiling that occurred in most houses (the ceiling strapping spaces provided a direct passage for air leakage from walls and windows) were only visible in the attic after the insulation was moved away.

The thermographic investigation has raised a number of issues about design features employed by the builder. Several examples are briefly described below and illustrated in Figures 4.1 to 4.4

1. The homes incorporate a double stud wall frame with 2 x 6 (5cm x 15cm) wood studs on the exterior wall, and 2 x 3 (5cm x 7.6cm) metal studs on the interior. The A/V barrier is sandwiched betweeen these walls against a layer of 13mm "10 test" sheathing. Because the exterior 2 x 6 wall is the load bearing wall, all the floor joists and partition walls must first penetrate the AV barrier before they are tied into the 2 x 6 wall. The leakage is considerable at these junctions. The 2 x 3 cavity also complicates the installation of duct work resulting in occasional tearing or cutting of the AV barrier.

2. The I beams in the basement were constantly leaking air at the junction with the exterior wall. They also function as a thermal bridge. These beams could have been supported with a metal post on the inside of the insulated foundation.

3. The fireplaces are a major weak spot in the energy efficiency of the Apple Hill homes. Although these fireplaces were installed to meet the special requests of buyers, it is unlikely the homeowners realized the full ramifications. Considerable leakage exists along the chimney/ceiling joint. The dampers leak. The heatilator unit also leaks very badly (sucking air from around the flue cavity and directly from out of doors). The glass doors

mounted across the fireplace openings leak badly. The location of a fireplace against the outside wall produces the effect of the masonry materials becoming a major thermal bridge in the envelope; moreover, much of the thermal mass of the fireplace, when in use, will not benefit the house. A more efficient fireplace design may be possible.

4. A major trouble spot on all of the homes was the header/joist area at the top of the foundation wall. A foam gasket was used underneath the sill plate. This foam gasket does not seal adequately wherever there is rough concrete, window frames or plumbing, and ductwork and wiring penetrations. The amount of air leakage into the finished wall cavity is such that all basement wall outlets and trimwork are very leaky.

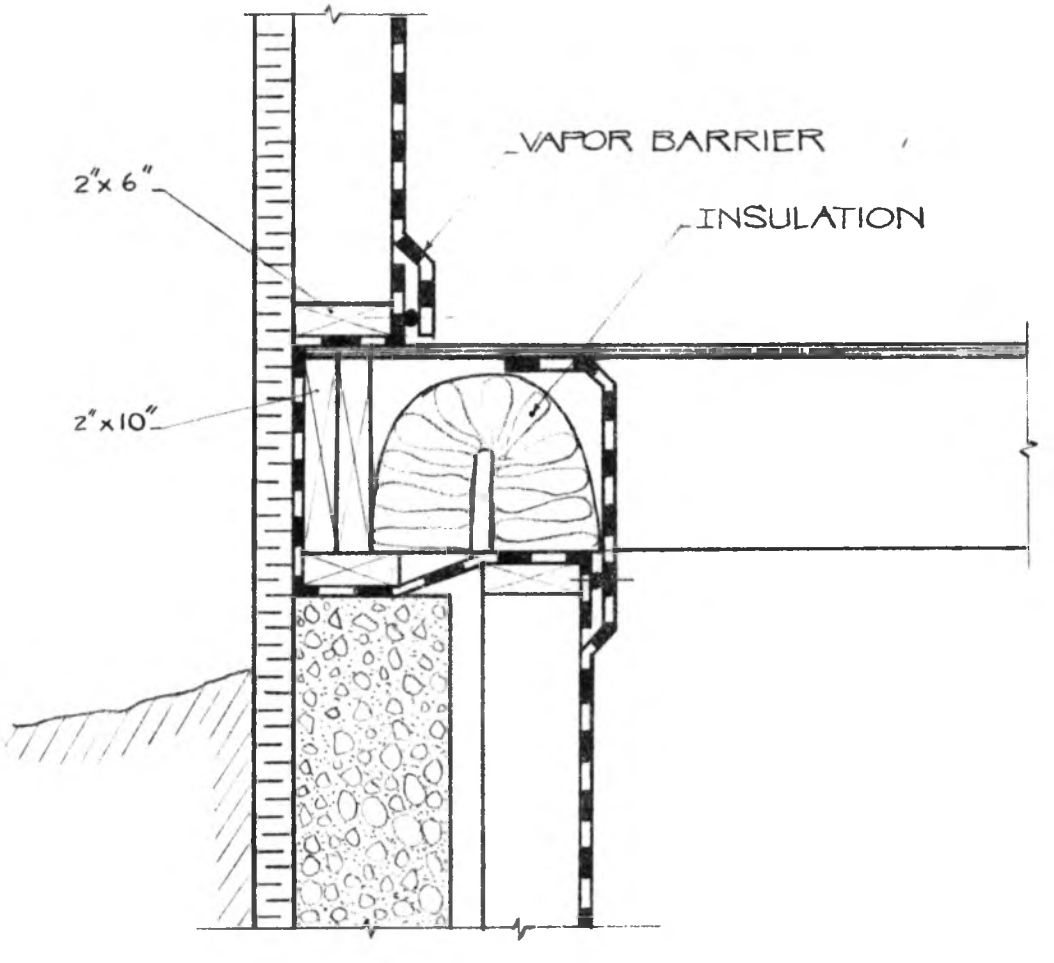
The difficulty of firmly attaching a polyethelene A/V barrier along the joist/sub-floor topography should not be underestimated. The evidence of condensation problems along the header joist (band joist) suggests that a considerable amount of vapour is diffusing into this area. Any moisture that does reach the band joist is likely condensing, and has accumulated for several reasons:

A. The band joist is inadequately insulated with 37 mm of Glasclad insulation sheathing;

B. The polyethene A/V barrier from the first floor walls appear to be lapped around the outside of the band joist, preventing proper drying;

C. The basement wall AV barrier is applied to the warm side of the header space fibreglass resulting in partial vapour lock. This last condition requires immediate corrective action to maintain the integrity of the header joist. This problem is illustrated in Figure 5.1.

Figure 5.1
CROSS-SECTION OF HEADER JOIST AREA



6.0 CONCLUSIONS & RECOMMENDATIONS

The thermographic equipment worked very well throughout the course of Phase 1 testing. The thermographic scanning clearly identified problem areas such as air leakage, condensation, insulation voids and thermal bridges.

Interior thermographic scanning of houses, depressurized using a door fan, provided a quick and reliable means of identifying possible thermal anomalies such as air leakkage, insulation voids and moisture condensation. Accurate verification of these occurances requires supplemental inspection and testing.

As it was observed that the thermal anomalies repeated themselves from house to house, it is felt, in hindsight, that a more useful approach for thermographic inspectors would have involved more analysis and discussion, and less field inspection. A team approach may have been especially useful, where the thermographer spends on-site time with the construction site supervisor and the builder's architect. The thermographer also requires an up-to-date copy of the blue prints detailing the construction assemblies and HVAC systems. In general, a builder must provide full co-operation, and some participation, in order to achieve high quality thermographic services.

It recommended that the equipment utilized for thermographic scanning provide the capacity for high resolution photography on-site. For this reason, the lower cost video tube, and hand held

units were avoided. It is preferable, and would certainly be much easier and more cost efficient, to use 35 mm colour slides on clear acetate folders, and to make prints of the thermograms only where necessary for illustrating highlights in written documents.

APPENDIX 3-A

PROVISIONAL STANDARD 149-GP-5MP

FOR INFRARED THERMOGRAPHIC SURVEY

CANADIAN GENERAL STANDARDS BOARD

Provisional Standard
for

INFRARED THERMOGRAPHIC SURVEY, INTERIOR, ON STUD FRAME RESIDENTIAL BUILDINGS, FOR INSULATION VOIDS

1. SCOPE

This provisional standard contains procedural requirements and a standardized report form for infrared thermographic surveys performed on stud frame residential buildings from the interior for the sole purpose of determining whether there are deficiences with the above-grade installation of thermal insulation.

Buildings suitable for inspection according to this provisional standard include those of wood frame, post and beam, plank construction and steel stud framing.

A thermographic technician following the procedure outlined herein should be able to identify the extent and location of the area where insulation is missing, including poorly fitting insulation, shrinkage and fissures.

Although building performance diagnosis using infrared radiation sensing systems has the capability for detecting the heat loss mechanisms of conduction, radiation, convection, air infiltration-exfiltration and moisture, their determination is not covered by this Provisional Standard.

ϕ This Provisional Standard has been prepared for use until the CGSB Committee on Thermography has developed a broader documentation system in the field of infrared thermographic building surveys.

ϕ = change from previous draft

2. TERMINOLOGY

2.1 Terms

THERMAL ANOMALIES - The heat-loss characteristics of a structure which are not in accordance with intended design characteristics.

APPARENT RADIANCE - Radiance as measured with attenuation and path radiance effects of intervening atmosphere (see RADIANCE).

APPARENT RADIANCE TEMPERATURE (^{o}C) - The temperature of a blackbody producing the same apparent radiance as the object of interest.

BLACKBODY - An ideal thermal radiator (emissivity = 1.0), which emits and absorbs the maximum theoretically available amount of thermal radiation at a given temperature.

CONSULTANT - Infrared thermography Building Consultant

INFRARED RADIATION SENSING SYSTEM - An instrument used to indicate, display and/or record infrared radiance.

The instrumentation varies in complexity from simple spot radiometers which measure only one "spot" or area to full two-dimensional thermal imaging devices which provide television quality pictures which map the scene apparent radiance.

~~EXFILTRATION---Air-flow-outward-through-a-structure~~

FIELD-OF-VIEW (^{o}) - The total angular dimensions within which objects can be imaged, recorded and displayed by an imaging device when pointed in any one direction.

infrared thermography building consultant means a business entity which performs infrared thermographic building surveys

infrared thermographic building survey means a survey performed on a building, or parts thereof, to assess thermal anomalies, by the use of an infrared radiation sensing system.

- MINIMUM RESOLVABLE TEMPERATURE DIFFERENCE (MRTD) (^{o}C) - A measure of the ability of the infrared imaging system to allow the human observer to recognize periodic bar targets on the display. The MRTD is the minimum temperature difference between a guideline periodic test pattern (7:1 aspect ratio, 4-bar) and its blackbody background at which an observer can resolve the pattern as a four-bar pattern. Unlimited viewing time and optimization of instrument level and gain controls are allowed.
- RADIANCE ($W/m^2.sr$) - It is the total amount of energy per unit solid angle per unit projected area which emanates from the surface. Thus, it includes the transmitted radiation, the emitted radiation and radiation reflected from sources other than the object of interest.
- HARD COPY RECORD - Any permanent record. Typically, the record will consist of photographs, magnetic tapes of some data log documentation.
- THERMOGRAM - A photograph or two-dimensional record of the apparent surface temperatures determined from the apparent radiance.
- THERMOGRAPHY (see note) - Determination and representation of apparent surface temperature distribution by measuring the apparent radiance of a surface, including interpretation of thermal images.
- ADDITIONAL INSULATION - thermal insulation added to an existing layer of insulation.
- THERMOGRAPHIC TECHNICIAN (BUILDINGS) (see note) - A trained operator of infrared radiation sensing systems with a para-professional knowledge of building science who performs and reports qualitative results on infrared thermographic building surveys.

INSULATION VOID - An area in the building envelope where thermal insulation is absent, including fissures, shrinkage, poorly fitting insulation and areas where additional insulation is absent.

Note: The field of thermography as applied to buildings can be divided into three levels of knowledge and expertise, the first of which is that of the thermographic technician.

2.2 Data Collection Symbols

T_i : Inside ambient temperature (^oC)

T_o : Outside ambient temperature (^oC)

RH_i : Relative humidity of the inside ambient air

RH_o : Relative humidity of the outside ambient air

T_r : Reference temperature (^oC)

ΔI : Isotherm difference between the reference and the surface

ΔT : - Difference between the exterior and interior ambient temperatures.

3. REQUIREMENTS

3.1 Infrared Thermography Building Consultant

3.1.1 Certification

The consultant shall certify that the survey was performed in accordance with this provisional standard.

3.1.3 Affiliations

The consultant shall be free of affiliations that might be deemed to represent a conflict of interest.

3.2 Thermographic Technician

3.2.2 The thermographic technician who performs the survey and writes the report:

a) shall have a basic knowledge of building science,

b) shall have a basic knowledge of insulating homes for energy conservation, as outlined in 51-GP-42MP Handbook on Insulating Homes for Energy Conservation

c) shall have been trained in all aspects of the operation of the infrared radiation sensing system used,

d) shall know the operational and environmental limitations of the infrared radiation sensing system used, and

e) shall know the construction and environment of the building surveyed.

3.3 Infrared Radiation Sensing System

3.3.1 Components

The infrared radiation sensing system shall comprise the following components.

a) infrared radiation sensor or sensors that can sense apparent radiance temperatures,

b) device that renders the apparent radiance temperature over the surface of measurement visible in the form of a thermal image,

c) device that makes it possible to record an accurate hard copy of the thermal image

d) procedure that establishes temperature levels upon the surface of measurement, or auxilliary surface temperature measuring devices, such as thermocouples

3.3.2 Minimum Resolvable Temperature Difference (MRTD)

The minimum resolvable temperature difference shall be at least 0.3°C at a surface temperature of 20°C over a measuring field of at least 0.3 x 0.3 m with a resolving power of at least 10 mm from a distance of 3 m.

3.4 Meteorological Conditions

3.4.1 The difference in temperature between the exterior and the interior ambient air shall be at least 10°C for a period of eight hours immediately prior to the survey.

3.4.2 For buildings of light construction there shall be no direct solar radiation for a period of three hours immediately prior to and during the survey.

3.4.3 For buildings of heavier construction, such as masonry veneer, there shall be no direct solar radiation for a period of eight hours immediately prior to and during the durvey.

3.5 Interior Considerations

3.5.1 All interior surfaces shall be made accessible for inspection. Obstructions shall be moved at least 1 h before the survey. If these conditions cannot be fulfilled, then the report shall state which condition was not fulfilled and shall contain a complete explanation.

3.5.2 The heating system shall be turned off provided that the interior temperature does not change more than 2°C by the time of the survey and provided that thermal anomalies are not caused by turning the system off.

3.5.2.1 The duration of time between turning off the heating system and performing the survey shall be according to the following table:

Heating System	Duration
Forced Air	30 min
Electric	30 min
Steam and Hydronic (light)	1 h
Steam and Hydronic (heavy)	2 h
Other Systems	30 min

Note: For hydronic systems in particular, the change in ambient indoor temperature is usually greater than 2°C, hence they are normally left on during the survey.

4. THERMOGRAPHIC SURVEY PROCEDURE

4.1 The interior infrared thermographic survey shall be performed on all exterior surfaces (ceilings and walls) which purport to have been insulated.

4.2 The survey shall be conducted so that the stud frames and insulation cavities are discernible (note: where insulation has been applied over the interior surface of the studs, then in some instances the stud frame may not be discernible).

4.3 Thermographic inspections shall be made of all surfaces which can be viewed with an angle of less than 30° from the normal to the surface.

4.4 Thermographic inspections shall be made: at one position as close to the perpendicular to the surface as is possible, and at two other positions of opposite oblique angles in order to detect the presence of reflected radiation.

4.5 When a thermal anomaly is observed, the following possible causes shall be eliminated prior to reporting it as an insulation void: moisture, air leakage, air convection, building construction phenomenon.

5. THERMOGRAPHIC SURVEY REPORT

5.1 The report shall contain a reference thermal image of an exterior wall over a stud having good performance.

ø 5.2 The report shall contain hard copies of thermal images for all voids. The thermal range setting of the system shall be shown on the image.

ø 5.3 Hard copy records of voids shall normally be made at a distance enabling at least two stud cavities to be retained in the field of view.

5.4 The thermogram, including the range scale and isotherm indicators, shall be at least 1500 mm^2.

5.5 Hard copy records shall be of sufficient detail to indicate the following:

a) stud frame (note: where insulation has been applied over the interior surface of the studs, then in some instances the stud frame may not be discernible).

b) physical characteristics to assist in locating voids (windows, doors, etc.)

c) location of fissures, shrinkage and poorly fitting insulation

d) area and location where insulation is absent

e) area and location where additional insulation is absent

5.6 The report shall contain all the information required by the specimen form given in the Appendix. The report shall also contain any additional data necessary for the correct interpretation of the thermal information provided.

5.7 The report shall contain the certification statement given on the last page of the Appendix.

ø 5.8 Each thermogram obtained from equipment without isotherm functions shall contain a reading from a device measuring the temperature of the surface in view.

ø 6. NOTES

ø 6.1 Infrared thermographic building surveys detect thermal anomalies. Their detection and the correct identification of their cause is dependent upon the equipment used and the skills and knowledge of its operator. Thermographic technicians performing surveys to this provisional standard are expected to distinguish between thermal anomalies caused by insulation voids and those caused by other mechanisms.

6.2 Thermograms obtained during an infrared thermographic building survey depict apparent surface temperatures under the existing environmental conditions. A survey performed under different environmental conditions could yield different thermograms, hence survey reports should be interpreted by those cognizant with the survey's limitations.

6.3 The ability of this survey to detect the absence of additional insulation is dependent upon the minimum resolvable temperature difference of the equipment used and prevailing environmental conditions.

EQUIPMENT SPECIFICATIONS

Specifications:

MEASUREMENT:

- Field of view: 12° × 12° (0.7 m to infinity)
- Geometrical resolution: 1.9 mrad
- Field frequency: 25 Hz
- Line frequency: 2500 Hz
- IR detector: InSb
- Cooling: Liquid Nitrogen
- Resolving power: 100 elements per line
- Temperature range: –20° to 200° C
- Sensitivity: 0.1°C at 30°C
- Thermal ranges: 2 to 1000 in 9 steps
  Thermal level: continuously adjustable
  Picture modes: normal, inverted, black, gray-scale
  Isotherm function: continuously adjustable level and width
- System Operating Temperature: –15°C to 55°C
- Power: Power supply/battery charger unit for 100, 220, 240 V, 50/60 Hz, 35 VA or separate battery for 8–15 VDC, 20 W
- Dimensions (W × H × L):
  scanner: 80 × 125 × 248 mm
  monitor: 253 × 129 × 322 mm
- Weight: scanner: 1.8 kg
  monitor: 4.5 kg

Photorecording: simultaneous screen viewing, electronically synchronized exposure, single or interlaced fields, Polaroid 107 film standard, 35 mm optional

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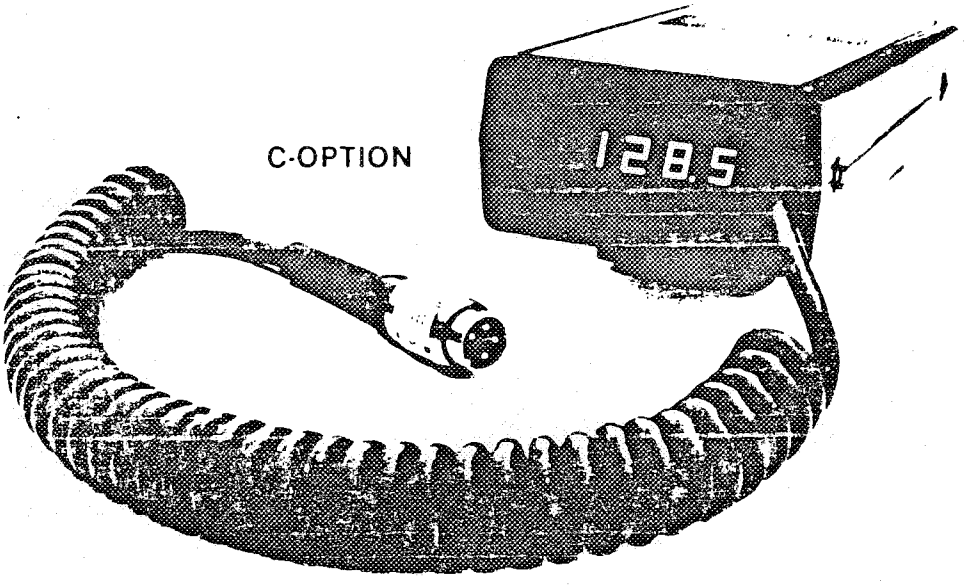
(414) 352-3810



MODELS 2100 & 2200 C-OPTION

The C-OPTION has been introduced to satisfy temperature measuring applications where specialized probes are required. The basic C-OPTION instrument consists of our standard 2100 and 2200 Digital Thermometers terminated with a heavy duty industrial connector which permits the use of interchangeable probes. All other instrument features such as the "precision calibration reference," long battery life, charger requirements and hold features remain the same. For operational requirements and performance specifications, please refer to the literature for the standard Models 2100 and 2200 Thermometers.

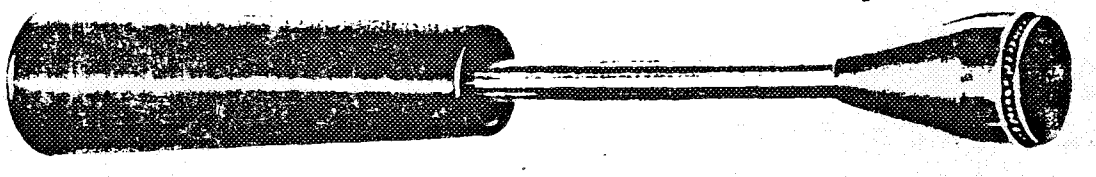
C-OPTION PROBES

The C-OPTION probes are designed to meet all applications, ranging from, deep tank immersion, penetration of semi-solids to surface temperatures of any material. Probe construction is of stainless steel on all exposed metal parts and of food-safe materials on non-metal components. The C-OPTION probes are ideally suited for applications ranging from Food Processing to general Commercial and Process Industries. All probes are precision matched to ±0.2°F (0.1°C) at 70°F (21°C) and utilize a highly stable RTD nickel sensor. Temperature Range is: Model 2100: -40°F to + 250°F; Model 2200: -40°C to + 140°C.

MODEL CS — Surface Probe

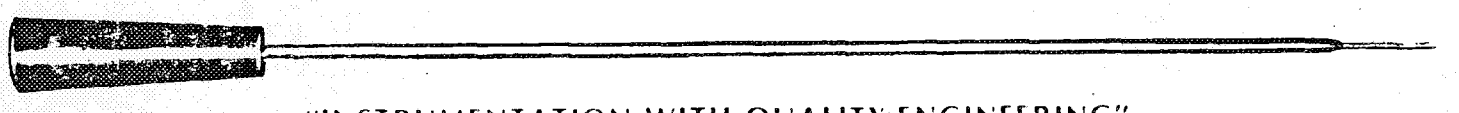
Exceptional probe design incorporates a resilient mount and a surface sensor with low thermal density which insures accurate interface to practically any type of surface. The probe is ideally suited for surface temperature measurements ranging from metals to near insulators, such as, wood and plaster. Response time is:

Metal Surfaces: 3 sec. (63°o) or 15 sec. (100°o)
Plastic Surfaces: 5 sec. (63°o) or 25 sec. (100°o)
Wood Surfaces: 8 sec. (63°o) or 40 sec. (100°o)



MODEL CP — Eighteen inch (46cm) or thirty-six inch (91cm) long stainless steel probe with closed pointed end for measurement of liquids, gases and deep penetration of semi-solids. Response time with light agitation is:

Penetration: 3 sec. (63°o) or 15 sec. (100%) -(food stuffs)
Liquids: 3 sec (63°o) or 15 sec. (100°o) - (water)
Gases: 20 sec. (63°o) or 100 sec. - (air)



MODEL CT4 — Universal Probe

Accepts all accessories of the standard Models 2100 and 2200 Thermometers, for temperature measurements of: Gases, Liquids, Surface, Penetration and Relative Humidity (wet-bulb) temperature). Response time with light agitation is:

Basic probe:

Liquid: 0.3 sec. (63%) or 1.5 sec. (100%)-(water)
Gases: 6.0 sec. (63%) or 30 sec. (100%)-(air)

Surface kit:

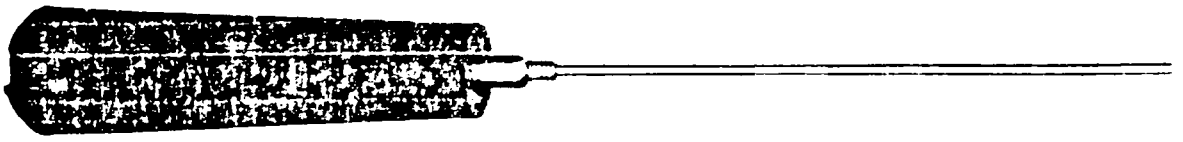
Surfaces: 9.0 sec. (63%) or 45 sec. (100%) - (metal surfaces only)

Penetration Sheath

Penetration: 3 sec. (63%) or 15 sec. (100%) - (food stuffs)

Wet Bulb Kit:

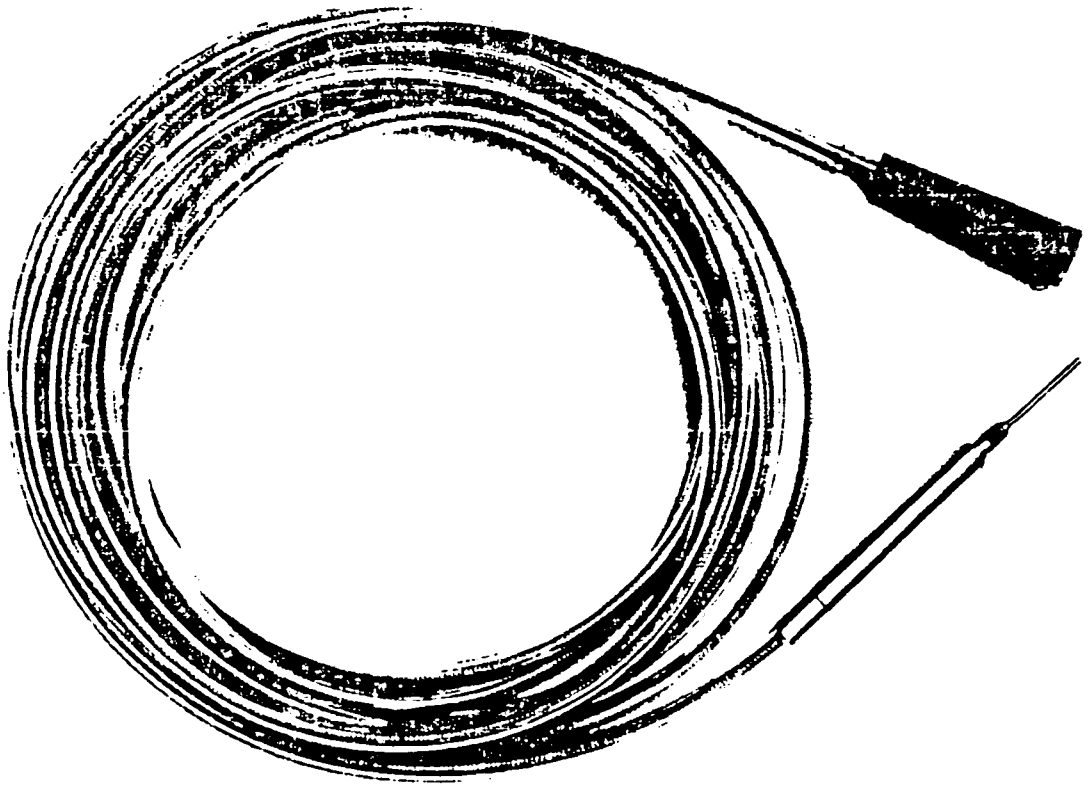
Wet-bulb: 30 sec. (100%) with gentle whirling



MODEL CF180 — Flexible Immersion Probe.

Twelve foot long (3.6m) food-safe cable terminated with a stainless steel probe. Suitable for deep immersion or for remote monitoring. Response time with light agitation is:

Liquids: 3 sec. (63%) or 15 sec. (100%) - (water)
Gases: 20 sec. (63%) or 100 sec. (100%) - (air)



APPENDIX 3-B SITE REPORTS

176 Bronson Ave.
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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE _____
- TIME _____
- CLIENT Test house 1
- ADDRESS _____
- PHONE (RES.) _____ (BUS.) _____
- TECHNICIAN _____
- GENERAL PURPOSE _____

BUILDING DESCRIPTION

- CONSTRUCTION DATE _____
- WALL CONSTRUCTION _____
- NO. OF STORIES _____
- BASEMENT _____
- HEATING SYSTEM _____
- D.H.W. SYSTEM _____
- SIDING _____
- WINDOWS _____
- VENTILATION SYSTEM _____

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) 5°
- WIND VELOCITY AND DIRECTION S.W @15
- RELATIVE HUMIDITY (RH_o) 70
- AIR PRESSURE 100.9 ↑
- PRECIPITATION –
- SOLAR RADIATION _____
- SKY/CLOUD CONDITIONS overcast

INSIDE

- AIR TEMPERATURE (T_1) _____ @ _____ (time)
- AIR TEMPERATURE (T_1) _____ @ _____ (time)
- T_1 LOCATION _____
- RELATIVE HUMIDITY _____
- AIR PRESSURE _____
- DIFFERENCE T_1/T_o (ΔT) _____
- REFERENCE SURFACE TEMP. (T_R) _____
- T_R LOCATION _____

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Retrospectors

THERMOGRAPHIC SITE REPORT

(1)

LOCATION (WALL ORIENTATION)

M. BED. - EAST WALL

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

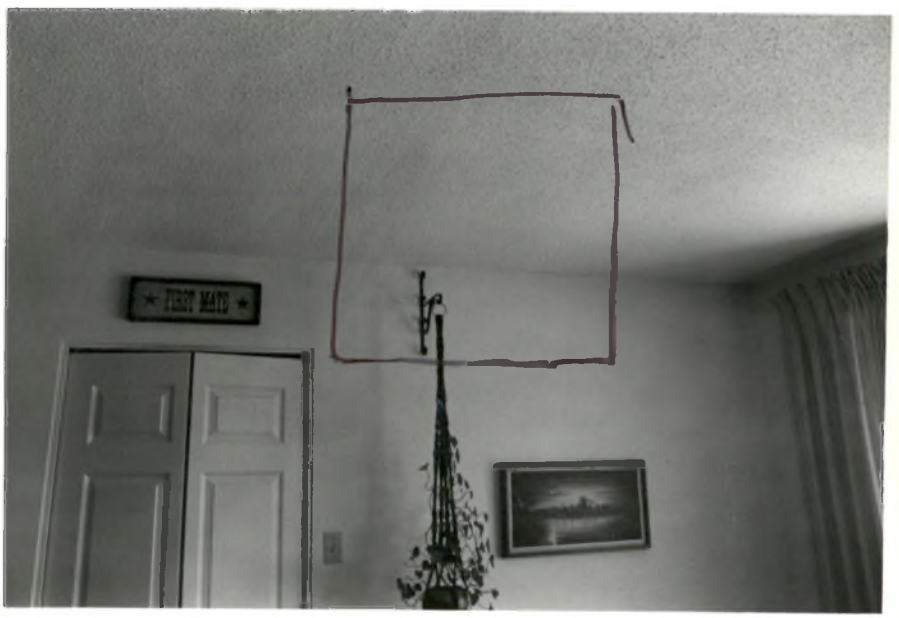
Grey streaked ceiling

EXPLANATION

Inadequate A/V barrier

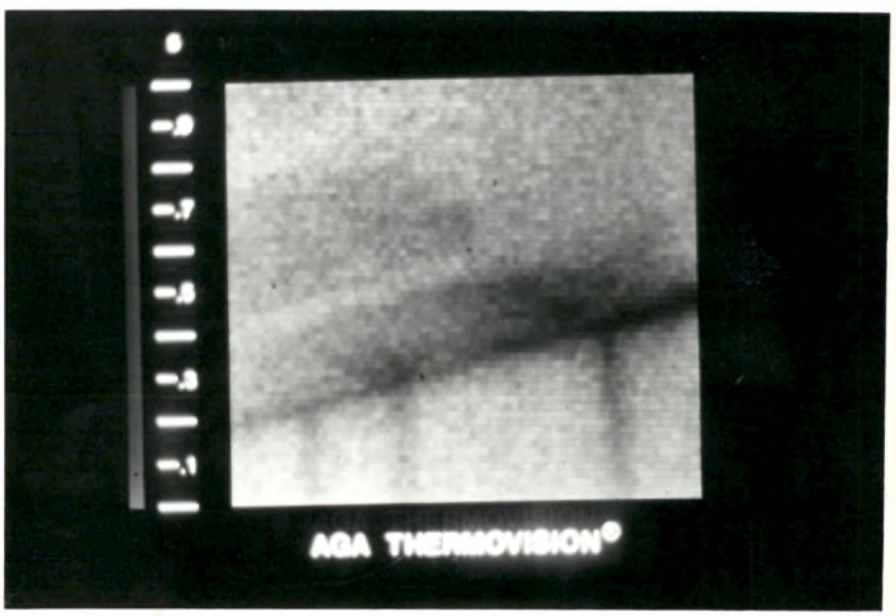
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

C-4

page 3
of 4

(1)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

FAMILY ROOM- NORTH WALL

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

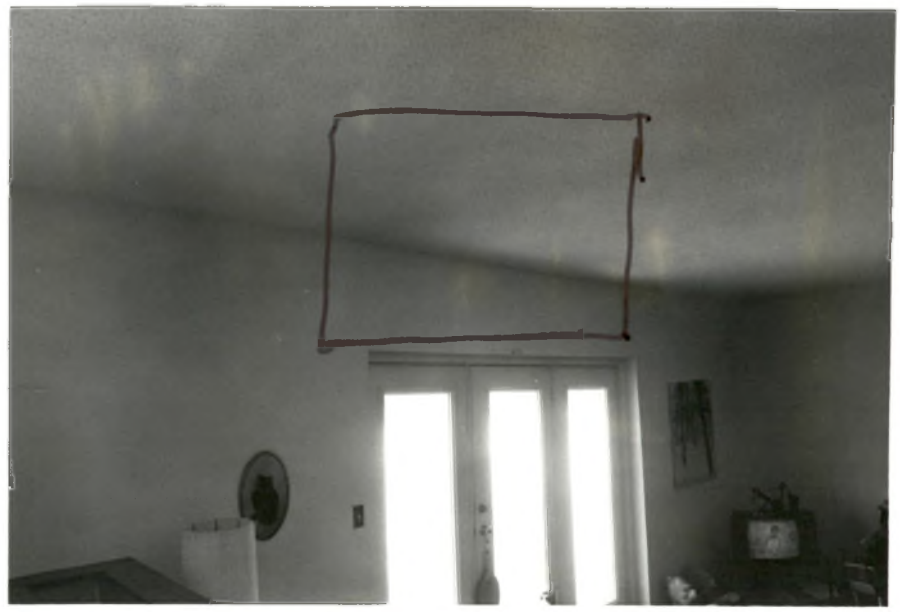
Streaked ceiling.

EXPLANATION

Air leakage from plate. Likely where strapping meets plate.

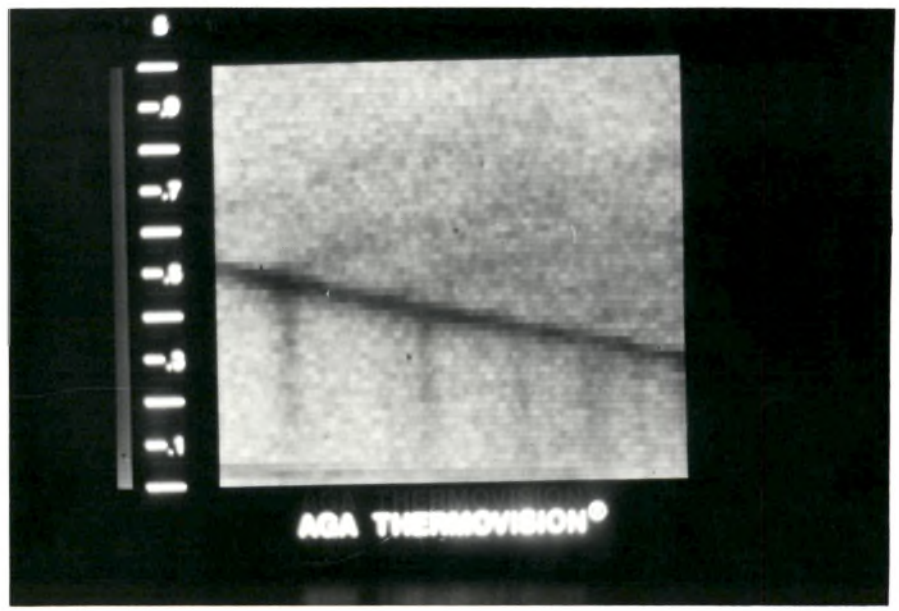
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(1)

LOCATION (WALL ORIENTATION)

North Wall - Family Room.

SITE CONDITIONS

- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

Grey mottled detail

EXPLANATION

Likely condensation in walls due to break in A/V barrier.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Feb 17/82
- TIME 13:30
- CLIENT Test house 2
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. Simple
- GENERAL PURPOSE Applehill Research

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -9°C.
- WIND VELOCITY AND DIRECTION NF @ 12 Km.
- RELATIVE HUMIDITY (RH_o) 40%
- AIR PRESSURE 102.9
- PRECIPITATION none
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS sunny + clear

INSIDE

- AIR TEMPERATURE (T_1) 22.5C @ 13:30 (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION Living Room
- RELATIVE HUMIDITY 45
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(2)

LOCATION (WALL ORIENTATION)

Second floor ceiling area

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall + stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

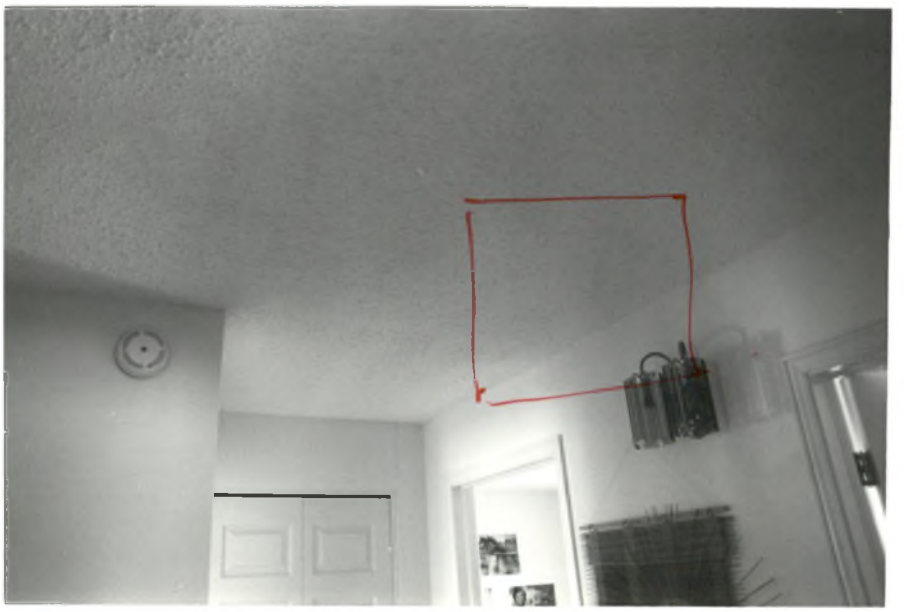
Cold images on ceiling

EXPLANATION

Possibly due to void in insulation but more likely ineffective vapour seal and condensation problem

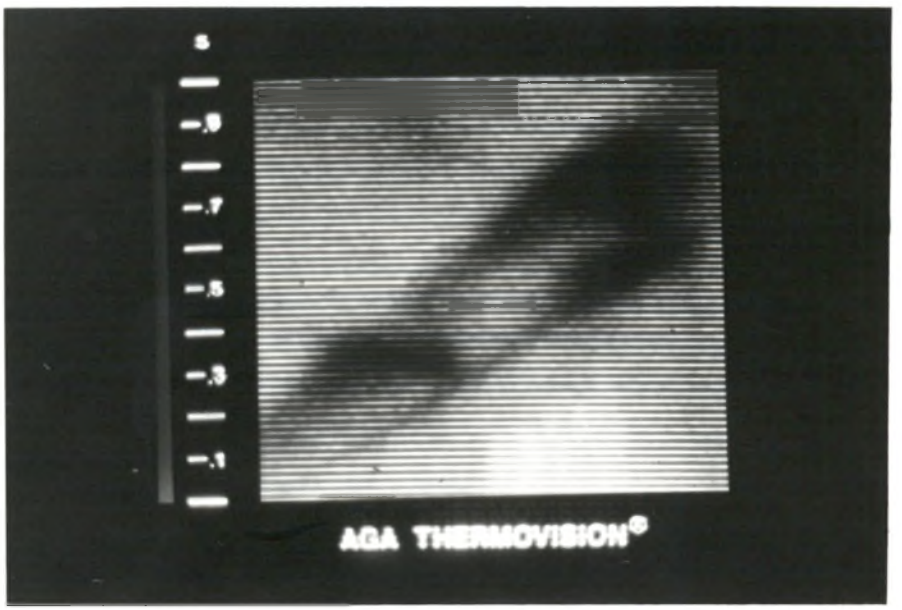
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 2/82
- TIME
- CLIENT Test house 3
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -6.6
- WIND VELOCITY AND DIRECTION NW @ 28
- RELATIVE HUMIDITY (RH_o) 67
- AIR PRESSURE 109
- PRECIPITATION -
- SOLAR RADIATION FULL
- SKY/CLOUD CONDITIONS CLEAR

INSIDE

- AIR TEMPERATURE (T_i) @ (time)
- AIR TEMPERATURE (T_i) @ (time)
- T_i LOCATION
- RELATIVE HUMIDITY 43%
- AIR PRESSURE
- DIFFERENCE T_i/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(3)

LOCATION (WALL ORIENTATION)
East Wall of basement

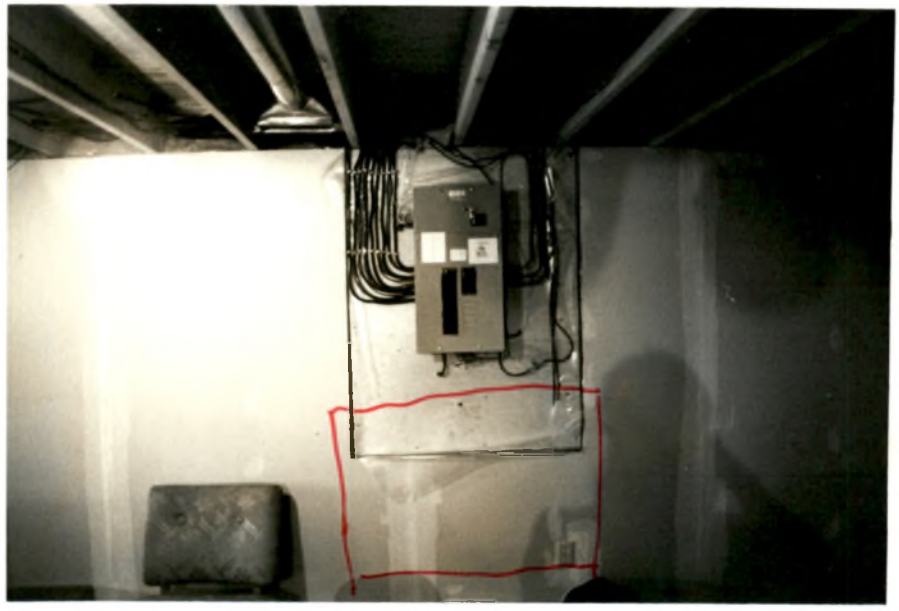
SITE CONDITIONS
- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall + plywood
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
air leakage at electric panel

EXPLANATION
insufficient seal where A/V barrier meets plywood panel

RECOMMENDATIONS
Seal A/V barrier to panel

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(3)

LOCATION (WALL ORIENTATION)

Basement

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Cold where "I" beams ties into wall

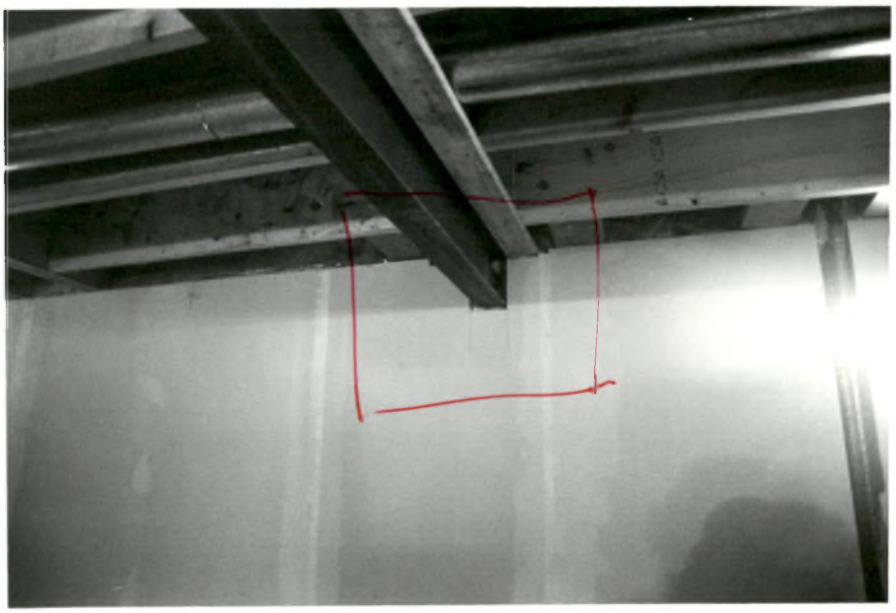
EXPLANATION

No A/V Barrier a "I" beam and insufficient insulation

RECOMMENDATIONS

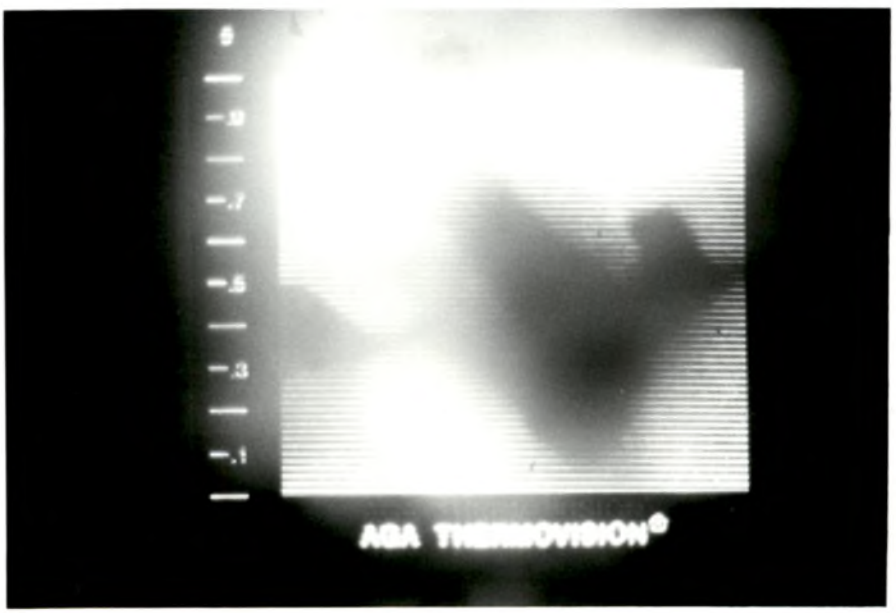
Insulate and seal around I beam

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(3)

LOCATION (WALL ORIENTATION)

North West corner of family room

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Drywall & stucco ceiling
- HEATING SYSTEM CONDITION 0
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

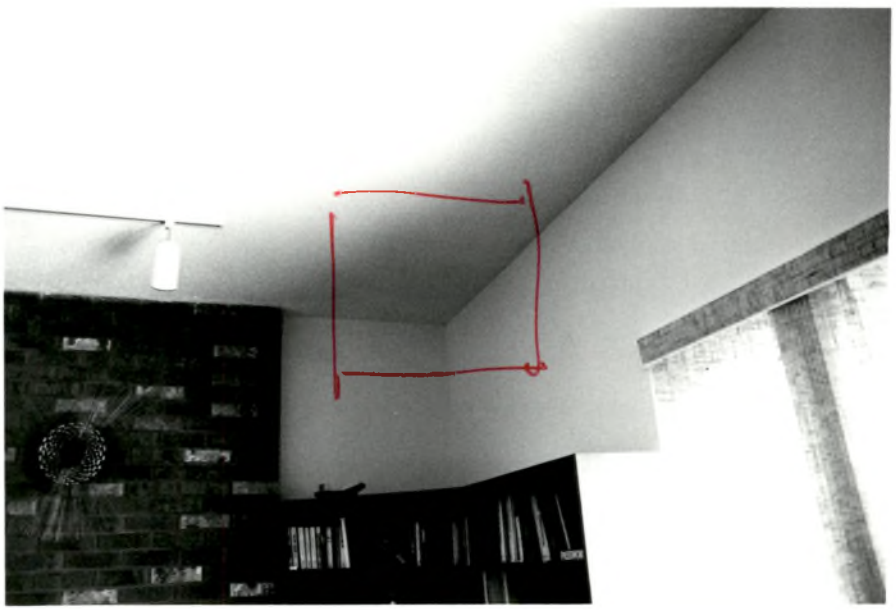
excessive cold feature at plate

EXPLANATION

Likely due to ineffective A/V barrier

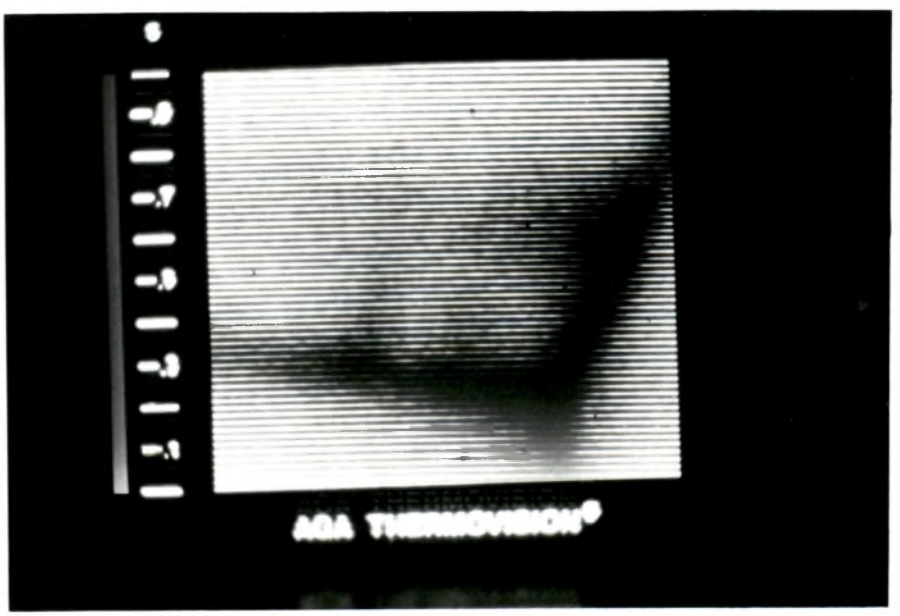
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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of 5

Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

North the East bedroom shooting South

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall + stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold features on ceiling due to air movement + condensation

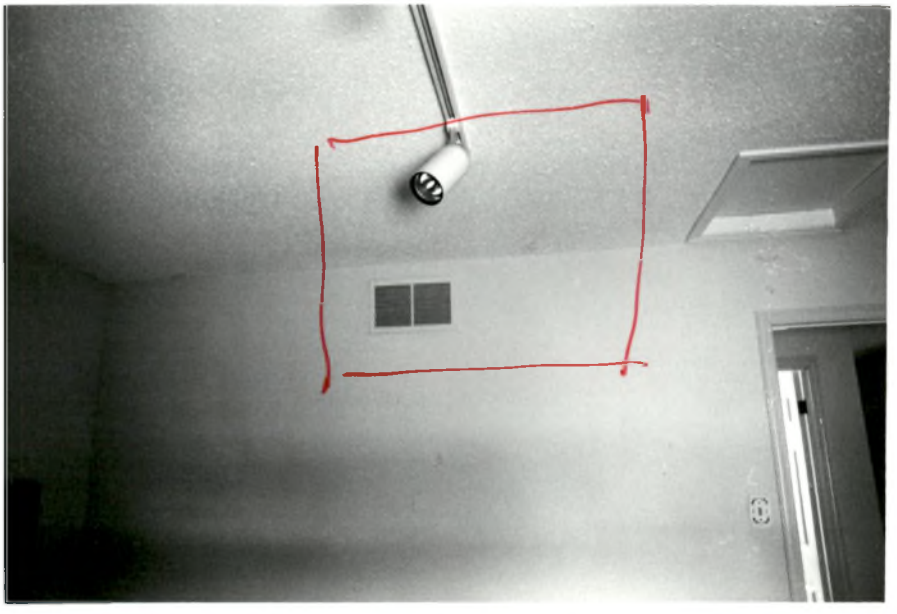
EXPLANATION

insufficient seal at A/V barrier around attic hatch

RECOMMENDATIONS

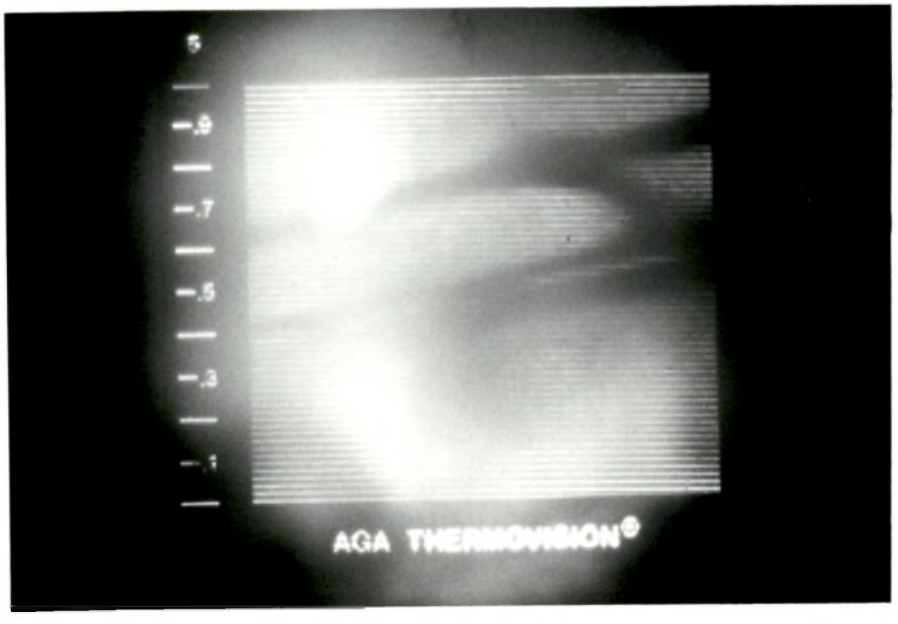
further insulate hatch and seal A/V barrier at hatch

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 11/82
- TIME 1
- CLIENT Test house 5
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) 4
- WIND VELOCITY AND DIRECTION SW. @ 7
- RELATIVE HUMIDITY (RH_o) 81%
- AIR PRESSURE 101.0
- PRECIPITATION light shower
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS overcast

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

(5)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Family Room – west wall

SITE CONDITIONS

- DOOR FAN @ 28 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

leakage @ ceiling track light in family room.

EXPLANATION

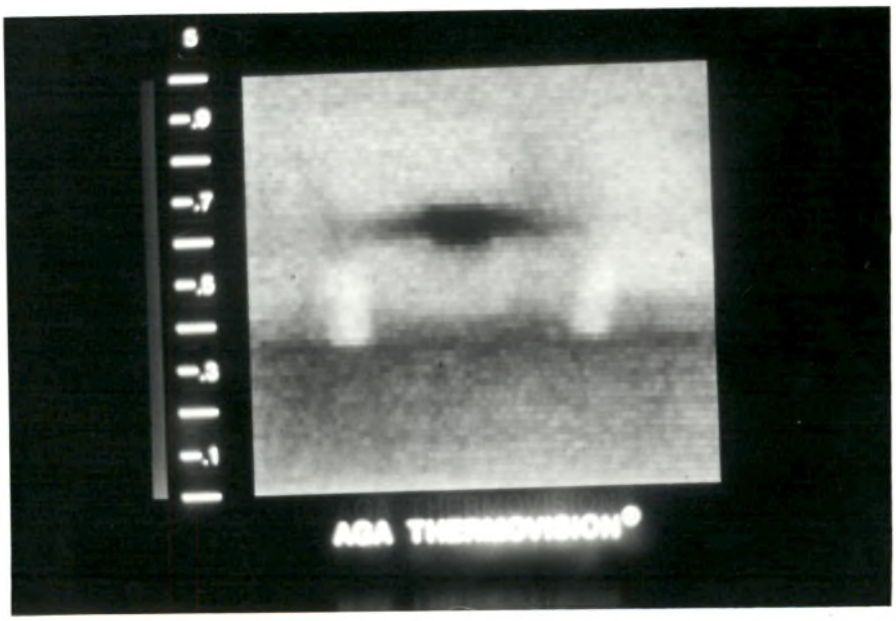
likely penetration of vapour barrier at ceiling fixture.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(5)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Front entrance – South side

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold void in [redacted] ceiling above front door

EXPLANATION

apparent void in insulation.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(5)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

North East bedroom - South wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

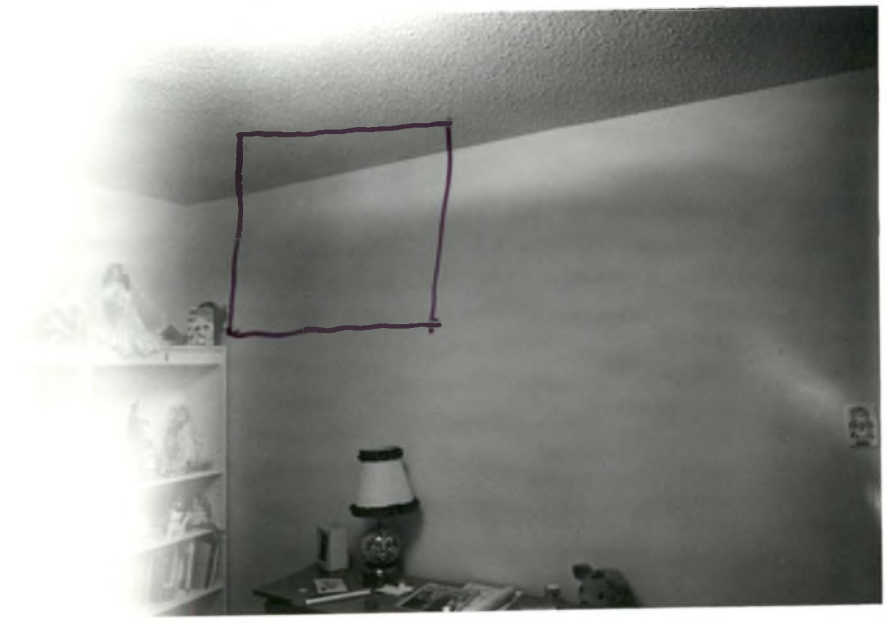
Cold streak from ceiling running down wall - ends before the floor.

EXPLANATION

Air leakage likely caused by break in A/V barrier.

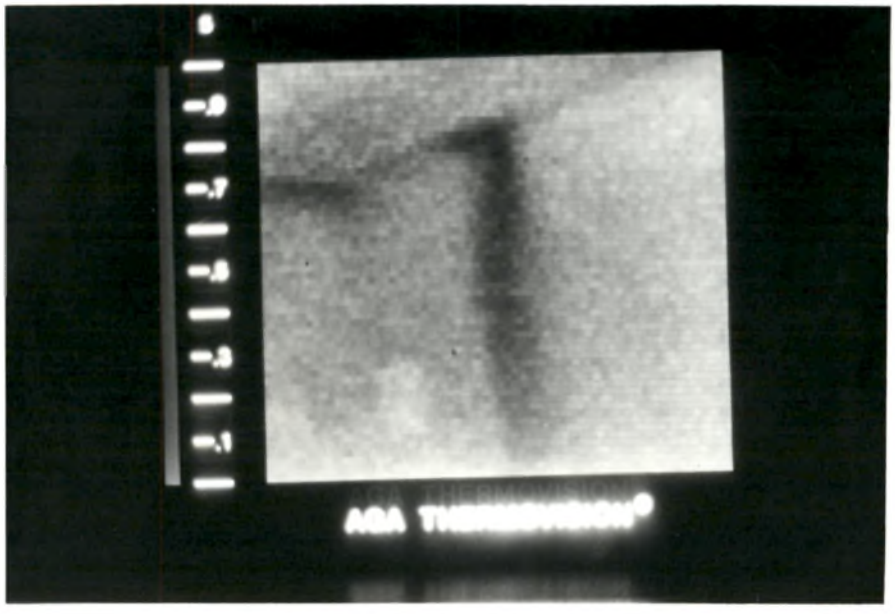
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(5)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Master Bedroom - west wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Cool feature across ceiling from plate

EXPLANATION

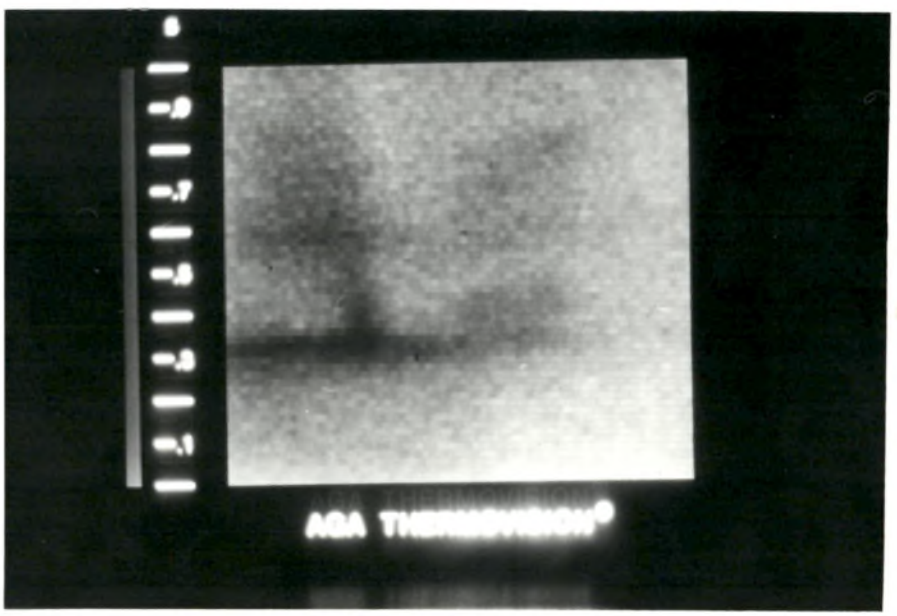
possible condensation problem resulting from air leakage at plate due to insufficient A/V seal

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors inc

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE FEB. 15/82
- TIME 14:30
- CLIENT Test house 7
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. SEMPLE
- GENERAL PURPOSE APPLEHILL RESEARCH

BUILDING DESCRIPTION

- CONSTRUCTION DATE 1981
- WALL CONSTRUCTION FRAME
- NO. OF STORIES TWO
- BASEMENT FULL
- HEATING SYSTEM GAS
- D.H.W. SYSTEM
- SIDING BRICK VENEER
- WINDOWS NEW THERMOPANE
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) +1.5°C
- WIND VELOCITY AND DIRECTION N.E. @ 9 Km.
- RELATIVE HUMIDITY (RH_o) 55%
- AIR PRESSURE 100.8 and falling.
- PRECIPITATION NONE
- SOLAR RADIATION PARTIAL
- SKY/CLOUD CONDITIONS OVERCAST

INSIDE

- AIR TEMPERATURE (T_1) 20°C @ 2:30 (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (AT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

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THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

South wall of Family Room

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage at baseboard and electric outlet

EXPLANATION

Due to ineffective A/V barrier at Sill

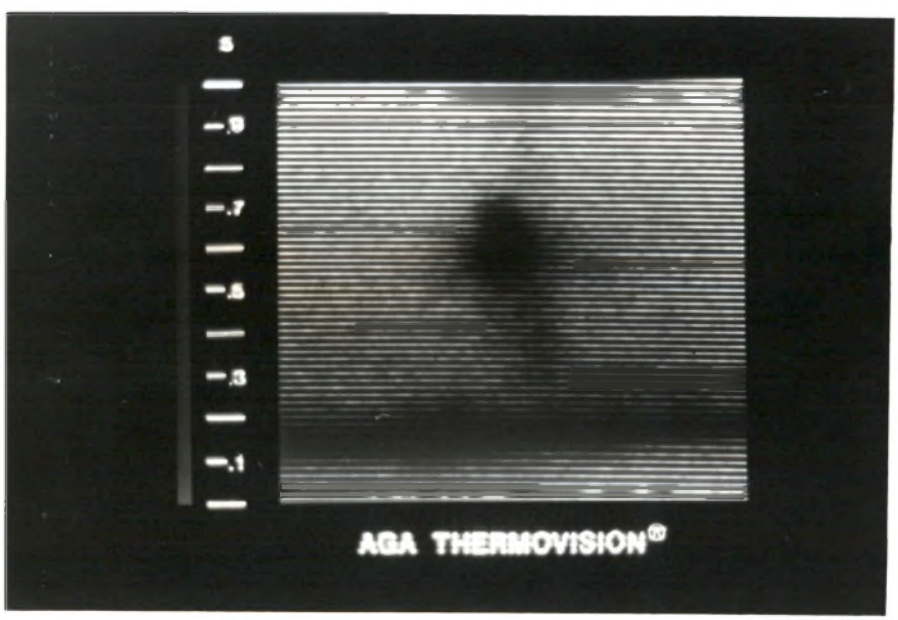
RECOMMENDATIONS

Seal outlet with gasket, caulk and plugs. Caulk baseboard

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(7)

LOCATION (WALL ORIENTATION)

Fireplace / ceiling joint, east wall at Family Room

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTE
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage at fireplace ceiling joint and at track lighting plate.

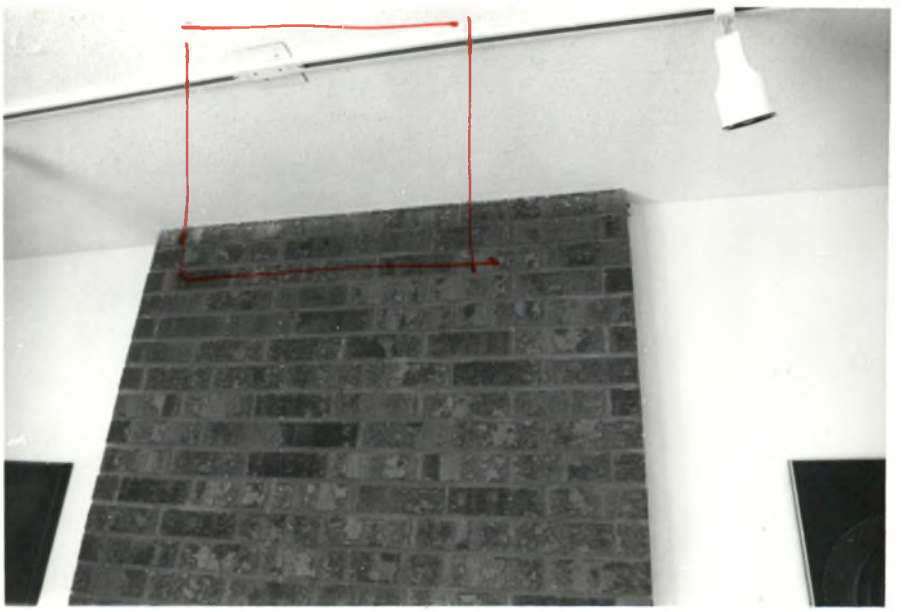
EXPLANATION

Poor A/V barrier joint at ceiling and fireplace joint and at ceiling fixture

RECOMMENDATIONS

Caulk joint. Caulk and seal ceiling fixture.

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

(11)

IDENTIFICATION

- DATE Feb. 25/82
- TIME
- CLIENT Test house 11
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. Semple
- GENERAL PURPOSE Applehill research

BUILDING DESCRIPTION

- CONSTRUCTION DATE 1981
- WALL CONSTRUCTION Frame - double wall
- NO. OF STORIES 2
- BASEMENT Full
- HEATING SYSTEM GAS
- D.H.W. SYSTEM GAS
- SIDING Aluminum & brick
- WINDOWS new thermopane
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -11
- WIND VELOCITY AND DIRECTION WNW @ 40-50
- RELATIVE HUMIDITY (RH_o) 33
- AIR PRESSURE 103.0
- PRECIPITATION -
- SOLAR RADIATION full
- SKY/CLOUD CONDITIONS clear

INSIDE

- AIR TEMPERATURE (T_i) @ (time)
- AIR TEMPERATURE (T_i) @ (time)
- T_i LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_i/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

(11)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)
North West Bedroom
(N.W. corner)

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall + stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
excessive cold features @ plate

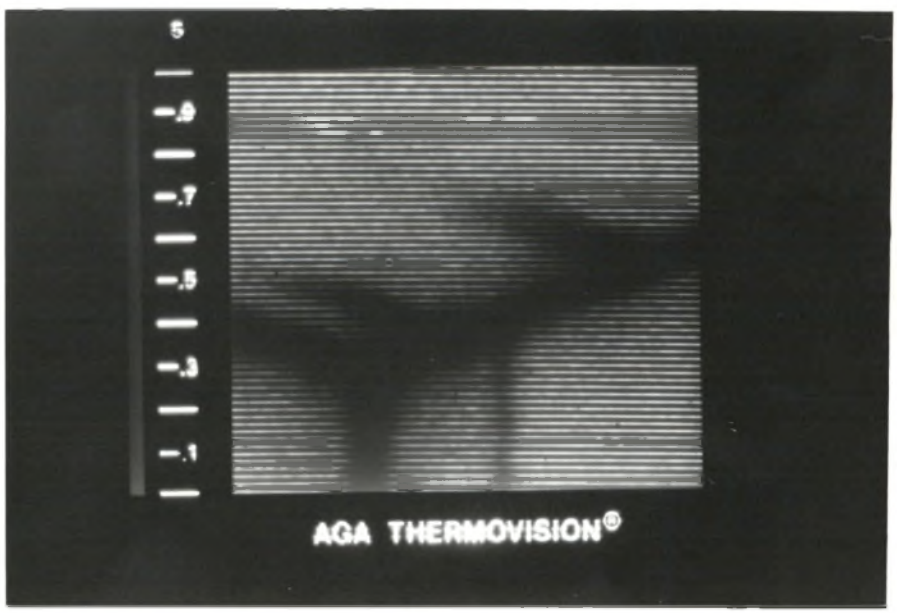
EXPLANATION
likely ineffective A/V barrier causing condensation

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(11)

LOCATION (WALL ORIENTATION)

North East bedroom

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall + stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

excessive cold features @ plate.

EXPLANATION

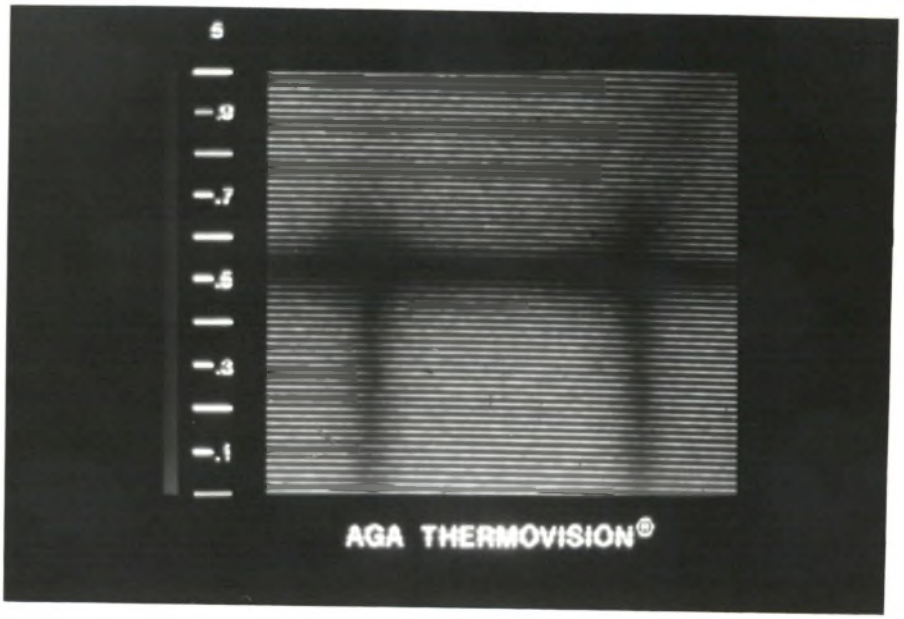
likely due to ineffective A/V barrier.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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of 5

Retrospectors

THERMOGRAPHIC SITE REPORT

11

LOCATION (WALL ORIENTATION)

Attic hatch in N.E bedroom

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall & stucco ceiling
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

excessive leakage @ attic hatch

EXPLANATION

air leakage due to no seal around trim frame or weather stripping around hatch

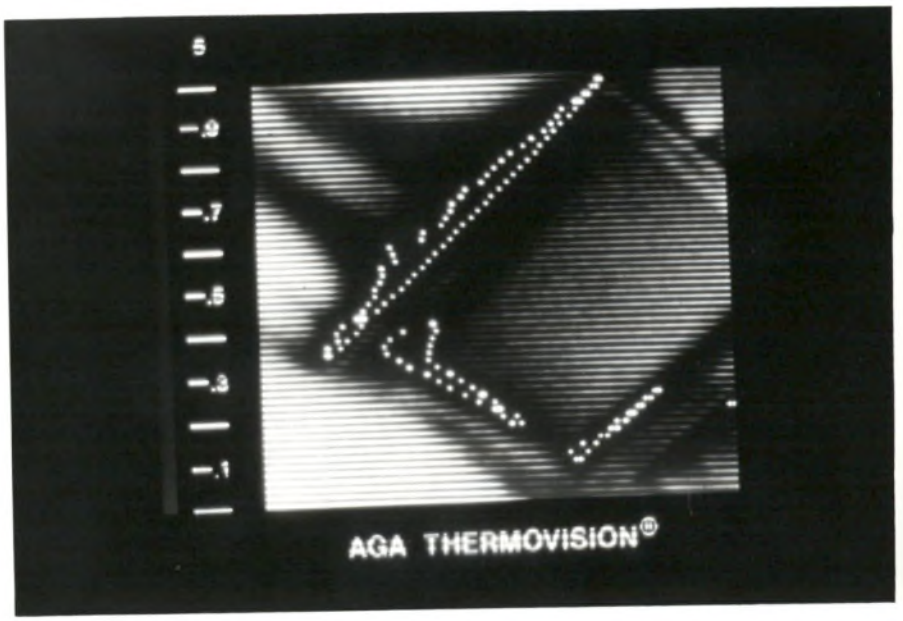
RECOMMENDATIONS

insulate hatch further. Caulk around trim and frame. Weather str. p. frame and clamp hatch tightly in place

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

11

LOCATION (WALL ORIENTATION)

North wall of basement

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

unplugged dryer vent hole

EXPLANATION

Vapour barrier was cut to put in dryer vent + not sealed properly.

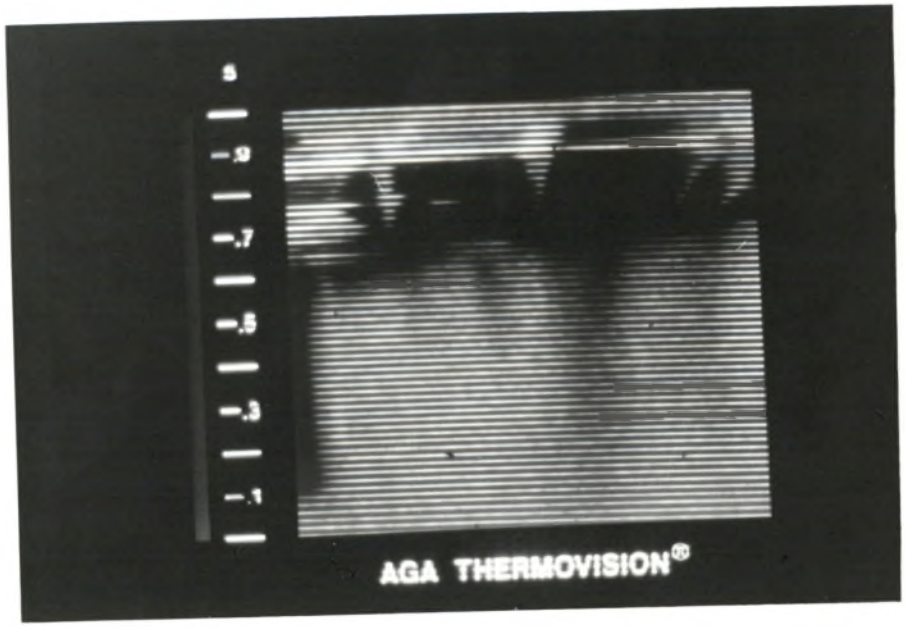
RECOMMENDATIONS

insulate + seal A/V barrier

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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of 5

Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 4/82
- TIME
- CLIENT Test house 13
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN BILL SEMPLE
- GENERAL PURPOSE RESEARCH STUDY

BUILDING DESCRIPTION

- CONSTRUCTION DATE 481
- WALL CONSTRUCTION DOUBLE
- NO. OF STORIES 2
- BASEMENT FULL
- HEATING SYSTEM GAS FORCED AIR
- D.H.W. SYSTEM GAS
- SIDING
- WINDOWS SEALED / SLIDING
- VENTILATION SYSTEM BATHROOM VENTS, FRESH AIR

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -9
- WIND VELOCITY AND DIRECTION E. @ 20
- RELATIVE HUMIDITY (RH_o) 44
- AIR PRESSURE 101.6
- PRECIPITATION -
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS cloudy

INSIDE

- AIR TEMPERATURE (T_1) 20°C @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 47%
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

(13)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

BASEMENT - WEST WALL

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage around gas pipe and ceiling/wall joint.

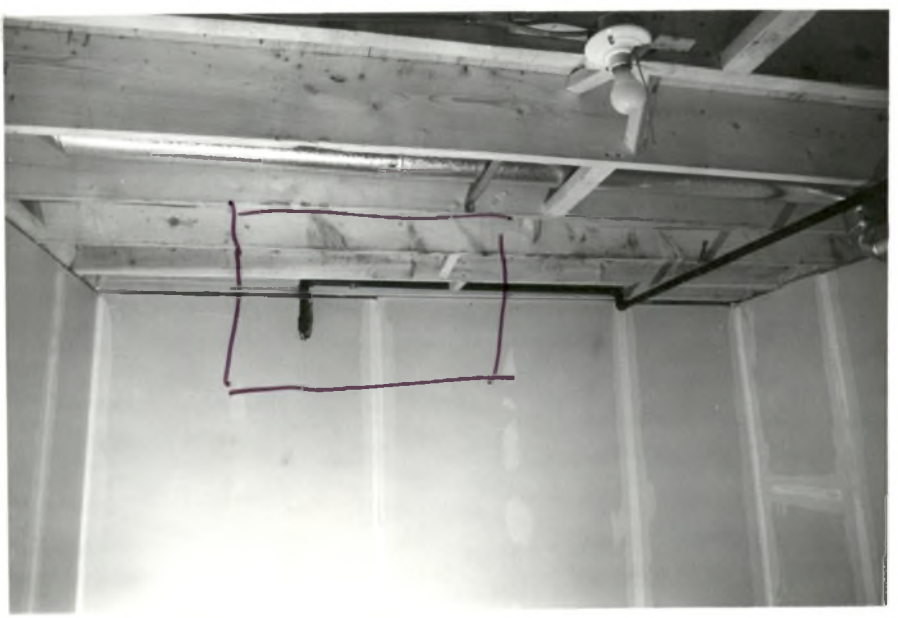
EXPLANATION

inadequate vapour seal allowing considerable leakage.

RECOMMENDATIONS

tighten vapour barriers in these places.

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

13

LOCATION (WALL ORIENTATION)

Ceiling in Front Entrance – North Wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Severe leakage at ceiling fixture and down outside wall. Moisture buildup in ceiling.

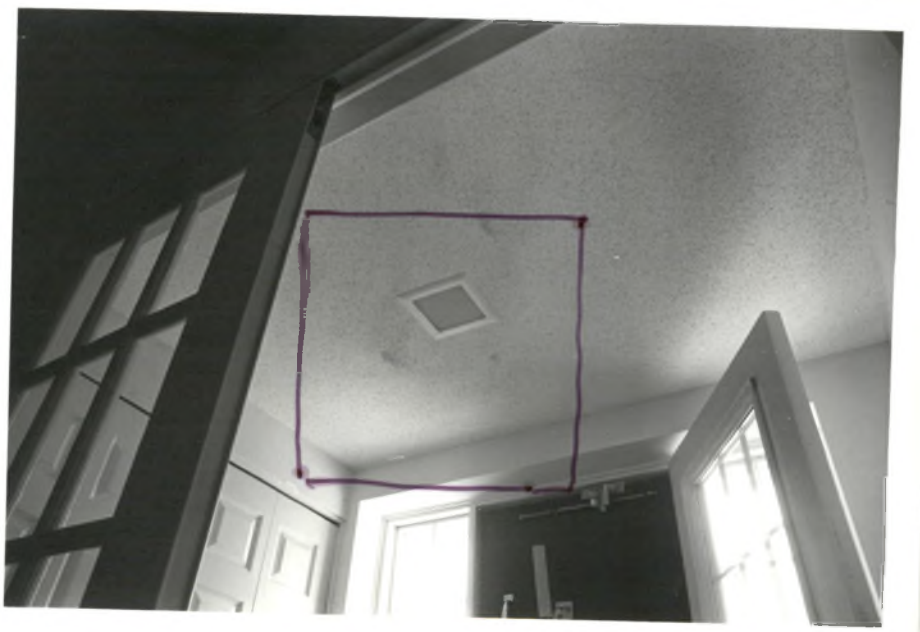
EXPLANATION

Poor A/V barrier details at light fixture and at plate on wall over front door.

RECOMMENDATIONS

Seal and caulk light fixtures.

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

13

LOCATION (WALL ORIENTATION)

Family Room - Chimney cavity on North Wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Cold air flow through chimney cavity which has also infiltrated 2nd Floor cavity.

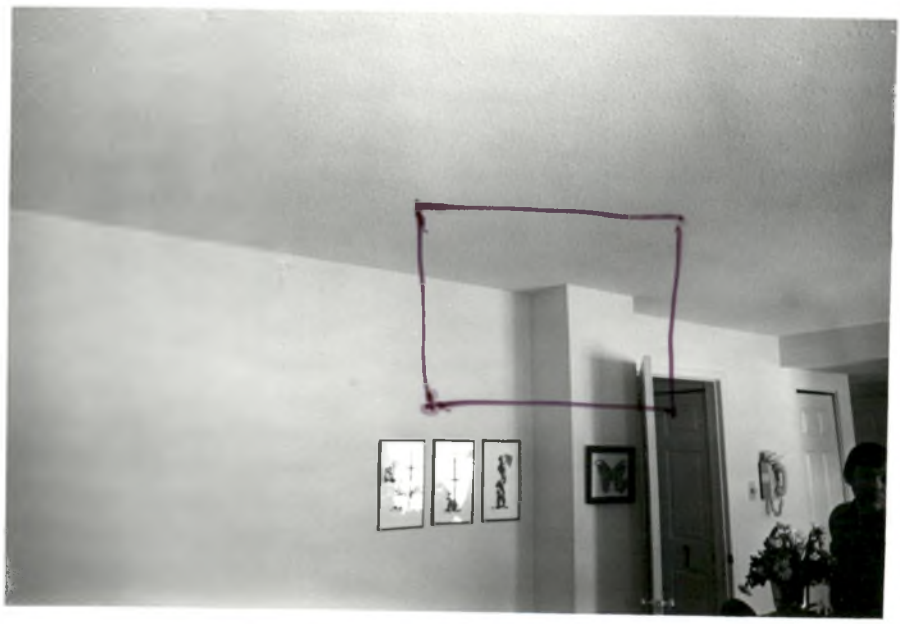
EXPLANATION

No air seal at 2nd Floor ceiling at infiltration room allowing cold air to infiltrate and flow through cavity and infiltrate 2nd Floor.

RECOMMENDATIONS

Seal & insulate flue at 2nd Floor ceiling and in furnace room.

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(14)

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 11/82
- TIME
- CLIENT Test house 14
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) 5
- WIND VELOCITY AND DIRECTION SW @ 13
- RELATIVE HUMIDITY (RH_o) 70
- AIR PRESSURE 100.9
- PRECIPITATION none
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS overcast

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(14)

LOCATION (WALL ORIENTATION)

Family Room - East wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

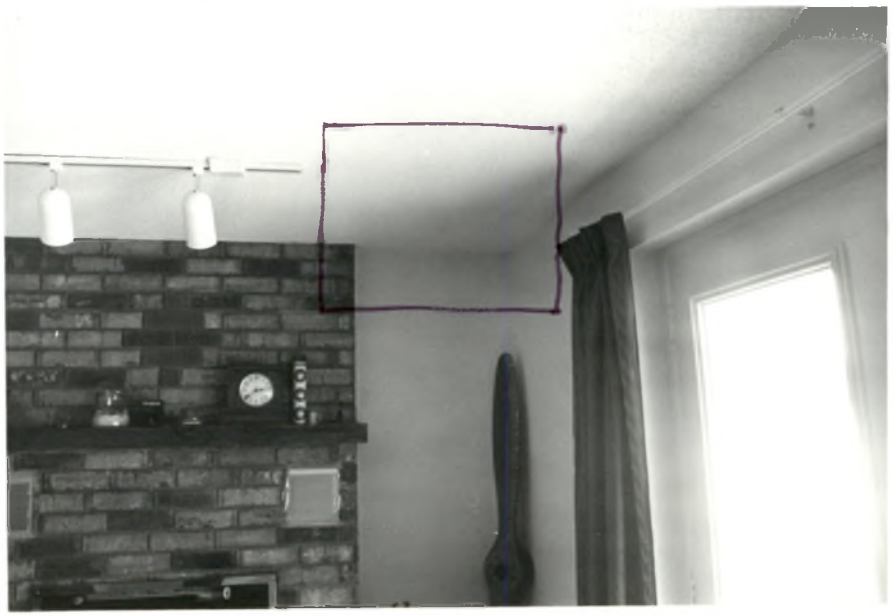
Cold corner and condensation in ceiling.

EXPLANATION

likely due to poor A/V barrier seal @ this point.

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(14)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Eating Area - Kitchen
South Wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage at baseboard

EXPLANATION

Air leakage due to ineffective A/V seal @ joist/header causing air leakage at baseboard.

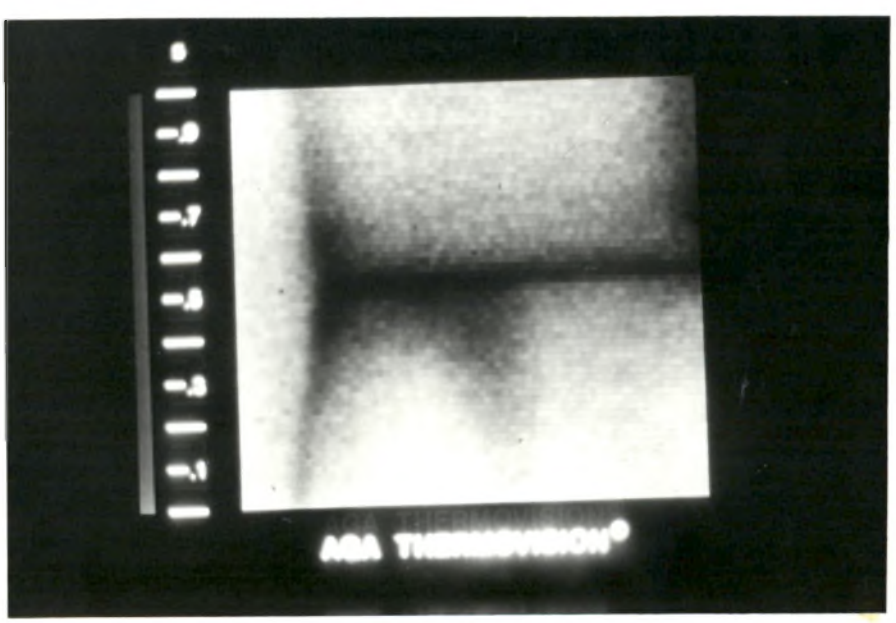
RECOMMENDATIONS

Caulk baseboard.

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(14)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Main Stairway
North East corner

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall.
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

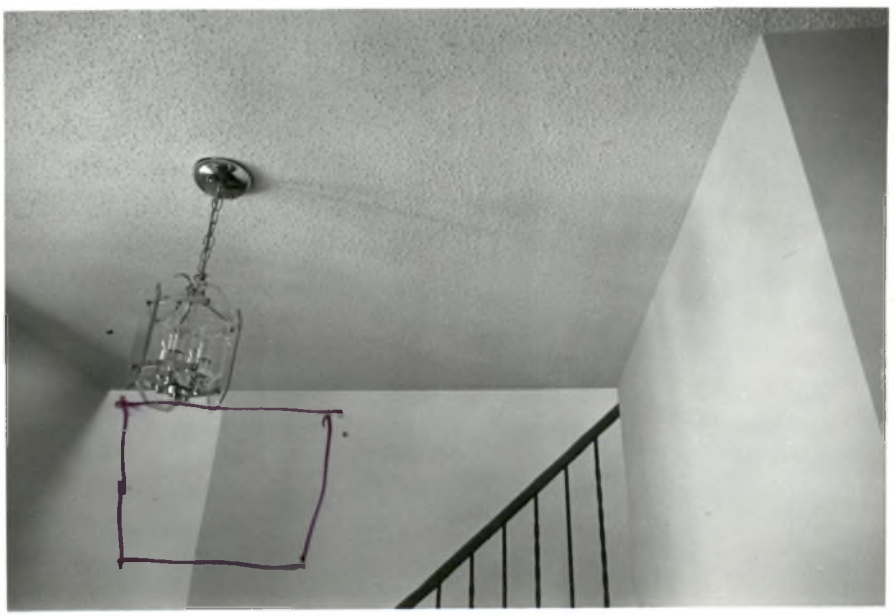
Air leakage and condensation in walls.

EXPLANATION

Break in A/V seal @ 1st/2nd Floor joint height. Condensation occurring in walls.

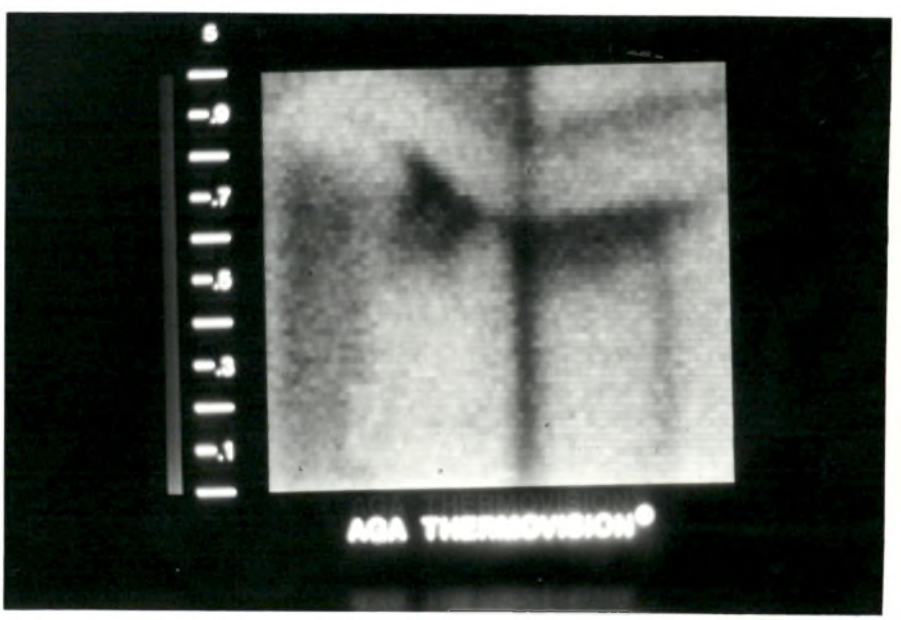
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Mar 3/82
- TIME 2:00 - 4:00
- CLIENT Test house 16
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -13°C
- WIND VELOCITY AND DIRECTION W @ 16 Kph
- RELATIVE HUMIDITY (RH_o) 43 %
- AIR PRESSURE 102.6
- PRECIPITATION
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS

INSIDE

- AIR TEMPERATURE (T_1) 22°C @ 15:00 (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 38 %
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(16)

LOCATION (WALL ORIENTATION)
Kitchen bay window

SITE CONDITIONS

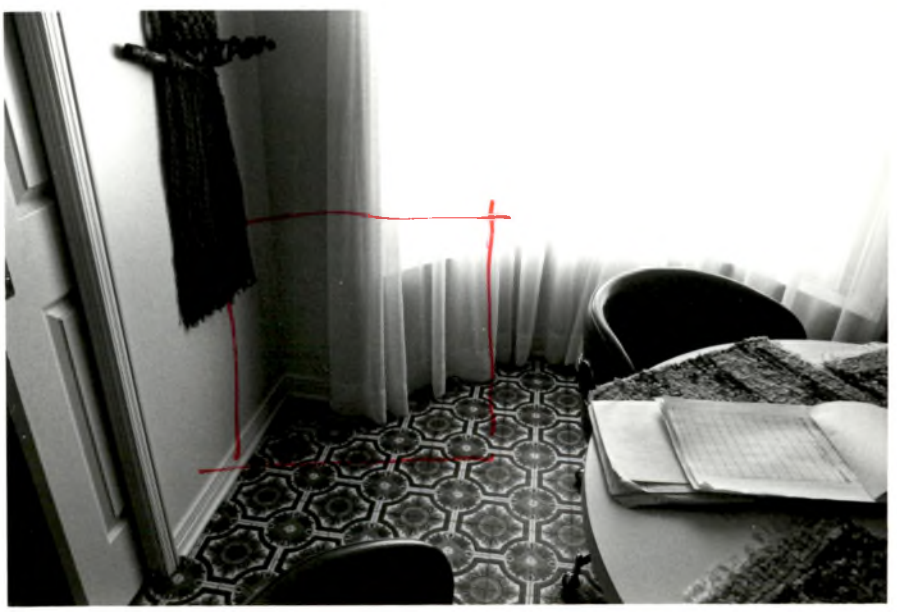
- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
air leakage at baseboard

EXPLANATION
ineffective vapour barrier

RECOMMENDATIONS
Caulk quarter round and baseboard

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

16

LOCATION (WALL ORIENTATION)

Family Room
door to exterior

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

air leakage @ threshold

EXPLANATION

ineffective weather stripping

RECOMMENDATIONS

more weather stripping

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(16)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Stair ceiling from 1st to 2nd Floor

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

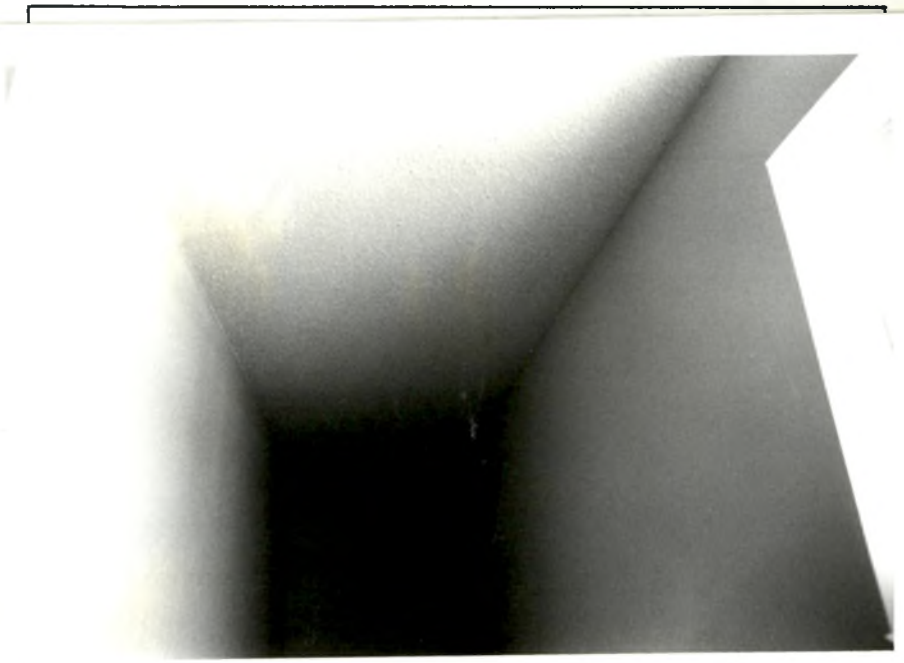
excessive cold features at plate and across ceiling.

EXPLANATION

likely ineffective A/V barrier at this point is causing excess condensation & perhaps air leakage @ ceiling.

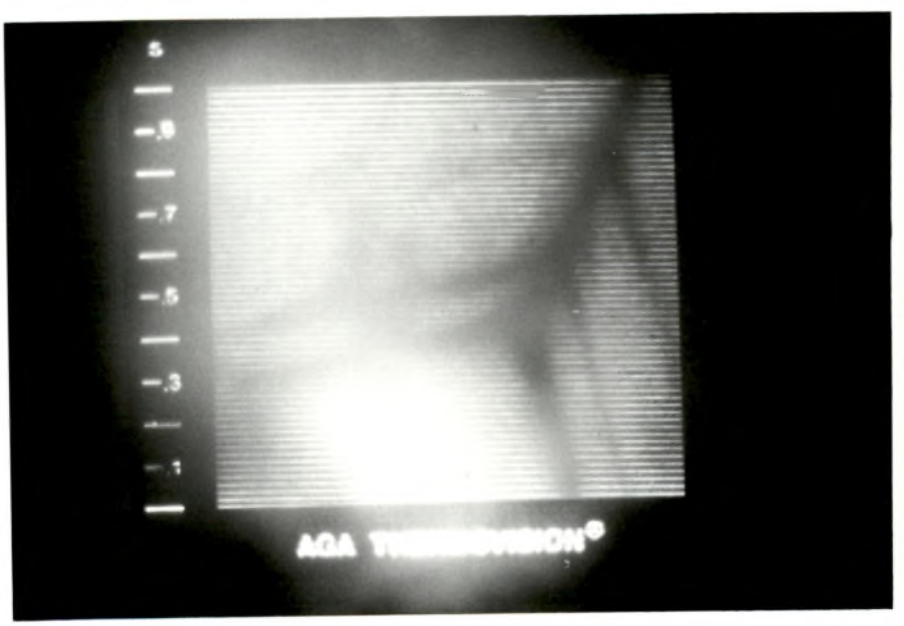
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(16)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

North West bedroom

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold feature where interior wall meets ceiling

EXPLANATION

caused by air infiltration & condensation across ceiling due to lack of A/V barrier Seal @ attic hatch

RECOMMENDATIONS

seal A/V barrier @ attic hatch & insulate hatch further.

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

16

LOCATION (WALL ORIENTATION)

Master Bathroom

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage down interior wall.

EXPLANATION

poor A/V barrier @ ceiling.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

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THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Master Bathroom

SITE CONDITIONS

- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

Air leakage down interior wall

EXPLANATION

poor A/V barrier @ ceiling.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(16)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

CEILING AT MAIN ENTRANCE

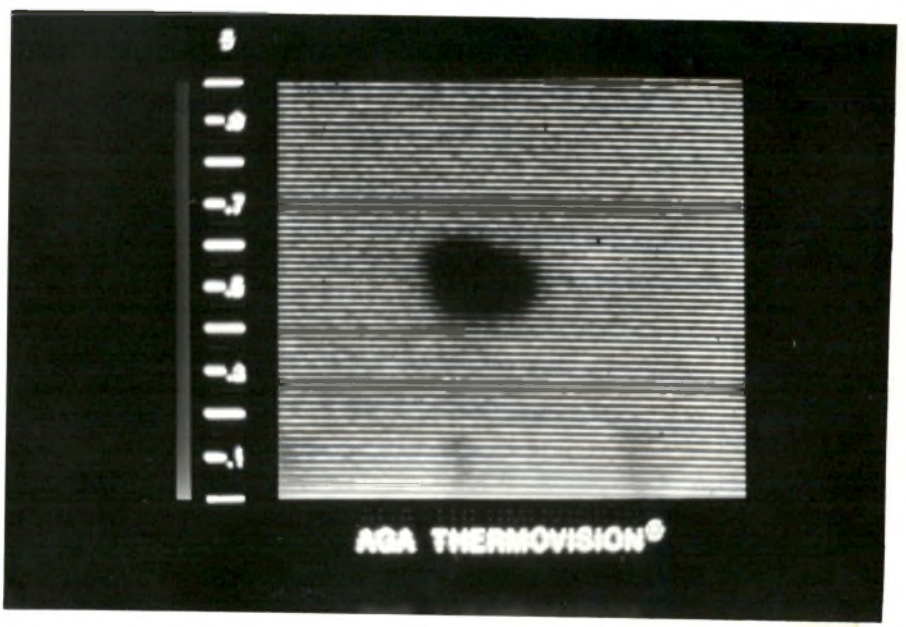
VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

PROBLEM DESCRIPTION

COLD VOID IN CEILING

EXPLANATION

RECOMMENDATIONS

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)
Ceiling in Second Floor Hallway

SITE CONDITIONS

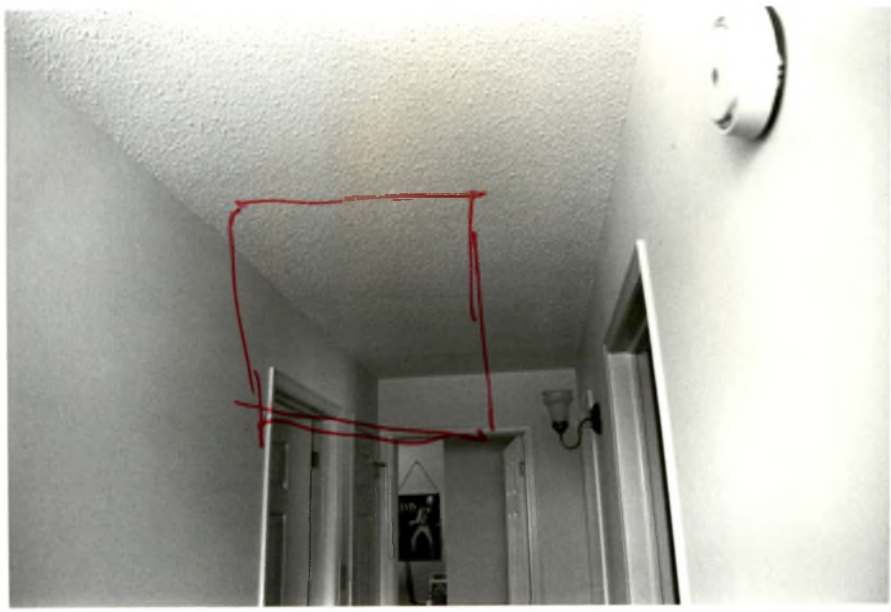
- DOOR FAN @ -20 pa
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
cold features on ceiling due to air infiltration + condensation

EXPLANATION
due to ineffective seal of A/V barrier @ attic hatch

RECOMMENDATIONS
Seal barrier and insulate hatch further

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

16

LOCATION (WALL ORIENTATION)

Bottom of Stairs from 1st to 2nd Floor South Wall

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

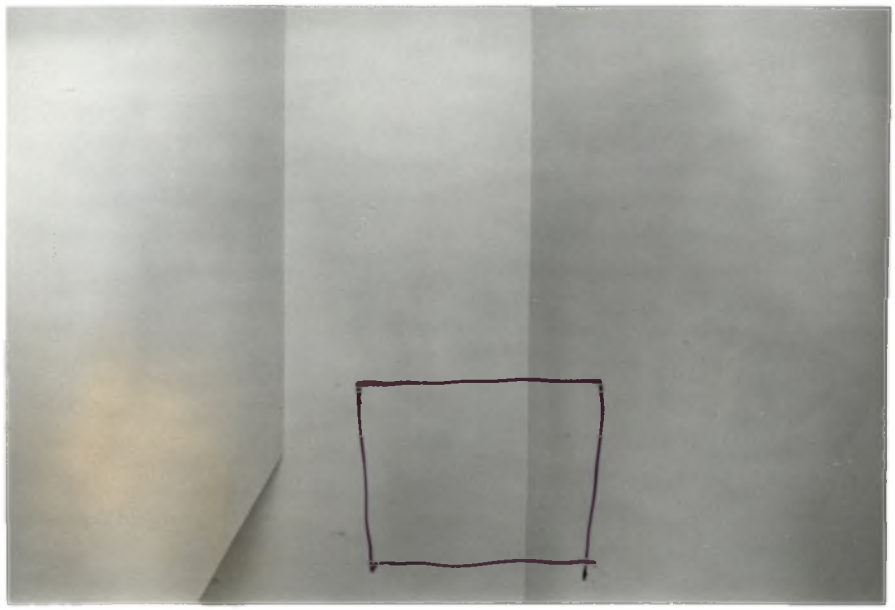
Void in wall insulation and resulting air leakage.

EXPLANATION

Likely void in insulation and ineffective A/V barrier causing air movement.

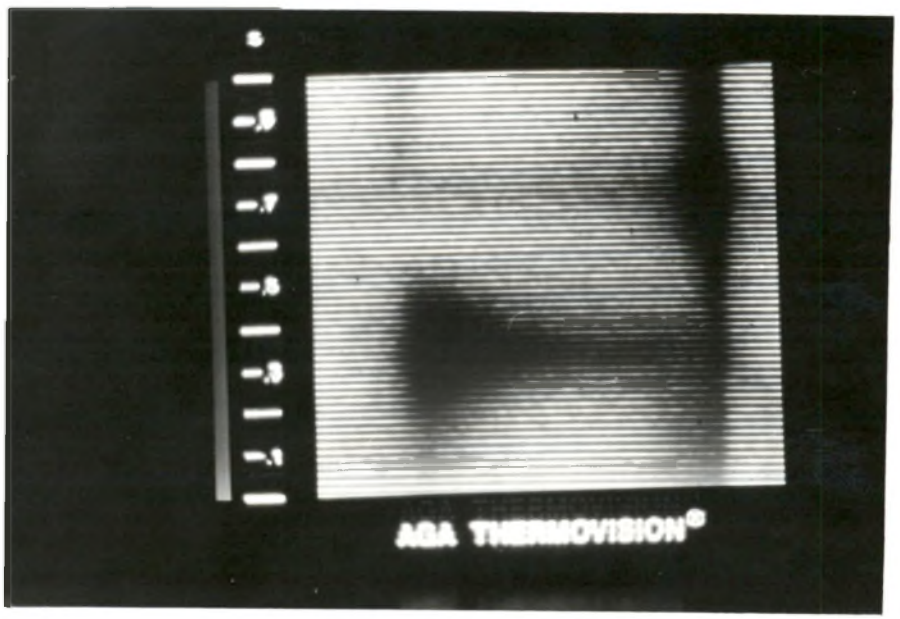
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(20)

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 9/82
- TIME
- CLIENT Test house 20
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o)
- WIND VELOCITY AND DIRECTION
- RELATIVE HUMIDITY (RH_o)
- AIR PRESSURE
- PRECIPITATION
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

(20)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

EAST WALL - LIVING ROOM

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage down wall from 1ST FLOOR PLATE

EXPLANATION

POOR A/V SEAL AT THIS POINT. CONSIDERABLE AIR LEAKAGE.

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(20)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

EAST WALL - ENTRANCE

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

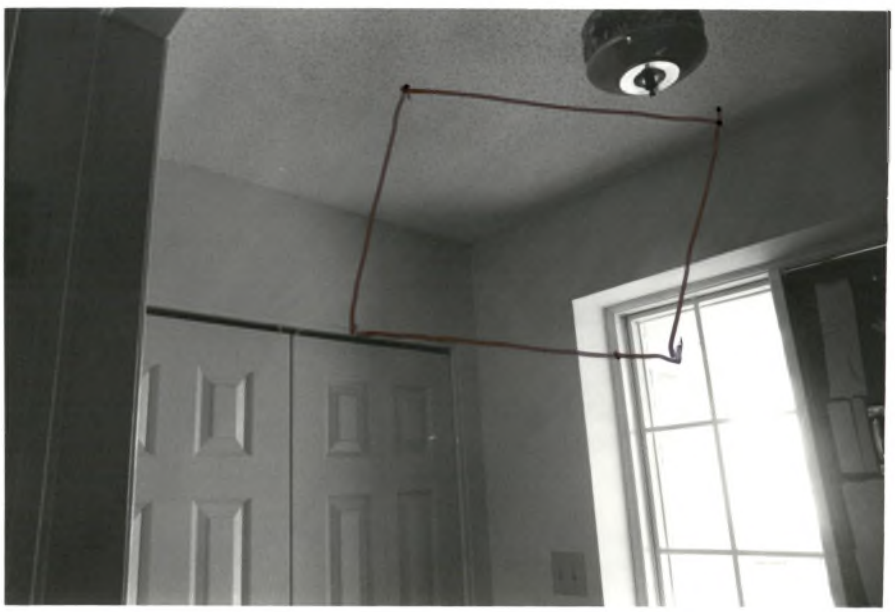
COLD VOID AND AIR LEAKAGE AT PLATE

EXPLANATION

Unadequate insulation and ~~considerable~~ poor A/V barrier

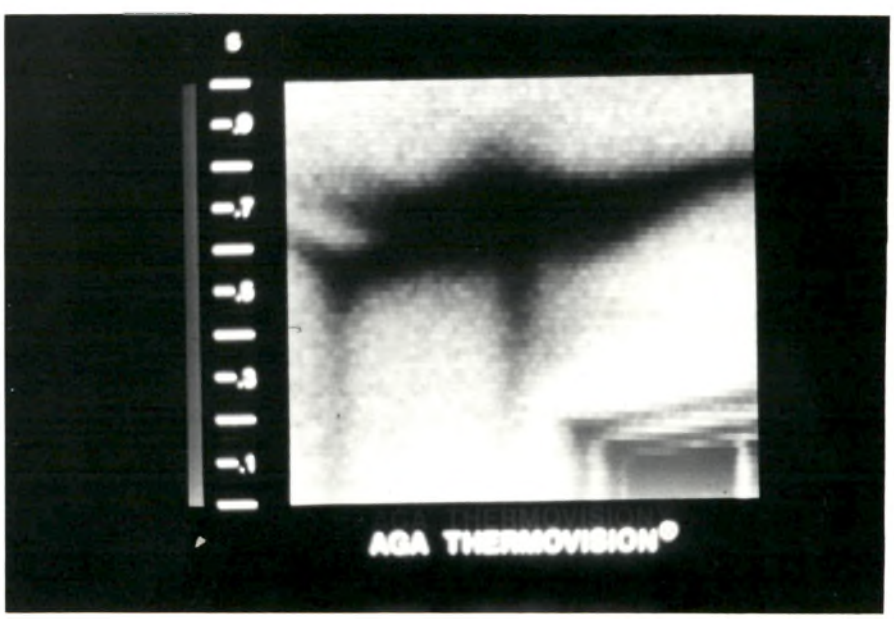
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(20)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

SITE CONDITIONS

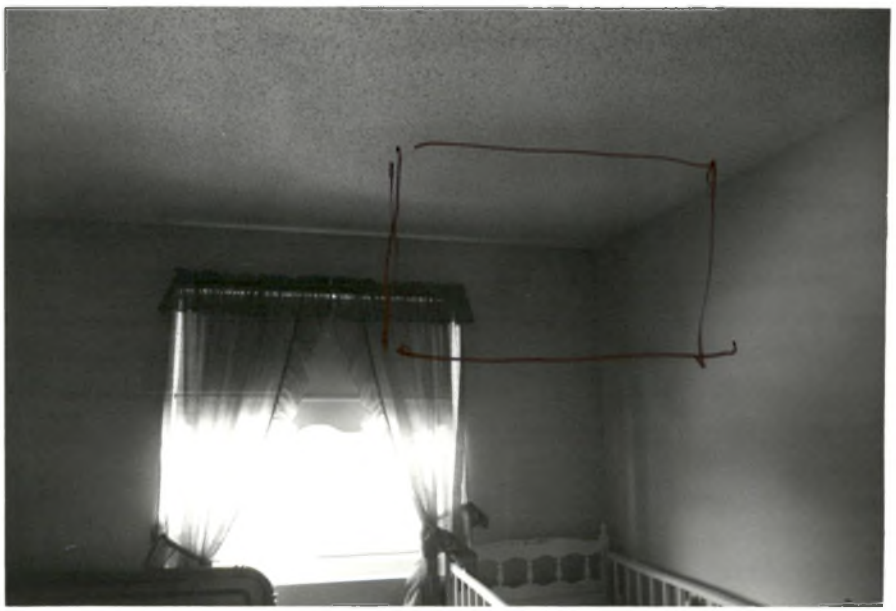
- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

EXPLANATION

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(20)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

FAMILY ROOM - S.W. CORNER

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Cold corner (inside) and cool streaks across ceiling

EXPLANATION

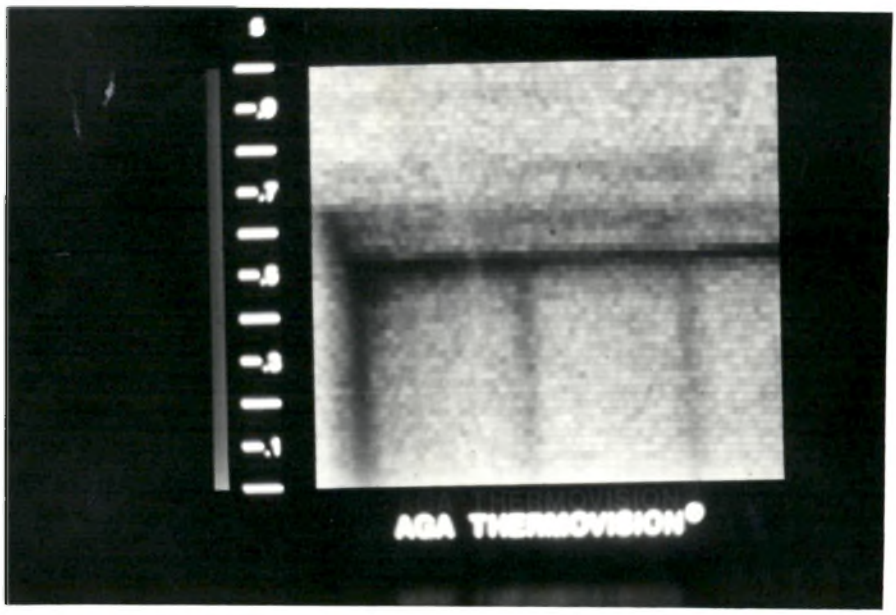
Poor A/V barrier where inside wall meets outside wall causing Air leakage across ceiling

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Feb. 24/82
- TIME 14:00
- CLIENT Test house 21
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. Semple
- GENERAL PURPOSE Applehill test

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -11
- WIND VELOCITY AND DIRECTION W @18
- RELATIVE HUMIDITY (RH_o) 47%
- AIR PRESSURE 102.2
- PRECIPITATION none
- SOLAR RADIATION none
- SKY/CLOUD CONDITIONS overcast

INSIDE

- AIR TEMPERATURE (T_1) 18.5°C @ 14:00 (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 40%
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(21)

LOCATION (WALL ORIENTATION)

Living Room. North West Corner

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold void at corner

EXPLANATION

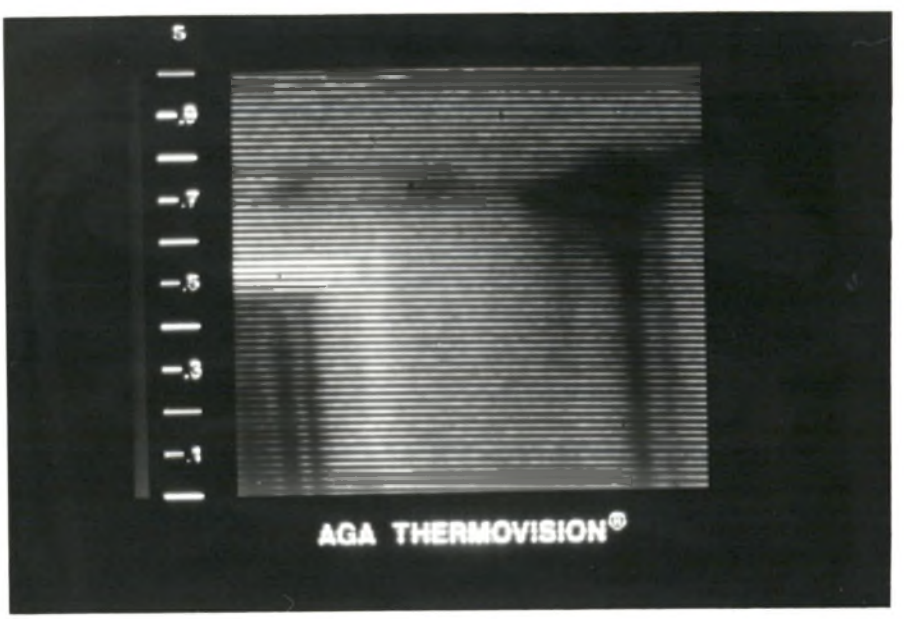
likely insufficient vapour barrier causing some air leakage and condensation

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE FEB. 24 /82
- TIME 12:00
- CLIENT Test house 22
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B SEMPLE
- GENERAL PURPOSE Applehill Test

BUILDING DESCRIPTION

- CONSTRUCTION DATE 1981
- WALL CONSTRUCTION Double Stud wall
- NO. OF STORIES one
- BASEMENT Full
- HEATING SYSTEM GAS
- D.H.W. SYSTEM GAS
- SIDING Aluminum + Brick
- WINDOWS Thermopane
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -13
- WIND VELOCITY AND DIRECTION N.W. @ 10c
- RELATIVE HUMIDITY (RH_o) 43%
- AIR PRESSURE 102.3
- PRECIPITATION none
- SOLAR RADIATION partial
- SKY/CLOUD CONDITIONS hazy sunshine

INSIDE

- AIR TEMPERATURE (T_1) 21 oC @ 12:00 (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 40%
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

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THERMOGRAPHIC SITE REPORT

(22)

LOCATION (WALL ORIENTATION)
Basement - west wall

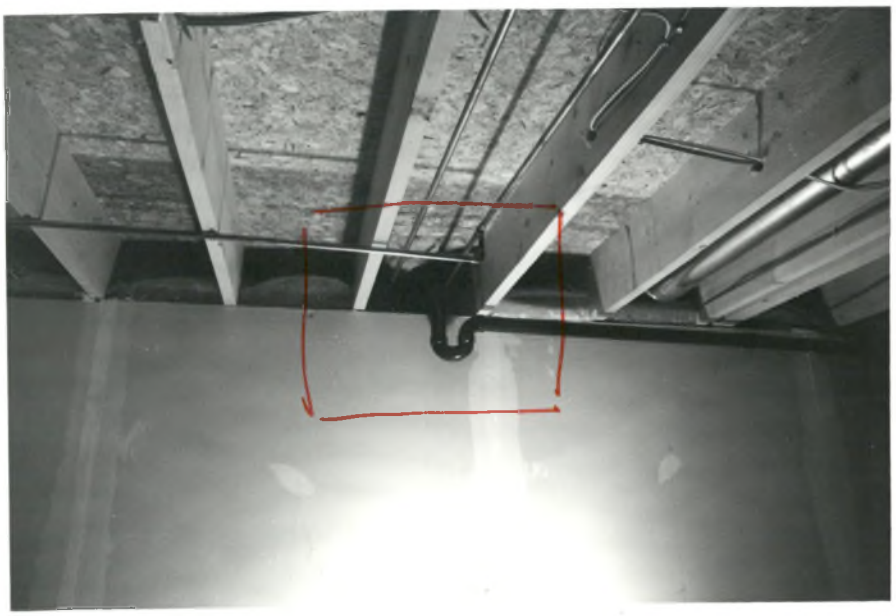
SITE CONDITIONS
- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
Air leakage + moisture buildup at joist

EXPLANATION
insufficient insulation and vapour barrier

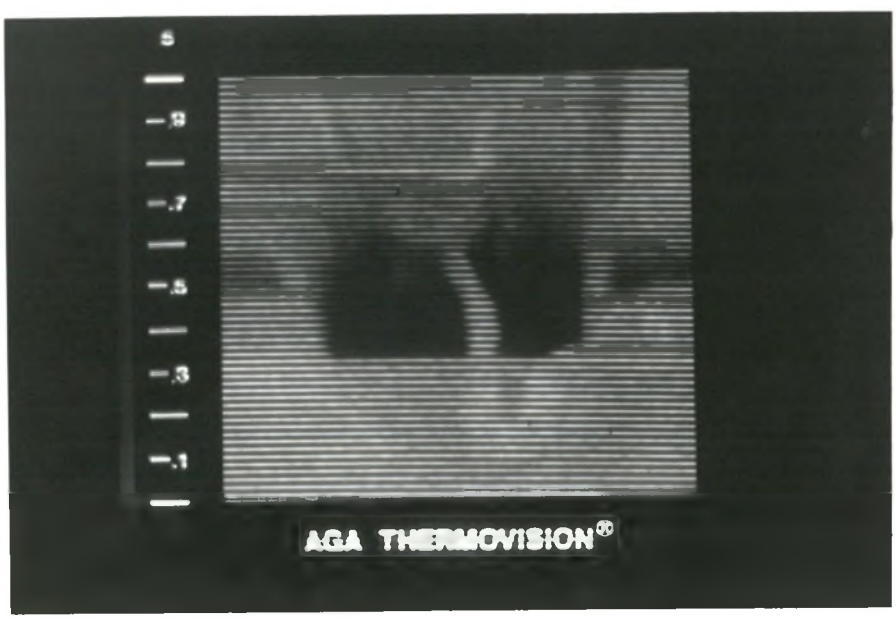
RECOMMENDATIONS
further insulation is needed. Vapour barrier between joists should likely be removed to avoid vapour lock

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(22)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

rear of fireplace in basement

SITE CONDITIONS

- DOOR FAN @ -20 pa ✓
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE brick
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

air leakage at back of fireplace

EXPLANATION

poor detail sealing vapour barrier to fireplace.

RECOMMENDATIONS

Seal with further insulation and vapour seal with caulking

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(22)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Master bedroom

SITE CONDITIONS

- DOOR FAN @ -20 pa. ✓
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

air leakage at medicine cabinet.

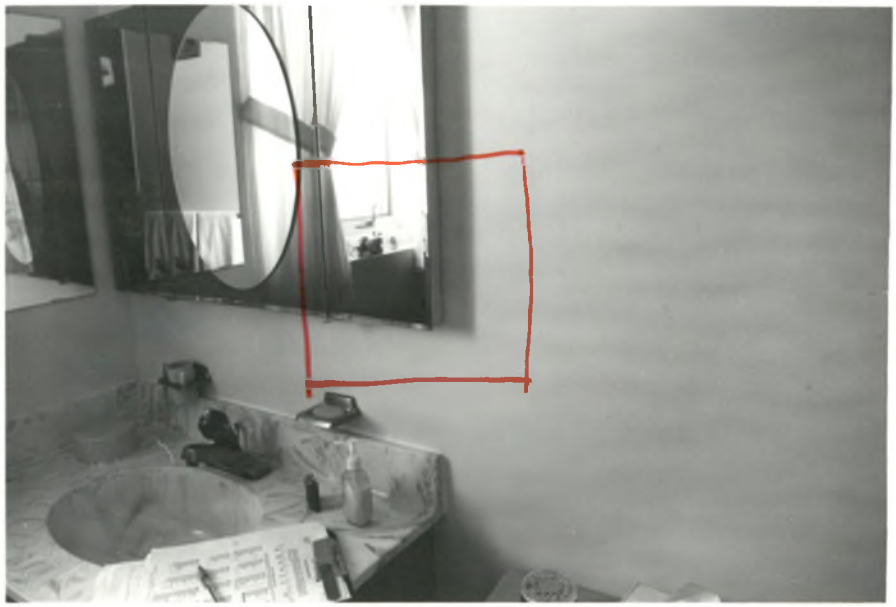
EXPLANATION

poor wall / cabinet joint

RECOMMENDATIONS

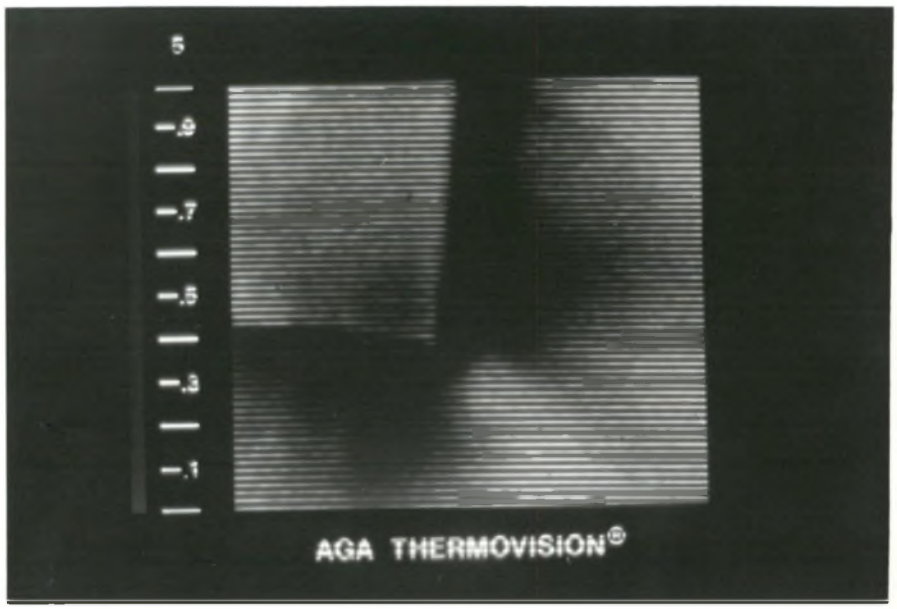
Caulk joint. If possible remove & insulate behind first.

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Mar 3/82
- TIME
- CLIENT Test house 23
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -12.9
- WIND VELOCITY AND DIRECTION W @ 9
- RELATIVE HUMIDITY (RH_o) 39
- AIR PRESSURE 102.6
- PRECIPITATION
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS

INSIDE

- AIR TEMPERATURE (T_1) 21 @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 52
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(23)

LOCATION (WALL ORIENTATION)

Main Bathroom
NORTH WALL

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

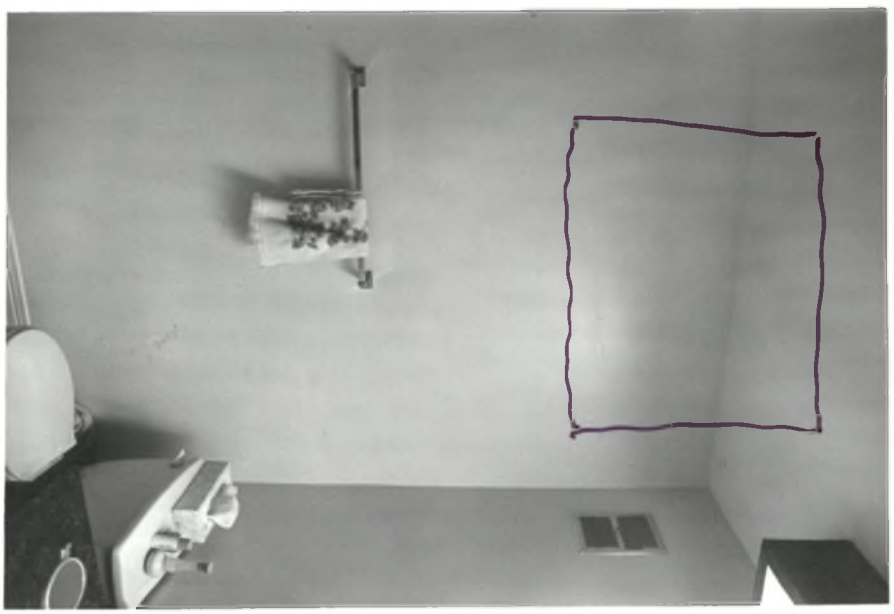
Cold air leakage down bathroom wall (exterior wall)

EXPLANATION

Air leakage from plate caused by poor A/V barrier seal @ plate.

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Master Bathroom

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

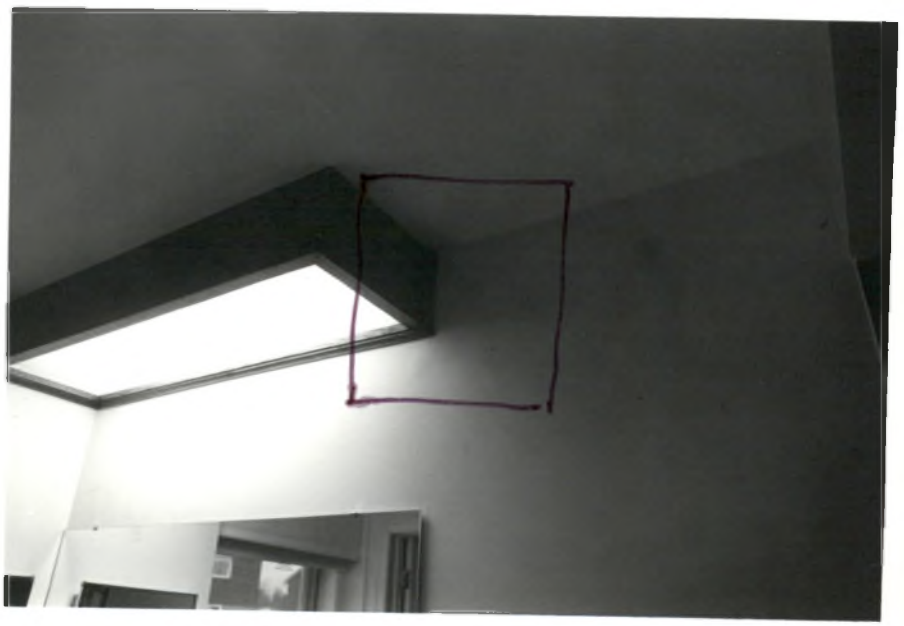
Pool image @ ceiling fixture

EXPLANATION

Leakage at fixture causing some condensation to occur in ~~the~~ wall.

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE March 4/82
- TIME
- CLIENT Test house 24
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -10
- WIND VELOCITY AND DIRECTION E. @ 26
- RELATIVE HUMIDITY (RH_o) 79
- AIR PRESSURE 101.1
- PRECIPITATION light snow
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS cloudy

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 45%
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Family Room.

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

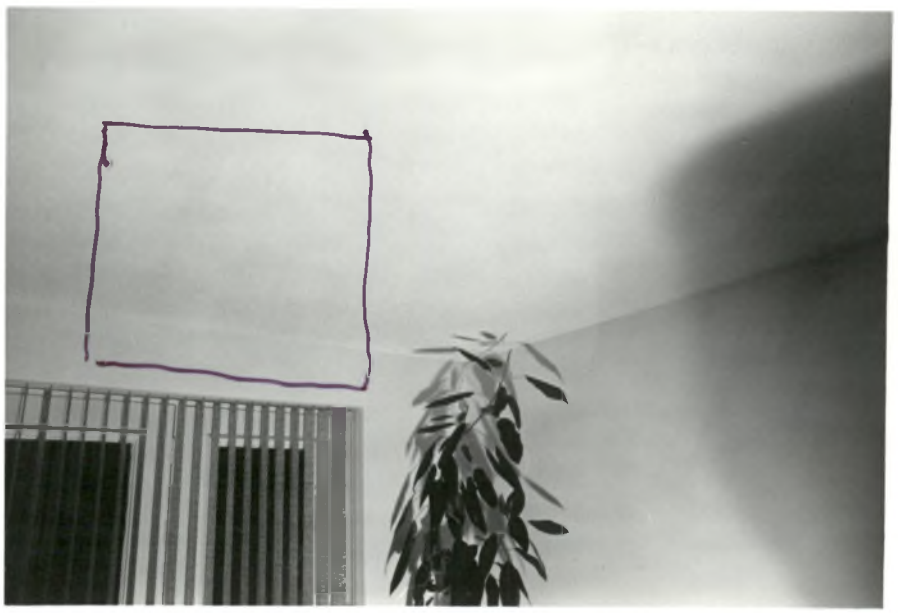
leakage across ceiling perm plate

EXPLANATION

likely due to ineffective A/V barrier @ plate.

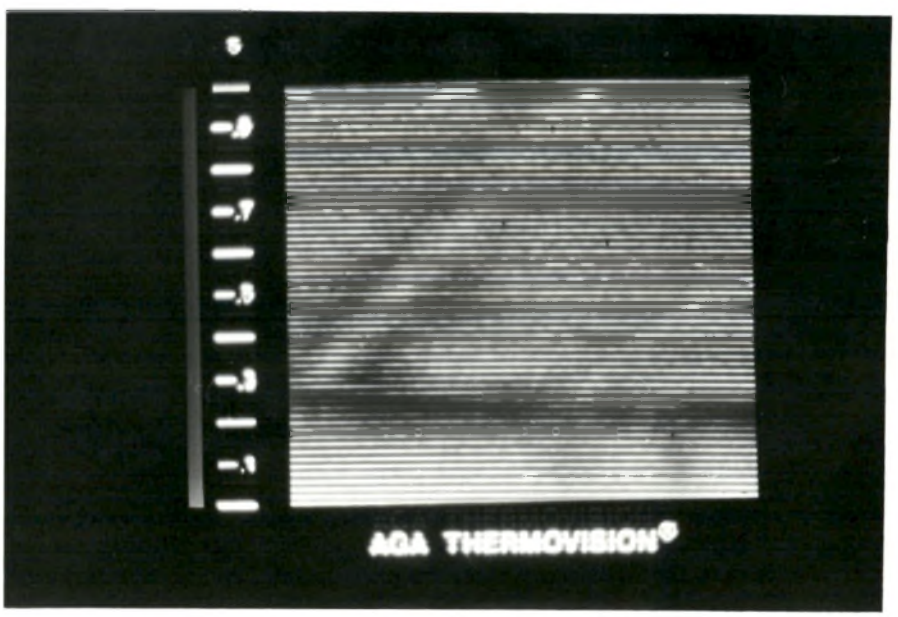
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

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THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Feb. 23/82
- TIME 11:00
- CLIENT Test house 31
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. Semple
- GENERAL PURPOSE Applehill Research

BUILDING DESCRIPTION

- CONSTRUCTION DATE 1981
- WALL CONSTRUCTION Frame - double Wall
- NO. OF STORIES 2 split level
- BASEMENT Full + crawl space
- HEATING SYSTEM GAS
- D.H.W. SYSTEM GAS
- SIDING Brick Veneer
- WINDOWS New Thermopane
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -6.4
- WIND VELOCITY AND DIRECTION N.E @ 7 K.P.H.
- RELATIVE HUMIDITY (RHo) 73%
- AIR PRESSURE 101, falling
- PRECIPITATION
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS Overcast N.E@

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

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THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)
North east corner of basement

SITE CONDITIONS

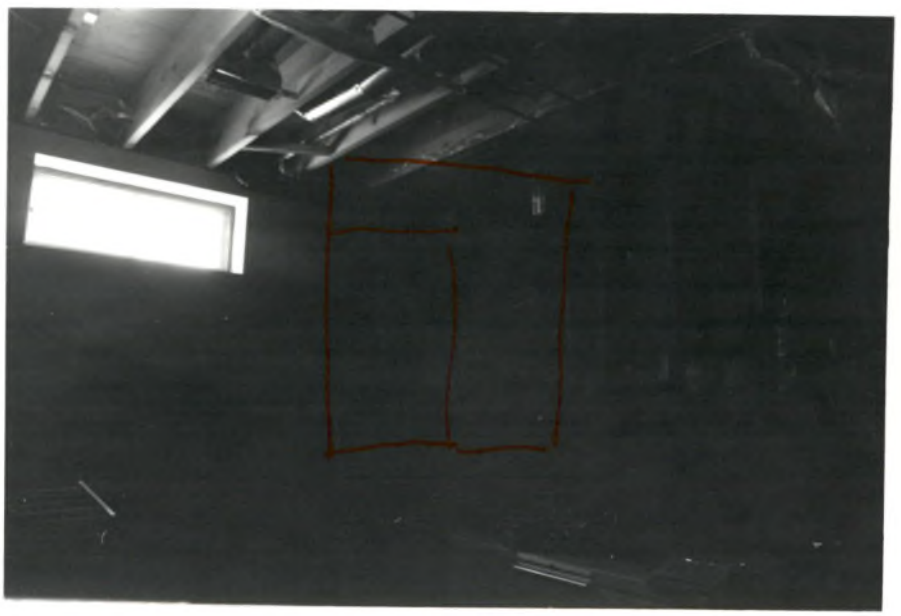
- DOOR FAN @ -20 pa. —
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
interior / exterior wall joint

EXPLANATION
Air leakage likely due to ineffective A.V. barrier & perhaps reduced insulation at this point

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Dining Room
ceiling fixture

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Airleakage at
ceiling fixture

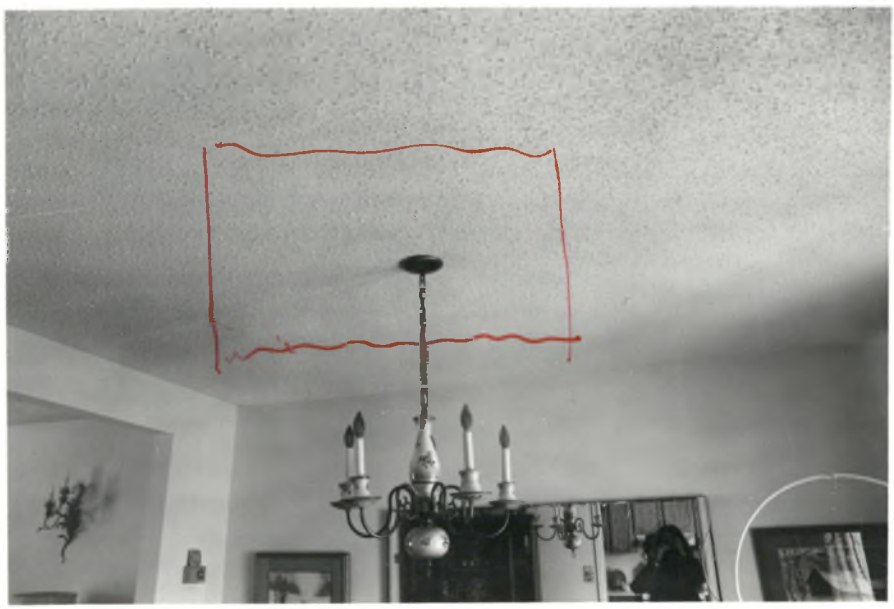
EXPLANATION

Vapour Barrier was
not sealed properly
when fixture was
installed

RECOMMENDATIONS

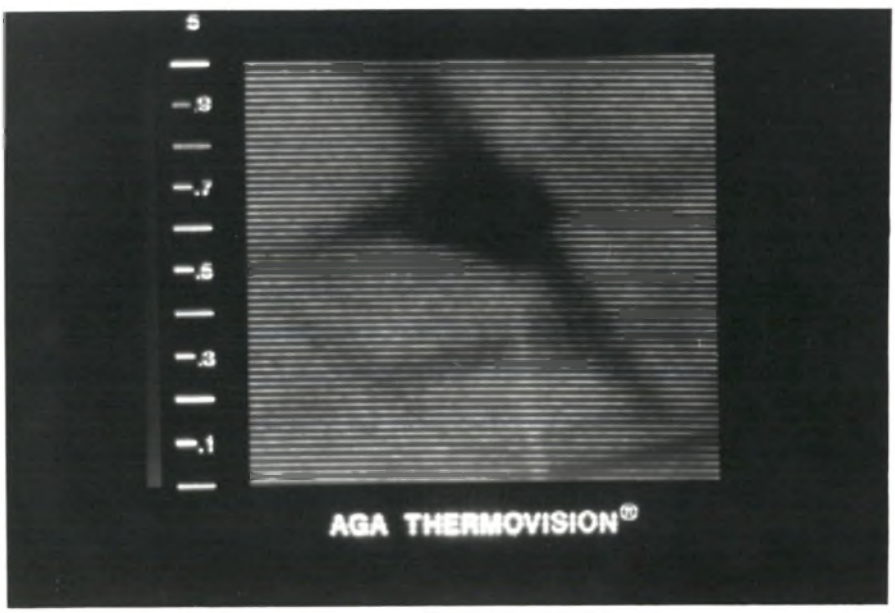
Caulk around
ceiling fixture plate

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Rear of chimney at main entrance to house

SITE CONDITIONS

- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Stucco ceiling and brick
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

air leakage at ceiling/fireplace joint

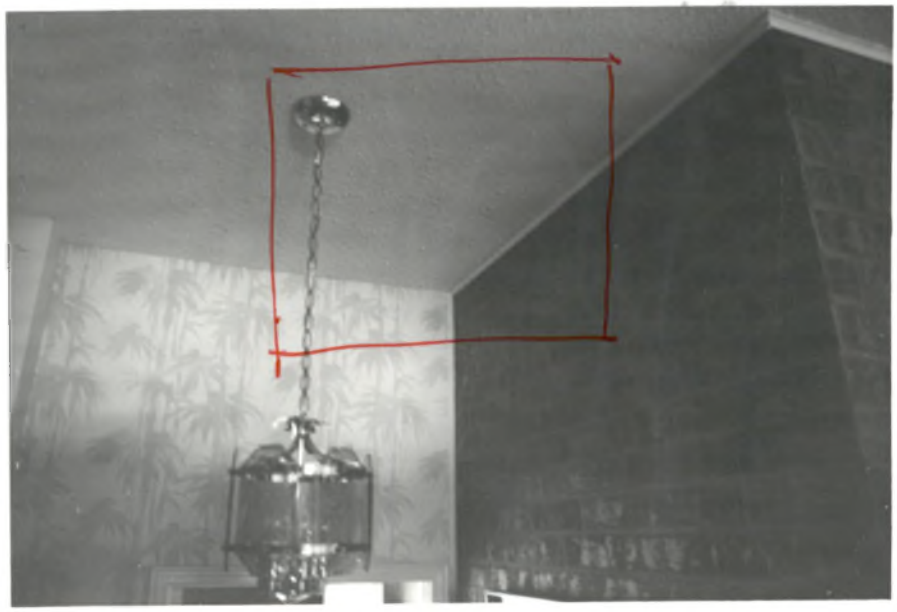
EXPLANATION

Insufficient seal at this point

RECOMMENDATIONS

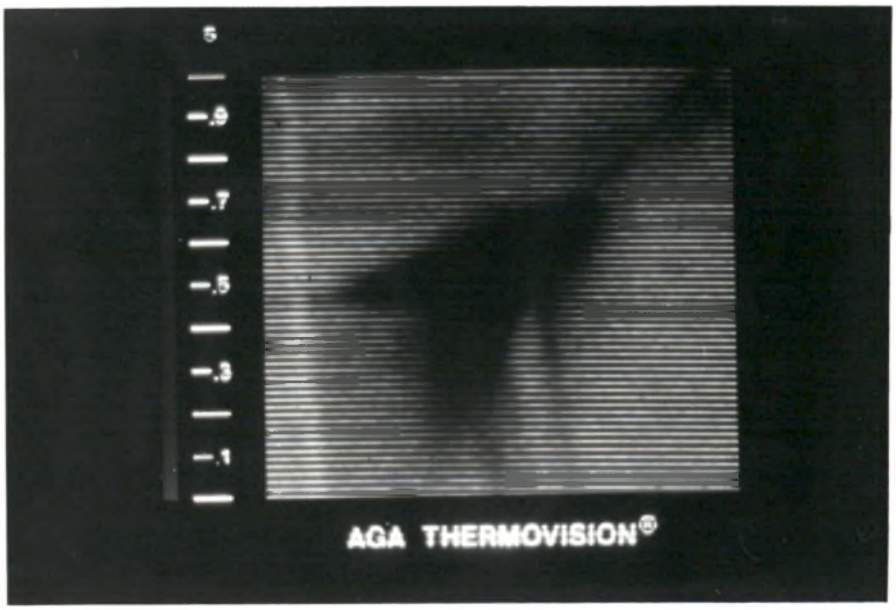
Caulk and seal this area

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Attic hatch in closet ceiling

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Stucco ceiling
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage at attic hatch

EXPLANATION

insufficient seal at trim, frame and hatch itself. Insufficient insulation on hatch as well.

RECOMMENDATIONS

Caulk trim and frame weather strip and clamp down hatch. Insulate hatch further with foam insulation.

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Wall hatch to attic

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

leakage at wall hatch.

EXPLANATION

Insufficient seal around hatch and insufficient insulation

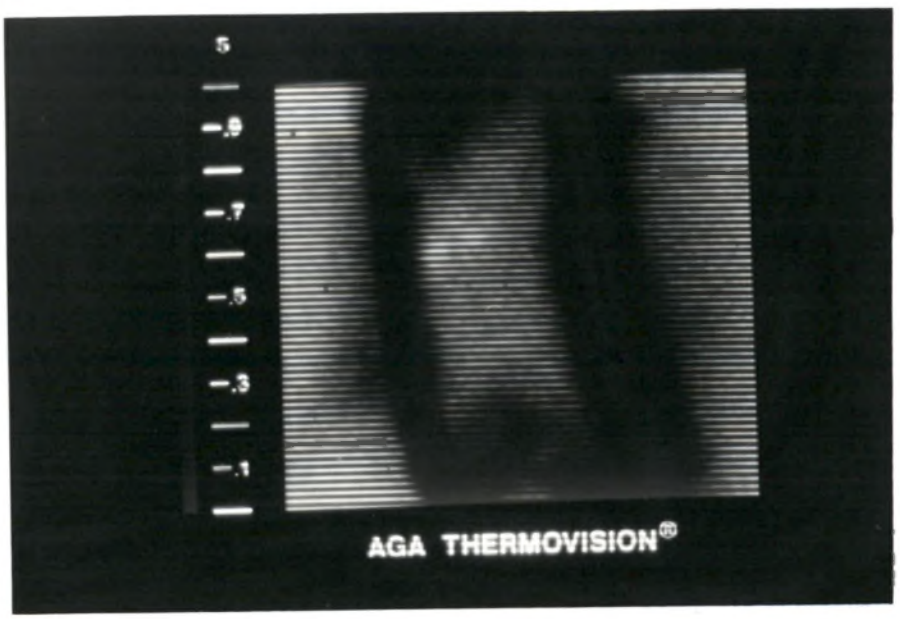
RECOMMENDATIONS

Caulk moulding + trim weather strip hatch and clamp down. Further insulate hatch with foam.

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Feb. 23, '82
- TIME 16:00
- CLIENT Test house 32
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -0.4
- WIND VELOCITY AND DIRECTION W. @ 23 K
- RELATIVE HUMIDITY (RH_o) 74%
- AIR PRESSURE 101.1, rising
- PRECIPITATION none
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS partly cloudy

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(32)

LOCATION (WALL ORIENTATION)
South West Basement Wall

SITE CONDITIONS

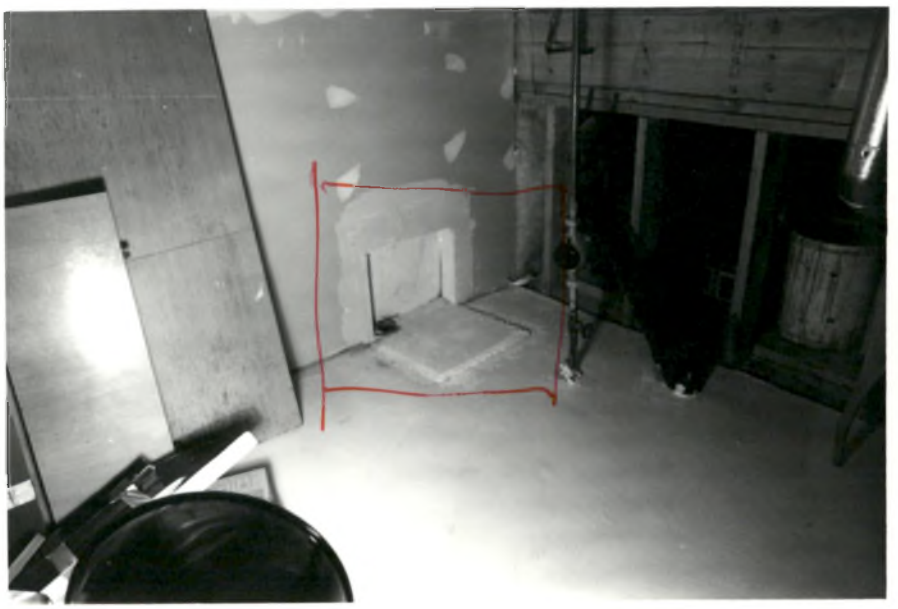
- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Drywall + Concrete
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
Cold features at panel on basement

EXPLANATION
cold air leakage

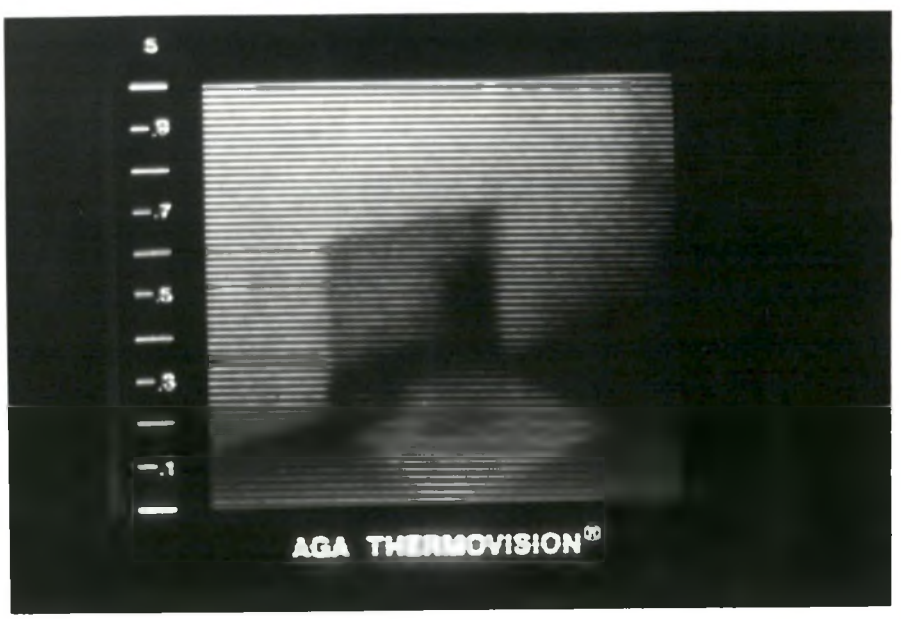
RECOMMENDATIONS
Caulk + insulate

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(32)

LOCATION (WALL ORIENTATION)

North West corner

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Where interior wall of basement meets exterior wall

EXPLANATION

No A/V seal

RECOMMENDATIONS

Seal A/V barrier

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

32

LOCATION (WALL ORIENTATION)

Ceiling of Family Area

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Stucco
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

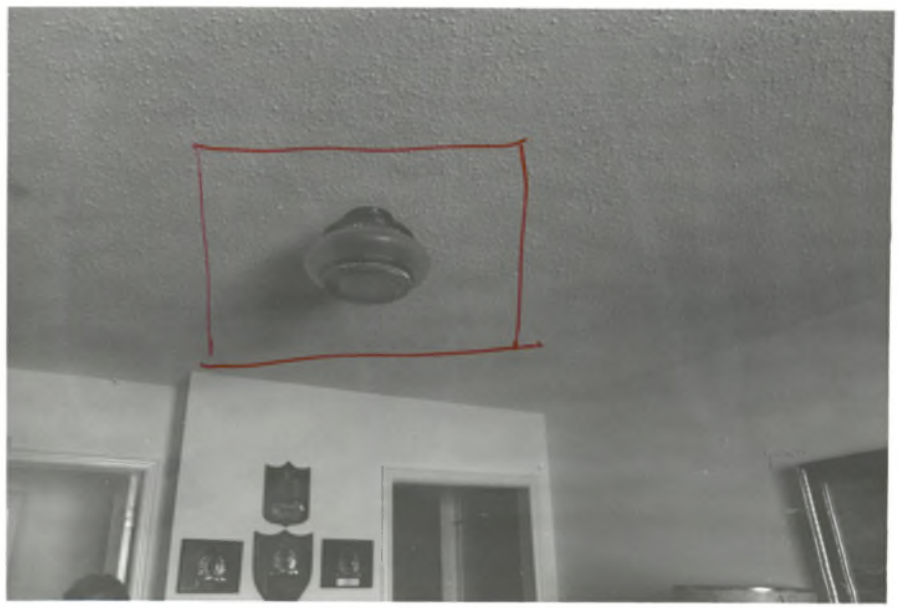
Cool features over whole ceiling

EXPLANATION

likely due to infiltration coming in from walls.

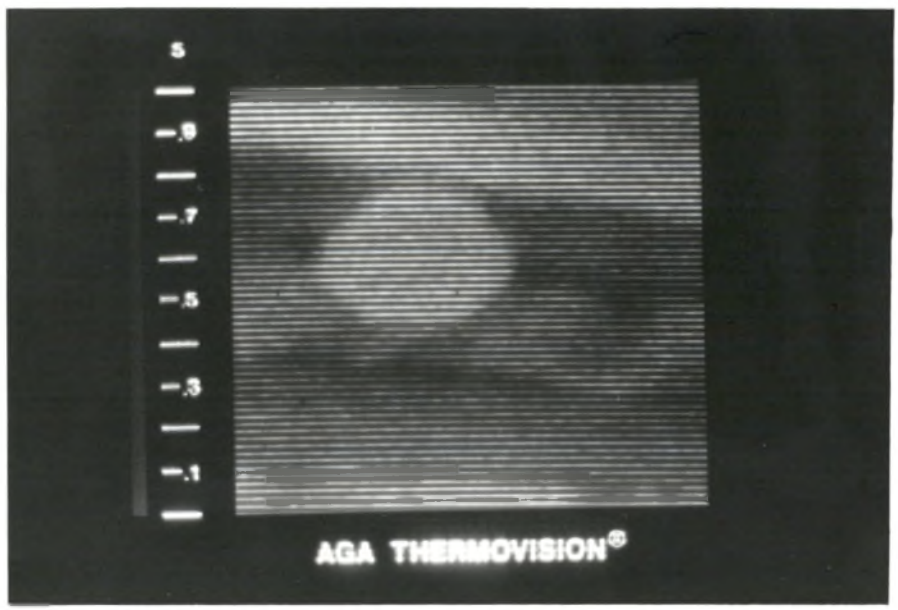
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(32)

LOCATION (WALL ORIENTATION)

Outside (South) Wall of bathroom on main floor

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE Wallpaper
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold feature on exterior wall

EXPLANATION

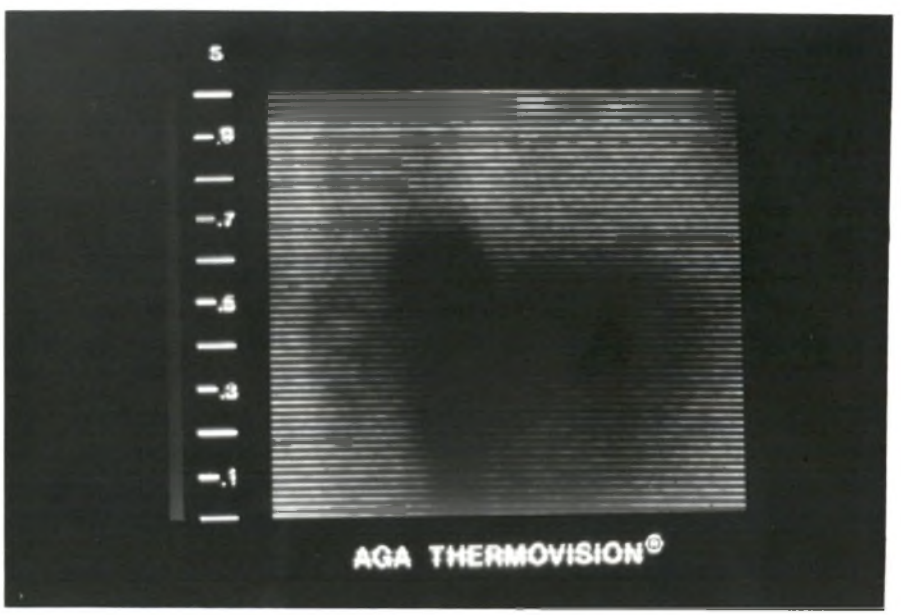
Vent was put in and later removed & not sealed properly

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(32)

LOCATION (WALL ORIENTATION)

Fireplace in Living Room

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

leakage around wall fixture and fireplace wall/joint

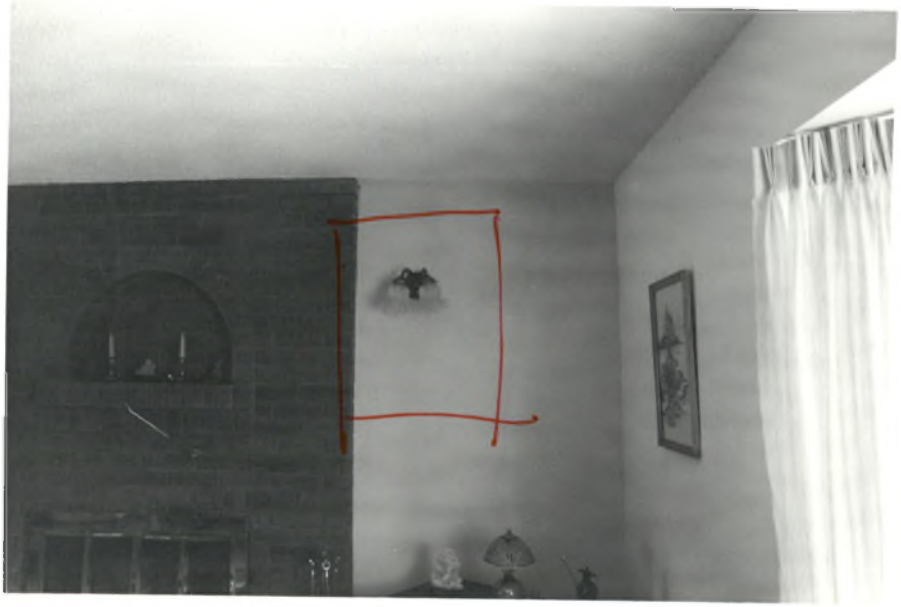
EXPLANATION

insufficient A/V barrier seal

RECOMMENDATIONS

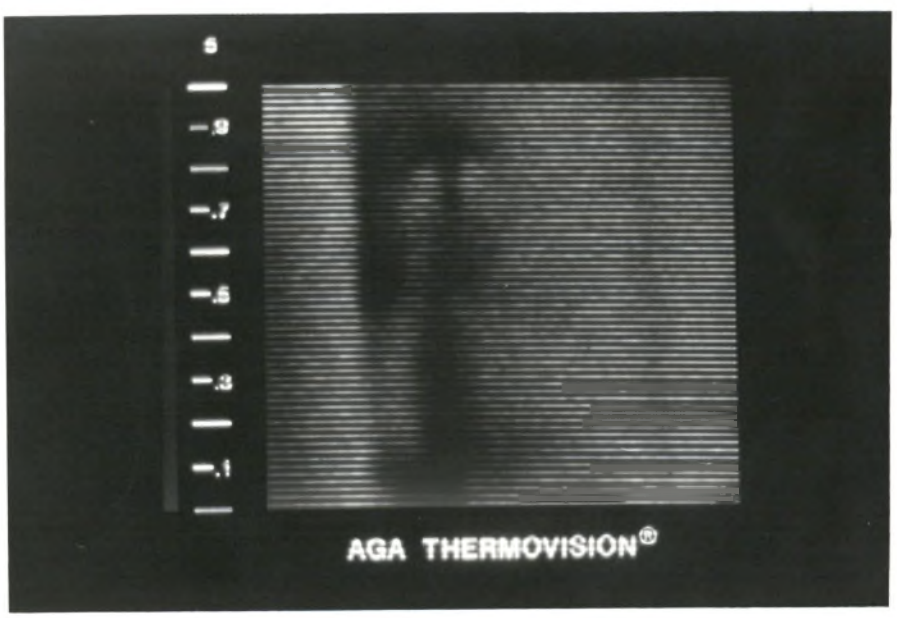
caulk joint and caulk around wall fixture

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

32

LOCATION (WALL ORIENTATION)

SITE CONDITIONS

- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

EXPLANATION

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(32)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

upstairs bathroom

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE tile
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

cold feature on wall

EXPLANATION

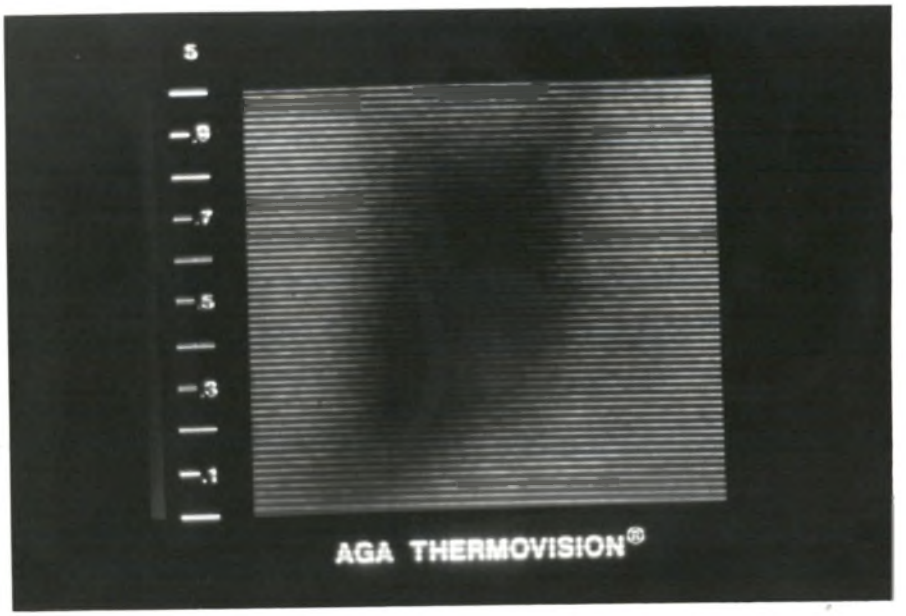
unknown

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE Feb 17/82
- TIME
- CLIENT Test house 34
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN B. Semple
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE 1981
- WALL CONSTRUCTION Frame
- NO. OF STORIES Two
- BASEMENT Full
- HEATING SYSTEM Gas
- D.H.W. SYSTEM
- SIDING Brick Veneer
- WINDOWS thermopane
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) -12 °C
- WIND VELOCITY AND DIRECTION NE @ 15 Km
- RELATIVE HUMIDITY (RH_o) 51%
- AIR PRESSURE 103.0
- PRECIPITATION none
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS Clear

INSIDE

- AIR TEMPERATURE (T_1) 17°C @ 11:00 AM (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY 42%
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(34)

LOCATION (WALL ORIENTATION)

Basement - West wall

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

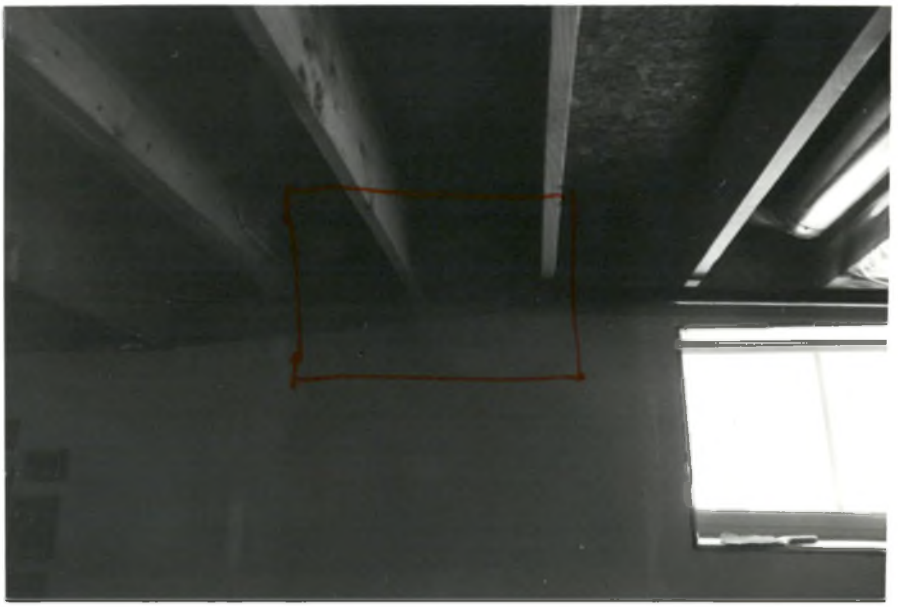
Cold image at joist header

EXPLANATION

Air leakage and condensation due to leaky A/V barrier and vapour lock due to A/V barrier too far to outside

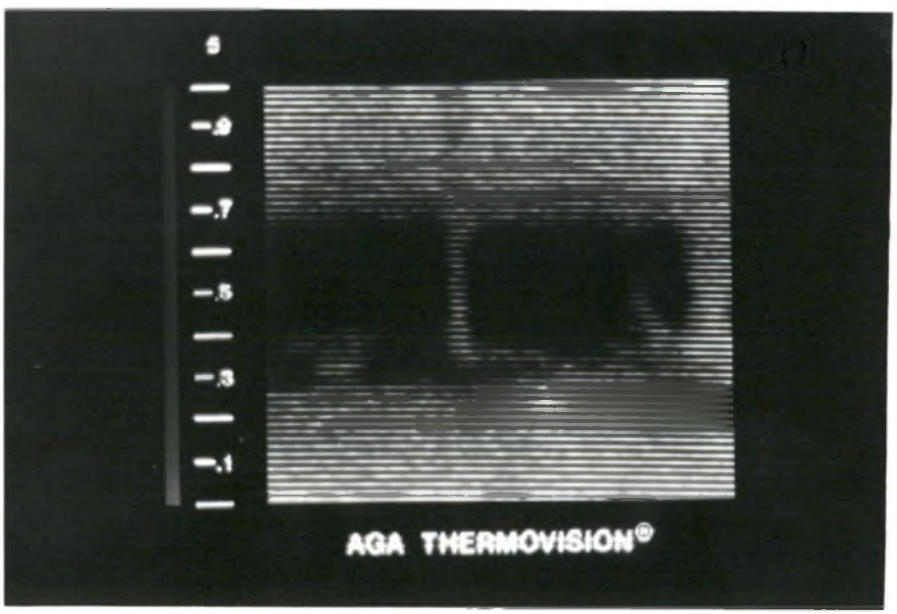
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(34)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

Master Bedroom ceiling fixture

SITE CONDITIONS

- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

extremely cold features @ light fixture and ceiling around it

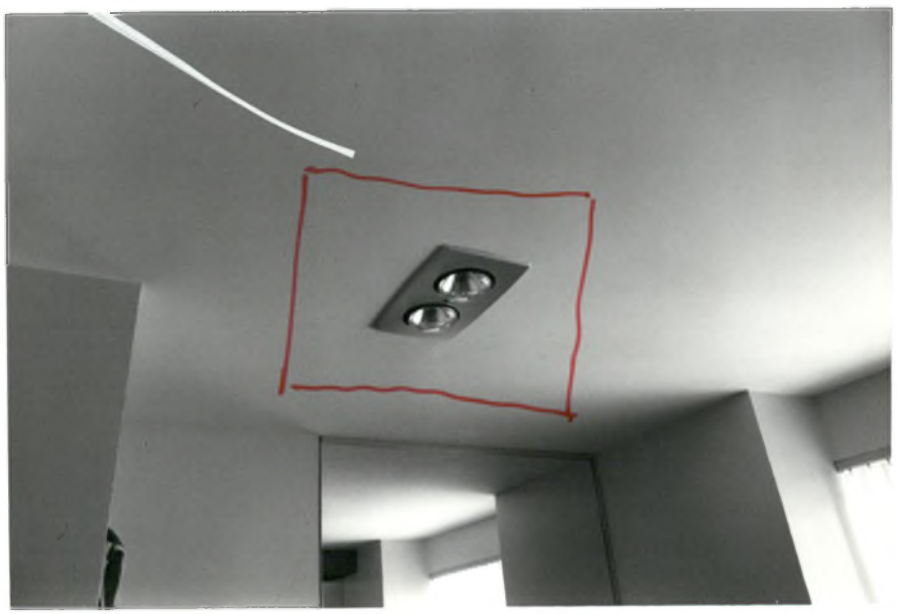
EXPLANATION

likely due to condensation due to improperly sealed A/V barrier - may be insulation problems as well.

RECOMMENDATIONS

Seal around light as best as possible

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(34)

LOCATION (WALL ORIENTATION)

Master Bedroom – North wall

SITE CONDITIONS

- DOOR FAN @ -20 pa. ✓
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

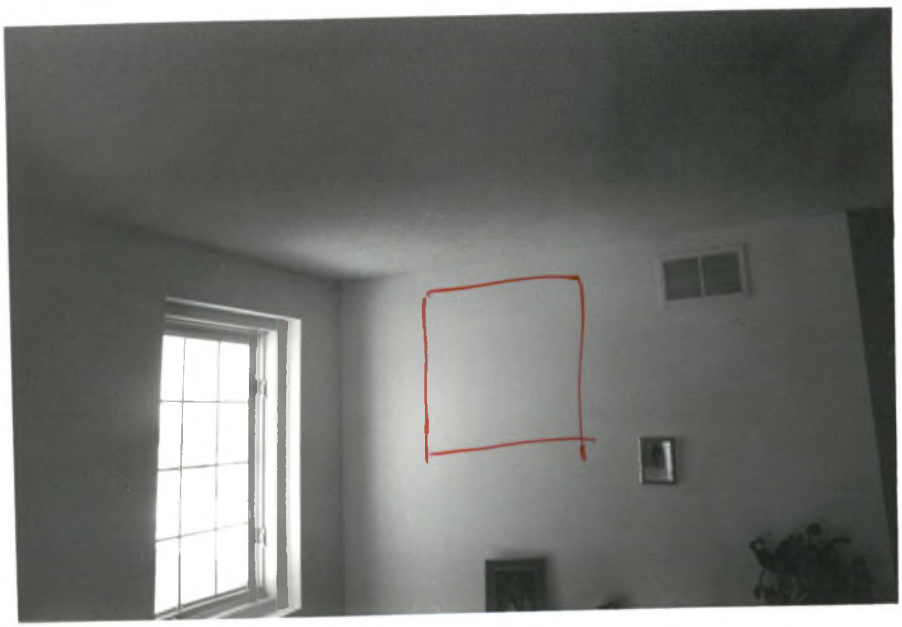
cold voids on wall

EXPLANATION

Possible voids in insulation and features indicating condensation in walls due to poor A/V barrier

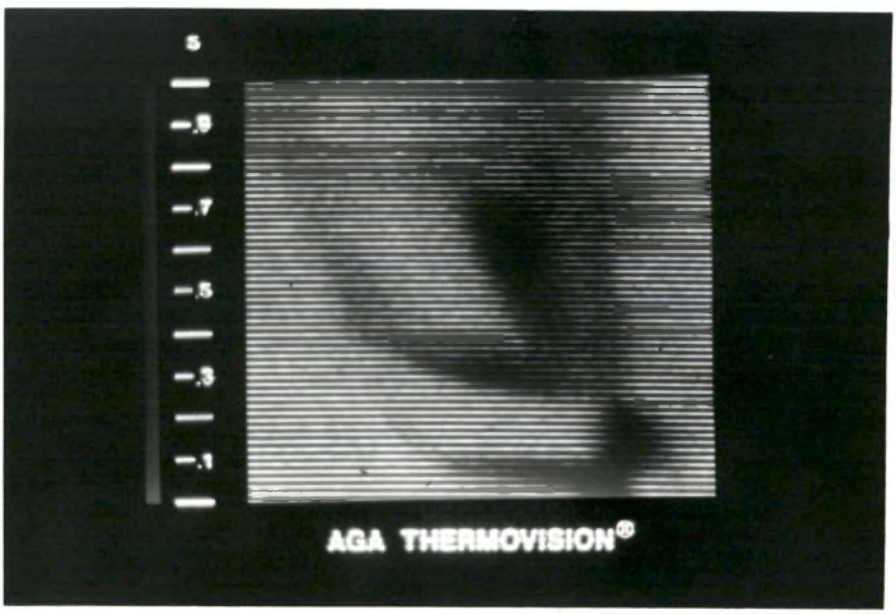
RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(34)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)
Ceiling above stairway to second floor

SITE CONDITIONS

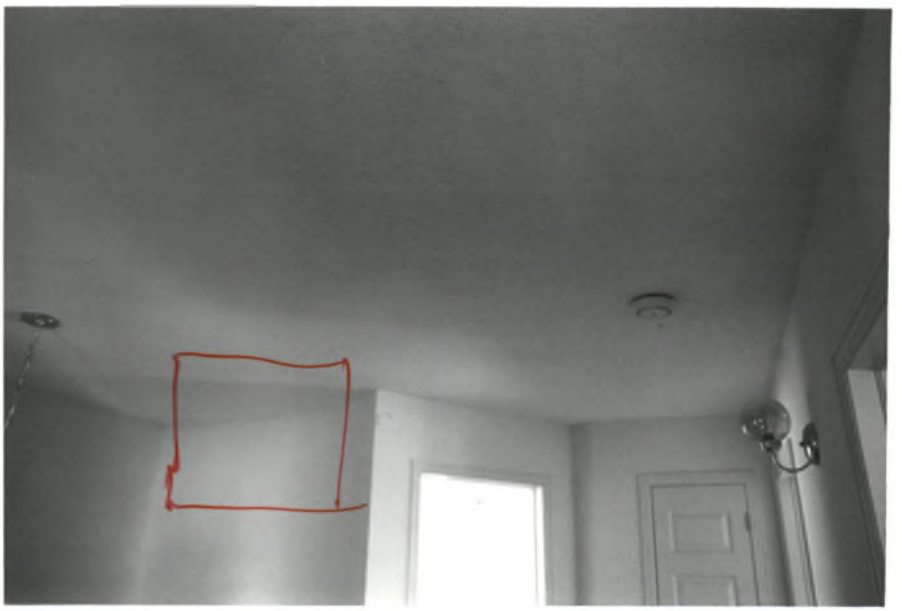
- DOOR FAN @ -20 pa.
- INTERIOR SURFACES ☑ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE drywall
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION
Air leakage on ceiling and sweeping down wall - some condensation

EXPLANATION
perhaps due to void in insulation and break in A/V barrier.

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC REPORT

IDENTIFICATION

- DATE
- TIME 17:00
- CLIENT Test House 37
- ADDRESS
- PHONE (RES.) (BUS.)
- TECHNICIAN
- GENERAL PURPOSE

BUILDING DESCRIPTION

- CONSTRUCTION DATE
- WALL CONSTRUCTION
- NO. OF STORIES
- BASEMENT
- HEATING SYSTEM
- D.H.W. SYSTEM
- SIDING
- WINDOWS
- VENTILATION SYSTEM

TEST CONDITIONS

OUTSIDE

- AIR TEMPERATURE (T_o) 3°
- WIND VELOCITY AND DIRECTION W. @ 17
- RELATIVE HUMIDITY (RH_o) 44%
- AIR PRESSURE 102.7
- PRECIPITATION -
- SOLAR RADIATION
- SKY/CLOUD CONDITIONS some clouds

INSIDE

- AIR TEMPERATURE (T_1) @ (time)
- AIR TEMPERATURE (T_1) @ (time)
- T_1 LOCATION
- RELATIVE HUMIDITY
- AIR PRESSURE
- DIFFERENCE T_1/T_o (ΔT)
- REFERENCE SURFACE TEMP. (T_R)
- T_R LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

(37)

LOCATION (WALL ORIENTATION)

NORTH WEST BEDROOM.
NORTH WEST CORNER.

SITE CONDITIONS

- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

COLD PLATE AND AIR LEAKAGE ACROSS CEILING

EXPLANATION

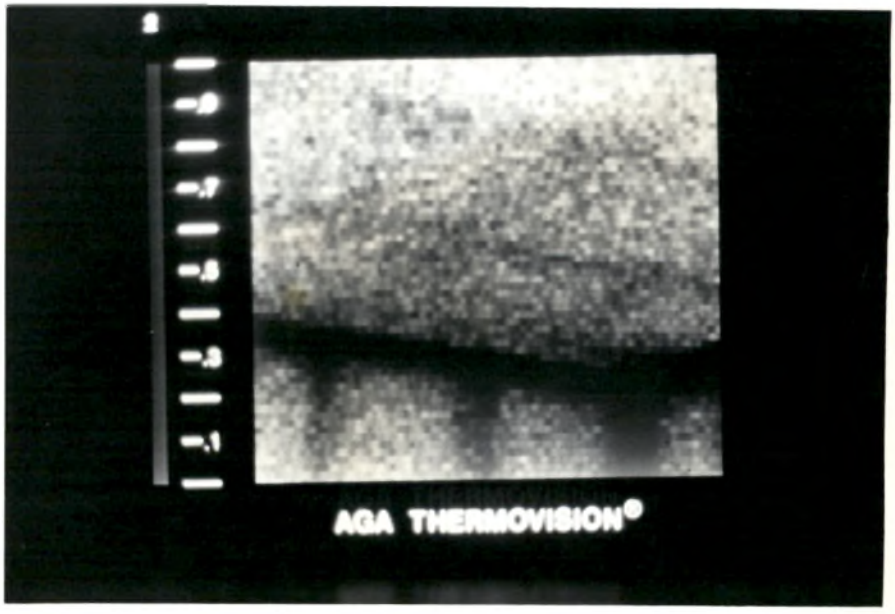
POOR AIR BARRIER AT PLATE

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(37)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

DINING ROOM — NORTH

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage through uninsulated ceiling space.

EXPLANATION

poor A.V. barrier at plate and header of 2ND floor

RECOMMENDATIONS

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

FAMILY ROOM - EAST

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

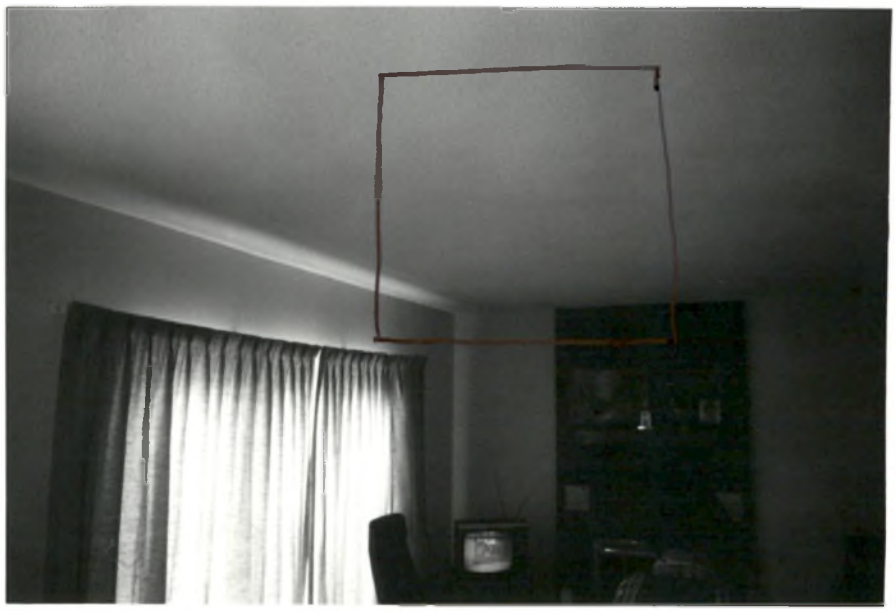
Air leakage across uninsulated ceiling

EXPLANATION

Likely poor A/V barrier at the fireplace/ ceiling joint.

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

(37)

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

FIREPLACE - EAST WALL

SITE CONDITIONS

- DOOR FAN @ 20 pa.
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE
- HEATING SYSTEM CONDITION
- TIME
- ROOM TEMP.
- REFERENCE TEMP (T_R)
- SURFACE TEMP. @ PROBLEM (S_1)
- OTHER SURFACE TEMP. (S_2)
- OTHER SURFACE TEMP. (S_3)
- DIFFERENCE T_R/S_1

PROBLEM DESCRIPTION

Air leakage @ Fireplace/WALL joint.

EXPLANATION

Inadequate seal

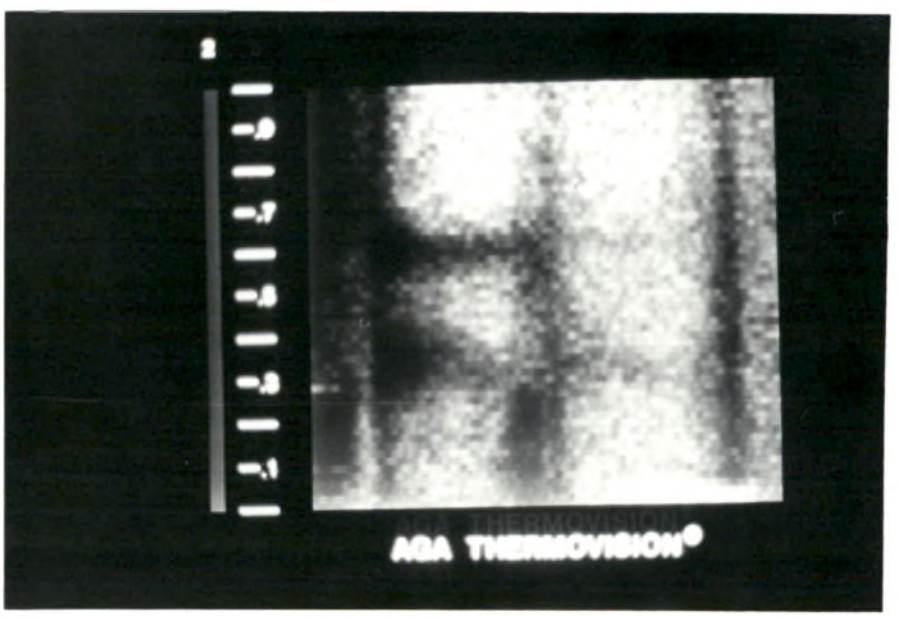
RECOMMENDATIONS

Caulk joint.

VISUAL

NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM



NOTE SURFACE TEMPERATURES AND THEIR LOCATION

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Retrospectors

THERMOGRAPHIC SITE REPORT

LOCATION (WALL ORIENTATION)

SITE CONDITIONS

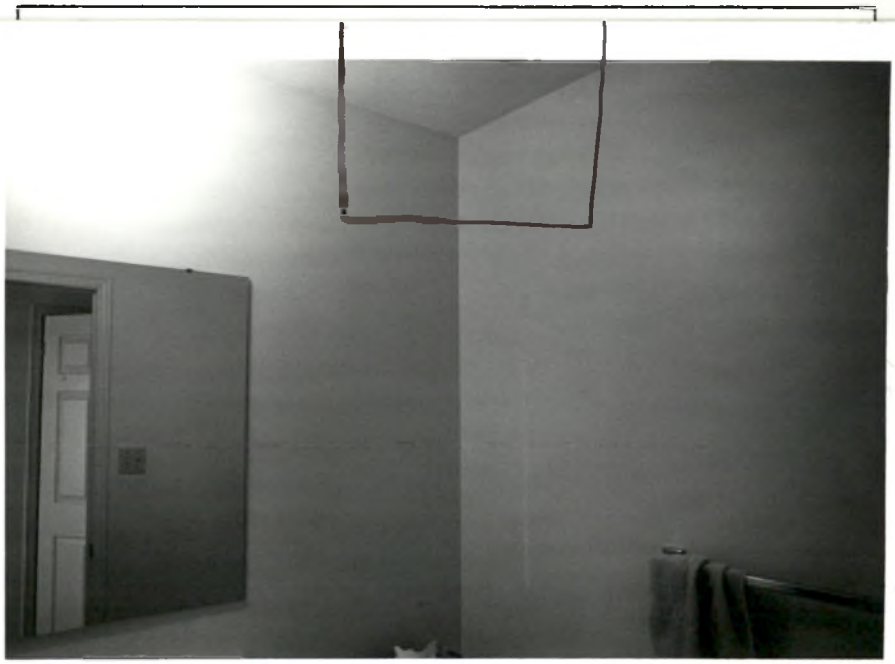
- DOOR FAN @ _____ pa. _____
- INTERIOR SURFACES ☐ ACCESSIBLE ☐ OBSTRUCTED
- SURFACE TYPE _____
- HEATING SYSTEM CONDITION _____
- TIME _____
- ROOM TEMP. _____
- REFERENCE TEMP (T_R) _____
- SURFACE TEMP. @ PROBLEM (S_1) _____
- OTHER SURFACE TEMP. (S_2) _____
- OTHER SURFACE TEMP. (S_3) _____
- DIFFERENCE T_R/S_1 _____

PROBLEM DESCRIPTION

EXPLANATION

RECOMMENDATIONS

VISUAL



NOTE THERMOGRAM LOCATION AND PROBLEM AREA

THERMOGRAM

NOTE SURFACE TEMPERATURES AND THEIR LOCATION