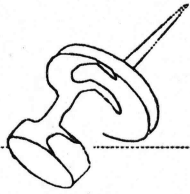
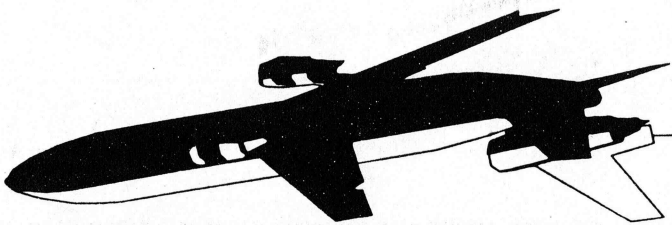


MAC Part 150 Part 150 Program

**Program Completion
Program Cost Summary**

MAC

Part 150 Sound Insulation Program



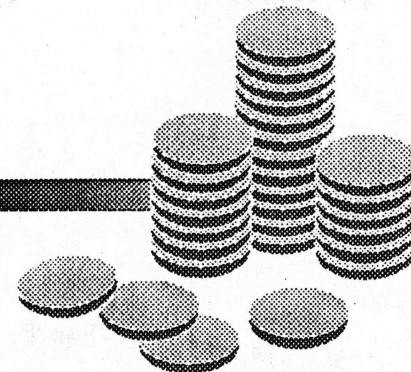
Completed Homes (1992-97)

1992-93	139 Homes	\$4.4M
1993-94	243 Homes	\$5.9M
1994-95	599 Homes	\$10.4M
1995-96	843 Homes	\$14.5M
1996-97	1,002 Homes	\$20.7M
1997-98	847 Homes	\$20.7M
TOTAL	3,673 Homes	\$76.6M

MAC PART 150 RESIDENTIAL SOUND INSULATION PROGRAM

■ 1992 - 1997 Completion & Funding Summary

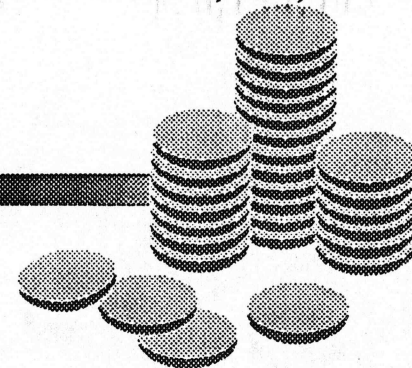
<u>Year</u>	<u>Workscope</u>	<u>TOTAL \$</u>	<u>AIP Grant \$</u>	<u>MSP PFC\$</u>
1992	139 homes	\$4.4M	\$3.5M	\$0.9M
1993	243 homes	\$5.9M	\$4.7M	\$1.2M
1994	599 homes	\$10.4M	\$3.0M	\$7.4M
1995	843 homes	\$14.5M	\$8.3M	\$6.2M
1996	1,002 homes	\$20.7M	\$5.7M	\$15.7M
1997	847 homes	\$20.7M	\$3.5M	\$17.2M
Total	3,673 homes	\$76.6M	\$28.7M	\$48.6M



MAC PART 150 SCHOOL SOUND INSULATION PROGRAM

■ 1981 - 1998 Funding Summary

	<u>SCHOOL</u>	<u>TOTAL \$</u>	<u>MN DOT \$</u>	<u>AIP Grant \$</u>	<u>MAC/PFC \$</u>
(1981)	St. Kevins	\$215,321	\$93,976	\$0	\$121,345
(1988)	Wenonah	\$1,153,525	\$171,200	\$397,848	\$584,477
(1988)	Centennial	\$1,809,248	\$132,000	\$536,584	\$1,140,664
(1989-90)	Hale	\$1,585,619	\$123,500	\$955,647	\$506,472
(1989-90)	Resurrection	\$1,263,284	\$323,300	\$557,179	\$382,805
(1991-92)	Windom	\$1,926,172	\$0	\$0	\$1,926,172
(1995)	Mt. Calvary	\$1,030,917	\$0	\$576,357	\$454,560
(1996)	Visitation	\$3,500,000	\$0	\$1,500,000	\$2,000,000
(1996)	St. Thomas	\$3,600,000	\$0	\$1,500,000	\$2,100,000
(1997)	Keewaydin	\$2,170,000	\$0	\$1,252,500	\$918,000
(1998)	<u>Washburn/Ramsey</u>	<u>\$10,000,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$10,000,000</u>
	TOTAL	\$28,254,086	\$843,976	\$7,276,115	\$20,134,495



MAC PART 150 RICHFIELD (NFT/RA) ACQUISITION/RELOCATION PROGRAM

■ 1993 - 1997 Completion & Funding Summary

<u>Year</u>	<u>TOTAL \$</u>	<u>AIP Grant \$</u>	<u>MSP PFC\$</u>
1993	\$15.0M	\$12.0M	\$3.0M
1994	\$8.8M	\$7.3M	\$1.5M
1995	\$10.4M	\$8.3M	\$2.1M
1996	\$7.5M	\$0.0M	\$7.5M
<u>1997</u>	<u>\$9.2M</u>	<u>\$0.0M</u>	<u>\$9.2M</u>
Total	\$50.9M	\$27.6M	\$23.3M

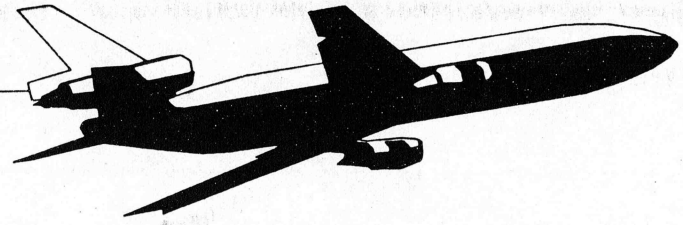


**MAC Part 150 Part 150
Residential Insulation Program**

Key Program Highlights

MAC

Part 150 Sound Insulation Program

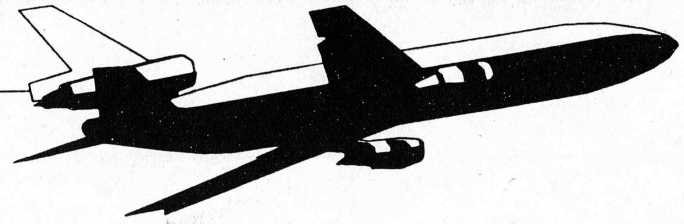


5 Decibel Reduction Package

- Reconditioning or Replacement of Existing Windows
- Addition of Exterior Acoustical Storm Windows
- Reconditioning or Replacement of Existing Prime Doors
- Addition of Exterior Acoustical Storm Doors
- Addition of Wall & Attic Insulation (*where permitted*)
- Baffling of Roof & Attic Vents (*where permitted*)
- Addition of Central Air Conditioning (*if not existing*)
- IAQ Remedial Modifications (*if required by "Post" test*)

MAC

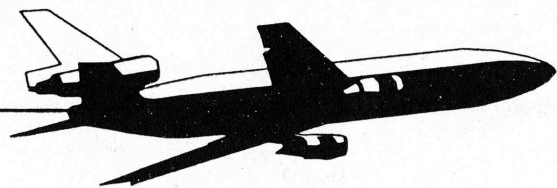
Part 150 Sound Insulation Program



Unique Program Elements

- ★ "House by House" system
- ★ Unique Acoustical Designs
- ★ 5 Decibel Reduction Package
- ★ Air Conditioning Modifications
- ★ Contractor Choices
- ★ Product Style Choices

MAC



Part 150 Sound Insulation Program

**Part 150
NOISE
ATTENUATION
GOALS**

The MAC Part 150 Program is designed to reduce the interior sound level of a home by a goal of 5 Decibels

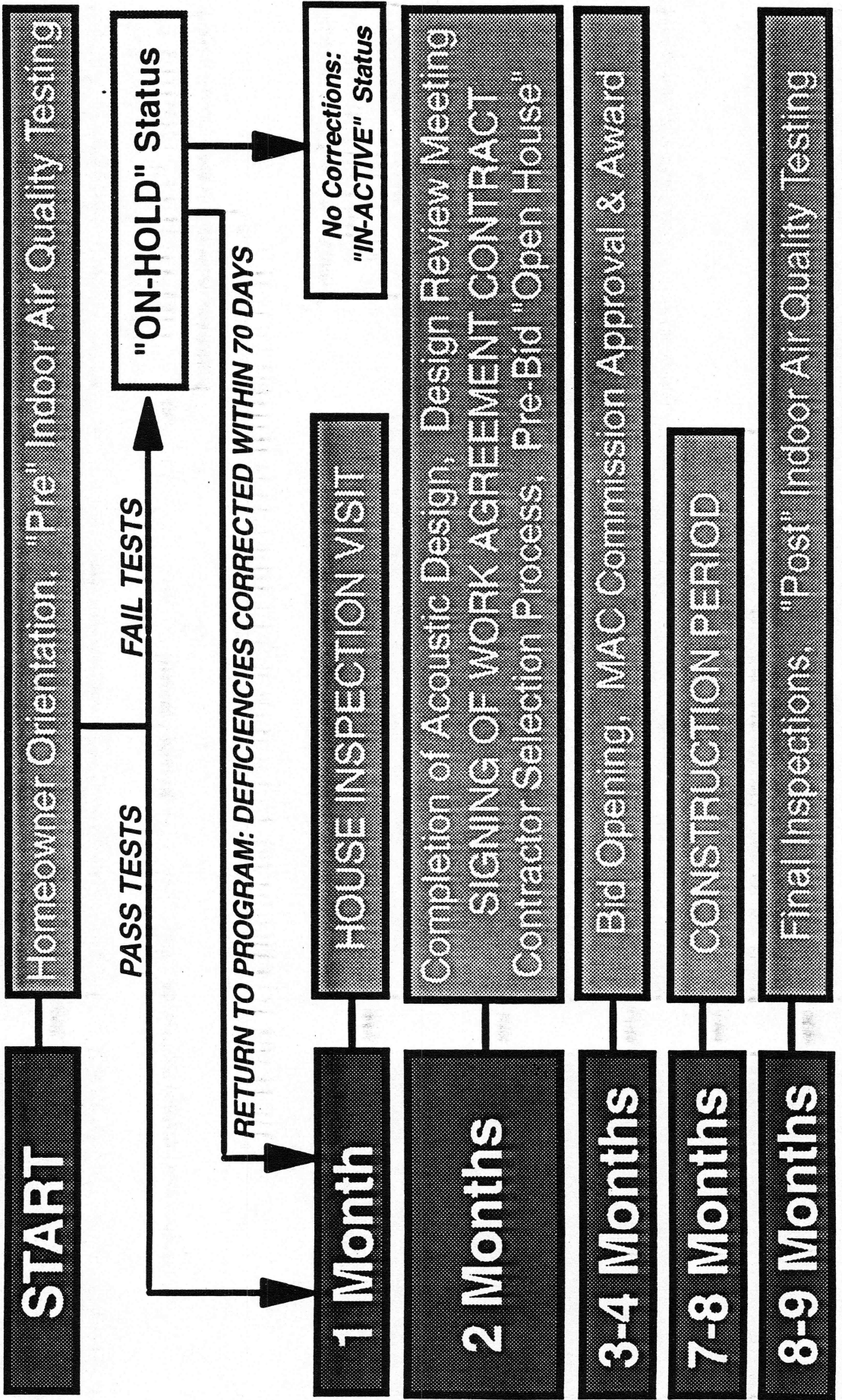


MAC



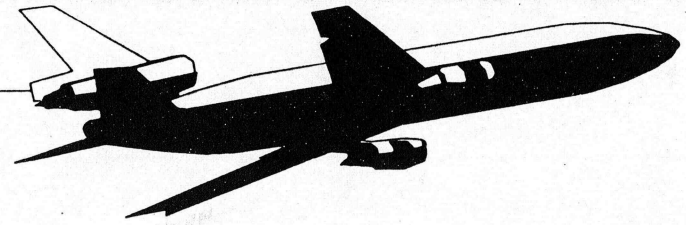
Part 150 Sound Insulation Program

**Program Process:
9-MONTH
TIMELINE**

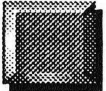


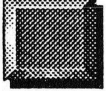
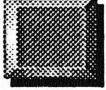
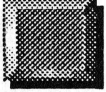
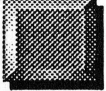



MAC

Part 150 Sound Insulation Program



Part 150 Time Requirements (20hrs.)

-  4 hours - "Pre" Ventilation & IAQ Test (**access only*)
-  3 hours - House Inspection Visit (*15-30 min. mechical visit, if necessary*)
-  2 hours - Design Review Meeting
-  4 hours - Pre-Bid Open House (**access only*)
-  1 hour - Pre-Construction Walk-thru
-  1 hour - Substantial Completion Inspection
-  1 hour - City Inspection (**access only*)
-  4 hours - "Post" Ventilation & IAQ Test (**access only*)

MAC

Part 150 Sound Insulation Program



Quality Management Measures

- ★ **Stringent Acoustic Product Testing & Standards**
- ★ **Random "Pre" & "Post" Acoustic Field Monitoring**
- ★ **Stringent Contractor & Construction Standards**
- ★ **Indoor Air Quality & Ventilation Design Elements**
- ★ **"Pre" & "Post" IAQ and Ventilation Testing**
- ★ **"Pre" & "Post" Homeowner Opinion Surveys**

**MAC Part 150 Part 150
Residential Insulation Program**

1991-1997 Key Program Changes

MAC Part 150 Residential Sound Insulation Program 1991-1998 Key Program Changes

- 1. Conversion from a "Cluster" bid method (construction contracts containing 40-50 homes) to the "House by House" bid method (single construction contracts for each home)**

Result: more competitive bidding, since it eliminated "blind" bidding

- 2. Development of the "Acoustic Designer" and "Construction Coordinator" positions**

Result: the addition of more specialization in the design process (by separating the duties of design and construction management processes) resulted in more consistent designs and construction management

- 3. Addition of Homeowner upgrades on limited window and door products**

Result: allowed more non-acoustical product options for homeowners

- 4. Removal of the \$25,000 cap per home**

Result: bigger homes result in higher costs; a 25,000 cap would have limited the effectiveness of the 5 decibel reduction package

- 5. Development of general contractor "deficiency notices"**

Result: management tool that penalizes contractors who fail to follow program specifications and construction guidelines

- 6. Development of new contractor probation period**

Result: insured that new contractors entering the program successfully met program construction and paperwork guidelines before bidding on multiple homes (new contractors are limited to 5 homes for the first year)

- 7. Establishment of a 6-month Final payment deadline on each Part 150 contract**

Result: In the MAC Part 150 Program there are two payments made for each contract, the Substantial payment (95%) and the Final payment. By limiting the

final payment required paperwork to a 6-month deadline, MAC insured that yearly grants could be closed-out on time.

- 8. Workers Compensation requirement on all Part 150 contracts for all general contractors, subcontractors, regardless of their "owner" status in the company (Minnesota state laws do not require owners to carry Workers Compensation, even though they may be working on the jobsite**

Result: Insures that every worker on a Part 150 jobsite is covered with Workers Compensation insurance

- 9. Development of Part 150 Program restriction to providing wood replacement windows with "True Divided Lite" glass components. Instead, the MAC Part 150 Program will provide the industry standard, "False Divided Lite", which simulates independent sections of glass while providing a better acoustic-performing window**

Result: windows with "True Divided Lite" (individual glass sections separated by wood muntin dividers) are considered a custom upgrade and are very costly. "False Divided Lite" windows provide a great overall cost savings, in addition to providing a better performing product.

- 10. Addition of an architect position in the Part 150 house design process to insure a more accurate and complete design that is also sensitive to architectural aesthetics**

Results: many homes in the MAC Part 150 Program were built during the 1920's, 1930's and 1940's. The majority of these homes contain many architectural design elements that need to be considered while replacing existing windows, doors and providing air conditioning. The design team of an architect, acoustical designer, indoor air quality technician and mechanical technician insure that the design will be contain all acoustic and aesthetic design elements.

- 11. Development of a Part 150 insulation process for homes listed on the National Historic Register**

Results: working with the Minnesota Historical Society, MAC developed a process for providing Part 150 insulation modifications to historic homes, while complying with state and federal standards.

12. Introduction of more complete product acoustic standards that contain both STC (sound transmission class) and ANLR (aircraft noise level reduction) criteria

Results: acoustic standards that better reflect aircraft exterior noise frequencies and interior sound transmission loss

**MAC Part 150 Part 150
Residential Insulation Program**

1995 Contractor Arrests

Part 150 General Contractor Arrest March, 1995

3 General Contractors were arrested by FBI agents for alleging to fix prices on some Part 150 contracts

These General Contractors were setting margins on Part 150 bids in an attempt to increase profits, by agreeing on a specified markup amount

These General Contractors plea bargained and were removed from the Part 150 Program

After a complete evaluation of the incident, MAC didn't change any Part 150 process, due to the assumption that the system wasn't bad, people were

**MAC Part 150 Part 150
Residential Insulation Program**

1996 Indoor Air Quality Issues

MAC



Part 150 Sound Insulation Program

**Part 150 Program
Ventilation & IAQ
Requirements**

Part 150 Ventilation Standards Committee



MAC Commission established the Part 150 Ventilation Standards Committee in October '96 after StarTribune reports that Part 150 modifications are responsible for creating Indoor Air Quality (IAQ) problems

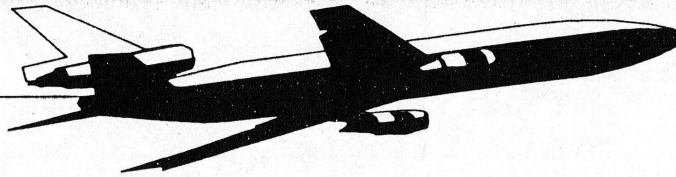


This MAC Committee established ventilation & safety standards in April 1997.....using these standards, MAC tested 944 homes prior to entering the Part 150 Program



Of 944 homes tested, results showed an 87% failure rate... indicating a high occurrence of pre-existing problems relating to ventilation, carbon monoxide, venting & house tightness

MAC



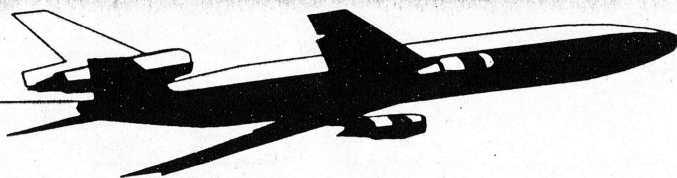
Part 150 Sound Insulation Program

**Part 150 Program
Ventilation & IAQ
Requirements**

Program Ventilation Requirements

- ★ **Because of pre-existing failures, homes must pass IAQ program standards before beginning the Part 150 Sound Insulation Program process**
- ★ **Since FAA regulations prohibit the use of federal funds to be used for correcting pre-existing code violations or maintenance problems, Homeowners are responsible to correct all IAQ failures before beginning the Part 150 Program process**
- ★ **Pre-existing Ventilation & IAQ deficiencies should be corrected within a 70-day period in order to maintain an "active" status in the program....**

MAC



Part 150 Sound Insulation Program

Part 150 Program Ventilation & IAQ Requirements

Homeowner Orientation

"Pre" Indoor Air Quality Testing

PASS TESTS

FAIL TESTS

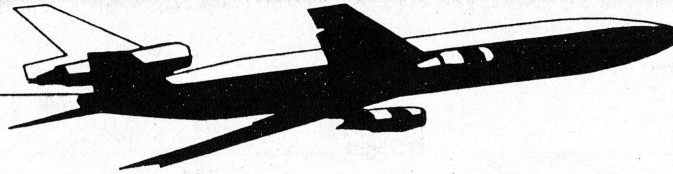
*Deficiencies corrected
within 70 days*

"ON-HOLD" Status

Begin Part 150 Program

**No Corrections within 70 days:
"IN-ACTIVE" Status**

MAC



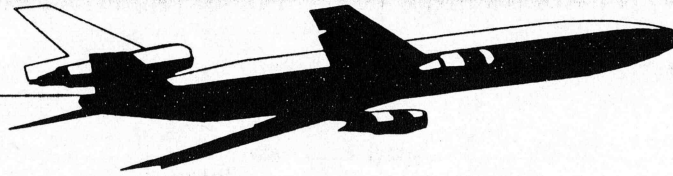
Part 150 Sound Insulation Program

**Part 150 Program
Ventilation & IAQ
Requirements**

Part 150 IAQ "Pre" Test Procedure

- **Carbon Monoxide**
- **Gas Appliance Venting**
- **House Tightness**
- **Moisture**
- **Sources of Contamination**

MAC



Part 150 Sound Insulation Program

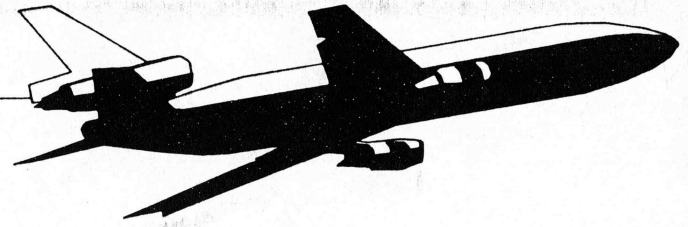
**Part 150 Program
Ventilation & IAQ
Requirements**

Part 150 IAQ "Pre" Test Standards

- **Carbon Monoxide Standard**
 - Gas Appliance CO levels > 100ppm
- **Gas Appliance Venting Standard**
 - Spillage
 - Low vent pressure
 - Observed code violations
- **House Tightness Standard**
 - Pre-existing lack of natural air infiltration
- **Moisture Standard**
 - High relative humidity levels
 - Structural damage
- **Pre-existing Contamination**

MAC

Part 150 Ventilation & IAQ Standards



● **80% Failure Rate**

FAILURE AREAS

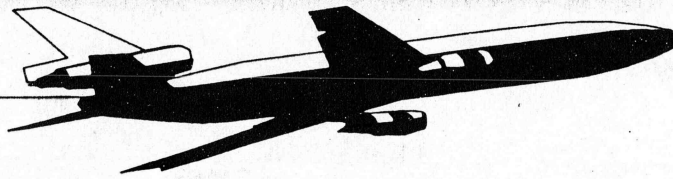
Single Failure Issues

Venting	56%
Carbon Monoxide (CO)	
House Tightness	

Multiple Failure Issues

Venting & CO	44%
Tightness & CO	
Venting & Tightness	
CO, Venting & Tightness	

MAC

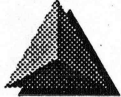









Part 150 Sound Insulation Program

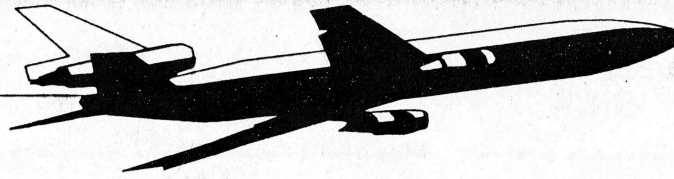
**Part 150 Program
Ventilation & IAQ
Entrance
Requirements**

Common Venting & Ventilation Deficiencies

To remedy deficiencies, Homeowners may be required to perform one or more of the following

-  **Clean & tune gas appliances**
-  **Perform venting modifications**
-  **Add mechanical ventilation**
 -  Exhaust fan
 -  HRV balanced ventilation unit
-  **Seal return air ducts**
-  **Add combustion "makeup" air**
-  **Replace gas appliances**

MAC



Part 150 Sound Insulation Program

Part 150 Program
Ventilation & IAQ
"POST" TESTING

Part 150 IAQ "Post" Test Procedure

- Vent Pressure
- Vent Spillage
- House Tightness
- Insulation Inspection