Certification Test Report

Harman Home Heating

Freestanding Pellet Stove

Model: Advance

Prepared for:	Harman Home Heating 352 Mountain House Road Halifax, PA 17032
Prepared by:	OMNI-Test Laboratories, Inc. 13327 NE Airport Way Portland, OR 97230 (503) 643-3788
Test Period:	May 7, 2015
Report Date:	May 2015
Report Number:	0135PS034E

AUTHORIZED SIGNATORIES

This report has been reviewed and approved by the following authorized signatories:

Technician:

Jeremy Clark, Emissions Testing Specialist
OMNI-Test Laboratories, Inc.

QA Review:

Alex Tiegs, QA Administrator
OMNI-Test Laboratories, Inc.

Evaluation Decision:

Ken Morgan, Testing Manager
OMNI-Test Laboratories, Inc.

5/28/15
Issue Date

TABLE OF CONTENTS

Section 1

Sampling Procedures and Test Results

INTRODUCTION

Harman Home Heating retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the Advance. The Advance is a freestanding, pellet-fired room heater.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in at the *OMNI*'s testing facility on April 15, 2015. It was assigned and labeled with *OMNI* ID #2065. *OMNI* representative Jeremy Clark conducted the certification testing and completed all testing by May 7, 2015.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this section. The results in this report are limited to the item(s) submitted.

SAMPLING PROCEDURE

The Advance was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters using EPA Test Method 28R, ASTM E2515, and ASTM E2779. The fuel used for certification testing was Lignetics "Premium Quality" hardwood pellet fuel; this fuel was graded as Premium by the Pellet Fuels Institute and was produced at registered mill # 03304. Particulate emissions were measured using dual sampling trains consisting of two sets of filters (front and back). The results of the integrated test run indicate an average particulate emission rate of 1.82 g/hr. The Advance results are within the emission limit of 4.5 g/hr for affected facilities manufactured on or after May 15, 2015, or sold at retail after December 31, 2015.

The model Advance was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10. The heater has a demonstrated an average thermal efficiency of 67.4%. The calculated CO emission rate was 8.54 g/hr.

SUMMARY OF RESULTS

The average particulate emission rate over the full test run was measured to be 1.82 g/hr.

The average particulate emission factor for the full test run was measured to be 1.90 g/dry kg of fuel.

The average thermal efficiency for the full test run was measured to be 67.4%.

The particulate emission rate for the first hour (the maximum burn rate segment) was measured to be 4.50 g/hr.

The proportionality results and sample train agreement for the test run was acceptable. Quality check results for each test run are presented in Section 3 of this report.

SUMMARY TABLES

Table 1.1 – Particulate Emissions

	One-Hour Filter	Integrated Total
Emission Rate (g/hr)	4.50	1.82
Emission Factor (g/dry kg)	1.86	1.90

Table 1.2 – Efficiency and CO

	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
Time (minutes)	60	125	185	370
Burn Rate (dry kg/hr)	2.42	1.04	0.46	0.96
Heat Output Rate (BTU/hr)	29,468	11,035	5,411	11,412
Efficiency (%, HHV)	69.1	62.7	72.6	67.4
CO Emission Rate (g/hr)	123.28	0.00*	0.00*	8.54

*CO measurement below detection limit for all data readings at this burn rate

Table 1.3 – Test Facility Conditions

	Initial	Middle	Final
Room Temperature (°F)	68	71	74
Barometric Pressure (in Hg)	30.20	30.12	30.05
Air Velocity (ft/min)	< 50	< 50	< 50
Induced Draft (in H2O)	0	0	0

Table 1.4 – Fuel Measurement Summary

Segment	**Time** (min)	**Burn Rate** (dry kg/hr)	**Consumed Fuel Weight** (lbs)	**Fuel Moisture Content** (dry basis - %)
Pretest	85	2.13	7.0	5.05
Maximum	60	2.42	5.6	5.05
Medium	125	1.04	5.0	5.05
Minimum	185	0.46	3.1	5.05
Integrated Total	370	0.96	13.7	5.05

Table 1.5 – Dilution Tunnel and Flue Gas Measurements

Segment	Average Flue Draft (in H_2O)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
Integrated Total	-0.087	14.44	159.7	94

Table 1.6 – Stove Configuration

Segment	Temperature Control	Feed Rate	Low Draft Adjustment	Stove Control
Pretest	7.00	5.32	-00 V	Constant Burn H
Maximum	7.00	5.32	-00 V	Constant Burn H
Medium	2.28	1.92	-00 V	Constant Burn H
Minimum	1.00	0.18	-37 V	Constant Burn H

Section 3

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

OMNI follows the guidelines of ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories," and the quality assurance/quality control (QA/QC) procedures found in *OMNI*'s Quality Assurance Manual.

OMNI's scope of accreditation includes, but is not limited to, the following:

- ANSI (American National Standards Institute) for certification of product to safety standards.
- To perform product safety testing by the International Accreditation Service, Inc. (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- To perform product safety testing as a "Certification Organization" by the Standards Council of Canada (SCC).
- Serving as a testing laboratory for the certification of wood heaters by the U.S. Environmental Protection Agency.

This report is issued within the scope of OMNI's accreditation. Accreditation certificates are available upon request.

The manufacturing facilities and quality control system for the production of the Advance at Harman Home Heating were evaluated to determine if sufficient to maintain conformance with OMNI's requirements for product certification. OMNI has concluded that the manufacturing facilities, processes, and quality control system are adequate to produce the appliance congruous with the standards and model codes to which it was evaluated.

Sample Analysis

Analysis Worksheets
Moisture Content Worksheet
Fuel Certification Label
Tared Filter, Probe, and O-Ring Data

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer:	Harman	Equipment Numbers:	OMNI-00023
Model:	Advance		OMNI-00131
Tracking No.:	2066		OMNI-00343
Project No.:	1035PS034E		
Run #:	1		
Date:	5/7/15		

TRAIN 1

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch (1 hr)	Filter	B745	116.3	112.9	3.4
B. Front filter catch (remainder)	Filter	B749	118.6	113.1	5.5
C. Rear filter catch	Filter	B746	114.1	113.9	0.2
D. Probe catch*	Probe	60	121852.5	121852.5	0.0
E. Filter seals catch*	Seals	R301	3348.5	3348.8	0.0

Total Particulate, mg:	9.1

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	B747	126.9	118.1	8.8
B. Rear filter catch	Filter	B748	118.0	118.7	-0.7
C. Probe catch*	Probe	63	121595.1	121595.1	0.0
D. Filter seals catch*	Seals	R302	4154.1	4154.1	0.0

Total Particulate, mg:	8.1

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	B743	114.5	114.2	0.3

Total Particulate, mg:	0.3

*Any particulate catch that results in a negative number, is assumed to be zero

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

OMNI-Test Laboratories, Inc. **ASTM E2779 Pellet Heater Run Sheets**

Client: Harman Home Heating Project Number: 0135PS034E Run Number: 1

Model: Advance Tracking Number: 2066 Date: 5/7/15

Test Crew: JC

OMNI Equipment ID numbers: 23, 131, 343

ASTM E2515 Lab Sheet

Assembled By: J. Clark

Date/Time in Dessicator: 5/7/15 16:00

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date:	5/15/15	5/18/15	5/19/15		
Time:	0900	1530	1000		
R/H %:	13.1	10.2	11.3		
Temp:	73.7	73.5	73.6		
Audit:	500.1	500.1	500.2		
Initials:					

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A	Front Filter	B745	112.9	116.4	116.3	-		
A	Rear Filter	B746	113.9	114.2	114.1	-		
A	Probe	60	~~118.0~~ 121852.5	121852.4	121852.5	-		
A	O-Ring Set	R301	3348.8	3348.7	3348.5	-		
B	Front Filter	B747	118.1	127.0	126.9	-		
B	Rear Filter	B748	118.7	118.2	118.0	-		
B	Probe	63	121595.1	121595.1	121595.1	-		
B	O-Ring Set	R302	4154.1	4154.5	4154.2	4154.1		
A	60 min Filter	B749	113.1	118.8	118.6	-		
Amb	Background Filter	~~B750~~ B743	114.2	114.6	114.5	-		

Technician Signature: [signature] Date: 5/19/15

Moisture Content Worksheet

Client: Harman Home Heating / Hearth and Home Technologies
Model: Advance
Project #: 0135PS034E Tracking #: 2066
Sample description: Lignetics Premium Quality Wood Pellet Fuel

Weight record:

Prior to Oven-Drying

Balance ID #: OMNI - 00128 Audit ID #: OMNI-00283B

Date/Time in: 5/1/15 13:30 Audit weight: 199.9 g

Container: ID#: 247 Tare weight: 94.1 g

Total weight: 235.6 g

Material weight (total weight - container tare weight): 141.5 g

Post Oven-Drying

Balance ID #: OMNI - 00128

Date/Time out: 5/6/15 15:00 Audit ID #: OMNI-00283B

Total weight: 228.8 g Audit weight (if necessary): 199.9 g

Material weight (total weight - container tare weight): 134.7 g

Calculations:

Dry basis (%) = $\frac{\text{Initial - Final}}{\text{Final}} \times 100 = \frac{141.5\text{ g} - 134.7\text{ g}}{134.7\text{ g}} \times 100\% = 5.05\ \%$

Wet basis (%) = $\frac{\text{Initial - Final}}{\text{Initial}} \times 100 = \frac{141.5\text{ g} - 134.7\text{ g}}{141.5\text{ g}} \times 100\% = 4.81\ \%$

Method: ASTM D4442-92 Method A—Oven-Drying Method

Technician signature: _____ Date: 5/7/15

Reviewed by: _____ Date: 5/7/15

Pellet Fuels Institute

PFI GRADED FUEL

PFI Densified Fuel Grade: Premium
Mill Registration # 03304

Grade Requirements:

Bulk Density:	40–46 lbs/ft³
Diameter:	.230–.285 in/5.84–7.25 mm
Durability:	≥96.5
Fines:	≤0.50%
Ash Content (as received):	≤1%
Length:	≤1% >1.5 in.
Moisture:	≤8.0%
Chlorides:	≤300 ppm

Manufacturers Guaranteed Analysis:

Type of Material:	Hardwood
Additives:	None
Minimum Higher Heating Value (as received):	8000 BTU/lb.

Other Manufacturers Guarantees:

 For more information, please visit the PFI website at www.pelletheat.org.

CERTIFICATE OF MEMBERSHIP

Be it known to all parties that:

LIGNETICS OF WEST VIRGINIA
LINN, WV

Facility #: 03304

Is certified to produce Premium grade fuel and is in good standing with Conway & Robison, LLC's Quality Assurance Program for Densified Fuel Manufacturers which has been approved by the American Lumber Standard Committee (ALSC) Board of Review and is in compliance with the Pellet Fuel Institute's (PFI) Standard Specifications for Residential/Commercial Densified Fuel and the PFI Residential/Commercial Densified Fuel QA/QC Handbook.

10/3/2013

Jason Robison — DATE

CONWAY & ROBISON, LLC
P O Box 1508 SHARPSBURG, GA 30277
(678) 642-4036 P (770) 234-5837 F www.cr-inspect.com

FILTER TARES

Date Placed in Desiccator: 4/13/15 1530 Technician: A. Kravitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Filter Size/ID# 102 (47) 110 55	Date: 4/21/15 Time: 1030 RH%: 14.7 T (F): 74.3 Initials: A	Date: 4/22/15 Time: 1200 RH%: 10.6 T (F): 71.2 Initials: A	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
B742	113.2	~~113.8~~ 113.2			[redacted]	[redacted]	[redacted]	[redacted]
B743	114.1	114.2			↓	↓	↓	↓
B744	118.1	118.1			↓	↓	↓	↓
B745	112.9	112.9			Harman	Advance	0135P5034E	1
B746	113.9	113.9			↓	↓	↓	↓
B747	118.2	118.1			↓	↓	↓	↓
B748	118.7	118.7			↓	↓	↓	↓
B749	113.0	113.1			↓	↓	↓	↓
B750	114.8	114.7						
B751	119.4	119.5			[redacted]	[redacted]	[redacted]	[redacted]
B752	113.6	113.1			↓	↓	↓	↓
B753	114.7	114.8			↓	↓	↓	↓
B754	119.0	119.2			↓	↓	↓	↓
B755	112.6	112.7			↓	↓	↓	↓

Final Technician signature: A Date: 4/22/15

PROBE TARES

Date Placed in Desiccator: 3/10/15 Technician: A. Kowitz Balance ID # 23

Thermo/Hygro meter ID #: 743 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Probe Size/ID# (4)	Date: 3/16/15 Time: 1345 RH%: 5.5 T (F): 73.5 Initials: A	Date: 3/19/15 Time: 1100 RH%: 5.8 T (F): 73.5 Initials: A	Date: 4/10/15 Time: 1230 RH%: 7.4 T (F): 75.2 Initials: A	Date: 4/13/15 Time: 1530 RH%: 6.8 T (F): 74.9 Initials: A	Manufacturer	Appliance	Project No.	Run No.
4	114863.7	114863.2	114863.9	114863.9	[redacted]	[redacted]	[redacted]	[redacted]
7	114981.9	114981.6	114982.4	114982.5	↓	↓	↓	↓
8	115593.6	115592.8	115593.9	115593.8	↓	↓	↓	[redacted]
12	114281.9	114281.0	114282.0	114282.0	↓	↓	↓	↓
18	114403.0	114402.2	114403.5	114403.4	[redacted]	[redacted]	[redacted]	[redacted]
22	114347.8	114347.0	114348.4	114348.2	↓	↓	↓	↓
23	114077.4	114076.6	114077.6	114077.7	[redacted]	[redacted]	[redacted]	[redacted]
34	115869.4	115868.4	115869.5	115869.5	↓	↓	↓	↓
35	114328.3	114327.6	114328.3	114328.2	[redacted]	[redacted]	[redacted]	[redacted]
50	121766.6	121766.1	121767.2	121767.3	↓	↓	↓	↓
60	121851.8	121851.1	121852.3	121852.5	Harman	Advance	0135P5034E	↓
63	121595.0	121594.4	121595.3	121595.1	↓	↓	↓	↓
65	122192.3	122191.3	122188.3	122188.5	[redacted]	[redacted]	[redacted]	[redacted]
66	123167.1	123166.3	123167.4	123167.3	↓	↓	↓	↓

Final Technician signature: [signature] Date: 4/13/15

O-RING TARES

Date Placed in Desiccator: 4/10/15 Technician: A. Kranitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

O-Ring Size/ID# (47)	Date: 4/16/15 Time: 1506 RH%: 9.9 T (F): 74.8 Initials: A	Date: 4/21/15 Time: 1000 RH%: 12.9 T (F): 74.6 Initials: A	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
R295	3337.2	3337.0			[redacted]	[redacted]	[redacted]	[redacted]
R296	4167.6	4167.4			↓	↓	↓	↓
R297	3286.1	3285.9			[redacted]	[redacted]	[redacted]	[redacted]
R298	3369.3	3369.2			↓	↓	↓	↓
R299	3357.0	3356.9			[redacted]	[redacted]	[redacted]	[redacted]
R300	4120.5	4120.3			↓	↓	↓	↓
R301	3348.8	3348.8			Harman	Advance	0135-P5034E	1
R302	4154.3	4154.1			↓	↓	↓	↓
R303	4891.0	4890.8			[redacted]	[redacted]	[redacted]	[redacted]
R304	3312.0	3311.9			↓	↓	↓	↓
R305	3423.6	3423.5			[redacted]	[redacted]	[redacted]	[redacted]
R306	3325.5	3325.6			↓	↓	↓	↓
R307	3322.6	3322.4			[redacted]	[redacted]	[redacted]	[redacted]
R308	3612.7	3612.5			↓	↓	↓	↓

Final Technician signature: [signature] Date: 4/21/15

Calibrations

EPA Method 28R, ASTM E2515, ASTM E2779

ID #	Lab Name/Purpose	Log Name	Attachment Type
1	Calibrator Dry Gas Meter	Rockwell Int'l Standard Test Meter	Calibration Certificate
23	Scale-Analytical Balance	Mettler Analytical Balance	Calibration Certificate
128	Scale	Acculab V1200	Calibration Log
131	500 mg Weight	Ohaus Weight Standard, 500 mg	Calibration Certificate
132	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate
185	Platform Scale	Weigh-Tronix Platform Scale	See Test Run Notes
209	Barometer	Barometer – Princo	Manual Cover
283B	Calibration Weights	Troemner Metric Weight Standards	Calibration Certificate
296-T54	Tape Measure	DeWalt 16' Tape Measure	Calibration Log
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
343	Thermohygrometer	Omega Digital Thermohygrometer	Calibration Log
410	Microtector	Dwyer Microtector	Manual, Photograph
420	Flue Gas Analyzer	Infrared Gas Analyzer	See Test Run Notes
559	Vaneometer	Dwyer Vaneometer	Manual

CERTIFICATE OF CALIBRATION

CUSTOMER:	**OMNI TEST LABS INC.** PORTLAND OR	**CALIBRATION DATE:**	10/23/14
PO NUMBER:	OTL-14-049	**CALIBRATION DUE:**	10/23/15
INST. MANUFACTURER:	ROCKWELL	**PROCEDURE:**	NAVAIR 17-20MG-02
INST. DESCRIPTION:	P.D. METER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70 F
MODEL NUMBER:	S-275	**STANDARD(S) USED:**	A4, A24, A321 DUE 02-2015
SERIAL NUMBER:	684390L	**NIST TRACE #' S:**	1329407628, 1361269184, 1390386562
RATED UNCERTAINTY:	+/- .5 % RD.	**AMBIENT CONDITIONS:**	760 mm HGA 51 % RH 72 F
UNCERTAINTY GIVEN:	FLOW measurement uncertainty: +/- .101 % RD. K=2	**CERTIFICATE FILE #:**	426663.14

NOTES: AS RECEIVED/AS LEFT WITHIN SPECS. REFERENCE CONDITIONS ARE: 760 mm HGA 70 F **OMNI-00001**

TEST POINT NUMBER	UUT INDICATED SCFM	DM.STD. ACTUAL SCFM	CORRECTION FACTOR	K FACTOR
1	0.2603	0.26	0.99888	60.067
2	0.5106	0.51	0.99877	60.074
3	1.0213	1.02	0.99868	60.079
4	1.4921	1.49	0.99858	60.085
5	2.0231	2.02	0.99845	60.093
6	2.4946	2.49	0.99817	60.110
7	3.0253	3.02	0.99823	60.106
8	3.4866	3.48	0.99812	60.113
		AVERAGE (Y)=	0.99848542	

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 10572 Calle Lee #130 • Los Alamitos, CA 90720
Phone (714) 827-1215 • Fax (714) 827-0823

Date: 10/23/2014 Approved By: Calibration Technician:

Certificate of Calibration

Certificate Number: **582510**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

OnSite

0723.01
Calibration

PO: **Onsite 1/23/15**
Order Date: **01/23/2015**
Authorized By: **N/A**

Property #: **OMNI-00023**
User: **N/A**
Department: **N/A**
Make: **Mettler**
Model: **AE200**
Serial #: **E17657**
Description: **Scale, 205g**
Procedure: **DCN 500818/500887**
Accuracy: **±0.0004g ±1 LSD**

Calibrated on: **01/23/2015**
*Recommended Due: **07/23/2015**
Environment: **22 °C 33 % RH**
* As Received: **Within Tolerance**
* As Returned: **Within Tolerance**
Action Taken: **Calibrated**
Technician: **111**

Remarks: * Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
723A	Rice Lake	1mg-200g (Class O)	Mass Set	10/31/2015	569749

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	Min	Max	ᵏError	UUT	Uncertainty
Before/After							Accredited = ✓
Force							
	g	1.00000	0.9995	1.0005	0.0001	0.9999 g	6.9E-05 ✓
	g	40.00000	39.9995	40.0005	0.0000	40.0000 g	1.2E-04 ✓
	g	80.00000	79.9995	80.0005	0.0002	79.9998 g	1.7E-04 ✓
	g	120.00000	119.9995	120.0005	0.0003	119.9997 g	3E-04 ✓
	g	160.00000	159.9995	160.0005	0.0004	159.9996 g	3.3E-04 ✓
	g	200.00000	199.9995	200.0005	0.0004	199.9996 g	5.8E-04 ✓

Reviewer

3 Issued 01/29/2015 Rev # 15

Inspector

ANALYTICAL BALANCE CALIBRATION DATA SHEET

Balance to be calibrated: Acculab V-1200 Electronic Field Balance

ID Number: OMNI-00128

ID Number of Standard Calibration Weights: OMNI-00283 A + B

Date: 2/3/2015 By: J. Clark

Standard Weight (A) (grams)	Weight Verified (B) (grams)	Difference (A - B)
1000.0	999.9	+0.1
500.0	500.0	0.0
200.0	199.9	0.1
100.0	99.9	0.1
50.0	49.9	0.1
20.0	19.9	0.1

This calibration is traceable to NIST using calibrated standard weights.

Technician signature: _____ Date: 2/3/2015

Certificate of Calibration

Certificate Number: **547339**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

0723.01
Calibration

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: OTL-13-035
Order Date: 11/19/2013
Authorized By: N/A

Property #: OMNI-00131
User: N/A
Department: N/A
Make: Ohaus
Model: 500mg
Serial #: 27503
Description: Mass
Procedure: DCN 500901
Accuracy: CLASS F (±0.72mg)

Calibrated on: 12/02/2013
*Recommended Due: 12/02/2018
Environment: 20 °C 34 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 34

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Refer to attachment for measurement results.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
432A	Sartorius	C-44	Microbalance 5.1g	03/11/2014	517747
723A	Rice Lake	1mg-200g (Class O)	Mass Set	09/05/2014	540048

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer _____ 3 Issued 12/06/2013 Rev # 14 Inspector _____

SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 lb

ID Number: 132

Standard Calibration Weight: 10 lb

ID Number: 256

Scale Used: MTW-150K

ID Number: 353

Date: 2/19/13 By: A. Kravitz

Standard Weight (A) (Lb.)	Weight Verified (B) (Lb.)	Difference (A - B)	% Error
10.0	10.0	0.0	Ø

*Acceptable tolerance is 1%.

This calibration is traceable to NIST using calibrated standard weights.

Technician signature: Date: 2/19/13

ATTN: BRUCE DAVIS

Weigh-Tronix, Inc.
7933-SW Nimbus Ave, #28
Beaverton, OR 97005
503-626-3008
1-800-870-3008

WEIGH-TRONIX

SERVICE WORK ORDER

SHIP TO
NAME OMNI ENVIRONMENTAL SERVICES
ADDRESS 5465 SW WESTERN AVE
CITY BEAVERTON STATE OR ZIP 97075
PHONE 503 - 643-3788
FAX
CONTACT Bruce or Richard

JOB No. 111991
CUSTOMER No.
Order Date / /
Start Date / /
Complete Date 1 / 11 / 99

BILL TO
NAME
ADDRESS PO BOX 743
CITY STATE ZIP
ATTN:

P.O. No. 99-007

EQUIPMENT

S/N	Location	Type	Cap.	Recommendations and Remarks
5547		WI-127	1K	10,000 DIV
21676		3030	1K	

COMMENTS

Rental 1 Month

Set up calibrated 1000 x 0.1 LB per. order tested, good.

PARTS

2.5

Qty.	Description	Price	Total

ZONE _____ VEHICLE _____
TECHNICIAN LD.

SERVICE SUMMARY

Reg.	Agree.	Pref.	Inst.
Hrs. @			
Mileage			
Parts			
Shop Supplies			
Other			
TOTAL			

THIS IS NOT AN INVOICE

I acknowledge all service has been performed satisfactorily, as stated above. All parts installed are warranted for thirty days from this date.

Authorized Signature Bruce Davis

WEIGH-TRONIX
Rental / Sales / Service

Print Name Bruce Davis

DAMAGE TO RENTAL/DEMO EQUIPMENT IS SOLELY THE RESPONSIBILITY OF THE USER WHILE IN THEIR POSSESSION!

DISTRIBUTION: WHITE – OFFICE YELLOW – FILE PINK – CUSTOMER

458
National
Weather
Service
Type

Instruction Booklet

for use with

PRINCO

Fortin type mercurial

Barometers

Manufactured by

PRINCO INSTRUMENTS, INC.
1020 Industrial Blvd.
Southampton, Pa. 18966-4095
U.S.A.

Phone: 215 355-1500
Fax: 215 355-7766

469
NOVA™
Economy
Model

Certificate of Calibration

Certificate Number: 466281

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

0723.01

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: OTL-10-085
Order Date: 12/20/2010
Authorized By: N/A

Property #: OMNI-00283B
User: N/A
Department: N/A
Make: Troemner Inc
Model: 200g-2Kg
Serial #: 47883
Description: Mass Set, 5 pc
Procedure: DCN 500901
Accuracy: Class 4

Calibrated on: 12/21/2010
*Recommended Due: 12/21/2015
Environment: 18 °C 40 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 92

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
383A	Setra	2000C	Scale, Digital 2 Kgm	03/25/2011	448104
479A	Sartorius	MC210S	Scale 210g	11/08/2011	461792
432A	Sartorius	C-44	Microbalance 5.1g	11/08/2011	461791
503A	Rice Lake	1mg-200g (Class O)	Mass Set	11/08/2011	460936
515A	Sartorius	LA1200S	Balance, Electronic 1200g	12/13/2011	465509

Measurement Data

Parameter / Measurement Description	Range	Unit	Reference	UUT	Variance	Min	Max	Uncertainty	
Before/After									Accredited = ✓
Mass									
		g	200.00000	200.0031	-0.00314	199.99600	200.00400	0.0003	✓
Dot		g	200.00000	200.0038	-0.00377	199.99600	200.00400	0.0003	✓
		g	500.00000	500.0056	-0.00555	499.98999	500.01001	0.0027	✓
		g	1000.0000	1000.017	-0.0172	999.9800	1000.0200	0.0029	✓
		g	2000.0000	2000.028	-0.0283	1999.9600	2000.0400	0.036	✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Carolyn S Johansen
Reviewer

5 Issued 12/22/2010 Rev # 14

Inspector

Tape Measure Calibration Log

Place the calibrated 12" ruler under the tape measure and verify that each ½" (i.e. 1.5", 2", 2.5") between 0 and 36" is within 1/8".

CALIBRATED USING OMNI - 00281

Tape Measure Number	Description	Cal Dates				Technician Initials			
00296-T32	Stanley FatMax 16'	7/25/12	7/2/13	7/8/14		JC	JC	JC	
00296-T51	Ace 26' Tape Measure	9/7/12	9/13/13	9/23/14		JC	JC	JC	
-T52	Stanley PowerLock 26'	9/7/12	9/13/13	9/22/14		JC	JC	JC	
-T53	Stanley PowerLock 16'	9/7/12				JC			
-T11	Stanley intermatic Tape Measure (cm)	11/30/12	2/28/14			JC	JC		
-T21	MTH Tape Measure (cm)	11/30/12	11/21/13			JC	JC		
-T30	Workforce Tape Measure	11/30/12				JC			
-T31	Stanley Powerlock Tape Measure	11/30/12	11/21/13	11/18/14		JC	JC	JC	
-T47	Workforce Tape Measure	11/30/12	11/21/13	11/26/14		JC	JC	JC	
-T36	Stanley FatMax 16' Tape Measure	11/30/12	11/21/13	11/18/14		JC	JC	JC	
~~-T42~~ -T40	Stanley FatMax 16' Tape Measure	11/30/12	11/21/13	11/18/14		JC	JC	JC	
-T54	DeWalt 16' Tape Measure	12/20/12	12/17/13	12/29/14		JC	JC	JC	
-T55	DeWalt 16' Tape Measure	12/20/12	12/18/13	12/29/14		JC	JC	JC	
-T56	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14		JC	JC	JC	
-T57	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14		JC	JC	JC	
-T58	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14		JC	JC	JC	
-T59	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14		JC	JC	JC	
-T42	Stanley PowerLock 26' Tape Measure	11/21/13	11/18/14			JC	JC		

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex Instruments
Model:	XC-60EP
Serial Number:	606001
OMNI Tracking No.:	OMNI-00335
Calibrated Orifice:	☐ Yes

Average Gas Meter y Factor	Orifice Meter dH@
1.004	N/A

Calibration Date:	12/03/14	
Calibrated by:	J. Clark	
Calibration Frequency:	6 months	
Next Calibration Due:	6/3/2015	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.9	"Hg
Signature/Date:		12/3/14

Previous Calibration Comparision

Date	5/20/2014	Acceptable Deviation (5%)	Deviation
y Factor	1.006908284	0.050345414	0.002
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.004
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	23-Oct-14	
	Calib. Value	0.9985	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.71	2.36	0.72
Initial Reference Meter	429.564	437.67	444.204
Final Reference Meter	437.612	444.184	451.477
Initial DGM	0	0	0
Final DGM	8.127	6.577	7.435
Temp. Ref. Meter (°F), Tr	63.5	65.2	66.5
Temperature DGM (°F), Td	75.0	78.0	80.0
Time (min)	44.0	30.0	62.0
Net Volume Ref. Meter, Vr	8.048	6.514	7.273
Net Volume DGM, Vd	8.127	6.577	7.435
Gas Meter y Factor =	1.006	1.007	1.000
Gas Meter y Factor Deviation (from avg.)	0.002	0.003	0.004
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr/13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd/13.6)) \times (Tr + 460)]$

** 3. $dH@ = 0.0317 \times Pd / (Pb\ (Td + 460)) \times [(Tr + 460) \times time) / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex Instruments
Model:	XC-60EP
Serial Number:	606001
OMNI Tracking No.:	OMNI-00335
Calibrated Orifice:	☐ Yes

Previous Calibration Comparision

Date	12/3/2014	Acceptable Deviation (5%)	Deviation
y Factor	1.004483232	0.050224162	0.001
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.006
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Average Gas Meter y Factor	Orifice Meter dH@
1.003	N/A

Calibration Date:	05/08/15	
Calibrated by:	J. Clark	
Calibration Frequency:	Post-test calibration	
Next Calibration Due:	6/3/2015	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	30.08	"Hg
Signature/Date:		5/6/15

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	23-Oct-14	
	Calib. Value	0.9985	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	0.76	2.39	0.40
Initial Reference Meter	883.687	889.71	895.151
Final Reference Meter	889.71	895.101	900.357
Initial DGM	0	0	0
Final DGM	6.066	5.428	5.32
Temp. Ref. Meter (°F), Tr	65.5	66.6	68.6
Temperature DGM (°F), Td	75.0	77.0	80.0
Time (min)	50.0	25.0	63.0
Net Volume Ref. Meter, Vr	6.023	5.391	5.206
Net Volume DGM, Vd	6.066	5.428	5.32
Gas Meter y Factor =	1.007	1.005	0.997
Gas Meter y Factor Deviation (from avg.)	0.004	0.002	0.006
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr/13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd/13.6)) \times (Tr + 460)]$

** 3. $dH@ = 0.0317 \times Pd / (Pb\ (Td + 460)) \times [(Tr + 460) \times time) / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Temperature Calibration
EPA Method 28 and 5G

BOOTH:	TEMPERATURE MONITOR TYPE:	IDENTIFICATION NUMBER:
E1	Type K Thermocouple	OMNI-00335

REFERENCE TEMPERATURE MONITOR TYPE:	IDENTIFICATION NUMBER:
OMEGA Calibrator Model CL20	OMNI-00373

CALIBRATION PERFORMED BY:	DATE:	AMBIENT TEMPERATURE:	BAROMETRIC PRESSURE:
J. Clark	12/3/14	65 °F	29.88 in Hg

Reference Point Source	Temperature Monitor (EF)					
	Method 28 Room	Method 5G Dilution Tunnel				
OMEGA Thermocouple Simulator		Meter (Tm)	Filters (Tf)	Tunnel (Tt)	Stack (Ts)	DB
0	0	0	1	0	0	N/A
100	100	100	100	100	100	
300	300	300	300	300	300	
500	501	500	501	500	500	
700	701	700	701	700	700	

Technician signature: _____ Date: 12/3/14

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
0-1" Magnehelic Gauge

Range: 0-1" WC ID Number: OMNI-00335 (B)

Calibration Instrument: Digital Manometer (A) ID Number: OMNI-00395

Date: 12/3/14 By: J. Clark

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer (A) ("WC)	Magnehelic Gauge (B) ("WC)	Difference (A - B)	% Error of Full Span*
0.0 – 0.2	0.20	0.202	-0.002	-0.20
0.2 – 0.4	0.36	0.363	-0.003	-0.30
0.4 – 0.6	0.52	0.519	0.001	0.10
0.6 – 0.8	0.79	0.794	-0.004	-0.40
0.8 – 1.0	0.99	0.984	0.006	0.60

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.1" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: _____ Date: 12/3/14

Reviewed by: _____ Date: 12-03-14

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex Instruments
Model:	XC-60EP
Serial Number:	606002
OMNI Tracking No.:	OMNI-00336
Calibrated Orifice:	☐ Yes

Average Gas Meter y Factor	Orifice Meter dH@
1.007	N/A

Calibration Date:	12/03/14	
Calibrated by:	J. Clark	
Calibration Frequency:	6 months	
Next Calibration Due:	6/3/2015	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.88	"Hg
Signature/Date:		12/3/14

Previous Calibration Comparision

Date	5/20/2014	Acceptable Deviation (5%)	Deviation
y Factor	1.014494292	0.050724715	0.008
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.005
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	23-Oct-14	
	Calib. Value	0.9985	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.75	2.22	0.78
Initial Reference Meter	451.511	458.531	465.879
Final Reference Meter	458.531	465.847	474.223
Initial DGM	0	0	0
Final DGM	7.015	7.342	8.428
Temp. Ref. Meter (°F), Tr	65.9	65.9	67.7
Temperature DGM (°F), Td	73.0	77.0	76.0
Time (min)	34.0	32.0	60.0
Net Volume Ref. Meter, Vr	7.020	7.316	8.344
Net Volume DGM, Vd	7.015	7.342	8.428
Gas Meter y Factor =	1.008	1.010	1.002
Gas Meter y Factor Deviation (from avg.)	0.001	0.003	0.005
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr/13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd/13.6)) \times (Tr + 460)]$

** 3. $dH@ = 0.0317 \times Pd / (Pb\ (Td + 460)) \times [(Tr + 460) \times time) / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex Instruments
Model:	XC-60EP
Serial Number:	606002
OMNI Tracking No.:	OMNI-00336
Calibrated Orifice:	☐ Yes

Average Gas Meter y Factor	Orifice Meter dH@
1.004	N/A

Calibration Date:	05/08/15	
Calibrated by:	J. Clark	
Calibration Frequency:	Post-test calibration	
Next Calibration Due:	6/3/2015	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	30.04	"Hg
Signature/Date:		5/4/15

Previous Calibration Comparision

		Acceptable Deviation (5%)	Deviation
Date	5/20/2014		
y Factor	1.014494292	0.050724715	0.010
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.005
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	23-Oct-14	
	Calib. Value	0.9985	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.26	2.07	0.94
Initial Reference Meter	900.357	905.972	911.738
Final Reference Meter	905.972	911.691	917.492
Initial DGM	0	0	0
Final DGM	5.606	5.76	5.827
Temp. Ref. Meter (°F), Tr	69.7	71.4	74.2
Temperature DGM (°F), Td	76.0	80.0	84.0
Time (min)	32.0	26.0	38.0
Net Volume Ref. Meter, Vr	5.615	5.719	5.754
Net Volume DGM, Vd	5.606	5.76	5.827
Gas Meter y Factor =	1.009	1.002	1.002
Gas Meter y Factor Deviation (from avg.)	0.005	0.002	0.003
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr/13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd/13.6)) \times (Tr + 460)]$

** 3. $dH@ = 0.0317 \times Pd / (Pb\ (Td + 460)) \times [(Tr + 460) \times time) / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Temperature Calibration
EPA Method 28 and 5G

Booth:	Temperature Monitor Type:	Identification Number:
E1	Type K Thermocouple	OMNI-00336

Reference Temperature Monitor Type:	Identification Number:
OMEGA Calibrator Model CL20	OMNI-00373

Calibration Performed By:	Date:	Ambient Temperature:	Barometric Pressure:
J. Clark	12/3/14	65 °F	29.88 in Hg

Reference Point Source	Temperature Monitor (EF)					
	Method 28 Room	Method 5G Dilution Tunnel				DB
OMEGA Thermocouple Simulator		Meter (Tm)	Filters (Tf)	Tunnel (Tt)	Stack (Ts)	
0	0	0	1	0	0	N/A
100	100	100	101	100	100	
300	300	300	301	300	300	
500	500	500	501	500	500	
700	700	700	701	700	700	

Technician signature: _____ Date: 12/3/14

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
0-1" Magnehelic Gauge

Range: 0-1" WC ID Number: OMNI-00336 (B)

Calibration Instrument: Digital Manometer (A) ID Number: OMNI-00395

Date: 12/3/14 By: J. Clark

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer (A) ("WC)	Magnehelic Gauge (B) ("WC)	Difference (A - B)	% Error of Full Span*
0.0 – 0.2	0.16	0.159	0.001	0.10%
0.2 – 0.4	0.32	0.317	0.003	0.30%
0.4 – 0.6	0.49	0.507	-0.008	-0.80%
0.6 – 0.8	0.72	0.723	-0.003	-0.30%
0.8 – 1.0	1.00	1.003	-0.003	-0.30%

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.1" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: _____ Date: 12/3/14

Reviewed by: _____ Date: 12-03-14

VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

Step 2: Place unit to be calibrated, tracking No. OMNI-00343, inside OMNI desiccate box on the same shelf with the NIST traceable standard.

Step 3: After a period of not less than four hours record the temperature and humidity of both units in the spaces provide below.

Step 4: If the unit to be calibrated matches the NIST standard within ± 4%, it is acceptable. If not, the unit needs to be sent to a repair company or replaced.

Verification Data:

Date: 9/16/13 Technician: J. Clark

Time in desiccate: 16:30 9/12/13 Recording time: 12:30 9/16/13

NIST Standard Temperature: 76.9 °F NIST Standard Humidity: 11.8 %

Test Unit Temperature Reading: 77.0 °F Test Unit Humidity Reading: 10.0 %

Test unit OMNI- 00343 is ✓ or was not ___ within acceptable limits.

Technician Signature: _____

Comments: _____

Negative Pressure or Vacuum Measurement

ro the gage. Connect the source of cuum or negative pressure to the right e gage connection (5) and proceed as scribed under Positive Pressure Mea- rement Section above. Remember that e pressure measured in this way is gative.

Differential Pressure Measurement

fferential pressures may be measured connecting the higher (more positive) ssure to the left connection (2) and e lower pressure to the right connection).

Storage

rn meter circuit switch to "off" posi- n and withdraw "hook" point well ar of fluid (by turning Micrometer unter-clockwise) when gage is not in e. This will conserve the batteries and nimize build-up of oxides, etc., on the ook." Keep the unit covered and in an a free of strong solvent fumes.

Maintenance

hen the meter reading becomes reduced the pointer movement gets sluggish ith circuit on and "hook" point in uid), the following should be done:

Remove the hook point (by unscrew- ing) and clean the tip lightly using fine crocus cloth. Wipe off all grit and dirt with a clean rag, reassemble and recheck meter operation.

If the meter operation continues to be sluggish, replace the size AA, 1½ volt battery. (Replace the battery at least once a year to avoid deteriora- tion of battery and damage to gage. Leakproof alkaline battery is recom- mended.)

o replace the battery, remove center rew (10) located in the back of the electronic enclosure. Cover (9) will come off exposing the battery. Pull the old battery out and push a new battery into the battery holder with the positive (center) terminal to the right (to the end marked with a + on the holder).

If the fluid becomes contaminated and requires replacement; empty old fluid from gage; flush out with clear water and replace with distilled water and Dwyer A126 Fluorescein Green Color Concentrate mixed 3/4 oz. concentrate to each quart of water. (CAUTION: Do not substitute other gage fluids as proper gage operation depends on use of the specified gage fluid to provide proper surface tension, wetting ability and electrolyte capability with unity specific gravity.)

If the gage bore is very dirty, a mild soap solution may be used to aid in cleaning prior to flushing with clear water. (CAUTION; Do not clean with liquid soaps, special solvents, degreasers, aromatic hydro-carbons, etc. Such cleaners and solvents frequently contain chlorine, fluorine, acetone and related compounds which will permanently damage the gage, and prevent proper operation.)

If meter becomes inoperative and cannot be made to operate properly by cleaning "hook" tip or replacing battery, return the entire gage to Dwyer Instruments, Inc., for service.

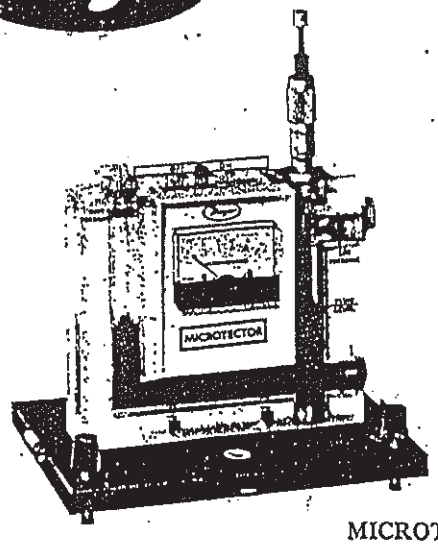
"Microtector" ®
A Product From
Dwyer Instruments, Inc.
"The Low Pressure People"

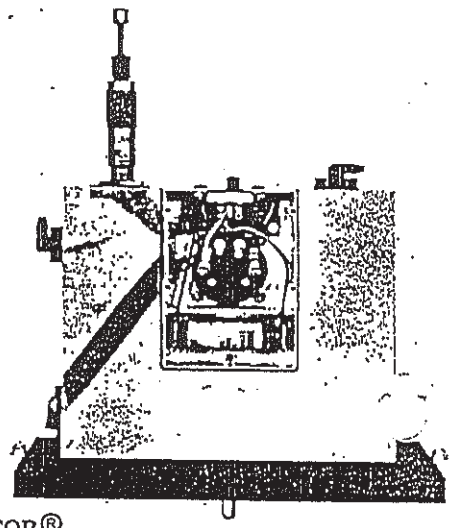
38-440190-00

DWYER INSTRUMENTS, INC.
P. O. Box 373 Michigan City, Indiana 46360 U.S.A.
Phone: Area 219/872-9141
Direct Chicago Line: Area 312/733-7883

MICROTECTOR®

Operating and Maintenance Instructions





MICROTECTOR®
Specifications and Features*

Time Proven Hook Gage Manometer Combined with Modern Electronics For Easier, Faster, more Accurate Precision Pressure Measurements.

Accurate and Repeatable to ±.0002 inches water column (.000009 P.S.I.).

Pressure Range 0-2" w.c. Positive, Negative or Differential Pressures.

Non Toxic and Inexpensive Gage Fluid Consists of Distilled Water Mixed with a Small Amount of Dwyer Color and Wetting Agent Concentrate.

Convenient, Portable, Light Weight, and Self-Contained, the Unit Requires No External Power Connections and is Operated by a 1½ Volt Penlight Cell.

A.C. Detector Current Eliminates Hook Plating, Fouling and Erosion.

Micrometer Complies with Federal Specification GGG-C-105A and is Traceable to a Master at the National Bureau of Standards.

Three Point Mounting with Dual Leveling Adjustment and Circular Level Assure Rapid Set Up.

Durablock® Precision Machined Acrylic Plastic Gage Body.

Sensitive 0-50 Microamp D.C. Meter Acts as Detector and Also Indicates Battery and Hook Probe Condition.

Heavy One Half Inch Thick Steel Base Plate Provides Steady Mounting.

Top Quality Glass Epoxy Circuit Board and Solid State-Integrated Circuit Electronics.

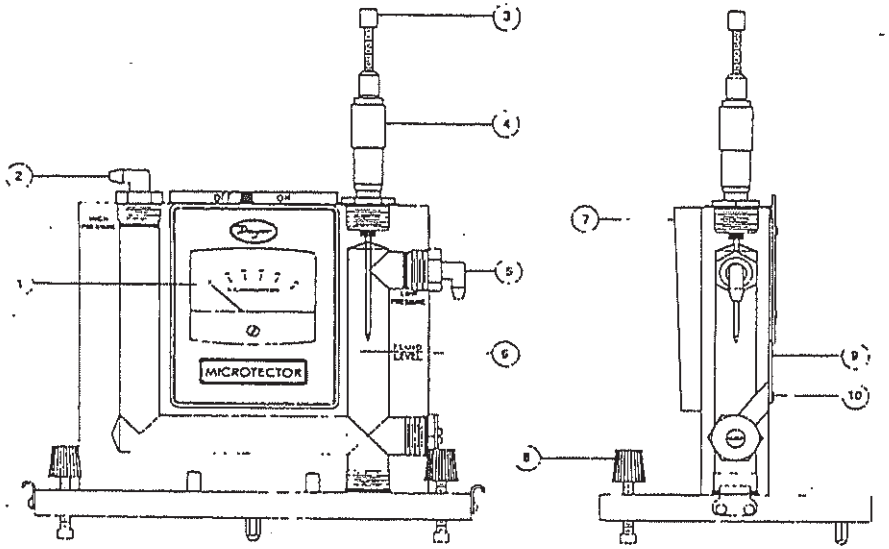
Electronic Enclosure of Tough Molded Styrene Acrylonitrile Provides Maximum Protection to Components Yet Allows Easy Access to Battery Compartment.

Rugged Sheet Steel Cover and Carrying Case Protects the Entire Unit When Not in Use.

Accessories Included are (2) 3 Foot Lengths Tygon Tubing, (2) 1/8" Pipe Thread Adapters and 3/4 oz. bottle of Fluorscein Green Color Concentrate with Wetting Agent.

**Patent Applied For*

DWYER INSTRUMENTS, INC. Telephone 219/872-9141, or



MICROTECTOR® GAGE

Precision Pressure Measurement

The Dwyer Microtector® combines the time proven principles of the Hook Gage type manometer and modern solid state integrated circuit electronics. It provides an inexpensive means of achieving accuracy and repeatability within ± .00025 inches water column throughout its 0 to 2 inches w.c. range. It is truly a new standard in precision pressure measuring devices.

Principles of Operation

A pressure to be measured is applied to the manometer fluid which is displaced in each leg of the manometer by an amount equal to ½ the applied pressure. A micrometer mounted point is then lowered until contacts the manometer gage fluid. The instant of contact is detected by completion of a low power A.C. circuit. Current for this circuit is supplied by a 1½ volt penlight cell feeding two semiconductor amplifiers which act as a free-running multivibrator operating at a frequency of approximately two kilohertz. Completion of the A.C. circuit activates a bridge rectifier which provides the signal for indication on a sensitive (0 to 50 microamps) D.C. microammeter.

On indication of contact the operator stops lowering the point and reads the micrometer which indicates one half the applied pressure. By interpolating eight divisions, (each being .000125" w.c.) between .001 micrometer graduations, a total accuracy of .00025 can easily be achieved. The micrometer complies with Federal Specification GGG-C-105A and is traceable to a master at the National Bureau of Standards.

Locating and Opening

Stand the Microtector® and case on a firm flat level surface. Remove the cover by releasing the latches and lifting straight up. If it is necessary to move the gage without case, handle only the base plate or clear acrylic block. (CAUTION: Do not handle gage by grasping meter-electronic package housing Item 7 on drawing.)

Fluid Level

Level the gage by adjusting the two front leveling screws (Item 8 on drawing) until the bubble in the spirit level is centered in the small circle. After leveling the gage, open both rapid shut off valve tube connectors (2 and 5). Back off the Micrometer (4), if necessary, to make sure that the point is not immersed in the gage fluid. The fluid level in the gage should now coincide with the mark on the right hand bore plus or minus approximately 1/32 inch (6). If the level of fluid is too high, fluid can be removed with an eye dropper pipette or carefully poured out of the right connection (5). If the level is too low, remove the top left rapid shut off valve tube connector (2), and add distilled water pre-mixed with the proper amount of Dwyer green concentrate. (See maintenance instruction for proportions.) After correcting the fluid level, reinstall the rapid shut off connectors and with them in the open position, relevel the Microtector.® The gage is now ready to be zeroed.

Zeroing

Turn the Micrometer barrel (4) until its lower end just coincides with the zero mark on the internal vertical scale *and* the zero on the barrel scale coincides with the vertical line on the internal scale. Note that the internal scale is graduated every .025" from 0 to 1.00 inch and the barrel scale is graduated in one thousandths from 0 to .025." Turn the meter circuit switch at the top of gage to the "on" position. While holding the barrel at the zero position (and with the gage level), raise or lower the point by turning the top knurled knob (3) until the point is above, but near the fluid.

Check to be sure that the meter (1) registers zero. Watch the meter, hold the barrel (4) and lower the point slowly by turning the top knurled knob (3). As the knob is turned, the point will contact the fluid and the meter pointer will move from zero to some upscale position. After making contact, turn the point out of the fluid by turning the Micrometer barrel counter-clockwise to a reading of .010 or more. Again watch the meter and, this time, lower the point by turning the Micrometer barrel. The point position where the meter pointer begins to move up scale is the zero position. This position should correspond to zero reading on the Micrometer. Adjust the point in relation to the Micrometer barrel by turning the top knob while holding the barrel steady. Repeat lowering the point, watching the meter for contact, and adjusting the point until the zero position and zero reading exactly coincide. The gage is now zeroed and should not be moved.

An alternate method of zeroing and reading can be used wherein, instead of zeroing the gage completely, a zero correction reading is taken and recorded then subtracted from the final read. Comparable results can be obtained with either method.

Positive Pressure Measurement

With the fluid at its proper level, a pressure of 2.0" water column maximum can be measured. Positive pressure should be applied to the top left connection (2) with the Micrometer zeroed as described above. This will permit simple direct reading to be taken.

After an unknown pressure has been applied at the top left connection, the fluid level will drop in the left bore and rise over the point in the right bore. Note the indicating meter point has moved upscale because the point is immersed in the fluid. Turn the Micrometer counter-clockwise until the point leaves the fluid as indicated by the meter pointer dropping to zero or scale. Then slowly turn the Micrometer down until its point just touches the fluid surface causing movement of the meter pointer. Withdraw the point and repeat several times noting each time the Micrometer reading where the meter pointer movement begins. The average of these readings multiplied by two is the pressure applied to the gage. (Avg. reading x 2 = pressure applied in inches w.c. The degree of uncertainty for the operator and instrument is indicated by the difference in these readings.)

When the readings are complete the pressure should be removed and the zero-setting of the Microtector® rechecked. Any change in the zero position will indicate inaccurate readings. Should this happen the zero-set and pressure measurement procedure should be repeated.

BULLETIN NO. H-11

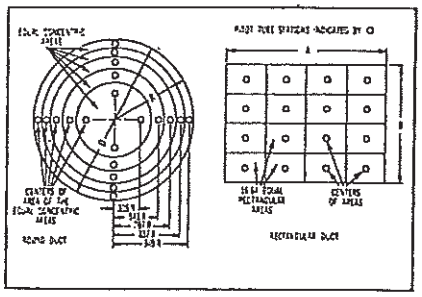
AIR VELOCITIES WITH THE DWYER PITOT TUBE

AIR VELOCITY

The total pressure of an air stream flowing in a duct is the sum of the static or bursting pressure exerted upon the sidewalls of the duct and the impact or velocity pressure of the moving air. Through the use of a pitot tube connected differentially to a manometer, the velocity pressure alone is indicated and the corresponding air velocity determined.

For accuracy of plus or minus 2%, as in laboratory applications, extreme care is required and the following precautions should be observed:

1. Duct diameter 4" or greater.
2. Make an accurate traverse per sketch at right, calculate the velocities and average the readings.
3. Provide smooth, straight duct sections a minimum of 8½ diameters in length upstream and 1½ diameters downstream from the pitot tube.
4. Provide an egg crate type straightener upstream from the pitot tube.



In making an air velocity check select a location as suggested above, connect tubing leads from both pitot tube connections to the manometer and insert in the duct with the tip directed into the air stream. If the manometer shows a minus indication reverse the tubes. With a direct reading manometer, air velocities will now be shown in feet per minute. In other types, the manometer will read velocity pressure in inches of water and the corresponding velocity will be found from the curves in this bulletin. If circumstances do not permit an accurate traverse, center the pitot tube in the duct, determine the center velocity and multiply by a factor of .9 for the approximate average velocity. Field tests run in this manner should be accurate within plus or minus 5%.

The velocity indicated is for dry air at 70°F., 29.9" Barometric Pressure and a resulting density of .075#/cu. ft. For air at a temperature other than 70°F. refer to the curves in this bulletin. For other variations from these conditions, corrections may be based upon the following data:

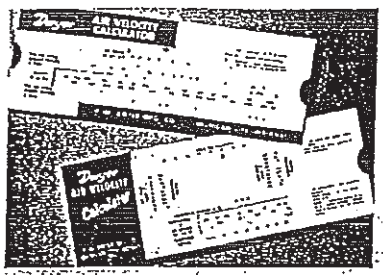
$$\text{Air Velocity} = 1096.2 \sqrt{\frac{Pv}{D}}$$

where Pv = velocity pressure in inches of water
D = Air density in #/cu. ft.

$$\text{Air Density} = 1.325 \times \frac{P_B}{T}$$

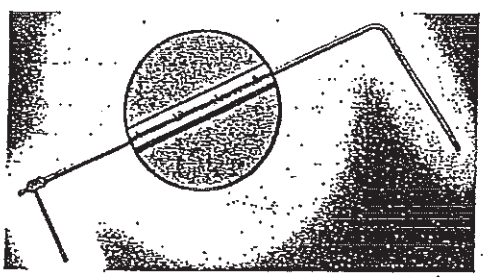
where P_B = Barometric Pressure in inches of mercury
T = Absolute Temperature (indicated temperature °F plus 460)

Flow in cu. ft. per min. = Duct area in square feet x air velocity in ft. per min.



AIR VELOCITY CALCULATOR

Computes velocity based on air density corrected for conditions of temperature and pressure. Eliminates tedious calculations. Ranges from .01 to 10" water corresponding to 400 to 20,000 FPM. Furnished with each pitot tube.

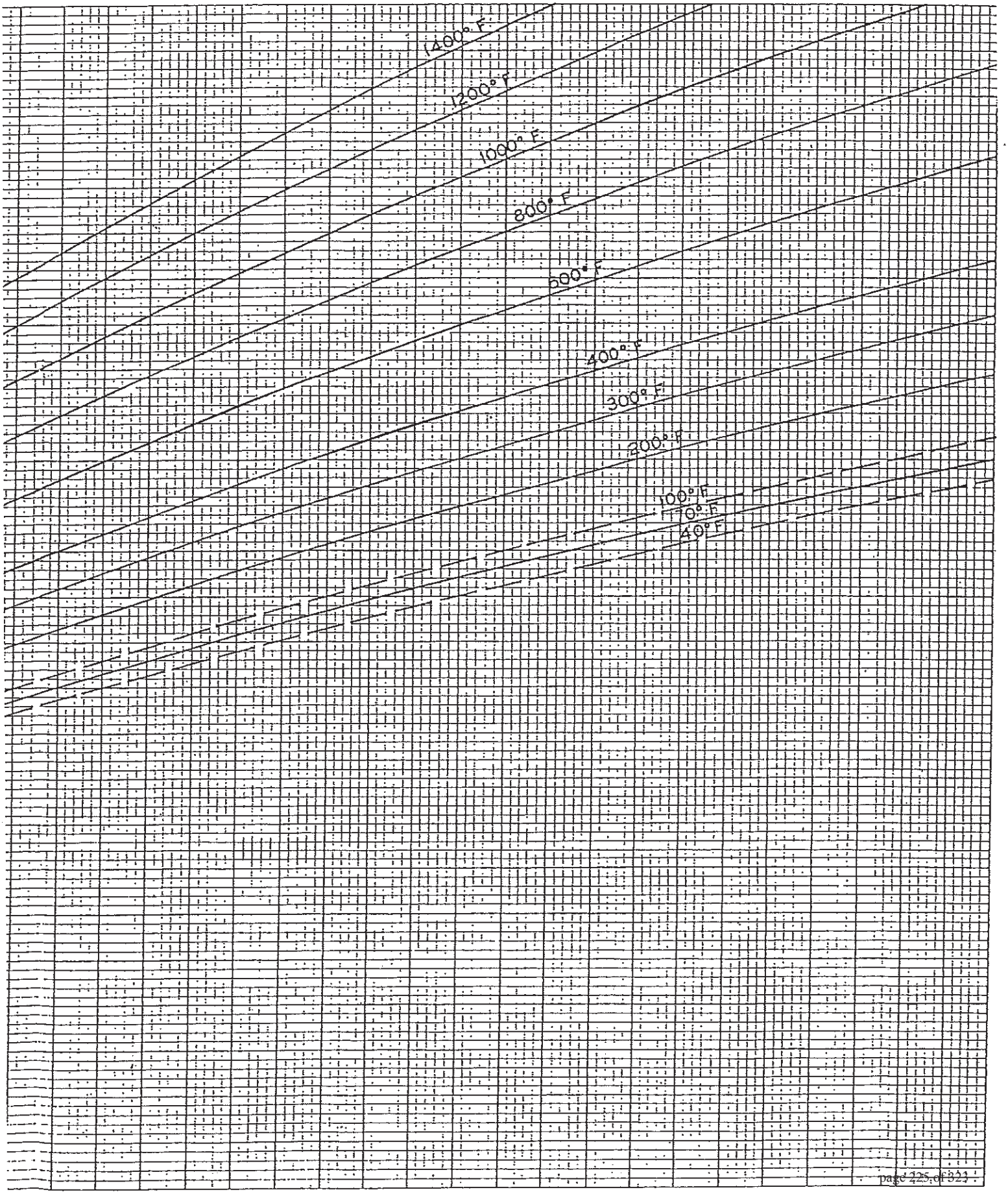


STAINLESS STEEL PITOT TUBES

Test-confirmed unity coefficient and lifetime construction of No. 304 stainless steel. Inch graduations show depth of insertion for traversing. Complies with AMCA and ASHRAE specifications. Sizes 12" to 60" long. Hand or fixed mounting types.

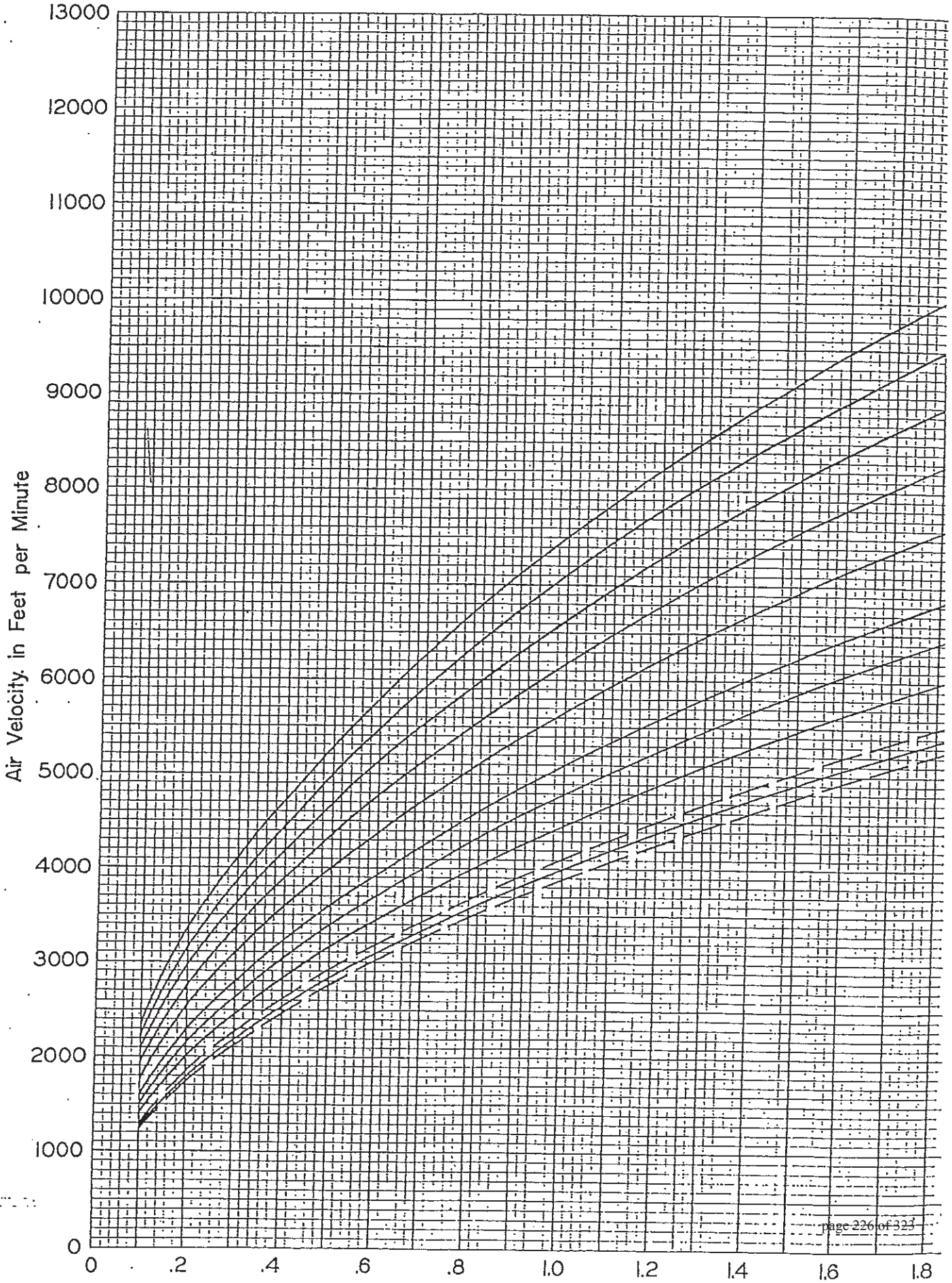
LITHOGRAPHED IN U.S.A. 3/84

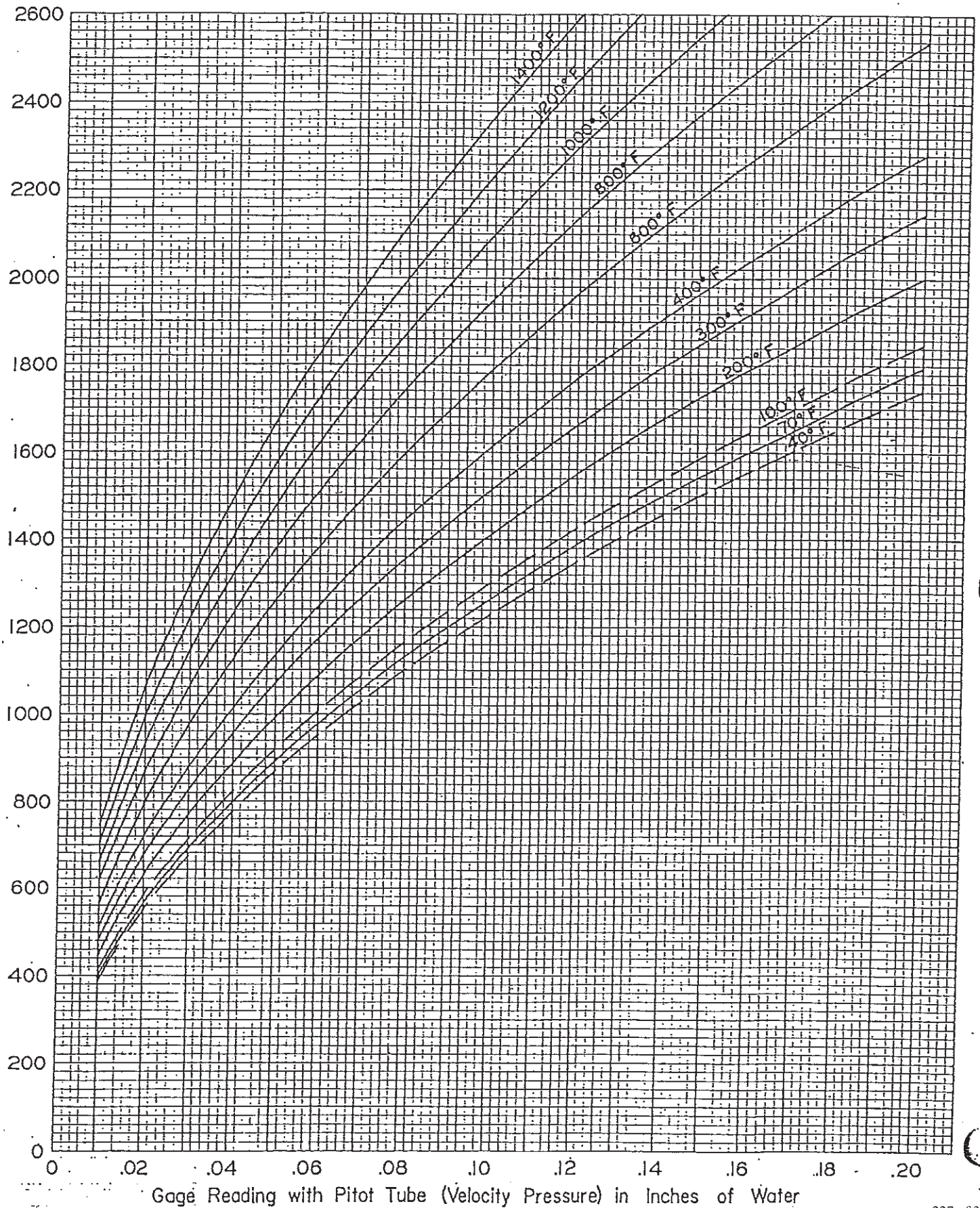
DWYER INSTRUMENTS, INC. Phone: 219/872-9141

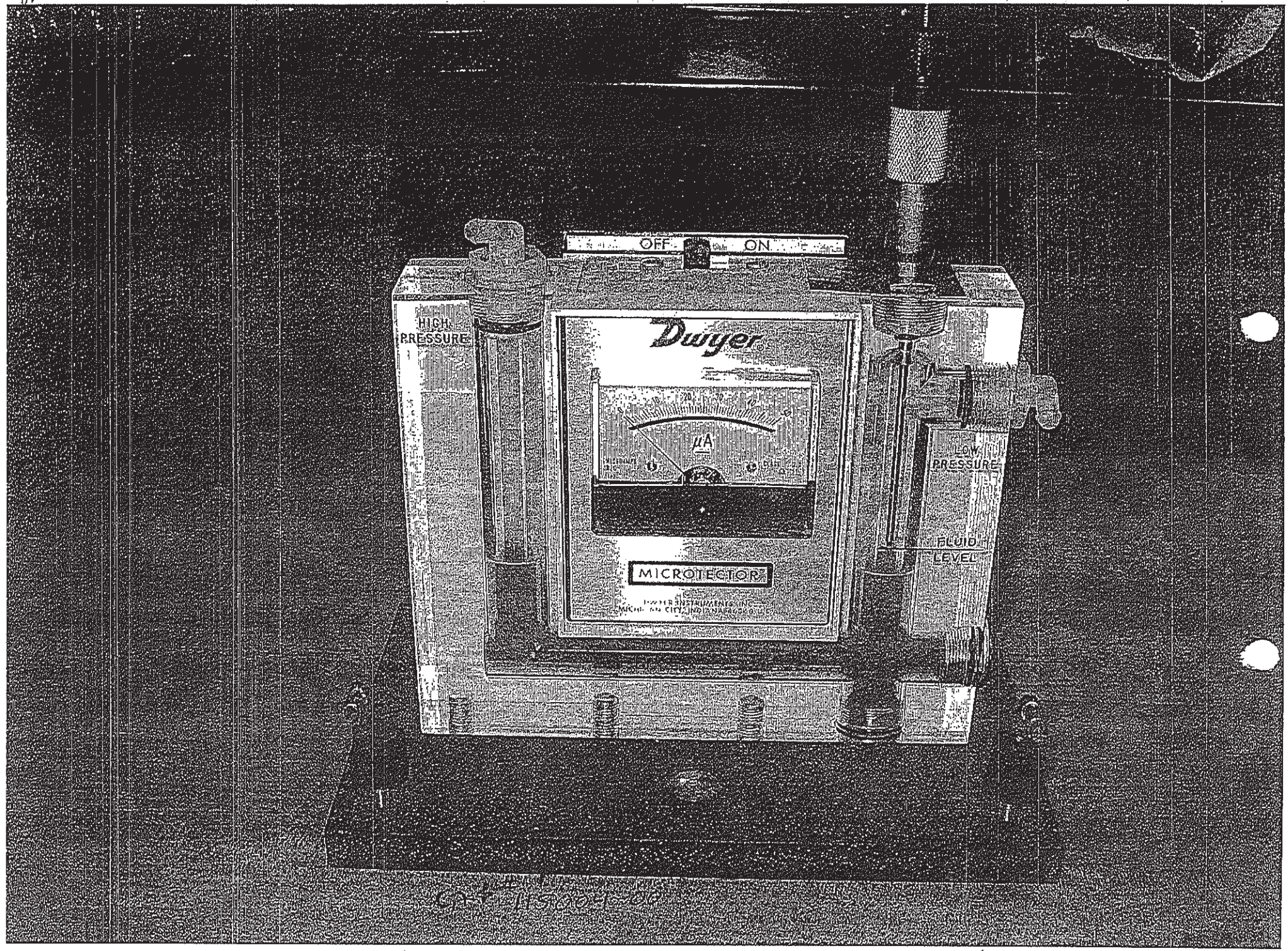


3 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0

Tube (Velocity Pressure) in Inches of Water


Air Velocity, in Feet per Minute
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

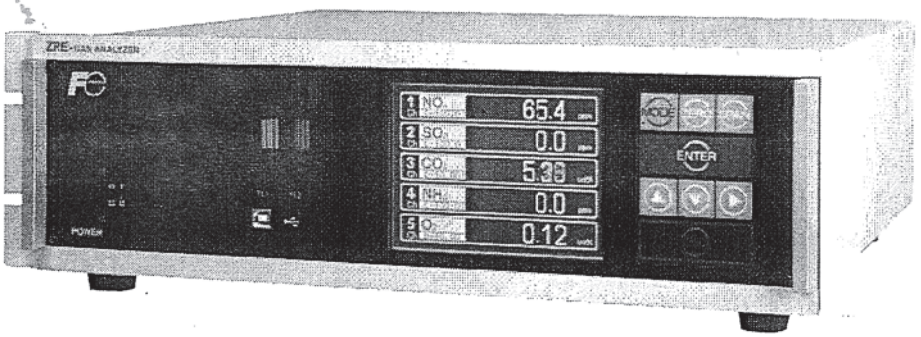

2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1400°F
1200°F
1000°F
800°F
600°F
400°F
300°F
200°F
100°F
70°F
40°F
0
.02
.04
.06
.08
.10
.12
.14
.16
.18
.20
Gage Reading with Pitot Tube (Velocity Pressure) in Inches of Water

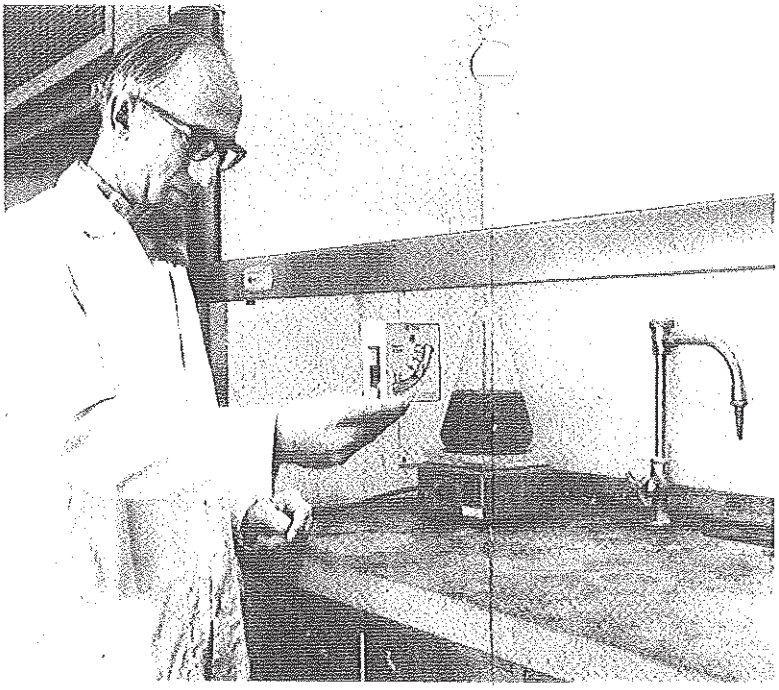

OFF
ON
HIGH PRESSURE
Dwyer
μA
LOW PRESSURE
FLUID LEVEL
MICROTECTOR

Instruction Manual

NDIR TYPE INFRARED GAS ANALYZER

TYPE: ZRE



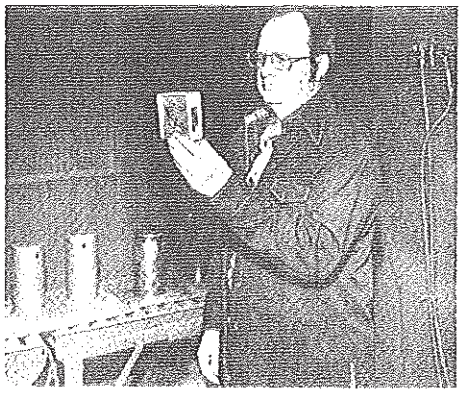


Bulletin H-14

INSTRUCTIONS for No. 480 VANEOMETER™ AIR VELOCITY METER

Use a Vaneometer to measure velocity of air flow into laboratory fume hoods and...

...at paint spray booths to determine when to change filters. Or wherever needed to meet OSHA standards of ventilation for smoke, dust or fume removal.



Use this sensitive new Dwyer Vaneometer™ to measure low air velocities–at low cost.

THE PROBLEM: How can you insure that OSHA, EPA and other safety ventilation requirements are met—at paint spray booths and at fume, smoke and dust exhaust hoods—in the plant, laboratory or restaurant? To do this, you need to measure low air velocities—from 25 to 400 feet per minute.+

Until now, instruments for this purpose have been complex and costly—from four to ten times the modest price of this unit.

SOLUTION: The new Dwyer Vaneometer™. It's pocket-size and light in weight—only four ounces. So it's handy to carry from one work station to another to make spot checks of air flow.* And it's easy to use—for untrained personnel. Just hold meter parallel to air flow—the pendulum vane/pointer indicates air velocity in feet per minute on a large, easy-to-read scale.

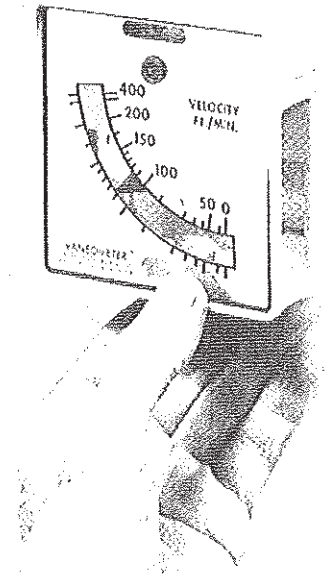
It can be hand held—or permanently mounted if continuous monitoring of face velocity is desired. A versatile steel mounting bracket and operating instructions are included. It's sensitive and accurate to ±10% of full scale. The Vaneometer has a bubble level and scale visible on both sides.

With housing of tough ABS plastic, it is durable and easy to clean with soap and water. The polyester vane can be cleaned with lacquer thinner. A spare vane is provided.

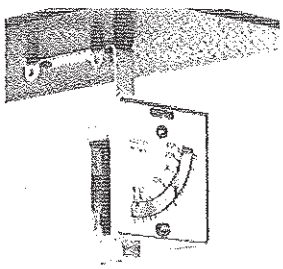
The Vaneometer is a tested, practical instrument for daily use—sensibly designed by Dwyer—"The Low Pressure People". Try one—and judge for yourself.

*For horizontal air flows only at this time.

+Metric scales are available. Range: 0 to 2.0 meters per second.

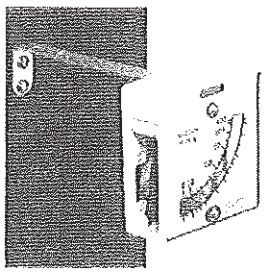


The Vaneometer's large scales are easy to read. Both sides have factory calibrated scales. Recessed bubble level at top helps insure accurate readings.



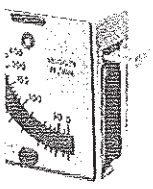
A versatile steel mounting bracket is included.

Left—Shows overhead mounting of Vaneometer for continuous monitoring.



The same bracket permits wall mounting. Bolts, nuts and screws are included.

How to Operate Meter



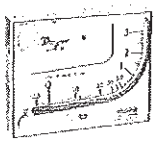
To install vane, pull vane holder from end of Vaneometer. Carefully remove vane from plastic bag and cardboard envelope. (Two vanes are enclosed, one is a spare.) Hang the vane by the wire in the two slots provided in the vane holder, then re-install the vane holder in the meter. Either side of vane may face the air flow. The meter is now ready to take readings. It is precalibrated. If vane becomes damaged, it is easily replaced with spare vane.

The Vaneometer is accurate to ±5% of full scale from bottom of scale to 100 FPM and ±10% from 100 FPM to top of scale.

For permanent mounting with bracket, Vaneometer should be located at least 6 inches from wall or side of duct. For accurate readings be sure to keep meter level at all times.

To determine face velocity, take the average of six readings. Readings should be taken at the center of six equal sections, three across top and three across the bottom.

When conditions are such that the Vaneometer cannot be permanently mounted, it may be more practical to install a Dwyer Mark II differential pressure manometer and calibrate it to indicate a dirty filter condition. To calibrate a Dwyer Mark II No. 25 Manometer with the Vaneometer, first follow Mark II installation instructions, (Bulletin D-58 included with the gage). Install new filters, start spray booth fan, note and record manometer reading and face velocity. Block-off filter media until face velocity reaches 100 feet per minute or conforms to OSHA, EPA or governing agency. Record and mark this point on the manometer, then replace filters at this point.



For replacement Vanes, order Part No. A390, package of two.

MARK II MANOMETER

DWYER INSTRUMENTS, INC., P.O. BOX 373, MICHIGAN CITY, INDIANA 46360, U.S.A., Phone: 219/879-8000

FR 69-440330-01

Example Calculations

Equations and Sample Calculations – ASTM E2779 & E2515

Manufacturer:	Harman
Model:	Advance
Run:	1
Category:	[Integrated]

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

BR	Dry burn rate, kg/hr
m_n	Total particulate matter collected, mg
$V_{m(std)}$	Volume of gas sampled corrected to standard conditions, dscf
v_s	Average dilution tunnel gas velocity, ft/sec
C_s	Particulate concentration, g/dscf
Q_{sd}	Dilution tunnel gas flow rate, dscf/min
E	Particulate emission rate, lbs/hr
E_T	Total particulate emissions, grams
MC_{avg}	Average fuel load moisture content, %
PR	Proportional rate variation, %
$E_{g/hr}$	Emission rate, g/hr

BR – Dry Burn Rate, kg/hr
ASTM E2779 equation (3)

$$BR = \frac{60\, M_{FTAdb}}{\theta}$$

Where,

BR	=	Dry burn rate, kg/hr
M_{FTAdb}	=	Total weight of fuel crib, dry basis, kg
θ	=	Total time of test run, minutes

Sample Calculation:

M_{FTAdb} = 13.04 lbs

M_{FTAdb} = 13.04 x 0.4536 kg/lb

M_{FTAdb} = 5.92 kg

$$BR = \frac{60 \times 5.9}{370}$$

BR = 0.96 kg/hr

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_n = Total particulate matter collected, mg

m_p = Particulate matter from probe, mg

m_f = Particulate matter from filters, mg

m_g = Particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train 1:

$m_n = \underline{0.0} + \underline{9.1} + \underline{0.0}$

$m_n = \underline{9.1}$ mg

Using equation for Train 2:

$m_n = \underline{0.0} + \underline{8.1} + \underline{0.0}$

$m_n = \underline{8.1}$ mg

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
ASTM E2515 equation (8)

$$V_{mr(std)} = K_1 \, V_{mr} \, Y \frac{P_{bar} + \left(\frac{\Delta H}{13.6}\right)}{T_m}$$

Where:

K_1	=	17.64 °R/in. Hg
V_{mr}	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_b	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = \frac{44.753 \times 1.00 \times 17.64 \times \left(30.12 + \frac{0.74}{13.6}\right)}{(81.52 + 460)}$$

$V_{m(std)}$ = 44.17 ft3

Using equation for Train 2:

$$V_{m(std)} = \frac{44.444 \times 1.01 \times 17.64 \times \left(30.12 + \frac{0.59}{13.6}\right)}{(81.12 + 460)}$$

$V_{m(std)}$ = 44.01 ft3

Using equation for ambient train:

$$V_{m(std)} = \frac{64.97 \times 1.01 \times 17.64 \times \left(30.12 + \frac{0.00}{13.6}\right)}{(70.75 + 460)}$$

$V_{m(std)}$ = 65.63 ft3

v_s – Dilution Tunnel Gas Velocity, ft/sec

ASTM E2515 equations (9) and (1)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

$$F_p = \frac{V_{strav}}{V_{scent}}$$

Where:

v_s	=	*Average dilution tunnel gas velocity, ft/sec
k_p	=	Pitot tube constant:
F_p	=	**Adjustment factor for center of tunnel pitot tube placement:
v_{strav}	=	Dilution tunnel velocity calculated after the multi-point pitot traverse
v_{scent}	=	Dilution tunnel velocity calculated after the multi-point pitot traverse at the center
ΔP_{trav}	=	$(sqrt(\Delta P))_{avg}$ calculated after the multi-point pitot traverse
ΔP_{cent}	=	sqrt(ΔP) measured at the center of the dilution tunnel during the multi-point pitot traverse
C_p	=	Standard pitot tube coefficient: 0.99, unitless
ΔP	=	Velocity pressure in the dilution tunnel, mm H_2O
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Static pressure of tunnel, in. Hg
P_s	=	Absolute tunnel pressure, = $P_b + P_g$
M_s	=	***Molecular weight of tunnel gas (wet); assume M_d=29 lb/lb-mole (dry)
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 2%
T_s	=	Dilution tunnel temperature, °R; (°R = °F + 460)

Sample calculation:

$$V_s = \frac{1}{} \times 85.49 \times \frac{0.99}{} \times \frac{0.213}{} \times \left(\frac{\frac{94.06}{} + 460}{\left(\frac{30.12}{} + \frac{-0.6}{13.6} \right) \times 28.56} \right)^{1/2}$$

V_s = 14.5 ft/s

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**F_P is equal to 1 if the pitot tube is place at $(sqrt(\Delta P))_{avgtrav}$ after the initial traverse data is collected.

**The ASTM test standard mistakenly identifies Ms as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

C_s – Particulate Concentration, g/dscf

ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K_2	=	Constant, 0.001 g/mg
C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{9.1}{44.17}$$

C_s = 0.000206 g/dscf

For Train 2

$$C_s = 0.001 \times \frac{8.1}{44.01}$$

C_s = 0.000184 g/dscf

For Ambient Train

$$C_s = 0.001 \times \frac{0.3}{65.63}$$

C_s = 0.000005 g/dscf

Q_{sd} – Average Dilution Tunnel Gas Flow Rate, dscf/hr

ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

Q_{sd}	=	Gas flow rate corrected to dry, standard conditions, dscf/hr
3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 4%
v_s	=	Average dilution tunnel gas velocity, ft/sec
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
$T_{s(avg)}$	=	Average absolute dilution tunnel temperature, °R, (°R = °F + 460)
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Dilution tunnel static pressure, in. Hg
P_s	=	Absolute dilution tunnel gas pressure, in Hg, (Hg = $P_b + P_g$)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.04) \times \underline{14.50} \times \underline{0.196} \times \frac{528}{\underline{94.06} + 460} \times \frac{\underline{30.123} + \frac{\underline{-0.6}}{13.6}}{29.92}$$

Q_{sd} = <u>9423.20426</u> dscf/hr

E, E_T – Particulate Emissions
ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

E_T	=	Particulate emissions, g
C_s	=	Concentration of particulate matter in the stack, g/dscf
C_r	=	Concentration of ambient particulate matter, g/dscf
Q_{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

E_T = (0.000206 - 0.000005) x 9423.20426 x 370 /60

E_T = 11.71 g

For Train 2

E_T = (0.000184 - 0.000005) x 9423.2 x 370 /60

E_T = 10.43 g

Average

E = 11.07 g

Total emission values shall not differ by more than 7.5% from the total average emissions

7.5% of the average =	0.83
Train 1 difference =	0.64
Train 2 difference =	0.64

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

θ = Time of test, min

θ_i = Time of interval, 1 min

V_{mi} = Volume of gas sample measured by the dry gas meter during the “ith” time interval, dscf

V_m = Volume of gas sample as measured by dry gas meter, dscf

V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, m/sec

V_s = Average gas velocity in the dilution tunnel, m/sec

T_{mi} = Average dry gas meter temperature during the "ith" time interval, ^oR

T_m = Average dry gas meter temperature, ^oR

T_{si} = Average gas temperature in the dilution tunnel during the "ith" time interval, ^oR

T_s = Average gas temperature in the dilution tunnel, ^oR

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{370 \times 0.11 \times 14.50 \times (115 + 460) \times (81.5 + 460)}{1 \times 44.8 \times 14.8 \times (94.06 + 460) \times (71.0 + 460)} \right) \times 100$$

PR = 95.3412 %

Section 4

Owner's Manuals

Installation Manual

Installation and Appliance Setup

INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.

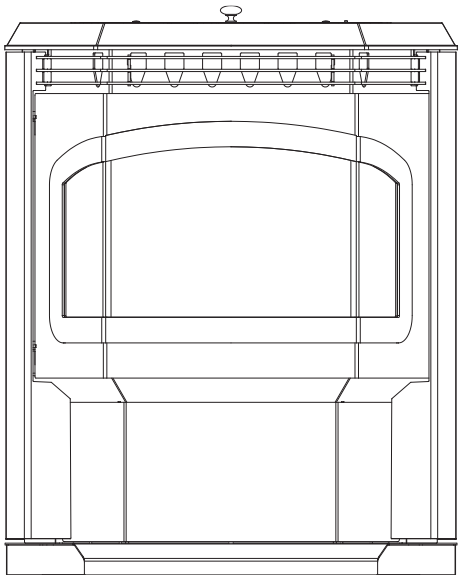
NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):

Advance Freestanding Pellet Stove



Tested & Listed By OMNI-Test Laboratories, Inc. Portland Oregon USA

We suggest that our hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute (NFI) as NFI Specialists.

⚠ CAUTION

Tested and approved for wood pellets only. Burning of any other type of fuel voids your warranty.

⚠ CAUTION

Check building codes prior to installation.

- Installation MUST comply with local, regional, state and national codes and regulations.
- Contact local building or fire officials about restrictions and installation inspection requirements in your area.

⚠ WARNING

Please read this entire manual before installation and use of this pellet fuel-burning room heater.

Failure to follow these instructions could result in property damage, bodily injury or even death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not overfire - If any external part starts to glow, you are overfiring. Reduce feed rate. Overfiring will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.

⚠ WARNING

HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
- NEVER allow children to touch glass
- Keep children away
- CAREFULLY SUPERVISE children in same room as stove.
- Alert children and adults to hazards of high temperatures.

  High temperatures may ignite clothing or other flammable materials.
- Keep clothing, furniture, draperies and other flammable materials away.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.harmanstoves.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.harmanstoves.com

⚠ Safety Alert Key:

- ***DANGER!*** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- ***WARNING!*** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- ***CAUTION!*** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- ***NOTICE:*** Indicates practices which may cause damage to the stove or to property.

TABLE OF CONTENTS

➔ = Contains updated information

Installation Standard Work Checklist

ATTENTION INSTALLER:

Follow this Standard Work Checklist

This standard work checklist is to be used by the installer in conjunction with, not instead of, the instructions contained in this installation manual.

Customer: _____
Lot/Address: _____
_____
Model: _____

Date Installed: _____
Location of Stove: _____
Installer: _____
Dealer/Distributer Ph # _____
Serial Number: _____

> ***WARNING! Risk of Fire or Explosion! Failure to install appliance to these instructions can lead to a fire or explosion.***

Appliance Install		**YES**	**IF NO, WHY?**
Required non-combustible floor protection	(Pg. 9)	☐	_____
Verified clearances to combustible.	(Pg. 11-14)	☐	_____
Unit is Leveled and secured.		☐	_____
Venting/Chimney Section 4 (Pg. 11-19)			
Venting Configuration complies to vent diagrams.		☐	_____
Venting installed, sealed and secured in place with proper clearances.		☐	_____
Exterior wall/roof flashing installed and sealed		☐	_____
Terminations installed and sealed.		☐	_____
Electrical Section 1 (Pg. 5)			
120VAC unswitched power provided to the appliance.		☐	_____
Appliance Setup Section 5 (Pg. 21-22)			
All packaging and protective materials are removed		☐	_____
Accessories installed properly		☐	_____
Manual bag and all it's contents are removed from inside the appliance and given to party responsible for use and operation		☐	_____
Started appliance and verified that all motors and blowers operate as they should.		☐	_____

Hearth and Home Technologies recommends the following:
Photographing the installation and copying this checklist for your file.
This checklist remain visible at all times on the appliance until the installation is complete.

Comments: Further description of the issues, who is responsible (Installer/Builder/Other Trades, etc.) and corrective action needed _____

_____

_____

Comments communicated to party responsible_____ by _____ on _____
(Builder / Gen Contractor) (Installer) (Date)

1 Product Specific and Important Safety Information

A. Appliance Certification

MODEL:	Advance Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	135-S-19b-6.2
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC/ORD-C1482-M1990, ULC-S627-00, ASTM E 2779-10, ASTM E 2515-11

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2004, ULC-S627-00, ULC/ORD-C-1482-M1990, (UM) 84-HUD**

The Advance is Certified to comply with 2015 particulate emission standards. Not approved for sale after May 15, 2020.

B. Glass Specifications

This appliance is equipped with 5mm mirrored ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

C. Mobile Home Approved

This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.

The structural integrity of the mobile home floor, ceiling, and walls must be maintained. The appliance must be properly grounded to the frame of the mobile home and use only listed pellet vent, Class “PL” connector pipe.

A Harman® Outside Air Kit must be installed in a mobile home installation.

⚠ WARNING

THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

DO NOT INSTALL IN SLEEPING ROOM.

D. BTU & Efficiency Specifications

EPA Certification Number:	
EPA Certified Emissions:	1.9 g/hr
***EPA Default Efficiency:**	78%
****Actual Tested Efficiency:**	67.4%
*****EPA BTU Output:**	31,000
******BTU Input**	40,000
Vent Size:	3 Inch
Hopper Capacity:	60 lbs
Fuel	Wood Pellet

**An efficiency based on EPA historical data of 78%*

***Actual tested Higher Heating Value (HHV) efficiency and data collected during EPA emissions test*

****A range of BTU outputs based on EPA default efficiency and the burn rates from the low and high EPA tests*

*****Based on the maximum feed rate per hour multiplied by approximately 8,600 BTU's which is the average BTU's from a pound of pellets.*

This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual.

E. Non-Combustible Materials Specification

Material which will not ignite and burn. Such materials are those consisting entirely of steel, iron, brick, tile, concrete, slate, glass or plasters, or any combination thereof.

Materials that are reported as passing **ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C** and **UL763** shall be considered non-combustible materials.

F. Combustible Materials Specification

Materials made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that can ignite and burn, whether flame proofed or not, or plastered or un-plastered shall be considered combustible materials.

G. Electrical Codes

120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps

NOTE: Some generator or battery back-up systems may not be compatible with the micro-processor electronics on this appliance. Please consult the power supply manufacturer for compatible systems.

WARNING! Risk of Fire! *Hearth & Home Technologies disclaims any responsibility for, and the warranty and agency listing will be voided by the below actions.*

DO NOT:

- *Install or operate damaged appliance*
- *Modify appliance*
- *Install other than as instructed by Hearth & Home Technologies*
- *Operate the appliance without fully assembling all components*
- *Overfire*
- *Install any component not approved by Hearth & Home Technologies*
- *Install parts or components not Listed or approved.*
- *Disable safety switches*

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

For assistance or additional information, consult a qualified installer, service agency or your dealer.

NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

2 Getting Started

A. Design and Installation Considerations

1. Appliance Location

NOTICE: *Check building codes prior to installation.*

- Installation MUST comply with local, regional, state and national codes and regulations.
- Consult insurance carrier, local building inspector, fire officials or authorities having jurisdiction over restrictions, installation inspection and permits.

It is a good idea to plan your installation on paper, using exact measurements for clearances and floor protection, before actually beginning the installation

Consideration must be given to:

- Safety, convenience, traffic flow
- Placement of the chimney and chimney connector.
- If you are not using an existing chimney, place the appliance where there will be a clear passage for a factory-built listed chimney through the ceiling and roof.
- Installing an optional outside air kit would affect the location of the vent termination.

Since pellet exhaust can contain ash, soot or sparks, you must consider the location of:

- Windows
- Air Intakes
- Air Conditioner
- Overhang, soffits, porch roofs, adjacent walls
- Landscaping, vegetation

When locating vent and venting termination, vent above roof line when possible.

⚠ WARNING

Risk of Fire *Damaged parts could impair safe operation. Do NOT install damaged, incomplete or substitute components*

NOTICE: *Locating the appliance in a location of considerable air movement can cause intermittent smoke spillage from appliance. Do not locate appliance near:*

- *Frequently open doors*
- *Central heat outlets or returns*

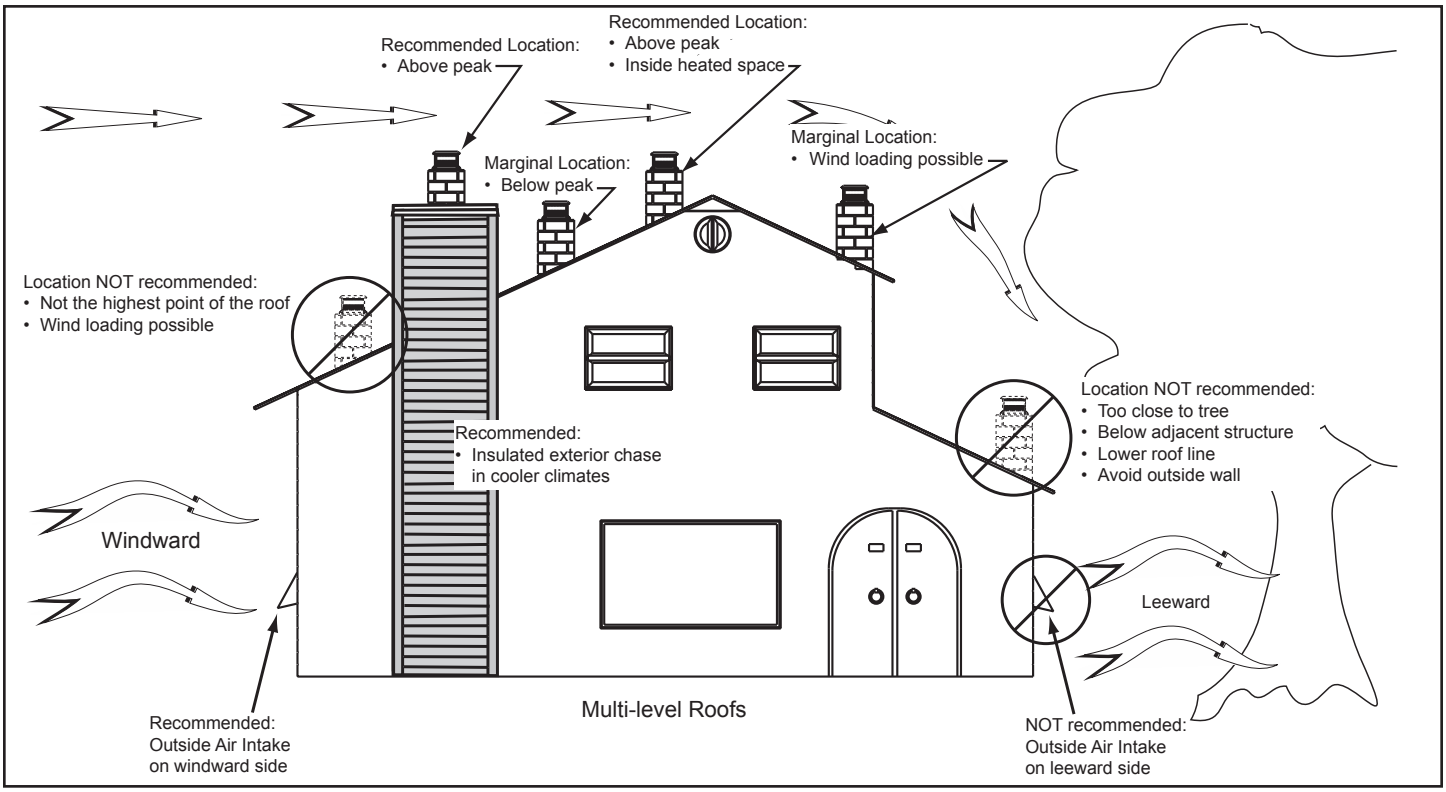


Figure 2.1

B. Tools And Supplies Needed

Tools and building supplies normally required for installation, unless installing into an existing masonry fireplace:

Reciprocating Saw	Gloves
Hammer	Safety Glasses
Phillips Screwdriver	Electric Drill & Bits
Tape Measure	
Level	<u>May also need:</u>
Non-Combustible Sealant	Vent Support Straps
Material	Venting Paint

C. Inspect Appliance and Components

- Carefully remove the appliance and components from the packaging.
- The vent system components and decorative doors and fronts may be shipped in separate packages.
- Report to your dealer any parts damaged in shipment, particularly the condition of the glass.
- **Read all of the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**

⚠ WARNING

RISK OF FIRE OR EXPLOSION! Damaged parts could impair safe operation. DO NOT i*nstall damaged, incomplete or substitute components. Keep appliance dry.*

Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by the following actions:

- Installation and use of any damaged appliance or vent system component.
- Modification of the appliance or vent system.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.

Any such action may cause a fire hazard.

⚠ WARNING

Risk of Fire, Explosion or Electric Shock! DO NOT use this appliance if any part has been under water. Call a qualified service technician to inspect the appliance and to replace any part of the control system which has been under water.

3 Clearances

A. Appliance Dimension Diagram

Dimensions are actual appliance dimensions. Use for reference only.

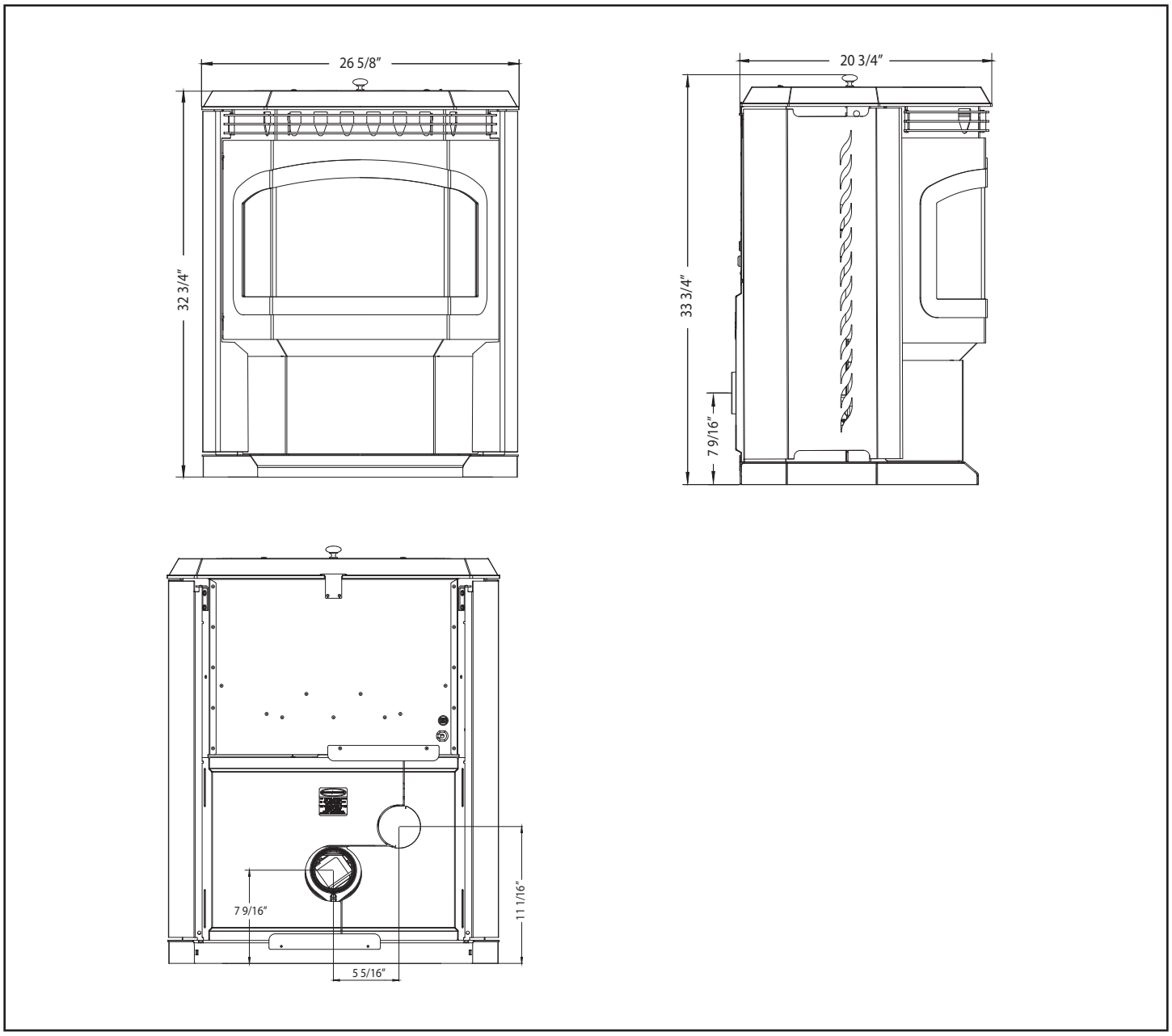


Figure 3.1

B. Clearances to Combustibles

When selecting a location for the appliance it is important to consider the required clearances to walls (see Figure 3.2).

⚠ WARNING

RISK OF FIRE OR BURNS! Provide adequate clearance around air openings and for service access. *Due to high temperatures, the appliance should be located out of traffic and away from furniture and draperies.*

⚠ CAUTION

THIS APPLIANCE MUST BE VENTED TO THE OUTSIDE.

NOTICE: *Illustrations reflect typical installations and are FOR DESIGN PURPOSES ONLY. Actual installation may vary due to individual design preference.*

Place the stove away from combustible walls at least as far as shown in Figure 3.2. Please note the difference in side wall clearance with and without side shields.

Note that the clearances shown are minimum for safety but do not leave much room for access when cleaning or servicing. Please take this into account when placing the stove.

Due to high temperatures, the stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this unit.

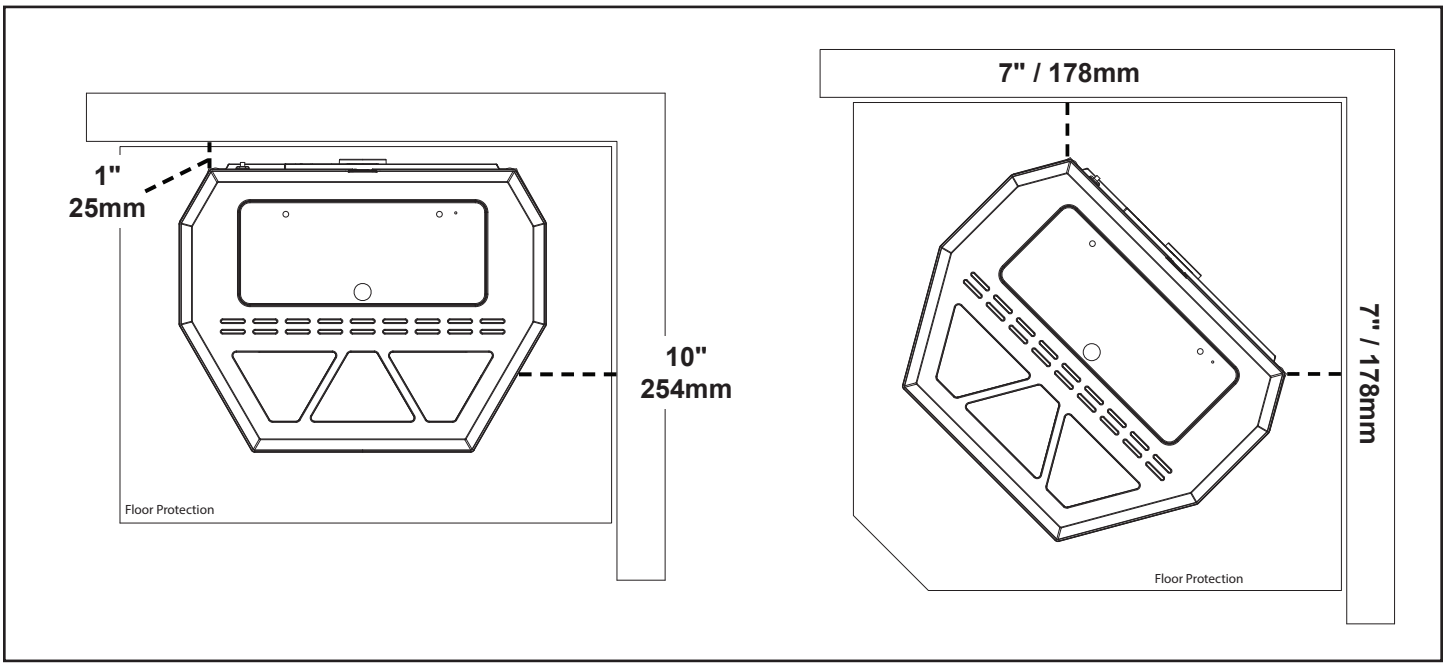


Figure 3.2

C. Floor Protection

Place the stove on a noncombustible type floor or floor protector that extends a minimum of 6 inches (152mm) to the front of the load door opening, 6 inches (152mm) to the sides of the door opening, and 6 inches to the rear. Floor protection must also extend 2 inches (51mm) beyond each side of any horizontal flue pipe. The Advance does not require R value floor protection. The minimum floor protector material is 20 gauge sheet metal. Other floor protector materials that can be used include Type I hearth pads, ceramic tile, stone, brick, etc. Figure 3.3

NOTE for Canadian installation only: Per ULC-S627-00, If installed on a combustible floor, the need to provide a noncombustible *floor protector* covering the area beneath the *space heater* and extending at least 17.72" (450mm) on the firing side and at least 7.87" (200mm) on the other sides.

In Canada, you may follow smaller U.S. floor protection requirements ONLY if the user agrees to completely shut-down the appliance, and allow it to cool to where all fire is extinguished and the combustion blower and its indicator light shuts off, prior to opening the firebox door or ash door.

Minimum size rectangular floor protection (USA) is 38-5/8" Wide by 27-3/4" Deep. (981mm x 705mm)

*Floor protection dimensions for the front and sides are measured from the appliance door opening in The United States. In Canada, the side dimension is measured from the widest part of the appliance.

Floor Protection Requirements		US	Canada
J	Sides	6"	200mm
K	Front	6"	450mm
L	Rear	1"	200mm

NOTE: Measurement "K" is measured from the glass in the US ONLY

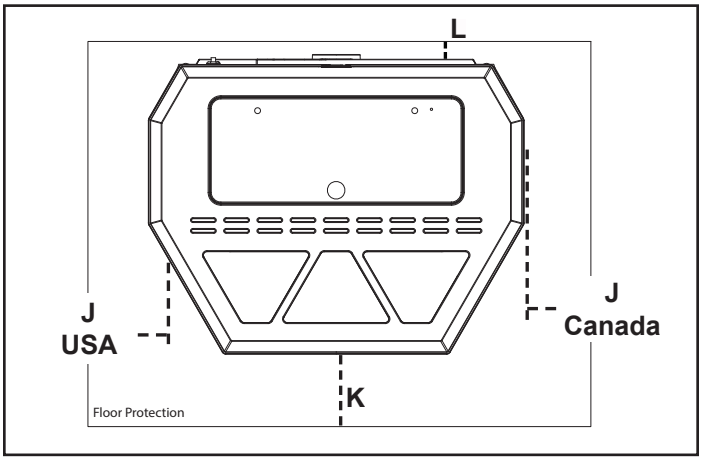
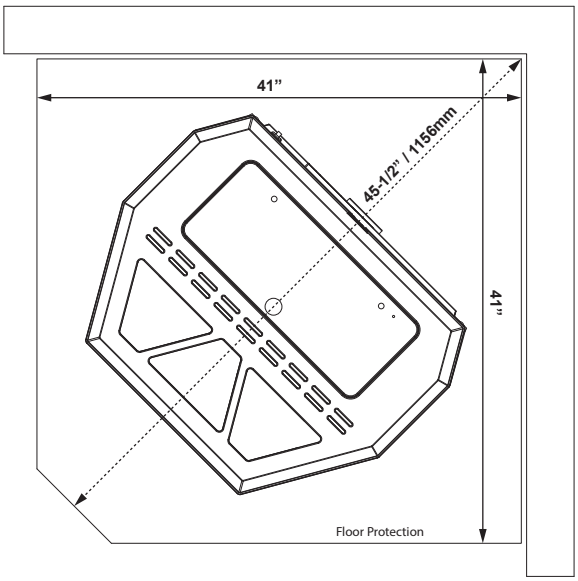


Figure 3.3

Alternate floor protector dimension may be used as long as they satisfy the measurement requirements shown below.

Minimum size floor protection for a corner installation hearth pad is 36" x 36" (USA ONLY). NOTE: Floor protector <u>WILL NOT</u> touch the wall.

Corner to edge dimension for corner installation floor protection.



D. Mobile Home Installation

When installing this unit in a mobile home, several requirements must be followed:

1. The unit must be bolted to the floor. This can be done with 1/4" lag screws through the 2 holes in the base plate.
2. The unit must also be connected to outside air. *See section 4-D Outside Air.*
3. Floor protection and clearances must be followed as shown.
4. The appliance must be properly grounded to the frame of the mobile home using a minimum of 8 AWG copper solid or stranded, insulated or bare wire or equivalent.

4 Termination Location and Vent Information

A. Vent Termination Minimum Clearances

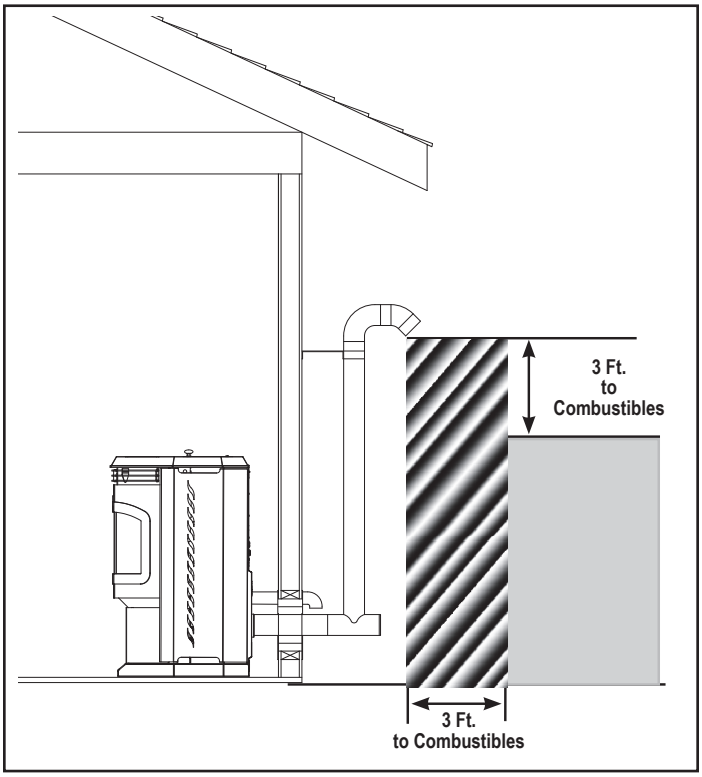


Figure 4.1

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER

#1 Preferred method (Figure 4.1)

This method provides excellent venting for normal operation and allows the stove to be installed closest to the wall. Two inches from the wall is safe; however, four inches allows better access to remove the rear panel. The vertical portion of the vent should be three to five feet high. This vertical section will help provide natural draft in the event of a power failure.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Do not place joints within wall pass-through.

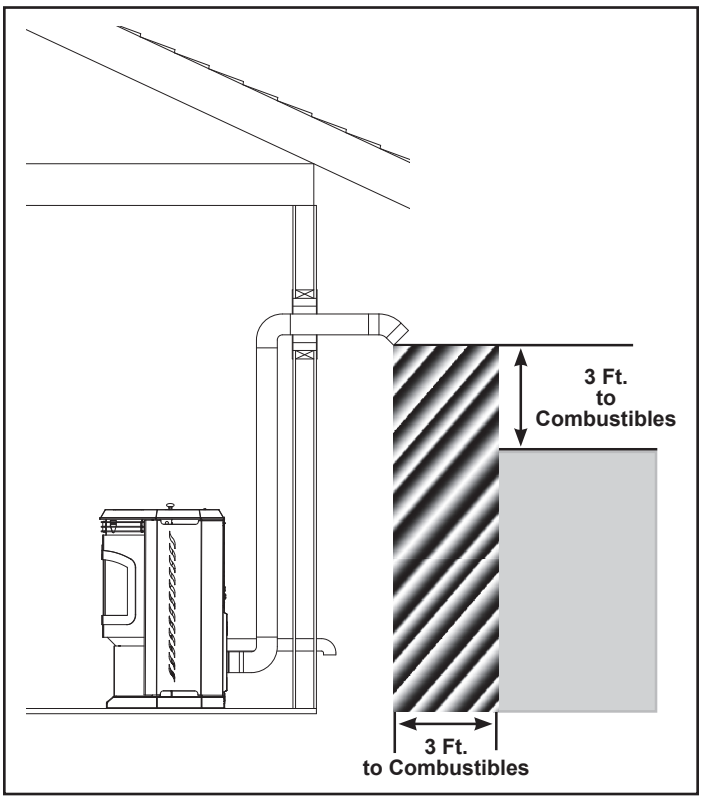


Figure 4.2

#2 Preferred method (Figure 4.2)

This method also provides excellent venting for normal operation but requires the stove to be installed farther from the wall. The vertical portion of the vent should be three to five feet high and at least 1” from a combustible wall. This vertical section will provide natural draft in the event of a power failure.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

If the stove is installed below grade be sure the vent t*ermination is at least 12" above grade* ***(with outside air only)****. The outlet must also be 1 foot from the house/building.*

Do not place joints within wall pass-through.

⚠ CAUTION

Keep combustible materials (such as grass, leaves, etc.) at least 3 feet away from the flue outlet on the outside of the building.

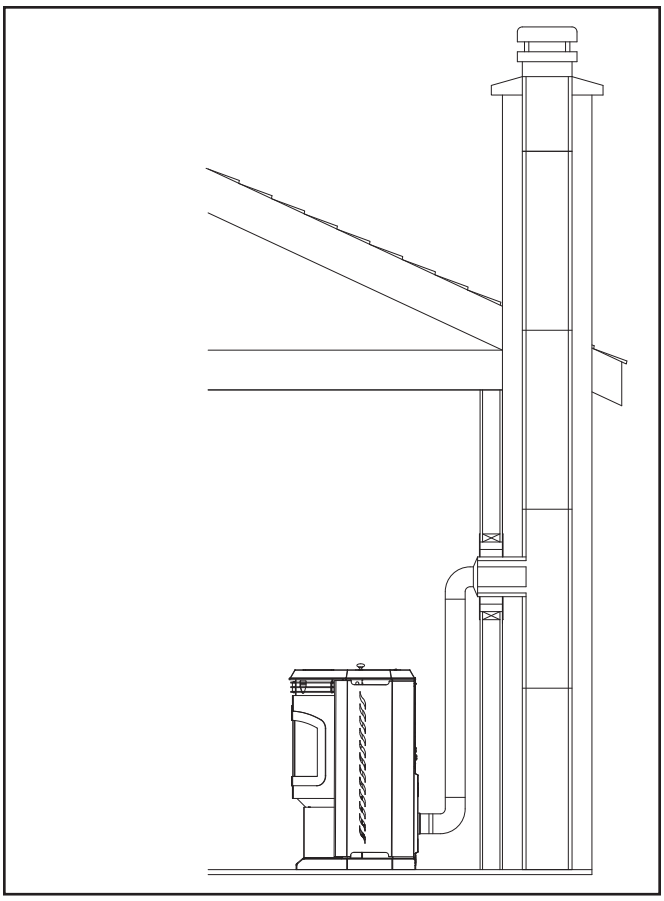


Figure 4.3

#3 Installing into an existing chimney (Figure 4.3)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #7.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. Refer to Method 6 & 7. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Be sure to design the venting so that it can be easily cleaned.

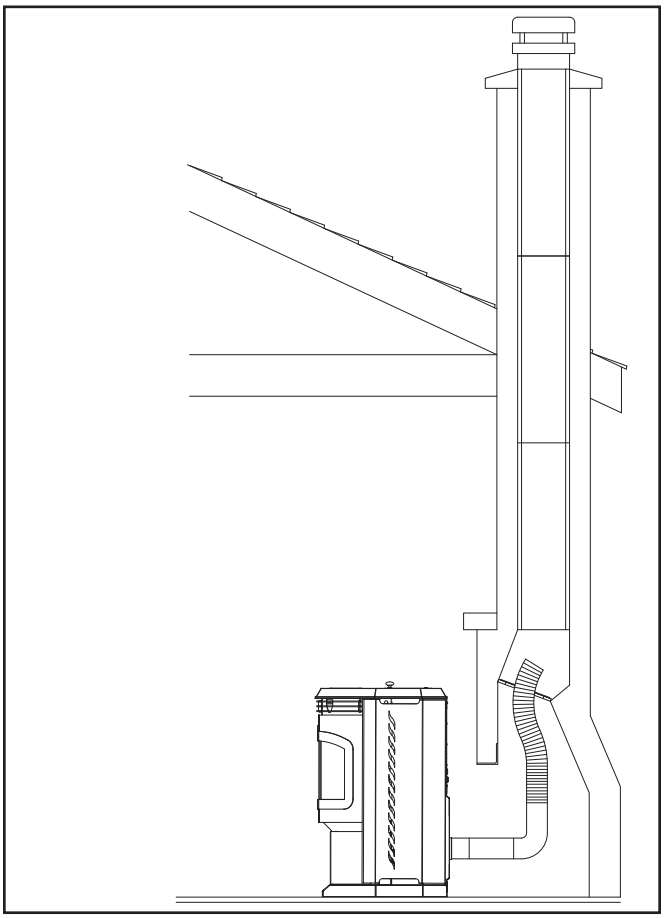


Figure 4.4

#4 Installing into an existing fireplace chimney (Figure 4.4)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #6.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. Refer to Method 5 & 6.

The chimney should be sealed at the damper using a steel plate. Kaowool, mineral wool or an equivalent non-combustible insulation is recommended to be installed on top of the sealing plate to reduce the possibility of condensation. The connector pipe should extend through the smoke chamber to the base or into the first flue tile. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Be sure to design the venting so that it can be easily cleaned.

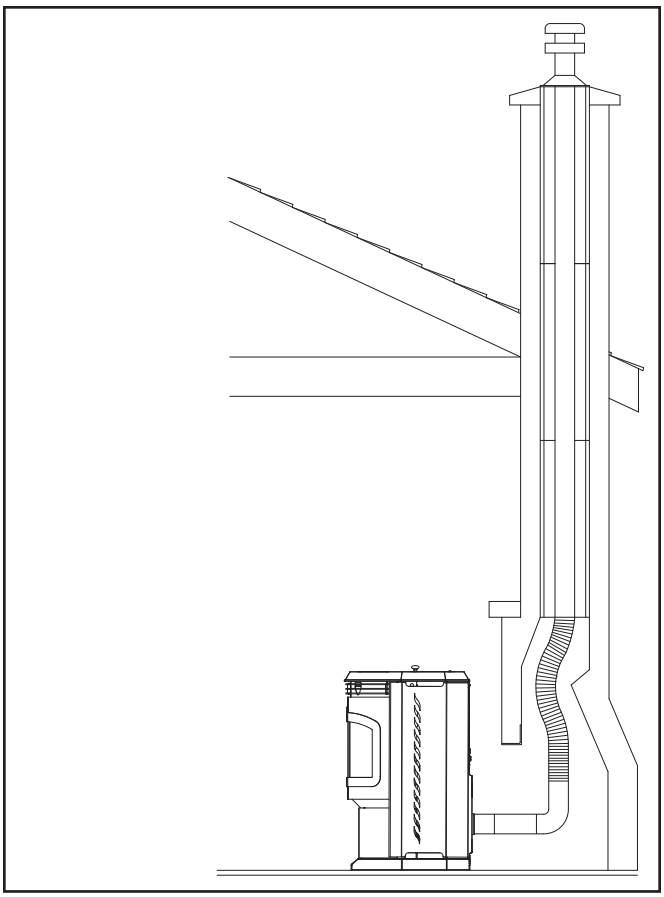


Figure 4.5

#5 Installing into an existing fireplace chimney (Figure 4.5) w/Full Liner

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney. The pipe or liner inside the chimney should be 4" diameter.

In this method a cap should also be installed on the chimney to keep out rain. Be sure to use approved pellet vent pipe fittings. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer. Pipe size should be increased to 4" using this method.

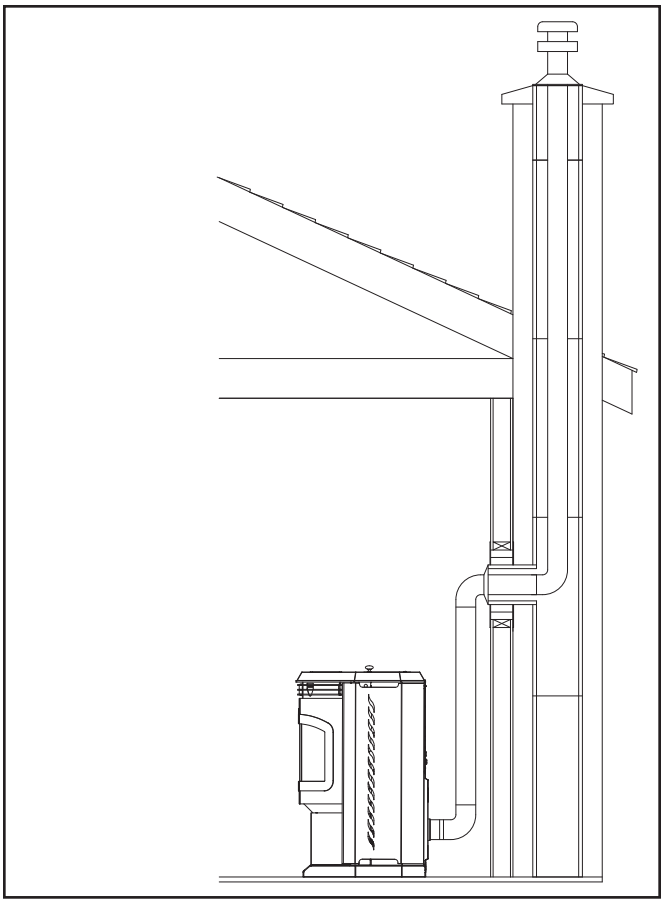


Figure 4.6

#6 Installing into an existing chimney (Figure 4.6) w/Full liner

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer. The pipe or liner inside the chimney should be 4" diameter.

In this method a cap should also be installed on the chimney to keep out rain.

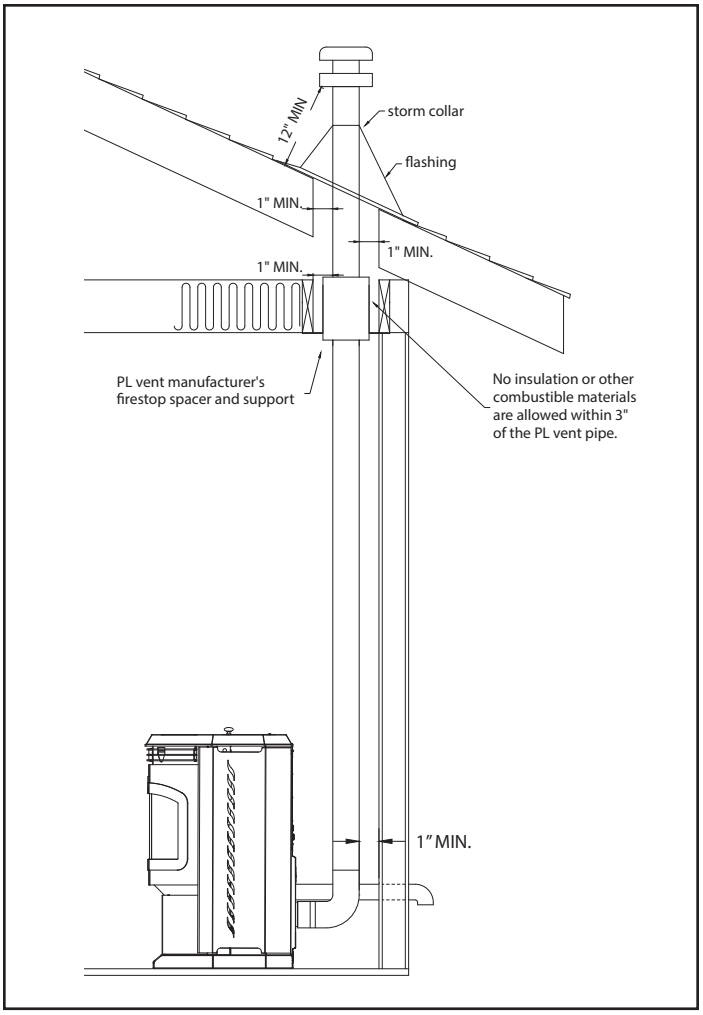


Figure 4.7

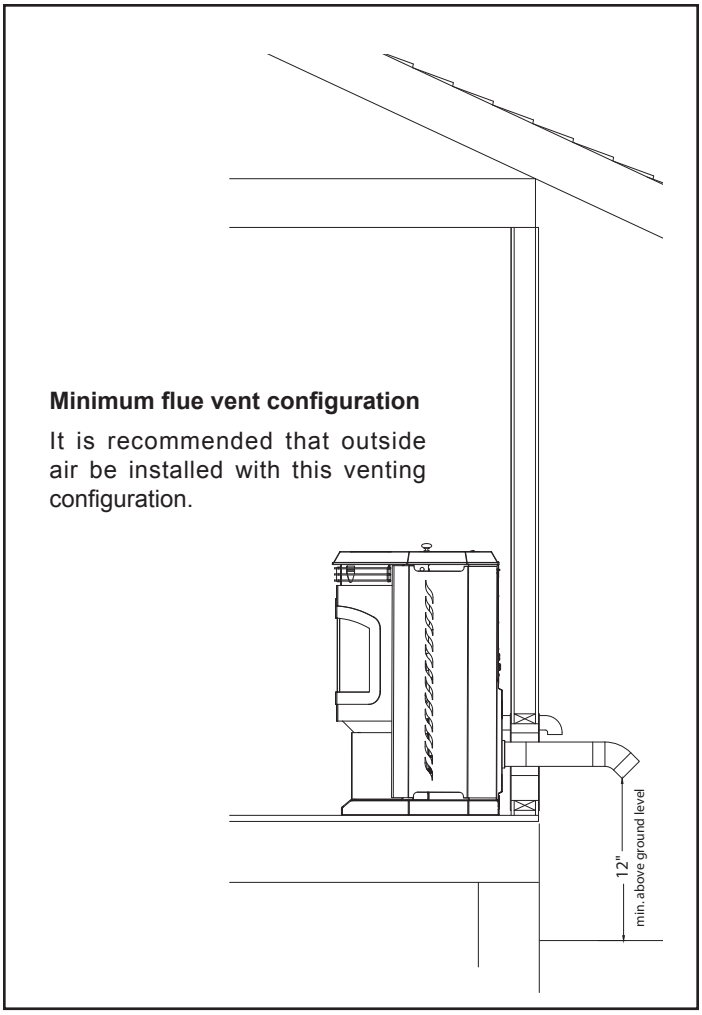


Figure 4.8

#7 Installing through the ceiling

Through the ceiling vent, follow PL vent manufacturers recommendations when using wall and ceiling pass through.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Do not place joints within wall pass-through.

Area within dotted circle represents the minimum clearance to combustible materials such as shrubbery, mulch or tall grasses.

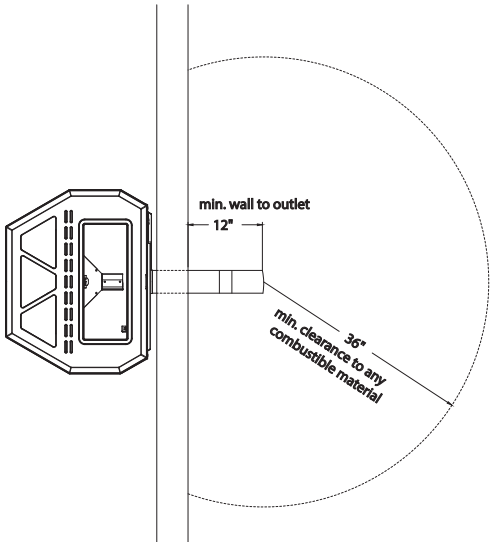


Figure 4.9

B. Chimney Diagram

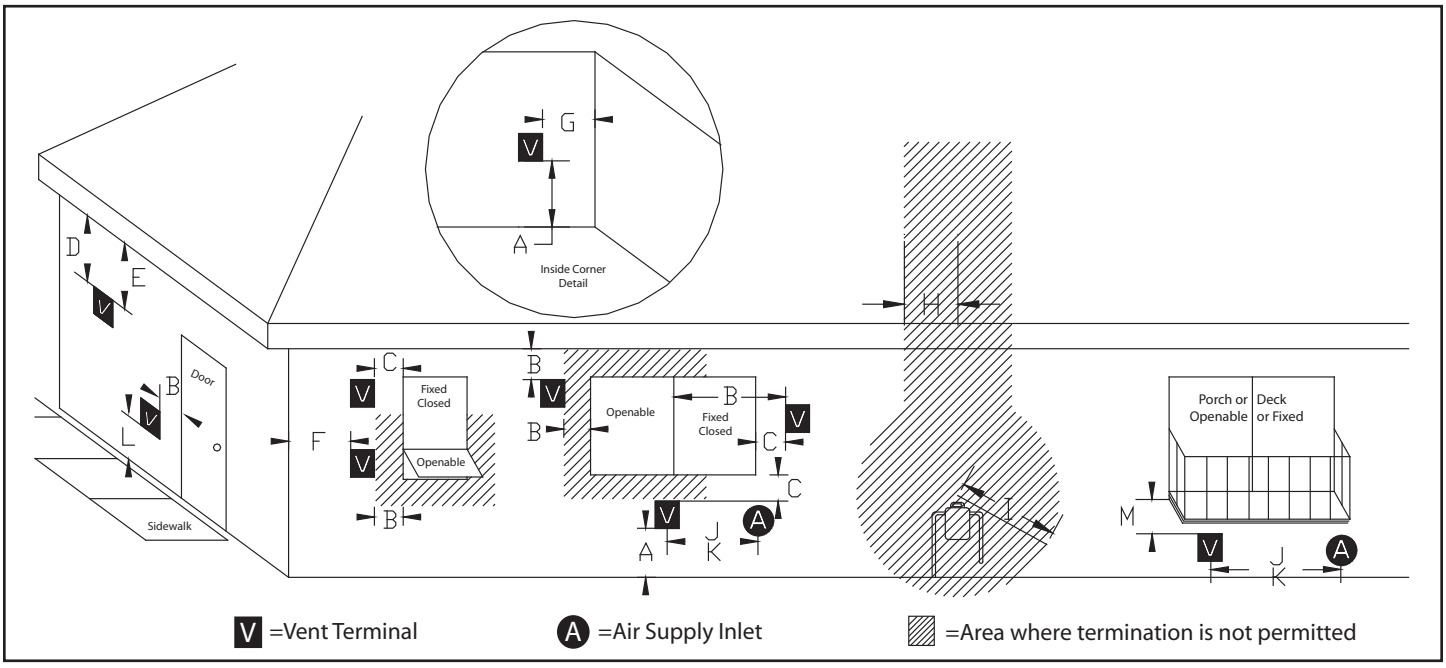


Figure 4.10

Requirements for Terminating the Venting

- **Venting terminals must not be recessed into a wall or siding.**
- **Only PL vent pipe wall pass-through and fire stops should be used when venting through combustible materials.**
- **Always take into consideration the effect the prevailing wind direction or other wind currents will cause with flyash and /or smoke when placing the termination.**

In addition, the following must be observed:

A. The clearance above grade must be a minimum of 12".

B. The clearance to a window or door that may be opened must be a minimum of 48" to the side and 48" below the window/door, and 12" above the window/door. (**with outside air installed, 12" to side and below**)

C. A 12" clearance to a permanently closed window is recommended to prevent condensation on the window.

D. The vertical clearance to a ventilated soffit located above the terminal within a horizontal distance of 2 feet (60 cm) from the center-line of the terminal must be a minimum of 18".

E. The clearance to an unventilated soffit must be a minimum of 12".

F. The clearance to an outside corner is 11" from center of pipe.

G. The clearance to an inside corner is 12".

H. A vent must not be installed within 3 feet (90 cm) above a gas meter/regulator assembly when measured from the horizontal center-line of the regulator.

I. The clearance to service regulator vent outlet must be a minimum of 6 feet.

J. The clearance to a non-mechanical air supply inlet to the building or the combustion air inlet to any other appliance must be a minimum of 48".

K. The clearance to a mechanical air supply inlet must be a minimum of 10 feet. (**with outside air installed, 6 feet**)

L. The clearance above a paved sidewalk or a paved driveway located on public property must be a minimum of 7 feet.

M. The clearance under a veranda, porch, deck or balcony must be a minimum of 12 inches. **(B. also) The clearance to vegetation and other exterior combustibles such as mulch is 36" as measured from the center of the outlet or cap. This 36" radius continues to grade or a minimum of 7 feet below the outlet.**

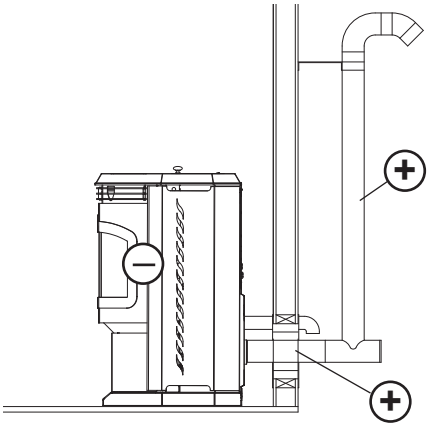
Certain Canadian and or Local codes or regulations may require different clearances.

A vent shall not terminate directly above a side-walk or paved driveway which is located between two single family dwellings and serves both dwellings.

Only permitted if veranda, porch, deck, or balcony is fully open on a minimum of 2 sides beneath the floor.

See NFPA 211 for more installation clearance reductions when using outside air. Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365. (if in Canada)

C. Venting & Use of Elbows



⊕ = *Positive static pressure*
⊖ = *Negative static pressure*

Figure 4.11

Harman pellet stoves depend on a combustion fan to pull air through the unit for combustion. The venting system restricts the ability of the combustion fan to move the required amount of air through the unit. A system with too much resistance will result in incomplete combustion, more frequent required cleaning and poor unit performance. It is always best to choose a location for the appliance that will result in a venting system with the shortest equivalent vent length (EVL).

It is best to have your venting system designed by a Harman authorized dealer before you finalize your purchase of an appliance.

***Equivalent Vent Length:* The equivalent vent length for common pellet vent components are:**

- 90° Elbows or Tee: 5 EVL Units
- 45° elbow: 3 EVL Units
- Vertical Pipe or Liner: ½ EVL Unit
- Horizontal Pipe or liner: 1 EVL Unit

The total allowable equivalent vent length is:

- 20 EVL for 3” pellet vent pipe or liner
- 30 EVL for 4” pellet vent pipe or liner

Due to the potential for fly ash accumulation in horizontal venting sections, the maximum permissible horizontal venting length is:

- 4 ft. for 3” & 4” pellet vent pipe.

Example: First Floor Installation

A unit is to be installed using 3” Pellet Pipe with 3 feet of horizontal pipe, a Tee, 10 feet of vertical pipe, a 90° elbow and a termination cap.

The equivalent vent length is:

3 ft. of Horizontal Pipe (1 x 3 EVL)	= 3 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
10 ft. of Vertical Pipe (10 x .5 EVL)	= 5 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
Termination Cap	= 0 EVL
Equivalent Vent Length	= 18 EVL

In the example system detailed above, the EVL was 138which is less than the maximum of 20 EVL for 3” pellet vent pipe, thus this is a satisfactory venting configuration.

Example: Connection to Masonry Chimney

A unit is to be installed using 3” Pellet Pipe with 2 feet of horizontal pipe, a Tee, 4 feet of vertical pipe, an elbow, a Tee, 21 feet of vertical liner, and a termination cap.

The equivalent vent length is:

2 ft. of Horizontal Pipe (1 x 2 EVL)	= 2 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
4 ft. of Vertical Pipe (4 x .5 EVL)	= 2 EVL
90° Elbow (1 x 5 EVL)	= 5 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
21 ft. of Vertical Liner (21 x .5 EVL)	= 10.5 EVL
Termination Cap	= 0 EVL
Equivalent Vent Length	= 29.5 EVL

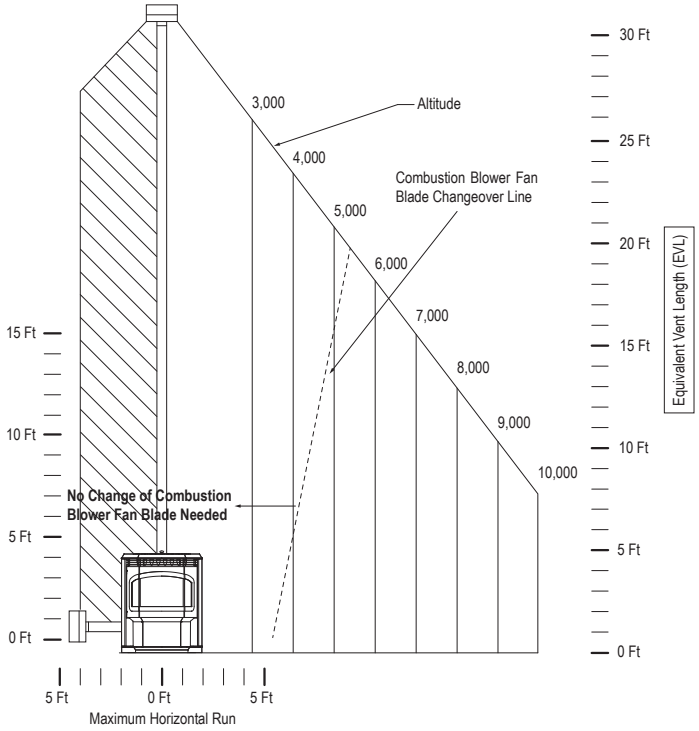
In the example system detailed above, the EVL was 29.5 which exceeds the maximum of 20 ft. for 3” pellet vent pipe, thus 3” vent pipe should not be used in this installation. However, since 4” pipe can support an EVL up to 30, the use of 4” pipe would create a satisfactory installation.

C. Venting & Use of Elbows *continued*

Note: When the amount of vertical pellet vent pipe in the system exceeds 15 feet, 4” pellet vent pipe should be used.

Note: Equivalent Venting Length decreases as altitude increases.

Note: When the High Altitude Fan Blade is used, the maximum length of Outside Air Pipe decreases to 20 ft.



Example:

A unit with an EVL of 13, is to be installed at an altitude of 3,000 feet above sea level.

From the chart to the left, at 3,000 feet of altitude, the maximum permissible equivalent venting length is 26 feet. Therefore this would be an acceptable installation with no need to change the combustion blower fan.

However, if the same unit (EVL 13)was to be installed an altitude of 9,000 feet above sea level, the installation would no longer be acceptable and the equivalent vent length of the pipe would have to be reduced for proper unit operation.

- Long runs of flex or PL vent pipe installed directly vertical from the flue stub may require more frequent cleaning due to fly ash falling off inside and collecting directly above the combustion blower outlet.
- 4" stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood-burning fireplaces with Class A metal chimneys.
- All pellet vent pipe must be secured together either by means provided by pipe manufacturer or by 3 screws at each joint.
- Use only the specified venting components. Use of any other components will void the product warranty and may pose a hazard.
- Do Not Install a Flue Damper In The Exhaust Venting System of This Appliance.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
- **NOTE:** Simpson DuraVent PelletVent Pro Harman®Adapter Part #3PVP-ADHB and PelletVent Pro Harman®Adapter Increaser Part #3PVPX4ADHB are highly recommended to be installed on the starter collar to insure a proper pipe connection to the unit.
- **INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER**
- Use silicone to create an effective vapor barrier at the location where the chimney or outside air ducting passes through to the exterior of the structure

D. Outside Air

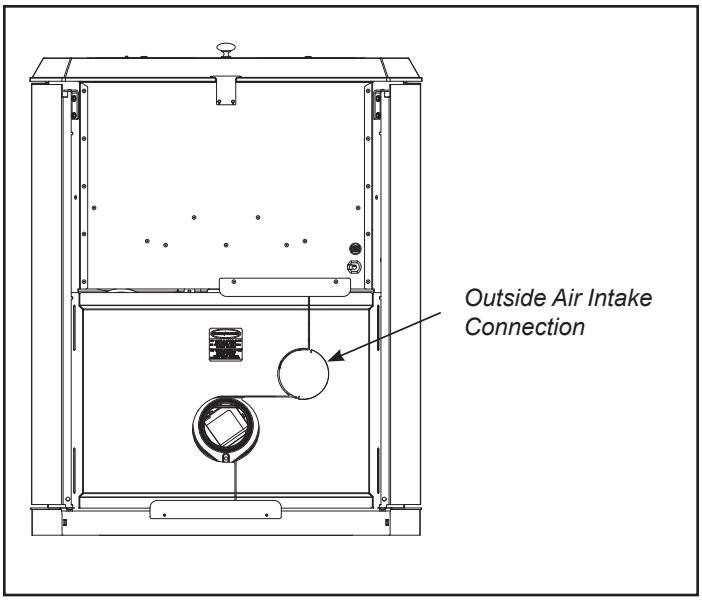


Figure 4.12

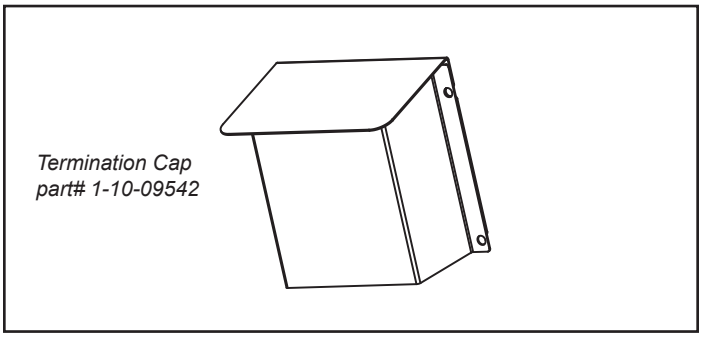


Figure 4.13

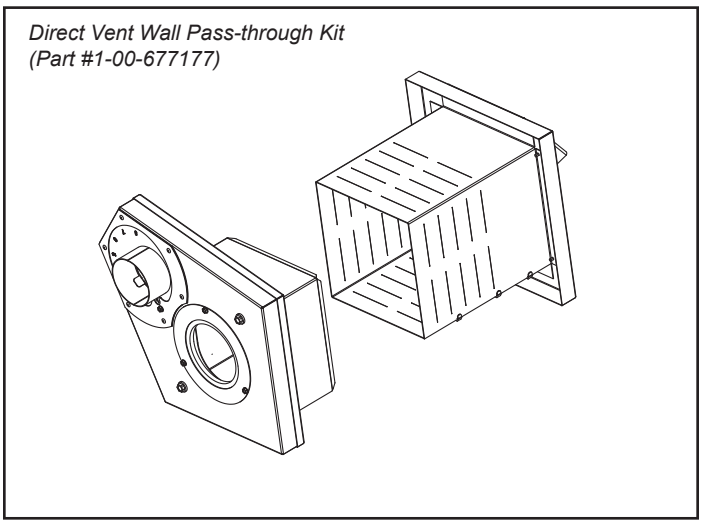


Figure 4.14

Outside Air:
Hearth & Home Technologies recommend attaching outside air in all installations, especially lower level and main floor locations.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands, may lead to back-drafting of those and other appliances.

When the appliance is side-wall vented: The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

When the appliance is roof vented: The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

The outside air connection will supply the demands of the pellet appliance, but consideration must be given to the total house demand. House demand may consume some air needed for the stove, especially during a power failure. It may be necessary to add additional ventilation to the space in which the pellet appliance is located. Consult with your local HVAC professional to determine the ventilation demands for your house.

To install outside air use 3". non-combustible flex pipe Figure 4.13. There is a break-away hole on the rear panel of the Advance stove which must be removed before connecting the flex pipe. Figure 4.12. The pipe should be run outside and terminate to the side or below the vent pipe outlet so the flue outlet is more than 12" from the inlet cover. The Termination Cap should be used to keep birds, rodents, etc. out of the pipe Figure 4.13.

You may choose to use the optional Direct Vent Wall Pass-through Kit which incorporates the venting pass-through and outside air inlet into one component. Figure 4.14.

Use silicone to create an effective vapor barrier at the location where the chimney or outside air ducting passes through to the exterior of the structure.

E. Locating Your Appliance & Chimney

Location of the appliance and chimney will affect performance.

- Install through the warm airspace enclosed by the building envelope. This helps to produce more draft, especially during lighting and die-down of the fire.
- Penetrate the highest part of the roof. This minimizes the effects of wind loading.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.
- Minimize the use of chimney offsets.
- Consider the appliance location relative to floor and ceiling and attic joists.

⚠ CAUTION

- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.
- DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house

F. Draft

Draft is the pressure difference needed to vent appliances successfully. When an appliance is drafting successfully, all combustion by products are exiting the home through the chimney.

Considerations for successful draft include:

- Preventing negative pressure
- Location of appliance and chimney

To measure the draft or negative pressure on your appliance use a magnahelic or a digital pressure gauge capable of reading 0 - 1 inches of water column (W.C.).

The appliance should be running on high for at least 15 minutes for the test.

With the stove running on high you should have a negative pressure equal to or greater than the number given in the chart below. If you have a lower reading than you find on the chart, your appliance does not have adequate draft to burn the fuel properly.

Minimum Vacuum Requirements:	**.35 - .55**

Prior to installing the flue pipe, connect a draft meter. (The draft meter must have a minimum range of 0 - .5") Record the first reading. Connect flue pipe to stove and be sure all doors and windows in the home are closed. Record the second draft reading _____. If the second reading is more than .05" lower than the first reading, check for possible restrictions or the need for outside air. For more information on the draft test procedure, refer to Page 21

G. Negative Pressure

⚠ WARNING

Risk of Asphyxiation! *Negative pressure can cause spillage of combustion fumes and soot.*

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

- Exhaust fans (kitchen, bath, etc.)
- Range hoods
- Combustion air requirements for furnaces, water heaters and other combustion appliances
- Clothes dryers
- Location of return-air vents to furnace or air conditioning
- Imbalances of the HVAC air handling system
- Upper level air leaks such as:
  - Recessed lighting
  - Attic hatch
  - Duct leaks

To minimize the effects of negative air pressure:

- Install the outside air kit with the intake facing prevailing winds during the heating season
- Ensure adequate outdoor air for all combustion appliances and exhaust equipment
- Ensure furnace and air conditioning return vents are not located in the immediate vicinity of the appliance
- Avoid installing the appliance near doors, walkways or small isolated spaces
- Recessed lighting should be a "sealed can" design
- Attic hatches weather stripped or sealed
- Attic mounted duct work and air handler joints and seams taped or sealed

NOTICE: *Hearth & Home Technologies assumes no responsibility for the improper performance of the chimney system caused by:*

- *Inadequate draft due to environmental conditions*
- *Downdrafts*
- *Tight sealing construction of the structure*
- *Mechanical exhausting devices*

H. Avoiding Smoke and Odors

Negative Pressure, Shut-down, and Power Failure:

T**o reduce the probability of back-drafting or burn-back in the pellet burning appliance during power failure or shut-down conditions, the stove must be able to draft naturally** without exhaust blower operation. Negative pressure in the house will resist this natural draft if not accounted for in the pellet appliance installation.

Heat rises in the house and leaks out at upper levels. This air must be replaced with cold air from outdoors, which flows into lower levels of the house. Vents and chimneys into basements and lower levels of the house can become the conduit for air supply, and reverse under these conditions.

Outside Air

An outside air kit is recommended in all installations. The Outside Air Kit must be ordered separately.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands may lead to back drafting of those and other appliances.

When the appliance is roof vented (strongly recommended):
The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

When the appliance is side-wall vented:
The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

The outside air supply kit can supply most of the demands of the pellet appliance, but consideration must be given to the total house demand.

House demand may consume the air needed for the appliance. It may be necessary to add additional ventilation to the space in which the pellet appliance is located.

Consult with your local HVAC professional to determine the ventilation demands for your house.

Vent Pipe

Be sure to use approved pellet vent pipe wall and ceiling pass- through fittings to go through combustible walls and ceilings. Be sure to use a starting collar to attach the venting system to the stove. The starting collar must be secured to the flue stub with at least three screws, and sealed with high temp silicone caulking.

4” stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood burning fireplaces with class A metal chimneys.

Pellet venting pipe (also known as Type L vent) is constructed of two layers with air space between the layers. This air space acts as an insulator and reduces the outside surface temperature to allow a clearance to combustibles of only 1 inch. The sections of pipe lock together to form an air tight seal in most cases; however, in some cases a perfect seal is not achieved. For this reason and the fact that the Advance operates with a positive vent pressure, we specify that the joints also be sealed with silicone.

Where passing through an exterior wall or roof, be sure to use the appropriate pass-through device providing an adequate vapor barrier. Venting manufacturers generally provide these pass-through devices.

Vent Configurations:

To reduce probability of reverse drafting during shut-down conditions, Hearth & Home Technologies strongly recommends:

- Installing the pellet vent with a minimum vertical run of five feet, preferably terminating above the roof line.
- Installing the outside air intake at least four feet below the vent termination.

To prevent soot damage to exterior walls of the house and to prevent re-entry of soot or ash into the house:

- Maintain specified clearances to windows, doors, and air inlets, including air conditioners.
- Vents should not be placed below ventilated soffits. Run the vent above the roof.
- Avoid venting into alcove locations.
- Vents should not terminate under overhangs, decks or onto covered porches.
- Maintain minimum clearance of 12 inches from the vent termination to the exterior wall. If you see deposits developing on the wall, you may need to extend this distance to accommodate your installation conditions.

Hearth & Home Technologies assumes no responsibility for, nor does the warranty extend to, smoke damage caused by reverse drafting of pellet appliances under shut-down or power failure conditions.

I. Fire Safety

To provide reasonable fire safety, the following should be given serious consideration:

- Install at least one smoke detector and CO detector on each floor of your home.
- Locate smoke detector away from the heating appliance and close to the sleeping areas.
- Follow the smoke detector manufacturer's placement and installation instructions and maintain regularly.
- Conveniently locate a Class A fire extinguisher to contend with small fires.
- In the event of a hopper fire:
  - Evacuate the house immediately.
  - Notify fire department.

⚠ WARNING

Fire Risk.
Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by the following actions:

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Do NOT Overfire.

Or any such action that may cause a fire hazard.

⚠ WARNING

THIS WOOD HEATER HAS A MANUFACTURER-SET MINIMUM LOW BURN RATE THAT MUST NOT BE ALTERED. IT IS AGAINST FEDERAL REGULATIONS TO ALTER THIS SETTING OR OTHERWISE OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

J. Inspect Appliance & Components

- Remove appliance and components from packaging and inspect for damage.
- Report to your dealer any parts damaged in shipment.
- **Read all the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**

⚠ WARNING

Inspect appliance and components for damage. Damaged parts may impair safe operation.

- Do NOT install damaged components.
- Do NOT install incomplete components.
- Do NOT install substitute components.

Report damaged parts to dealer.

5 Appliance Set-Up

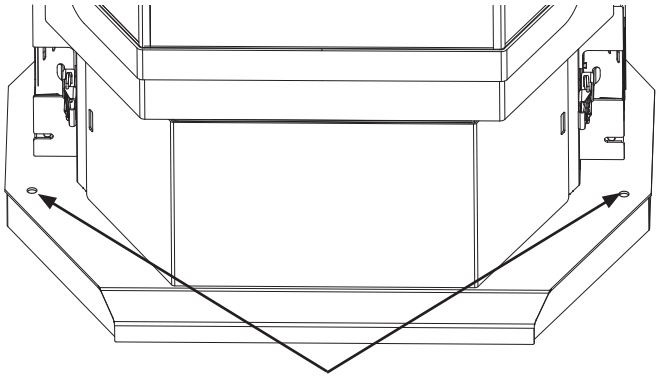


Figure 5.1

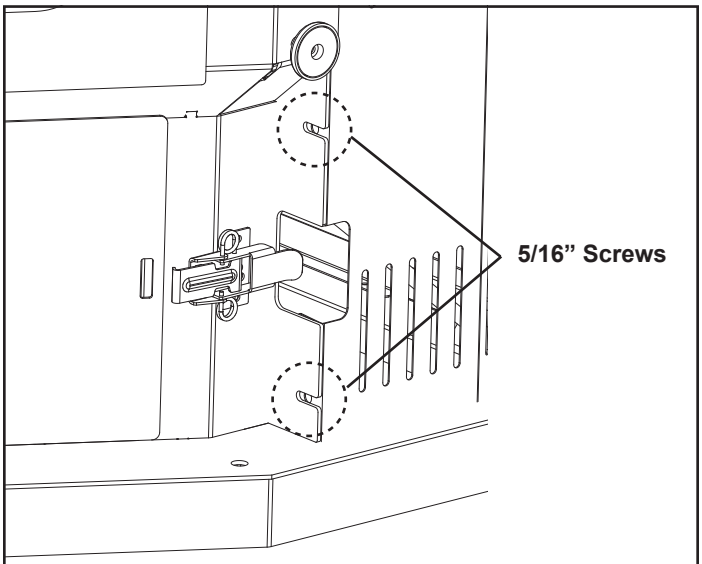


Figure 5.2

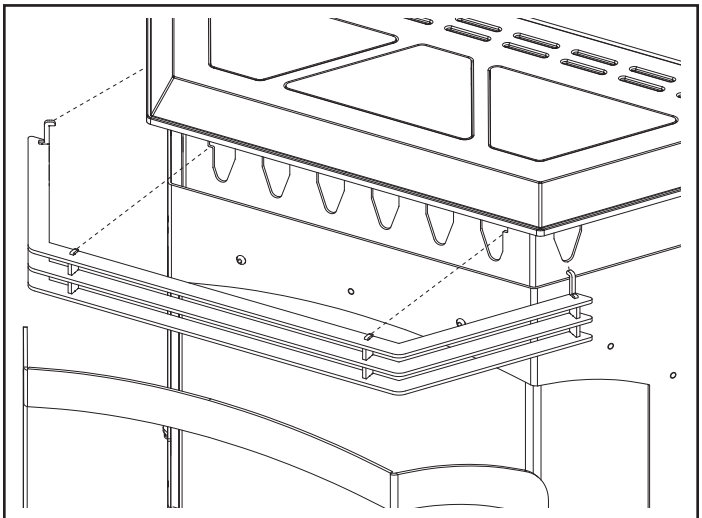


Figure 5.3

A. Unpacking

The Advance is bolted (1/4 x 1" hex head bolts) to the skid to prevent movement during shipping.

To free the stove from the skid you must remove the hold-down bolts in the rear of the pedestal base using a 7/16” socket or wrench. Figure 5.1.

B. Removing Rear Cover Panels

The rear cover panels are secured to the stove with (2) 5-16” screws each. The screws need only be loosened, not removed, to remove the panels. It is recommended that the rear covers are installed using a 5/16” socket, wrench or nut driver after the unit is in place and the vent pipe is installed, to prevent contact with hot or moving parts.

C. Air Grill Installation

There are 4 hooks located on the rear side of the grill. To install the Air Grill insert the hooks into the triangular distribution air openings at the front top of the unit as shown in Figure 5.3.

D. Door Frame Installation

There are 10 posts located on the rear side of the door frame. To install the door frame, insert the posts into the holes located in the door. Use the nuts located in the kit and tightened frame onto the door. Be careful not to overtighten. Figure 5.3.

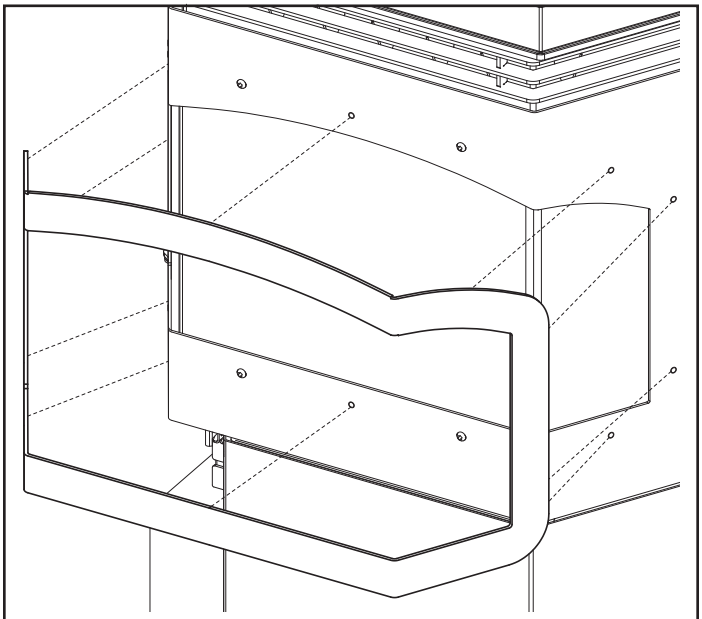


Figure 5.4

E. Room Sensor Installation

The room sensor is a small temperature sensor on the end of a 60" wire. This sensor is installed much like a standard wall thermostat. There is a remote room sensor port on the rear of the unit for easy external connection. Use standard 18-2 thermostat wire to extend the sensor to the desired location (50' maximum). The room sensor should be installed in the location where you want to control the temperature.

NOTE: Distances of more than 25 feet from the unit or in another room are not recommended. The room sensor is essential for the Advance excellent efficiency.

NOTE: It is recommended that the room sensor be installed, even if only installed on the rear of the unit as a return air sensor.

F. Low Draft Voltage Adjustment

These units are pre-tested at the factory with exactly 120 VAC, 60 Hz. They are checked and adjusted for firebox tightness, gasket leakage, motor operation and igniter operation. The Advance is then factory set at a mid-point adjustment and in most cases will not need any adjustments.

NOTE: The factory low draft setting may not be correct for the unit's permanent installation conditions.

The control board on the Advance is equipped with a low draft adjustment port located on the control face just to the right of the igniter light. Figure 5.4. This voltage adjustment is provided to allow the unit to be adjusted for the household voltage where the unit is going to be in permanent operation. **NOTE: The line voltage varies from area to area and often home to home.**

The low draft voltage should be adjusted to achieve the most efficient burn on low burn or "maintenance". This voltage adjustment allows the installer to change the low voltage set point approximately 10 volts. This adjustment should be done by the installer during set up because a draft meter reading is **required** to insure proper set up.

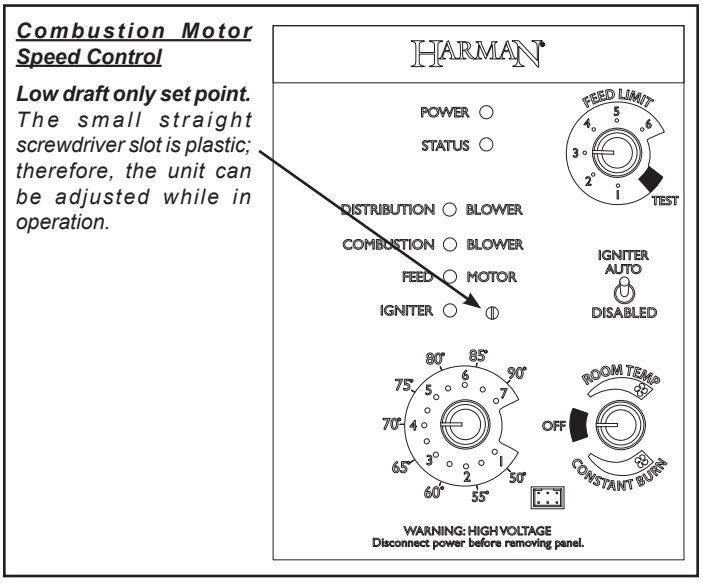


Figure 5.4

If the unit is not adjusted properly, it does not cause a safety concern. If the unit is adjusted too high, only efficiency is lost. If the unit is adjusted too low, the low draft pressure switch will not allow the feed motor or the igniter to operate.

A simple draft test should be performed after completing the flue pipe installation. To record the results for future reference:

1. Plug unit into a 120 VAC, 60 HZ outlet.
2. Close the hopper lid, front view door, and the ash pan door. Neither pellets or a fire are required for this test.
3. With the mode selector in the "OFF" position, turn the feed adjuster to "TEST".
4. Record the high draft_____in W.C. (Normal is -.50 to -.60) The control will be on the High Draft for a total of 2 minutes.
5. After 1 minute, the combustion motor will go down to low draft and the distribution blower will go on high. Allow approximately 15 seconds to pass for the combustion motor to slow before checking the low draft.
6. If the low draft is between -.35 and -.45, record the reading _____ in W.C. If the reading is higher, slowly turn the set screw counter-clockwise until the draft lowers. If the reading is lower, very slowly turn the set screw clockwise until the draft increases.

NOTE: In some cases, the draft may not go as low as -.35 to -.45 even with the set screw completely counter-clockwise. Ideally, you should just set it as low as possible.

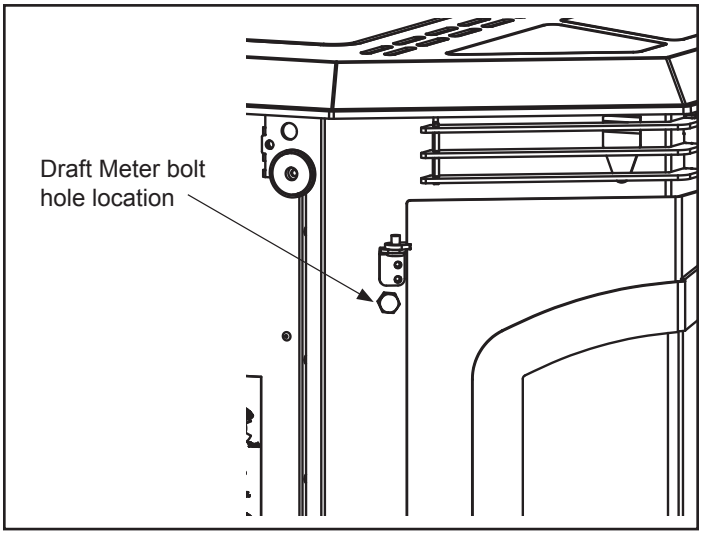


Figure 5.5

Connect the power cord to a 100 VAC, 50 Hz grounded receptacle. (A surge protector is recommended to protect the circuit board.) Also be sure that the polarity of the outlet that the stove is plugged into is correct.

6 Reference Material

A. Safety Reminders

When installing and operating your Harman® P-Series, respect basic safety standards. Read these instructions carefully before you attempt to install or operate the P-Series. Failure to do so may result in damage to property or personal injury and may void the product warranty.

Consult with your local building code agency and insurance representative before you begin your installation to ensure compliance with local codes, including the need for permits and follow-up inspections.

⚠ CAUTION

This appliance must be vented to the outside.

Due to high temperatures, this stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burn to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this stove.

Installation and repair of this stove should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning may be required. It is imperative that control compartments, burners, and circulating air passageways of this stove be kept clean.

⚠ CAUTION

WHEN THIS ROOM HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. TO REDUCE THE RISK OF FIRE, FOLLOW THE INSTALLATION INSTRUCTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

⚠ CAUTION

THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

⚠ CAUTION

THE STOVE IS HOT WHILE IN OPERATION.

KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

⚠ WARNING

MOBILE/MANUFACTURED HOME GUIDELINES DO NOT ALLOW INSTALLATION IN A SLEEPING ROOM.

⚠ WARNING

KEEP COMBUSTIBLE MATERIALS SUCH AS GRASS, LEAVES, ETC. AT LEAST 3 FEET AWAY FROM THE POINT DIRECTLY UNDER THE VENT TERMINATION.

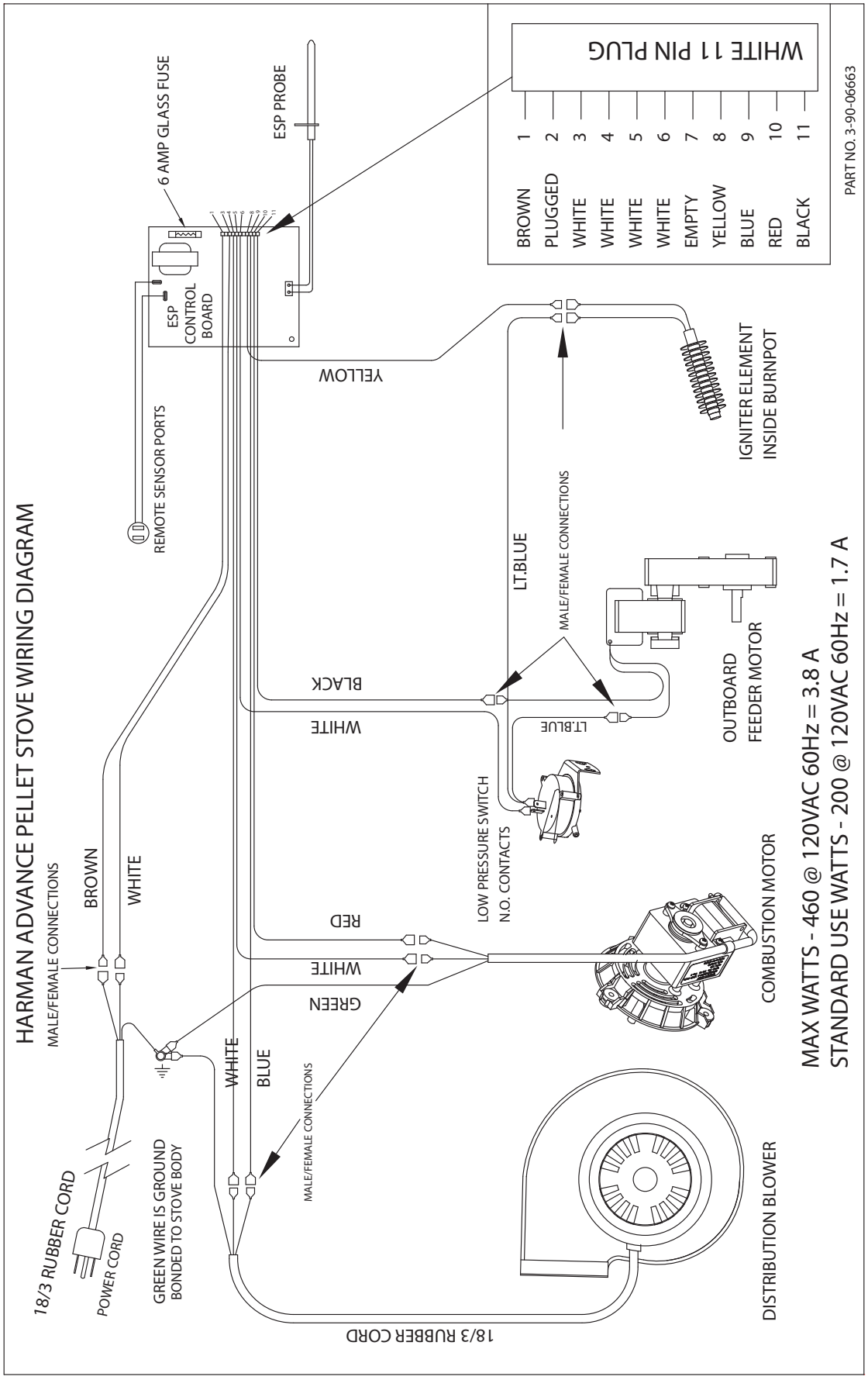
⚠ WARNING

USE OF IMPROPER FUELS, FIRESTARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND OPERATION GUIDELINES

⚠ WARNING

BURNING COLORED PAPER, CARDBOARD, SOLVENTS, TRASH AND GARBAGE OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND FOLLOW ONLY THESE OPERATION GUIDELINES.

B. Wiring Diagram



HARMAN®

352 Mountain House Road, Halifax, PA 17032
www.harmanstoves.com

Please contact your Harman® dealer with any questions or concerns.
For the location of your nearest Harman® dealer,
please visit www.harmanstoves.com.

Printed in U.S.A.

Owner's Manual
Care and Operation

INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.
Contact your local dealer with questions on installation, operation or service.

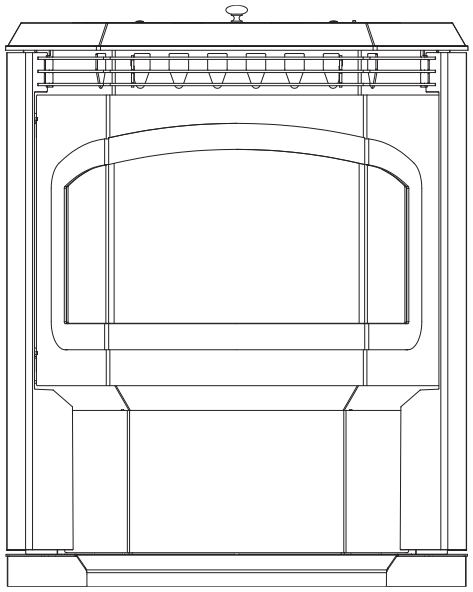
NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):
Advance Freestanding Pellet Stove

Advance
Use & Care Video



⚠ CAUTION

Tested and approved for wood pellets only. Burning of any other type of fuel voids your warranty.

⚠ CAUTION

Check building codes prior to installation.

- Installation MUST comply with local, regional, state and national codes and regulations.
- Contact local building or fire officials about restrictions and installation inspection requirements in your area.

⚠ WARNING

Please read this entire manual before installation and use of this pellet fuel-burning room heater.
Failure to follow these instructions could result in property damage, bodily injury or even death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not overfire - If any external part starts to glow, you are overfiring. Reduce feed rate. Overfiring will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.

⚠ WARNING

HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
- NEVER allow children to touch glass
- Keep children away
- CAREFULLY SUPERVISE children in same room as stove.
- Alert children and adults to hazards of high temperatures.

  High temperatures may ignite clothing or other flammable materials.
- Keep clothing, furniture, draperies and other flammable materials away.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.harmanstoves.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.harmanstoves.com

1 Welcome

Read this manual before operating this appliance.
Please retain this Owner's Manual for future reference.
Read the Installation Manual before making any installation or finishing changes.

A. Congratulations

Congratulations on selecting a Harman® Freestanding Pellet Stove. The Harman® Advance pellet stove you have selected is designed to provide the utmost in safety, reliability, and efficiency.

As the owner of a new pellet stove, you'll want to read and carefully follow all of the instructions contained in this owner's manual. Pay special attention to all cautions and warnings.

This owner's manual should be retained for future reference. We suggest that you keep it with your other important documents and product manuals.

Your new Harman® Advance Freestanding Pellet Stove will give you years of durable use and trouble-free enjoyment. Welcome to the Harman® family!

Local Dealer Information

***DEALER:** Fill in your name, address, phone and email information here and appliance information below.*

Dealer Name: _____

Address: _____

_____

Phone: _____

Email: _____

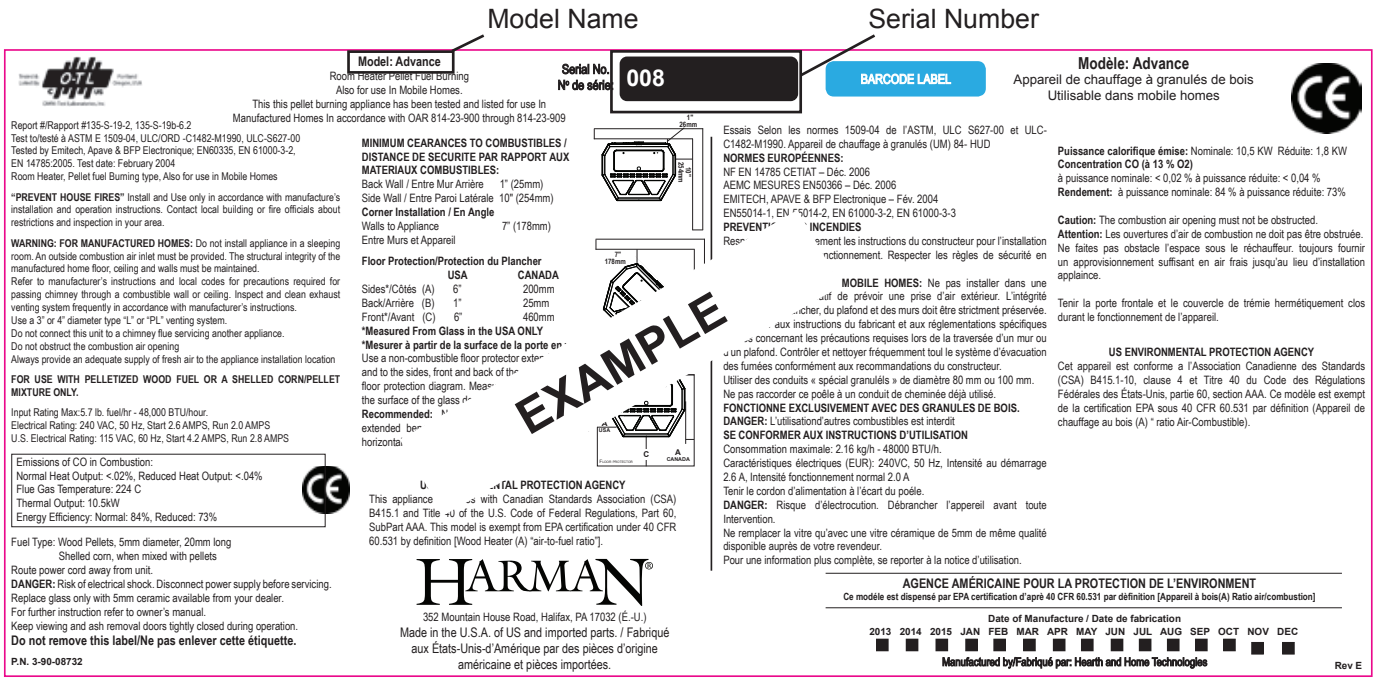
Appliance Information:

Brand: _____ Model Name: _____

Serial Number:_____ Date Installed: _____

Listing Label Information/Location

The model information regarding your specific stove can be found on the rating plate usually located in the control area of the stove.



⚠ Safety Alert Key:

- ***DANGER!*** *Indicates a hazardous situation which, if not avoided will result in death or serious injury.*
- ***WARNING!*** *Indicates a hazardous situation which, if not avoided could result in death or serious injury.*
- ***CAUTION!*** *Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.*
- ***NOTICE:*** *Used to address practices not related to personal injury.*

TABLE OF CONTENTS

➔ = Contains updated information

B. Limited Lifetime Warranty

Hearth & Home Technologies
LIMITED LIFETIME WARRANTY

Hearth & Home Technologies, on behalf of its hearth brands (”HHT”), extends the following warranty for HHT gas, wood, pellet, coal and electric hearth appliances that are purchased from an HHT authorized dealer.

WARRANTY COVERAGE:

HHT warrants to the original owner of the HHT appliance at the site of installation, and to any transferee taking ownership of the appliance at the site of installation within two years following the date of original purchase, that the HHT appliance will be free from defects in materials and workmanship at the time of manufacture. After installation, if covered components manufactured by HHT are found to be defective in materials or workmanship during the applicable warranty period, HHT will, at its option, repair or replace the covered components. HHT, at its own discretion, may fully discharge all of its obligations under such warranties by replacing the product itself or refunding the verified purchase price of the product itself. The maximum amount recoverable under this warranty is limited to the purchase price of the product. This warranty is subject to conditions, exclusions and limitations as described below.

WARRANTY PERIOD:

Warranty coverage begins on the date of original purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the product by an independent, authorized HHT dealer/ distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from HHT, regardless of the installation or occupancy date. The warranty period for parts and labor for covered components is produced in the following table.

The term “Limited Lifetime” in the table below is defined as: 20 years from the beginning date of warranty coverage for gas appliances, and 10 years from the beginning date of warranty coverage for wood, pellet, and coal appliances. These time periods reflect the minimum expected useful lives of the designated components under normal operating conditions.

Warranty Period		HHT Manufactured Appliances and Venting							Components Covered
Parts	Labor	Gas	Wood	Pellet	EPA Wood	Coal	Electric	Venting	
1 Year		X	X	X	X	X	X	X	All parts and material except as covered by Conditions, Exclusions, and Limitations listed
2 years				X	X	X			Igniters, electronic components, and glass
		X	X	X	X	X			Factory-installed blowers
			X						Molded refractory panels
3 years				X					Firepots and burnpots
5 years	1 year			X	X				Castings and baffles
7 years	3 years		X	X	X				Manifold tubes, HHT chimney and termination
10 years	1 year	X							Burners, logs and refractory
Limited Lifetime	3 years	X	X	X	X	X			Firebox and heat exchanger
90 Days		X	X	X	X	X	X	X	All replacement parts beyond warranty period

See conditions, exclusions, and limitations on next page.

B. Limited Lifetime Warranty *(continued)*

WARRANTY CONDITIONS:

- This warranty only covers HHT appliances that are purchased through an HHT authorized dealer or distributor. A list of HHT authorized dealers is available on the HHT branded websites.
- This warranty is only valid while the HHT appliance remains at the site of original installation.
- This warranty is only valid in the country in which the HHT authorized dealer or distributor that sold the appliance resides.
- Contact your installing dealer for warranty service. If the installing dealer is unable to provide necessary parts, contact the nearest HHT authorized dealer or supplier. Additional service fees may apply if you are seeking warranty service from a dealer other than the dealer from whom you originally purchased the product.
- Check with your dealer in advance for any costs to you when arranging a warranty call. Travel and shipping charges for parts are not covered by this warranty.

WARRANTY EXCLUSIONS:

This warranty does not cover the following:

- Changes in surface finishes as a result of normal use. As a heating appliance, some changes in color of interior and exterior surface finishes may occur. This is not a flaw and is not covered under warranty.
- Damage to printed, plated, or enameled surfaces caused by fingerprints, accidents, misuse, scratches, melted items, or other external sources and residues left on the plated surfaces from the use of abrasive cleaners or polishes.
- Repair or replacement of parts that are subject to normal wear and tear during the warranty period. These parts include: paint, wood, pellet and coal gaskets, firebricks, grates, flame guides, batteries and the discoloration of glass.
- Minor expansion, contraction, or movement of certain parts causing noise. These conditions are normal and complaints related to this noise are not covered by this warranty.
- Damages resulting from: (1) failure to install, operate, or maintain the appliance in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the appliance; (2) failure to install the appliance in accordance with local building codes; (3) shipping or improper handling; (4) improper operation, abuse, misuse, continued operation with damaged, corroded or failed components, accident, or improperly/incorrectly performed repairs; (5) environmental conditions, inadequate ventilation, negative pressure, or drafting caused by tightly sealed constructions, insufficient make-up air supply, or handling devices such as exhaust fans or forced air furnaces or other such causes; (6) use of fuels other than those specified in the operating instructions; (7) installation or use of components not supplied with the appliance or any other components not expressly authorized and approved by HHT; (8) modification of the appliance not expressly authorized and approved by HHT in writing; and/or (9) interruptions or fluctuations of electrical power supply to the appliance.
- Non-HHT venting components, hearth components or other accessories used in conjunction with the appliance.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas appliance is installed.
- HHT's obligation under this warranty does not extend to the appliance's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper appliance for the application. Consideration must be given to appliance location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The appliance has been over-fired or operated in atmospheres contaminated by chlorine, fluorine, or other damaging chemicals. Over-firing can be identified by, but not limited to, warped plates or tubes, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The appliance is subjected to prolonged periods of dampness or condensation.
- There is any damage to the appliance or other components due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF LIABILITY:

- The owner's exclusive remedy and HHT's sole obligation under this warranty, under any other warranty, express or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified above. In no event will HHT be liable for any incidental or consequential damages caused by defects in the appliance. Some states do not allow exclusions or limitation of incidental or consequential damages, so these limitations may not apply to you. This warranty gives you specific rights; you may also have other rights, which vary from state to state. EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE.

2 Product Specific and Important Safety Information

A. Appliance Certification

MODEL:	Advance Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	135-S-19b-6.2
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC/ORD-C1482-M1990, ULC-S627-00, ASTM E 2779-10, ASTM E 2515-11

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2004, ULC-S627-00, ULC/ORD-C-1482-M1990, (UM) 84-HUD**

The Advance is Certified to comply with 2015 particulate emission standards. Not approved for sale after May 15, 2020.

B. Mobile Home Approved

This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.

The structural integrity of the mobile home floor, ceiling, and walls must be maintained. The appliance must be properly grounded to the frame of the mobile home and use only listed pellet vent, Class “PL” connector pipe.

A Harman® Outside Air Kit must be installed in a mobile home installation.

WARNING

THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

DO NOT INSTALL IN SLEEPING ROOM.

C. Glass Specifications

This appliance is equipped with 5mm mirrored ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

D. Electrical Rating

120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps

NOTE: Some generator or battery back-up systems may not be compatible with the micro-processor electronics on this appliance. Please consult the power supply manufacturer for compatible systems.

E. BTU & Efficiency Specifications

EPA Certification Number:	
EPA Certified Emissions:	1.9 g/hr
***EPA Default Efficiency:**	78%
****Actual Tested Efficiency:**	67.4%
*****EPA BTU Output:**	31,000
******BTU Input**	40,000
Vent Size:	3 Inch
Hopper Capacity:	60 lbs
Fuel	Wood Pellet

**An efficiency based on EPA historical data of 78%*

***Actual tested Higher Heating Value (HHV) efficiency and data collected during EPA emissions test*

****A range of BTU outputs based on EPA default efficiency and the burn rates from the low and high EPA tests*

*****Based on the maximum feed rate per hour multiplied by approximately 8,600 BTU's which is the average BTU's from a pound of pellets.*

This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual.

BTU output will vary, depending on the brand of fuel you use in your appliance. Consult your Harman® dealer for best results.

WARNING! Risk of Fire! *Hearth & Home Technologies disclaims any responsibility for, and the warranty and agency listing will be voided by the below actions.*

DO NOT:

- *Install or operate damaged appliance*
- *Modify appliance*
- *Install other than as instructed by Hearth & Home Technologies*
- *Operate the appliance without fully assembling all components*
- *Overfire*
- *Install any component not approved by Hearth & Home Technologies*
- *Install parts or components not Listed or approved.*
- *Disable safety switches*

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

For assistance or additional information, consult a qualified installer, service agency or your dealer.

NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

3 General Information

A. Appliance Safety

WARNING! DO NOT operate stove before reading and understanding operating instructions. Failure to operate stove according to operating instructions could cause fire or injury.

⚠ WARNING

HOT SURFACES!
Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.
- **DO NOT** touch glass until it is cooled
- NEVER allow children to touch glass
- Keep children away

- CAREFULLY SUPERVISE children in same room as stove.
- Alert children and adults to hazards of high temperatures.

High temperatures may ignite clothing or other flammable materials.
- Keep clothing, furniture, draperies and other flammable materials away.

If you expect that small children or vulnerable adults may come into contact with this appliance, the following precautions are recommended:

- Install a physical barrier such as:
  - A decorative fire screen.
  - Adjustable safety gate.
- Install a switch lock or a wall/remote control with child protection lockout feature.
- Keep remote controls out of reach of children.
- Never leave children alone near a hot stove, whether operating or cooling down.
- Teach children to NEVER touch the stove.
- Consider not using the stove when children will be present.
- Use only specified components as replacement parts. Other components may not allow your stove to operate as it was intended.

Contact your dealer for more information, or visit: www.hpba.org/safety-information.

To prevent unintended operation when not using your stove for an extended period of time (summer months, vacations, trips, etc):

- Unplug stove from receptacle.

⚠ WARNING

THIS WOOD HEATER HAS A MANUFACTURER-SET MINIMUM LOW BURN RATE THAT MUST NOT BE ALTERED. IT IS AGAINST FEDERAL REGULATIONS TO ALTER THIS SETTING OR OTHERWISE OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

B. Clear Space

WARNING! RISK OF FIRE! *Do NOT place combustible objects in front or to the sides of the appliance. High temperatures may ignite clothing, furniture or draperies.*

Mantel: Avoid placing candles and other heat-sensitive objects on mantel or hearth. Heat may damage these objects.

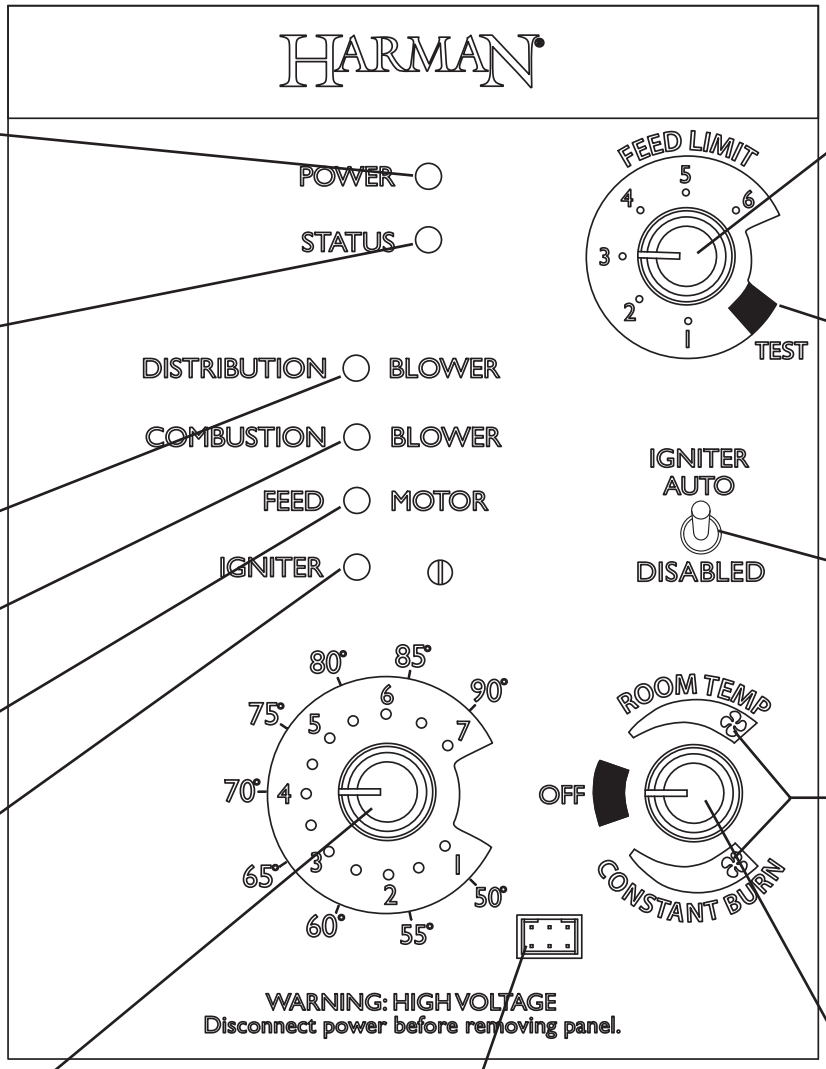
NOTICE: *Clearances may only be reduced by means approved by the regulatory authority having jurisdiction.*

WARNING! RISK OF FIRE! *Keep combustible materials, gasoline and other flammable vapors and liquids clear of appliance.*

- *Do **NOT** store flammable materials in the appliance's vicinity.*
- *Do **NOT** use gasoline, lantern fuel, kerosene, charcoal lighter fluid or similar liquids to start or "freshen up" a fire in this heater.*

Keep all such liquids well away from the heater while it is in use as combustible materials may ignite.

C. Control Explanation



Power Light
Indicates power to the control.

Status Light
Will be lit in either stove or room temp mode when pointer is not within off position band except after normal shut down. Blinks to indicate errors listed below.

Indicates power to distribution blower.

Indicates power to combustion blower

Indicates power to the feed motor.

Indicates igniter is on.

Feed limit
Sets the maximum feed rate

Test
Runs all motors at full speed for one minute to check operation. Afterwards the control will simulate a minimum burn with the combustion blower remaining on low.

Igniter switch
Set to appropriate Start-Up mode.

Distribution Blower speed adjustment range.
L = low
H = high

Temperature Dial
Allows you to adjust the room temperature setting, in Room Temp Mode, using the outer scale marked in degrees Fahrenheit. It also allows you to adjust the constant burn setting, while in Constant burn Mode, using the inner scale marked from 1 to 7.

Dealer Diagnostic Port
For dealer maintenance only. Requires special DDM monitor supplied to Harman® Dealers exclusively.

Mode Selector
Allows you to choose between Room Temp Mode, Constant burn Mode, or OFF. Also allows you to vary the distribution blower speed by turning the knob to the high or low side of each mode.

D. Fuel Specifications

Fuel and Fuel Storage

Pellet fuel quality can fluctuate from manufacturer to manufacturer, and even from bag to bag.

Hearth & Home Technologies recommends using only fuel that is certified by the Pellet Fuels Institute (PFI).

Fuel Material

- Made from sawdust and/or other wood by-products
- Source material typically determines ash content

Higher Ash Content Material

- Hardwoods with high mineral content
- Bark and leaves as source material
- “Standard” grade pellets

Lower Ash Content Material

- Softwood; pine, fir, etc.
- Materials with lower mineral content
- “Premium” grade pellets

⚠ CAUTION

Do not burn fuel that contains an additive.

- May cause hopper fire
- Damage to product may result

Read the list of ingredients on the packaging.

Clinkers

Minerals and other non-combustible materials, like sand, will turn into a hard glass-like substance when heated.

Trees from different areas will vary in mineral content. For this reason, some fuels will produce more clinkers than others.

Moisture

Always burn dry fuel. Burning fuel with high moisture content takes energy to dry and tends to cool the appliance thus, robbing heat from your home. Damp pellet fuel could turn back into sawdust which does not flow properly through the feed system.

Size

- Pellets are either 1/4 inch or 5/16 inch (6-8mm) in diameter
- Length should be no more than 1-1/2 inches (38mm)
- Pellet length can vary from lot to lot from the same manufacturer.

Performance

- Higher ash content requires more frequent maintenance.
- “Premium” grade pellets will produce the highest heat output.
- Burning pellets longer than 1-1/2 inches (38mm) can cause inconsistent feeding and/or ignition.

We recommend that you buy fuel in multi-ton lots whenever possible. However, we do recommend trying different brands prior to purchasing multi-ton lots, to ensure your satisfaction.

CAUTION! *Tested and approved for use with wood pellets ONLY. Burning of any other fuel will void your warranty.*

Storage

- Wood pellets should be left in their original sealed bag until ready to use, to prevent moisture.
- Do not store fuel within the specified clearance areas, or in a location that will interfere with routine cleaning and maintenance procedures.

⚠ CAUTION

Tested and approved for use with wood pellets ONLY. Burning of any other fuel will void your warranty.

NOTICE

Hearth & Home Technologies is not responsible for stove performance or extra maintenance required as a result of using fuel with higher ash or mineral content.

E. General Operating Information

1. Room Sensor Calls For Heat

The appliance is like most modern furnaces; when the room sensor calls for heat, your appliance will automatically light and deliver heat.

When the room is up to temperature and the room sensor is satisfied, the appliance will shut down.

2. Heat Output Controls

The appliance will turn on and off as the room sensor demands. When the room sensor calls for heat, the appliance will always start up on High. After burning approximately 7-10 minutes, the appliance will then burn at the rate at which it was originally set. If the appliance is set at one of the lower settings, it will run quieter but take longer to heat up an area than if it were set at a higher burn rate.

Regardless of the burn rate, when the area is warm enough to satisfy the room sensor, the appliance will shut off.

⚠ WARNING

Fire Hazard.
Keep combustible materials, gasoline and other flammable vapors and liquids clear of appliance.

- Do NOT store flammable materials in the appliance's vicinity.
- NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.
- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.
- DO NOT USE CHEMICALS OF FLUIDS TO START THE FIRE.
- Combustible materials may ignite.

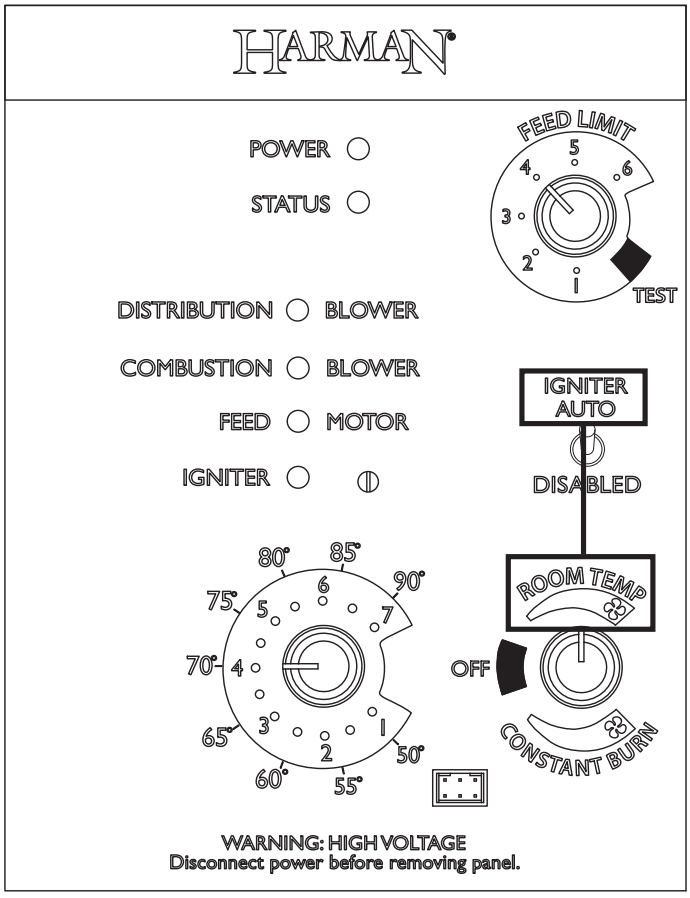


Figure 3.1

4 Operating Instructions

A. Starting Your First Fire

1. A room sensor is required for proper operation of this appliance in “Room Temp” mode. At this time, fill the hopper with pellets, insure the control is set to “OFF”. Figure 4.2. Plug the power cord into a properly grounded, nearby outlet.
2. Once power is present, the unit it will run through a quick diagnostics test to insure the control is operating properly. This is normal.
3. For your first fire it may be necessary to purge the auger system by putting the feed limit knob to “Test” prior to starting the unit. Figure 4.3. This insures that plenty of fuel enters the burn pot for proper ignition.
4. Flip toggle switch to desired mode “Auto or Disabled”. Figure 4.4. Set feed limit knob to desired setting and turn mode dial to “Room Temp” or “Constant burn” Figure 4.5. **Note:** Feed rate of #4 is a good starting point. Adjustments may need to be made depending on fuel quality and/or heat output desired.
5. The fuel feed system and the igniter should now be on.
6. Once the appliance has ignited, let it burn for approximately 7-10 minutes. After this time, the igniter light should turn off and the unit should begin to operate per the settings at the control.

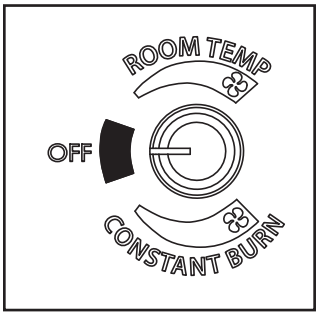


Figure 4.2

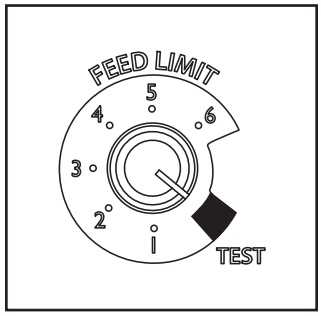


Figure 4.3

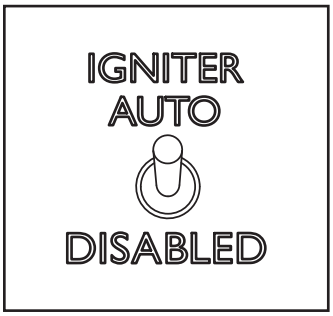


Figure 4.4

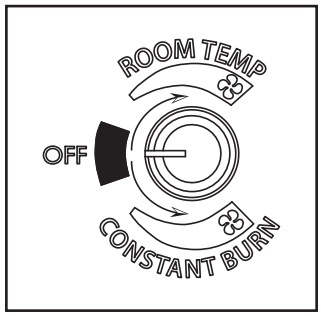


Figure 4.5

B. Fire Characteristics

A properly adjusted fire has a medium active flame pattern that extends out of the burn pot approximately 6 inches (152mm).

C. Feed Limit Instructions

The Feed Limit control is factory set at #4, and should be adequate for most fuels.

However, if the flame height is too high or too low, you will need to adjust the Feed Limit. Wait until the appliance has been burning for 15 minutes before making your adjustments and allow 15 minutes for feed adjustment to take effect.

⚠ CAUTION

Odors and vapors released during initial operation.

- Curing of high temperature paint.
- Open windows for air circulation.

Odors may be irritating to sensitive individuals.

D. Ignition Cycles

1. At the beginning of each ignition cycle, it is normal to see some smoke in the firebox. The smoke will stop once the fire starts.
2. The distribution blower will automatically turn on after your appliance has reached the set temperature.

   This blower transfers heat from your appliance into the room, and will continue to run in “constant burn” mode at the set speed you have the control knob at. In “room temp” mode however, the blower will turn on and off in accordance to what temperature the room sensor is reading. When the room sensor is satisfied the blower will shut down until the room sensor sees a demand for heat.
3. Occasionally the appliance may run out of fuel and shut itself down. When this happens, the unit will need to be turned to the off position and restarted.

   If needed, follow the instructions in Section A “Starting Your First Fire”.

⚠ WARNING

Fire Risk

Do NOT operate appliance:

- With appliance door open.
- Burnpot floor open.
- Cleaning slide plates open.

Do NOT store fuel:

- Closer than required clearances to combustibles to appliance
- Within space required for loading or ash removal.

E. Automatic Ignition

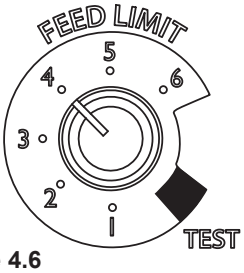


Figure 4.6

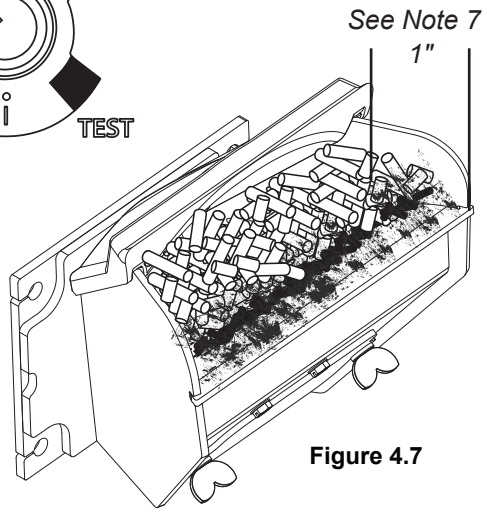


Figure 4.7

1. *Fines are small pieces of broken pellets (sawdust). Fines do not flow easily and often build up on the hopper funnel bottom angles. These fines can be pushed into the feeder opening and then fill the hopper with pellets. As the system works, they will be burned.*
2. *The "TEST" cycle will operate the feed motor for exactly one minute. Turning to "TEST" again and again may load too much fuel into the burn pot causing excessive smoke on start-up.*
3. *The firebox low pressure switch will not allow the auger motor or the igniter element to operate if the view door is open.*
4. *Adjust Feed Limit. If this is your first fire or you are trying different pellets, set the feed limit to #4, Figure 4.6 This is a conservative number and will probably need to be increased. After you know a Feed Limit setting that works well, use that setting. Remember, if your feed rate is too high you may waste fuel.*
5. *This is usually a weekly maintenance procedure. Cleaning the burn pot with the scraper with a small amount of new fuel in the bottom is not a problem. First, scrape the ashes off the front of the burn pot into the ash pan. Then scrape the holed surface downward into the burn pot. When the stove feeds, these scrapings will be pushed out by the feeder.*
6. *The ash pan can hold the ashes from approximately 1 ton of premium fuel. This means the ashes will only need to be emptied a few times a year.*
7. *Setting the feed limit # for maximum burn: With the unit burning in "AUTO", turn to "Constant Burn" and put the fan on "H". Set the Temperature Dial to #7. Allow the unit to burn for about 30 minutes and check ash on front of burn pot. Figure 4.7. If the ash line is larger than 1", turn the feed limit from #4 to #5. Allow another 30 minutes of burn time and check again. If, at #6 setting, a 1" or less ash bed is not obtainable, it is not a problem. The 1" ash bed is only at maximum burn rate and during normal operation, the ash bed will be larger.*

Igniter Switch to "AUTO" (up position)

Make sure the unit is plugged into a properly grounded, 120 VAC, 60 Hz electrical source. The power light should be the only light lit.

Note: Be sure there is no fuel or other combustibles in the ash pan prior to lighting.

1. Turn Mode Selector to "OFF".
2. Fill hopper with pellets.
3. Clean burn pot with scraper, if necessary.
4. If starting after an empty hopper, turn Feed Limit to "TEST" (for one 60 second cycle). This will flow pellets into the auger tube and also allow you to check the motors for operation.

NOTE: The auger motor will not operate with the view door open.

5. Turn Feed Limit to #4.
6. Flip the Igniter Switch up into the "AUTO" position.
7. Turn the Temperature Dial to the desired room temperature.
8. Turn Mode Selector to Room Temperature or Constant Burn mode.
9. Fill hopper with pellets and remove ashes as required. Keep the hopper lid and firebox doors closed while in operation. Maintain door seals in good condition. Failure to do so will affect operation of the appliance and may permit escape of smoke or gases into the living space causing smoke detectors to sound.

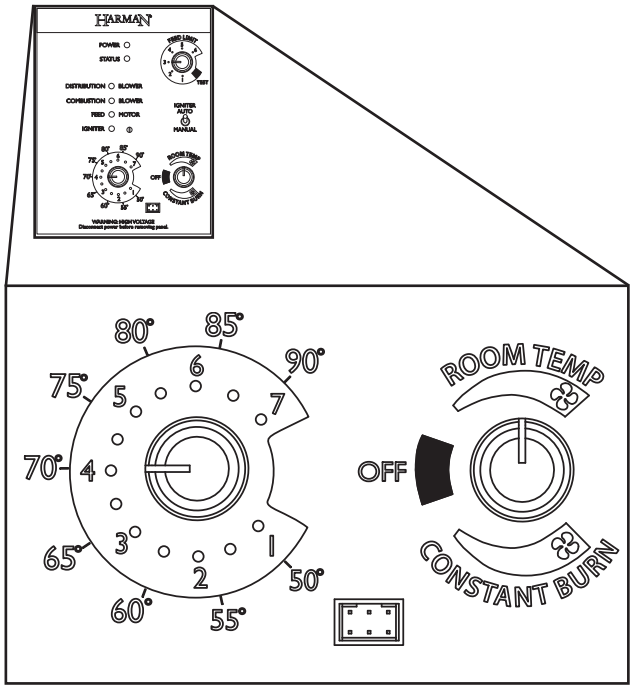
⚠ WARNING

BURNING GARBAGE, USE OF IMPROPER FUELS, FIRE STARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND FOLLOW ONLY THESE OPERATION GUIDELINES.

⚠ WARNING

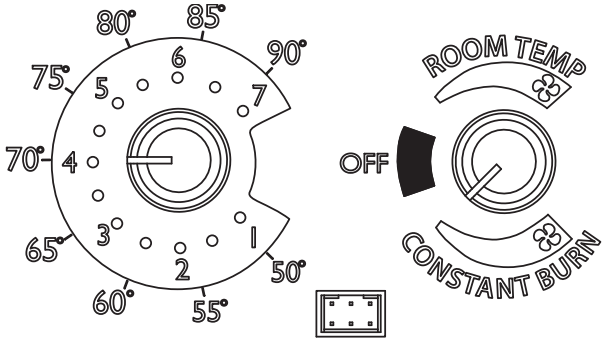
NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR 'FRESHEN UP' A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER, WHILE IN USE.

E. Automatic Ignition (Continued)

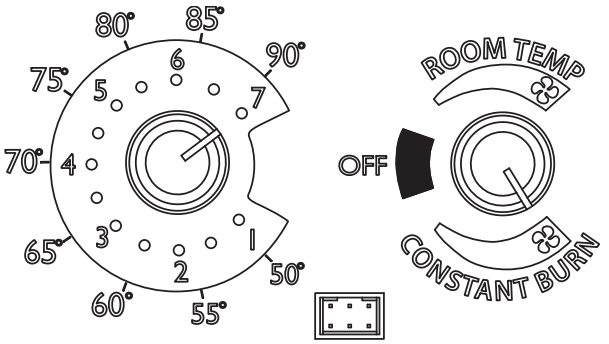


Room Temperature Mode: *This setting will produce a room temperature of 70 degrees with the distribution blower at medium speed.*

Constant burn Mode



This setting will produce medium heat with the distribution blower on "low".



This setting will produce continuous maximum heat output with the distribution blower at full speed.

The Advance Pellet Stove is more than just automatic ignition, it is also automatic temperature control. The automatic system will allow the fire size to be adjusted to match the heating needs and even put the fire out if necessary. If heat is needed after the fire is out, the Advance Pellet Stove will automatically re-ignite and adjust the fire size to match the heating need. The totally automatic room sensor mode is recommended because of its efficiency. The unit can be switched between "AUTO" and "DISABLED" at any time during operation.

Igniter switch to "AUTO"

Room Temperature Mode

In "Room Temp Mode" heat output is controlled automatically by the Room Sensing Probe. When the Room Sensing Probe calls for heat, the stove will increase output. When the Room Sensing Probe is getting close to the set temperature, the stove will begin to level off output and keep the fire burning at just the right temperature to maintain that setting.

High output is determined by the Feed Limit setting. This setting, generally on #4, can be increased if higher burn rates are necessary (Figure 4.6). The unit's maximum burn rate should not create less than 1" of ash on the burn pot front edge (Figure 4.7). Overfeeding is not a safety concern, but fuel may be wasted if unburned pellets fall into the ash pan.

In "Room Temp Mode" a constant fuel consumption rate is sacrificed for exact room temperature. Therefore, as it gets colder more pellets will be burned automatically.

The distribution blower speed will vary according to the position of the mode selector pointer, and fire size.

Igniter switch to "AUTO"

Constant Burn Mode

This allows for automatic ignition upon start-up only. The unit can then be set at any desired setting. The heat output and fuel consumption will remain constant regardless of room temperature. The unit's maximum feed rate should not create less than 1" of ash on the burn pot front edge. Figure 4.7.

The unit's low burn or maintenance setting is as low as it will go. It will not go out unless it runs out of fuel or is turned off.

Shut-Down Procedure

To kill the fire or stop burning the stove, turn the Mode Selector to "OFF". This will cause the fire to diminish and burn out. When the fire burns out and the stove cools down everything will stop.

If you pull the plug to shut down the stove, all motors will stop. This may cause incomplete combustion and smoke in the firebox. If the load door is opened, the smoke may escape.

The best way to shut down the stove is simply let it run out of pellets, the stove will shut down automatically.

5 Maintenance & Service

When properly maintained, your stove will give you many years of trouble-free service. **Contact your dealer** to answer questions regarding proper operation, trouble-shooting and service for your appliance. Visit www.harmanstoves.com to find your closest dealer. We recommend annual service by a qualified service technician.

A. Proper Shutdown Procedure

⚠ CAUTION

Shock and Smoke Hazard

- Turn unit to the off position, let appliance completely cool and combustion blower must be off. Now you can unplug appliance before servicing.
- Smoke spillage into room can occur if appliance is not cool before unplugging.
- Risk of shock if appliance not unplugged before servicing appliance.

Follow the detailed instructions found in this section for each step listed in the chart below.

B. Quick Reference Maintenance Chart

Cleaning or Inspection	Frequency		Daily	Weekly	Monthly	Yearly
Ash Pan	Every 5 bags of fuel depending on the fuel type or ash build-up	OR		X		
Ash Removal from Firebox	Every 5 bags or more frequently depending on the fuel type or ash build-up	OR		X		
Heat Exchanger	Every 1 ton of fuel	OR			X	
Blower, Combustion (Exhaust)	More frequently depending on the fuel type	OR				X
Blower, Distribution	Every 25 bags or more frequently depending on the fuel type	OR			X	
Door Gasket Inspection	Prior to heating season	OR				X
Exhaust Path	More frequently depending on ash build-up	OR				X
Firebox - Prepare for Non-Burn Season	At end of heating season	OR				X
Burnpot - Burning pellets - hardwood	Every 3 bags	OR	X			
Burnpot - Burning pellets - softwood	Every 5 bags	OR	X			
Glass	When clear view of burnpot becomes obscure	OR		X		
Hopper / Hopper Lid Gasket	Every 50 bags of fuel or when changing fuel types	OR			X	
Venting System	More frequently depending on the fuel type	OR				X

NOTICE: These are recommendations. Clean more frequently if you encounter heavy build-up of ash at the recommended interval or you see soot coming from the vent. ***Not properly cleaning your appliance on a regular basis will void your warranty.***

C. General Maintenance

Types of Fuel

The type of fuel you are burning will dictate how often you have to clean your burnpot.

If the fuel you are burning has a high dirt or ash content it may be necessary to clean the burnpot more than once a day.

Dirty fuel will cause clinkers to form in the burnpot. A clinker is formed when dirt, ash or a non-burnable substance is heated to 2000°F (1093°C) and becomes glass-like.

D. Glass Maintenance

The glass used in your stove is manufactured to exact standards to withstand the high heat of the fire, but like all glass, it must be treated with common sense and care. Never slam the door shut or strike the glass with a heavy object. If the glass is broken or damaged, do not operate the stove until it has been replaced.

Glass - Replacement

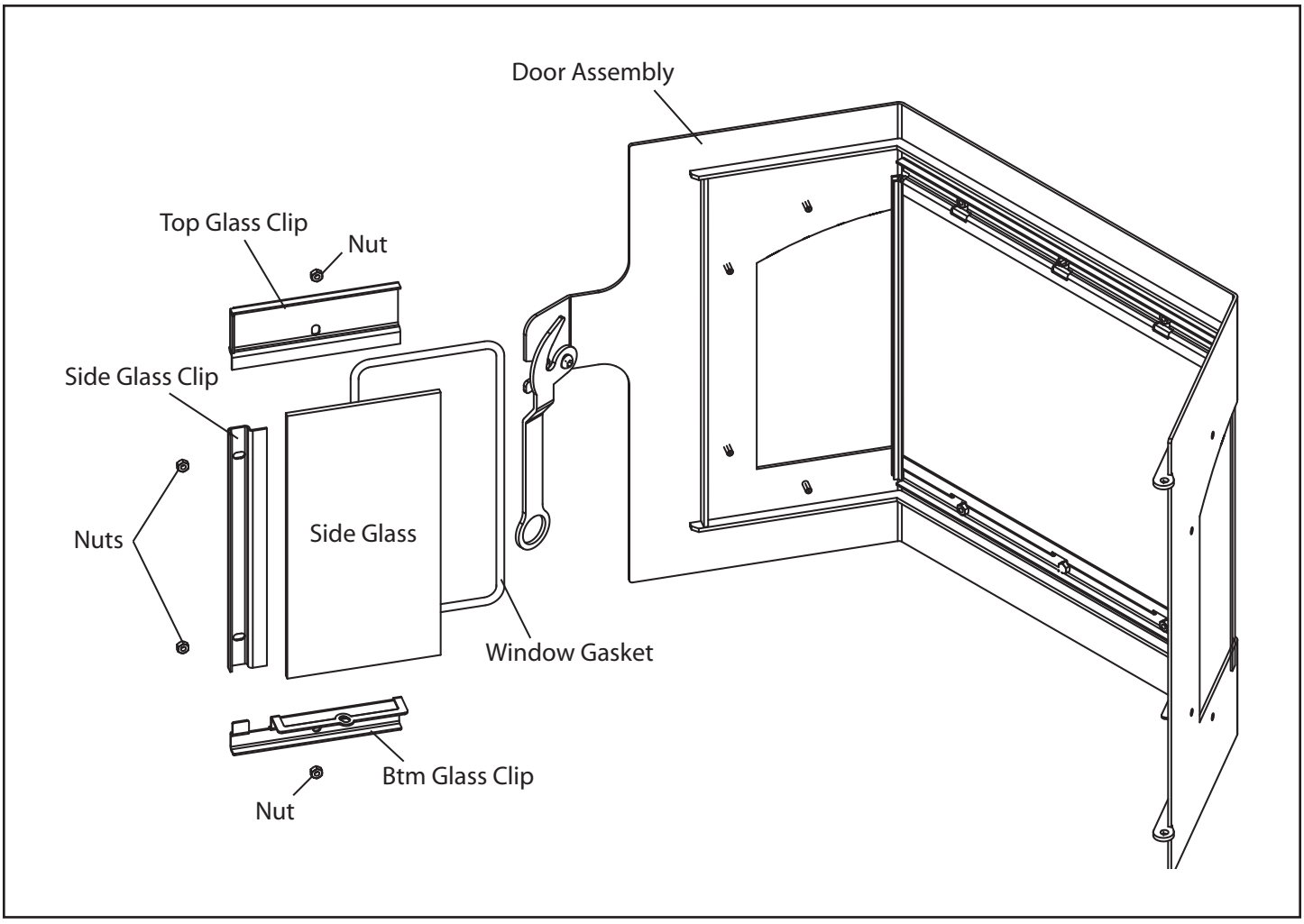
If the stove's glass is cracked or broken, you must replace it before operating your stove. Remove pieces carefully. Replace glass only with Harman® replacement glass; **do not use substitutes.**

Carefully remove damaged glass, gasket material, and glass clips (set aside).

Install the self adhesive 1/4" gasket material around the front face of the glass. Set the glass panel and gasket gently onto the door. Install the glass clips and tighten.

Glass - Cleaning

Sometimes it will be necessary to clean accumulated ash from the glass surface; allowing this ash to remain on the glass for long periods can result in "etching" due to the acidity of the ash. Never clean the glass while it is hot, and **do not** use abrasive substances. Wash the surface with cool water, and rinse thoroughly. You may wish to use a non-abrasive cleaner specifically designed for use on stove glass. In any case, dry thoroughly before relighting your stove.



E. Ash Pan Removal

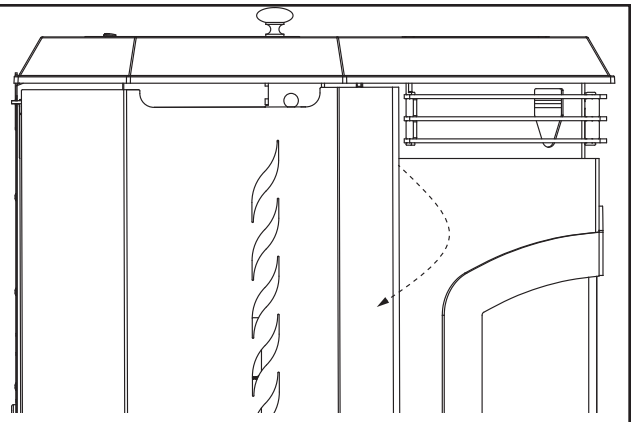


Figure 5.1

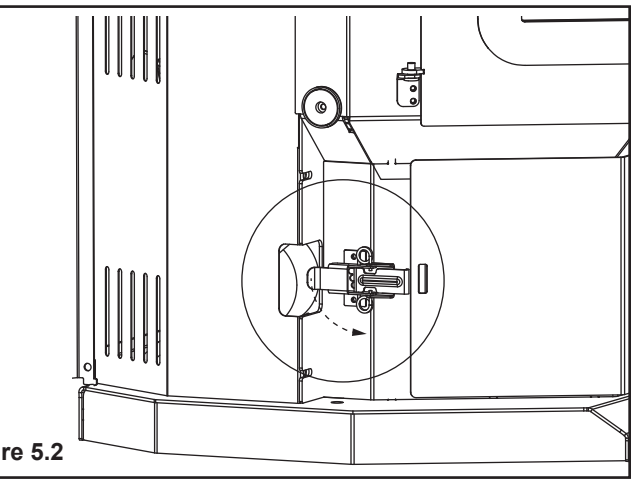


Figure 5.2

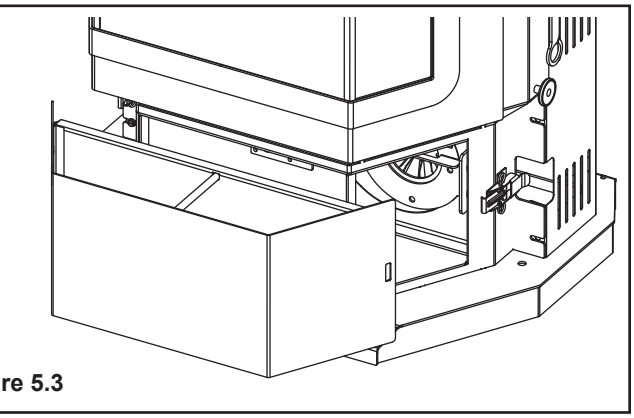


Figure 5.3

CAUTION: Surfaces are hot while in operation, Wear gloves to protect from burns.

1. Open side doors. Figure 5.1
2. Release spring latches on the right and left side of the ash pan. Figure 5.2
3. Slide ash pan forward enough to lift with center handle. Empty ashes and reinstall ash pan. Figure 5.3

Disposal of Ashes:
Ashes should be placed in a steel container with a tight fitting lid. The closed container of ashes should be moved outdoors immediately and placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled. Other waste shall not be placed in this container.

4. Inspect the gasket rope located on the back side of the ash pan for damage. Replace if necessary.
5. Insert spring latch front hooks into the ash pan side slots. Push both latches to the rear at the same time to latch.

Soot and Fly Ash
Formation and Need For Removal -The products of combustion will contain small particles of fly ash. The fly ash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during startup, shutdown, or incorrect operation of the room heater, will lead to some soot formation which will collect in the exhaust venting system. The exhaust venting system should be inspected at least once every year to determine if cleaning is necessary.

When removing the ash pan to empty ashes, you will note a build up of ash fines behind the ash pan. This space behind the ash pan was designed to allow the fines to fall out of the vertical heat exchangers and collect where they are easily cleaned out, rather than going into the flue pipe where it would be difficult to clean. These fines should not be allowed to build up. They may not allow the ash pan to be seated into its gasket properly.

NOTE: If an extreme amount of force is required to snap the latch on one or both sides of the ash pan, the area behind the ash pan should be checked for ash build up.

F. Burnpot Maintenance

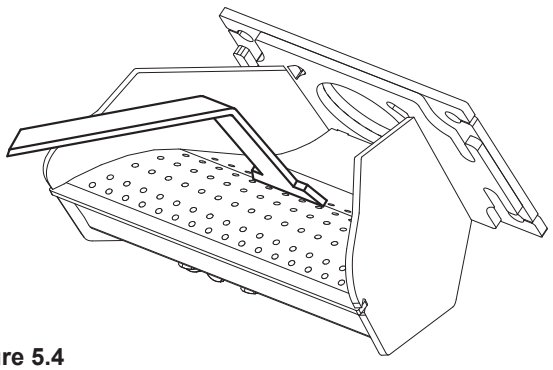


Figure 5.4

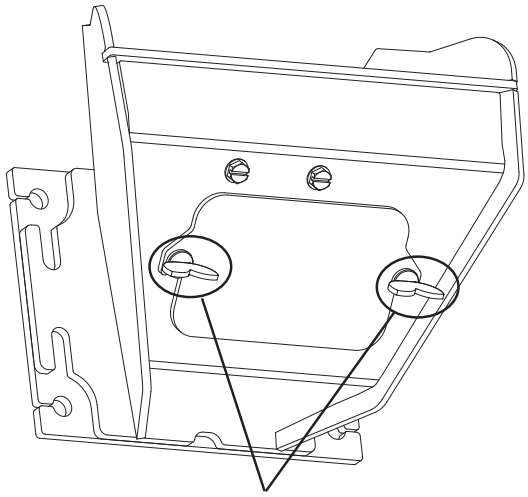


Figure 5.5 *Wing Thumb Screws*

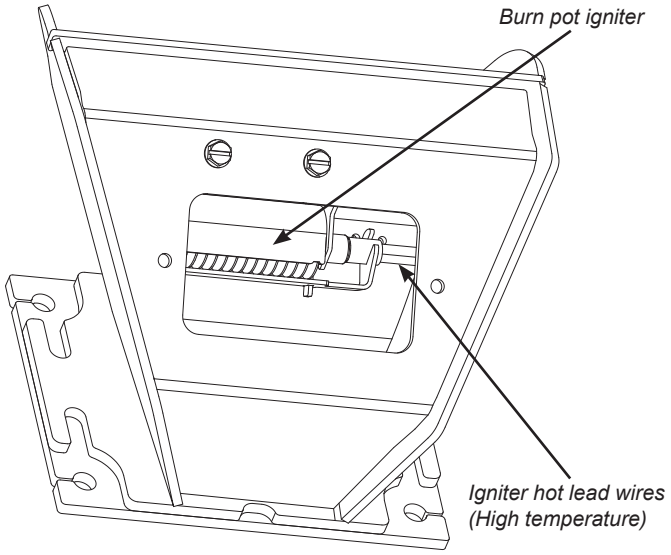


Figure 5.6

Viewed from below through the ash pan opening.

Whenever adding fuel, take the opportunity to clean the burn pot. **(Weekly at minimum)**

- Scrape the top holed surface and sides of the burn pot down to auger tube Figure 5.4. It is not necessary to completely remove all material from the burn pot. The excess will be pushed out during the next use.
- With the fire out and burn pot cold, use the supplied allen wrench to remove any build-up that may have accumulated in the holes of the burn pot grate. Simply push the allen wrench down through each hole ensuring it is clear of any build-up paying attention not to damage the igniter element in the process.

Monthly, or after each ton of fuel burned:

- Loosen the (2) wing thumb screws on the lower front angle of the burn pot. Figure 5.5
- Lift off the clean-out cover to open the bottom clean-out chamber. Figure 5.6

⚠ DANGER

Disconnect the power to the unit before removing cover.

- Clean ash buildup from inside the chamber while cover is off. Use the scraper to tap on the top front edge of the burn pot. This will help knock pieces of ash, loosened by the scraping process, down through the holes. It also helps knock scale off of the igniter element.

Figure 5.6

The igniter is made to be removable for service by insulated male/female wire connectors. These connections between the hot leads (the wires inside the burn pot) and the cold leads (the wires from the control board) are always pulled to the inside rear of the feeder body. **(Not coiled inside the burn pot.)**

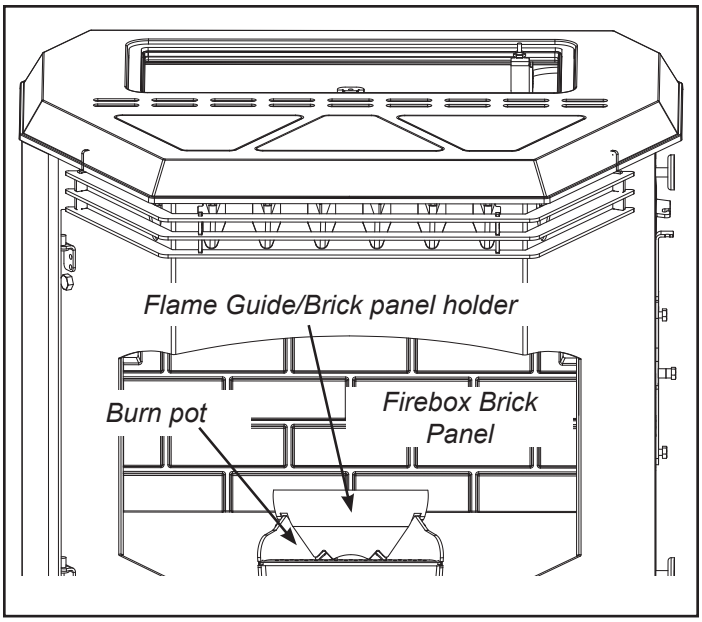
It is very important that these connections are to the inside rear of the feeder body. Also, the extra wire of the igniter wire service loop must be pulled out through the rear of the feeder and tied up so that it will not be damaged by any moving parts.

⚠ WARNING

Use caution when cleaning burn pot clean-out chamber. Do not damage the high temperature igniter wires.

Note: The hot lead/cold lead connection must always be pulled to the rear of the feeder body before operation.

G. Brick Panel Removal



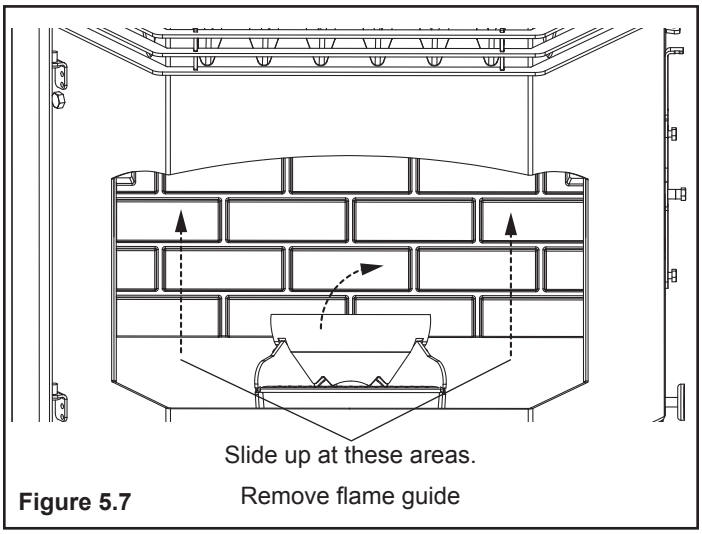


Figure 5.7

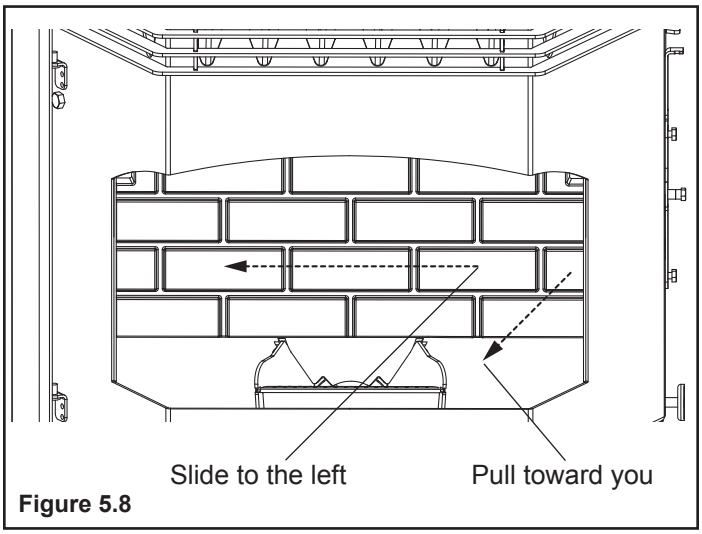


Figure 5.8

Slide brick panel straight upward with both hands. While holding the brick panel up with one hand, remove the flame guide from the top of the burn pot. Figure 5.7

Slide the brick panel into the left corner of the firebox with the panel resting on the top edges of the burn pot. Rotate the right side of the brick panel through the door opening. Figure 5.8

Reverse this operation to reinstall the brick panel after cleaning.

H. Heat Exchanger

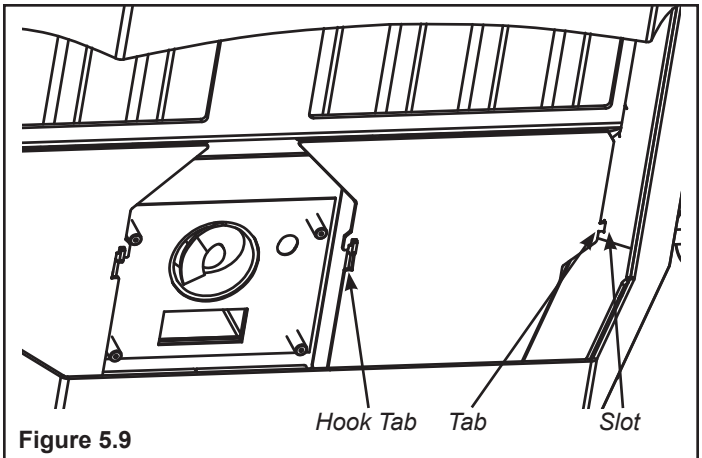


Figure 5.9

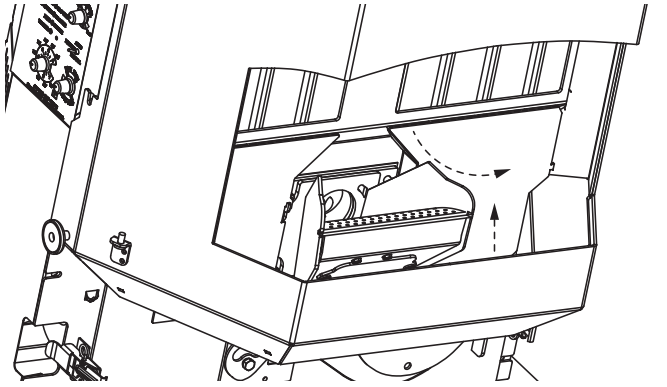


Figure 5.10

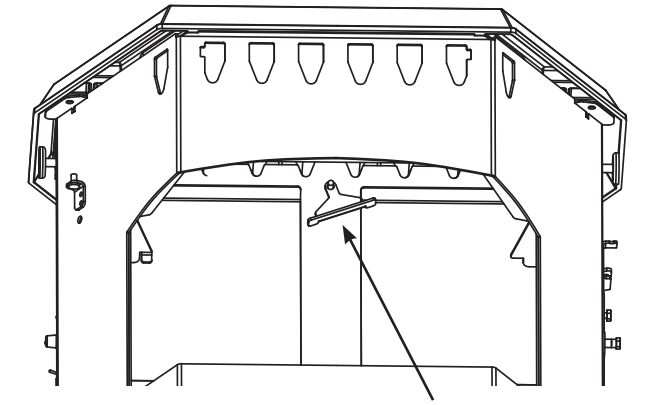


Figure 5.11 Center Lock

Monthly Cleaning- continued:

1. Remove flue baffles located on each side of the burnpot. Figures 5.9 & 5.10. The baffle is held in place by inserting the tab into the slot (located toward the outside of the firebox) and resting on the hook tab located beside the burnpot.
2. Pull the pointed end of the baffle slightly front with one hand while pushing up from below with the other hand. Figure 5.10.
3. With the baffle released from the tabs, rotate the pointed end toward the door opening. Lift baffle up and out.

The right and left baffle are interchangeable.

4. Now remove the heat exchanger baffle plates. Figure 5.11. To remove the left plate, slide the center lock to the right. To remove the right plate, slide the center lock to the left. (The right and left plates are interchangeable.)

This will allow access to all of the rear vertical heat exchanger surfaces.

5. With all four baffle plates removed, cleaning can be performed with the arrow end of the scraper. Figure 5.12.
6. Scrape all of the heat exchanger surfaces. (Be sure to clean any internal ledges where fly ash could have collected.)

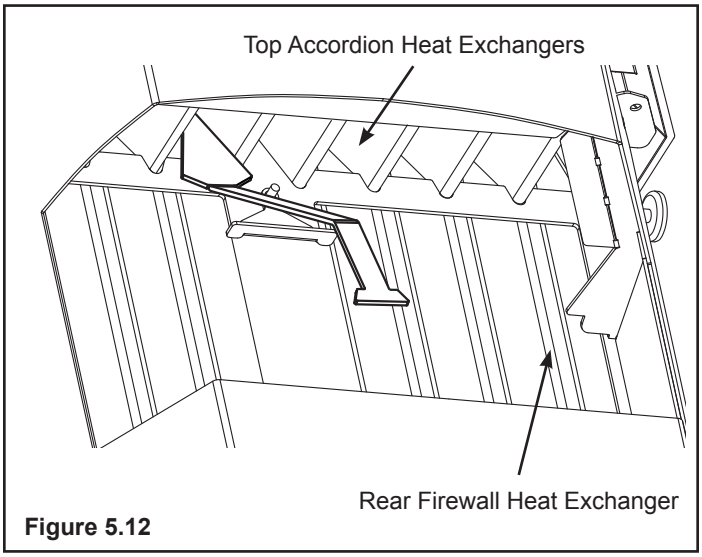


Figure 5.12

I. Combustion Blower Chamber

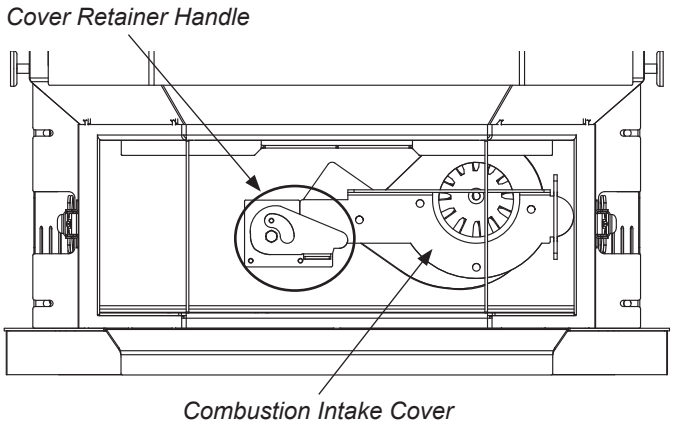


Figure 5.13

Monthly Cleaning- continued:

There is a combustion intake cover located behind the ash pan that must be removed to properly clean the combustion blower fan blade. Figure 5.13. In order to remove the combustion intake cover you must pull up on the intake retainer. Figure 5.14. This will allow the combustion intake cover to be removed. To remove the combustion intake cover pull towards the front of the unit while sliding to the right. Figure 5.15.

Now that the combustion intake cover is removed you can remove any flyash or debris that has collected around combustion blower fan blade and areas around it.

The exhaust passage may need cleaned as well. Keep in mind the ESP Sensor is located just inside the exhaust passage Figure 5.16. Be sure not to damage the ESP Sensor while cleaning this area.

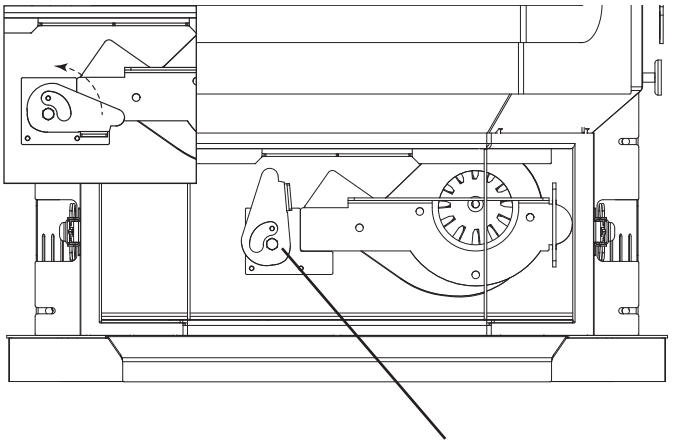


Figure 5.14

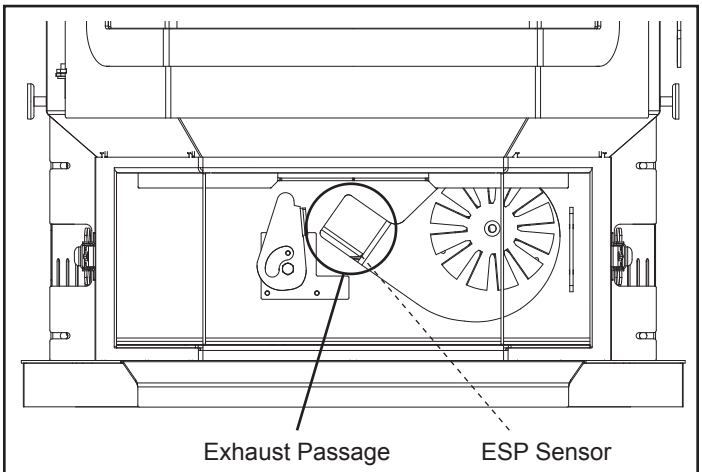


Figure 5.16

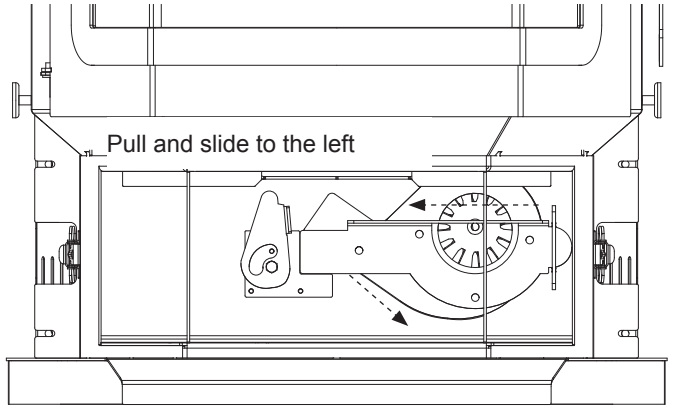
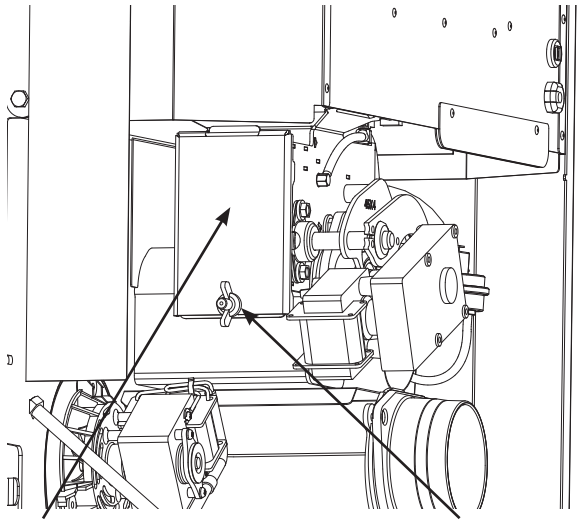


Figure 5.15

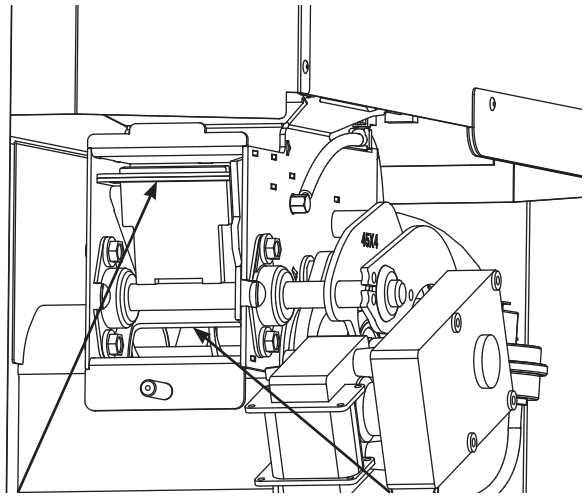
J. Pellet Feeder Chamber

Figure 5.17



Feeder clean out cover **5/16" Wing Nut**

Figure 5.18



Pellet Metering Slide Plate **Possible pellet fines buildup area.**

Feeder Chamber

This chamber may get a buildup of fines from the feeder mechanism movement. This area should be checked and cleaned at least once a year.

To remove the feeder cover:

- Loosen the 5/16" wing nut. Figure 5.17.
- Lift up and slide the cover off of the threaded stud.
- Inspect and clean the inner chamber if necessary Figure 5.18.
- Reinstall the cover making certain it is seated properly on the feeder body and tighten as tightly as you can by hand.

NOTE: Views are shown with the rear motor covers removed.

6 Troubleshooting and Frequently Asked Questions

A. Error Code Description

Status light error messages:

3 Blinks: Indicates that the ESP (Exhaust Sensing Probe) has failed, has a broken connection, or has gone out of range too many times. This requires a manual reset*.

4 Blinks: Can occur only in Room Temp Mode and indicates Room Sensing Probe failed or not installed. If a Room Sensing Probe is then installed, the status light will automatically reset.

NOTE: Unit will not start in "AUTO" with this status error.

5 Blinks (In Igniter Auto. Mode Only): Indicates that the unit has failed to light within the 36 minute start cycle. To reset - Turn Mode Selector to "OFF", then turn to either mode again.)

6 Blinks : Indicates that the control has calculated poor or incomplete combustion occurring for more than 25 minutes.

A six blink status may be set if the stove is allowed to run out of pellets. To reset, turn mode selector to "OFF" then back on to the desired mode. If the unit was not out of pellets, see Troubleshooting section for more details.

* **Manual reset**- disconnect power cord for a few seconds and reconnect. If error still occurs call your Dealer.

B. Frequently Asked Questions

ISSUES	SOLUTIONS
1. Metallic noise.	1. Noise is caused by metal expanding and contracting as it heats up and cools down, similar to the sound produced by a furnace or heating duct. This noise does not affect the operation or longevity of your appliance.
2. White ash buildup on glass.	2. This is normal. Clean the glass using any non-abrasive glass cleaner.
3. Glass has buildup of black soot	3. Excessive build-up of ash. See solution #4. The lower burn settings will produce more ash, the higher burn settings produce less. The more it burns on low the more frequent cleaning of the glass is required.
4. Glass has turned dirty.	4. Excessive build up of ash. The lower burn settings will produce more ash, the higher burn settings produce less. The more it burns on low the more frequent cleaning of the glass is required.
5. Fire has tall flames with black tails and is lazy.	5. The feed rate needs to be reduced or the burnpot needs cleaning. Heat exchanger or exhaust blower needs cleaning.
6. Smoky start-up or puffs of smoke from the airwash.	6. Either the burnpot is dirty or there is too much fuel at start-up and not enough air.
7. Large flame at start-up.	7. This is normal. Flame will settle down once the fire is established.

Contact your dealer for additional information regarding operation and troubleshooting. Visit www.harmanstoves.com to find dealer.

C. Troubleshooting

With proper installation, operation, and maintenance your appliance will provide years of trouble-free service. If you do experience a problem, this troubleshooting guide will assist a qualified service person in the diagnosis of a problem and the corrective action to be taken. This troubleshooting guide can only be used by a qualified service technician.

STOVE DOES NOT FEED

1. No fuel in hopper.
2. Firebox draft may be too low for sensing switch in feeder circuit to operate. **Check for closed doors**, loose or missing gasket on doors or hopper lid.
3. Feed motor will not run until the ESP control senses a certain temperature. Maybe you did not put enough fuel or starting gel in the burn pot before manually lighting the fire.
4. Restriction in the hopper or feeder. Remove all fuel and examine. Clear the obstruction.
5. Feed motor has failed.

PARTIALLY BURNED PELLETS

1. Feed rate too high.
2. Poor air to fuel mixture. (Check burn pot clean-out cover and air intake).
3. Burn pot or heat exchanger tubes may need to be cleaned.
4. Combination of all the above.
5. #6 status blink: A 6 blink control board status indication is caused by poor or incomplete combustion. The circuit board has the ability to track the combustion through feed settings and ESP temperatures. When the control board has calculated poor or incomplete combustion, it will shut down the unit as a safety feature. (Poor or incomplete combustion is a contributor of creosote which may cause a chimney fire)

A 6 blink status may be caused by several things:

1. Blocked or partially blocked flue.
2. Blocked or partially blocked inlet air.
   a. Backdraft damper on the inlet pipe may be stuck closed.
   b. If outside air is installed, the inlet cover may be blocked.
3. The air chamber under the burnpot may be filled with fines and small bits of ash.
4. The holes in the burnpot may be getting filled with ash or carbon buildup.
5. Combustion blower fan blades may need cleaned.
6. Fuel restrictions as noted above.

SMOKE SMELL

Seal the vent pipe joints and connection to stove with silicone. The exhaust vent is the only part of the system that is under positive pressure.

FIRE HAS GONE OUT- Check for status light.

1. No fuel in hopper.
2. Draft is too low, blocked flue.
3. Something is restricting fuel flow.
4. Hopper lid not closed properly.
5. Feed motor or combustion blower has failed.

SMOKE IS VISIBLE COMING OUT OF VENT

1. Air-fuel ratio is too rich.
   a. Feed rate too high.
   b. Draft too low caused by a gasket leak.

LOW HEAT OUTPUT

1. Feed rate too low
2. Draft too low because of gasket leak.
3. Poor quality or damp pellets
4. Combination of 1 and 2.

HELPFUL HINTS

1. Cleaning Burn Pot

Whenever your stove is not burning, take the opportunity to scrape the burn pot to remove carbon buildup. A vacuum cleaner is handy to remove the residue. Be sure the stove is cold if you use a vacuum.

Carbon buildup can be scraped loose with the fire burning using the special tool provided with your stove. Scrape the floor and sides of the burn pot. The carbon will be pushed out by the incoming fuel. Always wear gloves to do this.

2. Removing Ashes

Turn the Temperature Dial to number 1 approximately 30 minutes before removing ashes. This will result in a cooler stove and ash pan.

Maximum Feed Limit settings are not needed in most cases. Operating in the normal range (#4) is recommended when maximum heat output is not required. The ESP probe prevents the stove from being over-fired.

Keep the stove free of dust and dirt.

Fuel

The Advance Pellet Stove is approved for burning any grade of pelletized bio-mass fuel.

It should be noted, however, that higher ash content will require more frequent ash removal, scraping of the burn pot, and may provide less BTU's per pound.

The moisture content of pellets must not exceed 8%. Higher moisture will rob BTU's and may not burn properly.

Fuel should **not** be stored within the stove installation clearances or within the space required for cleaning and ash removal.

7 Reference Material

A. Safety Reminders

When operating your Harman® Advance Pellet Stove, respect basic safety standards. Read these instructions carefully before you attempt to operate the Advance Pellet Stove. Failure to do so may result in damage to property or personal injury and may void the product warranty.

Due to high temperatures, this stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burn to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this stove.

Installation and repair of this stove should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning will be required. It is imperative that control compartments and circulating air passageways of this stove be kept clean.

Disposal of ashes: Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

Soot and fly ash: Formation and need for removal. The products of combustion contain small particles of fly ash. The fly ash will collect in the exhaust venting system and will restrict the flow of the flue gases. Pellet fuels have different ash contents depending on what type of wood has been used to make the pellets. **We recommend to clean the system after approximately 1 ton of pellets have been burned and judge from that how often the stove should be cleaned, remember if you change pellets it may change how often you have to clean your stove.**

When burning wood slowly, the potential exists for creosote to form. The venting system should be inspected periodically throughout the heating season to determine if a creosote buildup has occurred. If a significant layer of creosote has accumulated (3mm or more), it should be removed to reduce the risk of a chimney fire. If a fire occurs, call the fire department, shut down the stove, and evacuate the residence. Before using the appliance, have the venting system thoroughly inspected and replace any damaged components.

⚠ CAUTION

THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

⚠ CAUTION

THE STOVE IS HOT WHILE IN OPERATION.

KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

⚠ CAUTION

This appliance must be vented to the outside.

⚠ WARNING

MOBILE/MANUFACTURED HOME GUIDELINES DO NOT ALLOW INSTALLATION IN A SLEEPING ROOM.

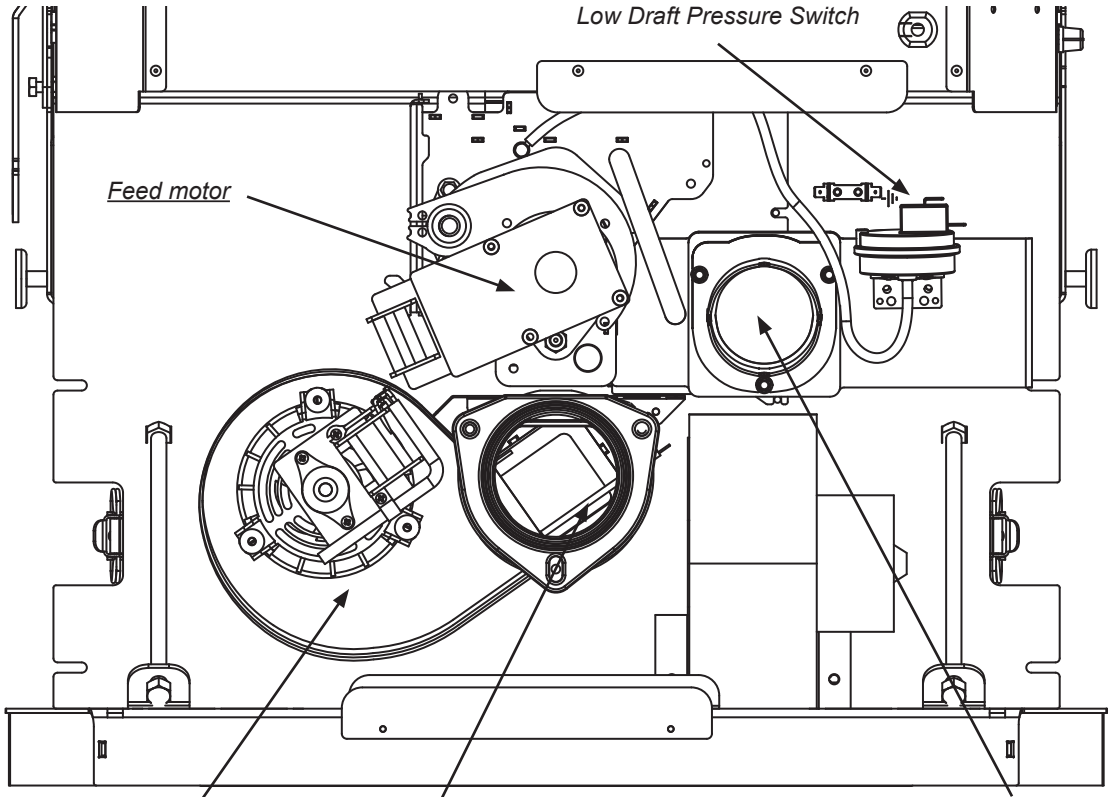
⚠ WARNING

KEEP COMBUSTIBLE MATERIALS SUCH AS GRASS, LEAVES, ETC. AT LEAST 3 FEET AWAY FROM THE POINT DIRECTLY UNDER THE VENT TERMINATION.

⚠ WARNING

USE OF IMPROPER FUELS, FIRESTARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND OPERATION GUIDELINES

B. Motor and Component Location



Backdraft Damper Assembly
Always check to see if the damper plate swings freely inward and that the seating edges are not covered with dirt or lint.

Advance Pellet Stove Safety Devices

The **Control Board/ESP** combination is responsible for all high limit safety control. There are 2 high limits, one normal operation high limit and one backup high limit. The control has an automatic diagnostic circuit that continuously monitors the ESP and Room Sensor for faults. If a fault should occur, the control sends a status alert and at the same time the unit goes down to minimum feed/ minimum burn as a safety condition.

The **Low Draft Pressure Switch** is a differential pressure switch that monitors the negative pressure (Draft) in the firebox. If the draft becomes too low for proper combustion, the switch opens, cutting power to the feed motor and the igniter circuits. This switch is connected into the AC (high voltage) wiring.

C. Loss of Power

Minimizing Smoke During Loss of Power Using Battery Back-up

Harman® strongly recommends installing battery back-up to minimize entry of smoke into the room in the event of power loss.

Your pellet/biomass burning appliance relies on a combustion blower to remove exhaust. A power failure will cause the combustion blower to stop. This may lead to exhaust seeping into the room. Vertical rise in the venting may provide natural draft. It is, however, no guarantee against leakage.

There are two Harman® approved battery back-up options for your appliance:

Uninterruptible Power Supply UPS battery back-ups are available online or at computer and office equipment stores. Your Harman® appliance with Rev E or later software available beginning in November 2010 may be plugged directly into a Harman® approved UPS:

- The APC (American Power Conversion) model #BE750G and the TrippLite model INTERNET750U are tested and approved. Other brands or models may not be compatible.

When power is lost, a fully charged UPS will power a safe, combustion blower only shut-down. Your appliance will pulse the blower every few seconds to clear exhaust until the fire is out. **NOTE: The UPS provides safe shut-down only. It is not intended for continued operation.**

- The Surefire 512 connects to a 12 volt deep cycle battery that will run your appliance for up to eight (8) hours. It includes a trickle charge feature that keeps your battery charged when power is available. NOTE: If the power is out for longer than battery life, smoke leakage may still occur unless your stove has been safely shut down.

Your appliance will recognize when power is restored. What happens depends on ESP temperature and whether it is equipped with automatic ignition:

- **In "Automatic" Mode**, units equipped with automatic ignition will respond to the set point and ESP temperature and resume normal operation.
- **In "Idle" Mode**, or for units without automatic ignition:
  - If the ESP is cool, the appliance will remain shut down.
  - If the fire is out and the ESP is still warm, the feeder may restart. Since the fire is out, the ESP temperature will not rise. The unit will then shut-down, and may flash a six-blink status error. (See ESP error codes)
  - If the fire is still burning, it will resume normal operation.

Contact your dealer if you have questions about UPS compatibility with your appliance.

⚠ WARNING

Use only Harman® approved battery back-up devices. Other products may not operate properly, can create unsafe conditions or damage your appliance.

⚠ CAUTION

Always keep appliance doors and hopper lid closed and latched during operation and during power failures to minimize risk of smoke or burn-back.

D. Emergency Manual Ignition

Harman® pellet stoves and inserts should be lit using the automatic ignition system. This is the safest and most reliable way for igniting the unit. In the event the automatic igniter is not functioning, the steps below may be followed to manually light the stove or insert in the "Constant Burn" mode. Manual lighting is for emergency purposes only, and the igniter should be repaired or replaced as soon as practical.

⚠ WARNING

Only use firestarter commercially marketed for pellet stoves and inserts, including wax coated wood chips, pellet starter gel and pellet igniter blocks. Use of any other type of firestarter is prohibited.

To avoid serious injury or death read and follow manufacturer's warning and instructions for use of firestarter. Use of firestarter is only permitted when performing a cold start.

Never attempt to manually light a stove or insert that has been operated recently and is not at room temperature. If automatic ignition was attempted, be sure to give the stove or insert at least 30 minutes or longer to cool to room temperature.

Be sure that the stove or insert is in the "Igniter - Disabled" mode of operation.

Once all the precautions have been taken, follow these steps:

1. Turn the Mode Selector to "OFF".
2. Fill burn pot with pellets, only half way. (Do Not Over Fill).
3. Add firestarter to pellets following manufacturer's instructions.
4. Light pellet gel with a match, and close the door, turn Mode Selector to Constant Burn. Operation will begin when the fire reaches the proper temperature.

D. Service Parts

HARMAN®
BUILT TO A STANDARD, NOT A PRICE

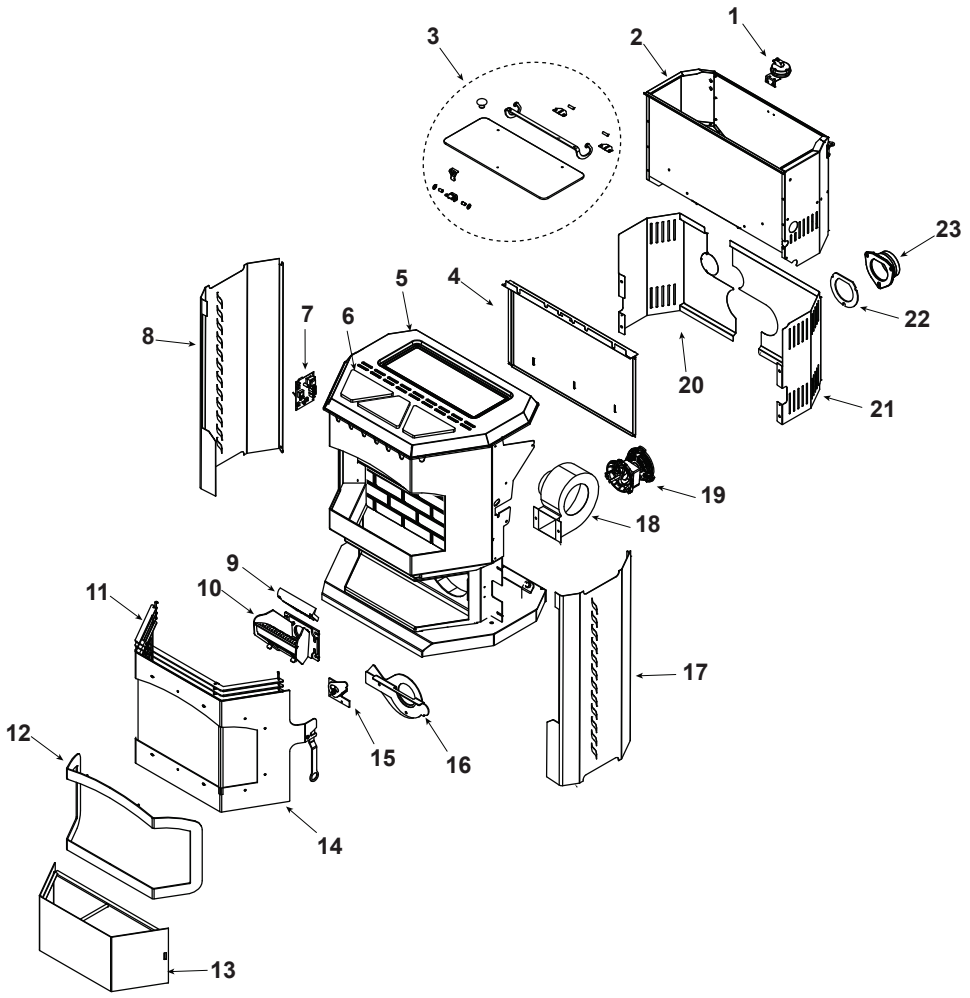
Service Parts — Advance

Pellet Stove
1-70-08730-1 (Black)

Beginning Manufacturing Date: N/A
Ending Manufacturing Date: Active

Retired Units

1-70-08730-2 (Charcoal) Ending Manufacturing Date: June 2009)
1-70-08730-3 (Goldenfire) (Ending Manufacturing Date: June 2009)
1-70-08730-4 (Metallic Blue) (Ending Manufacturing Date Jan 2010)
1-70-08730-5 (Honey Glo) (Ending Manufacturing Date: June 2009)
1-70-08730-7 (Black) (Ending Manufacturing Date: June 2009)
1-70-08730-10 (Mojave Red) (Ending Manufacturing Date Jan 2010)
1-70-08730-12 (Forest Green) (Ending Manufacturing Date Jan 2010

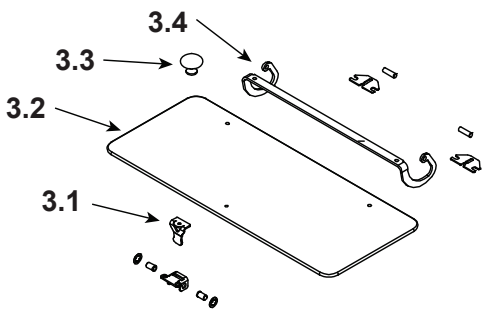


IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers**. Provide model number and serial number when requesting service parts from your dealer or distributor.

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
1	Differential Switch		3-20-6866	Y
2	UL Hopper Assembly	Pre 008360001	1-10-09731S	Y
		008360001 Thru 008362435/ Must also order Retrofit Switch kit**	1-10-09876A	Y
			1-00-232108**	Y
		Post 008362435	1-10-09876A	Y
	Gasket, Hopper Top & Hopper Lid		1-00-375501	Y
	Switch, Hopper, 48"	Post 008362469	3-20-232108	Y

Additional service parts on following page.

#3 Hopper Lid Assembly



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ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
3	Hopper Lid Assembly			
3.1	Hopper Lid Latch (Male and Female)	2 Sets	1-00-0669697	**Y**
3.2	Hopper Lid		3-40-06693	**Y**
3.3	Hopper Knob	Gold	1-00-02000	
		Brushed Nickel	1-00-02000-8	
3.4	Hinge		2-00-06694	
	Ball Plunger	Pkg of 3	3-31-5500-3	
	Hinge Plate	Qty 2 req	2-00-06695L	
	Push Retainers	Pkg of 100	3-31-94807-100	
	Screw Post 1/4"/ Washers (Hopper Lid)	Pkg of 20	1-00-129004	**Y**
4	Hopper Heat Shield		2-00-06612B	
5	Top		4-00-08739P	
6	Tile Set	Cream	3-43-03000-1	
		No longer available	3-43-03000-2	
		Black	3-43-03000-3	
		No longer available	3-43-03000-4	
7	Circuit Board w/Knobs & Shafts		1-00-05886	**Y**
	6 Amp Fuse	Pkg of 5	3-20-49447-5	**Y**
	Control Board Knob/ D-shaft	25 Sets	1-00-015605	**Y**
8	Side Door - Left		2-00-06610-1P	
9	Flame Guide		3-00-06644	**Y**
10	Burn Pot		1-10-00675	**Y**
	Burn Pot Igniter		3-20-677200	**Y**
		Pkg of 10	1-00-67200	**Y**
	Arrow Burn Pot Scraper	Pkg of 10	2-00-773850-10	
	Ceramic Insert Gasket		3-44-724114	**Y**
	Clean Out Cover	2 Sets	1-00-06623	**Y**
	Thumb Screw	Pkg of 10	3-31-782108-10	**Y**
	Ignitor Cradle, Holder, & Flat Bottom	3 Sets	1-00-06620	**Y**

Additional service parts on following page.

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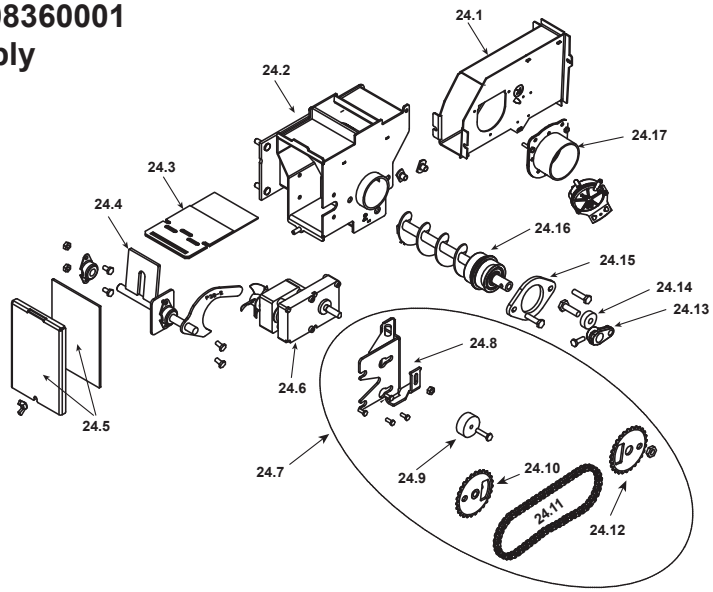
ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
11	Grill Weldment	Gold	3-43-06642-4	
		Brushed Stain	3-43-06642-7	
		Brushed Nickel	3-43-06642-8	
12	Frame	Gold	3-43-06613-4	
		Brushed Stain	3-43-06613-7	
		Brushed Nickel	3-43-06613-8	
13	Ash Pan Weldment		1-10-07581A	**Y**
	Ash Pan Gasket	30 Ft	1-00-00888	**Y**
14	Door Assembly		1-10-08612A	
	Gasket, Door, 1 1/2” x 7/16”	Qty 1 req	2-00-71611	**Y**
	Gasket, Glass	15 Ft	1-00-2312	**Y**
	Large Front Glass with Gasket		1-00-08728	**Y**
	Side Glass with Gasket		1-00-08729	**Y**
	Glass Clips	1 Set	1-00-06600	
15	Retainer Assembly		1-10-08553S	**Y**
16	Combustion Intake Weldment		1-10-07574W	**Y**
17	Side Door - Right		2-00-06610-2P	
18	Distribution Blower		3-21-33647	**Y**
19	Combustion Blower		3-21-08639	**Y**
	Fan Blade, 5” , Double Paddle		3-20-502221	**Y**
	Blower Mounting Screws	Pkg of 100	1-00-53483208	
20	UL Feeder Hopper Rear Shield Left	Pre 008360001	2-00-06617P	**Y**
		Post 008360001	2-00-06788P	**Y**
21	UL Feeder Hopper Rear Shield Right	Pre 008360001	2-00-06616P	**Y**
		Post 008360001	2-00-06789B	**Y**
22	Pellet Tailpipe Gasket	Pkg of 5	1-00-07381	**Y**
23	Pellet Tailpipe Cast		3-00-247237	**Y**

Additional service parts on following page.

Pre Serial Number 008360001
Feeder Assembly



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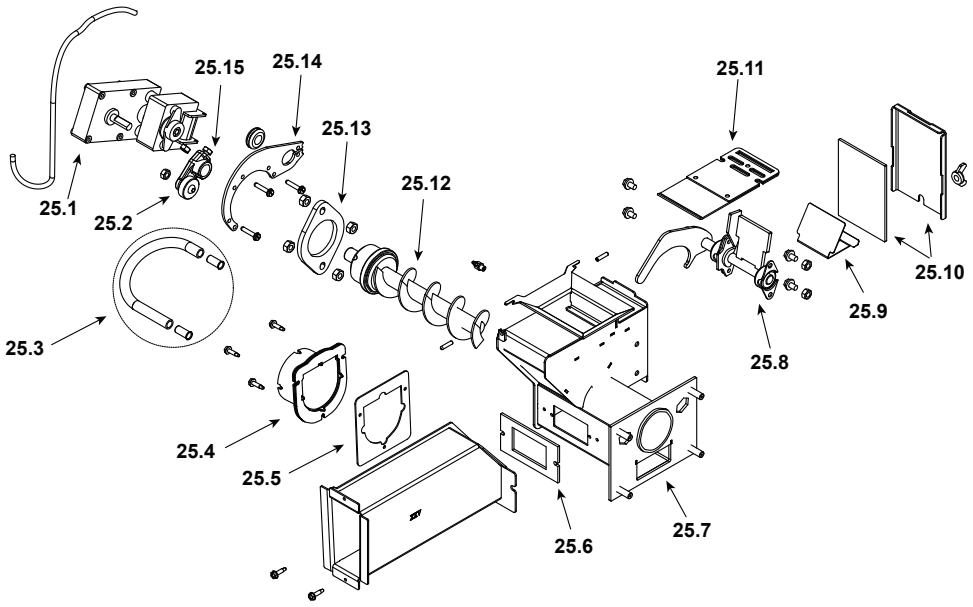
ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
24	Feeder Assembly	Pre 008360001	1-10-09775A	
24.1	Air Intake Weldment		1-10-06593W	
24.2	Feeder Weldment		1-10-677150	Y
24.3	Slide Plate Assembly		1-10-08037	Y
24.4	Pusher Arm Assembly		1-10-01530	Y
24.5	Feed Cover and Gasket	2 Sets	1-00-677152	Y
24.6	Gear Motor, 4 RPM		3-20-08752	Y
24.7	Sprocket Kit		1-00-06626	Y
24.8	Bracket, Gear Motor		1-10-677005	Y
	Grommets & Spacers	25 Sets	1-00-960026	
24.9	3/4 Feeder Tensioner		3-31-00075	Y
24.10	3 1/2” Sprocket w/Hub		1-10-08550W	Y
24.11	Chain - 60 Pin		3-50-06667	Y
24.12	3 1/2” Sprocket		2-00-06626M	Y
24.13	Cast Cam Block		3-00-00153	Y
24.14	Cam Bearing		3-31-3014	Y
24.15	Bearing Flange w/Hardware		1-00-04035	Y
24.16	Auger Assembly		3-50-00465	Y
24.17	Air Intake Damper Assembly		1-10-06466W	
	Gasket, Feeder, Air Intake	Pkg of 6	3-44-72224-6	Y
	Pillow Block	Pkg of 4	3-31-3614087-4	Y
	Feeder Air Crossover Kit		1-00-67900	Y
	Feeder Repair Kit		1-00-677150	Y

Additional service parts on following page.

Post Serial Number 008360001 Feeder Assembly



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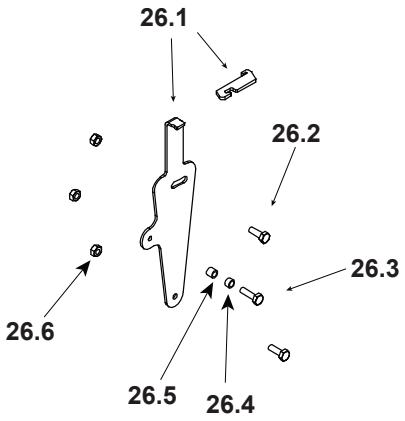
ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
25	UL Feeder Assembly	Post 008360001	1-10-09875A	
25.1	Pellet Feeder Gear Motor, 4 RPM		3-20-00677	**Y**
25.2	UL Feeder Cam Bearing		3-31-3014	**Y**
25.3	Feeder Air Crossover Kit		1-00-67900	**Y**
	9MM Silicone Tube	5 Ft	1-00-511427	**Y**
25.4	Pellet Air Intake Assembly		1-10-06810A	
25.5	Gasket Feeder Air Intake	Pkg of 6	3-44-72224-6	**Y**
25.6	Gasket Ultra Air Intake	Pkg of 10	3-44-677160-10	**Y**
25.7	Ultra Feeder Weldment		1-10-724132	**Y**
25.8	UL Feeder Pusher Arm		1-10-677131W	**Y**
25.9	Fines Deflector	**No longer available**	2-00-677138-10	
25.10	Gasket, UL Feeder Cover		1-00-677122	**Y**
25.11	Slide Plate Assembly		1-10-677121A	**Y**
25.12	UL Feeder Auger Assembly		3-50-00565	**Y**
25.13	Bearing Flange w/Hardware		1-00-04035	**Y**
25.14	UL Feeder Gear Motor Bracket w/Grommet		1-00-247406	**Y**
25.15	UL Feeder Cam Block		3-00-677154	**Y**
	Gasket, Hopper throat		3-44-677185	**Y**
	HopperSwitch Feeder Fitting	Pkg of 2	1-00-142818	**Y**
	Pillow Block	Pkg of 4	3-31-3614087-4	

Additional service parts on following page.

#26 Hardware Kit



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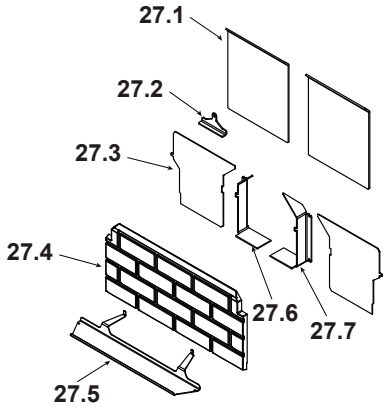
ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
26.1	Latch Adjuster, Spring Holder, Door Latch & Spring	I Set	1-00-06770	
26.2	Screw, 1/4-20 x 3/4" Grade 5 Zinc Plated Hex	Pkg of 100	3-30-1112-100	**Y**
26.3	Screw, 1/4-20 x 7/8 Grade 5 Zinc Hex Cap	Pkg of 50	3-30-1114-50	**Y**
26.4	Bushing 3/8 OD x 1/4 OAL	Pkg of 5	3-50-00058-5	**Y**
26.5	Latch Bushing 3/8 OD x 5/16 OAL	Pkg of 5	3-50-08288-5	**Y**
26.6	Nut, 1/4"-20 Zinc Plated Finished Hex	Pkg of 100	3-30-8004-100	**Y**

#27 Firebox Assembly



27.1	Firebox Heat Exchanger Cover	Qty. 2 Req.	2-00-06692B	
27.2	Heat Exchanger Cleanout Cover Latch		2-00-06698B	
27.3	Baffle Plate	Qty. 2 Req.	2-00-06632L	
27.4	Cast Brick Panel		3-00-06641	**Y**
27.5	Log Bracket		1-00-06677	
27.6	Burner Protector Left		2-00-06631-1B	
27.7	Burner Protector Right		2-00-06631-2B	

Additional service parts on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers**. Provide model number and serial number when requesting service parts from your dealer or distributor.

ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
	DDM Replacement Cable		1-00-05402	
	Diagnostic Display Meter		3-20-05401	**Y**
	Disconnect, Female, 1/4"	Pkg fo 25	1-00-00959	
	Disconnect, Male, 1/4"	Pkg of 25	1-00-00957	
	Door Hinge Weldment	Qty 2 req	1-10-08735W	
	Draft Meter Assembly		1-00-00637	**Y**
	Draft Meter Bolt & Tube		1-00-04004	
	Flue Brush		3-40-06663	
	Harman Gold Label	Pkg of 5	3-90-08540-5	
	Harman Silver Label	Pkg of 5	3-90-04580-5	
	Hopper Muffler and Fitting	1 Set	1-00-18186618	**Y**
	Labels, Caution & Danger	10 Each	1-00-200408541	
	Labels, Control Board		3-90-06655A	
	Labels, Large Caution		3-90-00247	
	Magnet & Hardware	Pkg of 4	1-00-08569	
	Power Cord		3-20-29685	**Y**
	Room Sensor		3-20-00906	**y**
	Silicone Tubing, 1/8"	5 Ft	1-00-5113574	**Y**
	Spring Latch	Qty 2 req	3-31-00927	**Y**
	Thermister Probe	Pre SN 008360001	3-20-11744	**Y**
		Post SN 008360001	3-20-00844	**Y**
	Touch up Paint, 12 oz can	Pre SN 008366324	3-42-1990	
		Post SN 008366324	3-42-19905	
	Thermostat Extension		3-20-00607	**Y**
	Wiring Harness		3-20-08727	**Y**

E. Contact Information

HARMAN®
BUILT TO A STANDARD, NOT A PRICE

352 Mountain House Road, Halifax, PA 17032
www.harmanstoves.com

Please contact your Harman® dealer with any questions or concerns.
For the location of your nearest Harman® dealer,
please visit www.harmanstoves.com.

- NOTES -

NOTICE

DO NOT DISCARD THIS MANUAL

- Important operating and maintenance instructions included.
- Read, understand and follow these instructions for safe installation and operation.
- Leave this manual with party responsible for use and operation.

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Section 5

Test Data by Run

Run 1

OMNI-Test Laboratories, Inc.

Pellet Heater Test Results - ASTM E2779 / ASTM E2515

Manufacturer: Harman
Model: Advance
Project No.: 1035PS034E
Tracking No.: 2066
Run: 1
Test Date: 05/07/15

Burn Rate (Composite)	**0.96 kg/hr dry**
Average Tunnel Temperature	94 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	14.4 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	9582.7 dscf/hour
Average Delta p	0.046 inches H20
Average Delta H	0.74 inches H20
Total Time of Test	370 minutes

Burn Rate (High)	**2.42** kg/hr dry
Burn Rate (Med)	**1.04** kg/hr dry **42.9%** of High
Burn Rate (Low)	**0.46** kg/hr dry **18.9%** of High

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	64.97 cubic feet	44.75 cubic feet	44.44 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	82 degrees Fahrenheit	81 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	65.7 dscf	44.2 dscf	44.0 dscf
Total Particulates - mn	0.3 mg	9.1 mg	8.1 mg
Particulate Concentration (dry-standard)	0.00000 grams/dscf	0.00021 grams/dscf	0.00018 grams/dscf
Particulate Emission Rate	0.04 grams/hour	1.97 grams/hour	1.76 grams/hour
Difference from Average		0.11 grams/hour	0.11 grams/hour
		Results Are Acceptable	

AVERAGE

Total Sample Volume - Vm	44.60 cubic feet
Average Gas Meter Temperature	81 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	44.1 dscf
Total Particulates - mn	8.6
Particulate Concentration (dry-standard)	0.00019 grams/dscf
Particulate Emission Rate	**1.82 grams/hour**
7.5% of the average emission rate	0.14

Particulate Emissions Rate:

4.50 g/hr	First Hour
1.82 g/hr	Integrated Run
1.86 g/kg	First Hour
1.90 g/kg	Integrated Run

TRAIN 1 - FIRST HOUR

Total Sample Volume - Vm	7.23 cubic feet
Average Gas Meter Temperature	75 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	7.2 dscf
Total Particulates - mn	3.4 mg
Particulate Concentration (dry-standard)	0.00047 grams/dscf
Particulate Emission Rate	**4.50 grams/hour**

OMNI-Test Laboratories, Inc.

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
0	0.000	0.000			0.51	71	0.81	0.41	72	0.8	115			47.9		398	68	68	68	-0.111	5.6	0.1
1	0.111	0.120	0.11	0.12	0.71	71	0.84	0.67	72	0.8	115	96	104	47.8	-0.1	398	68	69	68	-0.112	5.8	0.1
2	0.228	0.247	0.12	0.13	0.71	71	0.84	0.67	72	0.8	115	101	110	47.7	-0.1	399	68	70	69	-0.110	6.1	0.2
3	0.348	0.367	0.12	0.12	0.78	71	0.9	0.58	72	0.7	115	103	104	47.6	-0.1	400	69	70	68	-0.111	6.1	0.1
4	0.471	0.485	0.12	0.12	0.78	72	0.9	0.58	72	0.7	115	106	102	47.5	-0.1	402	69	70	67	-0.112	6.3	0.1
5	0.592	0.603	0.12	0.12	0.77	72	0.9	0.58	72	0.7	115	104	102	47.4	-0.1	401	69	70	66	-0.112	6.6	0.1
6	0.714	0.722	0.12	0.12	0.77	72	0.9	0.59	72	0.7	115	105	103	47.3	-0.1	402	69	70	68	-0.112	6.2	0.1
7	0.836	0.842	0.12	0.12	0.77	72	0.9	0.59	73	0.7	115	105	104	47.2	-0.1	402	69	71	66	-0.111	6	0.1
8	0.958	0.961	0.12	0.12	0.77	72	0.9	0.59	73	0.7	115	105	103	47.1	-0.1	402	69	71	67	-0.113	6	0.2
9	1.081	1.081	0.12	0.12	0.77	72	0.9	0.59	73	0.7	115	106	104	47.0	-0.1	403	69	71	67	-0.113	6	0.1
10	1.203	1.200	0.12	0.12	0.77	72	0.91	0.59	73	0.7	115	105	103	46.9	-0.1	406	69	71	68	-0.111	6.7	0.2
11	1.324	1.320	0.12	0.12	0.76	72	0.91	0.59	73	0.7	115	104	104	46.8	-0.1	406	69	71	67	-0.112	6.3	0.2
12	1.445	1.439	0.12	0.12	0.77	72	0.91	0.59	73	0.7	115	104	103	46.7	-0.1	405	69	71	67	-0.112	5.8	0.1
13	1.566	1.558	0.12	0.12	0.75	72	0.9	0.59	73	0.7	115	104	103	46.6	-0.1	404	69	71	68	-0.111	6.1	0.1
14	1.687	1.679	0.12	0.12	0.75	73	0.89	0.61	73	0.8	115	104	105	46.5	-0.1	404	69	71	68	-0.112	6.2	0.1
15	1.807	1.801	0.12	0.12	0.75	73	0.9	0.61	73	0.8	115	103	105	46.4	-0.1	404	69	71	68	-0.112	6.1	0.1
16	1.928	1.922	0.12	0.12	0.75	73	0.9	0.61	73	0.8	115	104	105	46.3	-0.1	405	69	72	68	-0.113	6.3	0.1
17	2.048	2.042	0.12	0.12	0.75	73	0.9	0.61	73	0.8	116	103	104	46.2	-0.1	406	69	72	67	-0.112	6.7	0.2
18	2.168	2.164	0.12	0.12	0.75	73	0.9	0.60	74	0.8	116	103	105	46.1	-0.1	405	69	72	68	-0.111	6	0.1
19	2.289	2.285	0.12	0.12	0.74	73	0.9	0.60	74	0.8	116	104	104	46.1	0	403	70	72	69	-0.112	5.8	0
20	2.409	2.406	0.12	0.12	0.74	73	0.9	0.61	74	0.8	116	103	104	45.9	-0.2	405	70	72	69	-0.111	6.3	0.2
21	2.529	2.527	0.12	0.12	0.74	74	0.91	0.60	74	0.8	116	103	104	45.9	0	408	70	72	68	-0.113	6.7	0.2
22	2.649	2.648	0.12	0.12	0.74	74	0.91	0.60	74	0.8	116	103	104	45.8	-0.1	406	70	72	68	-0.112	6.1	0.1
23	2.769	2.768	0.12	0.12	0.74	74	0.91	0.59	74	0.8	116	103	104	45.7	-0.1	408	70	72	68	-0.110	6.7	0.2
24	2.889	2.889	0.12	0.12	0.74	74	0.91	0.59	74	0.8	116	103	104	45.6	-0.1	407	70	72	68	-0.112	6.2	0.1
25	3.010	3.010	0.12	0.12	0.77	74	0.92	0.60	75	0.8	116	104	104	45.5	-0.1	406	70	73	69	-0.112	5.9	0
26	3.131	3.131	0.12	0.12	0.76	74	0.92	0.59	75	0.8	116	104	104	45.4	-0.1	404	70	73	68	-0.110	6.1	0.1
27	3.253	3.252	0.12	0.12	0.77	75	0.93	0.60	75	0.8	116	104	104	45.3	-0.1	405	70	73	69	-0.111	6.2	0.1
28	3.374	3.372	0.12	0.12	0.76	75	0.93	0.60	75	0.8	116	104	103	45.2	-0.1	406	71	73	69	-0.111	6.5	0.2
29	3.496	3.493	0.12	0.12	0.75	75	0.93	0.60	75	0.8	116	104	104	45.1	-0.1	405	71	73	69	-0.111	6.4	0.1
30	3.617	3.614	0.12	0.12	0.75	75	0.94	0.60	75	0.8	116	104	104	45.0	-0.1	404	71	73	69	-0.111	6.1	0.1
31	3.739	3.734	0.12	0.12	0.75	75	0.94	0.59	75	0.8	116	104	103	44.9	-0.1	404	71	73	69	-0.111	6.2	0.1
32	3.860	3.855	0.12	0.12	0.76	75	0.94	0.59	76	0.8	116	104	104	44.8	-0.1	402	71	73	68	-0.110	5.8	0.1
33	3.982	3.976	0.12	0.12	0.76	76	0.95	0.59	76	0.8	116	104	104	44.7	-0.1	404	71	73	68	-0.110	6.5	0.2
34	4.103	4.096	0.12	0.12	0.75	76	0.95	0.59	76	0.8	116	103	103	44.6	-0.1	407	71	73	69	-0.112	7	0.2
35	4.223	4.216	0.12	0.12	0.75	76	0.95	0.59	76	0.8	116	103	103	44.6	0	404	71	73	69	-0.111	5.9	0.1
36	4.344	4.336	0.12	0.12	0.75	76	0.96	0.59	76	0.8	116	103	103	44.4	-0.2	403	71	73	69	-0.112	5.8	0.1

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
37	4.465	4.457	0.12	0.12	0.75	76	0.96	0.59	76	0.8	116	103	104	44.4	0	404	71	73	69	-0.111	6.3	0.2
38	4.586	4.577	0.12	0.12	0.74	76	0.95	0.59	76	0.8	116	103	103	44.3	-0.1	402	71	73	69	-0.111	5.9	0.1
39	4.707	4.697	0.12	0.12	0.75	76	0.96	0.59	77	0.8	116	103	103	44.2	-0.1	402	71	73	68	-0.111	6.2	0.2
40	4.828	4.817	0.12	0.12	0.74	77	0.96	0.59	77	0.8	116	103	103	44.1	-0.1	404	71	73	68	-0.111	6.4	0.1
41	4.949	4.937	0.12	0.12	0.74	77	0.97	0.59	77	0.8	117	103	103	44.0	-0.1	404	71	73	68	-0.110	6.5	0.2
42	5.070	5.057	0.12	0.12	0.74	77	0.96	0.59	77	0.8	117	103	103	43.9	-0.1	406	71	73	69	-0.111	6.5	0.1
43	5.191	5.177	0.12	0.12	0.74	77	0.97	0.59	77	0.8	117	103	103	43.8	-0.1	405	71	73	70	-0.110	6.3	0.2
44	5.311	5.297	0.12	0.12	0.74	77	0.97	0.59	77	0.8	117	102	103	43.7	-0.1	405	71	73	68	-0.110	6.2	0.1
45	5.431	5.417	0.12	0.12	0.74	77	0.97	0.59	77	0.8	116	102	103	43.6	-0.1	405	71	73	69	-0.111	6.4	0.1
46	5.551	5.537	0.12	0.12	0.74	77	0.98	0.59	77	0.9	117	102	103	43.5	-0.1	404	71	74	68	-0.111	6.3	0.1
47	5.671	5.656	0.12	0.12	0.74	77	0.98	0.59	78	0.9	117	102	102	43.4	-0.1	407	71	74	68	-0.112	6.6	0.1
48	5.792	5.776	0.12	0.12	0.74	77	0.98	0.59	78	0.9	117	103	103	43.4	0	407	71	74	69	-0.111	6.4	0.1
49	5.912	5.896	0.12	0.12	0.74	78	0.98	0.59	78	0.9	117	102	103	43.2	-0.2	407	72	74	69	-0.111	6.6	0.2
50	6.032	6.016	0.12	0.12	0.74	78	0.98	0.59	78	0.9	117	102	103	43.2	0	406	72	74	69	-0.110	6.3	0.1
51	6.152	6.135	0.12	0.12	0.73	78	0.98	0.59	78	0.9	117	102	102	43.1	-0.1	404	72	74	69	-0.110	5.9	0.1
52	6.273	6.255	0.12	0.12	0.74	78	0.98	0.59	78	0.9	117	103	103	43.0	-0.1	404	72	74	69	-0.111	6	0.1
53	6.393	6.375	0.12	0.12	0.73	78	0.99	0.59	78	0.9	117	102	103	42.9	-0.1	403	72	74	69	-0.110	6.1	0.1
54	6.513	6.494	0.12	0.12	0.73	78	0.99	0.59	78	0.9	117	102	102	42.8	-0.1	404	72	74	68	-0.110	6.3	0.1
55	6.633	6.614	0.12	0.12	0.73	78	0.99	0.59	78	0.9	117	102	103	42.7	-0.1	404	72	74	69	-0.111	6.1	0.1
56	6.753	6.734	0.12	0.12	0.73	78	0.99	0.58	78	0.9	117	102	103	42.6	-0.1	404	72	74	70	-0.111	6.2	0.1
57	6.873	6.853	0.12	0.12	0.73	78	0.99	0.59	78	0.9	117	102	102	42.5	-0.1	404	72	74	70	-0.110	6.5	0.1
58	6.993	6.973	0.12	0.12	0.73	78	0.99	0.58	79	0.9	117	102	103	42.4	-0.1	404	72	74	70	-0.111	6.4	0.1
59	7.113	7.092	0.12	0.12	0.73	79	1	0.58	79	0.9	117	102	102	42.3	-0.1	403	72	74	69	-0.110	6.3	0.1
60	7.232	7.211	0.12	0.12	0.73	79	1	0.58	79	0.9	117	101	102	42.3	0	401	72	74	69	-0.109	5.8	0.1
61	7.358	7.330	0.13	0.12	0.86	79	0.8	0.58	79	0.9	117	107	102	42.2	-0.1	394	72	74	69	-0.107	4.7	0
62	7.472	7.450	0.11	0.12	0.78	79	0.9	0.58	79	0.9	116	97	103	42.1	-0.1	378	73	74	69	-0.104	2.9	0
63	7.595	7.569	0.12	0.12	0.79	79	0.9	0.62	79	0.9	114	104	102	42.1	0	360	73	74	69	-0.104	2.3	0
64	7.716	7.693	0.12	0.12	0.73	79	0.85	0.62	79	0.9	112	103	106	42.1	0	347	73	74	69	-0.103	2.2	0
65	7.836	7.814	0.12	0.12	0.73	79	0.86	0.59	79	0.9	111	102	103	42.1	0	335	73	74	70	-0.100	2.1	0
66	7.957	7.934	0.12	0.12	0.73	79	0.86	0.59	79	0.9	110	102	102	42.0	-0.1	323	73	74	70	-0.098	1.8	0
67	8.077	8.054	0.12	0.12	0.74	79	0.85	0.59	79	0.9	109	101	102	42.1	0.1	314	73	74	70	-0.098	1.9	0
68	8.197	8.174	0.12	0.12	0.73	79	0.85	0.59	79	0.9	108	101	102	42.0	-0.1	304	73	74	70	-0.096	1.8	0
69	8.318	8.295	0.12	0.12	0.73	79	0.85	0.59	79	0.9	107	102	103	42.0	0	298	73	74	70	-0.096	2	0
70	8.439	8.415	0.12	0.12	0.73	79	0.85	0.59	79	0.9	106	102	102	41.9	-0.1	293	73	74	70	-0.095	2	0
71	8.559	8.535	0.12	0.12	0.74	80	0.85	0.59	80	0.9	106	101	102	41.9	0	293	73	74	69	-0.094	2.5	0
72	8.680	8.655	0.12	0.12	0.74	80	0.85	0.59	80	0.9	105	102	101	41.9	0	290	72	74	69	-0.095	2.5	0
73	8.800	8.775	0.12	0.12	0.73	80	0.86	0.59	80	0.9	105	101	101	41.9	0	288	72	74	70	-0.094	2.5	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
74	8.920	8.895	0.12	0.12	0.74	80	0.86	0.59	80	0.9	104	101	101	41.8	-0.1	286	72	74	71	-0.093	2.6	0
75	9.040	9.015	0.12	0.12	0.73	80	0.85	0.59	80	0.9	104	101	101	41.8	0	286	72	74	70	-0.094	2.7	0
76	9.161	9.136	0.12	0.12	0.74	80	0.85	0.59	80	0.9	105	102	102	41.7	-0.1	291	72	74	69	-0.094	3.4	0
77	9.281	9.256	0.12	0.12	0.74	80	0.86	0.59	80	0.9	105	101	101	41.7	0	293	72	74	69	-0.095	3.4	0
78	9.402	9.376	0.12	0.12	0.74	80	0.86	0.59	80	0.9	105	102	101	41.6	-0.1	288	72	73	69	-0.094	2.6	0
79	9.523	9.496	0.12	0.12	0.74	80	0.85	0.59	80	0.9	104	102	101	41.6	0	283	72	73	69	-0.093	2.6	0
80	9.643	9.617	0.12	0.12	0.74	80	0.86	0.59	80	0.9	104	101	102	41.5	-0.1	284	72	73	69	-0.093	3	0
81	9.764	9.737	0.12	0.12	0.73	80	0.86	0.59	80	0.9	104	102	101	41.5	0	284	72	73	69	-0.093	3	0
82	9.885	9.857	0.12	0.12	0.73	80	0.85	0.59	80	0.9	103	102	101	41.5	0	281	72	73	69	-0.094	2.7	0
83	10.006	9.977	0.12	0.12	0.74	80	0.85	0.59	80	0.9	103	102	101	41.4	-0.1	279	72	73	70	-0.092	2.8	0
84	10.126	10.097	0.12	0.12	0.74	80	0.86	0.59	80	0.9	103	101	101	41.4	0	280	72	73	69	-0.094	2.9	0
85	10.247	10.218	0.12	0.12	0.74	80	0.85	0.59	80	0.9	103	102	102	41.4	0	281	72	73	70	-0.093	3	0
86	10.368	10.338	0.12	0.12	0.74	80	0.86	0.59	80	0.9	103	102	101	41.3	-0.1	281	72	73	70	-0.094	2.9	0
87	10.488	10.458	0.12	0.12	0.74	80	0.86	0.59	80	0.9	103	101	101	41.3	0	279	72	73	69	-0.094	2.9	0
88	10.608	10.578	0.12	0.12	0.74	80	0.86	0.59	80	0.9	102	101	101	41.2	-0.1	278	72	73	69	-0.093	2.8	0
89	10.729	10.698	0.12	0.12	0.74	80	0.86	0.59	80	0.9	102	101	101	41.2	0	277	72	73	68	-0.092	2.8	0
90	10.850	10.818	0.12	0.12	0.74	80	0.85	0.59	80	0.9	102	101	101	41.1	-0.1	276	72	73	69	-0.093	2.7	0
91	10.971	10.939	0.12	0.12	0.74	80	0.85	0.59	80	0.9	102	101	102	41.1	0	277	72	73	70	-0.093	2.9	0
92	11.092	11.059	0.12	0.12	0.74	80	0.85	0.59	80	0.9	102	101	101	41.1	0	273	72	73	70	-0.091	2.6	0
93	11.212	11.179	0.12	0.12	0.73	80	0.86	0.59	80	0.9	102	101	101	41.0	-0.1	271	72	73	69	-0.093	2.7	0
94	11.334	11.299	0.12	0.12	0.73	81	0.86	0.59	80	0.9	102	102	101	41.0	0	272	72	73	69	-0.092	2.8	0
95	11.454	11.419	0.12	0.12	0.74	81	0.86	0.59	80	0.9	102	100	101	40.9	-0.1	275	72	73	68	-0.094	3	0
96	11.575	11.540	0.12	0.12	0.74	81	0.86	0.59	80	0.9	102	101	102	40.9	0	274	72	73	69	-0.092	2.8	0
97	11.696	11.660	0.12	0.12	0.73	81	0.85	0.58	80	0.9	102	101	101	40.8	-0.1	273	72	73	69	-0.092	2.7	0
98	11.817	11.780	0.12	0.12	0.74	81	0.86	0.58	80	0.9	103	101	101	40.8	0	275	72	73	69	-0.093	3.1	0
99	11.937	11.900	0.12	0.12	0.74	81	0.86	0.58	80	0.9	103	100	101	40.7	-0.1	276	72	73	69	-0.093	3.1	0
100	12.058	12.020	0.12	0.12	0.74	81	0.86	0.59	80	0.9	103	101	101	40.7	0	274	72	73	69	-0.091	2.8	0
101	12.179	12.141	0.12	0.12	0.74	81	0.86	0.58	80	0.9	103	101	102	40.7	0	273	72	73	69	-0.093	2.7	0
102	12.300	12.261	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	40.6	-0.1	275	72	73	69	-0.093	2.9	0
103	12.421	12.381	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	40.6	0	274	72	73	69	-0.093	2.8	0
104	12.542	12.501	0.12	0.12	0.73	81	0.86	0.59	80	0.9	102	101	101	40.6	0	270	72	73	69	-0.092	2.4	0
105	12.663	12.621	0.12	0.12	0.73	81	0.86	0.59	80	0.9	102	101	101	40.5	-0.1	267	72	73	69	-0.090	2.5	0
106	12.784	12.741	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	40.5	0	267	72	73	69	-0.092	2.6	0
107	12.905	12.861	0.12	0.12	0.74	81	0.85	0.59	80	0.9	102	101	101	40.4	-0.1	265	72	73	70	-0.090	2.3	0
108	13.026	12.982	0.12	0.12	0.74	81	0.85	0.59	81	0.9	102	101	102	40.4	0	265	72	73	69	-0.092	2.6	0
109	13.146	13.102	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	100	101	40.4	0	267	72	73	69	-0.091	2.7	0
110	13.266	13.222	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	100	101	40.3	-0.1	268	72	73	69	-0.091	2.8	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg.	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%)	Pro. Rate (10%)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
111	13.387	13.342	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	40.3	0	269	72	73	69	-0.091	2.8	0
112	13.508	13.462	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	40.2	-0.1	272	72	73	69	-0.092	3.1	0
113	13.629	13.582	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	40.2	0	271	72	73	69	-0.092	2.9	0
114	13.750	13.702	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	40.2	0	270	72	73	69	-0.091	2.7	0
115	13.871	13.823	0.12	0.12	0.73	81	0.86	0.58	81	0.9	102	101	102	40.1	-0.1	271	72	73	69	-0.091	2.9	0
116	13.993	13.943	0.12	0.12	0.73	81	0.86	0.58	81	0.9	103	102	101	40.1	0	272	72	73	69	-0.092	3	0
117	14.114	14.063	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	40.0	-0.1	267	72	73	69	-0.091	2.3	0
118	14.235	14.183	0.12	0.12	0.73	81	0.86	0.58	81	0.9	102	101	101	40.0	0	265	72	73	69	-0.090	2.6	0
119	14.356	14.303	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.9	-0.1	264	72	73	69	-0.091	2.5	0
120	14.476	14.423	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	100	101	39.9	0	266	72	73	69	-0.092	2.9	0
121	14.597	14.543	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.9	0	264	72	73	69	-0.091	2.3	0
122	14.718	14.663	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.8	-0.1	264	72	73	70	-0.090	2.6	0
123	14.839	14.783	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.8	0	265	72	73	70	-0.090	2.7	0
124	14.960	14.904	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	102	39.7	-0.1	264	72	73	70	-0.090	2.7	0
125	15.081	15.024	0.12	0.12	0.73	81	0.86	0.59	81	0.9	102	101	101	39.7	0	261	72	73	69	-0.090	2.3	0
126	15.202	15.144	0.12	0.12	0.74	81	0.85	0.58	81	0.9	102	101	101	39.7	0	261	71	73	69	-0.089	2.4	0
127	15.323	15.264	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.6	-0.1	262	72	73	70	-0.090	2.6	0
128	15.445	15.384	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	102	101	39.6	0	262	72	73	70	-0.090	2.7	0
129	15.565	15.504	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	100	101	39.6	0	262	72	73	70	-0.090	2.7	0
130	15.686	15.624	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.5	-0.1	265	72	73	70	-0.091	2.9	0
131	15.806	15.744	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	100	101	39.5	0	268	72	73	70	-0.091	3.2	0
132	15.927	15.864	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	39.4	-0.1	266	72	73	69	-0.091	2.5	0
133	16.048	15.984	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	39.4	0	265	72	73	70	-0.091	2.6	0
134	16.169	16.104	0.12	0.12	0.73	81	0.86	0.58	81	0.9	102	101	101	39.3	-0.1	262	72	73	70	-0.091	2.4	0
135	16.290	16.224	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.3	0	261	72	73	70	-0.089	2.6	0
136	16.412	16.344	0.12	0.12	0.73	81	0.86	0.58	81	0.9	102	102	101	39.2	-0.1	262	72	73	70	-0.091	2.6	0
137	16.533	16.464	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.2	0	266	72	73	70	-0.091	3	0
138	16.654	16.584	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	39.2	0	267	72	73	70	-0.090	2.9	0
139	16.775	16.704	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	39.1	-0.1	266	72	73	69	-0.091	2.7	0
140	16.895	16.824	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	100	101	39.1	0	267	72	73	70	-0.091	2.7	0
141	17.016	16.944	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	39.0	-0.1	267	72	73	70	-0.091	2.7	0
142	17.137	17.064	0.12	0.12	0.74	81	0.86	0.58	81	0.9	102	101	101	39.0	0	262	72	73	69	-0.090	2.4	0
143	17.258	17.184	0.12	0.12	0.74	81	0.86	0.58	81	0.9	103	101	101	39.0	0	264	72	73	69	-0.091	2.7	0
144	17.379	17.304	0.12	0.12	0.73	81	0.86	0.59	81	0.9	102	101	101	38.9	-0.1	262	72	73	69	-0.089	2.5	0
145	17.500	17.424	0.12	0.12	0.74	81	0.86	0.59	81	0.9	102	101	101	38.9	0	263	72	73	69	-0.090	2.7	0
146	17.621	17.544	0.12	0.12	0.73	81	0.86	0.59	81	0.9	102	101	101	38.9	0	267	72	73	70	-0.090	2.9	0
147	17.743	17.664	0.12	0.12	0.73	81	0.86	0.59	81	0.9	103	102	101	38.8	-0.1	269	72	73	70	-0.092	3	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
148	17.863	17.784	0.12	0.12	0.74	81	0.86	0.58	81	0.9	103	100	101	38.8	0	269	72	73	70	-0.090	2.7	0
149	17.985	17.904	0.12	0.12	0.73	81	0.86	0.58	81	0.9	103	102	101	38.7	-0.1	268	72	73	70	-0.091	2.6	0
150	18.105	18.023	0.12	0.12	0.74	81	0.87	0.58	81	0.9	103	100	100	38.7	0	265	72	73	70	-0.090	2.4	0
151	18.226	18.143	0.12	0.12	0.74	81	0.86	0.58	81	0.9	103	101	101	38.6	-0.1	263	72	73	69	-0.091	2.4	0
152	18.346	18.263	0.12	0.12	0.74	82	0.86	0.59	81	0.9	102	100	101	38.6	0	265	72	73	70	-0.090	2.7	0
153	18.467	18.383	0.12	0.12	0.74	82	0.86	0.59	81	0.9	102	101	101	38.6	0	264	72	73	70	-0.090	2.6	0
154	18.588	18.503	0.12	0.12	0.74	82	0.86	0.59	81	0.9	102	101	101	38.5	-0.1	261	72	73	70	-0.088	2.3	0
155	18.710	18.623	0.12	0.12	0.74	82	0.86	0.58	81	0.9	102	102	101	38.5	0	259	72	73	70	-0.089	2.4	0
156	18.830	18.743	0.12	0.12	0.73	82	0.86	0.58	81	0.9	102	100	101	38.4	-0.1	265	72	73	70	-0.091	3.1	0
157	18.952	18.863	0.12	0.12	0.73	82	0.86	0.58	81	0.9	103	102	101	38.4	0	265	72	73	70	-0.090	2.7	0
158	19.073	18.983	0.12	0.12	0.74	82	0.86	0.58	81	0.9	102	101	101	38.4	0	258	72	73	70	-0.089	2.1	0
159	19.194	19.102	0.12	0.12	0.74	82	0.86	0.58	81	0.9	102	101	100	38.3	-0.1	260	72	73	70	-0.088	2.6	0
160	19.315	19.222	0.12	0.12	0.73	82	0.86	0.58	81	0.9	102	101	101	38.3	0	262	72	73	71	-0.091	2.6	0
161	19.435	19.342	0.12	0.12	0.74	82	0.87	0.58	81	0.9	102	100	101	38.2	-0.1	266	72	73	70	-0.092	2.9	0
162	19.556	19.462	0.12	0.12	0.74	82	0.86	0.58	81	0.9	103	101	101	38.2	0	266	72	73	70	-0.090	2.8	0
163	19.677	19.582	0.12	0.12	0.74	82	0.86	0.59	81	0.9	103	101	101	38.2	0	262	72	74	70	-0.088	2.3	0
164	19.798	19.701	0.12	0.12	0.74	82	0.86	0.59	82	0.9	103	101	100	38.1	-0.1	262	72	74	71	-0.091	2.6	0
165	19.919	19.821	0.12	0.12	0.73	82	0.87	0.58	82	0.9	103	101	101	38.1	0	261	72	74	70	-0.088	2.4	0
166	20.040	19.941	0.12	0.12	0.74	82	0.87	0.58	82	0.9	102	101	101	38.0	-0.1	260	72	74	70	-0.090	2.3	0
167	20.161	20.061	0.12	0.12	0.73	82	0.87	0.58	82	0.9	102	101	101	38.0	0	263	72	74	71	-0.091	2.7	0
168	20.283	20.180	0.12	0.12	0.73	82	0.86	0.58	82	0.9	103	102	100	38.0	0	263	72	74	71	-0.090	2.6	0
169	20.403	20.300	0.12	0.12	0.74	82	0.87	0.58	82	0.9	103	100	101	37.9	-0.1	264	73	74	71	-0.091	2.8	0
170	20.525	20.420	0.12	0.12	0.74	82	0.87	0.58	82	0.9	103	102	101	37.9	0	265	73	74	71	-0.091	2.7	0
171	20.645	20.539	0.12	0.12	0.74	82	0.86	0.58	82	0.9	103	100	100	37.8	-0.1	264	73	74	71	-0.090	2.6	0
172	20.766	20.659	0.12	0.12	0.74	82	0.86	0.58	82	0.9	103	101	101	37.8	0	265	73	74	70	-0.091	2.6	0
173	20.886	20.779	0.12	0.12	0.73	82	0.86	0.58	82	0.9	103	100	101	37.7	-0.1	266	73	74	71	-0.091	2.7	0
174	21.007	20.898	0.12	0.12	0.73	82	0.87	0.58	82	0.9	103	101	100	37.7	0	264	73	74	71	-0.090	2.4	0
175	21.128	21.018	0.12	0.12	0.73	82	0.86	0.58	82	0.9	103	101	101	37.7	0	261	73	74	71	-0.088	2.3	0
176	21.250	21.137	0.12	0.12	0.73	82	0.87	0.58	82	0.9	103	102	100	37.6	-0.1	262	73	74	71	-0.090	2.6	0
177	21.370	21.257	0.12	0.12	0.74	82	0.86	0.58	82	0.9	103	100	101	37.6	0	264	73	74	71	-0.090	2.6	0
178	21.492	21.377	0.12	0.12	0.73	82	0.86	0.58	82	0.9	103	102	101	37.6	0	265	73	74	70	-0.090	2.9	0
179	21.613	21.497	0.12	0.12	0.74	82	0.87	0.59	82	0.9	103	101	101	37.5	-0.1	267	73	74	71	-0.091	2.9	0
180	21.734	21.619	0.12	0.12	0.73	82	0.86	0.59	82	1	103	101	103	37.5	0	267	73	74	71	-0.090	2.6	0
181	21.855	21.740	0.12	0.12	0.74	82	0.87	0.60	82	1	103	101	102	37.4	-0.1	262	73	74	71	-0.089	2.3	0
182	21.975	21.862	0.12	0.12	0.74	82	0.86	0.60	82	1	103	100	103	37.4	0	262	73	74	71	-0.089	2.6	0
183	22.096	21.983	0.12	0.12	0.74	82	0.86	0.59	82	1	103	101	102	37.3	-0.1	261	73	74	71	-0.089	2.4	0
184	22.217	22.104	0.12	0.12	0.74	82	0.86	0.60	82	1	103	101	102	37.3	0	261	73	74	71	-0.089	2.6	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg.	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%)	Pro. Rate (10%)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
185	22.338	22.224	0.12	0.12	0.74	82	0.86	0.58	82	0.9	103	101	101	37.3	0	264	73	74	71	-0.090	2.8	0
186	22.459	22.345	0.12	0.12	0.73	82	0.87	0.59	82	0.9	103	101	102	37.2	-0.1	262	73	74	71	-0.089	2.5	0
187	22.580	22.465	0.12	0.12	0.73	82	0.87	0.58	82	0.9	95	100	100	37.2	0	241	73	74	71	-0.088	2	0
188	22.701	22.585	0.12	0.12	0.73	82	0.87	0.59	82	0.9	91	100	100	37.1	-0.1	224	73	74	71	-0.085	2.1	0
189	22.823	22.705	0.12	0.12	0.73	82	0.86	0.59	82	0.9	88	101	100	37.1	0	212	73	74	71	-0.084	2	0
190	22.944	22.826	0.12	0.12	0.73	82	0.86	0.59	82	0.9	87	100	100	37.1	0	204	73	74	71	-0.083	2.2	0
191	23.065	22.946	0.12	0.12	0.73	83	0.87	0.59	82	0.9	86	99	99	37.0	-0.1	198	73	74	72	-0.082	2.1	0
192	23.185	23.066	0.12	0.12	0.74	83	0.86	0.59	82	0.9	85	99	99	37.0	0	194	73	74	71	-0.081	2.3	0
193	23.306	23.187	0.12	0.12	0.73	83	0.87	0.59	82	0.9	85	99	100	37.0	0	189	73	74	71	-0.081	2	0
194	23.427	23.307	0.12	0.12	0.73	83	0.86	0.59	82	0.9	84	99	99	37.0	0	186	73	74	71	-0.080	1.9	0
195	23.548	23.427	0.12	0.12	0.74	83	0.86	0.59	82	0.9	84	99	99	37.0	0	183	73	74	71	-0.079	1.9	0
196	23.669	23.547	0.12	0.12	0.73	83	0.86	0.59	82	0.9	84	99	99	37.0	0	181	73	74	71	-0.079	2.2	0
197	23.790	23.668	0.12	0.12	0.74	83	0.86	0.59	82	0.9	83	99	100	36.9	-0.1	179	73	74	71	-0.079	1.9	0
198	23.911	23.788	0.12	0.12	0.73	83	0.86	0.59	82	0.9	83	99	99	36.9	0	177	73	73	71	-0.078	2	0
199	24.033	23.908	0.12	0.12	0.74	83	0.86	0.59	82	0.9	83	100	99	36.9	0	176	73	73	71	-0.078	2	0
200	24.154	24.029	0.12	0.12	0.74	83	0.87	0.59	82	0.9	83	99	100	36.9	0	174	73	73	71	-0.078	1.9	0
201	24.275	24.149	0.12	0.12	0.73	83	0.86	0.59	82	0.9	82	99	99	36.9	0	172	73	73	71	-0.077	1.9	0
202	24.396	24.270	0.12	0.12	0.73	83	0.86	0.59	82	0.9	82	99	100	36.9	0	171	73	73	71	-0.077	1.9	0
203	24.516	24.390	0.12	0.12	0.73	83	0.86	0.59	82	0.9	82	98	99	36.8	-0.1	170	73	73	71	-0.077	1.8	0
204	24.638	24.510	0.12	0.12	0.74	83	0.86	0.59	82	0.9	82	100	99	36.8	0	169	73	73	71	-0.077	2	0
205	24.758	24.631	0.12	0.12	0.73	83	0.86	0.59	82	0.9	82	98	100	36.8	0	169	73	73	72	-0.077	2	0
206	24.880	24.751	0.12	0.12	0.74	83	0.86	0.59	82	0.9	82	100	99	36.8	0	168	73	73	72	-0.077	1.9	0
207	25.001	24.872	0.12	0.12	0.73	83	0.87	0.59	82	0.9	82	99	100	36.8	0	167	73	73	71	-0.076	1.9	0
208	25.122	24.992	0.12	0.12	0.73	83	0.87	0.59	82	0.9	82	99	99	36.8	0	166	73	73	71	-0.076	1.8	0
209	25.244	25.112	0.12	0.12	0.73	83	0.87	0.58	82	0.9	82	100	99	36.7	-0.1	166	73	73	71	-0.076	1.9	0
210	25.365	25.233	0.12	0.12	0.73	83	0.86	0.58	82	0.9	82	99	100	36.7	0	165	73	73	71	-0.076	1.8	0
211	25.486	25.353	0.12	0.12	0.74	83	0.86	0.59	82	0.9	82	99	99	36.7	0	164	73	73	71	-0.076	1.7	0
212	25.607	25.474	0.12	0.12	0.73	83	0.86	0.58	82	0.9	81	99	100	36.7	0	163	73	73	71	-0.076	1.7	0
213	25.727	25.594	0.12	0.12	0.73	83	0.86	0.58	83	0.9	81	98	99	36.7	0	163	73	73	71	-0.076	1.7	0
214	25.849	25.715	0.12	0.12	0.74	83	0.86	0.59	83	0.9	81	100	100	36.7	0	162	73	73	71	-0.076	1.8	0
215	25.969	25.835	0.12	0.12	0.73	83	0.86	0.59	83	0.9	81	98	99	36.7	0	162	72	72	71	-0.076	1.9	0
216	26.091	25.956	0.12	0.12	0.74	83	0.87	0.59	83	0.9	81	100	100	36.7	0	162	72	72	71	-0.076	1.8	0
217	26.212	26.076	0.12	0.12	0.73	83	0.86	0.58	83	0.9	80	99	99	36.6	-0.1	162	72	72	71	-0.076	2	0
218	26.334	26.196	0.12	0.12	0.74	83	0.86	0.58	83	0.9	81	100	99	36.6	0	162	72	72	71	-0.076	2	0
219	26.455	26.317	0.12	0.12	0.73	83	0.86	0.58	83	0.9	80	99	99	36.6	0	161	72	72	71	-0.075	1.9	0
220	26.577	26.438	0.12	0.12	0.74	83	0.87	0.58	83	0.9	80	100	99	36.6	0	161	72	72	71	-0.075	1.7	0
221	26.697	26.558	0.12	0.12	0.74	83	0.86	0.58	83	0.9	80	98	99	36.6	0	161	72	72	71	-0.076	1.7	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
222	26.818	26.679	0.12	0.12	0.74	83	0.86	0.58	83	0.9	80	99	99	36.5	-0.1	160	72	72	71	-0.076	1.8	0
223	26.939	26.800	0.12	0.12	0.74	83	0.87	0.59	83	0.9	80	99	99	36.6	0.1	161	72	72	71	-0.076	1.9	0
224	27.060	26.920	0.12	0.12	0.74	83	0.86	0.59	83	0.9	80	99	99	36.5	-0.1	160	72	72	71	-0.076	1.9	0
225	27.182	27.041	0.12	0.12	0.74	83	0.86	0.59	83	0.9	80	100	99	36.5	0	160	72	72	71	-0.075	1.8	0
226	27.303	27.161	0.12	0.12	0.74	83	0.86	0.59	83	0.9	80	99	99	36.5	0	160	72	72	71	-0.075	1.8	0
227	27.425	27.282	0.12	0.12	0.73	83	0.86	0.59	83	0.9	80	100	99	36.5	0	159	72	72	71	-0.075	1.6	0
228	27.546	27.403	0.12	0.12	0.73	83	0.86	0.59	83	0.9	80	99	99	36.5	0	158	72	72	71	-0.075	1.7	0
229	27.667	27.523	0.12	0.12	0.73	83	0.87	0.59	83	0.9	80	99	99	36.5	0	157	72	72	71	-0.075	1.5	0
230	27.789	27.644	0.12	0.12	0.73	83	0.87	0.58	83	0.9	80	100	99	36.5	0	158	72	72	71	-0.075	1.8	0
231	27.909	27.765	0.12	0.12	0.74	83	0.86	0.58	83	0.9	80	98	99	36.4	-0.1	157	72	72	71	-0.075	1.7	0
232	28.030	27.885	0.12	0.12	0.73	83	0.86	0.59	83	0.9	80	99	99	36.4	0	157	72	72	71	-0.075	1.7	0
233	28.151	28.006	0.12	0.12	0.74	83	0.87	0.59	83	0.9	80	99	99	36.4	0	156	72	72	71	-0.074	1.6	0
234	28.272	28.126	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	99	99	36.4	0	156	72	72	71	-0.074	1.7	0
235	28.394	28.246	0.12	0.12	0.74	83	0.86	0.59	83	0.9	80	100	99	36.4	0	156	72	72	71	-0.075	1.7	0
236	28.515	28.367	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	99	99	36.4	0	155	72	72	71	-0.074	1.7	0
237	28.637	28.487	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	100	99	36.4	0	155	72	72	71	-0.074	1.6	0
238	28.758	28.608	0.12	0.12	0.73	83	0.87	0.59	83	0.9	79	99	99	36.3	-0.1	154	72	72	71	-0.074	1.6	0
239	28.879	28.729	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	99	99	36.3	0	154	73	72	71	-0.074	1.6	0
240	29.000	28.850	0.12	0.12	0.74	83	0.86	0.59	83	0.9	79	99	99	36.3	0	153	73	72	71	-0.074	1.5	0
241	29.121	28.970	0.12	0.12	0.74	83	0.86	0.59	83	0.9	79	99	99	36.3	0	153	73	72	71	-0.074	1.5	0
242	29.242	29.091	0.12	0.12	0.74	83	0.87	0.59	83	0.9	79	99	99	36.3	0	153	73	72	71	-0.073	1.6	0
243	29.363	29.211	0.12	0.12	0.74	83	0.87	0.59	83	0.9	79	99	99	36.3	0	153	73	72	71	-0.074	1.7	0
244	29.485	29.332	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	100	99	36.3	0	153	73	72	72	-0.074	1.7	0
245	29.606	29.453	0.12	0.12	0.74	83	0.87	0.59	83	0.9	79	99	99	36.2	-0.1	152	73	72	72	-0.074	1.5	0
246	29.728	29.573	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	100	99	36.2	0	152	73	72	71	-0.074	1.5	0
247	29.849	29.694	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	99	99	36.2	0	152	73	72	71	-0.073	1.6	0
248	29.970	29.815	0.12	0.12	0.73	83	0.87	0.58	83	0.9	79	99	99	36.2	0	152	73	72	72	-0.073	1.5	0
249	30.091	29.935	0.12	0.12	0.73	83	0.87	0.59	83	0.9	79	99	99	36.2	0	151	73	72	71	-0.074	1.5	0
250	30.212	30.056	0.12	0.12	0.73	83	0.86	0.59	83	0.9	79	99	99	36.2	0	151	73	72	72	-0.074	1.7	0
251	30.333	30.176	0.12	0.12	0.73	83	0.87	0.59	83	0.9	79	99	99	36.1	-0.1	151	73	72	72	-0.073	1.7	0
252	30.454	30.297	0.12	0.12	0.73	83	0.87	0.58	83	0.9	79	99	99	36.1	0	151	73	72	72	-0.073	1.7	0
253	30.575	30.417	0.12	0.12	0.73	83	0.86	0.58	83	0.9	79	99	99	36.1	0	151	73	72	72	-0.074	1.6	0
254	30.697	30.538	0.12	0.12	0.73	84	0.87	0.58	83	1	79	99	99	36.1	0	151	73	72	71	-0.073	1.6	0
255	30.818	30.658	0.12	0.12	0.73	83	0.86	0.58	83	0.9	79	99	99	36.1	0	151	73	72	72	-0.073	1.7	0
256	30.940	30.779	0.12	0.12	0.73	84	0.87	0.58	83	0.9	79	99	99	36.1	0	151	73	72	72	-0.074	1.7	0
257	31.061	30.899	0.12	0.12	0.73	84	0.86	0.58	83	0.9	79	99	99	36.1	0	152	73	72	72	-0.074	1.8	0
258	31.182	31.019	0.12	0.12	0.73	84	0.86	0.58	83	1	79	99	99	36.1	0	152	73	72	72	-0.074	1.8	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
259	31.303	31.140	0.12	0.12	0.73	84	0.86	0.58	83	0.9	79	99	99	36.1	0	152	73	72	72	-0.074	1.8	0
260	31.424	31.260	0.12	0.12	0.73	84	0.86	0.59	83	1	79	99	99	36.0	-0.1	153	73	72	72	-0.074	1.9	0
261	31.545	31.380	0.12	0.12	0.73	84	0.86	0.58	83	1	80	99	99	36.0	0	153	73	72	72	-0.074	2	0
262	31.666	31.500	0.12	0.12	0.73	84	0.86	0.58	83	1	79	99	99	36.0	0	154	73	72	72	-0.074	2	0
263	31.787	31.620	0.12	0.12	0.73	84	0.86	0.58	83	1	79	99	99	36.0	0	155	73	72	72	-0.074	1.9	0
264	31.909	31.740	0.12	0.12	0.73	84	0.86	0.58	83	1	79	99	99	36.0	0	155	73	72	72	-0.074	2	0
265	32.030	31.859	0.12	0.12	0.73	84	0.87	0.57	83	1	80	99	98	36.0	0	156	73	72	72	-0.074	2.1	0
266	32.151	31.979	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	99	35.9	-0.1	156	73	72	72	-0.074	2.1	0
267	32.273	32.099	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	99	35.9	0	156	73	72	72	-0.075	2.1	0
268	32.394	32.218	0.12	0.12	0.73	84	0.87	0.57	83	1	80	99	98	35.9	0	157	73	72	72	-0.075	1.9	0
269	32.514	32.338	0.12	0.12	0.73	84	0.87	0.57	83	1	79	98	99	35.9	0	157	73	72	72	-0.075	2	0
270	32.635	32.457	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	98	35.9	0	158	73	72	72	-0.075	2.1	0
271	32.756	32.576	0.12	0.12	0.73	84	0.86	0.57	83	1	79	99	98	35.9	0	158	73	72	72	-0.075	2.2	0
272	32.878	32.696	0.12	0.12	0.73	84	0.86	0.57	83	1	79	99	99	35.8	-0.1	159	73	72	72	-0.075	2.2	0
273	32.999	32.815	0.12	0.12	0.73	84	0.87	0.58	83	1	79	99	98	35.8	0	159	73	72	72	-0.075	2.1	0
274	33.120	32.934	0.12	0.12	0.73	84	0.87	0.58	83	1	79	99	98	35.8	0	159	73	72	72	-0.076	2.1	0
275	33.242	33.053	0.12	0.12	0.73	84	0.86	0.58	83	1	79	99	98	35.8	0	159	73	72	72	-0.075	2.1	0
276	33.363	33.172	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	98	35.8	0	159	73	72	72	-0.075	2	0
277	33.485	33.291	0.12	0.12	0.74	84	0.87	0.57	83	1	79	99	98	35.8	0	160	73	72	72	-0.076	2	0
278	33.605	33.409	0.12	0.12	0.73	84	0.86	0.57	83	1	79	98	97	35.7	-0.1	160	73	72	72	-0.075	2.1	0
279	33.726	33.528	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	98	35.7	0	160	73	72	72	-0.076	2.1	0
280	33.847	33.647	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	98	35.7	0	160	73	72	72	-0.075	1.9	0
281	33.968	33.765	0.12	0.12	0.73	84	0.86	0.57	83	1	79	99	97	35.7	0	160	73	72	72	-0.075	2	0
282	34.090	33.883	0.12	0.12	0.74	84	0.87	0.57	83	1	79	99	97	35.7	0	160	73	72	72	-0.075	1.9	0
283	34.211	34.002	0.12	0.12	0.73	84	0.87	0.57	83	1	79	99	98	35.6	-0.1	160	73	72	72	-0.075	1.9	0
284	34.333	34.121	0.12	0.12	0.73	84	0.86	0.56	83	1	79	99	98	35.7	0.1	159	73	72	72	-0.076	1.9	0
285	34.454	34.239	0.12	0.12	0.73	84	0.87	0.56	83	1	79	99	97	35.6	-0.1	159	73	72	72	-0.075	1.9	0
286	34.575	34.358	0.12	0.12	0.73	84	0.86	0.56	83	1	79	99	98	35.6	0	160	73	72	72	-0.076	2	0
287	34.696	34.475	0.12	0.12	0.73	84	0.87	0.56	83	1	80	99	96	35.6	0	160	73	72	72	-0.075	2.1	0
288	34.817	34.594	0.12	0.12	0.73	84	0.87	0.56	83	1	80	99	98	35.6	0	160	73	72	72	-0.075	2	0
289	34.938	34.711	0.12	0.12	0.74	84	0.87	0.56	83	1	80	99	96	35.5	-0.1	160	73	72	72	-0.076	1.9	0
290	35.059	34.829	0.12	0.12	0.73	84	0.87	0.56	83	1	79	99	97	35.5	0	160	73	72	72	-0.075	1.9	0
291	35.181	34.947	0.12	0.12	0.73	84	0.87	0.56	83	1	79	99	97	35.5	0	159	74	72	72	-0.075	1.9	0
292	35.302	35.064	0.12	0.12	0.73	84	0.87	0.56	83	1	80	99	96	35.5	0	159	74	72	72	-0.075	1.8	0
293	35.423	35.182	0.12	0.12	0.73	84	0.87	0.56	83	1	80	99	97	35.5	0	158	74	72	72	-0.075	1.9	0
294	35.545	35.301	0.12	0.12	0.73	84	0.87	0.61	83	1.1	80	100	98	35.5	0	158	74	72	72	-0.076	1.9	0
295	35.666	35.423	0.12	0.12	0.73	84	0.87	0.60	83	1.1	80	99	100	35.5	0	158	74	72	73	-0.075	1.8	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
296	35.787	35.545	0.12	0.12	0.73	84	0.86	0.60	83	1.1	80	99	100	35.5	0	158	74	72	73	-0.075	1.9	0
297	35.908	35.667	0.12	0.12	0.73	84	0.87	0.60	83	1.1	80	99	100	35.5	0	157	74	72	72	-0.075	1.9	0
298	36.029	35.789	0.12	0.12	0.73	84	0.87	0.59	83	1.1	80	99	100	35.4	-0.1	157	74	72	72	-0.075	1.9	0
299	36.150	35.911	0.12	0.12	0.74	84	0.87	0.60	83	1.1	80	99	100	35.4	0	157	74	72	72	-0.075	1.8	0
300	36.271	36.033	0.12	0.12	0.73	84	0.86	0.59	83	1.1	80	99	100	35.4	0	157	74	73	73	-0.074	2	0
301	36.392	36.154	0.12	0.12	0.73	84	0.87	0.60	83	1.1	80	99	99	35.3	-0.1	158	74	73	72	-0.075	2.1	0
302	36.514	36.276	0.12	0.12	0.73	84	0.87	0.59	83	1.1	80	100	100	35.3	0	159	74	73	73	-0.075	2.3	0
303	36.635	36.397	0.12	0.12	0.73	84	0.86	0.58	83	1.2	80	99	99	35.3	0	159	74	73	73	-0.075	2.3	0
304	36.756	36.518	0.12	0.12	0.73	84	0.87	0.59	83	1.2	80	99	99	35.3	0	159	74	73	73	-0.076	2	0
305	36.878	36.638	0.12	0.12	0.73	84	0.87	0.58	83	1.2	80	100	99	35.3	0	159	74	73	73	-0.075	1.9	0
306	36.999	36.758	0.12	0.12	0.73	84	0.87	0.58	83	1.2	80	99	99	35.3	0	159	74	73	73	-0.075	2	0
307	37.119	36.878	0.12	0.12	0.73	85	0.86	0.58	83	1.2	80	98	99	35.3	0	159	74	73	73	-0.075	2.1	0
308	37.240	36.998	0.12	0.12	0.74	85	0.87	0.58	83	1.2	80	99	99	35.3	0	159	74	73	73	-0.075	2.2	0
309	37.361	37.118	0.12	0.12	0.74	85	0.87	0.58	83	1.2	80	99	99	35.2	-0.1	160	74	73	73	-0.075	2	0
310	37.483	37.237	0.12	0.12	0.73	85	0.86	0.57	83	1.2	80	99	98	35.2	0	159	74	73	73	-0.075	2	0
311	37.604	37.356	0.12	0.12	0.73	85	0.87	0.57	83	1.2	80	99	98	35.2	0	160	74	73	73	-0.075	2.1	0
312	37.726	37.477	0.12	0.12	0.73	85	0.87	0.59	83	1.3	80	99	99	35.2	0	160	74	73	73	-0.075	2	0
313	37.847	37.598	0.12	0.12	0.73	85	0.87	0.59	84	1.3	80	99	99	35.1	-0.1	160	74	73	73	-0.075	2	0
314	37.968	37.718	0.12	0.12	0.73	85	0.87	0.59	84	1.3	80	99	98	35.1	0	160	74	73	73	-0.075	2.1	0
315	38.089	37.839	0.12	0.12	0.73	85	0.86	0.58	84	1.3	80	99	99	35.1	0	160	74	73	73	-0.074	2	0
316	38.210	37.959	0.12	0.12	0.73	85	0.87	0.58	84	1.3	80	99	98	35.1	0	160	74	73	73	-0.075	2	0
317	38.331	38.078	0.12	0.12	0.73	85	0.87	0.57	84	1.3	80	99	98	35.1	0	160	74	73	73	-0.075	2.2	0
318	38.452	38.197	0.12	0.12	0.73	85	0.87	0.57	84	1.3	80	99	98	35.1	0	160	74	73	73	-0.075	2.1	0
319	38.573	38.316	0.12	0.12	0.73	85	0.87	0.56	84	1.3	80	99	98	35.1	0	160	74	73	73	-0.075	1.9	0
320	38.694	38.435	0.12	0.12	0.73	85	0.87	0.57	84	1.3	80	99	98	35.0	-0.1	160	74	73	73	-0.075	1.8	0
321	38.815	38.554	0.12	0.12	0.72	85	0.87	0.58	84	1.4	80	99	98	35.1	0.1	159	74	73	73	-0.075	1.8	0
322	38.937	38.674	0.12	0.12	0.73	85	0.87	0.58	84	1.4	80	99	98	35.0	-0.1	159	74	73	73	-0.075	1.8	0
323	39.058	38.794	0.12	0.12	0.73	85	0.87	0.58	84	1.4	80	99	98	35.0	0	159	74	73	73	-0.075	1.8	0
324	39.179	38.914	0.12	0.12	0.73	85	0.88	0.58	84	1.4	80	99	98	35.0	0	160	74	73	73	-0.076	2.1	0
325	39.300	39.033	0.12	0.12	0.73	85	0.87	0.57	84	1.4	80	99	98	35.0	0	160	74	73	73	-0.075	2	0
326	39.421	39.153	0.12	0.12	0.73	85	0.87	0.58	84	1.4	80	99	98	35.0	0	160	74	73	73	-0.076	2	0
327	39.542	39.273	0.12	0.12	0.73	85	0.88	0.59	84	1.4	80	99	98	35.0	0	161	74	73	73	-0.076	2.1	0
328	39.663	39.394	0.12	0.12	0.73	85	0.87	0.59	84	1.4	80	99	99	34.9	-0.1	161	74	73	73	-0.075	1.9	0
329	39.784	39.515	0.12	0.12	0.73	85	0.88	0.58	84	1.4	80	99	99	34.9	0	160	74	73	73	-0.075	1.8	0
330	39.905	39.635	0.12	0.12	0.73	85	0.87	0.59	84	1.4	80	99	98	34.9	0	160	74	73	73	-0.076	1.9	0
331	40.026	39.756	0.12	0.12	0.73	85	0.88	0.58	84	1.4	80	99	99	34.9	0	160	74	73	73	-0.075	1.9	0
332	40.148	39.876	0.12	0.12	0.73	85	0.87	0.59	84	1.4	80	99	98	34.8	-0.1	161	74	73	74	-0.075	1.9	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman
Model: Advance
Tracking No.: 2066
Project No.: 1035PS034E
Test Date: 07-May-15
Beginning Clock Time: 09:39
Meter Box Y Factor: 1.004 (1) 1.007 (2) 1.009 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.20	30.12	30.05	30.12 "Hg

High Burn End Time: 60
Medium Burn End Time: 185
Total Sampling Time: 370 min
Recording Interval: 1 min
Background Sample Volume: 64.97 cubic feet

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.600 "H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Tunnel Velocity: 14.44 ft/sec.
Intial Tunnel Flow: 155.9 scfm
Average Tunnel Flow: 159.7 scfm
Post-Test Leak Check (1):).000@3.8 cfm@"Hg
Post-Test Leak Check (2):).000@5.6 cfm@"Hg
Fuel Moisture (dry basis %): 5.05

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
333	40.269	39.996	0.12	0.12	0.73	85	0.88	0.58	84	1.4	80	99	98	34.9	0.1	161	74	73	74	-0.075	2	0
334	40.390	40.116	0.12	0.12	0.73	85	0.87	0.58	84	1.4	80	99	98	34.8	-0.1	162	74	73	73	-0.075	2.1	0
335	40.511	40.236	0.12	0.12	0.73	85	0.88	0.58	84	1.4	80	99	98	34.8	0	162	74	73	74	-0.076	2.2	0
336	40.632	40.356	0.12	0.12	0.73	85	0.87	0.58	84	1.4	80	99	98	34.8	0	163	74	73	73	-0.076	2.3	0
337	40.753	40.475	0.12	0.12	0.73	85	0.88	0.57	84	1.4	80	99	98	34.7	-0.1	163	74	73	73	-0.076	2.1	0
338	40.874	40.594	0.12	0.12	0.73	85	0.87	0.57	84	1.4	81	99	98	34.8	0.1	163	74	73	73	-0.076	2.4	0
339	40.995	40.715	0.12	0.12	0.73	85	0.87	0.60	84	1.5	81	99	99	34.7	-0.1	164	74	73	74	-0.076	2.3	0
340	41.116	40.836	0.12	0.12	0.73	85	0.87	0.59	84	1.5	81	99	99	34.8	0.1	164	74	73	74	-0.076	2.4	0
341	41.238	40.957	0.12	0.12	0.73	85	0.88	0.59	84	1.5	81	99	99	34.7	-0.1	165	74	73	73	-0.076	2.3	0
342	41.359	41.078	0.12	0.12	0.73	85	0.87	0.59	84	1.5	81	99	99	34.7	0	164	74	73	73	-0.076	2	0
343	41.480	41.198	0.12	0.12	0.73	86	0.88	0.58	84	1.5	81	98	99	34.7	0	165	74	73	73	-0.076	2.2	0
344	41.602	41.319	0.12	0.12	0.72	85	0.88	0.59	84	1.5	81	99	99	34.7	0	165	74	73	74	-0.076	2.2	0
345	41.722	41.439	0.12	0.12	0.73	86	0.88	0.59	84	1.5	81	98	99	34.6	-0.1	165	75	73	73	-0.076	2.2	0
346	41.843	41.560	0.12	0.12	0.73	86	0.88	0.58	85	1.5	81	98	99	34.6	0	164	75	73	74	-0.076	1.9	0
347	41.964	41.679	0.12	0.12	0.73	86	0.88	0.58	84	1.5	81	98	98	34.6	0	164	74	73	74	-0.075	1.9	0
348	42.085	41.799	0.12	0.12	0.73	86	0.87	0.57	84	1.5	81	98	99	34.6	0	163	75	73	74	-0.076	1.9	0
349	42.207	41.918	0.12	0.12	0.73	86	0.87	0.57	84	1.6	81	99	98	34.6	0	163	74	73	74	-0.076	2	0
350	42.328	42.037	0.12	0.12	0.73	86	0.88	0.57	85	1.5	81	98	98	34.5	-0.1	163	75	73	74	-0.076	1.9	0
351	42.450	42.157	0.12	0.12	0.73	86	0.87	0.56	85	1.5	81	99	98	34.5	0	162	74	73	73	-0.076	1.9	0
352	42.571	42.276	0.12	0.12	0.73	86	0.87	0.58	85	1.6	81	98	98	34.5	0	162	74	73	74	-0.075	1.8	0
353	42.692	42.397	0.12	0.12	0.73	86	0.88	0.58	85	1.6	81	98	99	34.5	0	163	74	73	74	-0.076	2	0
354	42.813	42.517	0.12	0.12	0.73	86	0.87	0.59	85	1.6	81	98	98	34.5	0	162	75	73	74	-0.075	1.9	0
355	42.934	42.638	0.12	0.12	0.73	86	0.88	0.58	85	1.6	81	98	99	34.5	0	162	75	73	74	-0.076	1.9	0
356	43.055	42.758	0.12	0.12	0.73	86	0.87	0.58	85	1.6	81	98	98	34.4	-0.1	161	75	74	74	-0.075	1.8	0
357	43.176	42.879	0.12	0.12	0.73	86	0.88	0.58	85	1.6	81	98	99	34.4	0	161	75	73	74	-0.075	1.8	0
358	43.298	42.999	0.12	0.12	0.73	86	0.87	0.58	85	1.6	81	99	98	34.4	0	161	75	74	74	-0.075	2	0
359	43.419	43.118	0.12	0.12	0.73	86	0.87	0.57	85	1.6	81	98	98	34.4	0	161	75	74	74	-0.075	2	0
360	43.541	43.237	0.12	0.12	0.73	86	0.87	0.57	85	1.6	80	99	97	34.4	0	161	75	74	74	-0.075	1.9	0
361	43.662	43.357	0.12	0.12	0.73	86	0.87	0.59	85	1.7	81	98	98	34.3	-0.1	161	75	74	74	-0.075	2.1	0
362	43.784	43.478	0.12	0.12	0.73	86	0.87	0.59	85	1.7	81	99	99	34.4	0.1	162	75	74	74	-0.075	2	0
363	43.905	43.599	0.12	0.12	0.73	86	0.88	0.59	85	1.7	81	98	99	34.3	-0.1	162	75	74	74	-0.075	2.1	0
364	44.025	43.720	0.12	0.12	0.73	86	0.87	0.59	85	1.7	80	98	99	34.3	0	162	75	74	74	-0.076	2.2	0
365	44.147	43.840	0.12	0.12	0.73	86	0.87	0.59	85	1.7	81	99	98	34.3	0	162	75	74	74	-0.076	2.1	0
366	44.268	43.961	0.12	0.12	0.73	86	0.87	0.59	85	1.7	80	98	99	34.3	0	162	75	74	74	-0.075	1.9	0
367	44.389	44.082	0.12	0.12	0.73	86	0.87	0.58	85	1.7	80	98	99	34.3	0	162	75	74	74	-0.076	2	0
368	44.510	44.203	0.12	0.12	0.73	86	0.87	0.59	85	1.7	81	98	99	34.3	0	162	75	74	74	-0.076	2.1	0
369	44.632	44.324	0.12	0.12	0.72	86	0.87	0.59	85	1.7	81	99	99	34.2	-0.1	163	75	74	74	-0.076	2.2	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer:	Harman	High Burn End Time:	60	PM Control Module:	335/336
Model:	Advance	Medium Burn End Time:	185	Dilution Tunnel MW(dry):	29.00 lb/lb-mole
Tracking No.:	2066	Total Sampling Time:	370 min	Dilution Tunnel MW(wet):	28.78 lb/lb-mole
Project No.:	1035PS034E	Recording Interval	1 min	Dilution Tunnel H2O:	2.00 percent
Test Date:	07-May-15			Dilution Tunnel Static:	-0.600 "H2O
Beginning Clock Time:	09:39	Background Sample Volume:	64.97 cubic feet	Tunnel Area:	0.1963 ft2
Meter Box Y Factor:	1.004 (1)	1.007 (2)	1.009 (Amb)	Pitot Tube Cp:	0.99

Barometric Pressure:	Begin	Middle	End	Average
	30.20	30.12	30.05	30.12 "Hg

Tunnel Velocity:	14.44	ft/sec.
Intial Tunnel Flow:	155.9	scfm
Average Tunnel Flow:	159.7	scfm
Post-Test Leak Check (1):	).000@3.8	cfm@"Hg
Post-Test Leak Check (2):	).000@5.6	cfm@"Hg
Fuel Moisture (dry basis %):	5.05	

OMNI Equipment Numbers: 335, 336, 185, 209, 23, 131, 343, 128, 132, 417, 419

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.042	0.054	0.052	0.040	0.036	0.058	0.052	0.030	"H2O
Temp:	115	115	115	115	115	115	115	115	oF

	Particulate Sampling Data													Fuel Weight, lb		Temperature Data			Stack Data			
Elapsed Time	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Meter oF (1)	Meter Vac. In. Hg. (1)	Orifice dH (2)	Meter oF (2)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Stack	Filter (1)	Filter (2)	Ambient	Draft In. H2O	CO_2 (%)	CO (%)
370	44.753	44.444	0.12	0.12	0.73	86	0.87	0.59	85	1.7	80	98	98	34.2	0	162	75	74	74	-0.076	1.9	0
Avg/Tot	44.753	44.444	0.12	0.12	0.74	81.52		0.59	81.12		94.06	100.37	100.37				72.51	72.85		-0.087		

OMNI-Test Laboratories, Inc. **ASTM E2779 Pellet Heater Run Sheets**

Client: Harman Home Heating Project Number: 0135PS034E Run Number: 1

Model: Advance Tracking Number: 2066 Date: 5/7/15

Test Crew: JC

OMNI Equipment ID numbers: 185, 335, 336, 420, 132, 410

Pellet Heater Run Notes

Air Control Settings

High Burn Rate Target: 100%

Settings: Temperature = 7.00 (450°F); Feed = 5.32 (55.0 sec)
Low draft = -00 V
Constant Burn High

Medium Burn Rate Target: 450%

Settings: Temperature = 2.28 (320°F); Feed = 1.92 (25.0 sec)
Low draft = -00 V
Constant Burn High

Low Burn Rate Target: Minimum

Settings: Temperature = 1.00 (285°F); Feed = 0.18 (10.0 sec)
Low draft = -37 V
Constant Burn High

Additional Settings Notes:
High burn segment = 0-60 min ET
Med burn segment = 61~~65~~ sec - 185 min ET
Min burn segment = ~~190~~ 186 sec - 370 min ET

Preburn Notes

Time	Notes
	N/A

Test Notes

Time	Notes
60 min ET	1-hour filter change; B749 swapped into Train A, front

Pellet Moisture Content: 5.05% lb

Background Filter Volume: 64.970 ft³

Technician Signature: _____ Date: 5/7/15

OMNI-Test Laboratories, Inc. **ASTM E2779 Pellet Heater Run Sheets**

Client: Harman Home Heating Project Number: 0135PS034E Run Number: 1

Model: Advance Tracking Number: 2066 Date: 5/7/15

Test Crew: SL

OMNI Equipment ID numbers: 132, 185, 335, 336, 410, 420

Pellet Heater Supplemental Data

Start Time: 9:39 Booth #: E1

Stop Time: 15:49

Stack Gas Leak Check:

Initial: 0 Final: 0

Sample Train Leak Check:

A: 0.000 @ 3.8 "Hg

B: 0.000 @ 5.6 "Hg

Calibrations: Span Gas CO_2: 16.78 CO: 4.244

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	9:10	9:13	15:54	15:57
CO_2	0.00	16.78	0.09	16.81
CO	0.000	4.244	-0.016	4.205

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: 0 Final: 0

Stack Diameter (in): 3

Induced Draft: 0

% Smoke Capture: 100 %

Flue Pipe Cleaned Prior to First Test in Series:

Date: 5/5/15 Initials: SL

	Initial	Middle	Ending
P_b (in/Hg)	30.20	30.12	30.05
Ambient (°F)	68	71	74

Tunnel Traverse	
dP (in H_2O)	T(°F)
0.042	115
0.054	↓
0.052	↓
0.040	↓
0.036	↓
0.058	↓
0.052	↓
0.030	↓
N/A	N/A
↓	↓
↓	↓
↓	↓
Static P:	-0.60

Technician Signature: [signature] Date: 5/7/15

OMNI-Test Laboratories, Inc.

Manufacturer:	Harman
Model:	Advance
Date:	05/07/15
Run:	1
Control #:	2066
Test Duration:	370
Output Category:	Integrated

Technicians: J. Clark

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	67.4%	73.0%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	68%	73.3%

Output Rate (kJ/h)	12,030	11,412	**(Btu/h)**
Burn Rate (kg/h)	0.96	2.11	**(lb/h)**
Input (kJ/h)	17,855	16,938	**(Btu/h)**

Test Load Weight (dry kg)	5.92	13.04	**dry lb**
MC wet (%)	4.81		
MC dry (%)	5.05		
Particulate (g)	0		
CO (g)	53		
Test Duration (h)	6.17		

Emissions	Particulate	CO
g/MJ Output	0.00	0.71
g/kg Dry Fuel	0.00	8.89
g/h	0.00	8.54
lb/MM Btu Output	0.00	1.65

Air/Fuel Ratio (A/F)	33.00

VERSION: **2.3** **3/23/2010**

OMNI-Test Laboratories, Inc.

Manufacturer:	Harman	**Technicians:**	J. Clark
Model:	Advance		
Date:	05/07/15		
Run:	1		
Control #:	2066		
Test Duration:	184		
Output Category:	Minimum		

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	72.6%	78.6%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	79.0%

Output Rate (kJ/h)	5,705	5,411	**(Btu/h)**
Burn Rate (kg/h)	0.42	0.93	**(lb/h)**
Input (kJ/h)	7,862	7,458	**(Btu/h)**

Test Load Weight (dry kg)	1.30	2.86	**dry lb**
MC wet (%)	4.81		
MC dry (%)	5.05		
Particulate (g)	0		
CO (g)	0		
Test Duration (h)	3.07		

Emissions	**Particulate**	**CO**
g/MJ Output	0.00	0.00
g/kg Dry Fuel	0.00	0.00
g/h	0.00	0.00
lb/MM Btu Output	0.00	0.00

Air/Fuel Ratio (A/F)	44.80

VERSION: **2.3** **3/23/2010**

OMNI-Test Laboratories, Inc.

Manufacturer:	Harman	**Technicians:**	J. Clark
Model:	Accentra-2		
Date:	05/12/15		
Run:	1		
Control #:	2067		
Test Duration:	120		
Output Category:	Medium		

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	64.2%	69.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	64%	69.8%

Output Rate (kJ/h)	9,540	9,050	**(Btu/h)**
Burn Rate (kg/h)	0.80	1.76	**(lb/h)**
Input (kJ/h)	14,868	14,104	**(Btu/h)**

Test Load Weight (dry kg)	1.60	3.52	**dry lb**
MC wet (%)	4.81		
MC dry (%)	5.05		
Particulate (g)	0		
CO (g)	1		
Test Duration (h)	2.00		

Emissions	**Particulate**	**CO**
g/MJ Output	0.00	0.07
g/kg Dry Fuel	0.00	0.80
g/h	0.00	0.64
lb/MM Btu Output	0.00	0.16

Air/Fuel Ratio (A/F)	35.86

VERSION: **2.3** **3/23/2010**

OMNI-Test Laboratories, Inc.

Manufacturer:	Harman	**Technicians:**	J. Clark
Model:	Accentra-2		
Date:	05/12/15		
Run:	1		
Control #:	2067		
Test Duration:	61		
Output Category:	Maximum		

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	73.1%	79.1%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	79.5%

Output Rate (kJ/h)	26,576	25,210	**(Btu/h)**
Burn Rate (kg/h)	1.95	4.31	**(lb/h)**
Input (kJ/h)	36,364	34,495	**(Btu/h)**

Test Load Weight (dry kg)	1.99	4.38	**dry lb**
MC wet (%)	4.81		
MC dry (%)	5.05		
Particulate (g)	0		
CO (g)	26		
Test Duration (h)	1.02		

Emissions	**Particulate**	**CO**
g/MJ Output	0.00	0.94
g/kg Dry Fuel	0.00	12.84
g/h	0.00	25.09
lb/MM Btu Output	0.00	2.19

Air/Fuel Ratio (A/F)	16.15

VERSION: **2.3** **3/23/2010**