

FRICITION EQUIVALENTS OF TAKE-OFFS
IN RECTANGULAR DUCT

By

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A THESIS

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INTRODUCTION

It is now generally accepted by those who realize the friction effect of metal duct work toward air flow that any change imparted to the air stream will in some way disturb the flow characteristics of the stream. In order to determine some of these disturbances this project was undertaken under the auspices of the American Society of Heating and Ventilating Engineers to determine the friction effect of take-offs in an air delivery system.

This paper involves a small portion of take-offs to be tested. Though not representative of any particular installed system, the subsequent data offers considerable information on friction effect and air separation. It is not within the scope of these tests to go into the mechanics of flow, but the paper shall endeavor to establish a method for determining optimum conditions for design and installation.

EQUIPMENT

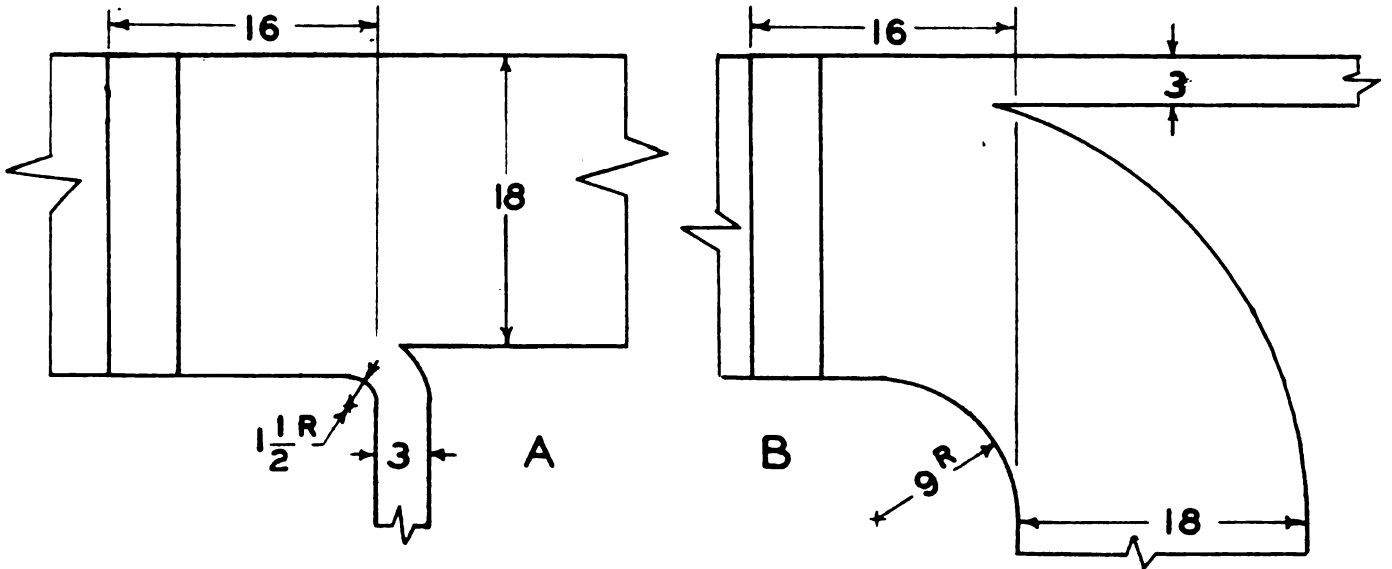
The assembled equipment, a sketch of which is illustrated in Fig. 1 is located in the balcony of the Power Laboratory, Olds Hall of Engineering. It is intact for further testing of the remaining fittings presented in Fig. 2. This equipment consists of a Clarage blower type W 2 belt driven by a 9.5 horsepower 440 volt motor. Air discharged by the blower is forced through a straightener grid prior to its passage to the measuring nozzle. The nozzle, a 6 inch A. S. M. E. standard long radius nozzle is equipped with a static tap and pitot tube as outlined in the A. S. M. E. Power Test Codes, 1940 Chapter 4. It allows measurements with sufficient accuracy. Manometers employed for measuring the velocity pressure at this nozzle range from 8 inches to $\frac{1}{2}$ inch and are shown in Fig. 8. With the above arrangement this system is capable of delivering up to 1800 cubic feet of air per minute.

To be certain that the measured air is passing through the orifice plate located in the reduced straight and take-off, all seams and joints in the duct have been solder sealed. With the system closed off, i. e. inserting blanks in the reduced straight and take-off,

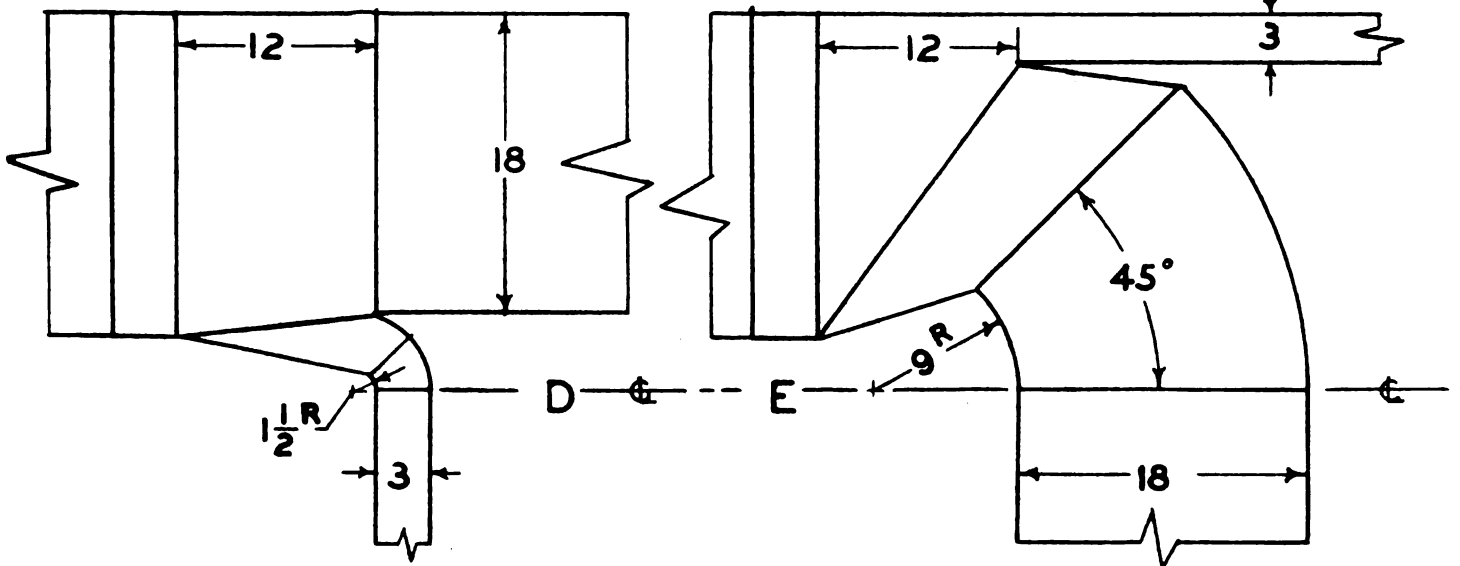
the measured velocity pressure at the nozzle is .002 inches of H₂O.

In conjunction with the assembled equipment orifice plates have been cut from 20 gauge galvanized sheet metal to approximately 25, 50, 75 and 100 feet of equivalent round duct corresponding to the rectangular duct into which these orifice plates are inserted.

16" STRAIGHT SECTION WITH



16" DECREASER SECTION WITH



16" INCREASER SECTION WITH

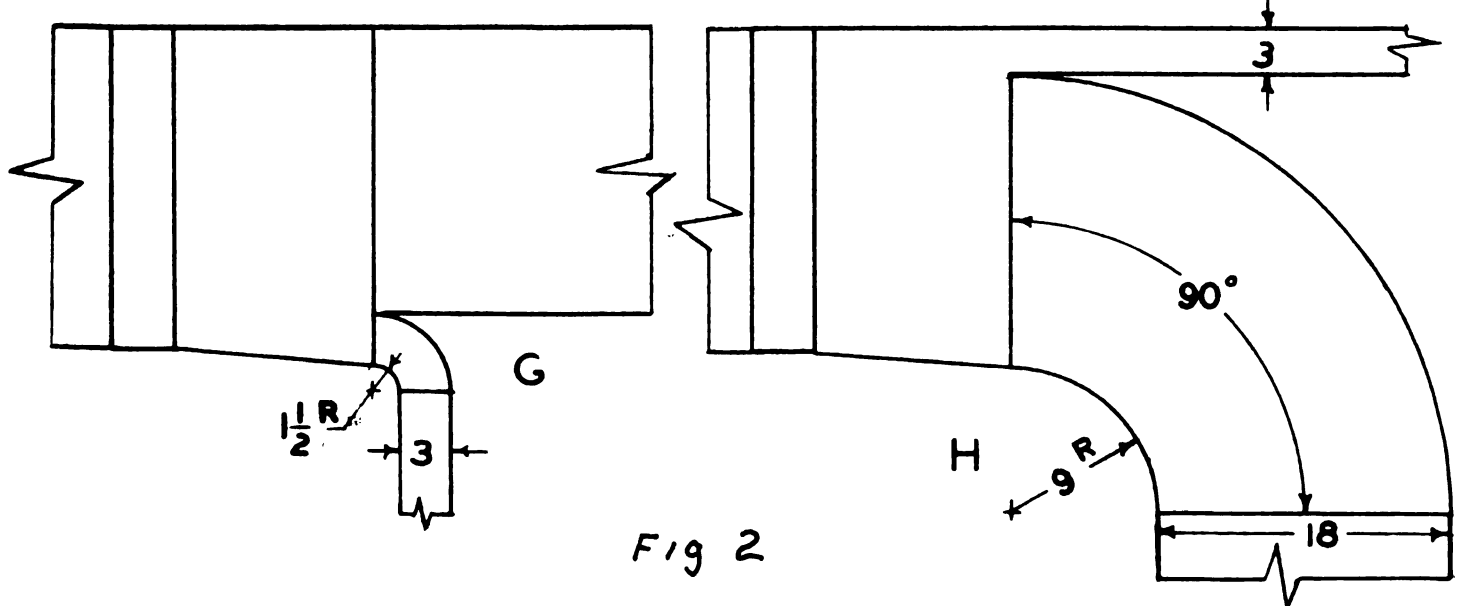


Fig 2

ORIFICE PLATE ARRANGEMENT

In the take-off and reduced straight, at some position slightly in excess of 10 diameters from the increaser type fitting, tracks have been installed. These tracks make a very convenient method of exchanging orifice plates to vary the resistance of either straight or take-off. The duct into which these tracks are inserted is itself slotted on one side. Orifice plates inserted into duct slots are guided in testing position by the aforementioned tracks.

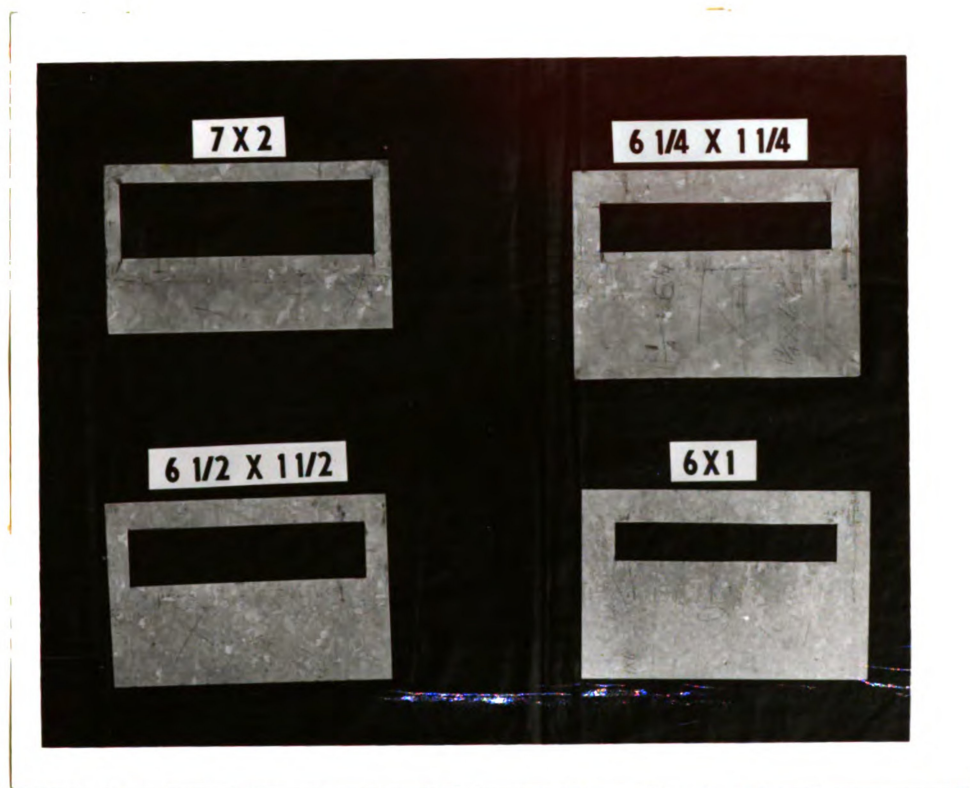


Fig. 3

Orifice plates for insertion into 3" X 8" Duct.

7" X 2"	= 29'	of 5.2" round
6 1/2" X 1 1/2"	= 78'	of 5.2" round
6 1/4" X 1 1/4"	= 136'	of 5.2" round
6" X 1"	= 266'	of 5.2" round



Fig. 4

Orifice plates for insertion into 18" X 8" Duct.

16 $\frac{1}{2}$ " X 6 $\frac{1}{2}$ " = 33' of 13" round

16" X 6" = 51' of 13" round

15 $\frac{1}{2}$ " X 5 $\frac{1}{2}$ " = 82' of 13" round



Fig. 5

Orifice plates for insertion into 18" X 8" Duct.

15" X 5" = 146' of 13" round

14" X 4" = 365' of 13" round

MEASURING STATIONS

There are two measuring stations for the system. Station 1 being employed to measure the air delivery to the system and Station 2 employed to measure the static pressures created as a result of the orifice plate insertions. These measuring stations are shown in figures 8 and 9 respectively. The air delivery measuring station, designated as Station 1 has already been discussed under section titled Equipment. It accommodates the P_3 and P_2 readings. P_3 refers to the total pressure or impact pressure measured with a pitot tube while P_2 refers to static pressure in the nozzle at the plane of the pitot tube.

The static taps P_4 , P_5 and P_6 which are included in measuring station 2 are located in the main, reduced straight and take-off respectively. Position of P_4 is directly before the increaser type fitting, P_5 and P_6 are located at approximately 10 equivalent diameters of their respective ducts and on the up stream side of the orifice plates. Manometers ranging from 3 inches to $\frac{1}{2}$ inch are adequate for static pressure measurements at this station.

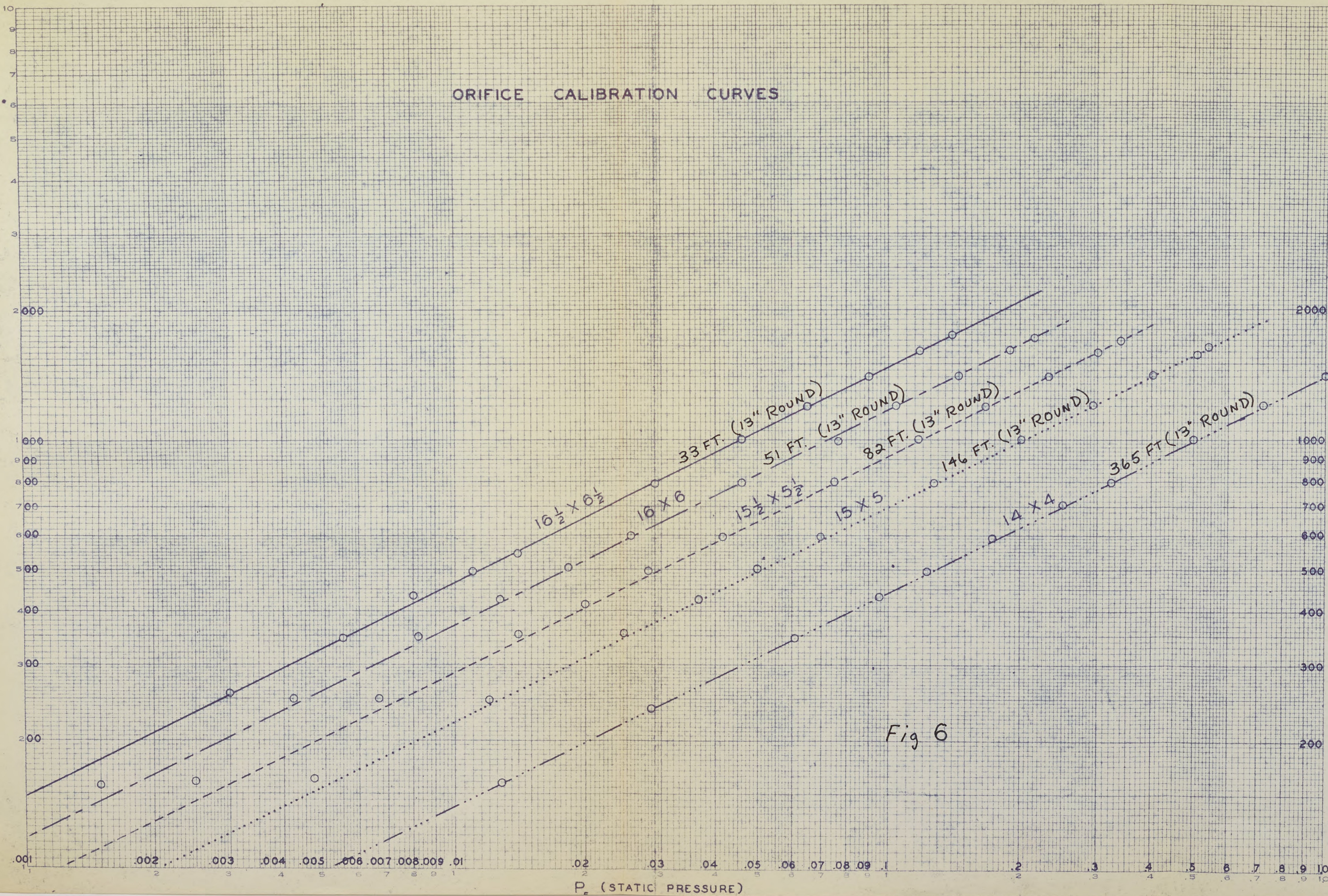
ORIFICE PLATE CALIBRATIONS

In order to determine the air distribution of the system, it was first necessary to calibrate the orifice plates. These orifice plates of which there are nine are shown in Figs. 3, 4 and 5. Each orifice is identified according to size and approximate equivalent length of appropriate round.

Calibrations were made against the 6 inch standard nozzle and appear graphically in Figs. 6 and 7. The calibration is accomplished by allowing the measured air to pass through one orifice plate and measuring the static pressure in this line. This measurement requires that either the reduced straight or take-off be sealed during the calibration run.

It was necessary to make calibration runs in duplicate since the system was reversed, i. e. (1) 18" X 8" reduced straight and 3" X 8" take off and (2) 3" X 8" reduced straight and 18" X 8" take off. It is interesting to note that one set of calibration curves serves both system set-ups since these curves fall within the limits of experimental error.

ORIFICE CALIBRATION CURVES



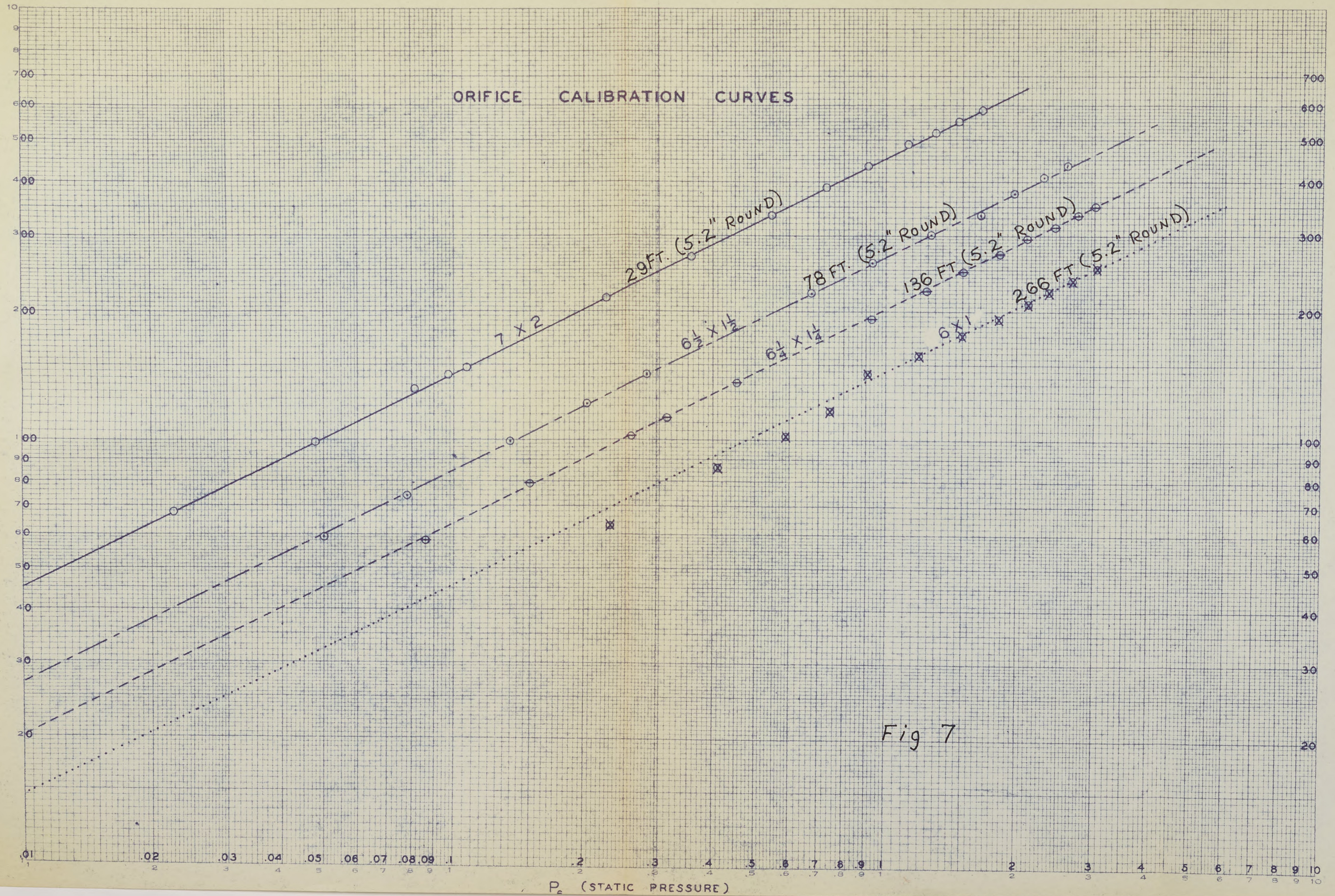


Fig 7

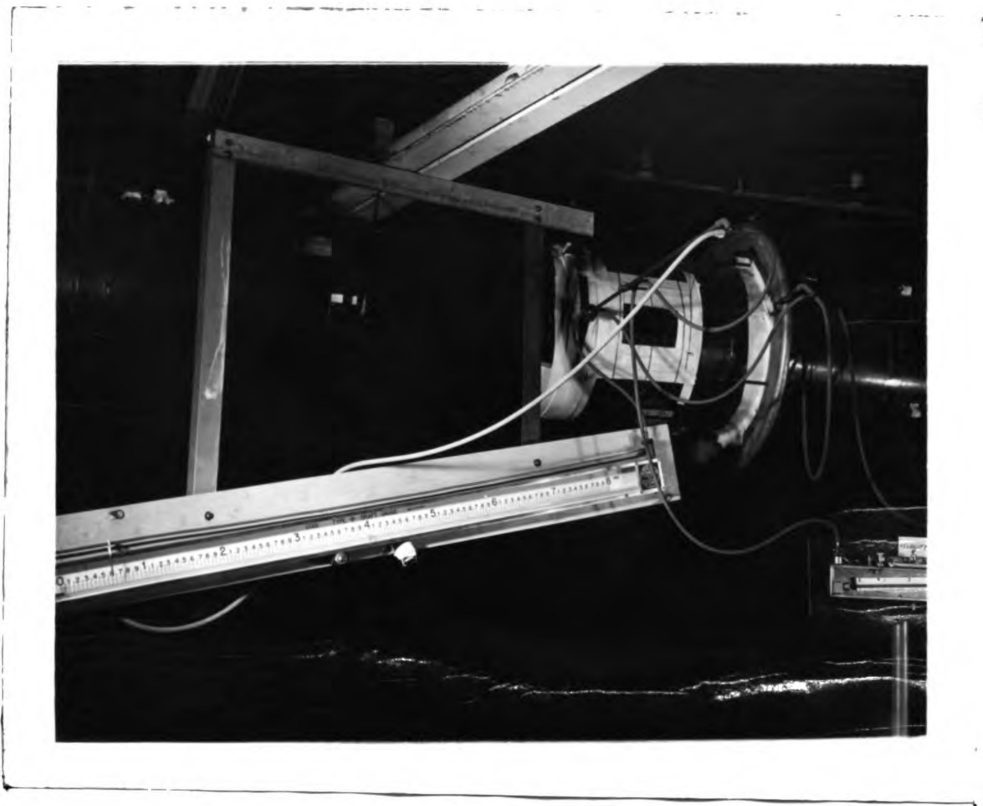


Fig. 8

Photograph of measuring station 1 showing 8 and $\frac{1}{2}$ inch manometers. The array of rubber tubing shown is connected to the pitot tube (long projection from duct) and static tap (short projection from duct) of the standard nozzle. The flange of the nozzle is visible as a ring around the duct in right center of photograph. Station accommodates $P_3 - P_2$ measurement (velocity pressure) to determine volume of air delivered to system.

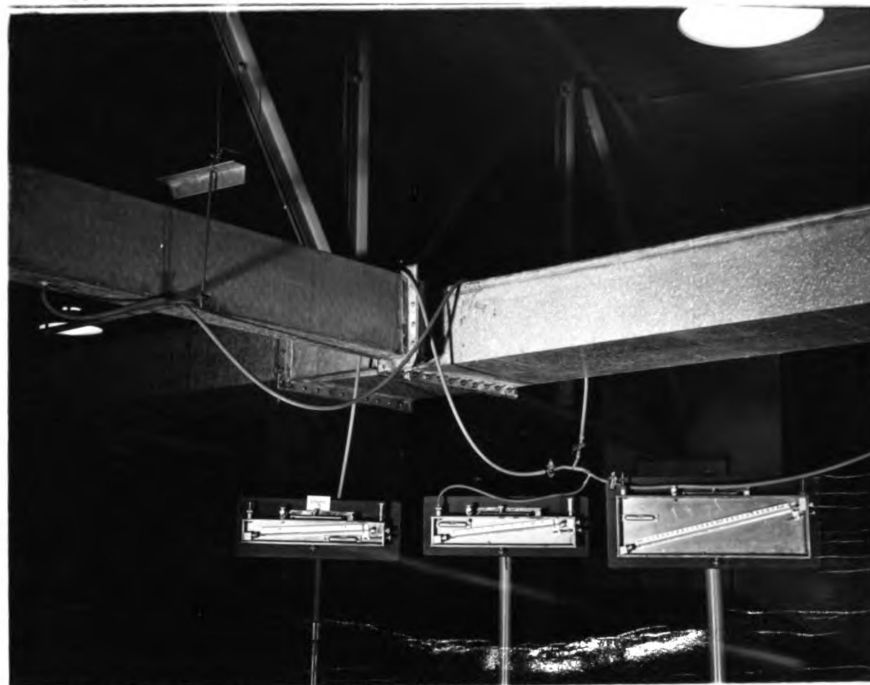


Fig. 9

Photograph of measuring station 2 showing 3, 1 and $\frac{1}{2}$ inch manometers. Rubber tubing shown connected to static tap in main, reduced main and take-off. Station accommodates P₄, P₅ and P₆ measurement (static pressures).

TEST PROCEDURE

Testing is performed to determine the resistance created by the take off and reduction of straight in the arrangement as illustrated in Figs. 10 and 11. The determination is assisted by varying the resistance of the take-off and reduced straight through the insertion of the calibrated orifice plates. In all, there are a series of 20 determinations of interchanging orifice plates.

For known quantities of air delivered to the system, measured at measuring station 1 as velocity pressure (difference of total pressure and static pressure designated $P_3 - P_2$) static pressure readings are taken at station 2. These static pressures, designated P_4 , P_5 and P_6 have previously been described. Having measured them, the quantities of air passing through the orifice plates can be determined from the orifice calibration curves and these quantities used to compute the velocity pressures in the plane of the static taps. The total pressures are computed as the sum of the static and velocity pressures and are designated TP_4 , TP_5 and TP_6 .

The total pressure calculations are made from the

following equations:

$$Q = 4005 h^{\frac{1}{2}} A \text{ where } Q = \text{volume of air cu ft/min}$$

4005 = Constant for standard air

A = Cross section of duct in ft^2

h = Velocity pressure of air flowing through duct

In the above equation h is the unknown which is solved very conveniently by the nomograph in Fig. 12.

Then:

TP = SP + VP where:

TP = Total pressure at the plane of tap

SP = Static pressure direct reading

VP = Velocity pressure as computed by nomograph

Since the air is a static pressure tap immediately before the air is expanded in the increaser type fitting, the total pressure must be determined at that plane. The difference in total pressures of plane P₄ to plane P₅ and plane P₄ to P₆ can then be used to evaluate the resistances of the take-off and reduced straight. Each portion however must be determined by separate evaluation.



Fig. 10

System set up for runs 10 through 29 showing 3" x 8" take off, 18" x 8" reduced straight, and increaser type fitting. P₄ static tap is shown in lower center of photograph.



Fig. 11

System set up for runs 39 through 58 showing
18" x 8" take-off, 3" x 8" reduced straight and
increaser type fitting.

DETERMINATION OF FRICTION EQUIVALENTS

Friction equivalents of take-off and reduced straight have been determined by plotting curves from the computed data. These curves are plotted as total pressure difference against cu ft/min delivery and appear as a series of four to a set to represent the inter-changing of orifice plates in the 3" X 8" duct while the orifice plate in the 18" X 8" duct is kept constant. These curves are then compared for the appropriate equivalent round with the friction chart from the A. S. H. V. E. Guide, an enlargement of which appears in Fig. 13.

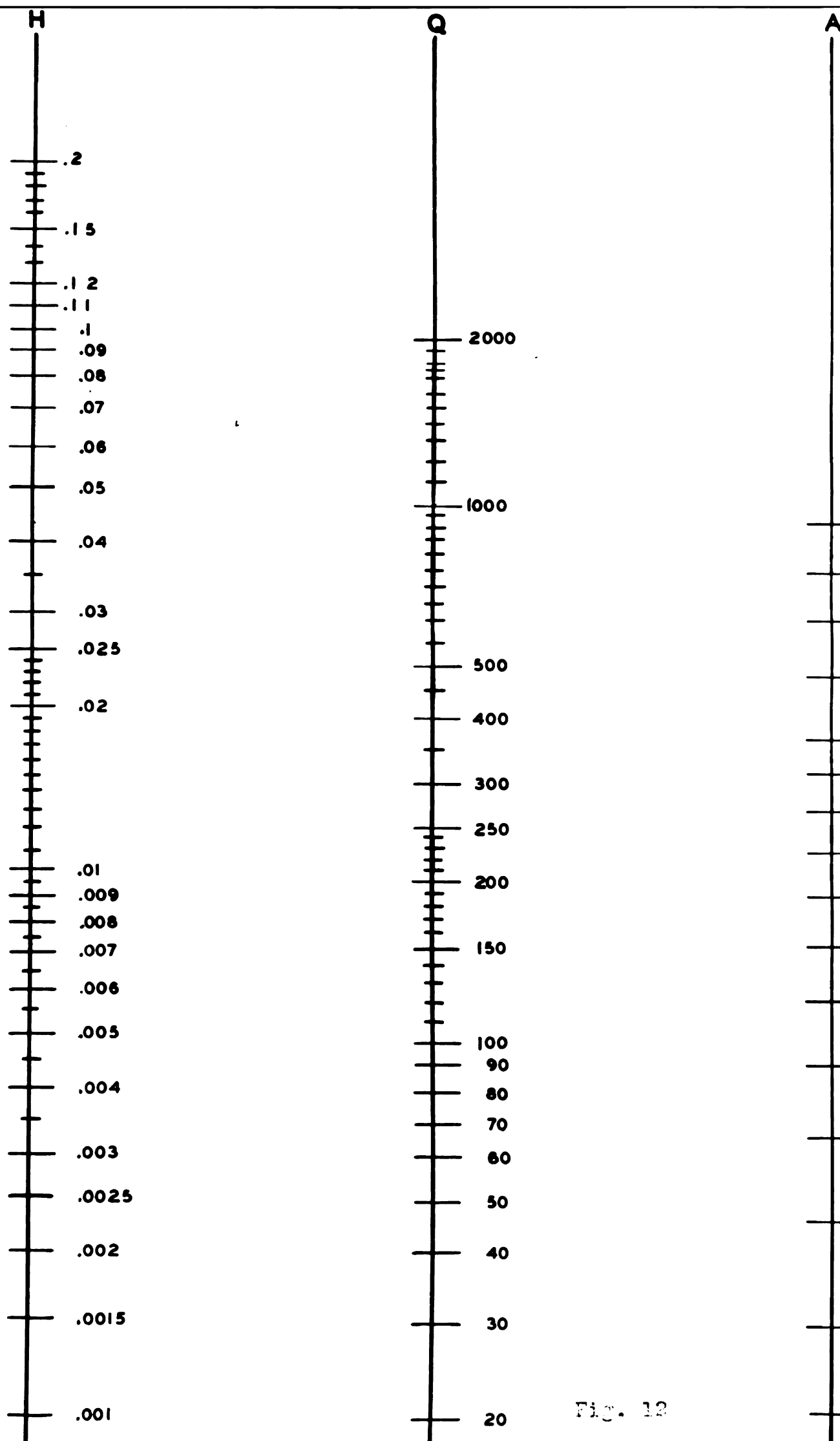
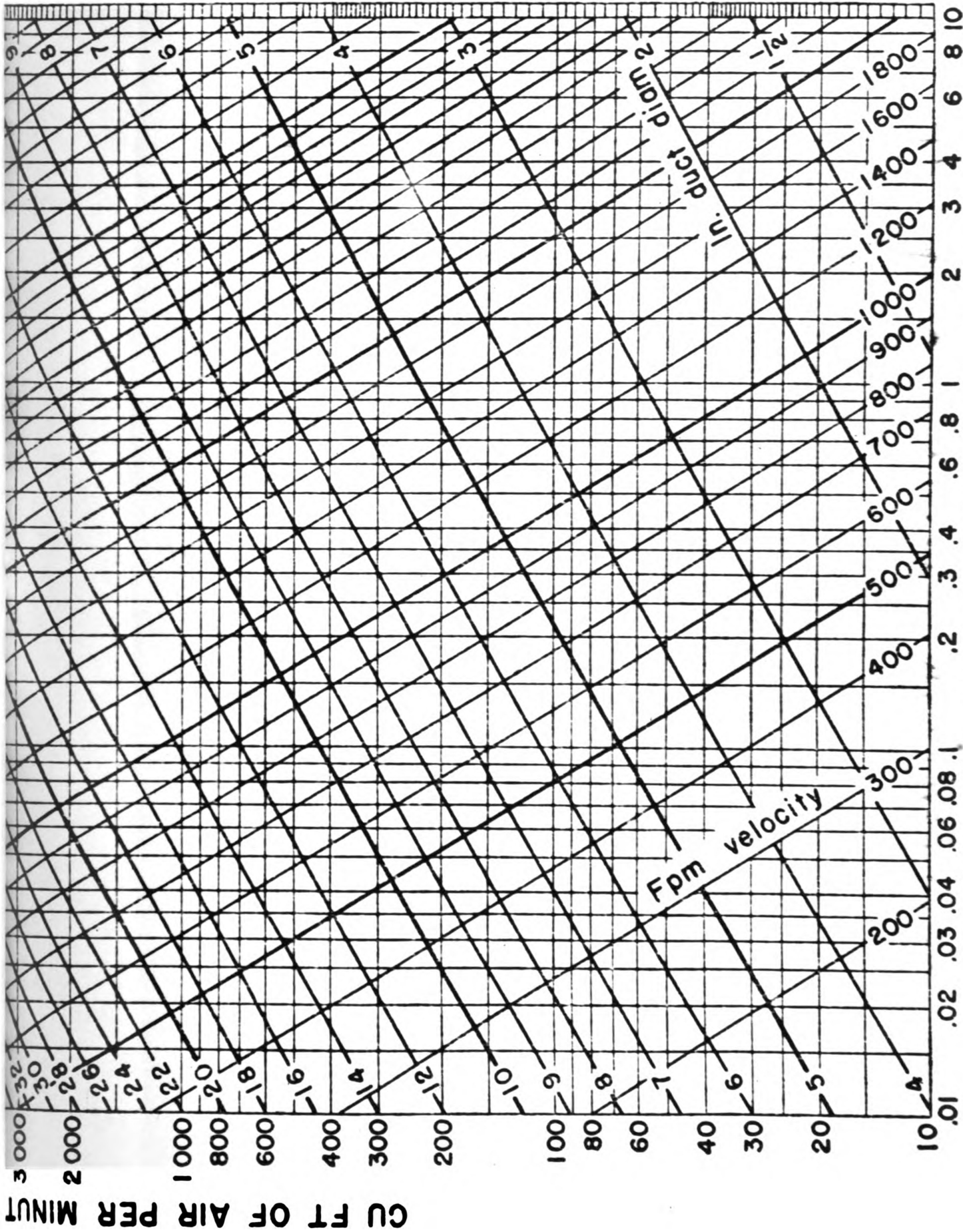


Fig. 12



FRICTION LOSS IN INCHES OF WATER PER 100 FT

DISCUSSION

The inserted orifice plate can be classified as serving two specific purposes:

- (1) A method for measuring quantities of air delivered through the duct in question.
- (2) A method of simulating changes in length of the duct, thereby varying the resistance of the system.

The method of measuring has already been discussed. The data evaluations present evidence that these orifice plate measurements are consistently accurate. In the graphical representations of Total Pressure drop vs cubic ft/min deliveries, it is observed that the points do not lie completely on the average curve. This discrepancy probably can best be accounted for as a result of bulging of the duct (created by static pressure); in which case the cross sectional area of the duct changes. Apparently an affect of the bulging type does exist since a comparison of the curves for the 3" X 8" duct with the 18" X 8" duct shows the latter to present more variance. Consequently, we can assume that the static pressure measurements are accurate and the calculated velocity pressure in error.

In varying the resistance of the system by orifice

plate insertions, we were able to simulate a condition of varying the length of the take-off and reduced straight and treat the system as one of varying the length of duct. Again graphic representations of total pressure drop vs cubic ft/min delivery appear to justify this conclusion. These parabolic curves follow the same general shape for 5.2" rounds and 13" rounds of the A. S. H. V. E. friction flow chart.

The curve evaluations are presented numerically in Tables 1 and 2 and graphically in Figures 14 and 15. It is to be noted that the plots of columns 7 against 5 for the 3" X 8" duct appear to be parabolic regardless of the fact that the 3" X 8" duct is the take-off in one and the reduced straight in the other. These curves show that the 3" X 8" duct offers positive resistance to flow in either system set up, but that this resistance to flow is larger by approximately $3\frac{1}{2}$ widths when acting as take-off under the best flow conditions. The plots of column 9 against 5 for the 18" X 8" duct appear widely scattered. However, it is to be noted that the difference in any one set is in the vicinity of $1\frac{1}{2}$ widths from the average curve represented as straight lines. It is believed that the friction effect of the 18" X 8" duct remains approximately constant for any particular system set up but changes as the system set up is altered.

As is shown on the graph, resistance changes from a negative value for 15" X 8" duct as reduced straight to a positive resistance for the same duct as a take-off.

The parabolic representation of equivalent length against Column 5 of tables I and II indicates that optimum flow conditions exist with the ratio of Column 5, approaching 1. Below and above this value, the curves bend to the right, which indicate increase in resistance. From a fluid flow standpoint, it might be argued that the reduced straight for values below 1 is robbing a portion of the air which normally would be in the plane of the take-off. On the other hand when the valve is above 1, the behavior is directly opposite; the take-off is robbing air which normally would be in the plane of the reduced straight. If we consider this interpretation as being accurate, then when the value of Column 5, approaches 1, both take-off and reduced straight deliver air which lies in their respective planes. We might say that neither contraction nor expansion of the air at the entrance of the take-off or reduced straight exist.

CONCLUSION

From the data presented in this paper we may draw the following conclusions:

- (1) For the system set ups described, more accuracy in measuring exists in the 3" X 8" duct than in the 18" X 8" duct. This is shown by the smoothness of the total pressure drop vs cu ft/min curves for both types. The bulging affect in the 18" X 8" duct may be the controlling factor of accuracy.
- (2) More resistance is developed by the take-off than in the reduced straight. In cases where the take-off is small such as a 3" X 8", the resistance remains positive, but is reduced by a matter of $3\frac{1}{2}$ widths at optimum flow conditions when changing from take-off to reduced straight.

When the take-off becomes large, as in the case of the 18" X 8" duct, the resistance decreases from a positive value for the duct as take-off to a negative value for the duct as reduced straight.
- (3) Optimum flow conditions appear to exist when the ratio of % air through small divided by the % ratio of small area to main is 1. The general shape of the equivalent length curves seem to bear this out. At this condition of flow it is believed that neither expansion nor compression of the air exists in the plane of the

separation.

It is obvious from a study of this paper that there yet remains a great deal of work to be done in this field. There are many phases such as flow mechanics, orifice coefficients, air separation and distribution which demand exploration. The data presented in the paper are based on limited research, though a great deal of effort has been put forth to obtain a high degree of accuracy in the results. It is the hope of the author that this information may not only be of practical value to designers and installers, but also that it may stimulate further investigation by others so that all concerned will benefit by such research in the forthcoming years.

TABLE I

RUN NO.	ORIFICE DISPOSITION		% AIR THROUGH SMALL	% AIR (Small)*	3" ADDED EQUIV. LENGTH		18" ADDED EQUIV. LENGTH	
	SMALL	LARGE			FEET	WIDTHS	FEET	WIDTHS
10	7" x 2"	16 1/2" x 6 1/2"	9.65	.590	9.5	33	- 1.5	- 1
11	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	7.10	.425	20	30	- 2.0	- 1.3
12	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	5.65	.336	33.5	134	- 2.5	- 1.7
13	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	4.20	.252	67.5	270	- 2.5	- 1.7
14	7" x 2"	16 1/2" x 6 1/2"	11.00	.660	8.5	34	- 4.0	- 2.7
15	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	7.80	.467	16.5	66	- 3.5	- 2.3
16	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	6.25	.375	24.5	98	- 4.5	- 3.0
17	6 1/2" x 1 1/2"	16 1/2" x 6 1/2"	4.80	.283	46.5	186	0	0
18	7" x 2"	15 1/2" x 5 1/2"	12.80	.767	5.5	22	- 3.5	- 2.3
19	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	9.25	.555	10.0	40	- 1.0	- .7
20	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	7.40	.444	17.5	70	- 1.0	- .7
21	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	5.50	.330	33.5	134	0	0
22	7" x 2"	15 1/2" x 5 1/2"	14.20	.852	3.5	14	- 3.0	- 2.0
23	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	10.90	.655	6.0	24	- 3.0	- 2.0
24	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	8.65	.530	12.0	48	- 1.5	- 1.0
25	6 1/2" x 1 1/2"	15 1/2" x 5 1/2"	6.70	.401	22.0	88	- .5	- .3
26	7" x 2"	14" x 4"	20.30	1.220	5.5	22	- 3.5	- 2.3
27	6 1/2" x 1 1/2"	14" x 4"	15.60	.935	3.0	12	- 2.5	- 1.7
28	6 1/2" x 1 1/2"	14" x 4"	12.50	.750	4.0	16	- 3.5	- 2.3
29	6 1/2" x 1 1/2"	14" x 4"	9.60	.575	6.5	26	- 2.0	- 1.3

* Column 5 - % Air through small duct $\div$ % (Area of 3"x3" to Area of main)

SYSTEM ARRANGEMENT - 18" x 8" TAKE-OFF 3" x 8" REDUCED STRAIGHT

TABLE II

RUN NO.	ORIFICE DISPOSITION		% AIR THROUGH SMALL	% AIR (Small)*	3" ADDED EQUIV. LENGTH		16" ADDED EQUIV. LENGTH	
	SMALL	LARGE			FEET	WIDENINGS	FEET	WIDENINGS
39	7" x 2"	16" x 6"	11.4	.684	4.5	18	10.0	6.7
40	6" x 1"	16" x 6"	7.3	.461	10.5	42	12.0	8.0
41	6" x 1"	16" x 6"	6.2	.372	22.5	90	13.5	9.0
42	6" x 1"	16" x 6"	4.6	.276	47.0	168	14.0	9.3
43	7" x 2"	16" x 6"	12.0	.720	3.5	14	11.0	7.3
44	6" x 1"	16" x 6"	8.6	.515	8.0	32	12.5	6.3
45	6" x 1"	16" x 6"	6.8	.407	15.5	62	12.5	6.3
46	6" x 1"	16" x 6"	5.2	.311	35.5	142	14.0	9.3
47	7" x 2"	15" x 5"	13.5	.810	3.5	14	11.0	7.3
48	6" x 1"	15" x 5"	9.3	.587	5.5	22	13.5	9.0
49	6" x 1"	15" x 5"	7.8	.461	10.5	42	13.0	8.7
50	6" x 1"	15" x 5"	5.3	.348	25.5	102	14.0	9.3
51	7" x 2"	15" x 5"	15.7	.941	3.0	12	11.0	7.3
52	6" x 1"	15" x 5"	11.5	.690	3.5	14	13.5	9.0
53	6" x 1"	15" x 5"	9.3	.557	6.0	24	13.0	8.7
54	6" x 1"	15" x 5"	7.0	.420	15.0	60	15.0	18.0
55	7" x 2"	14" x 4"	20.9	1.25	3.5	14	12.0	8.0
56	6" x 1"	14" x 4"	15.9	.955	2.0	8	14.0	9.3
57	6" x 1"	14" x 4"	12.3	.768	2.5	10	13.0	8.7
58	6" x 1"	14" x 4"	9.7	.581	4.0	12	14.5	9.7

* Column 5 - % Air through small duct $\div$ % (Area of 3" x 6" to Area of main)

SYSTEM ARRANGEMENT - 18" x 8" TAKE-OFF 3" x 8" REDUCED STRAIGHT



Fig. 14

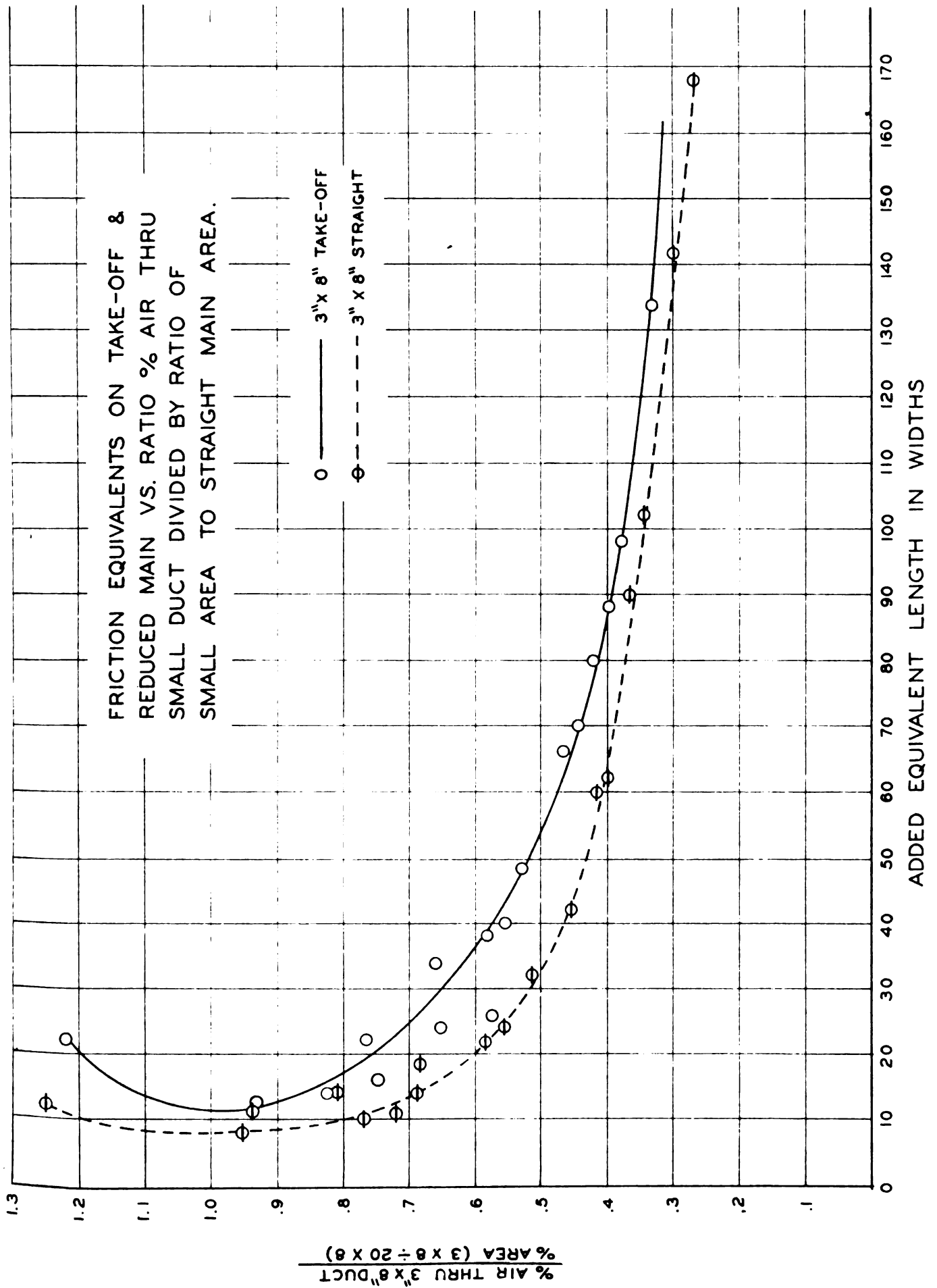
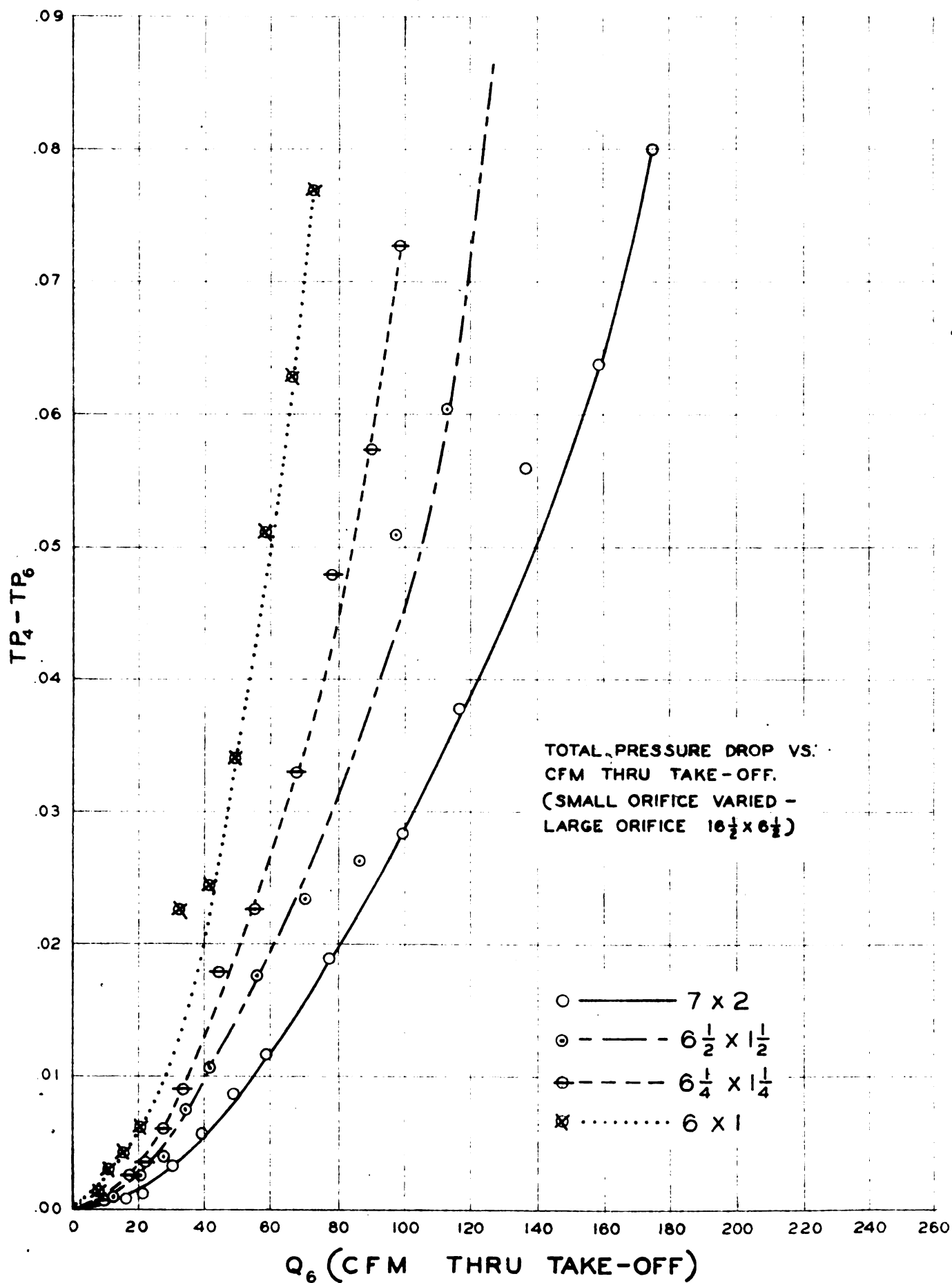
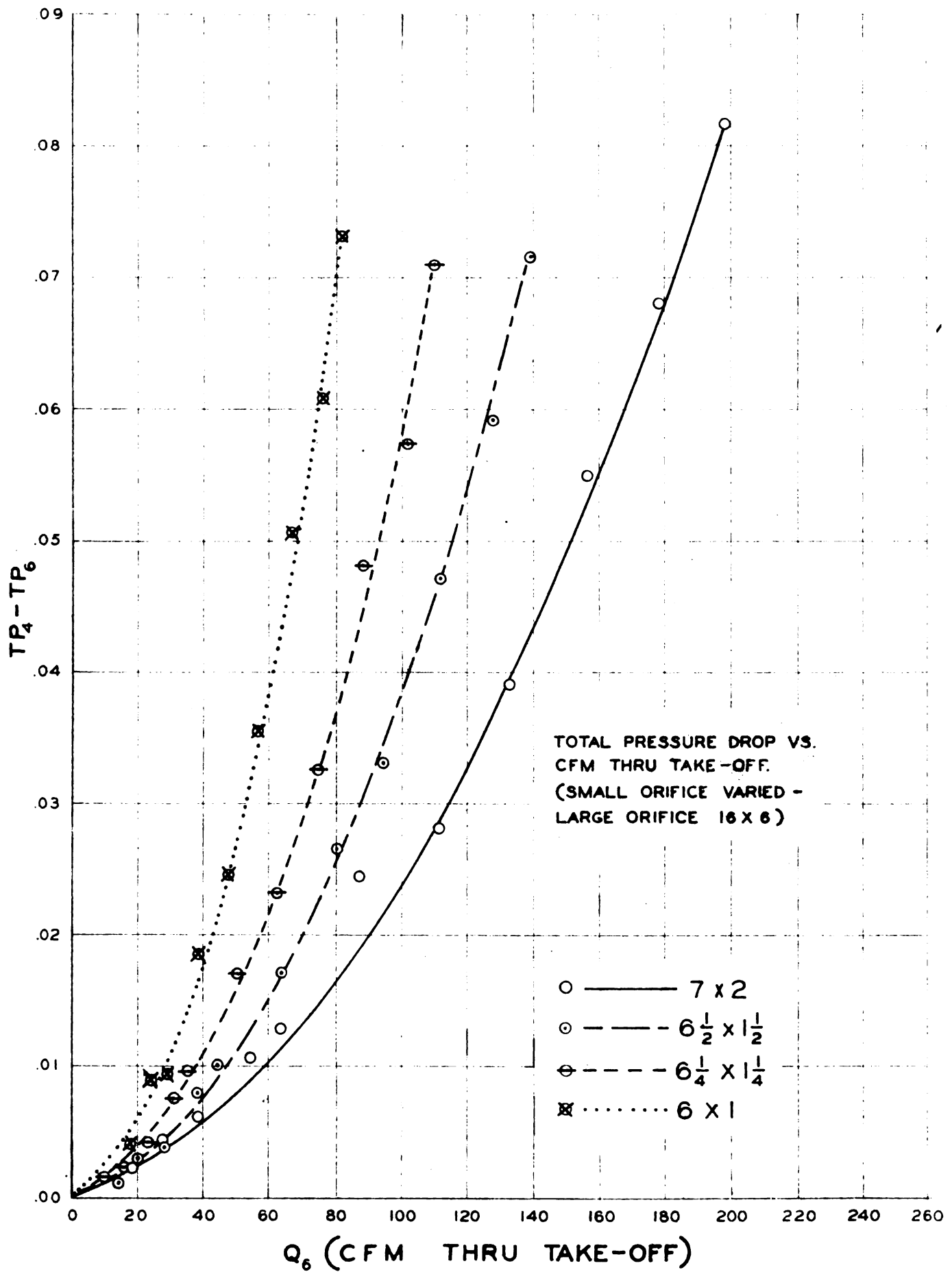


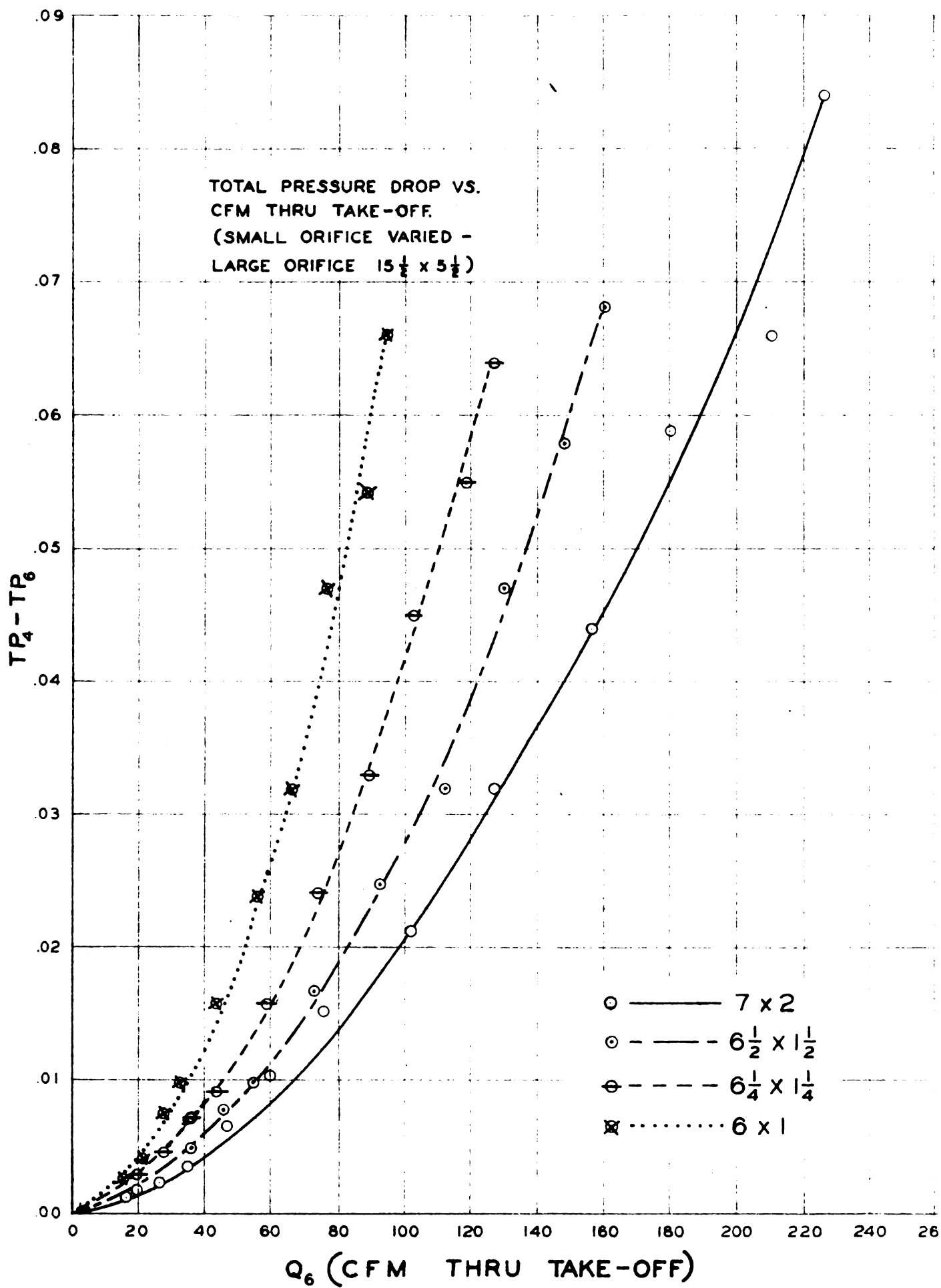
Fig. 15

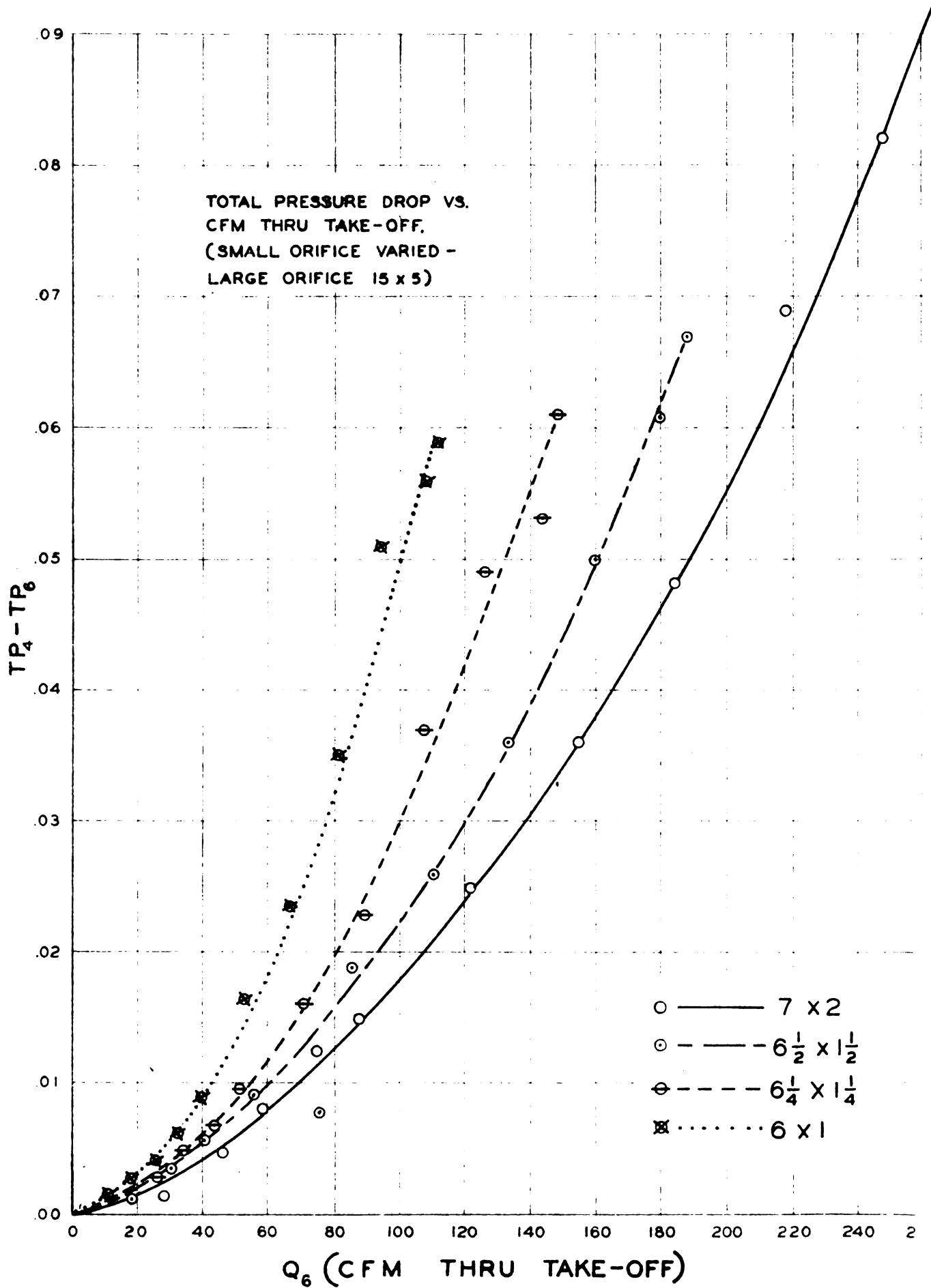
AUTHOR'S COMMENTS

All calculations in this paper are based on standard air conditions though these conditions never existed. Nor has there been any attempt to correct values to standard air values. However, the author feels that the evaluation as a direct result of these data obtained is within the limits of monometer and human accuracy.

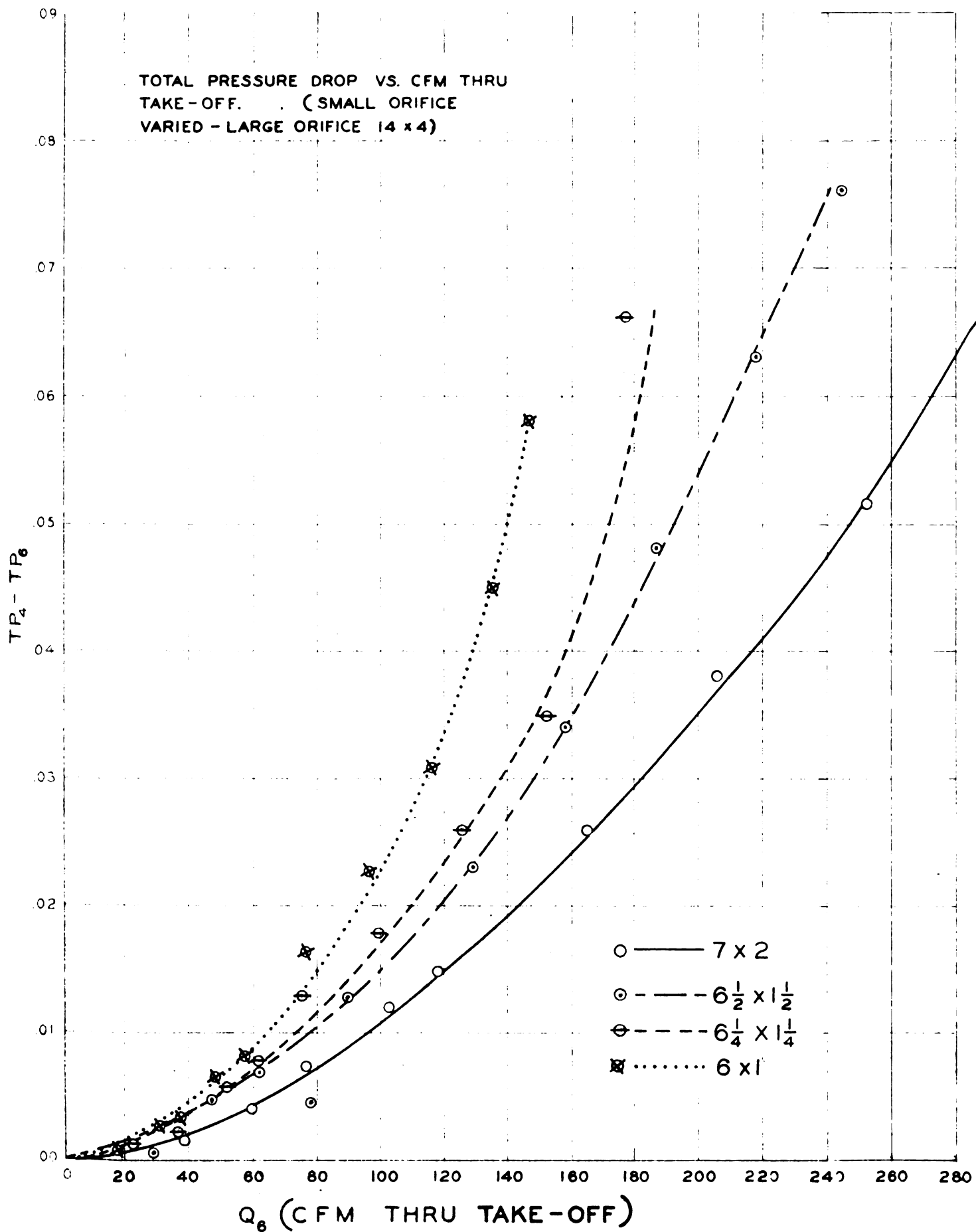


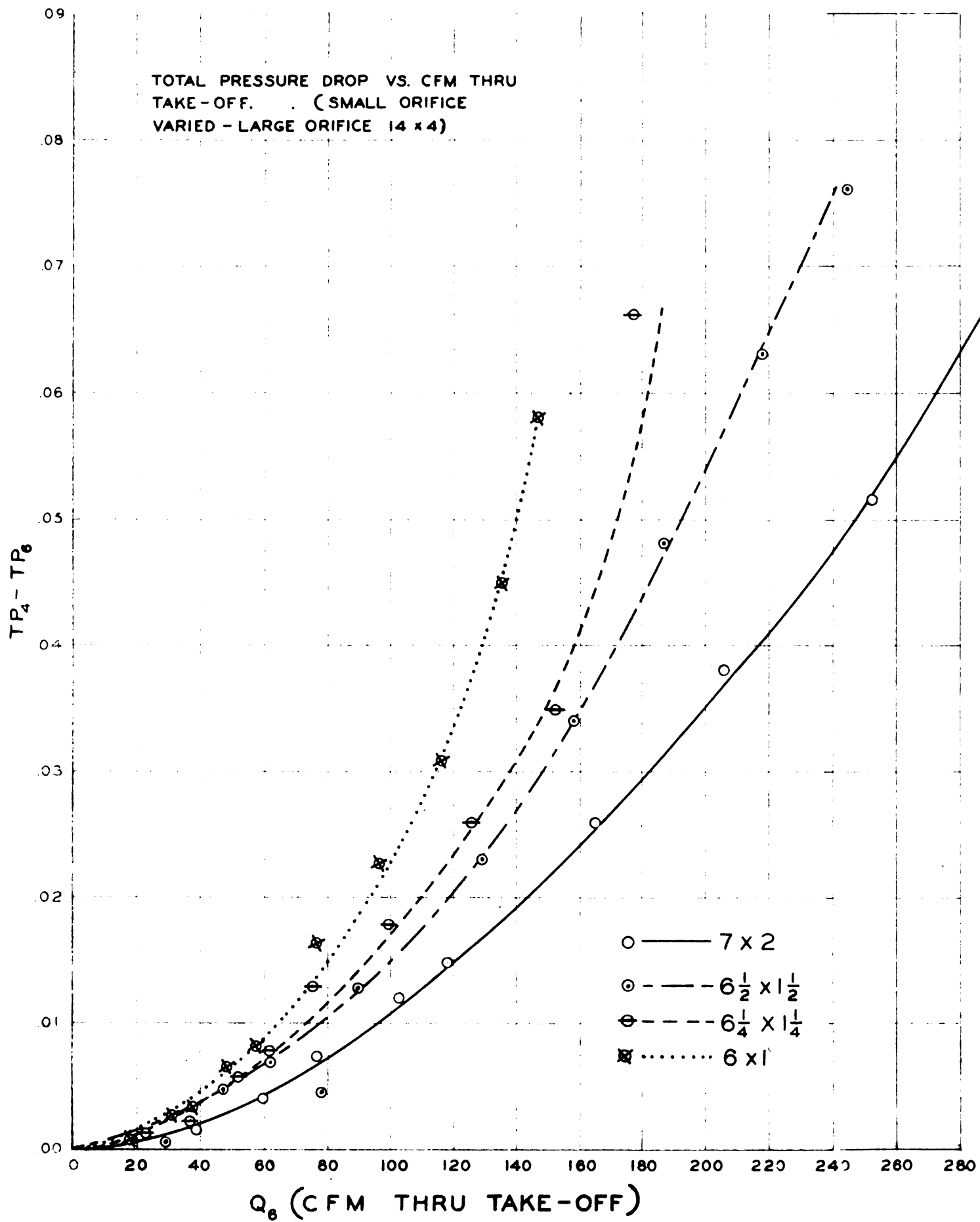


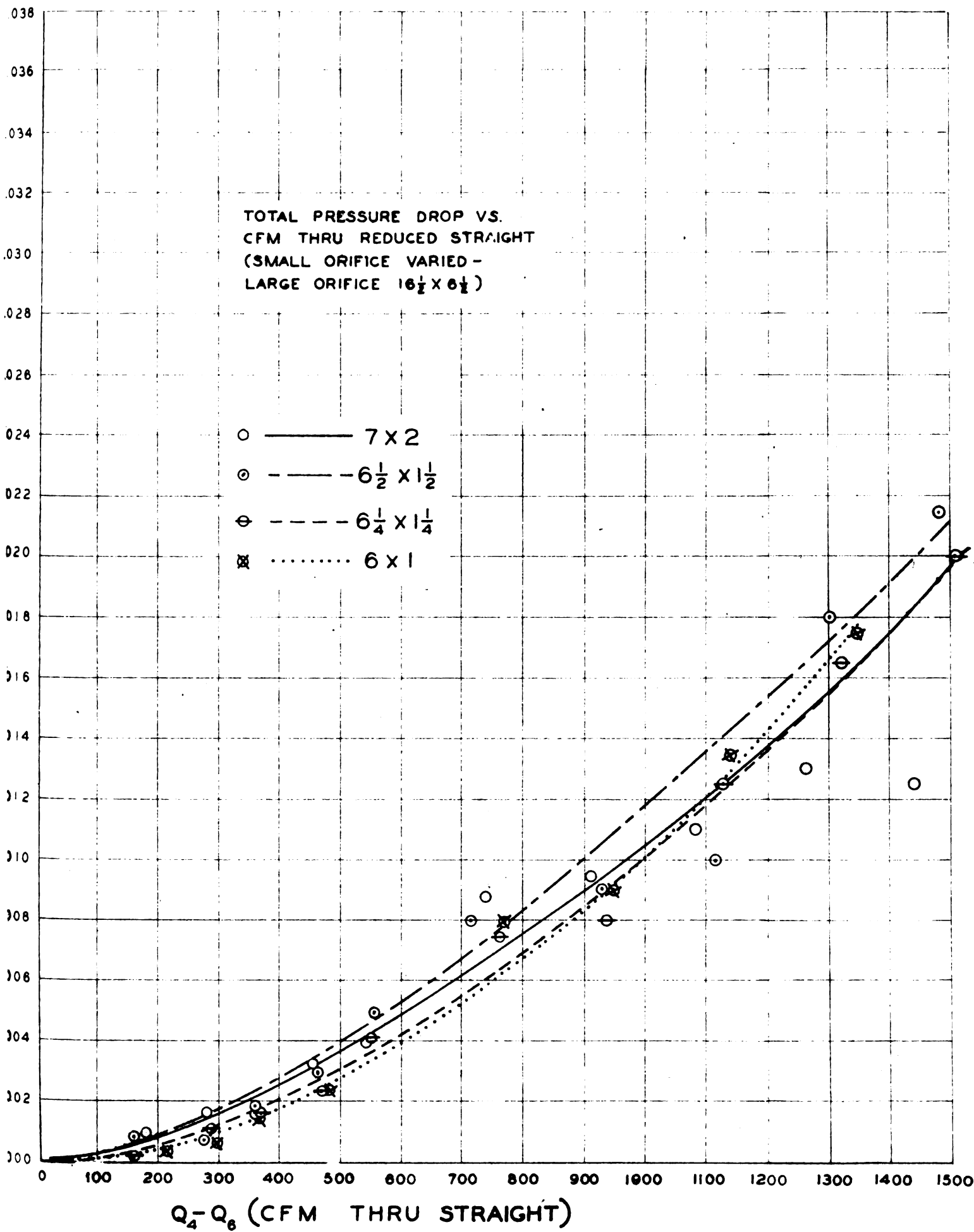


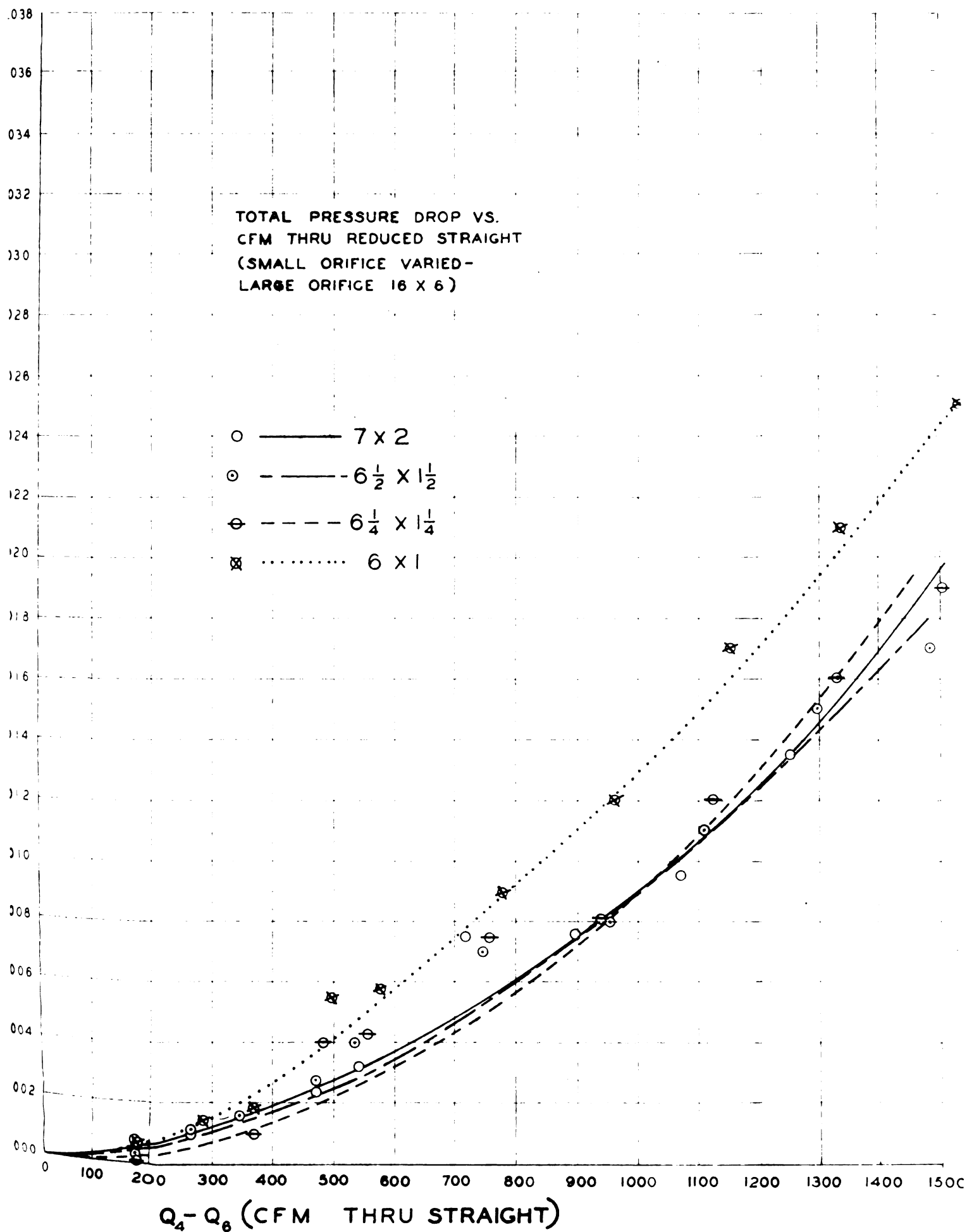


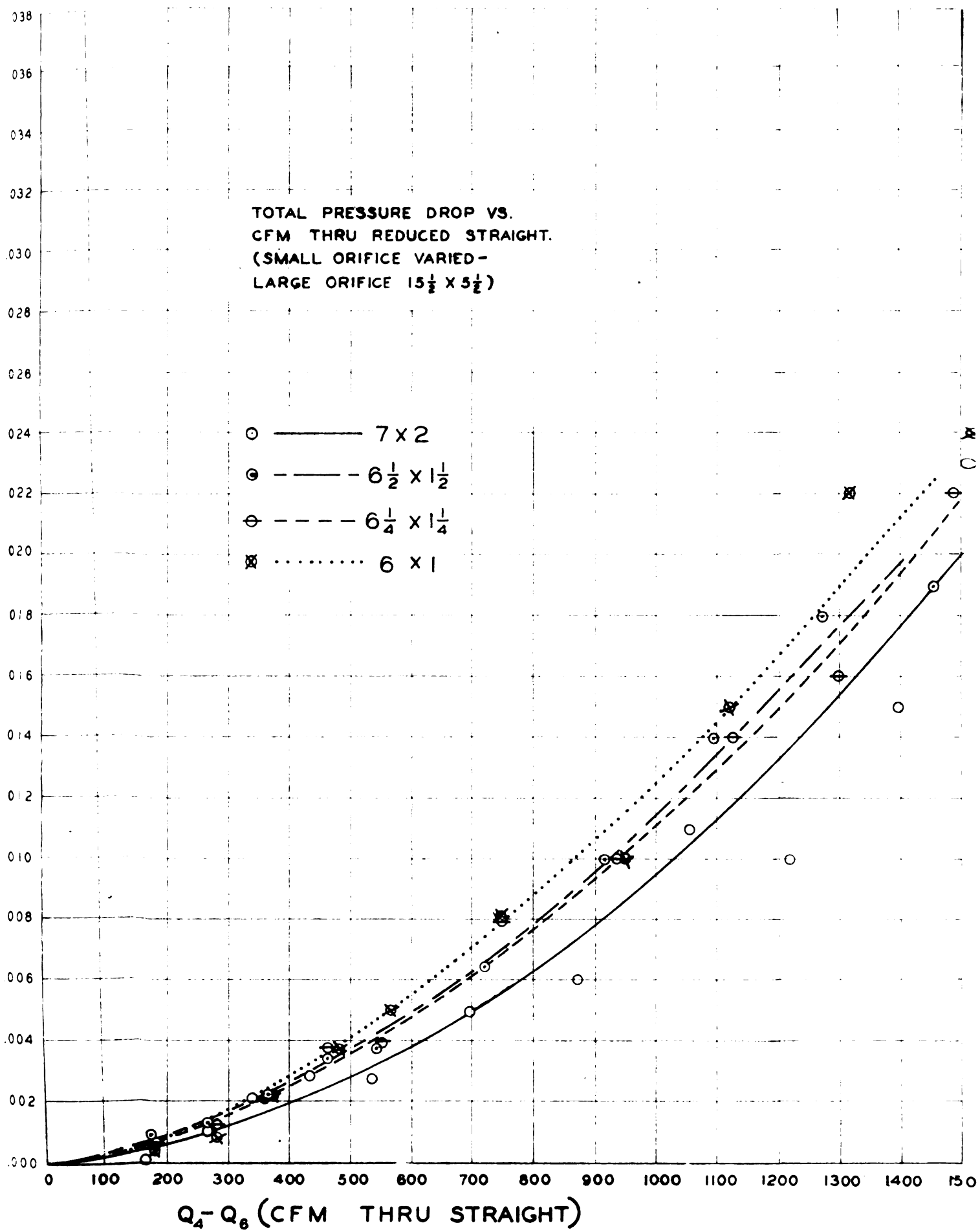
TOTAL PRESSURE DROP VS. CFM THRU
TAKE-OFF. (SMALL ORIFICE
VARIED - LARGE ORIFICE 14 x 4)

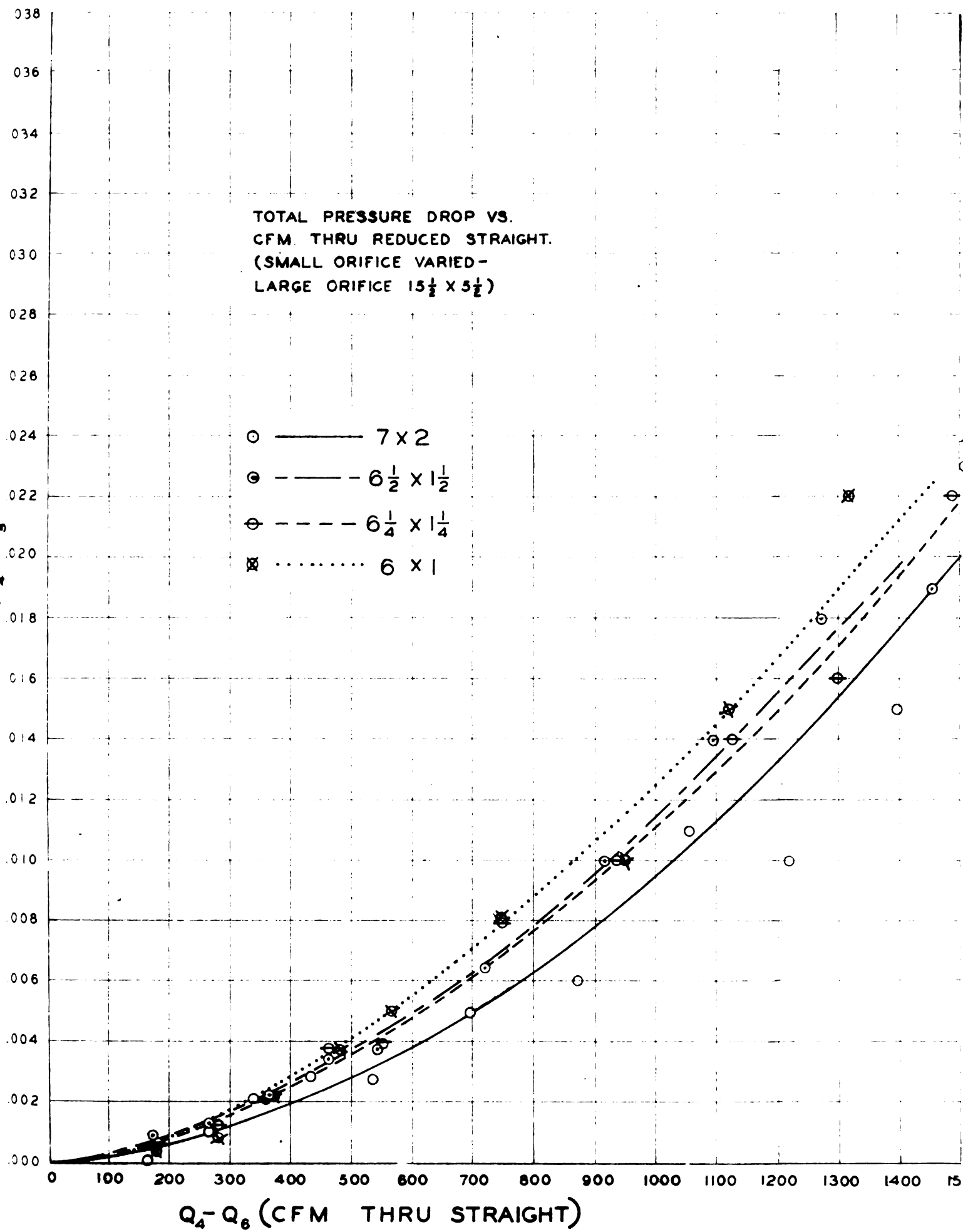


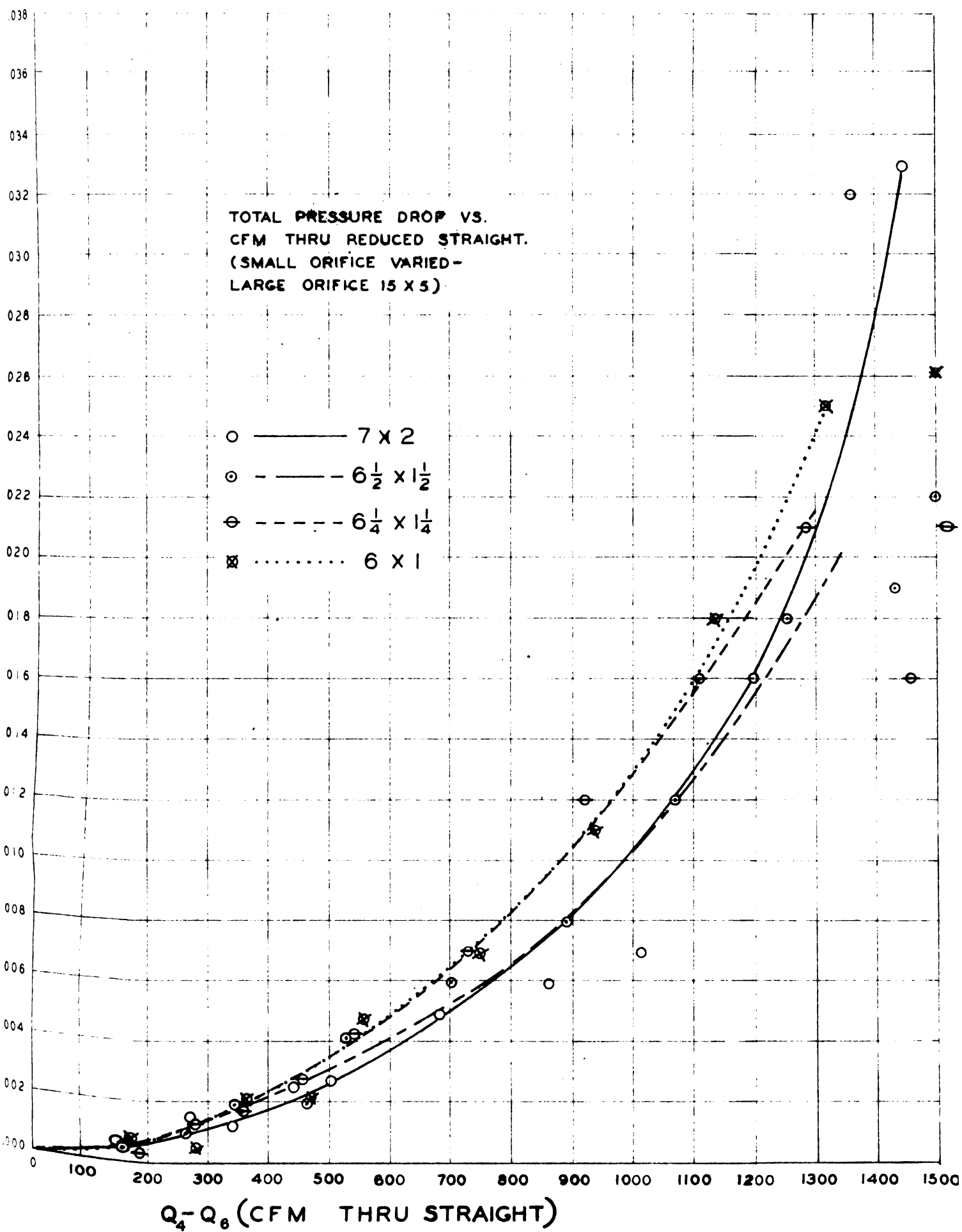


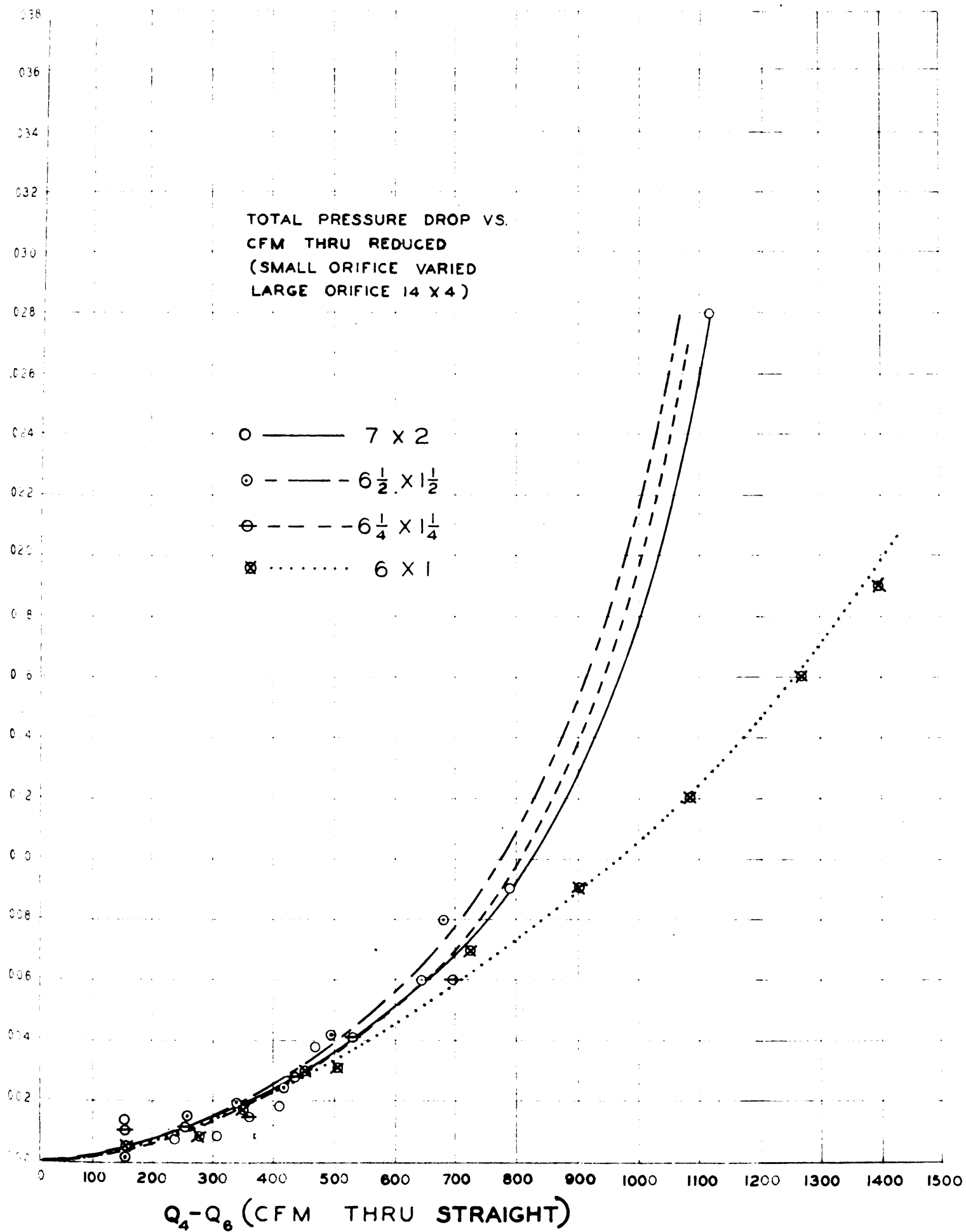












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MICHIGAN STATE COLLEGE**

Running Log of CALIBRATION 16½ x 6½ ORIFICE

Observers { _____ } { _____ } Date AUG 25, 19 49

NO.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH. OF	BAR. IN HG.	CFM MAIN
1	2:15	4.93		.0139		73.0	84.0		29.40	1748
2	2:17	4.18		.118						1609
3	2:19	3.19		.090				91.5		1402
4	2:21	2.32		.065						1198
5	2:23	1.63		.046						1003
6	2:25	1.02		.029						794
7	2:27	.492		.014				92.7		546
8	2:29	.395		.011						495
9	2:31	.296		.008						434
10	2:34	.194		.0055						346
11	2:36	.107		.003						257
12	2:38	.040		.0015		73.0	90.0	93.0		157
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Remarks:

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Running Log of CALIBRATION 16" X 6" CRIFICE

Observers { _____ } { _____ } Date AUG 26, 19 49

o. Z	TIME	P ₃ -P ₂	P ₅	WET OF	DRY OF	DISCH OF	BAR IN HG	CFM MAIN + ST.
1	11:25	4.99	.216	71.0	87.0		29.37	1720
2	11:27	4.18	.1895			93.0		1609
3	11:30	3.19	.1445					1402
4	11:32	2.33	.1104					1200
5	11:34	1.59	.0765					991
6	11:37	1.02	.046					794
7	11:39	.578	.0255			94.0		598
8	11:42	.411	.0182					504
9	11:44	.293	.0127					425
10	11:46	.195	.0082					348
11	11:49	.100	.0042					249
12	11:52	.040	.0015	71.5	89.0	94.0	29.36	157
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of CALIBRATION 15 1/2 x 5 1/2 ORIFICE

Observers {

Date AUG 26, 19 9

$\frac{O}{Z}$	TIME	$P_1 - P_2$	P_3	WET °F	DRY °F	DISCH CF	BAR IN HG	CFM MAIN + ST.
1	1:40	4.62	.340	70.5	90.0	93.0	29.33	1690
2	1:42	4.07	.302					1586
3	1:44	3.17	.233					1399
4	1:46	2.30	.167					1192
5	1:48	1.625	.1175			94.5		1002
6	1:51	1.045	.075					805
7	1:53	.573	.0418					595
8	1:55	.343	.028					493
9	1:57	.278	.020					415
10	1:59	.200	.014			95.0		352
11	2:02	.100	.0067					249
12	2:04	.042	.0025	71.0	91.0		29.31	161
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION 15 1/2 x 5 1/2 ORIFICE

Observers {

Date Aug 26, 19 9

o 2	Time	P ₃ -P ₂	P ₅	WET °F	DRY °F	DISCH F	RAP IN HG	CFM MAIN 7.5T
1	1:40	4.62	.340	70.5	90.0	93.0	29.33	1690
2	1:42	4.07	.302					1586
3	1:44	3.17	.233					1399
4	1:46	2.30	.167					1192
5	1:48	1.625	.1175			94.5		1002
6	1:51	1.045	.075					805
7	1:53	.573	.0418					595
8	1:55	.393	.028					493
9	1:57	.278	.020					415
10	1:59	.200	.014			95.0		352
11	2:02	.100	.0067					249
12	2:04	.042	.0025	71.0	91.0		29.31	161
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION 15 1/2 x 5 1/2 ORIFICE

Observers {

Date Aug 26, 19 9

o 2	Time	P ₃ -P ₂	P ₅	WET °F	DRY °F	DISCH F	RAP IN HG	CFM MAIN 7-5T
1	1:40	4.62	.340	70.5	90.0	93.0	29.33	1690
2	1:42	4.07	.302					1586
3	1:44	3.17	.233					1399
4	1:46	2.30	.167					1192
5	1:48	1.625	.1175			94.5		1002
6	1:51	1.045	.075					805
7	1:53	.573	.0418					595
8	1:55	.393	.028					493
9	1:57	.278	.020					415
10	1:59	.200	.014			95.0		352
11	2:02	.100	.0067					249
12	2:04	.042	.0025	71.0	91.0		29.31	161
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION 15" x 5" ORIFICE

Observers { _____ } { _____ } Date AUG 26, 1949

$\frac{1}{2}$ in	Time	P ₁ -P ₂	P ₂	WET °F	DRY °F	DISCH °F	BAR IN HG	CFM MAIN ST.
1	2:15	432	.540	71.0	91.0		29.31	1635
2	2:18	401	.511			95.5		1575
3	2:21	370	.402					1405
4	2:24	234	.294					1201
5	2:26	162	.202			96.0		1020
6	2:28	113	.127					798
7	2:30	.572	.070					594
8	2:32	.407	.050					501
9	2:34	293	.0067			96.5		425
10	2:36	.200	.0245					352
11	2:38	.101	.012					249
12	2:40	.0425	.0047	72.0	92.0	95.5	29.30	162
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION 14" X 4" ORIFICE PLATE

Observers { _____ } { _____ } Date _____, 19 _____

$\frac{Q}{2}$	Time	$P_3 \cdot P_2$	P_2	WET OF	DRY OF	Disch OF	BAR IN HG.	CFM Deliv
1	2:50	3.58	1.13	72.0	92.0	95.5		1488
2	2:53	3.58	1.00					1402
3	2:59	2.31	.720			96.0		1195
4	3:01	1.61	.501					999
5	3:03	1.025	.323					795
6	3:05	.800	.252			96.5		704
7	3:08	.562	.1732					589
8	3:12	.395	.1235					445
9	3:15	.303	.095					433
10	3:18	.192	.061			97.0		345
11	3:21	.091	.0285					237
12	3:23	.041	.0128	72.0	92.0	96.0		159
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of CALIBRATION 7" x 2" CRIPPLE PLATE

Observers { _____ } { _____ } Date AUG 29, 19 49

NO	TIME	$P_1 - P_2$	P_6	WET OF	DRY OF	DISCH OF	BAR IN HG	CFM DELIV
1	3:30	.535	1.665	65.0	79.0	83.5	29.19	585
2	3:45	.488	1.470					550
3	3:52	.433	1.305					518
4	4:00	.374	1.125			84.5		480
5	4:03	.305	.910					435
6	4:06	.242	.731					387
7	4:10	.178	.544			88.0		332
8	4:13	.116	.353					268
9	4:15	.074	.2245					214
10	4:18	.035	.107			87.5		147
11	4:24	.033	.097					143
12	4:27	.028	.081					132
13	4:30	.016	.048					99
14	4:33	.0075	.0225	67.5		88.0	29.19	68
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION $6\frac{1}{2} \times 1\frac{1}{2}$ CRIFICE

Observers { _____ } { _____ } Date AUG 19, 19 48

$\frac{1}{2}$	TIME	$P_3 - P_2$	P_6	WET °F	DRY °F	DISCH °F	BAR IN H ₂ O	CFM DELIV
1	2:40	.308	2.595	66.0	80.0	84.5	29.20	437
2	2:43	.270	2.31					408
3	2:46	.230	1.97					377
4	2:51	.193	1.64			85.5		336
5	2:54	.148	1.27					302
6	2:57	.108	.930					258
7	3:00	.078	.675					220
8	3:03	.0325	.282			86.0		142
9	3:07	.024	.203					122
10	3:11	.016	.1355					99
11	3:14	.009	.078					74
12	3:17	.0057	.050	65.0	79.0	83.5	29.20	59
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of CALIBRATION 6 1/4 x 1 1/4 ORIFICE

Observers { _____ } { _____ } Date AUG 29, 19 49

$\frac{Q}{Q_{FM}}$	TIME	$P_1 - P_2$	P_2	WET	DRY	DISCH.	BAR IN HG.	QFM DELIV
1	2:00	.199	3.02	670	80.0		29.21	351
2	2:03	.180	2.76			83.8		334
3	2:05	.159	2.45					313
4	2:16	.140	2.15			84.5		294
5	2:18	.120	1.83					272
6	2:20	.098	1.514			85.0		246
7	2:27	.0805	1.24					223
8	2:30	.060	.925					192
9	2:33	.030	.457			85.0		136
10	2:35	.0205	.303					113
11	2:37	.017	.258					102
12	2:39	.010	.150			83.5		79
13	2:41	.0055	.086	66.0	80.0		29.20	58
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of CALIBRATION 6" x 1" ORIFICE

Observers { _____ } { _____ } Date AUG 29, 19 49

Time	P ₃ -P ₂	P ₂	NET OF	DRY OF	DISCH OF	BAR in HG.	CFM Deliv.
1 11:22	.103	3.04	68.5	80.0	83.0	29.22	252
2 11:26	.090	2.67			83.5		236
3 11:28	.080	2.36					222
4 11:31	.070	2.12			84.0		208
5 11:33	.060	1.815					192
6 11:37	.050	1.50					175
7 11:39	.040	1.19					157
8 11:42	.030	1.91			84.0		143
9 11:45	.022	.745					117
10 11:48	.017	.590					102
11 11:51	.012	.420					86
12 11:54	.0065	.229	67.5	80.0	83.0	29.22	63
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST X 3" X 8" TAKE-OFF
ORIFICES 16 1/2" X 6 1/2" X 7" X 2"

Observers { _____ } { _____ } Date AUG 23, 19 49

Time	P ₃ - P ₂	P ₄	P ₅	P ₆	WET CF	DRY CF	DISCH CF	BAR. IN HG.	CFM MAIN	CFM T	CFM T-OFF
1 3:25	5.04	.140	.115	.150	71.0	85.0		29.33	1763	1580	175
2 3:27	4.15	.116	.0955	.123			88.5		1601	1445	154
3 3:29	3.16	.090	.073	.095					1397	1260	134
4 3:33	2.31	.066	.053	.068					1195	1075	117
5 3:35	1.64	.0475	.038	.048			90.0		1007	910	99
6 3:38	1.01	.030	.023	.0295					795	707	78
7 3:41	.585	.018	.014	.017					601	550	59
8 3:44	.410	.013	.010	.012			90.0		503	467	49
9 3:47	.262	.009	.007	.0078					402	390	40
10 3:51	.158	.0055	.004	.0048					313	295	31
11 3:54	.066	.003	.002	.0025					202	208	22
12 3:56	.042	.002	.001	.0015	71.5	87.0	90.0		161	147	17
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" JT & 3"X8" TAKE-OFF
ORIFICES 16 1/2" X 6 1/2" & 7" X 2"

Observers { _____ } { _____ } Date AUG 23, 19 49

Z	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₆	VP ₆	TP ₆	Q ₆	SP ₆	VP ₆	TP ₆
1	1763	.140	.160	.300	1588	.115	.161	.276	175	.150	.070	.220
2	1601	.116	.132	.248	1442	.0955	.140	.2355	159	.123	.059	.182
3	1397	.090	.102	.192	1260	.073	.106	.179	137	.093	.043	.136
4	1195	.066	.072	.138	1078	.053	.074	.129	117	.068	.032	.100
5	1007	.0475	.052	.0995	908	.038	.052	.090	99	.048	.023	.071
6	790	.030	.033	.063	712	.023	.033	.056	78	.0295	.0144	.0439
7	601	.018	.019	.037	542	.014	.019	.033	59	.017	.0082	.0252
8	503	.013	.0134	.0264	454	.010	.0131	.0231	49	.012	.0056	.0176
9	402	.009	.0084	.0174	362	.007	.0085	.0155	40	.0078	.0038	.0116
10	313	.0055	.0052	.0107	282	.004	.0050	.009	31	.0048	.0024	.0072
11	202	.003	.0021	.0051	180	.002	.0021	.0041	22	.0025	.0012	.0037
12	161	.002	.0013	.0033	144	.001	.0013	.0023	17	.0015	.0008	.0023

	Q ₄ -Q ₆	TP ₄ -TP ₆	Q ₆	TP ₄ -TP ₆	% AIR DIVERTED
14					
15	1588	.024	175	.080	9.93
16	1442	.0125	159	.064	9.94
17	1260	.013	137	.056	9.83
18	1078	.011	117	.038	9.79
19	908	.0095	99	.0285	9.83
20	712	.0080	78	.0191	9.88
21	542	.0040	59	.0118	9.82
22	454	.0033	49	.0088	9.75
23	362	.0019	40	.0058	9.95
24	282	.0017	31	.0035	9.90
25	180	.0010	22	.0014	10.90
	144	.0010	17	.0010	10.50

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INC. TYPE 18" x 8" ST x 8" x 3" TAKE-OFF
ORIFICES 16 1/2" x 6 1/2" x 6 1/2" x 1 1/2"

Observers { _____ } { _____ } Date AUG 26, 19 49

No	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR. CFM IN HG. MAIN	CFM ST	CFM T-OFF	
1	3:40	4.91	.166	.125	.2115	72.0	92.0	95.5	29.30	1741	1630	123
2	3:45	4.10	.131	.1055	.1775					1592	1500	113
3	3:54	3.16	.105	.080	.1350			95.5		1397	1310	98
4	4:00	2.33	.0775	.0605	.1055					1200	1140	87
5	4:05	1.615	.0555	.044	.0695					1000	910	71
6	4:09	1.020	.036	.0251	.044			96.0		794	735	56
7	4:13	.580	.024	.015	.025					599	570	42
8	4:17	.400	.015	.011	.0175			96.5		497	485	35
9	4:21	.245	.009	.0065	.011					388	313	28
10	4:25	.143	.0055	.0042	.0062					297	302	21
11	4:38	.047	.0025	.0015	.0025	72.0	94.0	96.5	29.29	171	180	13
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18"X8" ST. X 8" X 3" TAKE-OFF
ORIFICES 16 1/2" X 6 1/2" & 6 1/2" X 1 1/2"

Observers { _____ } { _____ } Date AUG 26, 19 48

No.	Q ₁	SP ₁	VP ₁	TP ₁	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1741	.160	.158	.318	1618	.125	.165	.290	123	.2115	.035	.2150
2	1592	.137	.130	.267	1479	.1055	.140	.2455	113	.1775	.029	.2065
3	1397	.105	.103	.208	1299	.080	.110	.190	98	.1350	.022	.1570
4	1200	.0735	.072	.1445	1113	.0605	.079	.1395	87	.1055	.0175	.1230
5	1020	.055	.050	.105	929	.044	.055	.099	71	.0695	.012	.0815
6	794	.036	.033	.069	738	.0252	.035	.0602	56	.044	.0073	.0513
7	599	.021	.019	.040	557	.015	.020	.035	42	.025	.0043	.0293
8	497	.015	.013	.028	462	.011	.014	.025	35	.0175	.0029	.0204
9	388	.009	.0077	.0167	360	.0065	.0085	.0150	28	.011	.0016	.0126
10	297	.0055	.0046	.0101	276	.0043	.0050	.0093	21	.0063	.0011	.0074
11	171	.0025	.0015	.0040	158	.0015	.0016	.0031	13	.0025	.0004	.0029
12												
13			Q ₄ -Q ₆	TP ₄ -TP ₅		Q ₆	TP ₄ -TP ₅		% AIR DIVERTED			
14			1618	.028		123	.103		7.07			
15			1479	.0215		113	.0605		7.10			
16			1299	.018		98	.0510		7.01			
17			1113	.0100		87	.0265		7.25			
18			929	.006		71	.0235		7.10			
19			738	.0088		56	.0177		7.05			
20			557	.005		42	.0107		7.02			
21			462	.003		35	.0076		7.04			
22			360	.0017		28	.0041		7.23			
23			276	.0008		21	.0027		7.08			
24			158	.0007		13	.0011		7.60			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. + 3" X 8" TAKE-OFF
ORIFICES 16 1/2 X 6 1/2 + 6 1/4 X 1 1/4

Observers { _____ } { _____ } Date AUG 26, 19 49

o 2	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	T _{is} °F	BAR. IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	1:45	5.03	.179	.140	.245	66.0	72.0	76.5	24.16	1764	1740	100
2	1:50	4.135	.150	.116	.203					1600	1580	91
3	1:55	3.17	.1155	.088	.155			77.0		1399	1380	79
4	1:59	2.31	.085	.0645	.113					1195	1180	68
5	2:14	1.59	.058	.044	.078					991	980	56
6	2:17	1.05	.040	.0295	.051			80.0		806	800	45
7	2:20	.550	.022	.016	.028					583	595	34
8	2:23	.402	.015	.011	.020					499	487	28
9	2:26	.251	.010	.0075	.013			80.0		393	405	23
10	2:30	.153	.0065	.005	.008					308	330	18
11	2:34	.048	.0025	.002	.003	67.0	74.0	79.0	29.16	172	208	11
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of MCREASER TYPE 18"X8" ST. & 3"X8" TAKE-OFF
ORIFICES 16 $\frac{1}{2}$ "X6 $\frac{1}{2}$ " & 6 $\frac{1}{4}$ "X1 $\frac{1}{4}$ "

Observers { _____ } { _____ } Date Aug 26, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1764	.179	.161	.340	1664	.140	.1173	.313	100	.245	.0223	.2673
2	1600	.150	.130	.280	1509	.116	.144	.260	91	.203	.0195	.2225
3	1399	.1155	.102	.2175	1320	.088	.113	.201	79	.155	.0146	.1696
4	1195	.085	.072	.157	1127	.0645	.080	.1445	68	.113	.0109	.1239
5	991	.058	.050	.108	935	.044	.056	.100	56	.078	.0072	.0852
6	806	.040	.034	.074	761	.0295	.037	.0665	45	.051	.0049	.0559
7	583	.022	.018	.040	544	.016	.0198	.0358	34	.028	.0028	.0308
8	499	.015	.013	.028	471	.011	.0146	.0256	28	.020	.0018	.0218
9	393	.010	.0080	.0180	370	.0075	.0088	.0163	23	.013	.0013	.0143
10	308	.0065	.0051	.0116	290	.005	.0054	.0104	18	.008	.0008	.0088
11	172	.0025	.0015	.0040	161	.002	.0017	.0037	11	.003	.0003	.0033

No.	Q ₄ -Q ₆	TP ₄ -TP ₅	Q ₆	TP ₄ -TP ₆	% AIR DIVERTED
13					
14	1664	.027	100	.0727	5.67
15	1509	.020	91	.0575	5.68
16	1320	.0165	79	.0479	5.65
17	1127	.0125	68	.0331	5.69
18	935	.008	56	.0228	5.65
19	761	.0075	45	.0181	5.59
20	040	.0042	34	.0092	5.84
21	028	.0024	28	.0062	5.62
22	0180	.0017	23	.0037	5.85
23	0116	.0012	18	.0028	5.85
24	0040	.0003	11	.0007	6.40

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"x8" ST. & 3"x8" TAKE-OFF
ORIFICES 16 1/2" x 6 1/2" & 6 1/4" x 1 1/4"

Observers { _____ } { _____ } Date AUG 26, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1764	.179	.161	.340	1664	.140	.1173	.313	100	.245	.0223	.2673
2	1600	.150	.130	.280	1509	.116	.144	.260	91	.203	.0195	.2225
3	1399	.1155	.102	.2175	1320	.088	.113	.201	79	.155	.0146	.1696
4	1195	.085	.072	.157	1127	.0645	.080	.1445	68	.113	.0109	.1239
5	991	.058	.050	.108	935	.044	.056	.100	56	.078	.0072	.0852
6	806	.040	.034	.074	761	.0295	.037	.0665	45	.051	.0049	.0559
7	583	.022	.018	.040	549	.016	.0198	.0358	34	.028	.0028	.0308
8	499	.015	.013	.028	471	.011	.0146	.0256	28	.020	.0018	.0218
9	393	.010	.0080	.0180	370	.0075	.0088	.0163	23	.013	.0013	.0143
10	308	.0065	.0051	.0116	290	.005	.0054	.0104	18	.008	.0008	.0088
11	172	.0025	.0015	.0040	161	.002	.0017	.0037	11	.003	.0003	.0033
12												
13				Q ₄ -Q ₆	TP ₄ -TP ₅			Q ₆	TP ₄ -TP ₅	% AIR DIVERTED		
14				1664	.027			100	.0727	5.67		
15				1509	.020			91	.0575	5.68		
16				1320	.0165			79	.0479	5.65		
17				1127	.0125			68	.0331	5.69		
18				935	.008			56	.0228	5.65		
19				761	.0075			45	.0181	5.59		
20				040	.0042			34	.0092	5.84		
21				028	.0024			28	.0062	5.62		
22				0180	.0017			23	.0037	5.85		
23				0116	.0012			18	.0028	5.85		
24				0040	.0003			11	.0007	6.40		
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST. & 3"X8" TAKE-OFF
ORIFICES 16 $\frac{1}{2}$ "X6 $\frac{1}{2}$ " & 6 $\frac{1}{4}$ "X1 $\frac{1}{4}$ "

Observers { _____ } { _____ } Date AUG 26, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₆	SP ₆	VP ₆	TP ₆	Q ₆	SP ₆	VP ₆	TP ₆
1	1764	.179	.161	.340	1664	.140	.1173	.313	100	.245	.0223	.2673
2	1600	.150	.130	.280	1509	.116	.144	.260	91	.203	.0195	.2225
3	1399	.1155	.102	.2175	1320	.088	.113	.201	79	.155	.0146	.1696
4	1195	.085	.072	.157	1127	.0645	.080	.1445	68	.113	.0109	.1239
5	991	.058	.050	.108	935	.044	.056	.100	56	.078	.0072	.0852
6	806	.040	.034	.074	761	.0295	.037	.0665	45	.051	.0049	.0559
7	583	.022	.018	.040	549	.016	.0198	.0358	34	.028	.0028	.0308
8	499	.015	.013	.028	471	.011	.0146	.0256	28	.020	.0018	.0218
9	393	.010	.0080	.0180	370	.0075	.0088	.0163	23	.013	.0013	.0143
10	308	.0065	.0051	.0116	290	.005	.0054	.0104	18	.008	.0008	.0088
11	172	.0025	.0015	.0040	161	.002	.0017	.0037	11	.003	.0003	.0033
12												
13			Q ₄ -Q ₆	TP ₄ -TP ₆		Q ₆	TP ₄ -TP ₆		% AIR DIVERTED			
14			1664	.027		100	.0727		5.67			
15			1509	.020		91	.0575		5.68			
16			1320	.0165		79	.0479		5.65			
17			1127	.0125		68	.0331		5.69			
18			935	.008		56	.0228		5.65			
19			761	.0075		45	.0181		5.59			
20			040	.0042		34	.0092		5.84			
21			028	.0024		28	.0062		5.62			
22			0180	.0017		23	.0037		5.85			
23			0116	.0012		18	.0028		5.85			
24			0040	.0003		11	.0007		6.40			
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 13" T-OFF
ORIFICES 16 1/2" X 6 1/2" & 6" X 1"

Observers { _____ } { _____ } Date AUG 30, 19 49

TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRY OF	DISC OF	BAR. IN HG.	CFM MAIN	CFM ST	CFM T-OFF
1 2:45	5.00	.1189	.141	.259	67.0	74.0	79.0	2916	1760	1750	74
2 2:50	4.12	.1575	.117	.214					1597	1580	67
3 2:55	3.20	.123	.0905	.166			79.5		1405	1400	59
4 3:00	2.27	.088	.0645	.119					1186	1175	50
5 3:07	1.58	.062	.045	.083			81.0		989	984	42
6 3:12	1.04	.040	.028	.0525					801	775	33
7 3:15	.555	.0175	.0152	.0295					585	572	25
8 3:20	.407	.015	.011	.021			81.5		501	485	21
9 3:24	.245	.010	.007	.0125					388	388	16
10 3:28	.153	.0058	.0045	.0075					308	310	12
11 3:31	.081	.003	.0022	.0040			80.5		224	218	9
12											
13											
14											
15											
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17											
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19											
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23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST. X 8" X 13" TAKE-OFF
ORIFICES 16 1/2" X 6 1/2" & 6" X 1"

Observers { _____ } { _____ } Date AUG 30, 19 42

$\frac{Q}{Z}$	Q_4	SP_4	VP_4	TP_4	Q_4-Q_6	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1760	.189	.160	.349	1686	.141	.180	.321	74	.259	.013	.272
2	1597	.1575	.130	.2875	1530	.117	.149	.266	67	.214	.0105	.2245
3	1405	.123	.103	.226	1346	.0905	.118	.2085	59	.166	.0088	.1748
4	1186	.088	.071	.159	1136	.0645	.081	.1455	50	.119	.0059	.1249
5	989	.062	.050	.112	947	.045	.058	.103	42	.083	.0043	.0873
6	801	.040	.034	.074	768	.028	.038	.066	33	.0525	.0026	.0551
7	585	.0175	.018	.0355	560	.0152	.0205	.0355	25	.0295	.0015	.0310
8	501	.015	.0134	.0284	480	.011	.015	.026	21	.021	.0011	.0221
9	388	.010	.0077	.0177	372	.007	.0091	.0161	16	.0125	.0006	.0131
10	308	.0058	.0051	.0109	296	.0045	.0057	.0102	12	.0075	.0003	.0078
11	224	.003	.0026	.0056	215	.0022	.0030	.0052	9	.0040	.0002	.0042

	Q_4-Q_6	TP_4-TP_5	Q_6	TP_5-TP_6	% AIR DIVERTED
13					
14	1686	.028	74	.077	4.20
15	1530	.0215	67	.0630	4.20
16	1346	.0175	59	.0512	4.20
17	1136	.0135	50	.0341	4.21
18	947	.009	42	.0247	4.25
19	768	.008	33	.0224	4.13
20	560	.0060	25	.0045	4.28
21	480	.0024	21	.0063	4.20
22	372	.0016	16	.0046	4.13
23	296	.0007	12	.0031	3.90
24	215	.0004	9	.0014	4.01
25					

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 13" TAKE-OFF
ORIFICES 16 1/2" X 6 1/2" & 6" X 1"

Observers { _____ } { _____ } Date AUG 30, 19 49

NO.	Q_4	SP_4	VP_4	TP_4	Q_4-Q_6	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1760	.189	.160	.349	1686	.141	.180	.321	74	.259	.013	.272
2	1597	.1575	.130	.2875	1530	.117	.149	.266	67	.214	.0105	.2245
3	1405	.123	.103	.226	1346	.0905	.118	.2085	59	.166	.0088	.1748
4	1186	.088	.071	.159	1136	.0645	.081	.1455	50	.119	.0059	.1249
5	989	.062	.050	.112	947	.045	.058	.103	42	.083	.0043	.0873
6	801	.040	.034	.074	768	.028	.038	.066	33	.0525	.0026	.0551
7	585	.0175	.018	.0355	560	.0152	.0205	.0355	25	.0295	.0015	.0310
8	501	.015	.0134	.0284	480	.011	.015	.026	21	.021	.0011	.0221
9	388	.010	.0077	.0177	372	.007	.0091	.0161	16	.0125	.0006	.0131
10	308	.0058	.0051	.0109	296	.0045	.0057	.0102	12	.0075	.0003	.0078
11	224	.003	.0026	.0056	215	.0022	.0030	.0052	9	.0040	.0002	.0042

	Q_4-Q_6	TP_4-TP_6	Q_6	TP_5-TP_6	% AIR DIVERTED
12					
13					
14	1686	.028	74	.077	4.20
15	1530	.0215	67	.0630	4.20
16	1346	.0175	59	.0512	4.20
17	1136	.0135	50	.0341	4.21
18	947	.009	42	.0247	4.25
19	768	.008	33	.0229	4.13
20	560	.0000	25	.0045	4.28
21	480	.0024	21	.0063	4.20
22	372	.0016	16	.0046	4.13
23	296	.0007	12	.0031	3.90
24	215	.0004	9	.0014	4.01
25					

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST x 8"X3" T-OFF
ORIFICES 16"X6" x 7"X2"

Observers { _____ } { _____ } Date AUG 30, 19 49

z	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	3:48	4.97	.1975	.183	.188	66.5	75.0	79.5	29.6	1753	1580	197
2	3:53	4.12	.165	.153	.155					1597	1450	178
3	3:59	3.19	.127	.1175	.120			80.0		1402	1220	156
4	4:03	2.33	.094	.0855	.087					1200	1080	133
5	4:07	1.65	.066	.060	.061					1009	910	112
6	4:15	1.04	.042	.0375	.0375			81.0		801	720	88
7	4:19	.590	.024	.021	.0205					604	540	64
8	4:23	.446	.018	.0152	.0147			81.0		525	458	55
9	4:29	.236	.0095	.008	.0079					382	332	39
10	4:33	.140	.006	.005	.0042					294	263	29
11	4:42	.063	.003	.0023	.0017	66.5	75.0	79.5	29.15	197	178	19
12												
13												
14												
15												
16												
17												
18												
19												
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22												
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X18" ST. & 8"X3" TAKE-OFF
ORIFICES 16"X6" & 7"X2"

Observers { _____ } { _____ } Date Aug 30, 19 49

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_6	VP_6	TP_6	Q_6	SP_6	VP_6	TP_6
1	1753	.1975	.160	3575	1556	.183	.150	.333	197	.188	.088	.276
2	1597	.165	.130	.295	1419	.153	.130	.283	178	.155	.072	.227
3	1402	.127	.104	.231	1246	.1175	.100	.2175	156	.120	.056	.176
4	1200	.094	.072	.166	1067	.0855	.071	.1565	133	.087	.040	.127
5	1009	.066	.052	.118	897	.060	.051	.111	112	.061	.029	.090
6	801	.042	.038	.080	713	.0375	.033	.0705	88	.0375	.018	.0555
7	604	.024	.0192	.0432	540	.021	.019	.040	64	.0205	.0099	.0304
8	525	.018	.0143	.0323	470	.0152	.0147	.0299	55	.0147	.0071	.0218
9	382	.0095	.0075	.0170	343	.008	.0074	.0154	39	.0073	.0036	.0109
10	294	.006	.0045	.0105	265	.005	.0045	.0095	29	.0042	.0020	.0062
11	197	.003	.0020	.0050	178	.0023	.0020	.0043	19	.0017	.0009	.0026
12												
13			$Q_4 - Q_6$	$TP_4 - TP_6$		Q_6	$TP_4 - TP_6$		% AIR DIVERTED			
14			1556	.0245		197	.0815		11.20			
15			1419	.012		178	.068		11.13			
16			1246	.0135		156	.055		11.11			
17			1067	.0095		133	.039		11.09			
18			897	.007		112	.028		11.10			
19			713	.0095		88	.0245		11.00			
20			540	.0032		64	.0128		10.60			
21			470	.0024		55	.0105		10.48			
22			343	.0016		39	.0061		10.21			
23			265	.0010		29	.0043		9.87			
24			178	.0007		19	.0024		9.65			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 3" TAKE-OFF
ORIFICES 16" X 6" & 6 1/2" X 1 1/2"

Observers {

Date Aug 31, 19 49

NO.	TIME	P ₁ -P ₂	P ₄	P ₅	P ₆	NET OF	DRY OF	DISCH OF	BAR IN HG.	CFM MAIN	CFM ST	CFM T-OFF
1	9:30	4.93	.2255	.197	.270	65.0	77.0	78.5	29.06	1752	1640	139
2	9:58	4.17	.192	.167	.228			81.0		1605	1520	128
3	10:09	3.20	.148	.128	.175					1405	1340	112
4	10:13	2.335	.109	.093	.127					1200	1130	95
5	10:17	1.715	.079	.068	.092			82.0		1030	965	81
6	10:21	1.055	.049	.041	.056					807	750	64
7	10:24	.540	.025	.0205	.028					578	530	45
8	10:28	.419	.019	.0155	.0215			83.5		509	460	39
9	10:32	.229	.010	.008	.0115					376	330	29
10	10:37	.131	.006	.0045	.0062					284	248	21
11	10:41	.066	.0025	.002	.003	65.0	77.0	83.2		192	166	15
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST. & 8"X3" TAKE-OFF
ORIFICES 16"X6" & 6 1/2" X 1 1/2"

Observers { _____ } { _____ } Date Aug 31, 19 49

Time	P ₁ -P ₂	P ₄	P ₅	P ₆	WET OF	DRY OF	DISCH OF	BAR IN HG.	CFM MAIN	CFM ST	CFM T-OFF
1 9:30	4.93	.2255	.197	.270	65.0	77.0	78.5	29.06	1752	1640	139
2 9:58	4.17	.192	.167	.228			81.0		1605	1520	128
3 10:09	3.20	.148	.128	.175					1405	1340	112
4 10:13	2.335	.109	.093	.127					1200	1130	95
5 10:17	1.715	.079	.068	.092			82.0		1030	965	81
6 10:21	1.055	.049	.041	.056					807	750	64
7 10:24	.540	.025	.0205	.028					578	530	45
8 10:28	.419	.019	.0155	.0215			83.5		509	460	39
9 10:32	.229	.010	.008	.015					376	330	29
10 10:37	.131	.006	.0045	.0062					284	248	21
11 10:41	.066	.0025	.002	.003	65.0	77.0	83.2		192	166	15

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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18"X8" ST. x 8"X3" TAKE-OFF
ORIFICES 16"X6" x 6 1/2" x 1 1/2"

Observers { _____ } { _____ } Date Aug 31, 19 42

z	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1752	.2255	.160	.3855	1613	.197	.162	.359	139	.270	.044	.314
2	1605	.192	.132	.324	1477	.167	.140	.301	128	.228	.037	.265
3	1405	.148	.103	.251	1293	.128	.108	.236	112	.175	.029	.204
4	1200	.109	.072	.181	1105	.093	.077	.170	95	.127	.021	.148
5	1030	.079	.055	.134	949	.068	.058	.126	81	.092	.0155	.1075
6	807	.049	.034	.083	743	.041	.035	.076	64	.056	.0099	.0659
7	578	.025	.018	.043	533	.0205	.0185	.0390	45	.028	.0049	.0329
8	509	.019	.014	.033	470	.0155	.0147	.0302	39	.0215	.0036	.0251
9	376	.010	.0073	.0173	347	.008	.0077	.0157	29	.0115	.0020	.0135
10	284	.006	.0042	.0102	263	.0045	.0045	.0090	21	.0062	.0011	.0073
11	192	.0025	.0019	.0044	177	.002	.0021	.0041	15	.0030	.0005	.0035
12												
13			Q ₄ -Q ₆	TP ₄ -TP ₅		Q ₆	TP ₆ -TP ₅		% AIR DIVERTED			
14			1613	.0265		139	.0715		7.94			
15			1477	.017		128	.059		7.98			
16			1293	.015		112	.047		7.97			
17			1105	.011		95	.033		7.92			
18			949	.008		81	.0265		7.86			
19			743	.007		64	.0171		7.93			
20			533	.0040		45	.0101		7.79			
21			470	.0028		39	.0079		7.67			
22			347	.0016		29	.0038		7.72			
23			263	.0012		21	.0029		7.40			
24			177	.0003		15	.0009		7.82			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INC. TYPE 18" x 8" ST. & 8" x 3" T-OFF
ORIFICES 16" x 6" & 6 1/2" x 1 1/4"

Observers {

Date AUG 31, 19 49

TIME	P ₃ -P ₂	P ₄	P ₃	P ₆	WET OF	DRY OF	DISCH OF	BAR IN HG	CFM MAIN	CFM ST	CFM T-OFF
1 11:00	4.89	.238	.201	.296	65.0	77.0	82.0	2904	1739	1650	110
2 11:06	4.16	.204	.172	.253					1602	1540	102
3 11:11	3.23	.157	.133	.195					1413	1350	89
4 11:16	2.31	.114	.095	.140			82.8		1195	1150	75
5 11:21	1.62	.080	.066	.0975					1000	955	63
6 11:26	1.05	.052	.0425	.063					806	765	51
7 11:31	.560	.0275	.0215	.033			83.0		588	545	36
8 11:36	.428	.021	.016	.025					515	470	32
9 11:40	.250	.012	.010	.014					392	370	24
10 11:44	.1375	.0055	.005	.007			81.5		292	263	17
11 11:47	.057	.0028	.0025	.0030	65.0	74.0		2905	188	185	11
12											
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" x 18" ST. & 8" x 18" TAKE OFF
ORIFICES 16" x 16" & 6 1/4" x 1 1/4"

Observers {

Date AUG 31, 19 42

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1739	.238	.157	.345	1629	.201	.168	.369	110	.296	.028	.324
2	1602	.204	.131	.334	1500	.172	.143	.315	102	.253	.0238	.2768
3	1413	.157	.105	.264	1324	.133	.113	.246	89	.195	.0188	.2138
4	1195	.114	.072	.186	1120	.095	.079	.174	75	.140	.0134	.1534
5	1000	.080	.050	.130	937	.066	.056	.122	63	.0975	.0095	.1070
6	806	.052	.034	.086	755	.0425	.036	.0785	51	.063	.0061	.0690
7	518	.0275	.018	.0455	552	.0215	.0197	.0412	36	.033	.0030	.0360
8	515	.021	.014	.035	483	.016	.015	.031	32	.025	.0024	.0274
9	392	.012	.0078	.0198	368	.010	.0088	.0188	24	.014	.0015	.0155
10	292	.0055	.0044	.0099	275	.005	.0049	.0099	17	.007	.0008	.0078
11	188	.0028	.0019	.0047	177	.0025	.0021	.0046	11	.003	.0003	.0033
12												
13			$Q_4 - Q_6$	$TP_4 - TP_5$		Q_6	$TP_4 - TP_6$		% AIR DIVERTED			
14			1629	.026		110	.071		6.33			
15			1500	.019		102	.0572		6.37			
16			1324	.016		89	.0482		6.30			
17			1120	.012		75	.0326		6.28			
18			937	.008		63	.0230		6.30			
19			755	.0075		51	.0170		6.34			
20			552	.0043		36	.0095		6.13			
21			483	.004		32	.0076		6.22			
22			368	.0010		24	.0043		6.13			
23			275	.0008		17	.0021		5.83			
24			177	.0001		11	.0014		5.83			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" x 18" ST. & 8" x 18" TAKE OFF
ORIFICES 16" x 6" & 6 1/4" x 1 1/4"

Observers {

Date AUG 31, 19 49

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1739	.238	.157	.345	1629	.201	.168	.369	110	.296	.028	.324
2	1602	.204	.131	.334	1500	.172	.143	.315	102	.253	.0238	.2768
3	1413	.157	.105	.264	1324	.133	.113	.246	89	.195	.0188	.2138
4	1195	.114	.072	.186	1120	.095	.079	.174	75	.140	.0134	.1534
5	1000	.080	.050	.130	937	.066	.056	.122	63	.0975	.0095	.1070
6	806	.052	.034	.086	755	.0425	.036	.0785	51	.063	.0061	.0690
7	518	.0275	.018	.0455	552	.0215	.0197	.0412	36	.033	.0030	.0360
8	515	.021	.014	.035	483	.016	.015	.031	32	.025	.0024	.0274
9	392	.012	.0078	.0198	368	.010	.0088	.0188	24	.014	.0015	.0155
10	292	.0055	.0044	.0099	275	.005	.0049	.0099	17	.007	.0008	.0078
11	188	.0028	.0019	.0047	177	.0025	.0021	.0046	11	.003	.0003	.0033
12												
13			$Q_4 - Q_6$	$TP_4 - TP_6$			Q_6	$TP_4 - TP_6$		% AIR DIVERTED		
14			1629	.026			110	.071		6.33		
15			1500	.019			102	.0572		6.37		
16			1324	.016			89	.0482		6.30		
17			1120	.012			75	.0326		6.28		
18			937	.008			63	.0230		6.30		
19			755	.0075			51	.0170		6.34		
20			552	.0043			36	.0095		6.13		
21			483	.004			32	.0076		6.22		
22			368	.0010			24	.0043		6.13		
23			275	.0008			17	.0021		5.83		
24			177	.0001			11	.0014		5.83		
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 3" T-OFF
ORIFICES 16" X 6" & 6" X 1"

Observers {

Date Sept 28, 19 49

No.	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	8:00	4.58	.256	.208	.324	58.5	77.5	80.5	29.22	1738	1690	82
2	8:10	4.14	.221	.179	.279					1600	1570	76
3	8:15	3.18	.170	.137	.213					1400	1370	67
4	8:20	2.36	.126	.102	.158					1208	1180	57
5	8:25	1.66	.091	.071	.113					1012	985	48
6	8:30	1.07	.060	.047	.073					815	805	39
7	8:35	.545	.034	.026	.042					606	600	30
8	8:38	.440	.025	.019	.030					521	505	25
9	8:43	.242	.014	.011	.017					387	390	19
10	8:46	.145	.009	.007	.011					299	310	15
11	8:48	.055	.005	.004	.005	58.0	77.5	79.5	29.23	184	235	10

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INC. TYPE 18" X 8" ST. & 8" X 3" T-OFF
ORIFICES 16" X 6" & 6" X 1"

Observers {

Date

Sept 28, 19 49

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_6	VP_6	TP_6	Q_6	SP_6	VP_6	TP_6
1	1738	.256	.157	.413	1656	.208	.172	.380	82	.324	.06	.340
2	1600	.221	.132	.353	1524	.179	.146	.328	76	.279	.0133	.2923
3	1400	.170	.104	.274	1333	.137	.116	.253	67	.213	.0105	.2235
4	1208	.126	.075	.201	1151	.102	.082	.184	57	.158	.0076	.1656
5	1012	.091	.052	.145	964	.071	.060	.131	48	.113	.0054	.1184
6	815	.060	.035	.095	776	.047	.039	.086	39	.073	.0036	.0766
7	606	.034	.0193	.0533	576	.026	.0215	.0475	30	.042	.0021	.0441
8	521	.025	.0155	.0405	496	.019	.016	.035	25	.030	.0015	.0315
9	387	.014	.0077	.0217	368	.011	.0088	.0198	19	.017	.0009	.0179
10	299	.009	.0047	.0137	284	.007	.0052	.0122	15	.011	.0008	.0115
11	184	.005	.0018	.0068	174	.004	.0020	.0060	10	.005	.0002	.0052
12												
13			$Q_4 - Q_6$	$TP_4 - TP_6$		Q_6	$TP_6 - TP_6$					
14			1656	.033		82	.073					% AIR DIVERTED
15			1524	.025		76	.0607					4.72
16			1333	.021		67	.0505					4.75
17			1151	.017		57	.0354					4.79
18			964	.012		48	.0246					4.71
19			776	.009		39	.0184					4.74
20			576	.0058		30	.0092					4.79
21			496	.0055		25	.0090					4.95
22			368	.0019		19	.0038					4.89
23			284	.0015		15	.0022					4.91
24			174	.0008		10	.0016					5.02
25												5.44

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INC. TYPE 18" x 18" ST. & 8" x 3" T.-OFF
ORIFICES 15 1/2" x 5 1/2" & 7" x 2"

Observers { _____ } { _____ } Date Sep 28, 19 49

TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRY OF	DISCH OF	BAR IN HG.	CFM MAIN	CFM ST.	CFM T-OFF
1 9:10	4.84	.292	.280	.249	58.0	77.5	78.5	29.23	1730	1540	226
2 9:18	4.16	.251	.243	.213					1602	1440	210
3 9:22	3.19	.193	.185	.161			80		1402	1250	186
4 9:27	2.36	.143	.137	.119					1208	1080	156
5 9:30	1.61	.098	.093	.080			80.5		999	890	127
6 9:34	1.03	.063	.060	.051					798	710	102
7 9:38	.602	.037	.035	.028			80.7		610	540	76
8 9:40	.394	.024	.022	.018					494	430	60
9 9:43	.243	.015	.013	.011			80.5		387	330	47
10 9:45	.140	.008	.007	.006					294	240	35
11 9:47	.055	.003	.003	.002	59.0	75.0		29.24	184	158	20

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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18"x8" ST. + 8"x3" TAKE OFF
ORIFICES 15½" x 5½" + 7"x2"

Observers { _____ } { _____ } Date Sept 28, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1730	.292	.156	.448	1504	.280	.145	.425	226	.249	.115	.364
2	1602	.251	.131	.381	1392	.243	.123	.366	210	.213	.102	.315
3	1402	.193	.104	.294	1222	.185	.099	.284	180	.161	.074	.235
4	1208	.143	.075	.218	1052	.137	.070	.207	156	.119	.055	.174
5	999	.098	.050	.148	872	.093	.049	.142	127	.080	.036	.116
6	798	.063	.033	.096	696	.060	.031	.091	102	.051	.0238	.0748
7	610	.037	.0195	.0565	534	.035	.0187	.0537	76	.028	.0133	.0413
8	494	.024	.013	.037	434	.022	.0121	.0341	60	.018	.0085	.0265
9	387	.015	.0077	.0227	340	.013	.0075	.0205	47	.011	.0051	.0161
10	294	.008	.0045	.0125	259	.007	.0043	.0113	35	.006	.0029	.0089
11	184	.003	.0018	.0048	164	.003	.0017	.0049	20	.002	.0009	.0029
12												
13			Q ₄ -Q ₆	TP ₄ -TP ₅		Q ₆	TP ₄ -TP ₆		% AIR	DIVERTED		
14			1504	.023		226	.084		13.07			
15			1392	.015		210	.066		13.10			
16			1222	.010		180	.059		12.83			
17			1052	.011		156	.044		12.92			
18			872	.006		127	.032		12.71			
19			696	.005		102	.0212		12.78			
20			534	.0028		76	.0152		12.47			
21			434	.0029		60	.0105		12.15			
22			340	.0022		47	.0066		12.12			
23			259	.0012		35	.0036		11.91			
24			164	.0001		20	.0019		10.87			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE MAIN 8" x 8" x 3" x 8" TIRE-OFF
ORIFICES 15 1/2" x 5 1/2" x 6 1/2" x 1 1/2"

Observers {

Date Sept 29, 19 49

No.	Time	P _{3-P₂}	P ₄	P ₅	P ₆	DRY OF	WET OF	Disch OF	CFM MAIN	CFM ST	CFM T-OFF	BAR IN HG
1	7:41	4.805	.328	.302	.356	74	61.3	79	1721	1590	160	29.31
2	7:46	4.140	.285	.261	.307				1600	1485	148	
3	7:49	3.165	.218	.200	.235			80.0	1398	1300	130	
4	7:52	2.355	.161	.146	.173				1204	1110	112	
5	7:55	1.650	.114	.103	.121				1009	935	93	
6	7:58	1.020	.0705	.063	.074				795	730	73	
7	8:00	.575	.046	.036	.042				596	550	55	
8	8:02	.416	.0285	.025	.0295			81.5	507	458	46	
9	8:06	.260	.0177	.015	.018				401	355	36	
10	8:10	.139	.0095	.008	.010				293	258	27	
11	8:13	.058	.0040	.003	.004	75.0	59.0	81.0	190	158	17	29.32
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE MAIN 8"x8" x 3"x8" TAKE-OFF
ORIFICES 15 1/2" x 5 1/2" x 6 1/2" x 1 1/2"

Observers { _____ } { _____ } Date Sept 29, 19 49

No.	Time	P _{3-P₂}	P ₄	P ₅	P ₆	DRY °F	WET °F	DISEN °F	CFM MAIN	CFM ST	CFM T-OFF	BAR IN HG
1	7:41	4.805	.328	.302	.356	74	61.3	79	1721	1590	160	29.31
2	7:46	4.140	.285	.261	.307				1600	1485	148	
3	7:49	3.165	.218	.200	.235			80.0	1398	1300	130	
4	7:52	2.355	.161	.146	.173				1204	1110	112	
5	7:55	1.650	.114	.103	.121				1009	935	93	
6	7:58	1.020	.0705	.063	.074				795	730	73	
7	8:00	.575	.040	.036	.042				596	550	55	
8	8:02	.416	.0285	.025	.0295			81.5	507	458	46	
9	8:06	.260	.0177	.015	.018				401	355	36	
10	8:10	.139	.0095	.008	.010				293	258	27	
11	8:13	.058	.0040	.003	.004	75.0	59.0	81.0	190	158	17	29.32
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14												
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE MAIN 8" x 8" x 3" x 8" TAKE-OFF
ORIFICES 1 1/2" x 3 1/2" x 6 1/2" x 1 1/2"

Observers {

Date

Sept 29, 19 49

No.	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	DRY °F	WET °F	Disc. °F	CFM MAIN	CFM ST	CFM T-OFF	BAR IN HG
1	7:41	4.805	.328	.302	.356	74	61.3	79	1721	1590	160	29.31
2	7:46	4.140	.285	.261	.307				1600	1485	148	
3	7:49	3.165	.218	.200	.235			80.0	1398	1300	130	
4	7:52	2.355	.161	.146	.173				1204	1110	112	
5	7:55	1.650	.114	.103	.121				1009	935	93	
6	7:58	1.020	.0705	.063	.074				795	730	73	
7	8:00	.575	.046	.036	.042				596	550	55	
8	8:02	.416	.0285	.025	.0295			81.5	507	458	46	
9	8:06	.260	.0177	.015	.018				401	355	36	
10	8:10	.139	.0095	.008	.010				293	258	27	
11	8:13	.058	.0040	.003	.004	75.0	59.0	81.0	190	158	17	29.32
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASED TYPE MAIN 18" x 18" + 3" x 18" TATE OFF
ORIFICES 15 1/2" x 5 1/2" x 6 1/2" x 1 1/2"

Observers {

Date Sept 29, 19 49

$\frac{Q}{Z}$	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1721	.328	.155	.483	1561	.302	.152	.454	160	.356	.059	.415
2	1600	.285	.130	.415	1452	.261	.135	.396	148	.307	.050	.357
3	1398	.218	.103	.321	1268	.200	.103	.303	130	.235	.039	.274
4	1204	.161	.073	.234	1092	.146	.074	.220	112	.173	.029	.202
5	1009	.114	.052	.166	916	.103	.053	.156	93	.121	.0202	.1412
6	795	.0705	.033	.1035	722	.063	.034	.097	73	.074	.0128	.0868
7	596	.040	.0188	.0588	541	.036	.019	.055	55	.042	.0071	.0491
8	507	.0285	.0138	.0423	461	.025	.0138	.0388	46	.0295	.0050	.0345
9	401	.0177	.0082	.0259	365	.015	.0086	.0236	36	.018	.0031	.0211
10	293	.0095	.0044	.0139	266	.008	.0045	.0125	27	.010	.0017	.0117
11	190	.0040	.0019	.0059	173	.003	.0019	.0049	17	.004	.0007	.0047
12												
13			$Q_4 - Q_6$	$TP_4 - TP_5$			Q_6	$TP_4 - TP_6$		% AIR DIVERTED		
14			1561	.029			160	.068		9.30		
15			1452	.019			148	.058		9.26		
16			1268	.018			130	.047		9.30		
17			1092	.014			112	.032		9.31		
18			916	.010			93	.0248		9.22		
19			722	.0065			73	.0167		9.19		
20			541	.0038			55	.0097		9.23		
21			461	.0035			46	.0078		9.07		
22			365	.0023			36	.0048		8.99		
23			266	.0014			27	.0022		8.32		
24			173	.0010			17	.0012		8.95		
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" 5T X 3" X 8" TAKE OFF
ORIFICES 15½ X 5½ X 6½ X 1½

Observers {

Date

Sept 29, 19 49

2	Time	P ₁ -P ₂	P ₄	P ₅	P ₆	DRY OF	WET OF	DISCH OF	BAR IN HG.	CFM MAIN	CFM ST	CFM T-OFF
1	8:29	4.750	.345	.312	.397	74.0	59.5	79.5	2932	1712	1620	127
2	8:32	4.170	.306	.275	.349					1603	1530	119
3	8:35	3.170	.231	.208	.265					1399	1330	103
4	8:38	2.370	.174	.155	.197			74.5		1210	1150	90
5	8:41	1.650	.122	.1075	.137					1009	950	74
6	8:44	1.040	.077	.067	.086					801	750	59
7	8:47	.570	.0425	.037	.047					593	560	44
8	8:50	.395	.0295	.025	.032			80.0		495	458	36
9	8:54	.238	.0175	.015	.019					384	355	28
10	8:56	.134	.010	.0085	.0105					287	265	20
11	8:58	.062	.0048	.0040	.0052	74.0	58.0	79.5	2933	196	183	14
12												
13												
14												
15												
16												
17												
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASED TYPE 18" x 8" ST & 3" x 8" TAKE OFF
ORIFICES 15½" x 5½" & 6½" x 1½"

Observers { _____ }

Date Sept 29, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1712	.345	.152	.497	.1585	.312	.157	.469	127	.397	.0360	.4330
2	1603	.306	.131	.437	1484	.275	.140	.415	119	.349	.0330	.3820
3	1399	.231	.103	.334	1296	.208	.110	.318	103	.265	.0240	.2890
4	1210	.174	.075	.249	1120	.155	.080	.235	90	.197	.0191	.2161
5	1009	.122	.052	.174	935	.1075	.056	.1635	74	.137	.0130	.1500
6	801	.077	.033	.110	742	.067	.035	.102	59	.086	.0082	.0942
7	593	.0425	.0183	.0608	549	.037	.0198	.0568	44	.047	.0047	.0517
8	495	.0295	.0128	.0423	459	.025	.0135	.0385	36	.032	.003	.035
9	384	.0175	.0078	.0253	356	.015	.0081	.0231	28	.019	.0018	.0208
10	287	.010	.0048	.0143	267	.0085	.0046	.0131	20	.0105	.0009	.0114
11	196	.0048	.0020	.0068	182	.0040	.0021	.0061	14	.0052	.0004	.0056
12												
13			Q ₄ -Q ₆	TP ₄ -TP ₅		Q ₆	TP ₄ -TP ₆		% AIR DIVERTED			
14			1585	.028		127	.0640		7.42			
15			1484	.022		119	.0550		7.43			
16			1296	.016		103	.0450		7.37			
17			1120	.014		90	.0329		7.44			
18			935	.0105		74	.0240		7.33			
19			742	.008		59	.0158		7.37			
20			549	.0040		44	.0091		7.43			
21			459	.0038		36	.0073		7.27			
22			356	.0022		28	.0045		7.30			
23			267	.0012		20	.0029		6.97			
24			182	.0007		14	.0012		7.15			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST. & 8"X3" T-OFF
ORIFICES 15 1/2" X 5 1/2" & 6" X 1"

Observers {

Date

Sept 24, 19 49

TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR IN HG	CFM MAIN	CFM ST	CFM T-O
1 9:14	4.735	.367	.324	.432	58.0	73.0	78.5	29.33	1711	1650	95
2 9:18	4.145	.323	.285	.380					1600	1545	89
3 9:26	3.145	.247	.215	.287					1392	1345	77
4 9:28	2.310	.180	.157	.210			78.5		1195	1150	66
5 9:30	1.630	.128	.111	.148					1003	965	56
6 9:32	1.010	.079	.068	.0905					790	755	44
7 9:35	.575	.045	.038	.0515					596	565	33
8 9:37	.414	.0325	.0275	.0370					506	478	28
9 9:39	.250	.0195	.016	.022					392	367	22
10 9:42	.142	.0110	.0095	.0123					296	282	16
11 9:45	.058	.0047	.0040	.005	57.5	72.0	78.5	29.34	190	183	10
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST. & 8"X3" TAKE OFF
ORIFICES 15 1/2" X 5 1/2" & 6" X 1"

Observers { _____ } { _____ } Date Sept 29, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1711	.367	.152	.519	1616	.324	.162	.486	95	.432	.021	.453
2	1600	.323	.130	.453	1511	.285	.144	.429	89	.380	.0188	.3988
3	1392	.247	.101	.348	1315	.215	.111	.326	77	.287	.0140	.3010
4	1195	.180	.072	.252	1129	.157	.080	.237	66	.210	.0101	.2261
5	1003	.128	.051	.179	947	.111	.058	.169	56	.148	.0072	.1552
6	790	.079	.032	.111	746	.068	.035	.103	44	.0905	.0047	.0952
7	596	.045	.0188	.0638	563	.038	.0208	.0588	33	.0515	.0026	.0541
8	566	.0325	.0138	.0463	478	.0275	.0150	.0425	28	.0370	.0018	.0388
9	392	.0195	.0078	.0273	370	.016	.0088	.0248	22	.022	.0013	.0233
10	296	.0110	.0045	.0155	280	.0095	.0051	.0146	16	.0123	.0006	.0129
11	190	.0047	.0019	.0066	180	.0040	.0021	.0061	10	.005	.0002	.0052
12												
13												
14			Q ₄ -Q ₆	TP ₄ -TP ₅			Q ₆	TP ₄ -TP ₅		% AIR DIVERTED		
15			1616	.033			95	.066		5.56		
16			1511	.024			89	.0542		5.53		
17			1315	.022			77	.0470		5.53		
18			1129	.015			66	.0319		5.51		
19			947	.010			56	.0238		5.57		
20			746	.008			44	.0158		5.58		
21			563	.0050			33	.0097		5.54		
22			478	.0038			28	.0075		5.54		
23			370	.0025			22	.0040		5.62		
24			280	.0009			16	.0026		5.41		
25			180	.0005			10	.0014		5.26		

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST & 8"X3" T.-OFF
ORIFICES 15"X5" & 7"X2"

Observers { _____ } { _____ } Date Sept 30, 19 49

NO	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR IN HG.	CFM MAIN	CFM ST	CFM T.-OFF
1	7:45	4.71	.442	.441	.338	63.5	78.0	79.5	29.53	1706	1470	265
2	7:50	4.17	.394	.391	.301					1603	1380	248
3	7:54	3.24	.305	.304	.232			81.0		1415	1220	218
4	7:58	2.31	.218	.216	.164					1195	1035	184
5	8:02	1.66	.157	.155	.117			82.0		1012	870	155
6	8:06	1.04	.099	.097	.073					801	690	122
7	8:10	.560	.053	.052	.038			82.5		588	505	88
8	8:14	.430	.040	.039	.028					517	437	75
9	8:18	.266	.025	.0245	.017					405	346	59
10	8:22	.160	.015	.014	.0105					314	260	46
11	8:24	.052	.0055	.005	.004	58.5	77.0	82.0	29.53	179	155	28
12												
13												
14												
15												
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17												
18												
19												
20												
21												
22												
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"x8" ST. 48" x 3" TAKE OFF
ORIFICES 15"x5" & 7"x2"

Observers {

Date Sept 30, 19 49

$\frac{Q}{Z}$	Q_4	SP_4	VP_4	TP_4	Q_4-Q_6	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1706	.442	.150	.592	1441	.441	.118	.559	265	.338	.160	.498
2	1603	.394	.131	.525	1355	.391	.102	.493	248	.301	.142	.443
3	1415	.305	.105	.410	1197	.304	.090	.394	218	.232	.109	.341
4	1195	.218	.072	.290	1011	.216	.067	.284	184	.164	.078	.242
5	1012	.157	.052	.209	857	.155	.048	.203	155	.117	.056	.173
6	801	.099	.033	.132	679	.097	.030	.127	122	.073	.034	.107
7	588	.053	.018	.071	500	.052	.0162	.0682	88	.038	.018	.056
8	517	.040	.0139	.0539	442	.039	.0123	.0513	75	.028	.0134	.0414
9	405	.025	.0085	.0335	346	.0245	.0077	.0322	59	.017	.0082	.0252
10	314	.015	.0052	.0202	268	.014	.0046	.0186	46	.0105	.0050	.0155
11	179	.0055	.0017	.0072	151	.005	.0015	.0065	28	.004	.0018	.0058
12												
13			Q_4-Q_6	TP_4-TP_6		Q_6	TP_4-TP_6		% AIR DIVERTED			
14			1441	.033		265	.094		15.53			
15			1355	.032		248	.082		16.45			
16			1197	.016		218	.069		15.46			
17			1011	.007		184	.048		15.38			
18			857	.006		155	.036		15.30			
19			679	.005		122	.025		15.28			
20			500	.0028		88	.015		14.98			
21			442	.0026		75	.0125		14.50			
22			346	.0013		59	.0083		14.55			
23			268	.0016		46	.0047		14.63			
24			151	.0007		28	.0014		15.63			
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST. 48" X 3" TAKE OFF
ORIFICES 15" X 5" & 7" X 2"

Observers { _____ } { _____ } Date Sept 30, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q _{4-Q6}	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1706	.442	.150	.592	1441	.441	.118	.559	265	.338	.160	.498
2	1603	.394	.131	.525	1355	.391	.102	.493	248	.301	.142	.443
3	1415	.305	.105	.410	1197	.304	.090	.394	218	.232	.109	.341
4	1195	.218	.072	.290	1011	.216	.067	.284	184	.164	.078	.242
5	1012	.157	.052	.209	857	.155	.048	.203	155	.117	.056	.173
6	801	.099	.033	.132	679	.097	.030	.127	122	.073	.034	.107
7	588	.053	.018	.071	500	.052	.0162	.0682	88	.038	.018	.056
8	517	.040	.0139	.0539	442	.039	.0123	.0513	75	.028	.0134	.0414
9	405	.025	.0085	.0335	346	.0245	.0077	.0322	59	.017	.0082	.0252
10	314	.015	.0052	.0202	268	.014	.0046	.0186	46	.0105	.0050	.0155
11	179	.0055	.0017	.0072	151	.005	.0015	.0065	28	.004	.0018	.0058
12												
13			Q _{4-Q6}	TP _{4-TP6}			Q ₆	TP _{4-TP6}		% AIR DIVERTED		
14			1441	.033			265	.094		15.53		
15			1355	.032			248	.082		16.45		
16			1197	.016			218	.069		15.40		
17			1011	.007			184	.048		15.38		
18			857	.006			155	.036		15.30		
19			679	.005			122	.025		15.28		
20			500	.0028			88	.015		14.98		
21			442	.0026			75	.0125		14.50		
22			346	.0013			59	.0083		14.55		
23			268	.0016			46	.0047		14.63		
24			151	.0007			28	.0014		15.63		
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASED TYPE 18"x8" ST. & 8" x 3" TAKE OFF
ORIFICES 15"x5" & 7"x2"

Observers { _____ } { _____ } Date Sept 30, 19 49

Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1706	.442	.150	.592	1441	.441	.118	.559	265	.338	.160	.498
1603	.394	.131	.525	1355	.391	.102	.493	248	.301	.142	.443
1415	.305	.105	.410	1197	.304	.090	.394	218	.232	.109	.341
1195	.218	.072	.290	1011	.216	.067	.284	184	.164	.078	.242
1012	.157	.052	.209	857	.155	.048	.203	155	.117	.056	.173
801	.099	.033	.132	679	.097	.030	.127	122	.073	.034	.107
588	.053	.018	.071	500	.052	.0162	.0682	88	.038	.018	.056
517	.040	.0139	.0539	442	.039	.0123	.0513	75	.028	.0134	.0414
405	.025	.0085	.0335	346	.0245	.0077	.0322	59	.017	.0082	.0252
314	.015	.0052	.0202	268	.014	.0046	.0186	46	.0105	.0050	.0155
179	.0055	.0017	.0072	151	.005	.0015	.0065	28	.004	.0018	.0058
		Q ₄ -Q ₆	TP ₄ -TP ₆			Q ₆	TP ₄ -TP ₆	% AIR DIVERTED			
		1441	.033			265	.094	15.53			
		1355	.032			248	.082	16.45			
		1197	.016			218	.069	15.40			
		1011	.007			184	.048	15.38			
		857	.006			155	.036	15.30			
		679	.005			122	.025	15.28			
		500	.0028			88	.015	14.98			
		442	.0026			75	.0125	14.50			
		346	.0013			59	.0083	14.55			
		268	.0016			46	.0047	14.63			
		151	.0007			28	.0014	15.63			

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X8" ST & 8"X3" T-OFF
ORIFICES 15"X5" & 6 1/2" X 1 1/2"

Observers {

Date

Sept 30, 19 49

No.	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH °F	BAR. IT HE	CFM MAIN	CFM ST	CFM T-OFF
1	8:40	4.58	.492	.473	.490	58.5	77.0	81	29.53	1682	1525	188
2	8:48	4.18	.451	.435	.450					1609	1460	180
3	8:54	3.21	.344	.330	.342			81.5		1410	1270	160
4	8:56	2.35	.251	.241	.247					1203	1080	134
5	8:59	1.62	.173	.165	.169					1000	900	111
6	9:02	1.00	.107	.102	.103			82.5		785	704	86
7	9:05	.59	.063	.060	.061					604	540	76
8	9:08	.435	.0455	.043	.043					519	458	56
9	9:11	.240	.025	.023	.023			82.3		385	335	41
10	9:13	.140	.0145	.0135	.013					294	256	31
11	9:16	.054	.0055	.005	.005	58.0	77.0	81.7	29.53	182	155	19
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASED TYPE 18"x18" ST. & 8"x12" TAKE OFF
ORIFICES 15"x15" & 6 1/2" x 1 1/2"

Observers { _____ } { _____ } Date Sept 30, 19 49

NO	Q ₄	SP ₄	VP ₄	TP ₄	Q ₆	SP ₆	VP ₆	TP ₆	Q ₆	SP ₆	VP ₆	TP ₆
1	1682	.492	.145	.637	1494	.473	.142	.615	188	.490	.080	.570
2	1609	.451	.134	.585	1429	.435	.131	.566	180	.450	.074	.524
3	1410	.344	.105	.449	1250	.330	.101	.431	160	.342	.059	.401
4	1203	.251	.073	.324	1069	.241	.071	.312	134	.247	.041	.288
5	1070	.273	.050	.223	889	.165	.050	.215	111	.169	.028	.197
6	785	.107	.032	.139	699	.102	.031	.133	86	.103	.0172	.1202
7	604	.063	.0192	.0822	528	.060	.018	.078	76	.061	.0133	.0743
8	519	.0455	.0140	.0595	463	.043	.0145	.0575	56	.043	.0073	.0503
9	385	.025	.0076	.0326	344	.023	.0076	.0306	41	.023	.0040	.0270
10	294	.0145	.0045	.0190	263	.0135	.0045	.0180	31	.013	.0024	.0154
11	182	.0055	.0017	.0072	163	.005	.0017	.0067	19	.005	.0009	.0059
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

Q ₄ -Q ₆	TP ₄ -TP ₆	Q ₆	TP ₄ -TP ₆	% AIR DIVERTED
1494	.022	188	.067	11.18
1429	.019	180	.061	11.18
1250	.018	160	.050	11.33
1069	.012	134	.036	11.12
889	.008	111	.026	11.10
699	.006	86	.0188	10.95
528	.0042	76	.0079	12.58
463	.0020	56	.0062	10.80
344	.0020	41	.0056	10.63
263	.0010	31	.0036	10.52
163	.0005	19	.0013	10.43

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASED TYPE 18"x8" ST. & 8"x3" TAKE OFF
ORIFICES 15"x5" & 6 1/2" x 1 1/2"

Observers {

Date Sept 30, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄₋₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1682	.492	.145	.637	1494	.473	.142	.615	188	.490	.080	.570
2	1609	.451	.134	.585	1429	.435	.131	.566	180	.450	.074	.524
3	1410	.344	.105	.449	1250	.330	.101	.431	160	.342	.059	.401
4	1203	.251	.073	.324	1069	.241	.071	.312	134	.247	.041	.288
5	1000	.273	.050	.223	889	.165	.050	.215	111	.169	.028	.197
6	785	.107	.032	.139	699	.102	.031	.133	86	.103	.0172	.1202
7	604	.063	.0192	.0822	528	.060	.018	.078	76	.061	.0133	.0743
8	519	.0455	.0140	.0595	463	.043	.0145	.0575	56	.043	.0073	.0503
9	385	.025	.0076	.0326	344	.023	.0076	.0306	41	.023	.0040	.0270
10	294	.0145	.0045	.0190	263	.0135	.0045	.0180	31	.013	.0024	.0154
11	182	.0055	.0017	.0072	163	.005	.0017	.0067	19	.005	.0009	.0059
12												
13			Q ₄₋₆	TP _{4-TP}		Q ₆	TP _{4-TP}		% AIR DIVERTED			
14			1494	.022		188	.067		11.18			
15			1429	.019		180	.061		11.18			
16			1250	.018		160	.050		11.33			
17			1069	.012		134	.036		11.12			
18			889	.008		111	.026		11.10			
19			699	.006		86	.0188		10.95			
20			528	.0042		76	.0079		12.58			
21			463	.0020		56	.0062		10.80			
22			344	.0020		41	.0056		10.63			
23			263	.0010		31	.0036		10.52			
24			163	.0005		19	.0013		10.43			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" x 8" ST & 8" x 3" T-OFF
ORIFICES 15" x 15" & 6 1/4" x 1 1/4"

Observers { _____ } { _____ } Date _____, 19 49

	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRY OF	DSCH OF	BAR IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:28	4.50	.520	.493	.550	71.5	81.0	84	29.33	1667	1550	149
2	7:32	4.14	.482	.459	.511					1600	1500	144
3	7:35	3.21	.375	.354	.397					1410	1320	127
4	7:37	2.39	.275	.258	.288			85		1214	1130	108
5	7:46	1.65	.190	.177	.200					1009	930	90
6	7:48	1.04	.120	.112	.125					801	740	71
7	7:50	.565	.065	.050	.067					591	485	52
8	7:52	.405	.046	.043	.0475					500	465	44
9	7:54	.255	.030	.028	.0305			85.5		397	370	35
10	7:56	.152	.017	.0155	.0175					306	275	27
11	7:58	.065	.009	.0065	.007	69.0	80.5	85.0	29.33	201	178	17

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18"X18" ST. X 8"X3" TAKE OFF
ORIFICES 15"X5" X 6 1/4" X 1 1/4"

Observers {

Date _____, 19 ____

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1667	.520	.143	.663	1518	.493	.149	.642	1449	.550	.052	.602
2	1600	.482	.130	.612	1456	.459	.137	.596	144	.511	.048	.559
3	1410	.375	.107	.482	1283	.354	.107	.461	127	.397	.036	.4330
4	1214	.275	.076	.351	1106	.258	.077	.335	108	.288	.026	.3140
5	1009	.190	.052	.242	919	.177	.053	.230	90	.200	.0191	.2191
6	801	.120	.033	.153	730	.112	.034	.146	71	.125	.012	.137
7	591	.065	.0181	.0831	539	.060	.0188	.0788	52	.067	.0065	.0735
8	500	.046	.0130	.0590	456	.043	.0132	.0562	44	.0475	.0047	.0522
9	397	.030	.0082	.0382	362	.028	.0084	.0364	35	.0305	.0029	.0334
10	306	.017	.0049	.0219	279	.0155	.0050	.0205	27	.0175	.0017	.0192
11	201	.007	.0020	.0090	184	.0065	.0021	.0086	17	.007	.0006	.0076
12												
13			$Q_4 - Q_6$	$TP_4 - TP_5$			Q_6	$TP_4 - TP_6$		% AIR DIVERTED		
14			1518	.021			1449	.061		8.94		
15			1456	.016			144	.053		9.00		
16			1283	.021			127	.0490		9.00		
17			1106	.016			108	.0370		8.90		
18			919	.012			90	.0229		8.93		
19			730	.007			71	.016		8.87		
20			539	.0043			52	.0096		8.81		
21			456	.0028			44	.0068		8.80		
22			362	.0018			35	.0048		8.83		
23			279	.0014			27	.0027		8.83		
24			184	.0004			17	.0014		8.47		
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 18" ST. & 8" X 3" T-OFF
ORIFICES 15" X 5" & 6" X 1"

Observers {

Date _____, 19 ____

Time	P ₁ -P ₂	P ₄	P ₅	P ₆	NET OF	DRY OF	J _{sch} OF	P _{bar} IN HG	CFM MAIN	CFM ST	CFM T-OFF
1 8:08	4.45	.548	.510	.600	64.0	80.5	85.0	29.33	1654	1586	112
2 8:10	4.16	.519	.482	.567					1602	1535	109
3 8:17	3.21	.400	.370	.435					1410	1350	95
4 8:19	2.40	.293	.272	.319			86.0		1216	1150	82
5 8:21	1.63	.200	.183	.217					1003	945	67
6 8:23	1.04	.127	.117	.137					801	755	53
7 8:25	.575	.0705	.0645	.0765					596	560	40
8 8:28	.396	.047	.043	.051			85.0		495	460	33
9 8:32	.249	.030	.027	.032					392	362	26
10 8:36	.144	.017	.016	.018					298	278	19
11 8:38	.055	.0065	.0053	.0065	68.7	80.0	85.0	29.33	183	163	12
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Remarks:

MECHANICAL ENGINEERING LABORATORY

MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST & 8" X 3" TAKE OFF
GRIFCES 15" X 5" & 6" X 1"

Observers { _____ } { _____ } Date _____, 19 49

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1654	.548	.140	.688	1542	.510	.150	.660	112	.600	.029	.679
2	1602	.519	.131	.650	1493	.482	.142	.624	109	.567	.027	.594
3	1410	.400	.107	.570	1315	.370	.112	.482	95	.432	.021	.456
4	1216	.293	.077	.370	1134	.272	.080	.352	82	.319	.016	.335
5	1003	.200	.051	.251	936	.183	.057	.240	67	.217	.0105	.2275
6	801	.127	.033	.160	748	.117	.036	.153	53	.137	.0067	.1437
7	596	.0705	.0188	.0893	556	.0645	.020	.0845	40	.0765	.0038	.0803
8	495	.047	.0128	.0598	462	.043	.0145	.0575	33	.051	.0026	.0536
9	392	.030	.0078	.0378	366	.027	.0086	.0356	26	.032	.0016	.0336
10	298	.017	.0046	.0216	279	.016	.0050	.0210	19	.018	.0009	.0189
11	183	.0065	.0017	.0082	171	.0055	.0018	.0073	12	.0065	.0003	.0068
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$Q_4 - Q_6$	$TP_4 - TP_6$	Q_6	$TP_4 - TP_6$	% AIR DIVERTED
1542	.028	112	.059	6.78
1493	.026	109	.056	6.80
1315	.025	95	.051	6.74
1134	.018	82	.035	6.75
936	.011	67	.0235	6.66
748	.007	53	.0165	6.63
556	.0048	40	.0090	6.72
462	.0023	33	.0062	6.67
366	.0022	26	.0042	6.64
279	.0006	19	.0029	6.38
171	.0009	12	.0014	6.56

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" x 8" ST. & 3" x 8" TAKE OFF
ORIFICES 14" x 4" & 7" x 2"

Observers {

Date OCT 3, 19 49

$\frac{1}{2}$ TIME	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	DISCH °F	BAR IN HG	CFM MAIN	CFM ST	CFM T. CFM
1 9:05	4.11	.820	.834	.535	69.0	79.3	84.5	29.33	1593	1270	332
2 9:07	3.205	.647	.657	.419					1408	1130	294
3 9:09	2.38	.481	.488	.304					1212	980	252
4 9:12	1.60	.329	.331	.207			85.0		995	800	205
5 9:14	1.06	.211	.212	.131					808	640	164
6 9:17	.555	.111	.111	.067					585	463	117
7 9:20	.427	.085	.086	.051			84.5		514	410	102
8 9:23	.240	.0485	.049	.028					385	310	76
9 9:26	.146	.029	.029	.017					300	226	59
10 9:29	.063	.012	.011	.007	68.5	79.3	84.5	29.32	197	148	38

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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" x 18" ST x 3" x 8" TAKE OFF
ORIFICES 14" x 4" x 7" x 2"

Observers { _____ } { _____ } Date OCT. 3, 19 49

No.	Q_4	SP_4	VP_4	TP_4	$Q_4 - Q_6$	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1593	.820	.134	.949	1261	.834	.102	.936	332	.535	.247	.782
2	1408	.647	.106	.753	1114	.657	.1078	.725	294	.419	.194	.613
3	1212	.481	.075	.556	960	.488	.060	.548	252	.309	.144	.453
4	995	.329	.051	.380	790	.331	.040	.371	205	.207	.097	.304
5	808	.211	.034	.245	644	.212	.027	.239	164	.131	.062	.193
6	585	.111	.0179	.1289	468	.111	.0141	.1251	117	.067	.032	.095
7	514	.085	.0140	.0990	412	.086	.0111	.0971	102	.051	.0238	.0748
8	385	.0485	.0076	.0561	309	.049	.0062	.0552	76	.028	.0133	.0413
9	300	.029	.0046	.0336	241	.029	.0038	.0328	59	.017	.0082	.0252
10	197	.012	.0020	.0140	159	.011	.0016	.0126	38	.007	.0034	.0104

	$Q_4 - Q_6$	$TP_4 - TP_5$	Q_6	$TP_5 - TP_6$	% AIR DIVERTED
12					
13	1261	.013	332	.167	20.82
14	1114	.028	294	.140	20.90
15	960	.008	252	.103	20.80
16	790	.009	205	.076	20.62
17	644	.006	164	.052	20.33
18	468	.0038	117	.0299	20.00
19	412	.0019	102	.0242	19.85
20	309	.0009	76	.0148	19.72
21	241	.0008	59	.0084	19.65
22	159	.0014	38	.0036	19.30
23					
24					
25					

Remarks:

Running Log of INCREASER TYPE 18"x8" ST & 3"x8" TAKE OFF
CRIFICES 14"x4" & 6 1/2" x 1 1/2"

Observers { _____ } { _____ } Date Oct 5, 1949

[illegible]**Remarks:**

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASED TYPE 18" X 8" ST. + 3" X 8" TAKE-OFF
ORIFICES 14" X 4" + 6 1/2" X 1 1/2"

Observers { _____ } { _____ } Date Oct 5, 19 _____

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₄	VP ₄	TP ₄	Q ₆	SP ₆	VP ₆	TP ₆
1	1592	.918	.124	.1047	1347	.919	.118	.1037	245	.833	.138	.971
2	1402	.738	.103	.841	1184	.735	.088	.823	218	.668	.110	.778
3	1205	.547	.074	.621	1018	.542	.068	.610	187	.492	.081	.573
4	1015	.385	.052	.437	857	.383	.047	.430	158	.345	.058	.403
5	806	.240	.034	.274	677	.237	.029	.266	129	.213	.038	.251
6	585	.127	.0180	.145	495	.125	.0158	.1408	90	.113	.0191	.1321
7	495	.091	.0128	.1038	417	.090	.0113	.1013	78	.085	.0142	.0992
8	401	.061	.0083	.0693	339	.060	.0073	.0673	62	.053	.0093	.0623
9	308	.036	.0050	.0410	261	.035	.0044	.0394	47	.031	.0051	.0361
10	182	.013	.0017	.0147	153	.013	.0015	.0145	29	.012	.0020	.0140
11												
12			Q ₄ -Q ₆	TP ₄ -TP ₆		Q ₆	TP ₄ -TP ₆		% AIR DIVERTED			
13			1347	.0010		245	.076		15.40			
14			1184	.018		218	.063		15.53			
15			1018	.011		187	.048		15.51			
16			857	.007		158	.034		15.55			
17			677	.008		129	.023		16.00			
18			495	.0042		90	.0129		15.40			
19			417	.0025		78	.0046		15.75			
20			339	.0020		62	.0020		15.45			
21			261	.0016		47	.0049		15.25			
22			153	.0002		29	.0007		15.92			
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. & 3" X 8" TAKE-OFF
ORIFICES 14" X 4" & 6 1/4" X 1 1/4"

Observers { _____ } { _____ } Date Oct 5, 19 49

No.	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	DISCH. °F	BAR IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	8:12	3.92	.962	.955	.941	62.0	83.0	86.5	29.40	1558	1360	195
2	8:18	3.20	.861	.792	.772					1405	1250	177
3	8:22	2.33	.585	.579	.571					1200	1060	152
4	8:25	1.62	.399	.394	.387			86.7		1000	880	125
5	8:30	1.015	.249	.245	.241					792	690	99
6	8:35	.60	.146	.143	.139					608	530	75
7	8:38	.395	.096	.094	.092			86.5		495	428	61
8	8:40	.275	.067	.066	.064					412	360	51
9	8:42	.137	.033	.032	.032					291	251	36
10	8:45	.052	.013	.012	.012	62.0	83.0	86.0	29.39	179	154	22
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASED TYPE 18" X 8" ST X 3" X 8" TAKE OFF
ORIFICES 14" X 4" X 6 1/4" X 1 1/4"

Observers { _____ } { _____ } Date Oct 5, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₄ -Q ₆	SP ₅	VP ₅	TP ₅	Q ₆	SP ₆	VP ₆	TP ₆
1	1558	962	.124	.1086	1363	.955	.119	.1074	195	.941	.087	.1028
2	1405	801	.104	.905	1228	.792	.099	.891	177	.772	.071	.843
3	1200	585	.073	.658	1048	579	.070	.649	152	.571	.052	.623
4	1000	399	.050	.449	875	.394	.049	.443	125	.387	.036	.423
5	792	249	.032	.281	693	.245	.030	.275	99	.241	.0221	.2631
6	608	.146	.093	.1653	533	.143	.0182	.1612	75	.139	.132	.1522
7	495	.096	.0128	.1088	434	.094	.0120	.1060	61	.092	.0090	.1010
8	412	.067	.0089	.0759	361	.066	.0084	.0744	51	.064	.0061	.0101
9	291	.033	.0043	.0373	255	.032	.0044	.0361	36	.032	.0036	.0350
10	179	.013	.0017	.0147	157	.012	.0016	.0136	22	.012	.0012	.0132

	Q ₄ -Q ₆	TP ₄ -TP ₅	Q ₆	TP ₅ -TP ₆	% AIR DIVERTED
12					
13	1363	.0012	195	.0058	12.50
14	1228	.014	177	.062	12.60
15	1048	.009	152	.035	12.67
16	875	.006	125	.026	12.50
17	693	.006	99	.0179	12.50
18	533	.0041	75	.0131	12.32
19	434	.0028	61	.0078	12.32
20	361	.0015	51	.0058	12.38
21	255	.0012	36	.0023	12.38
22	157	.0011	22	.0015	12.30
23					
24					
25					

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 3" T-OFF
ORIFICES 14" X 14" & 6" X 1"

Observers { _____ } { _____ } Date Oct 5, 19 49

Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRV OF	DISCH OF	BAR IN HG	CFM MAIN	CFM ST	CFM T-O
1 9:04	3.85	1.015	.992	1.028	61.5	82.0	84.2	29.39	1542	1380	147
2 9:06	3.19	.857	.840	.872					1402	1275	135
3 9:10	2.34	.630	.618	.641					1201	1100	116
4 9:14	1.62	.434	.424	.440			86.0		1000	910	96
5 9:18	1.04	.275	.268	.279					801	720	76
6 9:22	.515	.136	.133	.137					564	510	57
7 9:26	.407	.107	.104	.108			86.0		501	450	48
8 9:29	.247	.065	.063	.066					391	350	37
9 9:32	.158	.042	.041	.042					312	284	30
10 9:35	.051	.0135	.013	.0135	62.0	82.0	84.3	29.38	176	160	17

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of INCREASER TYPE 18" X 8" ST. X 8" X 3" T-OFF
ORIFICES 14" X 4" & 6" X 1"

Observers { _____ } { _____ } Date Oct 5, 19 49

Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRV OF	DISCH OF	BAR IN HG	CFM MAIN	CFM ST	CFM T-O
1 9:04	3.85	1.015	.992	1.028	61.5	82.0	84.2	29.39	1542	1380	147
2 9:06	3.19	.857	.840	.872					1402	1275	135
3 9:10	2.34	.630	.618	.641					1201	1100	116
4 9:14	1.62	.434	.424	.440			86.0		1000	910	96
5 9:18	1.04	.275	.268	.279					801	720	76
6 9:22	.515	.136	.133	.137					564	510	57
7 9:26	.407	.107	.104	.108			86.0		501	450	48
8 9:29	.247	.065	.063	.066					391	350	37
9 9:32	.158	.042	.041	.042					312	284	30
10 9:35	.051	.0135	.013	.0135	62.0	82.0	84.3	29.38	176	160	17

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

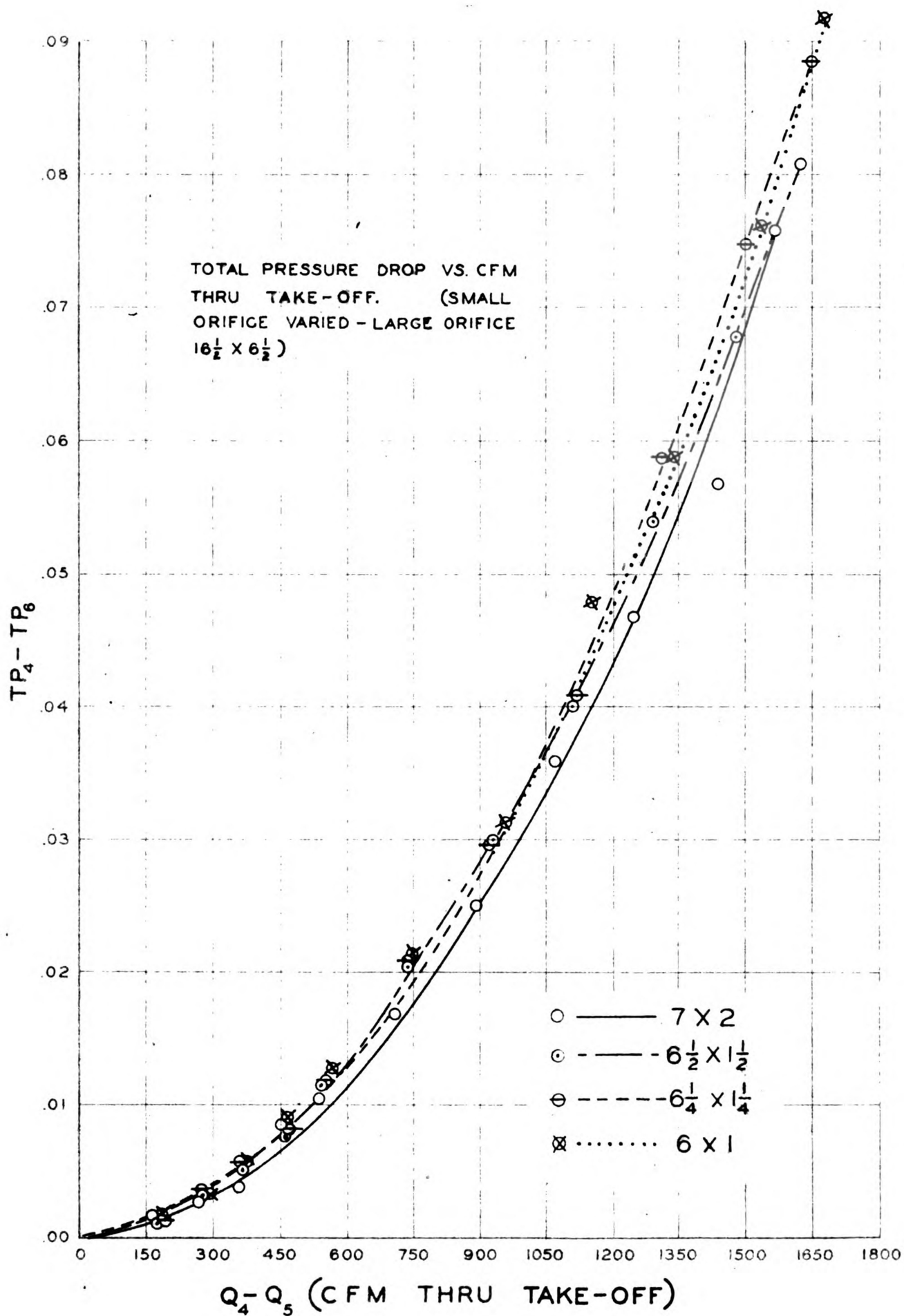
Running Log of INCREASER TYPE 18" X 8" ST. & 8" X 3" TAKE OFF
ORIFICES 14" X 4" & 6" X 1"

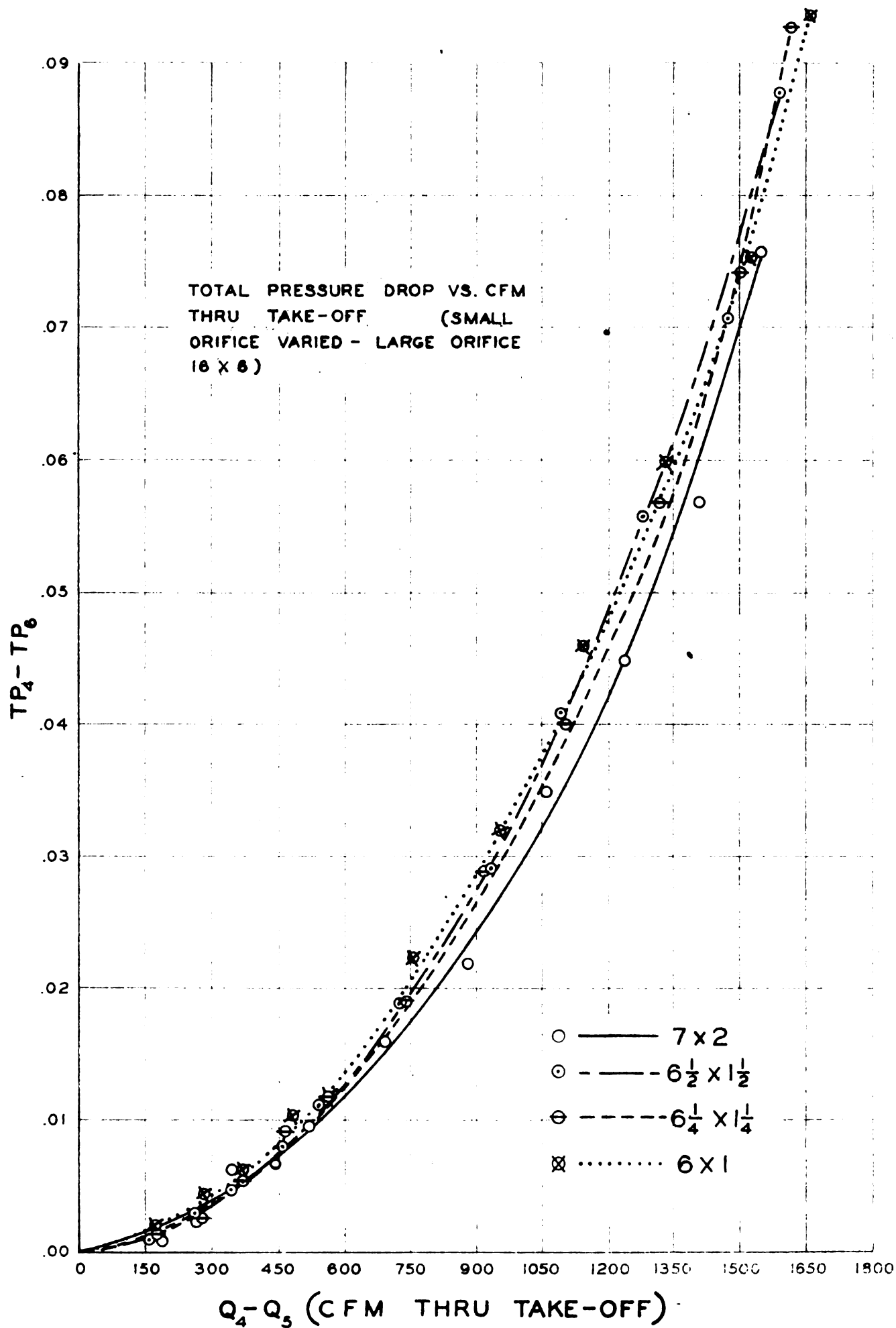
Observers { _____ } { _____ } Date Oct 5, 19 49

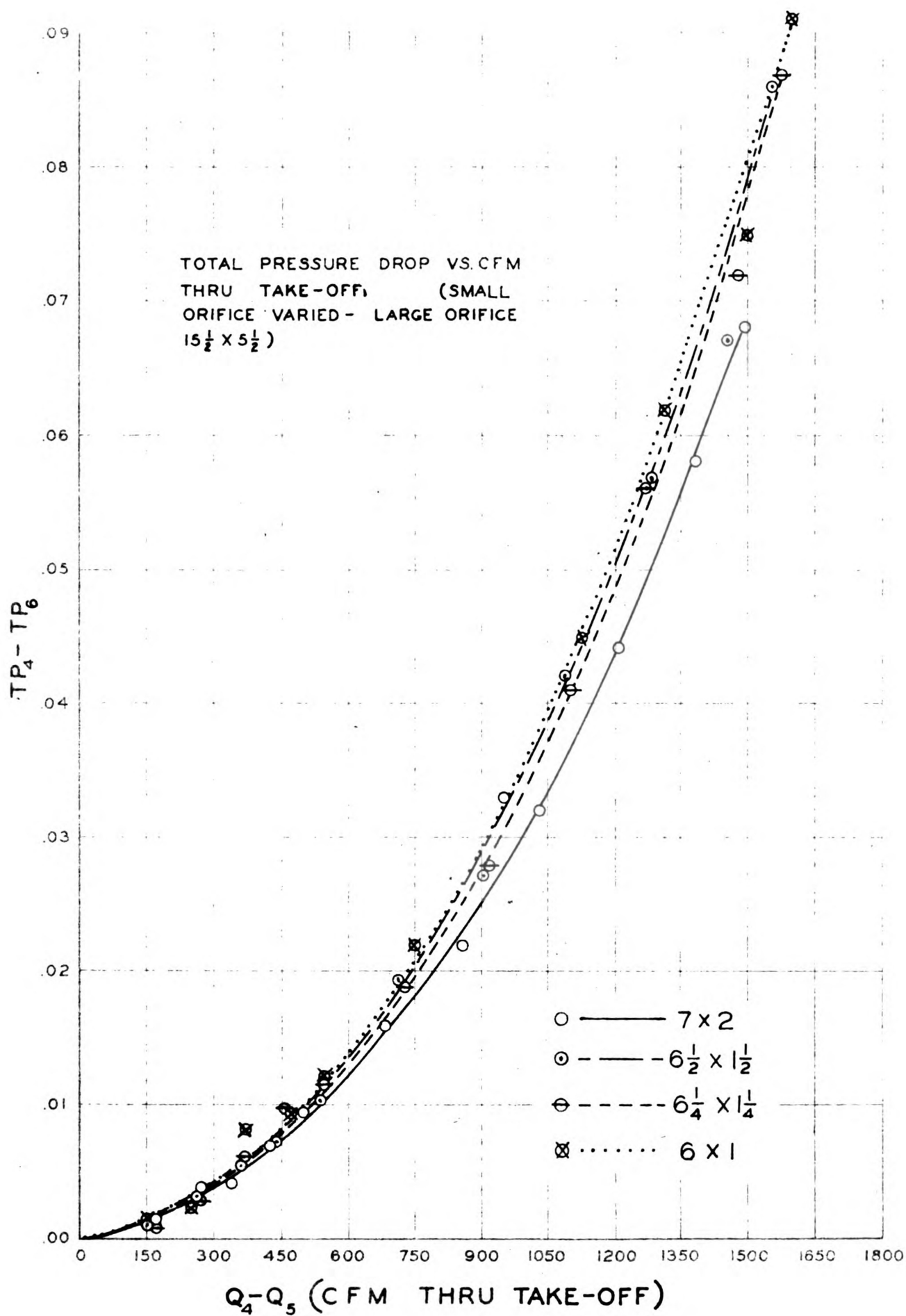
No.	Q_4	SP_4	VP_4	TP_4	Q_6	SP_6	VP_6	TP_6	Q_6	SP_6	VP_6	TP_6
1	1542	1.015	.121	1.136	1395	.992	.125	1.117	147	1.028	.050	1.078
2	1402	.857	.102	.959	1267	.840	.103	.943	135	.872	.042	.914
3	1201	.630	.073	.703	1085	.618	.073	.691	116	.641	.031	.672
4	1000	.434	.050	.484	904	.424	.051	.475	96	.440	.0212	.4612
5	801	.275	.034	.309	725	.268	.034	.302	76	.279	.0135	.2925
6	564	.136	.0168	.1528	507	.133	.0167	.0497	57	.137	.0075	.1445
7	501	.107	.013	.120	453	.104	.013	.117	48	.108	.0053	.1133
8	391	.065	.0077	.0727	354	.063	.0080	.0710	37	.066	.0032	.0692
9	312	.042	.0050	.0470	282	.041	.0051	.0461	30	.042	.0021	.0441
10	176	.0135	.0016	.0151	159	.013	.0016	.0146	17	.0135	.0007	.0142

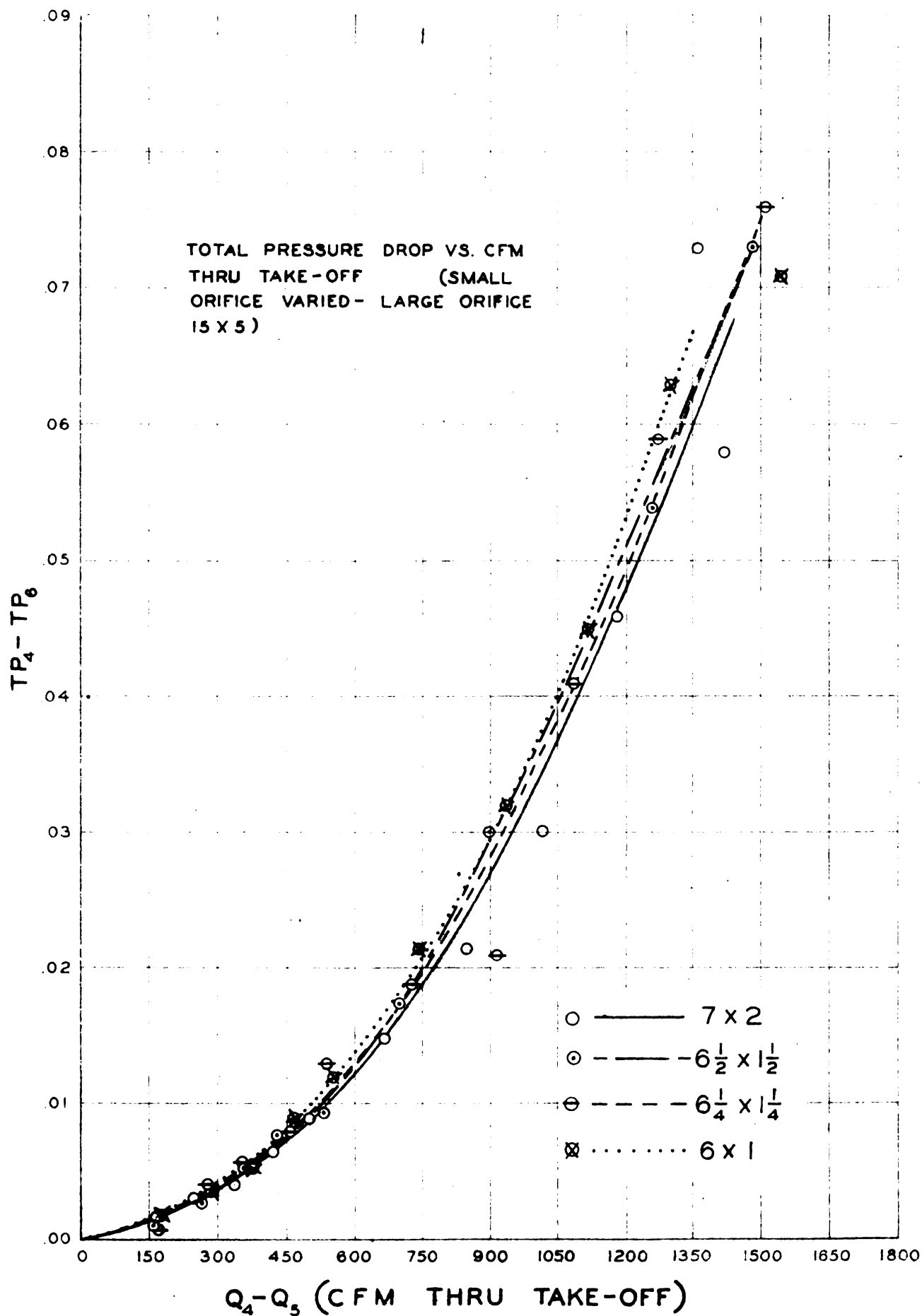
No.	Q_4	Q_6	$TP_4 - TP_6$	Q_6	$TP_4 - TP_6$	% AIR DIVERTED
12						
13			1395 .019	147 .058		9.54
14			1267 .016	135 .045		9.63
15			1085 .012	116 .031		9.66
16			904 .009	96 .0228		9.60
17			725 .007	76 .0165		9.51
18			507 .0031	57 .0083		10.11
19			453 .0017	48 .0067		9.59
20			354 .0009	37 .0035		9.47
21			282 .0005	30 .0029		9.62
22			159 .0003	17 .0009		9.66
23						
24						
25						

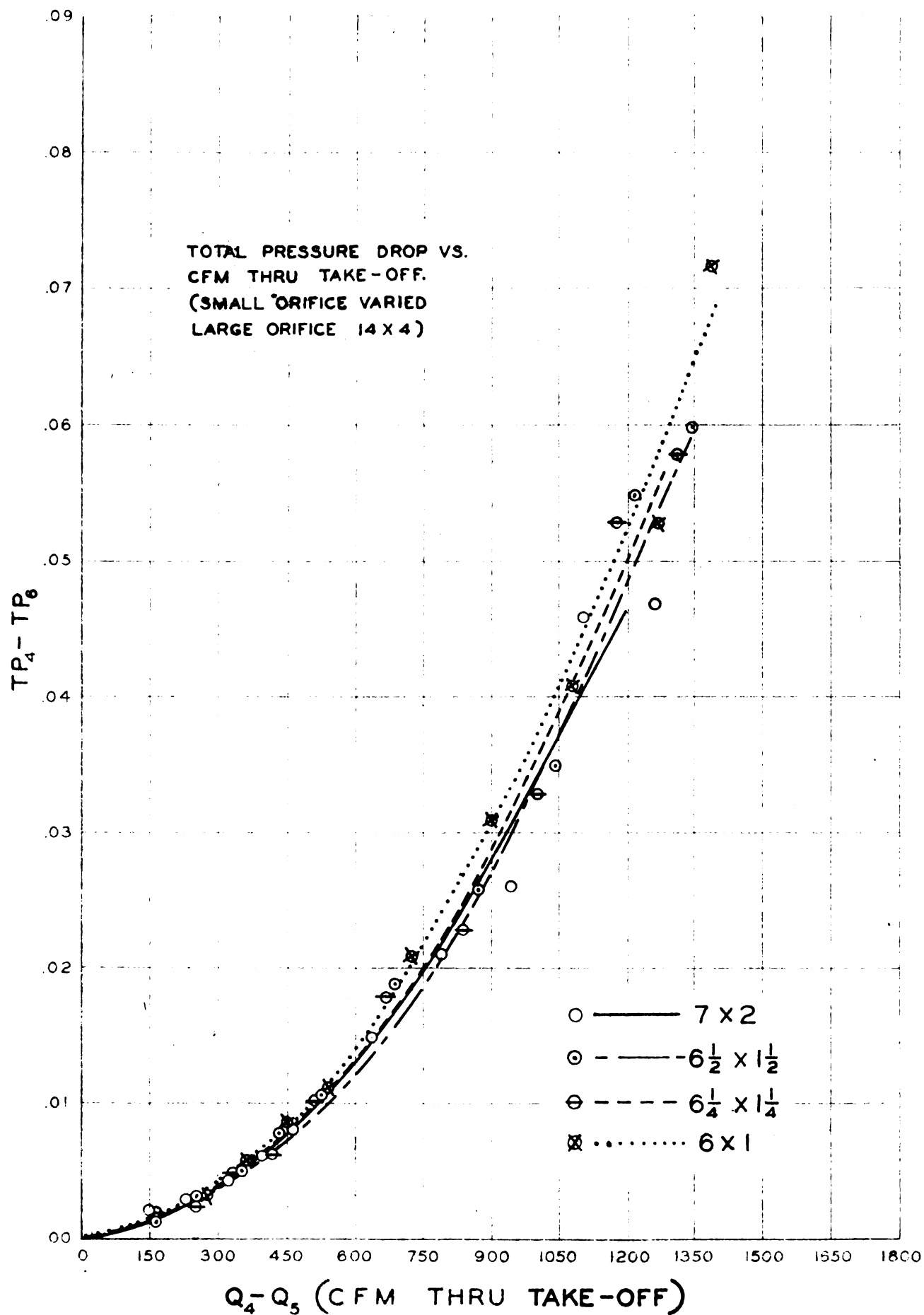
Remarks:

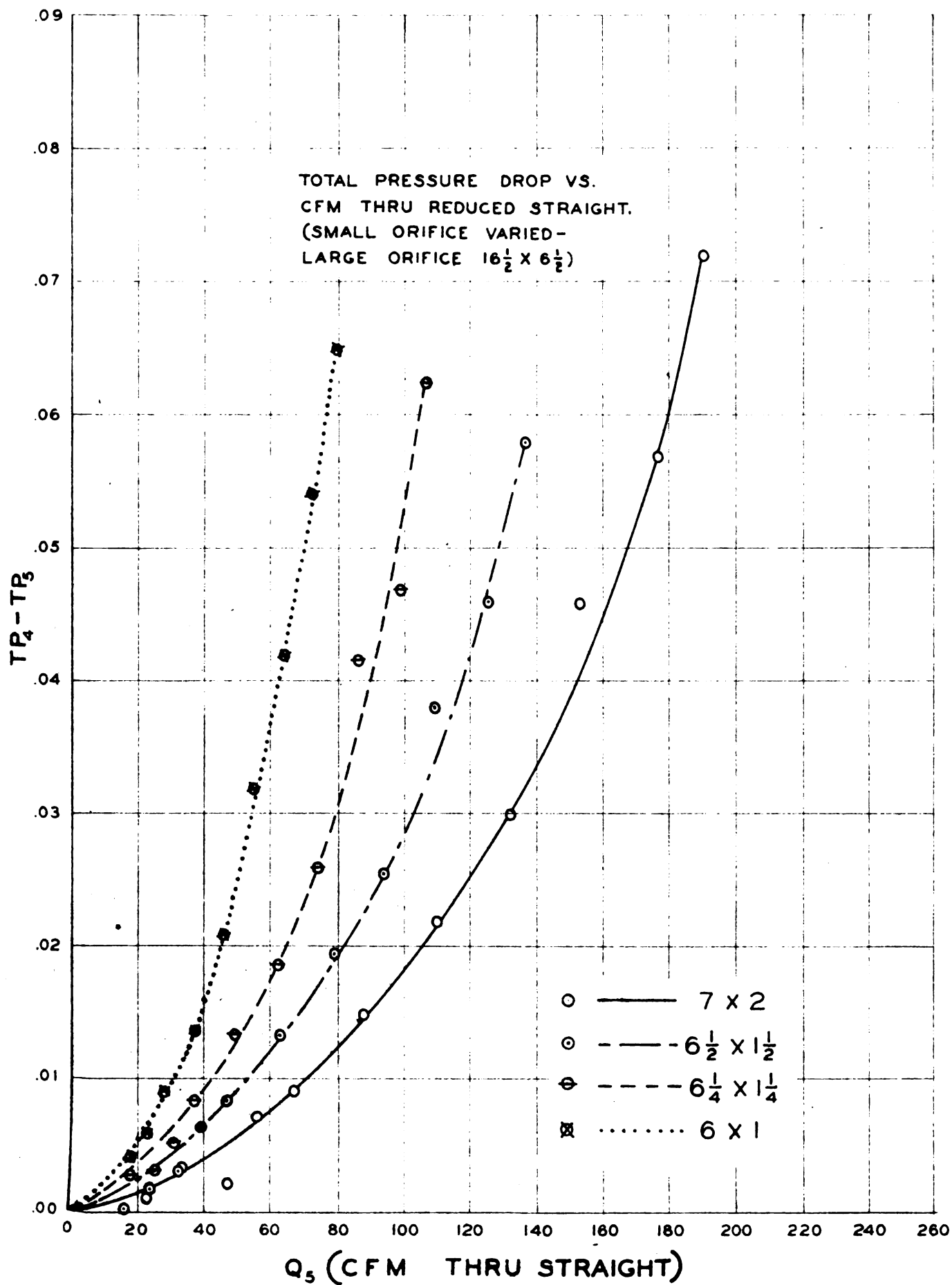


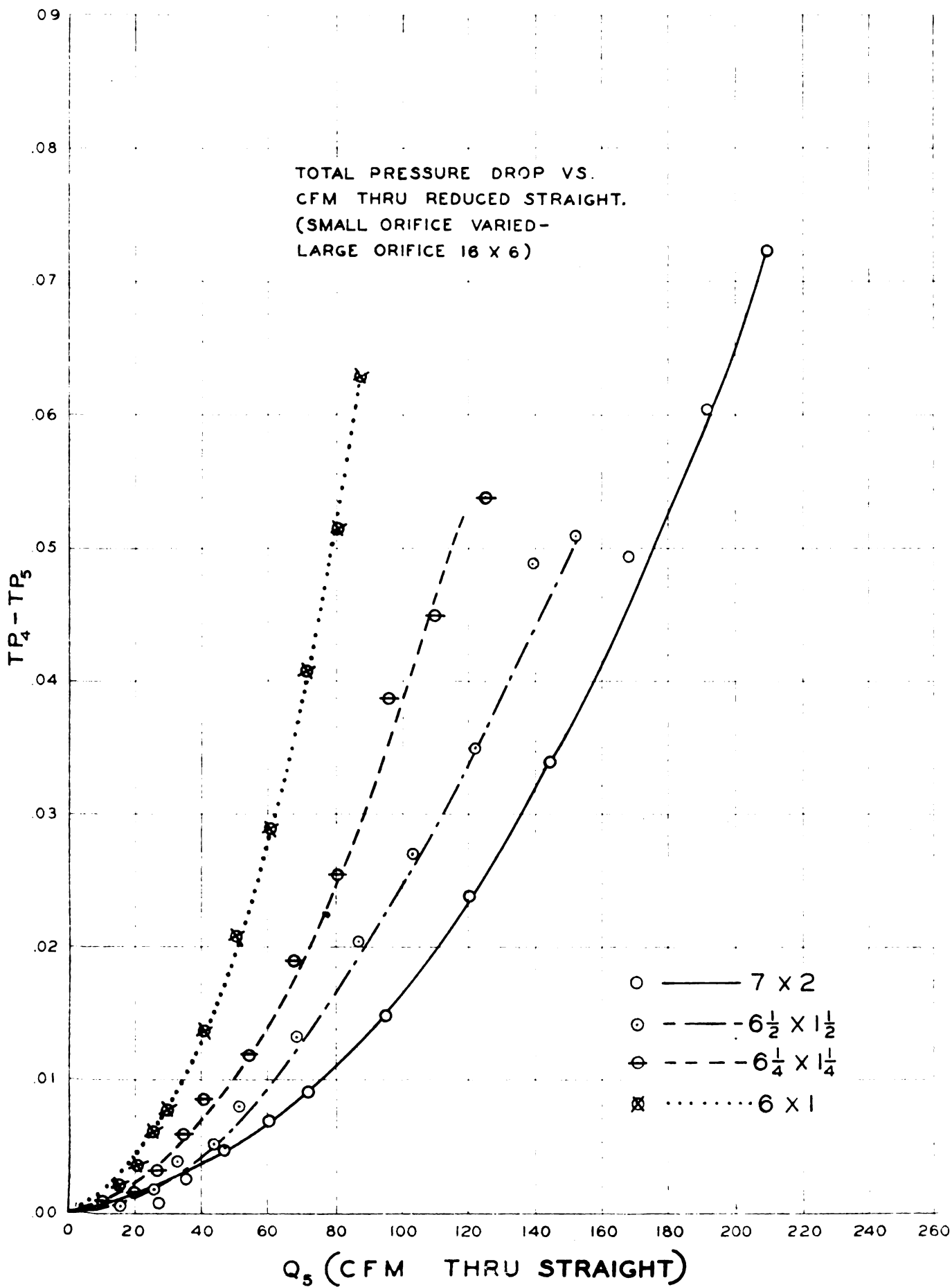


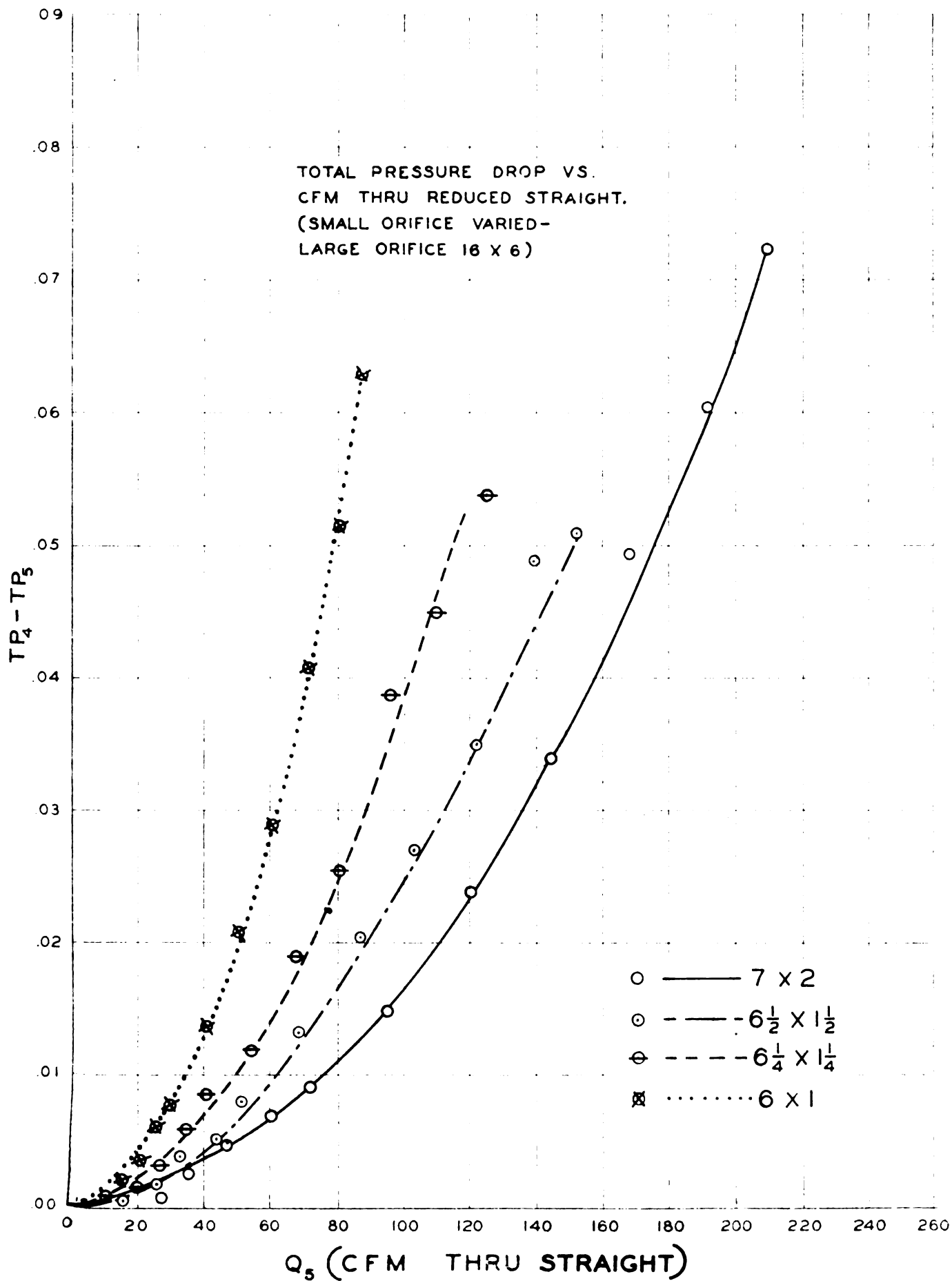


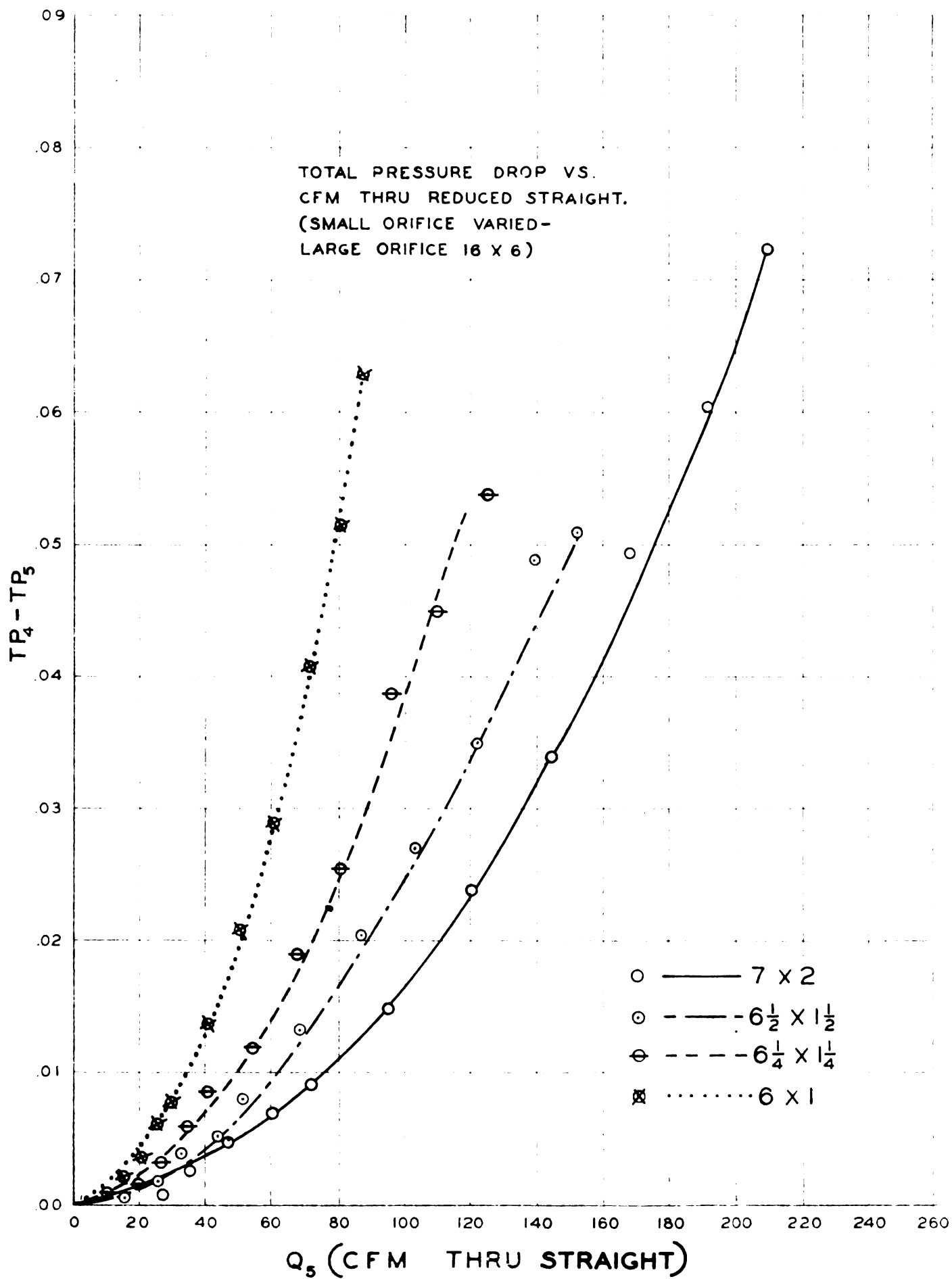


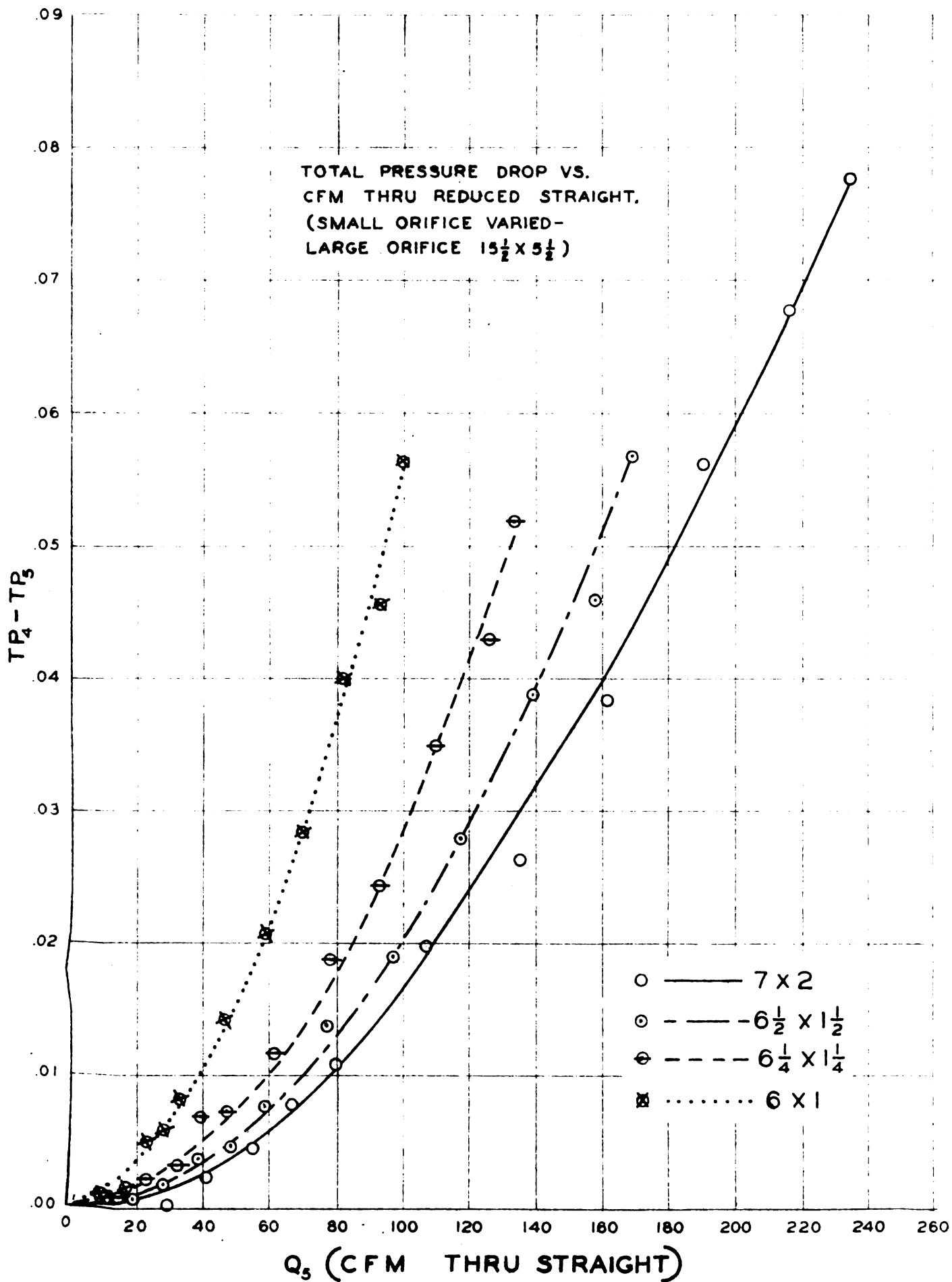


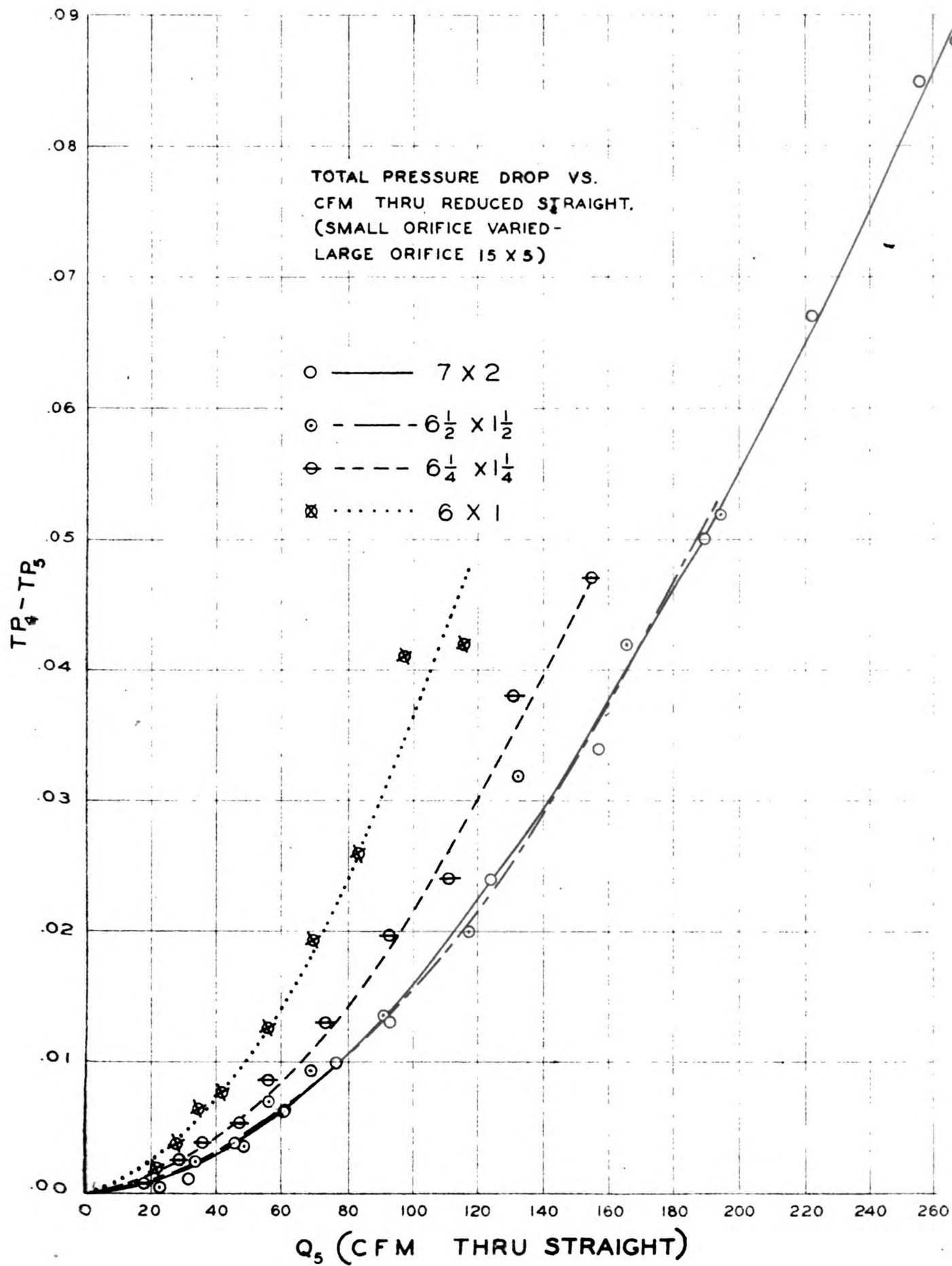


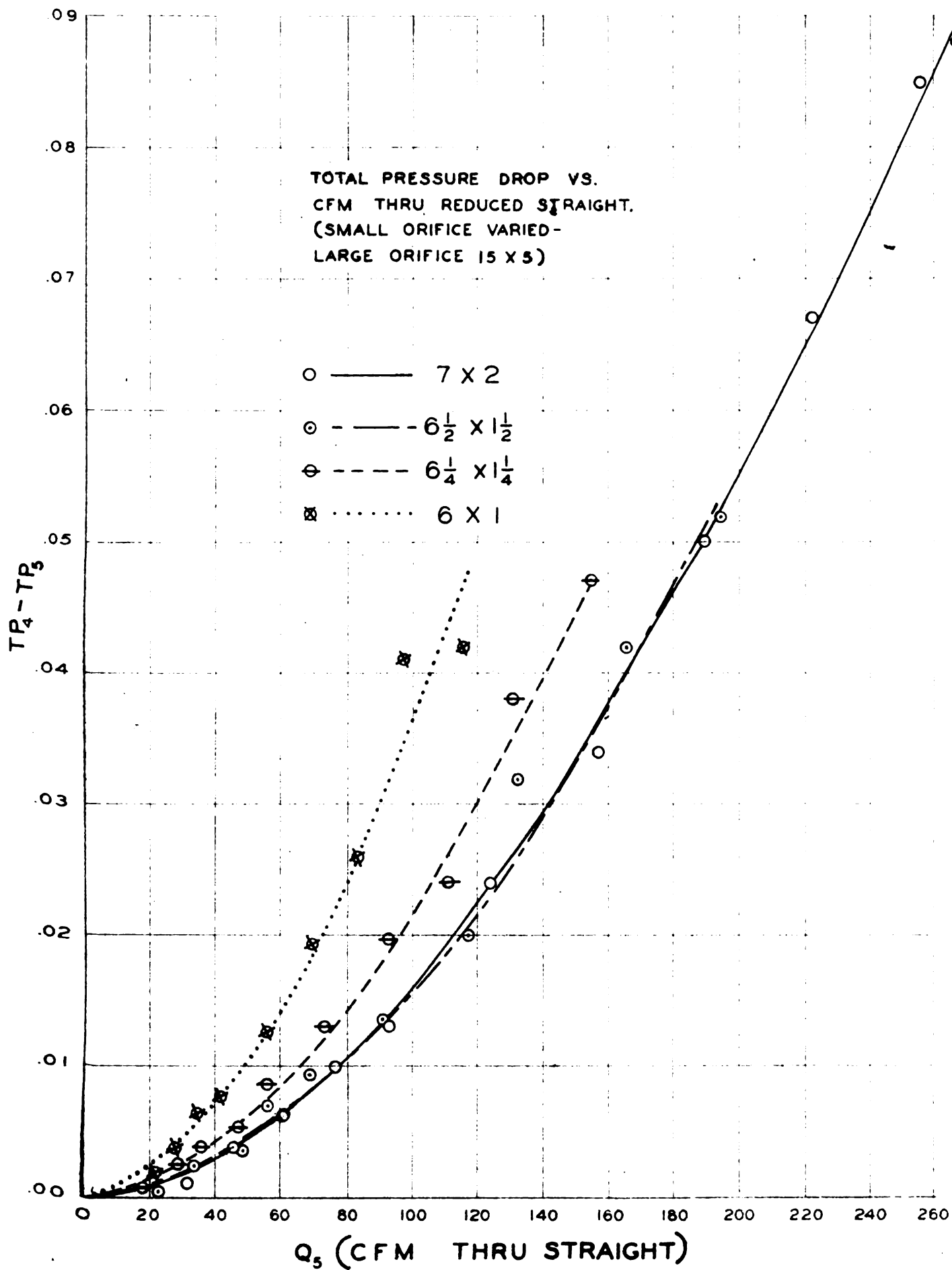


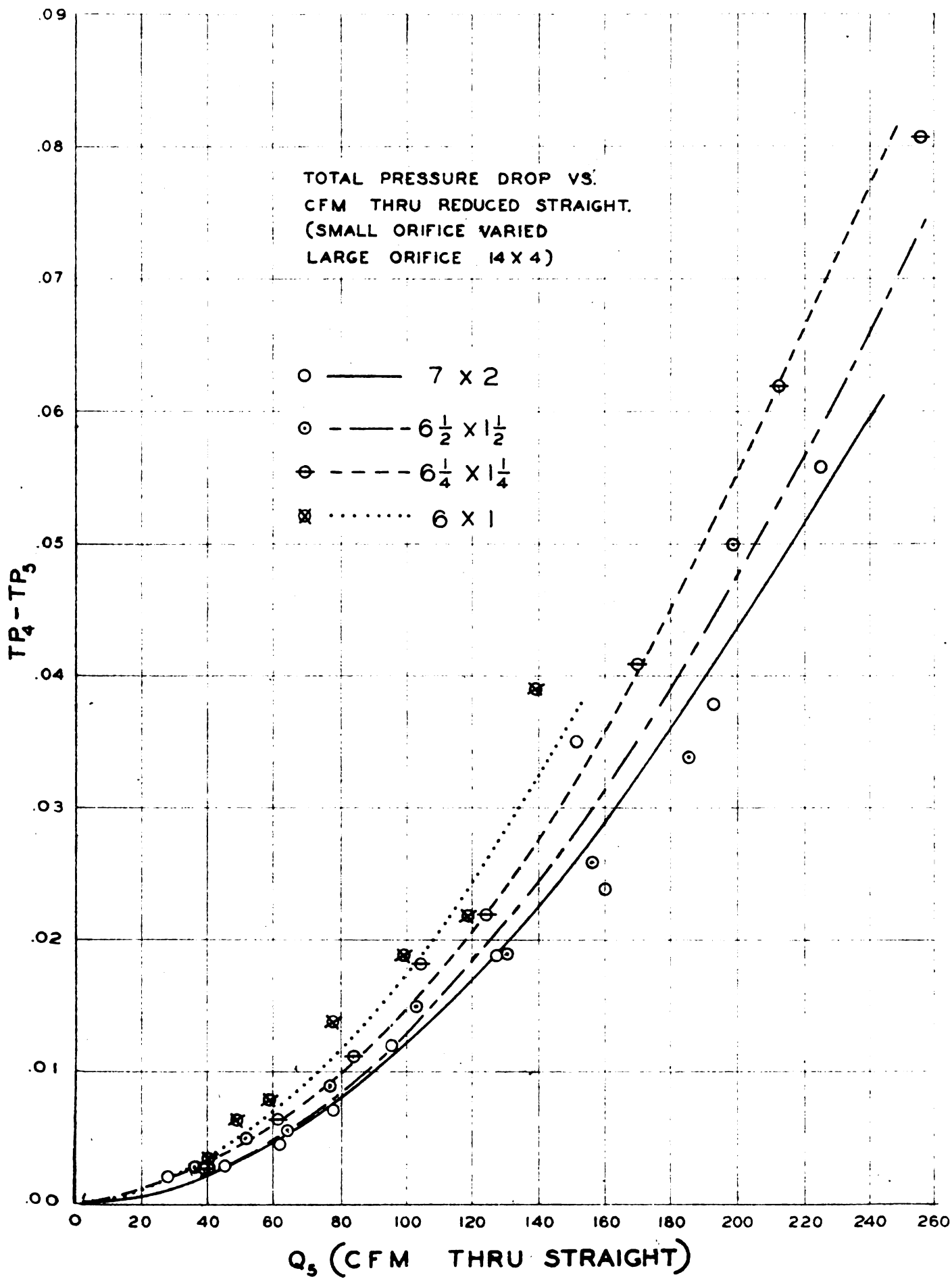












MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of RECHECK CALIBRATION OF 16 1/2 x 6 1/2 ORIFICE PLATES
INSERTED IN 18" x 8" TANK OFF

Observers { _____ } { _____ } Date _____, 19 _____

2	TIME	P ₃ - P ₂	P ₆	WET °F	DRY °F	DISCH °F	BAR. IN HG.	CFM MAIN TANK OFF
1	8:37	4.79	.122	61.2	78.0		29.02	1720
2	8:45	4.19	.107					1610
3	8:52	3.18	.082					1400
4	8:54	2.31	.060					1195
5	8:56	1.64	.043					1007
6	8:58	1.03	.027					798
7	9:01	.495	.013					553
8	9:04	.408	.011					502
9	9:07	.290	.008					423
10	9:10	.185	.005					338
11	9:13	.107	.003					257
12	9:16	.047	.002	61.0	78.0		29.02	171
13								
14								
15								
16								
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of 16"x6" Orifice Plate in 18"x8"
Take-off

Observers { _____ } { _____ } Date NOV 9, 19 49

No.	TIME	$P_3 - P_2$	P_6	WET °F	DRY °F	BAROM in Hg	C.F.M.
1	7:20	4.72	.223	62.3	81.0	29.13	1709
2	7:22	4.17	.180				1605
3	7:24	3.21	.139				1410
4	7:26	2.32	.100				1198
5	7:28	1.65	.071				1009
6	7:30	1.02	.043				794
7	7:32	.61	.026				615
8	7:34	.414	.017				506
9	7:36	.258	.010				400
10	7:38	.142	.006				296
11	7:40	.048	.0025	61.5	79.8	29.13	172
12							
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of $15\frac{1}{2} \times 5\frac{1}{2}$ Orifice Plate
on $18" \times 8"$ Inlet of

Observers { _____ } { _____ } Date Nov 9, 19 49

No.	Time	$P_3 - P_2$	P_6	WET °F	DRY °F	BAROM IN HG	CFM
1	7:45	4.58	.320	61.5	79.8	29.13	1682
2	7:49	4.17	.275				1603
3	7:50	3.15	.223				1393
4	7:52	2.30	.161				1192
5	7:54	1.65	.116				1009
6	7:56	1.005	.070				788
7	7:58	.600	.042				608
8	8:00	.407	.028				501
9	8:02	.247	.017				390
10	8:04	.137	.009				291
11	8:06	.052	.003	60.0	79.0	29.13	179
12							
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Recalibration of $15\frac{1}{2} \times 5\frac{1}{2}$ Orifice Plate
on $18'' \times 8''$ Inlet pipe

Observers {

Date Nov 9, 19 49

No.	Time	$P_3 - P_2$	P_6	WET °F	DRY °F	BAROM IN HG.	CFM
1	7:45	4.58	.320	61.5	79.8	29.13	1682
2	7:49	4.17	.295				1603
3	7:50	3.15	.223				1393
4	7:52	2.30	.161				1192
5	7:54	1.65	.116				1009
6	7:56	1.005	.070				788
7	7:58	.600	.042				608
8	8:00	.407	.028				501
9	8:02	.247	.017				390
10	8:04	.137	.009				291
11	8:06	.052	.003	60.0	79.0	29.13	179
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Recalibration of 15x5 orifice plate in
18"x8" Lake 78

Observers { _____ } { _____ } Date Nov 9, 19 49

No.	Time	P ₃ -P ₂	P ₆	WET °F	DRY °F	BAROM in HG	CFM
1	8:18	4.29	543	60.0	79.0	29.13	2624
2	8:20	3.21	1405				1410
3	8:22	2.32	292				1198
4	8:24	1.61	202				999
5	8:26	1.03	129				798
6	8:28	.575	07.5				596
7	8:30	.395	048				495
8	8:32	.254	031				396
9	8:34	.135	016				289
10	8:36	.050	.0055	59.7	78.0	29.13	175
11							
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of 14"x14" orifice Plate
in 18"x8" Lake off

Observers {

Date Nov 9, 19 49

No.	TIME	P _{3-P₂}	P ₀	WET 'F	DRY 'F	Barom in Hg	CFM
1	9:00	3.56	1.13	59.7	78.0	29.13	1482
2	9:02	3.165	1.01				1398
3	9:04	2.31	.739				1145
4	9:06	1.625	.521				1001
5	9:08	1.01	.323				790
6	9:10	.585	.185				601
7	9:12	.415	.125				506
8	9:14	.255	.081				397
9	9:16	.148	.046				302
10	9:18	.051	.015	59.8	78.0	29.13	176
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of 14" x 14" orifice plate
on 18" x 8" Lake off

Observers { _____ } { _____ } Date Nov 9, 19 48

No.	TIME	P ₃ -P ₂	P ₆	WET °F	DRY °F	Barom in Hg	CFM
1	9:00	3.56	1.13	59.7	78.0	29.13	1482
2	9:02	3.165	1.01				1398
3	9:04	2.31	.739				1145
4	9:06	1.625	.521				1001
5	9:08	1.01	.323				790
6	9:10	.585	.185				601
7	9:12	.415	.125				506
8	9:14	.255	.081				397
9	9:16	.148	.046				302
10	9:18	.051	.015	59.8	78.6	29.13	176
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of 14" x 14" orifice Plate
on 18" x 8" Inlet of

Observers { _____ } { _____ } Date Nov 9, 19 49

o Z	TIME	P ₃ -P ₂	P ₆	WET 'F	DRY 'F	BAROM IN HG	CFM
1	9:00	3.56	1.13	59.7	78.0	29.13	1482
2	9:02	3.165	1.01				1398
3	9:04	2.31	.739				1145
4	9:06	1.625	.521				1001
5	9:08	1.01	.323				790
6	9:10	.585	.185				601
7	9:12	.415	.125				506
8	9:14	.255	.081				397
9	9:16	.148	.046				302
10	9:18	.051	.015	59.8	78.0	29.13	176
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalculation of 7x2" orifice Plate
on 8"x3" Straight main

Observers { _____ } { _____ } Date Nov 11, 19 49

No.	TIME	P ₃ -P ₂		P ₅		NET DRY BAROM CFM	
						°F	°F IN HG
1	8:50	.640	1.79	61.0	77.0	29.20	
2	8:54	.497	1.40				
3	8:56	.432	1.20				
4	8:58	.372	1.03				
5	9:00	.300	.833				
6	9:02	.230	.648				
7	9:04	.172	.502				
8	9:06	.108	.305				
9	9:08	.037	.105	60.0	76.0	29.20	
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration 6 1/2" x 1 1/2" orifice in
3" x 8" Straight main

Observers {

Date Nov 11, 19 49

No.	TIME	P _g -P ₂	P _g	WET °F	DRY °F	BAROM IN HG	CFM MAIN
1	9:44	.330	2.783	60.0	77.0	29.20	452
2	9:46	.278	2.372				415
3	9:48	.220	1.865				369
4	9:50	.175	1.492				329
5	9:52	.137	1.175				291
6	9:54	.111	.950				262
7	9:56	.071	.620				210
8	9:58	.032	.285	60.0	77.0	29.20	141
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Recalibration 6" x 1" orifice in 8" x 3"
Duct Straight Man

Observers { _____ } { _____ } Date Nov 14, 19 49

No.	TIME	$P_3 - P_2$	P_5	WET °F	DRY °F	BAROM IN HG	CFM MAIN
1	7:30	.207	3.18	56.2	72.0	28.87	358
2	7:34	.1795	2.78				334
3	7:37	.160	2.49				314
4	7:39	.141	2.19				295
5	7:41	.1175	1.83				270
6	7:43	.098	1.542				246
7	7:45	.080	1.255				222
8	7:47	.059	.930				191
9	7:50	.031	.502	56.0	71.8	28.87	138
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Recalibration of 6"x1" Orifice in 8"x3"
Straight man

Observers { _____ } { _____ } Date Nov 14, 19 49

6 2	TIME	P ₁ -P ₂	P ₃	NET OF	DRY OF	BARK IN H ₂	CFM MAN
1	8:07	.115	3.48	56.0	71.8	28.87	266
2	8:12	.0995	3.02				248
3	8:14	.089	2.695				235
4	8:17	.080	2.435				222
5	8:19	.061	1.880				194
6	8:22	.0495	1.525				175
7	8:25	.040	1.235				157
8	8:27	.024	.762	56.5	71.5	28.84	122
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 3'x8' Straight 18"x8"
Take off with 7"x2" x 16 1/2" x 6 1/2" Orifice plate in position

Observers { _____ } { _____ } Date Nov 14, 19 49

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	9:00	4.97	.170	.178	.102	56.5	71.5	28.84	1753	190	1480
2	9:03	4.205	.146	.152	.087				1612	176	1370
3	9:06	3.17	.112	.115	.066				1399	153	1195
4	9:12	2.33	.083	.085	.048				1200	132	1020
5	9:17	1.64	.059	.060	.035				1007	110	875
6	9:22	1.025	.038	.038	.022				796	88	690
7	9:25	.590	.0225	.022	.0125				604	67	520
8	9:28	.415	.016	.015	.008				506	56	417
9	9:31	.262	.0095	.0105	.006				403	47	360
10	9:35	.140	.006	.0035	.0035				294	32	275
11	9:39	.057	.003	.002	.002	56.5	72.0	28.84	188	23	208
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Remarks:

MECHANICAL ENGINEERING LABORATORY

MICHIGAN STATE COLLEGE

Running Log of _____

Observers {

Date _____, 19 _____

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	$SP_4 - SP_5$	$VP_4 - VP_5$	$TP_4 - TP_5$
1	1753	170	.160	.330	140	.178	.080	.258	1563	.102	.152	.254
2	1612	146	.132	.278	176	.152	.069	.221	1436	.087	.134	.221
3	1399	112	.102	.214	153	.118	.053	.168	1246	.066	.101	.167
4	1200	083	.072	.155	132	.085	.046	.125	1068	.048	.071	.119
5	1007	054	.051	.110	110	.060	.028	.088	891	.035	.050	.085
6	796	038	.033	.071	88	.038	.018	.056	708	.022	.032	.054
7	604	.0225	.0192	.0417	67	.022	.0105	.0325	537	.0125	.0186	.0311
8	506	.016	.0135	.0245	56	.015	.0072	.0222	450	.008	.013	.021
9	403	.0095	.0083	.0178	47	.0105	.0051	.0156	356	.006	.0081	.0141
10	294	.006	.0045	.0105	32	.005	.0024	.0074	262	.0035	.0044	.0079
11	188	.003	.0019	.0049	23	.0025	.0013	.0038	165	.0017	.0017	.0037
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_4 - TP_5$		% THRU TAKE-OFF			
14			190	.072		1563	.076		89.2			
15			176	.057		1436	.057		89.1			
16			153	.046		1246	.047		89.0			
17			132	.030		1068	.036		88.9			
18			110	.022		891	.025		88.6			
19			88	.015		708	.017		89.0			
20			67	.0092		537	.0106		89.0			
21			56	.0073		450	.0085		89.0			
22			47	.0022		356	.0037		88.5			
23			32	.0031		262	.0026		89.2			
24			23	.0011		165	.0016		87.8			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 5" Lake 78
with 6 1/2 x 1 1/2 x 16 1/2 x 6 1/2 Refused in Position

Observers { _____ } { _____ } Date Nov 16, 19 49

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-CFF
1	7:15	4.98	.200	.254	.111	55.8	72.0	29.13	1754	136	1550
2	7:20	4.16	.168	.218	.093				1602	125	1415
3	7:25	3.185	.130	.167	.071				1401	109	1240
4	7:30	2.35	.097	.124	.052				1203	94	1060
5	7:35	1.645	.069	.087	.037				1008	79	895
6	7:40	1.045	.045	.056	.0235				805	63	715
7	7:45	.580	.0255	.031	.013				599	47	530
8	7:50	.409	.018	.021	.0095				502	39	455
9	7:55	.263	.0115	.014	.006				403	32	360
10	8:00	.150	.0065	.008	.0035				304	24	275
11	8:04	.060	.0025	.0035	.0015	54.5	71.0	29.13	192	16	170
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18" x 8" Take off
with 6 1/2 x 1 1/2 x 16 1/2 x 6 1/2 surfaces in Position

Observers {

Date Nov 16, 19 47

$\frac{Q_4}{Z}$	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1754	.200	.158	.358	136	.259	.041	.300	1618	.111	.166	.277
2	1602	.168	.131	.299	125	.218	.035	.253	1477	.093	.138	.231
3	1401	.130	.102	.232	109	.167	.027	.194	1292	.071	.107	.178
4	1203	.097	.073	.170	94	.124	.0205	.1445	1109	.052	.078	.130
5	1008	.069	.052	.121	79	.084	.0146	1016	929	.037	.054	.091
6	805	.045	.034	.079	63	.056	.0095	.0655	742	.0235	.035	.0585
7	599	.0255	.019	.0445	47	.031	.0051	.0361	552	.013	.020	.033
8	502	.018	.013	.031	39	.021	.0036	.0246	463	.0095	.0138	.0233
9	403	.0115	.0084	.0199	32	.014	.0024	.0164	371	.006	.0088	.0148
10	304	.0065	.0048	.0113	24	.008	.0015	.0095	280	.0035	.0050	.0085
11	192	.0025	.0019	.0044	16	.0035	.0006	.0006	176	.0015	.0020	.0035
12												
13		Q_5	$TP_5 - TP_6$		$Q_4 - Q_5$	$TP_5 - TP_6$			% Thru Take-off			
14		136	.058		1618	.081			92.2			
15		125	.046		1477	.068			92.2			
16		109	.038		1292	.054			92.3			
17		94	.0255		1109	.040			92.2			
18		79	.0194		929	.030			92.2			
19		63	.0135		742	.0205			92.2			
20		47	.0084		552	.0115			92.2			
21		39	.0064		463	.0077			92.3			
22		32	.0035		371	.0051			92.1			
23		24	.0018		280	.0028			92.2			
24		16	.0003		176	.0009			91.7			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increased Type 8" x 3" Straight 18" x 8" Lake No
with 6 1/4 x 1 1/4 & 16 1/2 x 6 1/2 orifices in Position

Observers { _____ } { _____ } Date Nov 16, 19 49

NO	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom in HG	CFM MAIN	CFM ST	CFM T.OFF
1	8:15	4.95	.214	.286	.114	54.5	71.0	29.13	1750	107	1560
2	8:19	4.165	.182	.244	.096				1602	99	1445
3	8:22	3.175	.140	.185	.073				1400	86	1255
4	8:33	2.315	.103	.135	.053				1196	74	1070
5	8:37	1.62	.073	.095	.037				1000	62	895
6	8:40	1.015	.047	.060	.023				792	49	705
7	8:42	.575	.027	.034	.013				596	37	530
8	8:45	.408	.019	.0245	.0085				502	31	455
9	8:48	.249	.012	.015	.0055				391	25	345
10	8:51	.144	.007	.008	.003				298	18	256
11	8:53	.062	.003	.0035	.0015	54.5	71.5	29.13	196	12	181

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase in Type 8" x 3" Straight 18" x 8" Lake No
with 6 1/4 x 1 1/4 & 16 1/2 x 6 1/2 orifices in Position

Observers { _____ } { _____ } Date Nov 16, 19 49

no.	TIME	P ₁ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom in HG	CFM MAIN	CFM ST	CFM T-OFF
1	8:15	4.95	.214	.286	.114	54.5	71.2	29.13	1750	107	1560
2	8:19	4.165	.182	.244	.096				1602	99	1445
3	8:22	3.175	.140	.185	.073				1400	86	1255
4	8:33	2.315	.103	.135	.053				1196	74	1070
5	8:37	1.62	.073	.095	.037				1000	62	895
6	8:40	1.015	.047	.060	.023				792	49	705
7	8:42	.575	.027	.034	.013				596	37	530
8	8:45	.408	.019	.0245	.0085				502	31	435
9	8:48	.249	.012	.015	.0055				391	25	345
10	8:51	.144	.007	.008	.003				298	18	256
11	8:53	.062	.003	.0035	.0015	54.5	71.5	29.13	196	12	181
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase in Temp 8" x 3" Straight 18" x 8" Lake No
with 6 1/4 x 1 1/4 x 16 1/2 x 6 1/2 orifice in Position

Observers {

Date Nov 16, 19 49

Time	P ₁ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom in HG	CFM MAIN	CFM ST	CFM T. OFF
1 8:15	4.95	.214	.286	.114	54.5	71.2	29.13	1750	107	1560
2 8:19	4.165	.182	.244	.096				1602	99	1445
3 8:22	3.175	.140	.185	.073				1400	86	1255
4 8:33	2.315	.103	.135	.053				1196	74	1070
5 8:37	1.62	.073	.095	.037				1000	62	895
6 8:40	1.015	.047	.060	.023				792	49	705
7 8:42	.575	.027	.034	.013				596	37	530
8 8:45	.408	.019	.0245	.0085				502	31	455
9 8:48	.249	.012	.015	.0055				391	25	345
10 8:51	.144	.007	.008	.003				298	18	256
11 8:53	.062	.003	.0035	.0015	54.5	71.5	29.13	196	12	181

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increaser Type 8" x 3" Straight 18 x 8 In. m
with 6 1/4 x 1 1/4 + 1 1/2 x 6 1/2 orifices in Position

Observers { _____ } { _____ } Date Apr 16, 19 47

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1750	.214	.160	.374	107	.286	.0255	.3115	1643	.114	.172	.286
2	1602	.182	.151	.313	99	.244	.0221	.2661	1503	.096	.142	.238
3	1400	.140	.104	.244	86	.185	.0172	.2022	1314	.073	.112	.185
4	1196	.103	.071	.174	74	.135	.0130	.1480	1122	.053	.080	.133
5	1000	.073	.050	.123	62	.095	.0092	.1042	938	.037	.056	.093
6	792	.047	.032	.075	49	.060	.0055	.0655	743	.023	.035	.058
7	596	.027	.0188	.0458	37	.034	.0032	.0372	559	.013	.021	.034
8	502	.014	.0131	.0321	31	.0245	.0024	.0269	471	.0095	.0143	.0238
9	391	.012	.0078	.0198	25	.015	.0015	.0165	366	.0055	.0086	.0141
10	298	.007	.0046	.0116	18	.008	.0008	.0088	280	.003	.0051	.0081
11	196	.003	.0020	.005	12	.0025	.0003	.0038	184	.0015	.0022	.0037
12												
13			Q_5	TP_5		$Q_4 - Q_5$	$TP_4 - TP_5$					
14			107	.0625		1643	.088					
15			99	.0469		1503	.075					
16			86	.0418		1314	.059					
17			74	.0260		1122	.041					
18			62	.0188		938	.030					
19			49	.0135		743	.021					
20			37	.0086		559	.0118					
21			31	.0052		471	.0083					
22			25	.0033		366	.0057					
23			18	.0028		280	.0035					
24			12	.0012		184	.0013					
25												

$\frac{Q_4}{Q_5}$ Thru Take-off

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93.8

93.8

93.9

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 8" Lake to
with 6" x 1" x 16" x 1/2" P₂ Orifices in Position

Observers { _____ } { _____ } Date Nov 16, 19 49

No.	TIME	P ₃ -P ₂	P ₂	P ₃	P ₆	WET CF	DRY CF	Barom in Hg.	CFM MAIN	CFM 57	CFM T-CFF
1	9:15	4.94	.228	.306	.116	54.5	71.5	29.13	1749	80	1584
2	9:20	4.16	.194	.260	.0985				1603	73	1456
3	9:25	3.185	.149	.199	.075				1401	64	1270
4	9:28	2.35	.111	.146	.055				1205	55	1090
5	9:31	1.63	.078	.103	.0385				1003	46	912
6	9:34	1.05	.056	.065	.0245				792	37	725
7	9:37	.580	.029	.037	.014				599	28	550
8	9:41	.395	.020	.0255	.0095				495	23	455
9	9:45	.256	.013	.016	.006				398	18	360
10	9:49	.146	.0075	.010	.0035				300	15	275
11	9:53	.060	.003	.0035	.0015	54.0	71.0	29.13	192	9	180
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Incremental type 8" x 3" Straight 18" x 8" Inlet
with 6" x 1" & 16" x 1 1/2" Orifices in Position

Observers {

Date Nov 16, 19 42

No	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1749	.228	.158	.386	80	.366	.015	.321	1669	.116	.178	.294
2	1603	.194	.131	.325	73	.260	.0126	.2726	1530	.0985	.150	.2485
3	1401	.149	.102	.251	64	.199	.0099	.2089	1337	.075	.117	.192
4	1205	.111	.074	.185	55	.146	.0071	.1531	1150	.055	.082	.137
5	1003	.078	.051	.129	46	.103	.0050	.1080	957	.0385	.059	.0975
6	792	.050	.032	.082	37	.065	.0032	.0682	755	.0245	.036	.0605
7	599	.029	.019	.048	28	.037	.0018	.0388	571	.012	.0213	.0353
8	495	.020	.0128	.0328	23	.0255	.0013	.0268	472	.0095	.014	.0239
9	398	.013	.0081	.0211	18	.016	.0008	.0168	380	.006	.0094	.0154
10	300	.0075	.0046	.0121	15	.010	.0005	.0105	285	.0035	.0052	.0087
11	192	.003	.0019	.0049	9	.0025	.0001	.0036	183	.0015	.0022	.0037
12												
13		Q_5	$TP_4 - TP_5$		$Q_6 - Q_5$	$TP_5 - TP_6$			Q_6 Thru T.C.F.F.			
14		60	.065		1669	.092			95.4			
15		73	.0524		1530	.0765			95.5			
16		64	.0421		1337	.054			95.4			
17		55	.0319		1150	.048			95.5			
18		46	.0210		957	.0315			95.3			
19		37	.0138		755	.0215			95.4			
20		28	.0092		571	.0127			95.4			
21		23	.0060		472	.0089			95.4			
22		18	.0043		380	.0057			95.5			
23		15	.0016		285	.0034			95.0			
24		9	.0013		183	.0012			95.4			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase in Type 8x3" Straight 15", 8" Inlet 78
with 7"x2" x 16"x6" Orifice in Position

Observers {

Date Nov 17, 19 49

No.	TIME	B-P ₂	P ₄	P ₅	P ₆	NET ·F	DRY CF	BAROM IN HG	CFM ANEM	CFM ST	CFM T-CF
1	7:25	4.92	.2295	.215	.1645	54.8	70.0	29.14	1750	209	1500
2	7:31	4.12	.192	.1795	.138				1597	191	1370
3	7:34	3.15	.150	.1385	.106				1402	168	1234
4	7:37	2.33	.110	.101	.078				1200	144	1030
5	7:40	1.62	.077	.070	.053				1000	120	865
6	7:43	1.00	.048	.040	.033				785	95	670
7	7:46	.570	.028	.025	.018				593	72	510
8	7:49	.468	.020	.0175	.014				502	60	438
9	7:52	.253	.0125	.0105	.0085				395	47	340
10	7:55	.145	.007	.006	.005				297	35	262
11	8.00	.065	.004	.0035	.002	54.5	68.0	29.14	201	27	166

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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 8"
Take 78 with 7" x 2" x 16" x 6" surfaces in position

Observers { _____ } { _____ } Date Nov 17, 19 49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1750	.2295	.158	.3875	209	.215	.100	.315	1541	.1645	.147	.3115
2	1547	.192	.130	.322	191	.1795	.082	.2615	1406	.138	.127	.265
3	1402	.150	.102	.252	168	.1385	.064	.2025	1234	.106	.101	.207
4	1200	.110	.073	.183	144	.101	.048	.149	1056	.078	.070	.148
5	1000	.077	.050	.127	120	.070	.033	.103	880	.055	.050	.105
6	785	.048	.032	.080	95	.044	.021	.065	690	.033	.031	.064
7	593	.028	.0183	.0463	72	.025	.0123	.0373	521	.019	.0177	.0367
8	502	.020	.0131	.0331	60	.0175	.0085	.0260	442	.014	.0124	.0264
9	395	.0125	.0080	.0205	47	.0105	.0051	.0156	348	.0085	.0077	.0142
10	299	.007	.0047	.0117	35	.006	.0029	.0089	264	.005	.0045	.0095
11	211	.004	.0020	.006	27	.0035	.0017	.0052	174	.002	.0020	.004
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_4 - TP_6$		% Thru	T.OFF		
14			209	.0725		1541	.0760		88.0			
15			191	.0605		1406	.057		88.0			
16			168	.0495		1234	.045		88.0			
17			144	.034		1056	.035		88.0			
18			120	.024		880	.022		88.0			
19			95	.015		690	.016		88.0			
20			72	.009		521	.0096		88.0			
21			60	.0071		442	.0067		88.0			
22			47	.0049		348	.0063		88.2			
23			35	.0028		264	.0022		88.4			
24			27	.0008		174	.002		86.6			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Compressor Type 8" x 3" Straight 18 x 8" Lake m
with 6 1/2 x 1 1/2 x 16 x 6" Duplex Plates in Position

Observers {

Date Nov 17, 19 49

NO	TIME	P ₁ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	BAROM IN HG.	CFM MAIN	CFM SV	CFM T-OFF
1	8:34	4.86	.262	.310	.175	54.5	68.0	29.14	1734	152	1545
2	8:37	4.18	.228	.270	.153				1609	139	1445
3	8:40	3.17	.172	.205	.115				1399	122	1250
4	8:43	2.34	.128	.150	.085				1201	103	1080
5	8:47	1.64	.091	.105	.060				1007	87	905
6	8:50	1.03	.057	.0655	.037				798	69	710
7	8:54	.580	.0325	.037	.021				599	52	535
8	8:57	.419	.023	.027	.015				509	44	452
9	9:00	.244	.014	.015	.009				387	33	350
10	9:03	.134	.008	.009	.005				293	26	262
11	9:05	.052	.003	.0035	.002	54.5	71.5	29.14	178	16	165
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18" x 5" Lake 78
with 6 1/2 x 1 1/2 x 16" x 6" Deface plate in Position

Observers {

Date Nov 17, 19 49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_4	VP_4	TP_4
1	1734	.262	.156	.418	152	.316	.057	.367	1582	.175	.155	.330
2	1609	.228	.134	.362	139	.270	.043	.313	1470	.153	.138	.291
3	1399	.172	.102	.274	122	.205	.034	.239	1277	.115	.103	.218
4	1201	.128	.073	.201	103	.150	.024	.174	1098	.085	.076	.161
5	1007	.091	.052	.143	87	.105	.0175	.1225	920	.060	.054	.114
6	798	.057	.033	.090	69	.0655	.0111	.0766	729	.037	.034	.071
7	599	.0325	.019	.0515	52	.037	.0065	.0435	547	.021	.0193	.0403
8	509	.023	.014	.037	44	.027	.0047	.0317	465	.015	.0140	.0290
9	387	.014	.0077	.0217	33	.015	.0026	.0176	354	.009	.0080	.0170
10	293	.008	.0044	.0124	26	.009	.0016	.0106	267	.005	.0046	.0096
11	178	.003	.0016	.0046	16	.0035	.0006	.0041	162	.002	.0017	.0037
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_4 - TP_5$		% Thru - Torff			
14			152	.051		1582	.088		91.3			
15			139	.049		1470	.071		91.4			
16			122	.035		1277	.056		91.2			
17			103	.027		1098	.040		91.5			
18			87	.0205		920	.029		91.4			
19			69	.0134		729	.019		91.4			
20			52	.0080		547	.0112		91.3			
21			44	.0053		465	.0080		91.4			
22			33	.0041		354	.0047		91.5			
23			26	.0018		267	.0028		91.5			
24			16	.0005		162	.0009		91.0			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8x3" Straight 18"x18" Lake 70
with 6x4 x 1 1/4 x 16"x16" Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 17, 19 49

$\frac{Q}{Z}$	Time	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	BAL. in HG	CFM MAIN	CFM ST	CFM T-OFF
1	9:30	4.85	.280	.346	.182	54.5	71.5	29.14	1732	125	1580
2	9:35	4.16	.242	.300	.158				1602	110	1470
3	9:40	3.20	.187	.230	.122				1405	96	1290
4	9:45	2.315	.138	.165	.087				1196	81	1130
5	9:50	1.61	.095	.115	.060				999	68	900
6	9:54	1.02	.060	.074	.039				795	55	730
7	9:57	.590	.0355	.042	.022				604	41	550
8	10:00	.409	.025	.0295	.015				503	35	450
9	10:02	.254	.015	.018	.009				396	27	350
10	10:04	.136	.008	.010	.005				290	20	261
11	10:07	.058	.0035	.0045	.002	54.5	72.0	29.14	190	14	165
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8x3" Straight 18"x8" Lake 77
with 6x4 x 1/4" x 16"x6" orifice Plate in Position

Observers {

Date Nov 17, 19 49

No.	Time	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	9:30	4.85	.280	.346	.152	54.5	71.5	29.14	1732	125	1580
2	9:35	4.16	.242	.300	.158				1602	110	1470
3	9:40	3.20	.187	.230	.122				1405	96	1290
4	9:45	2.315	.135	.165	.087				1196	81	1130
5	9:50	1.61	.095	.115	.060				999	68	900
6	9:54	1.02	.060	.074	.039				795	55	730
7	9:57	.590	.0355	.042	.022				604	41	550
8	10:00	.409	.025	.0295	.015				503	35	450
9	10:02	.254	.015	.018	.009				396	27	350
10	10:04	.136	.008	.010	.005				290	20	261
11	10:07	.058	.0035	.0045	.002	54.5	72.0	29.14	190	14	165
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Decreaser Type 8" x 3" Straight 18" x 8" Loke 22
with 6 1/4" x 1 1/4" x 16" x 6" surface Plates in Position

Observers { _____ } { _____ } Date Nov 17, 19 41

No.	Q_4	S_4	U_4	T_4	Q_5	S_5	U_5	T_5	$Q_4 - Q_5$	S_6	U_6	T_6
1	1732	.280	.156	.436	125	.346	.036	.382	1607	.182	.161	.343
2	1602	.242	.131	.373	110	.300	.028	.328	1492	.158	.141	.299
3	1405	.187	.103	.290	96	.230	.0212	.2512	1309	.122	.111	.233
4	1196	.135	.071	.206	81	.165	.0155	.1805	1115	.087	.079	.166
5	999	.095	.050	.145	68	.115	.0109	.1259	931	.060	.056	.116
6	795	.060	.033	.093	55	.074	.0071	.0811	740	.039	.035	.074
7	604	.0355	.0192	.0547	41	.042	.0040	.0460	564	.022	.021	.043
8	503	.025	.0134	.0384	35	.0295	.0029	.0324	468	.015	.0142	.0292
9	396	.015	.008	.0230	27	.018	.0017	.0197	369	.009	.0088	.0178
10	290	.008	.0044	.0124	20	.010	.0009	.0109	270	.005	.0046	.0096
11	190	.0035	.0019	.0054	14	.0045	.0004	.0049	176	.002	.0020	.004
12												
13			Q_5	$T_6 - T_5$		$Q_4 - Q_5$	$T_6 - T_5$		$\% \text{ Thru}$	$T - \text{OFF}$		
14			125	.054		1607	.093		92.8			
15			110	.045		1492	.074		93.2			
16			96	.0388		1309	.057		93.1			
17			81	.0255		1115	.040		93.3			
18			68	.0191		931	.024		93.2			
19			55	.0119		740	.019		93.2			
20			41	.0087		564	.0117		93.3			
21			35	.0060		468	.0092		93.1			
22			27	.0030		369	.0052		93.2			
23			20	.0015		270	.0028		93.2			
24			14	.0005		176	.0014		92.6			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Overman Type 8x3 Straight 18x8 Lax 78
with 6x1 & 16x6 orifice Plates in Position

Observers {

Date Nov 18, 19 49

NO.	TIME	P ₃ -P ₂	P ₂	P ₃	P ₆	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:29	4.90	.301	.318	.192	52.5	67.5	29.23	1740	88	1620
2	7:34	4.13	.257	.320	.162				1599	81	1480
3	7:38	3.18	.199	.248	.125				1400	72	1300
4	7:41	2.34	.146	.181	.092				1201	61	1120
5	7:43	1.63	.103	.127	.064				1003	51	930
6	7:46	1.04	.067	.082	.0405				801	42	740
7	7:49	.55	.036	.044	.022				585	30	550
8	7:52	.425	.028	.034	.0165				573	26	475
9	7:56	.255	.017	.0205	.010				347	21	370
10	7:59	.145	.010	.012	.005				294	16	260
11	8:04	.060	.0047	.0055	.0025	52.0	67.5	29.23	192	11	185
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8x3 Straight 18x8 Lake 78
with 6x1 x 16x6 Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 18, 19 49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1740	.301	.158	.454	88	.378	.018	.346	1652	.192	.173	.365
2	1599	.257	.130	.387	81	.320	.0155	.3355	1518	.162	.149	.311
3	1400	.199	.102	.301	72	.248	.0122	.2602	1328	.125	.116	.241
4	1201	.146	.073	.219	61	.181	.0090	.1900	1140	.092	.081	.173
5	1003	.103	.051	.154	51	.127	.0061	.1331	952	.064	.058	.122
6	801	.067	.033	.100	42	.082	.0048	.0863	759	.0405	.037	.0775
7	585	.036	.018	.054	30	.044	.0021	.0461	555	.022	.020	.0420
8	513	.028	.0139	.0419	26	.034	.0016	.0356	487	.0165	.0151	.0316
9	397	.017	.0082	.0252	21	.0205	.0011	.0216	376	.010	.0091	.0191
10	299	.010	.0047	.0147	16	.012	.0006	.1126	283	.005	.0051	.0101
11	192	.0047	.0019	.0066	11	.0055	.0003	.0058	181	.0025	.0021	.0046
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_4 - TP_5$		% Thru T-05K			
14			88	.063		1652	.094		95.0			
15			81	.0515		1518	.076		94.9			
16			72	.0468		1328	.060		94.8			
17			61	.0290		1140	.046		95.0			
18			51	.0205		952	.032		94.8			
19			42	.0137		759	.0225		95.0			
20			30	.0079		555	.012		94.9			
21			26	.0063		487	.0103		95.0			
22			21	.0036		376	.0061		94.8			
23			16	.0021		283	.0046		94.6			
24			11	.0008		181	.0020		94.3			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8x3 Straight 18x8 Lathe
with 6x1 x 16x1 Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 18, 19 49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1740	.301	.158	.454	88	.378	.018	.346	1652	.192	.173	.365
2	1599	.257	.130	.387	81	.320	.0155	.3355	1518	.162	.149	.311
3	1400	.199	.102	.301	72	.248	.0122	.2602	1328	.125	.116	.241
4	1201	.146	.073	.219	61	.181	.0090	.1900	1140	.092	.081	.173
5	1003	.103	.051	.154	51	.127	.0061	.1331	952	.064	.058	.122
6	801	.067	.033	.100	42	.082	.0049	.0863	759	.0405	.037	.0775
7	585	.036	.018	.054	30	.044	.0021	.0461	555	.022	.020	.0420
8	513	.028	.0139	.0419	26	.034	.0016	.0356	487	.0165	.0151	.0316
9	397	.017	.0082	.0252	21	.0205	.0011	.0216	376	.010	.0091	.0191
10	299	.010	.0047	.0147	16	.012	.0006	.1126	283	.005	.0051	.0101
11	192	.0047	.0019	.0066	11	.0055	.0003	.0058	181	.0025	.0021	.0046
12												
	Q_5	$TP_4 - TP_5$	$Q_4 - Q_5$	$TP_4 - TP_6$	% Thru T-ORF							
13	88	.063	1652	.094	95.0							
14	81	.0515	1518	.076	94.9							
15	72	.0408	1328	.060	94.8							
16	61	.0290	1140	.046	95.0							
17	51	.0205	952	.032	94.8							
18	42	.0137	759	.0225	95.0							
19	30	.0079	555	.012	94.9							
20	26	.0063	487	.0103	95.0							
21	21	.0036	376	.0061	94.8							
22	16	.0021	283	.0046	94.6							
23	11	.0008	181	.0020	94.3							
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increased Type 8" x 3" x 18 x 8" Inlet to
water 7" x 2" x 15" x 5" orifice Plate in Position

Observers { _____ } { _____ } Date Nov 18, 19 49

No.	TIME	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-CH
1	8:30	4.85	.317	.268	.261	52.0	67.5	29.20	1732	234	1470
2	8:35	4.14	.274	.230	.225				1600	216	1370
3	8:40	3.20	.210	.1755	.173				1405	190	1200
4	8:45	2.32	.1545	.128	.1255				1198	161	1020
5	8:50	1.61	.108	.0895	.087				999	135	850
6	8:53	1.025	.069	.058	.055				796	107	678
7	8:56	.565	.039	.031	.0305				591	80	505
8	8:59	.402	.0275	.022	.0215				499	67	425
9	9:02	.260	.018	.0145	.0145				401	55	347
10	9:05	.142	.010	.008	.008				296	41	260
11	9:08	.055	.0045	.004	.0035	52.5	67.5	29.20	184	29	171
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase in Type 8" x 3" x 18" x 8" Tank
with 7" x 2" x 15 1/2" x 5 1/2" orifice Plates in Position

Observers {

Date Nov 18, 19 49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1732	.317	.157	.471	234	.268	.125	.393	1498	.261	.142	.413
2	1670	.274	.130	.404	216	.230	.106	.336	1384	.225	.121	.346
3	1405	.210	.103	.313	190	.1755	.081	.2565	1215	.173	.096	.269
4	1198	.1545	.072	.2265	161	.128	.060	.188	1037	.1255	.069	.1945
5	999	.108	.050	.1580	135	.0895	.042	.1315	864	.087	.049	.136
6	796	.069	.033	.1020	107	.056	.026	.082	689	.055	.031	.086
7	591	.039	.0181	.0571	80	.031	.0151	.0461	511	.0305	.017	.0475
8	499	.0275	.013	.0405	67	.022	.0105	.0325	432	.0215	.012	.0335
9	401	.019	.0083	.0263	55	.0145	.0071	.0216	346	.0145	.0076	.0221
10	296	.010	.0045	.0145	41	.008	.0040	.0120	255	.008	.0042	.0122
11	184	.0045	.0018	.0063	29	.004	.0020	.006	155	.0035	.0016	.0051
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_4 - TP_6$		$\% \text{ Thru T.C.F.F.}$			
14			234	.078		1498	.068		86.5			
15			216	.068		1384	.058		86.6			
16			190	.0565		1215	.044		86.5			
17			161	.0385		1037	.032		86.6			
18			135	.0265		864	.022		86.5			
19			107	.0200		689	.016		86.6			
20			80	.0110		511	.0096		86.5			
21			67	.0080		432	.007		86.6			
22			55	.0047		346	.0042		86.3			
23			41	.0025		255	.0023		86.2			
24			29	.0003		155	.0012		84.2			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increaseer Type 8" 3" Straight 18" 8" Lake
with 6 1/2 x 1 1/2 x 15 1/2 x 5 1/2 orifice plates in Position

Observers { _____ } { _____ } Date Nov 18, 19 49

No.	TIME	P ₁ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	BURIM in HG	CFM MAIN	CFM ST	CFM T-OFF
1	9:31	4.82	.370	.399	.285	51.5	67.5	29.20	1724	169	1555
2	9:35	4.18	.318	.348	.250				1609	158	1450
3	9:38	3.21	.245	.268	.191				1410	139	1271
4	9:40	2.36	.180	.195	.140				1200	118	1090
5	9:43	1.63	.125	.135	.097				1003	98	905
6	9:46	1.03	.080	.085	.060				798	78	720
7	9:49	.580	.045	.048	.035				599	59	540
8	9:52	.390	.031	.033	.024				490	49	441
9	9:56	.261	.0205	.0215	.015				402	39	363
10	9:59	.142	.011	.0117	.008				296	29	267
11	10:02	.0475	.005	.0053	.004	51.0	66.0	29.20	190	20	170
12											
13											
14											
15											
16											
17											
18											
19											
20											
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22											
23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Decreaser Type 8" x 3" Straight 18" x 8" Lub 78
with 6 1/2" x 1 1/2" x 15 1/2" x 5 1/2" Orifice Plate in Position

Observers {

Date Nov 18, 1947

no.	Q_4	SP_4	IP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1724	.370	.153	.533	169	.344	.067	.466	1555	.285	.152	.437
2	1609	.318	.134	.452	158	.348	.058	.406	1451	.250	.135	.385
3	1410	.245	.105	.350	139	.268	.043	.311	1271	.191	.103	.294
4	1208	.180	.075	.255	118	.195	.032	.227	1090	.140	.073	.213
5	1003	.125	.051	.176	98	.135	.022	.157	905	.097	.052	.144
6	798	.080	.033	.113	78	.083	.0142	.0942	720	.060	.034	.094
7	599	.045	.014	.064	54	.048	.0082	.0562	540	.035	.0188	.0533
8	490	.031	.0123	.0433	49	.033	.0055	.0385	441	.024	.0123	.0363
9	402	.0205	.0084	.0289	39	.0215	.0036	.0251	363	.015	.0085	.0235
10	296	.011	.0045	.0155	29	.0117	.0020	.0137	267	.008	.0046	.0126
11	190	.005	.0014	.0069	20	.0053	.0009	.0062	170	.004	.0018	.0058
12												
13			Q_5	$TP_4 - TP_5$		$Q_4 - Q_5$	$TP_5 - TP_6$		% Thru T-OFF			
14			169	.037		1555	.086		90.2			
15			158	.046		1451	.067		90.2			
16			134	.039		1271	.056		90.2			
17			118	.028		1090	.042		90.3			
18			98	.019		905	.027		90.2			
19			78	.0138		720	.019		90.2			
20			54	.0078		540	.0102		90.2			
21			49	.0048		441	.0070		90.1			
22			39	.0038		363	.0054		90.4			
23			29	.0018		267	.0029		90.2			
24			20	.0007		170	.0011		89.5			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase in Type 8" x 3" Straight 1828' Lake 78
with 6 1/4 x 1 1/4 x 15 1/2 x 5 1/2 Duplex Plate in Position

Observers { _____ } { _____ } Date _____, 19 _____

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:30	4.72	.382	.440	.292	54.5	78.0	29.16	1709	134	
2	7:36	4.165	.340	.392	.260				1603	126	
3	7:42	3.145	.256	.294	.195				1392	110	
4	7:48	2.33	.190	.217	.144				1200	94	
5	8:54	1.62	.133	.150	.100				1100	78	
6	8:00	1.005	.083	.092	.062				788	62	
7	8:06	.580	.0475	.054	.035				599	47	
8	8:12	.415	.035	.038	.025				506	39	
9	8:18	.270	.022	.025	.0155				408	32	
10	8:23	.143	.012	.013	.008				297	23	
11	8:28	.061	.005	.0055	.0035	52.5	75.0	29.16	192	15	
12											
13											
14											
15											
16											
17											
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19											
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21											
22											
23											
24											
25											

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Incompressible Syphon 8" x 3" Straight 1828' Lake 28
with 6 1/4 x 1 1/4 + 15 1/2 x 5 1/2 Duplex Plate in Position

Observers { _____ } { _____ } Date _____, 19 _____

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET OF	DRY OF	BAROM IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:30	4.72	.382	.440	.292	54.5	78.0	29.16	1709	134	
2	7:36	4.165	.340	.392	.260				1603	126	
3	7:42	3.145	.256	.294	.195				1392	110	
4	7:48	2.33	.190	.217	.144				1200	94	
5	7:54	1.62	.133	.150	.100				1100	78	
6	8:00	1.005	.083	.094	.062				788	62	
7	8:06	.580	.0475	.054	.035				599	47	
8	8:12	.415	.035	.038	.025				506	39	
9	8:18	.270	.022	.025	.0155				408	32	
10	8:23	.143	.012	.013	.008				297	23	
11	8:28	.061	.005	.0055	.0035	52.5	75.0	29.16	192	15	
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 1" x 3" Straight 18" x 8" Loke to
with 6 1/4 x 1 1/4 x 15 1/2 x 5 1/2 square Plates in Position

Observers {

Date _____, 19 ____

No.	Q_4	S_{P_4}	V_{P_4}	T_{P_4}	Q_5	S_{P_5}	V_{P_5}	T_{P_5}	$Q_4 - Q_5$	S_{P_6}	V_{P_6}	T_{P_6}
1	1709	.382	.151	.533	137	.440	.041	.1481	1575	.292	.154	.446
2	1603	.340	.131	.471	126	.392	.036	.428	1477	.260	.137	.399
3	1392	.256	.101	.357	110	.294	.028	.322	1282	.195	.105	.300
4	1200	.190	.072	.262	94	.217	.0205	.2375	1106	.144	.071	.221
5	1000	.133	.050	.183	78	.150	.0142	.1642	922	.100	.053	.155
6	788	.083	.032	.115	62	.094	.0093	.1033	726	.062	.037	.096
7	599	.0475	.019	.0665	47	.054	.0051	.0591	552	.035	.0148	.0548
8	506	.035	.0138	.0488	39	.038	.0036	.0416	467	.025	.014	.039
9	408	.022	.0087	.0307	32	.025	.0024	.0274	376	.0155	.0091	.0246
10	297	.012	.0046	.0162	23	.013	.0013	.0143	274	.008	.0048	.0128
11	194	.005	.0020	.0070	15	.0055	.0005	.0060	179	.0035	.0020	.0055
12												
13			Q_5	$T_{P_4} - T_{P_5}$		$Q_4 - Q_5$	$T_{P_5} - T_{P_6}$		% Thru T-OFF			
14			134	.052		1575	.081		92.2			
15			126	.043		1477	.072		92.2			
16			110	.035		1282	.057		92.2			
17			94	.0245		1106	.041		92.2			
18			78	.0188		922	.028		92.2			
19			62	.0117		726	.019		92.2			
20			47	.0074		552	.0119		92.2			
21			39	.0072		467	.0098		92.3			
22			32	.0033		376	.0061		92.2			
23			23	.0023		274	.0038		92.3			
24			15	.0010		179	.0015		92.3			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Orificer Type 8" x 3" Straight 18" x 8" Inlet
with 6 x 1 + 15 1/2 x 5 1/2 Orifice Plate in Position

Observers { _____ } { _____ } Date _____, 19 _____

NO.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	NET °F	DRY °F	DRY WET IN HE. MAIN	CFM ST	CFM T-CEP
1	8:45	4.685	.405	.475	.303	52.5	75.0	20.16	1701	110
2	8:50	4.11	.358	.420	.268				1593	94
3	8:54	3.165	.276	.323	.205				1397	82
4	8:57	2.35	.203	.235	.150				1198	76
5	9:00	1.65	.145	.168	.106				1009	59
6	9:04	1.05	.092	.1065	.067				806	47
7	9:08	.575	.050	.057	.036				591	34
8	9:12	.415	.036	.0415	.0255				506	29
9	9:17	.259	.022	.026	.015				400	23
10	9:22	.195	.011	.013	.0075				289	17
11	9:27	.060	.005	.0055	.003	54.	80.0	27.15	192	11
12										
13										
14										
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18" x 8" Take off
with 6 x 1 x 15 1/2 x 5 1/2 Orifice Plates in Position

Observers { _____ } { _____ } Date _____, 19 _____

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1701	.1405	.149	.554	100	.475	.0226	.4476	1601	.303	.160	.463
2	1593	.358	.128	.486	94	.420	.0205	.4415	1499	.268	.143	.411
3	1397	.276	.103	.379	82	.323	.0159	.3389	1315	.205	.112	.317
4	1198	.203	.072	.275	70	.235	.0116	.2466	1128	.150	.080	.230
5	1009	.145	.052	.197	59	.168	.0082	.1762	950	.106	.058	.164
6	806	.092	.034	.126	47	.105	.0051	.1116	759	.067	.037	.104
7	591	.050	.0185	.0681	34	.057	.0028	.0598	557	.036	.0202	.0562
8	506	.036	.0135	.0495	29	.0415	.0020	.0435	477	.0255	.0145	.0400
9	400	.022	.0083	.0323	23	.026	.0013	.0273	377	.015	.0090	.0240
10	289	.011	.0044	.0154	17	.013	.0008	.0138	272	.0075	.0048	.0123
11	192	.005	.0019	.0069	11	.0055	.0003	.0058	181	.003	.0021	.0051
12												
13			Q_5	$TP_5 - TP_6$		$Q_4 - Q_5$	$TP_4 - TP_6$		$\% \text{ Thru}$	$T.O.F.F.$		
14			100	.0564		1601	.091		94.2			
15			94	.0455		1499	.075		94.2			
16			82	.0401		1315	.062		94.2			
17			70	.0284		1128	.045		94.2			
18			59	.0208		950	.0330		94.2			
19			47	.0144		759	.022		94.2			
20			34	.0083		557	.0119		94.3			
21			29	.0060		477	.0095		94.3			
22			23	.0050		377	.0083		94.3			
23			17	.0016		272	.0031		94.2			
24			11	.0011		181	.0018		94.3			
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18" x 8" Take off
with 6 x 1 & 15 1/2 x 5 1/2 Orifice Plates in Position

Observers { _____ } { _____ } Date _____, 19 _____

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1701	.1405	.149	.554	100	.475	.0226	.4476	1601	.303	.160	.463
2	1593	.358	.128	.486	94	.420	.0205	.4415	1499	.268	.143	.411
3	1397	.276	.103	.379	82	.323	.0159	.3389	1315	.205	.112	.317
4	1198	.203	.072	.275	70	.235	.0116	.2466	1128	.150	.080	.230
5	1019	.145	.052	.191	59	.168	.0082	.1762	950	.106	.058	.164
6	806	.092	.034	.126	47	.105	.0051	.1116	759	.067	.037	.104
7	591	.050	.0181	.0681	34	.057	.0028	.0598	557	.036	.0202	.0562
8	506	.036	.0135	.0495	29	.0415	.0020	.0435	477	.0255	.0145	.0400
9	400	.022	.0083	.0323	23	.026	.0013	.0273	377	.015	.0090	.0240
10	289	.011	.0044	.0154	17	.013	.0008	.0138	272	.0075	.0048	.0123
11	192	.005	.0019	.0069	11	.0055	.0003	.0058	181	.003	.0021	.0051
12												
	Q_5	$TP_5 - TP_6$	$Q_4 - Q_5$	$TP_4 - TP_6$	% Thru T-Off							
13												
14	100	.0564	1601	.091	94.2							
15	94	.0455	1499	.075	94.2							
16	82	.0401	1315	.062	94.2							
17	70	.0284	1128	.045	94.2							
18	59	.0208	950	.0330	94.2							
19	47	.0144	759	.022	94.2							
20	34	.0083	557	.0119	94.3							
21	29	.0060	477	.0095	94.3							
22	23	.0050	377	.0083	94.3							
23	17	.0016	272	.0031	94.2							
24	11	.0011	181	.0018	94.3							
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Decrease Type 8" x 3" Straight 18" x 8" Take off
with 6 x 1 x 15 1/2 x 5 1/2 Orifice Plates in Position

Observers { _____ } { _____ } Date _____, 19 _____

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1701	.1405	.149	.554	100	.475	.0226	.4476	1601	.303	.160	.463
2	1593	.358	.128	.486	94	.426	.0205	.4465	1499	.268	.143	.411
3	1397	.276	.103	.379	82	.323	.0159	.3389	1315	.205	.112	.317
4	1198	.203	.072	.275	70	.235	.0116	.2466	1128	.150	.080	.230
5	1009	.145	.052	.197	59	.168	.0082	.1762	950	.106	.058	.164
6	806	.092	.034	.126	47	.105	.0051	.1116	759	.067	.037	.104
7	591	.050	.0181	.0681	34	.057	.0028	.0598	557	.036	.0202	.0562
8	506	.036	.0135	.0495	29	.0415	.0020	.0435	477	.0255	.0145	.0400
9	400	.022	.0083	.0323	23	.026	.0013	.0273	377	.015	.0090	.0240
10	289	.011	.0044	.0154	17	.013	.0008	.0138	272	.0075	.0048	.0123
11	192	.005	.0019	.0069	11	.0055	.0003	.0058	181	.003	.0021	.0051
12												
13			Q_5	$TP_5 - TP_6$		$Q_4 - Q_5$	$TP_4 - TP_6$		% Thru T-051			
14			100	.0564		1601	.091		94.2			
15			94	.0455		1499	.075		94.2			
16			82	.0401		1315	.062		94.2			
17			70	.0284		1128	.045		94.2			
18			59	.0208		950	.0330		94.2			
19			47	.0144		759	.022		94.2			
20			34	.0083		557	.0119		94.3			
21			29	.0060		477	.0095		94.3			
22			23	.0050		377	.0083		94.3			
23			17	.0016		272	.0031		94.2			
24			11	.0011		181	.0018		94.3			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Incremental Type 8x3" Straight 18x8" Loke II
with 7"x2" x 15"x5" engine Plate in Position

Observers {

Date _____, 19 ____

NO	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	NET OF	DRY WF	BURDEN IN HG.	CFM MAIN	CFM ST	CFM T-OFF
1	11:15	4.57	.455	.346	.410	58.0	81.0	29.06	1680	266	
2	11:20	4.35	.415	.315	.373				1601	255	
3	11:25	3.17	.317	.242	.288				1399	222	
4	11:30	2.34	.232	.174	.208				1201	189	
5	11:35	1.63	.161	.121	.1445				1003	157	
6	11:40	1.02	.101	.075	.096				795	124	
7	11:45	.570	.057	.042	.050				593	93	
8	11:50	.400	.040	.029	.035				497	77	
9	11:55	.255	.025	.018	.022				397	61	
10	12:00	.149	.0145	.0105	.012				303	46	
11	12:05	.060	.0065	.005	.0055	54.0	76.0	29.06	192	32	
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8"x3" Straight 18"x8" Loke II
with 7"x2" x 15"x15" Orifice Plate in position

Observers {

Date _____, 19 ____

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	Q_4-Q_5	SP_6	VP_6	TP_6
1	1680	.455	.143	.598	266	.346	.164	.510	1414	.416	.130	.546
2	1611	.415	.133	.548	255	.315	.148	.463	1356	.373	.102	.475
3	1399	.317	.103	.420	222	.242	.112	.353	1177	.288	.086	.374
4	1201	.232	.073	.305	189	.174	.081	.255	1012	.208	.067	.275
5	1003	.161	.051	.212	157	.121	.057	.178	846	.1445	.046	.1905
6	795	.101	.033	.134	124	.075	.035	.116	671	.090	.029	.119
7	593	.057	.0183	.0753	93	.042	.0202	.0622	500	.050	.0162	.0662
8	497	.040	.013	.053	77	.029	.0140	.0430	420	.035	.0115	.0465
9	397	.025	.0082	.0332	61	.018	.0090	.0270	336	.022	.0071	.0291
10	303	.0145	.0048	.0193	46	.0105	.0050	.0155	257	.012	.0043	.0163
11	192	.0065	.0019	.0084	32	.005	.0024	.0074	160	.0055	.0016	.0071
12												
13			Q_5	TP_4-TP_5		Q_4-Q_5	TP_4-TP_5		$\%$	Thru T-OFF		
14			266	.088		1414	.054		84.2			
15			255	.085		1356	.073		84.2			
16			222	.067		1177	.046		84.1			
17			189	.050		1012	.030		84.4			
18			157	.034		846	.0215		84.3			
19			124	.024		671	.015		84.4			
20			93	.0131		500	.0091		84.4			
21			77	.0100		420	.0065		84.5			
22			61	.0062		336	.0041		84.7			
23			46	.0038		257	.0030		84.9			
24			32	.0010		160	.0013		83.3			
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase type 8" x 3" Straight 18" x 8" Lateral
with 6" x 1 1/2" x 15 x 5" Drip Plates in Position

Observers {

Date Nov 25, 19 49

No.	TIME	P ₁	P ₄	P ₅	P ₆	WET	DRY	BAROM	CFM	CFM	CFM
						°F	°F	IN HG	MAIN	ST	T-OFF
1	12:40	4.485	.519	.522	.450	54.0	76.0	29.06	1666	194	
2	12:45	3.23	.378	.379	.329				1413	165	
3	12:50	2.33	.242	.243	.232				1200	132	
4	12:55	1.645	.190	.190	.167				1008	117	
5	1:00	1.115	.117	.116	.100				792	91	
6	1:05	.585	.067	.0655	.058				601	64	
7	1:10	.382	.045	.043	.0375				486	56	
8	1:15	.265	.032	.0315	.027				404	48	
9	1:20	.146	.017	.0165	.0145				300	34	
10	1:23	.057	.007	.007	.0055	55.0	80.0	29.06	184	23	
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Overcracker Type 8" x 3" Straight 18" x 8" Loke 77
with 6 1/2 x 1 1/2 x 15 x 15" Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 25, 19 48

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1666	.519	.142	.661	194	.522	.087	.609	1472	.450	.138	.588
2	1413	.378	.105	.483	165	.379	.062	.441	1248	.329	.110	.429
3	1200	.242	.073	.315	132	.243	.040	.283	1068	.232	.070	.302
4	1008	.190	.052	.246	117	.190	.032	.222	891	.162	.050	.212
5	792	.117	.032	.149	91	.116	.0195	.1355	701	.100	.0315	.1315
6	601	.067	.019	.086	69	.0655	.0111	.0766	532	.056	.0205	.0765
7	486	.045	.0122	.0572	56	.043	.0072	.0502	430	.0375	.0120	.0495
8	404	.032	.0084	.0404	48	.0315	.0053	.0368	356	.027	.0081	.0351
9	300	.017	.0047	.0217	34	.0165	.0038	.0193	266	.0145	.0045	.0190
10	184	.007	.0018	.0088	23	.007	.0013	.0083	166	.0055	.0018	.0073
11												
12			Q_5	TP_4-TP_5		Q_4-Q_5	TP_4-TP_5				$\%$ THRU	T-OFF
13			194	.052		1472	.073				88.5	
14			165	.0412		1248	.054				88.3	
15			132	.032		1068	.043				89.0	
16			117	.020		891	.030				88.3	
17			91	.0135		701	.0175				88.6	
18			69	.0094		532	.0095				88.6	
19			56	.0070		430	.0077				88.5	
20			48	.0056		356	.0053				88.2	
21			34	.0024		266	.0027				88.7	
22			23	.0005		166	.0015				87.8	
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Incremental Type 8" x 3" Straight 18" x 8" Lake 77
with 6 1/2 x 1 1/2 x 15 x 5" Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 25, 19 48

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	Q_6	SP_6	VP_6	TP_6
1	1666	.519	.142	.661	194	.522	.087	.609	1472	.450	.138	.588
2	1413	.378	.105	.483	165	.379	.062	.441	1248	.329	.110	.429
3	1200	.242	.073	.315	132	.243	.040	.283	1068	.232	.070	.302
4	1008	.190	.052	.242	117	.190	.032	.222	891	.162	.050	.212
5	792	.117	.032	.149	91	.116	.0195	.1355	701	.100	.0315	.1315
6	601	.067	.019	.086	69	.0655	.0111	.0766	532	.056	.0205	.0765
7	486	.045	.0122	.0572	56	.043	.0072	.0502	430	.0375	.0120	.0495
8	404	.032	.0084	.0404	48	.0315	.0053	.0368	356	.027	.0081	.0351
9	300	.017	.0047	.0217	34	.0165	.0028	.0193	266	.0145	.0045	.0190
10	184	.007	.0018	.0088	23	.007	.0013	.0083	166	.0055	.0018	.0073
11												
12			Q_5	TP_4-TP_5		Q_4-Q_5	TP_4-TP_5					
13			194	.052		1472	.073					
14			165	.0412		1248	.054					
15			132	.032		1068	.043					
16			117	.020		891	.030					
17			91	.0135		701	.0175					
18			69	.0094		532	.0095					
19			56	.0070		430	.0077					
20			48	.0036		356	.0053					
21			34	.0024		266	.0027					
22			23	.0005		166	.0015					
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 8" Inlet
with 6" x 1" x 1" x 5" Orifice Plate in Position

Observers {

Date Nov 25, 19 49

No.	TIME	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM T-CFF
1	1:50	4.45	.551	.584	.473	55.0	80.0	29.06	1660	155	
2	1:55	3.19	.402	.425	.340				1402	131	
3	2:00	2.305	.285	.304	.242				1194	111	
4	2:05	1.625	.202	.213	.250				1002	93	
5	2:09	1.03	.128	.135	.108				795	74	
6	2:13	.575	.073	.076	.060				596	56	
7	2:17	.414	.051	.054	.043				506	47	
8	2:20	.250	.0315	.0325	.026				392	36	
9	2:23	.155	.020	.0205	.016				309	29	
10	2:26	.058	.0078	.008	.007	54.5	77.0	29.06	190	18	
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8x3" Straight 18x18" Loke 28
with 6x4 x 1 1/4 x 18" x 15" Duffin Plates in Position

Observers {

Date Nov 25, 19 49

No.	G ₄	SP ₄	VP ₄	TP ₄	G ₅	SP ₅	VP ₅	TP ₅	G ₄ -G ₅	SP ₆	VP ₆	TP ₆
1	1660	551	.141	.692	155	589	.056	.645	1505	1473	.243	.616
2	1402	402	.102	.502	131	425	.039	.464	1271	.340	.103	.413
3	1194	285	.071	.356	111	304	.028	.332	1083	242	.1073	.315
4	1002	.202	.051	.253	93	.213	.0202	.2332	909	.150	.052	.232
5	798	.128	.033	.161	74	.135	.0130	.1480	724	.108	.030	.142
6	596	.073	.0188	.098	56	.076	.0072	.0832	540	.060	.0188	.0788
7	506	.051	.0135	.0645	47	.054	.0051	.0591	459	.043	.0135	.0505
8	392	.0315	.0078	.0372	36	.0325	.0030	.0355	352	.026	.0081	.0341
9	309	.020	.0050	.0250	29	.0205	.0020	.0225	280	.016	.0050	.0210
10	190	.0078	.0019	.0097	18	.008	.0008	.0088	172	.007	.0019	.0085
11												
12			G ₄ -G ₅	TP ₄ -TP ₅			G ₄ -G ₅	TP ₄ -TP ₅		% Thru	Force	
13			155	.041			1505	.076		90.7		
14			131	.038			1271	.059		90.7		
15			111	.024			1083	.041		90.8		
16			93	.0195			909	.021		90.7		
17			74	.013			724	.019		90.6		
18			56	.0086			540	.0130		90.7		
19			47	.0054			459	.0080		90.7		
20			36	.0038			356	.0057		90.8		
21			29	.0025			280	.0040		90.7		
22			18	.0009			172	.0008		90.5		
23												
24												
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY

MICHIGAN STATE COLLEGE

Running Log of Increase Type 8x3" Straight 18x18" Lake 78
with 6x4 x 1 1/4 x 18" x 15" Duffie Plates in Position

Observers {

Date Nov 25, 19 49

No.	G_4	$5P_4$	$6P_4$	$7P_4$	G_5	$5P_5$	$6P_5$	$7P_5$	$G_4 - G_5$	SP_6	$6P_6$	$7P_6$
1	1660	.551	.141	.692	.55	.589	.056	.645	.1505	.473	.143	.616
2	1402	.402	.102	.502	.131	.425	.039	.464	.1271	.340	.103	.443
3	1194	.285	.071	.356	.111	.304	.028	.332	.1083	.242	.073	.315
4	1002	.202	.051	.253	.93	.213	.0202	.2332	.909	.150	.052	.232
5	798	.128	.033	.161	.74	.135	.0130	.1480	.724	.108	.030	.142
6	596	.073	.0188	.0918	.56	.076	.0072	.0832	.540	.060	.0188	.0788
7	506	.051	.0135	.0645	.47	.054	.0051	.0591	.459	.043	.0135	.0565
8	392	.1315	.0078	.0372	.36	.0325	.0030	.0355	.356	.036	.0081	.0341
9	309	.020	.0050	.0250	.29	.0205	.0020	.0225	.280	.016	.0050	.0210
10	190	.0078	.0019	.0097	.18	.008	.0008	.0088	.172	.007	.0019	.0089
11												
12			G_5	TP_5		$G_4 - G_5$	$TP_5 - TP_6$		$\% \text{ Thru}$	$T - 0.025$		
13			.155	.047		.1505	.076		.907			
14			.131	.038		.1271	.059		.907			
15			.111	.024		.1083	.041		.908			
16			.93	.0195		.909	.021		.907			
17			.74	.013		.724	.019		.906			
18			.56	.0086		.540	.0130		.907			
19			.47	.0054		.459	.0080		.907			
20			.36	.0038		.356	.0057		.908			
21			.29	.0025		.280	.0040		.907			
22			.18	.0009		.172	.0008		.905			
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increment Type 8" x 3" Straight 8 x 8" Joke 78
with 6" x 6" + 15" x 5" Refuse Plate in Position

Observers {

Date Nov 25, 19 49

No.	TIME	P ₁	P ₂	P ₃	P ₄	WET CF	DRY CF	Barom in Hg	CFM MAIN	CFM ST	CFM T-CF
1	5:45	4.47	.575	.640	.495	55.0	76.0	29.14	1662	116	
2	5:50	3.16	.420	.460	.350				1397	98	
3	5:55	2.32	.306	.336	.255				1198	84	
4	6:00	1.64	.216	.237	.180				1007	70	
5	6:05	1.03	.136	.149	.1125				798	56	
6	6:10	.585	.077	.080	.063				601	42	
7	6:15	.410	.054	.058	.044				503	35	
8	6:20	.266	.035	.038	.029				405	28	
9	6:23	.157	.020	.022	.016				311	22	
10	6:26	.054	.007	.0075	.005	55.0	77.0	29.14	182	13	
11											
12											
13											
14											
15											
16											
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18											
19											
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22											
23											
24											
25											

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of One-way type 8" x 3" Straight 15" x 8" Latex
with 6" x 1" x 15" x 5" surface plates in position

Observers {

Date Nov 25, 1942

No.	G_4	SP_4	VP_4	TP_4	G_5	SP_5	VP_5	TP_5	$Q-Q_5$	SP_6	VP_6	TP_6
1	1662	.575	.141	.716	116	.644	.030	.674	1546	.495	.130	.645
2	1397	.420	.103	.523	98	.460	.022	.482	1299	.350	.110	.460
3	1198	.306	.073	.379	84	.330	.0169	.3529	1114	.255	.079	.334
4	1007	.216	.052	.268	70	.237	.0116	.2486	937	.180	.056	.236
5	798	.136	.033	.169	56	.144	.0073	.1563	742	.1125	.035	.1475
6	601	.077	.019	.096	42	.084	.0043	.0883	559	.063	.021	.084
7	503	.054	.0134	.0674	35	.058	.0029	.0609	468	.044	.0142	.0582
8	405	.035	.0085	.0435	28	.038	.0018	.0398	377	.029	.0090	.0380
9	311	.020	.0051	.0251	22	.022	.0012	.0232	289	.016	.0054	.0214
10	182	.007	.0017	.0087	13	.0075	.0004	.0079	169	.005	.0018	.0068
11												
12			G_5	TP_4-TP_5		G_4-G_5	TP_4-TP_5			$\% \text{ Thru Ticket}$		
13			116	.042		1546	.071			93.0		
14			98	.041		1299	.063			93.0		
15			84	.0261		1114	.045			93.1		
16			70	.0194		937	.032			93.1		
17			56	.0127		742	.0215			93.0		
18			42	.0077		559	.012			93.0		
19			35	.0065		468	.0092			93.1		
20			28	.0037		377	.0055			93.1		
21			22	.0019		289	.0037			93.0		
22			13	.0008		169	.0019			92.8		
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8"x3" Straight 18"x8" Inlet 78
with 7"x2" x 14"x14" orifice Plate in Position

Observers {

Date Nov 25, 1944

No.	TIME	P ₃ -P ₂	P ₂	P ₅	P ₆	WET °F	DRY °F	BAROM IN HG	CFM MAIN	CFM ST	CFM TOFF
1	6:35	4.125	.830	.558	.807	55.0	77.0	29.14	1598	338	
2	6:40	3.16	.646	.480	.626				1397	297	
3	6:45	2.32	.471	.314	.459				1197	254	
4	6:50	1.635	.332	.218	.322				1005	212	
5	6:54	1.055	.214	.140	.207				807	169	
6	6:58	.565	.114	.075	.110				591	124	
7	7:02	.410	.083	.0535	.080				503	104	
8	7:06	.267	.0545	.035	.052				406	84	
9	7:10	.142	.029	.018	.027				296	61	
10	7:14	.060	.012	.0075	.011	54.5	77.0	29.14	192	39	
11											
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23											
24											
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Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18-18" Take off
with 7" x 2", 14" x 4" on pin Plates in Position

Observers { _____ } { _____ } Date Nov 25, 1949

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	SP_6	VP_6	TP_6
1	1598	.830	.130	.460	338	.558	.260	.818	1260	.807	.106	.913
2	1397	.646	.102	.748	297	.430	.210	.640	1100	.626	.076	.702
3	1198	.471	.072	.543	254	.314	.148	.462	944	.459	.058	.517
4	1005	.332	.051	.363	212	.218	.103	.341	793	.322	.040	.362
5	807	.214	.034	.248	169	.140	.067	.207	638	.207	.026	.233
6	591	.114	.0181	.1321	124	.075	.035	.110	467	.110	.0141	.1241
7	503	.083	.0134	.0964	104	.0535	.0240	.0781	399	.080	.0102	.0902
8	406	.0545	.0086	.0631	84	.035	.0169	.0519	322	.052	.0067	.0587
9	296	.029	.0045	.0335	61	.018	.0090	.0270	235	.027	.0035	.0305
10	192	.012	.0019	.0139	39	.0075	.0036	.0111	153	.011	.0015	.0116
11												
12			Q_5	$TP_5 - TP_6$		$Q_4 - Q_5$	$TP_5 - TP_6$		% Thru T-clip			
13			338	.142		1260	.047		78.8			
14			297	.108		1100	.046		78.8			
15			254	.081		944	.026		78.8			
16			212	.062		793	.021		78.8			
17			169	.041		638	.015		79.1			
18			124	.0221		467	.0080		79.0			
19			104	.0183		399	.0062		79.3			
20			84	.0112		322	.0044		79.4			
21			61	.0065		235	.0030		79.4			
22			39	.0028		153	.0023		79.7			
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 8" Lake 78
with 6" x 1" x 14" x 4" square Plate in Position

Observers { _____ } { _____ } Date Nov 28, 1949

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:15	3.18	.925	.851	.879	59.5	70.0	28.78	1549	246	
2	7:21	3.18	.767	.707	.730				1400	228	
3	7:27	2.33	.565	.517	.538				1200	192	
4	7:32	1.61	.386	.353	.368				999	160	
5	7:36	1.03	.245	.224	.232				798	127	
6	7:40	.54	.140	.126	.132				604	95	
7	7:50	.397	.094	.085	.089				495	78	
8	7:56	.249	.054	.053	.055				391	62	
9	8:01	.138	.032	.0285	.030				292	45	
10	8:05	.0545	.013	.011	.012	60.0	71.5	28.78	192	28	
11											
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" x 8" Loke 22
with 6" x 1" x 14" x 4" square Plate in Position

Observers {

Date Nov 28, 1949

No.	TIME	P ₃ -P ₂	P ₄	P ₅	P ₆	WET °F	DRY °F	Barom IN HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:15	3.88	.925	857	.879	59.5	60.0	28.78	1549	246	
2	7:21	3.18	.767	707	.730				1400	224	
3	7:27	2.33	.565	517	.538				1200	192	
4	7:32	1.61	.386	.353	.368				999	160	
5	7:36	1.03	.245	.224	.232				798	127	
6	7:44	.54	.140	.126	.132				604	95	
7	7:50	.397	.094	.085	.089				445	78	
8	7:56	.249	.059	.053	.055				391	62	
9	8:01	.138	.032	.0285	.030				292	45	
10	8:05	.0545	.013	.011	.012	60.0	61.5	28.78	192	28	
11											
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14											
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase type 8"x3" Straight 18"x8" Lathe
with 6 1/2 x 1 1/2 x 14"x14" surface plates in position

Observers {

Date Nov 28, 1949

No.	G_4	SP_4	VP_4	TP_4	G_5	SP_5	VP_5	TP_5	$G_4 - G_5$	SP_4	VP_4	TP_4
1	1549	.925	.122	1.047	246	.851	.138	.989	13.3	.879	.110	.989
2	1400	.767	.102	.869	224	.700	.113	.813	1176	.730	.086	.816
3	1200	.565	.073	.638	192	.577	.083	.600	1008	.538	.067	.605
4	999	.386	.050	.436	160	.353	.059	.412	839	.368	.045	.413
5	798	.245	.034	.279	127	.224	.0360	.260	671	.232	.029	.261
6	604	.146	.0192	.132	95	.126	.021	.147	509	.132	.0168	.1488
7	495	.094	.0128	.1068	78	.085	.0145	.0995	417	.089	.013	.1003
8	391	.059	.0078	.0668	62	.053	.0092	.0622	329	.055	.0069	.0619
9	292	.032	.0044	.0364	45	.0285	.0049	.0334	247	.030	.0039	.0339
10	192	.013	.0019	.0149	28	.011	.0018	.0128	164	.012	.0017	.0137
11												
12			G_5	$TP_4 - TP_5$		$G_4 - G_5$	$TP_4 - TP_5$		%	THRU	T-OFF	
13			246	.058		13.3	.058		84.2			
14			224	.056		1176	.053		84.0			
15			192	.038		1008	.033		84.0			
16			160	.024		839	.023		84.0			
17			127	.019		671	.018		84.1			
18			95	.0122		509	.0104		84.3			
19			78	.0073		417	.0065		84.3			
20			62	.0046		329	.0049		84.3			
21			45	.0030		247	.0025		84.6			
22			28	.0021		164	.0012		85.4			
23												
24												
25												

Remarks:

MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE

Running Log of Increase Type 8" x 3" Straight 18" x 8" Take 73
with 6" x 1" x 1" x 4" Orifice Plates in Position

Observers { _____ } { _____ } Date Nov 28, 19 49

No	Time	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	BAROM in Hg	CFM MAIN	CFM ST	CFM T-CFF
1	8:13	3.80	.981	.962	.925	60.0	81.5	28.78	1532	198	
2	8:20	3.17	.828	.819	.780				1399	185	
3	8:25	2.33	.613	.605	.580				1200	156	
4	8:29	1.625	.425	.418	.401				1002	130	
5	8:34	1.03	.268	.263	.253				798	103	
6	8:38	.58	.1495	.1455	.140				599	77	
7	8:44	.406	.105	.1025	.098				501	64	
8	8:48	.269	.069	.066	.0645				407	52	
9	8:51	.135	.035	.0335	.032				289	37	
10	8:55	.058	.0145	.014	.013	60.0	82.0	28.80	190	24	
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8"x3" Straight 18"x8" Gate
with 6 1/4" x 1 1/4" & 14"x4" Orifice Plate in Position

Observers { _____ } { _____ } Date Nov 28, 19 49

No.	Q ₄	SP ₄	VP ₄	TP ₄	Q ₅	SP ₅	VP ₅	TP ₅	Q ₄ -Q ₅	SP ₆	VP ₆	TP ₆
1	1532	1981	.121	1.102	198	.962	.090	1.052	134	.925	.117	1.042
2	1399	.828	.102	.930	185	.819	.077	.896	1214	.780	.095	.875
3	1200	.613	.073	.686	156	.605	.055	.660	1044	.580	.071	.651
4	1002	.425	.051	.476	130	.418	.039	.457	872	.401	.049	.450
5	798	.268	.034	.302	103	.263	.0240	.2870	695	.253	.030	.283
6	599	.1495	.019	.1685	77	.1455	.0140	.1595	522	.140	.018	.1578
7	501	.105	.0133	.1180	64	.1025	.0099	.1124	437	.098	.0121	.1101
8	407	.069	.0086	.0776	52	.066	.0065	.0725	355	.0645	.0081	.0726
9	289	.035	.0044	.0344	37	.0335	.0032	.0367	252	.032	.0041	.0361
10	190	.0145	.0019	.0164	24	.014	.0015	.0155	166	.013	.0018	.0148
11												
12			Q ₅	TP ₄ -TP ₅		Q ₄ -Q ₅	TP ₄ -TP ₆		% THRU T-OFF			
13			198	.050		134	.060		87.1			
14			185	.034		1214	.055		86.9			
15			156	.026		1044	.035		87.1			
16			130	.019		872	.026		87.0			
17			103	.015		692	.019		86.7			
18			77	.009		522	.0107		87.2			
19			64	.0056		437	.0079		87.3			
20			52	.0051		355	.0050		87.2			
21			37	.0027		252	.0033		87.2			
22			24	.0009		166	.0016		87.3			
23												
24												
25												

Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increase Type 8" x 3" Straight 18" S Duct of
with 6" x 1" x 14" x 14" orifice plates in position

Observers {

Date Nov 30, 19 49

$\frac{Q}{Z}$	Time	$P_3 - P_2$	P_4	P_5	P_6	WET °F	DRY °F	BAROM in HG	CFM MAIN	CFM ST	CFM T-OFF
1	7:10	3.78	1.057	1.085	.985	57.0	79.5	29.08	1528	151	
2	7:15	3.185	.900	.920	.843				1461	139	
3	7:20	2.23	.660	.678	.618				1200	119	
4	7:24	1.63	.465	.475	.434				1023	99	
5	7:30	1.005	.284	.290	.263				807	78	
6	7:34	.580	.162	.165	.151				599	59	
7	7:38	.412	.1155	.117	.1107				505	49	
8	7:42	.260	.074	.075	.068				401	40	
9	7:45	.145	.040	.040	.037				299	29	
10	7:48	.064	.0165	.017	.015	55.0	74.0	29.08	199	19	
11											
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Remarks:

**MECHANICAL ENGINEERING LABORATORY
MICHIGAN STATE COLLEGE**

Running Log of Increaser Type 8" x 3" Straight 18" x 8" Data 75
with 6" x 1" & 14" x 4" surface plates in position

Observers {

Date

Nov 3

, 19

49

No.	Q_4	SP_4	VP_4	TP_4	Q_5	SP_5	VP_5	TP_5	$Q_4 - Q_5$	$SP_4 - SP_5$	$VP_4 - VP_5$	$TP_4 - TP_5$
1	1528	1.057	.120	1.177	151	1.085	.057	1.142	1377	.985	.120	1.105
2	1401	.902	.102	1.002	139	.920	.043	.963	1262	.843	.106	.949
3	1200	.660	.073	.733	119	.678	.033	.711	1081	.618	.074	.692
4	1003	.465	.051	.516	99	.475	.021	.497	904	.434	.051	.485
5	807	.284	.034	.318	78	.290	.012	.304	729	.263	.034	.297
6	599	.162	.019	.181	59	.165	.008	.173	540	.151	.018	.169
7	505	.115	.013	.129	49	.117	.005	.122	456	.107	.013	.120
8	401	.074	.008	.082	40	.075	.003	.078	361	.068	.008	.076
9	299	.046	.004	.047	29	.040	.002	.042	270	.037	.004	.041
10	199	.016	.002	.018	19	.017	.000	.017	180	.015	.001	.017

No.	Q_5	$TP_4 - TP_5$	$Q_4 - Q_5$	$TP_4 - TP_5$	% Thru T-off
12					
13	151	.035	1377	.072	90.1
14	139	.039	1262	.053	90.2
15	119	.022	1081	.041	90.2
16	99	.018	904	.031	90.0
17	78	.013	729	.021	90.3
18	59	.007	540	.011	90.2
19	49	.006	456	.008	90.3
20	40	.003	361	.005	90.0
21	29	.002	270	.003	90.3
22	19	.000	180	.001	90.5

Remarks:

~~ROOM~~
EE2 53 pd

FE1853 x261

MR1353

AP. 6 '53

~~926~~

~~_____~~

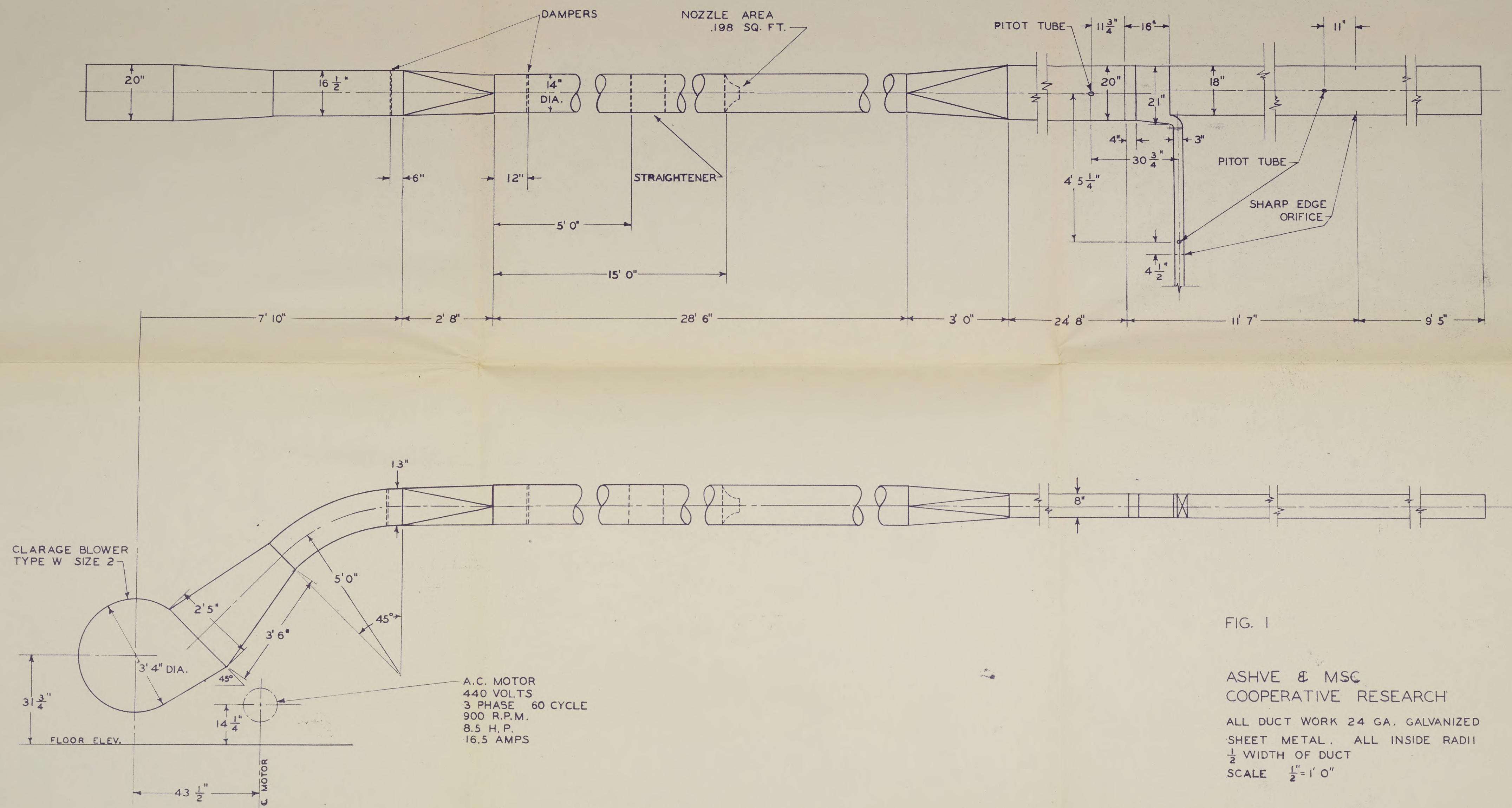


FIG. 1

ASHVE & MSC
COOPERATIVE RESEARCH

ALL DUCT WORK 24 GA. GALVANIZED
SHEET METAL, ALL INSIDE RADII
1/2 WIDTH OF DUCT
SCALE 1/2" = 1' 0"

Packet has:
Figure 1

131
663
THS
Fig. 1

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**SUPPLEMENTARY
MATERIAL**

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