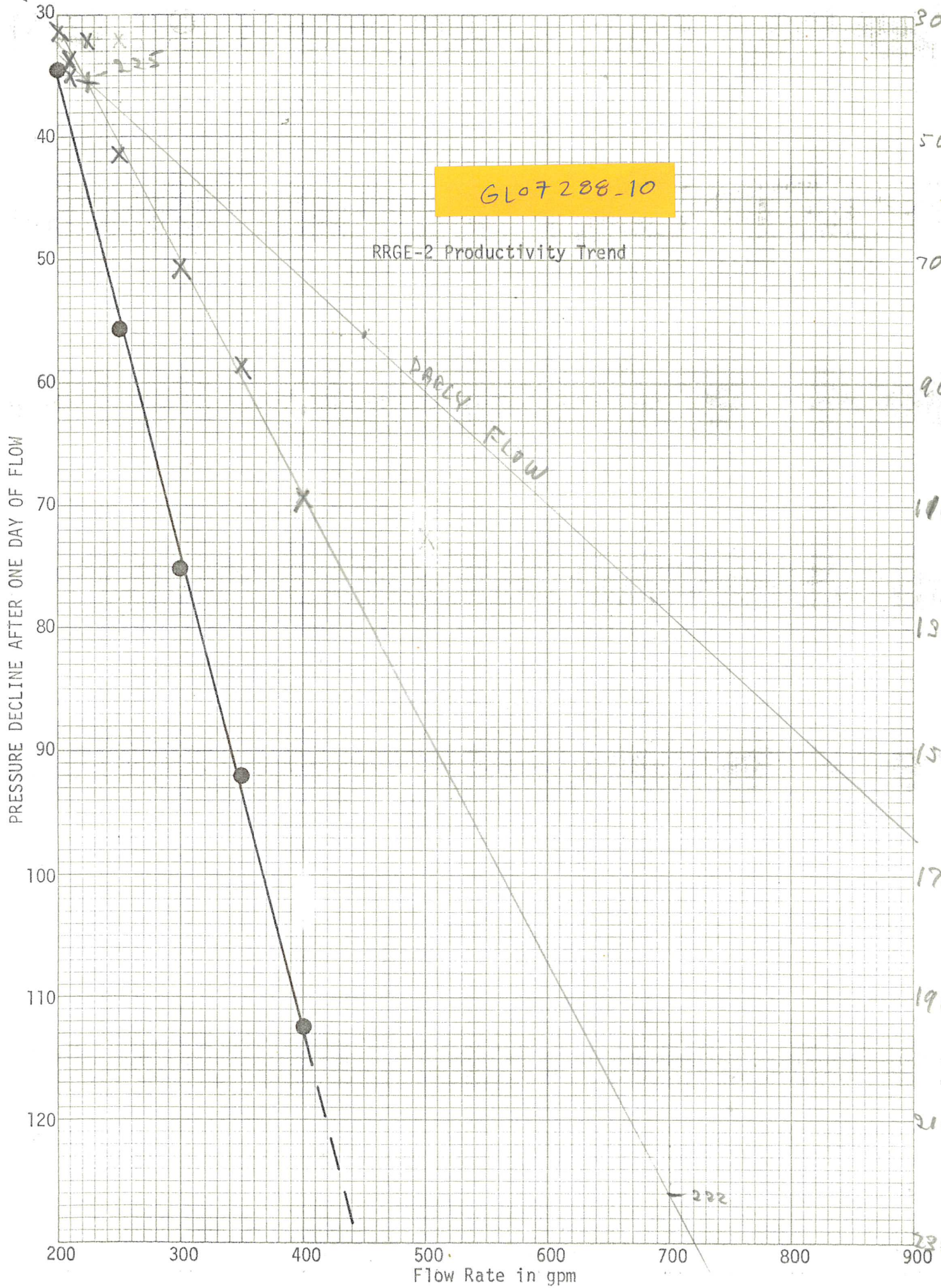


46 0707

10 X 10 TO THE INCH KEUFFEL & ESSER CO. MADE IN U.S.A.



RRGE 2

FIGURE

GRAPH OF $Q/\Delta Q$ vs Q FOR RRGE-2

$\frac{Q}{\Delta Q}$
13
/gpm
PSY
LOG CYCLE
TIME 12

16
15
14
13
12
11
10
9
8

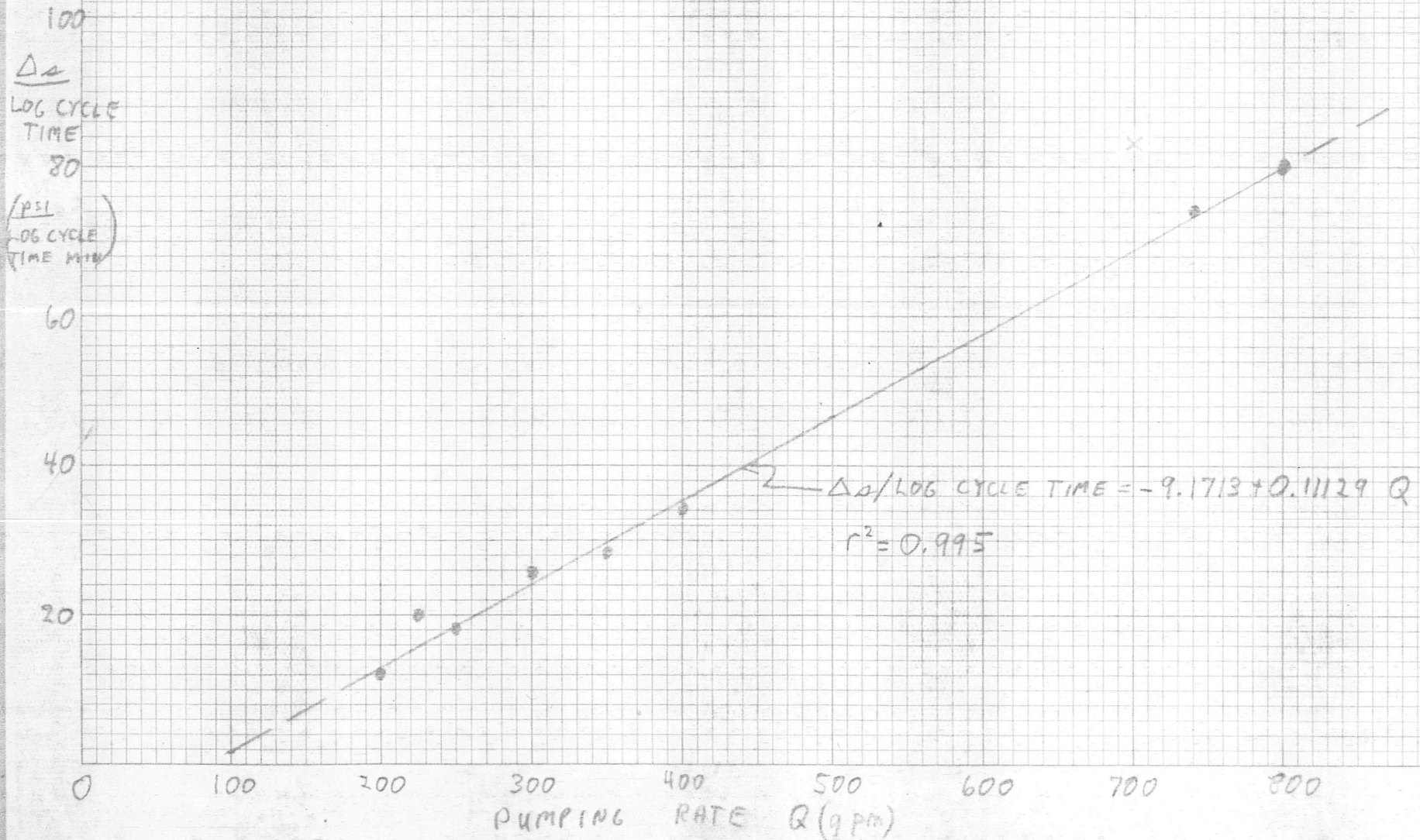
0 100 200 200 400 500 600 700 800 900

PUMPING RATE Q (gpm)

$$\frac{Q}{\Delta Q} = -9.171297725 + 0.1112926131 Q$$

8/16/78

FIGURE
 GRAPH OF Δp /LOG CYCLE TIME
 VERSUS Q FOR RANGE-2



8/16/78

FIGURE 2
 GRAPH OF Δs /LOG CYCLE TIME
 VERSUS Q FOR RAGE-2

X VALUES NOT USED TO
 COMPUTE EQUATION

Δs
 LOG CYCLE
 TIME
 (PSI)
 LOG CYCLE
 TIME MIN

120

100

80

60

40

20

0 100 200 300 400 500 600 700 800

PUMPING RATE Q (GPM)

1/10/79 \rightarrow X

3/20/79 X

X 10/31/81 RECOVERY

X 1/19/79

10/20/81 DRAWDOWN

X 10/31/81 DRAWDOWN

Δs /LOG CYCLE TIME = $-9.1713 + 0.11129 Q$

$r^2 = 0.995$

8/16/78

KRGE 2

FIGURE 4

GRAPH OF $Q/\Delta s$ vs Q FOR KRGE-2
 FOR $t \geq 333$ MIN.
 X VALUES NOT USED TO
 COMPUTE EQUATION

$\frac{Q}{\Delta s}$
 (4400)
 PSI
 LOG CYCLE
 TIME 12

16
15
14
13
12
11
10
9
8

0 100 200 300 400 500 600 700 800 900

PUMPING RATE Q (gpm)

$\frac{Q}{\Delta s} = -9.171297725 + 0.1112926131 Q$

- X 1/19/79
- X 3/30/79
- X 3/26/81
- X 1/10/79
- X 10/20/81 DRAWDOWN
- X 10/31/81 RECOVERY
- X 10/31/81 DRAWDOWN
- 6.25

2/16/75

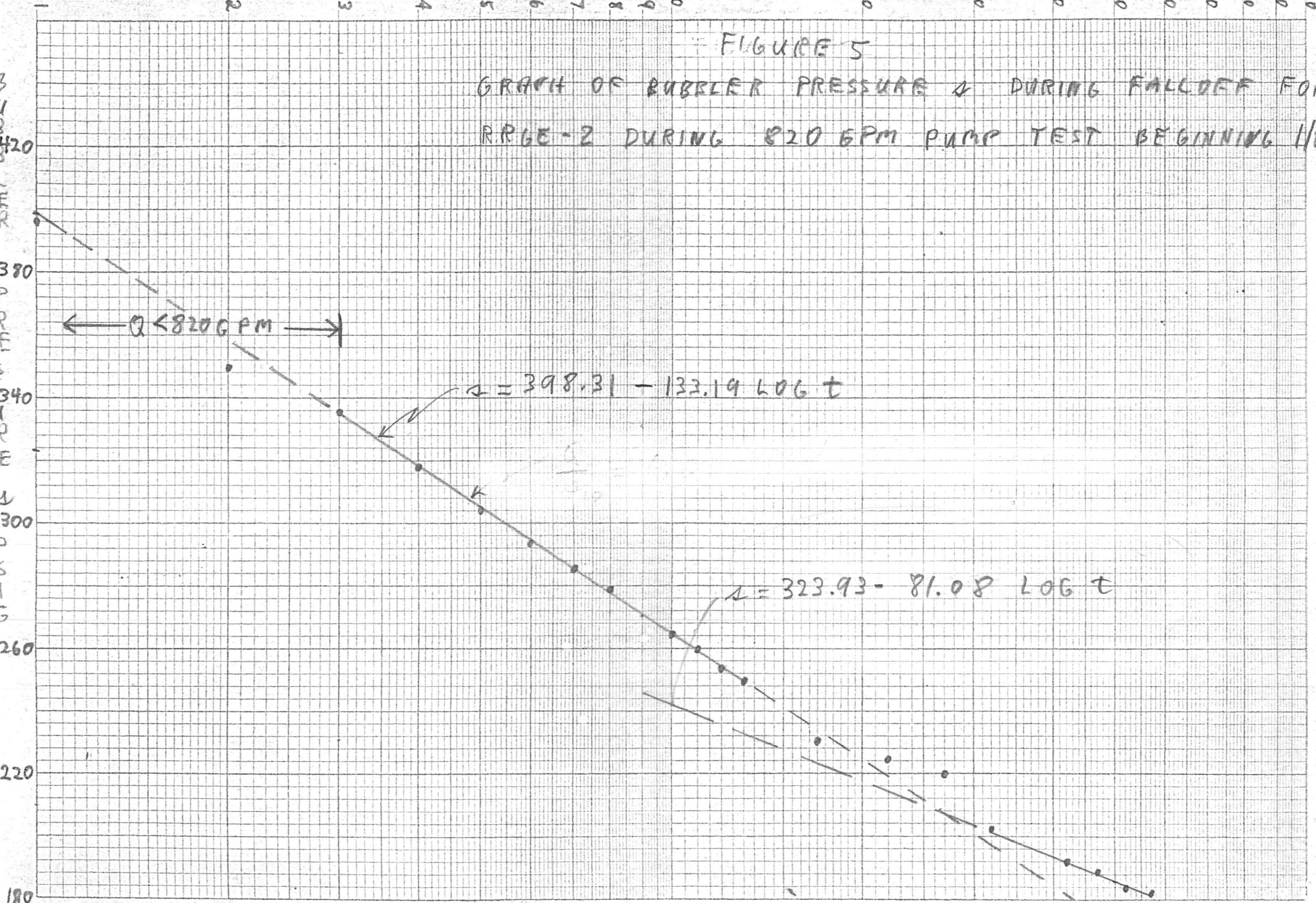
have copy

KEUFFEL & ESSER CO.

t min.

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100

FIGURE 5
GRAPH OF BUBBLER PRESSURE Δ DURING Falloff FOR
R.P.GE-2 DURING 820 GPM PUMP TEST BEGINNING 11/09/79



RR6E 2 - 820 6AM
QP. 1/09/79

RR6E.2 820
1/09/79

3.0000 ***
335.0000 ***

4.0000 ***
318.0000 ***

5.0000 ***
305.0000 ***

6.0000 ***
294.0000 ***

7.0000 ***
286.0000 ***

8.0000 ***
279.0000 ***

10.0000 ***
265.0000 ***

11.0000 ***
260.0000 ***

12.0000 ***
254.0000 ***

13.0000 ***
250.0000 ***

0.9997 ***
398.3063 ***
-57.8311 ***

1.0000 ***
398.3063 ***

10.0000 ***
265.1453 ***

100.0000 ***
131.9843 ***

131.9843 ***
1000.0000 ***

1000.0000 ***
-1.1767 ***

t 32.000 ***
202.000 ***

42.000 ***
192.000 ***

47.000 ***
189.000 ***

52.000 ***
184.000 ***

57.000 ***
182.000 ***

0.995 ***
323.926 ***
-35.208 ***

1.000 ***
323.926 ***

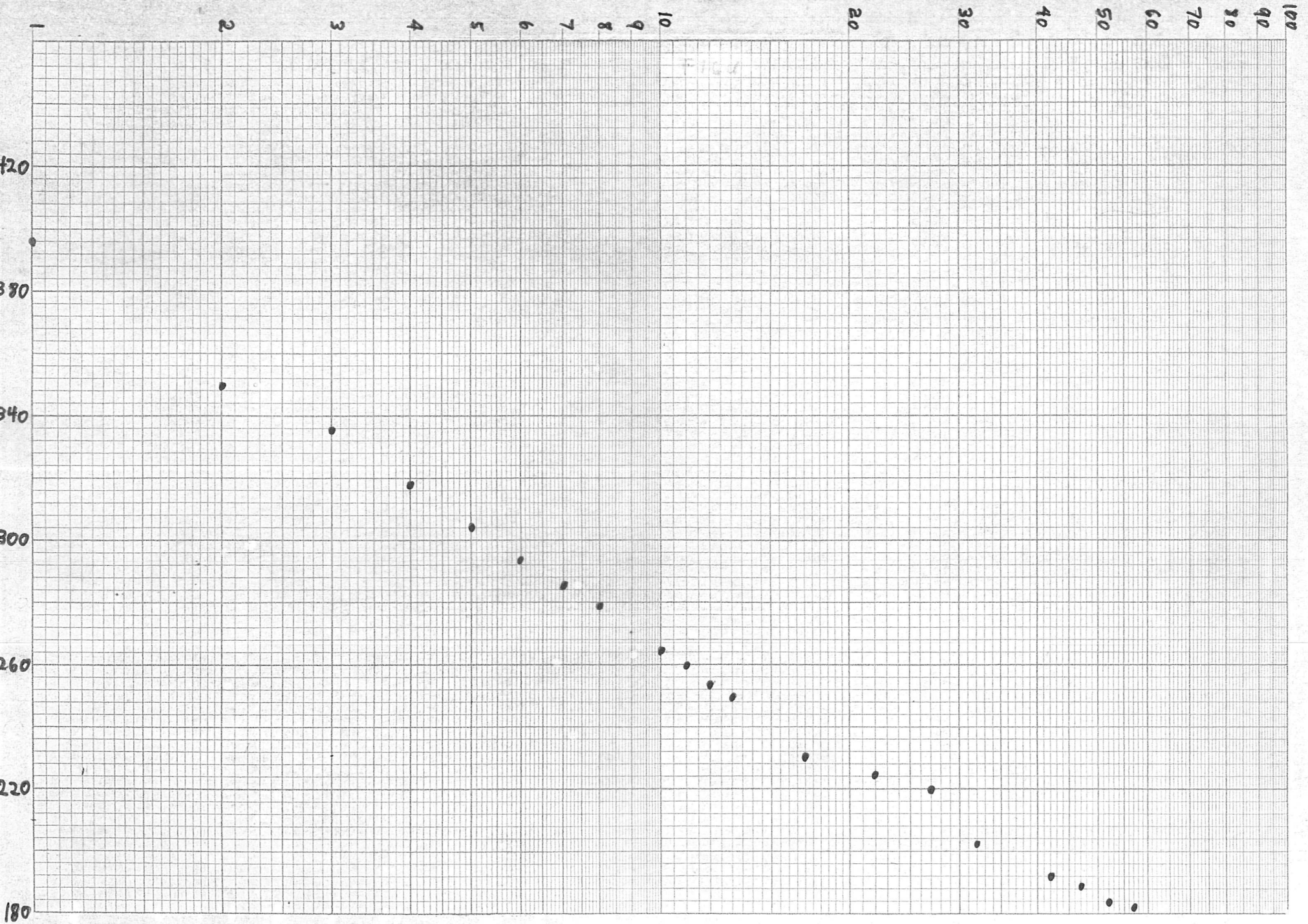
10.000 ***
242.858 ***

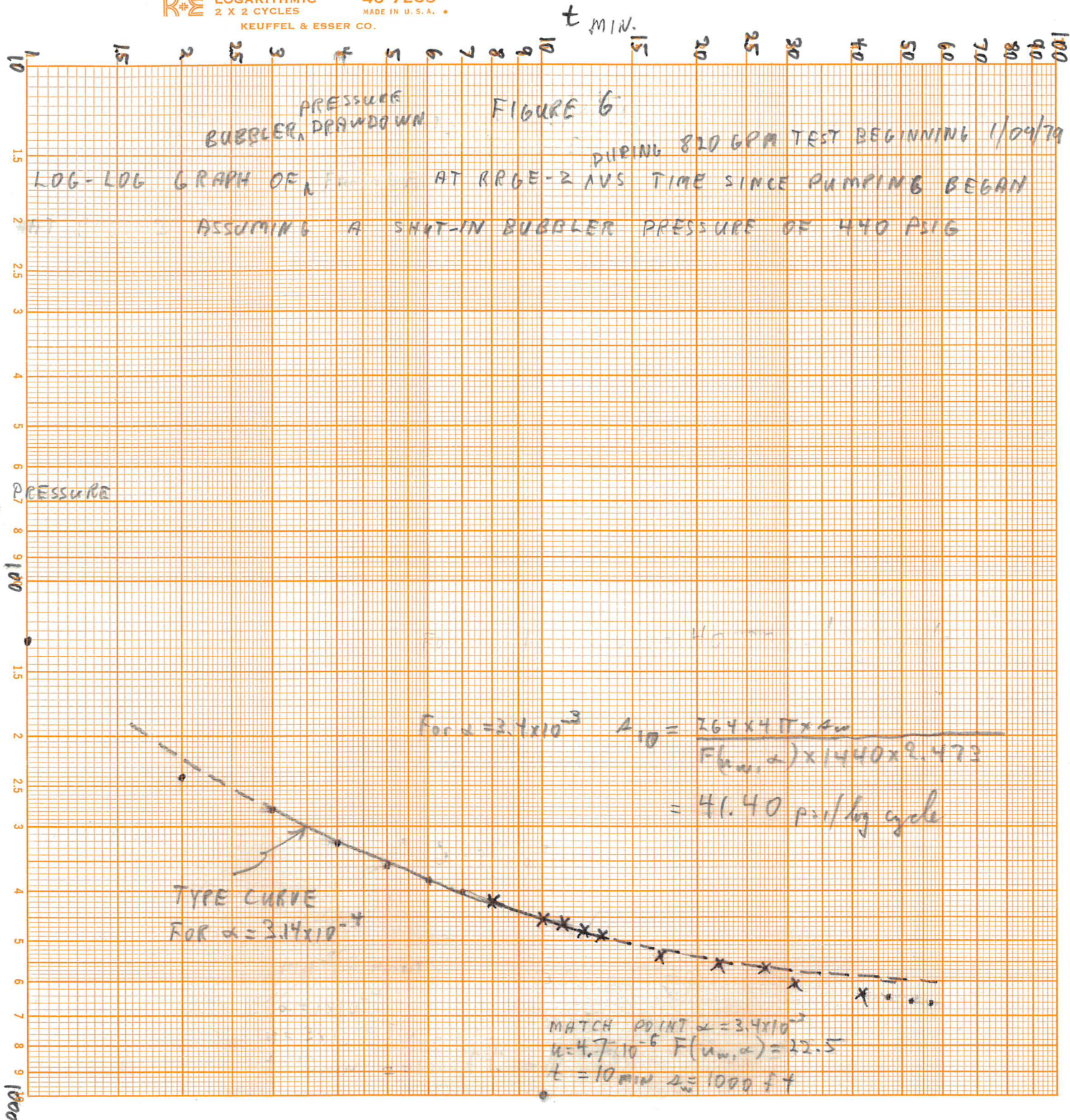
60.000 ***
179.774 ***

50.000 ***
166.193 ***

81.08402

133.19





BUBBLER
 DRAWDOWN
 DURING FALLOFF
 (FT OF
 WATER @
 270°F)

PRESSURE BUBBLER DRAWDOWN
 FIGURE 6
 DURING 820 GPM TEST BEGINNING 1/04/79
 LOG-LOG GRAPH OF PRESSURE AT RGE-2 VS TIME SINCE PUMPING BEGAN
 ASSUMING A SHUT-IN BUBBLER PRESSURE OF 440 PSIG

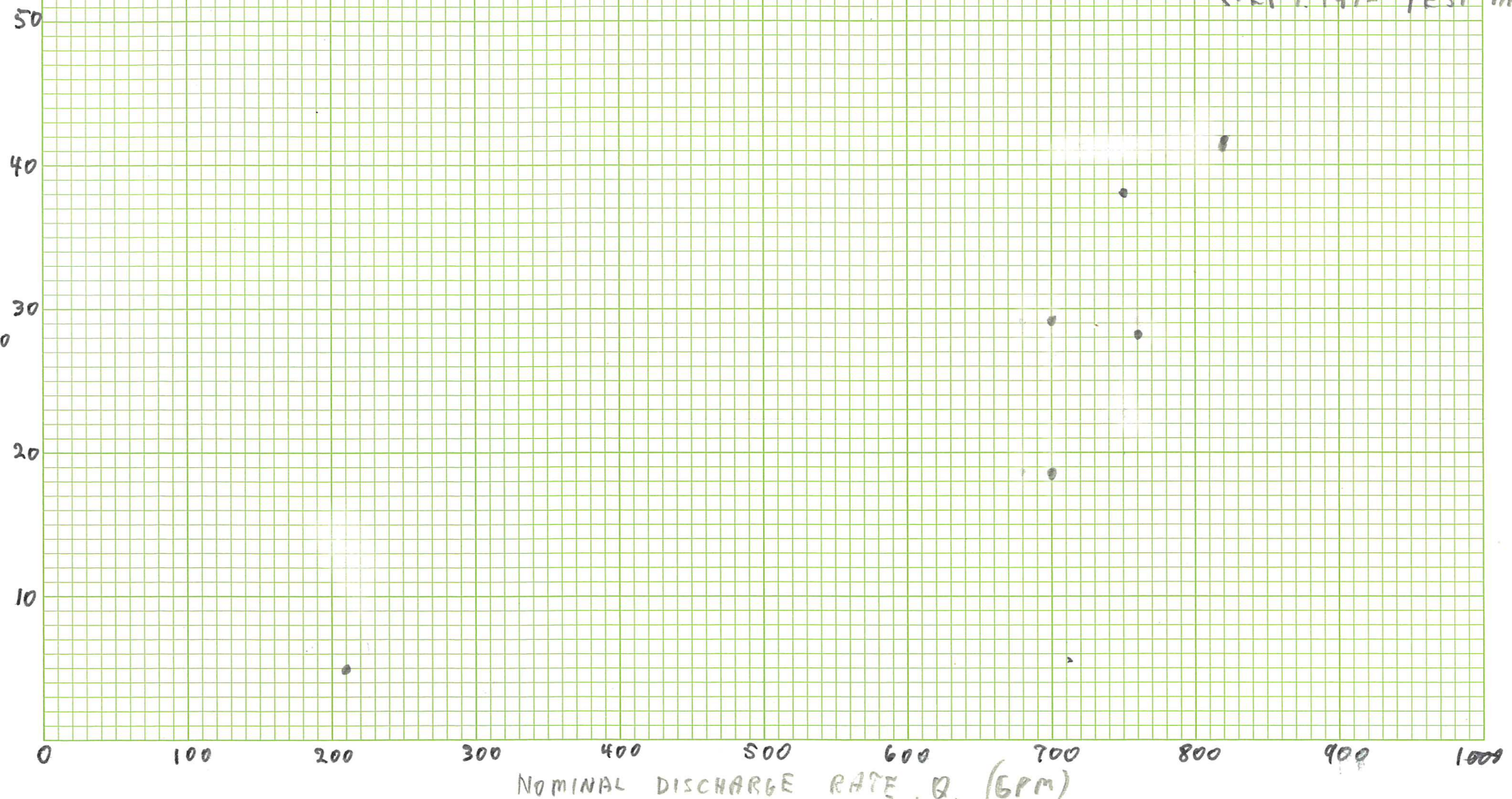
For $\alpha = 3.4 \times 10^{-3}$ $A_{10} = \frac{264 \times 4 \pi \times 4w}{F(u_w, \alpha) \times 1440 \times 9.473}$
 $= 41.40 \text{ psi/log cycle}$

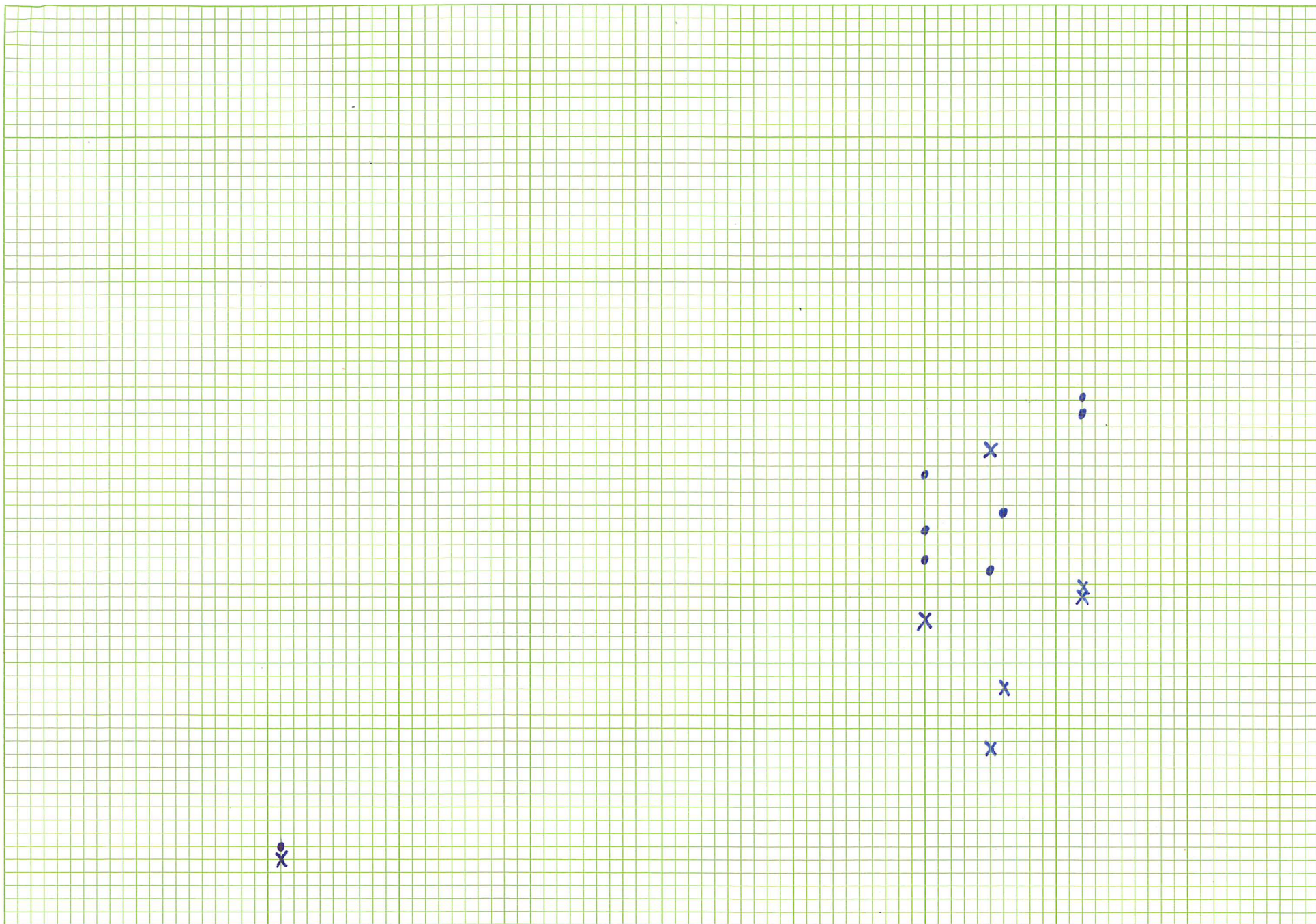
TYPE CURVE
 FOR $\alpha = 3.14 \times 10^{-4}$

MATCH POINT $\alpha = 3.4 \times 10^{-4}$
 $u = 4.7 \times 10^{-6}$ $F(u_w, \alpha) = 22.5$
 $t = 10 \text{ min}$ $z_w = 1000 \text{ ft}$

FIGURE 7

GRAPH OF S_{10} VALUES USING EQUATIONS CONSIDERING WELLBORE STORAGE
FOR THE FIRST LINEAR DATA SEGMENTS OCCURRING WITHIN 20 MINUTES
AFTER BEGINNING ~~OR STARTING~~ PUMPING FROM RRGE-2 DURING JAN. 1979 TESTS
VS NOMINAL DISCHARGE RATE, Q , SEPT. 1975 TEST AND





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t/t'

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100

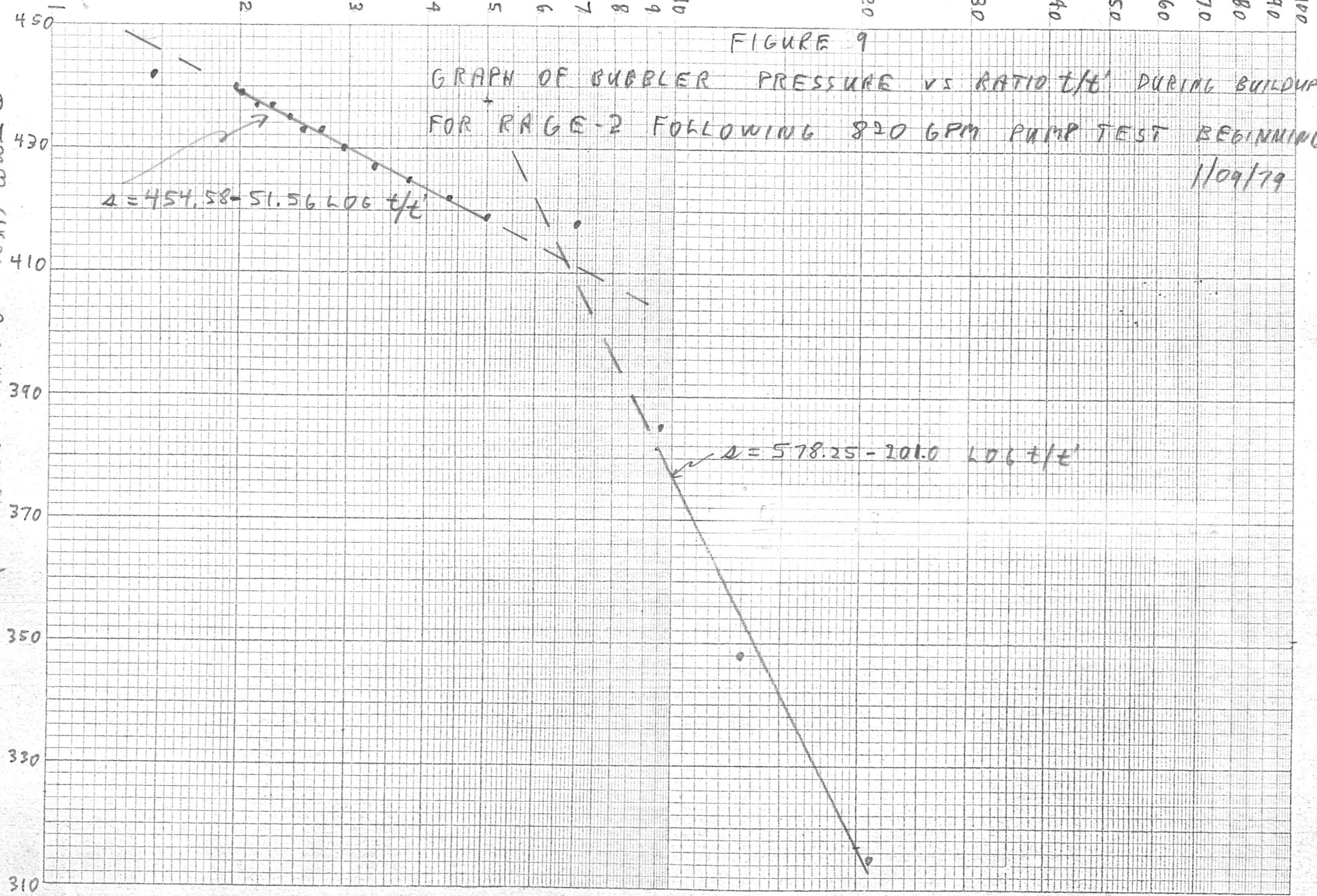
FIGURE 9

GRAPH OF BUBBLER PRESSURE VS RATIO t/t' DURING BUILDUP FOR RAGE-2 FOLLOWING 820 GPM PUMP TEST BEGINNING 1/09/79

$\Delta = 454.58 - 51.56 \text{ LOG } t/t'$

$\Delta = 578.25 - 201.0 \text{ LOG } t/t'$

BUBBLER PRESSURE



820 GPM RICE

1/10/19 both signs

21.0000 ***

315.0000 ***

13.0000 ***

348.0000 ***

9.5700 ***

385.0000 ***

0.9747 ***

578.2506 ***

2010027-97.2830 ***

10.0000 ***

377.2741 ***

20.0000 ***

316.7741 ***

6.0000 ***

421.8605 ***

5.0000 ***

437.7740 ***

6.7000 ***

412.2289 ***

5.0000 ***

419.0000 ***

4.5500 ***

422.0000 ***

3.7500 ***

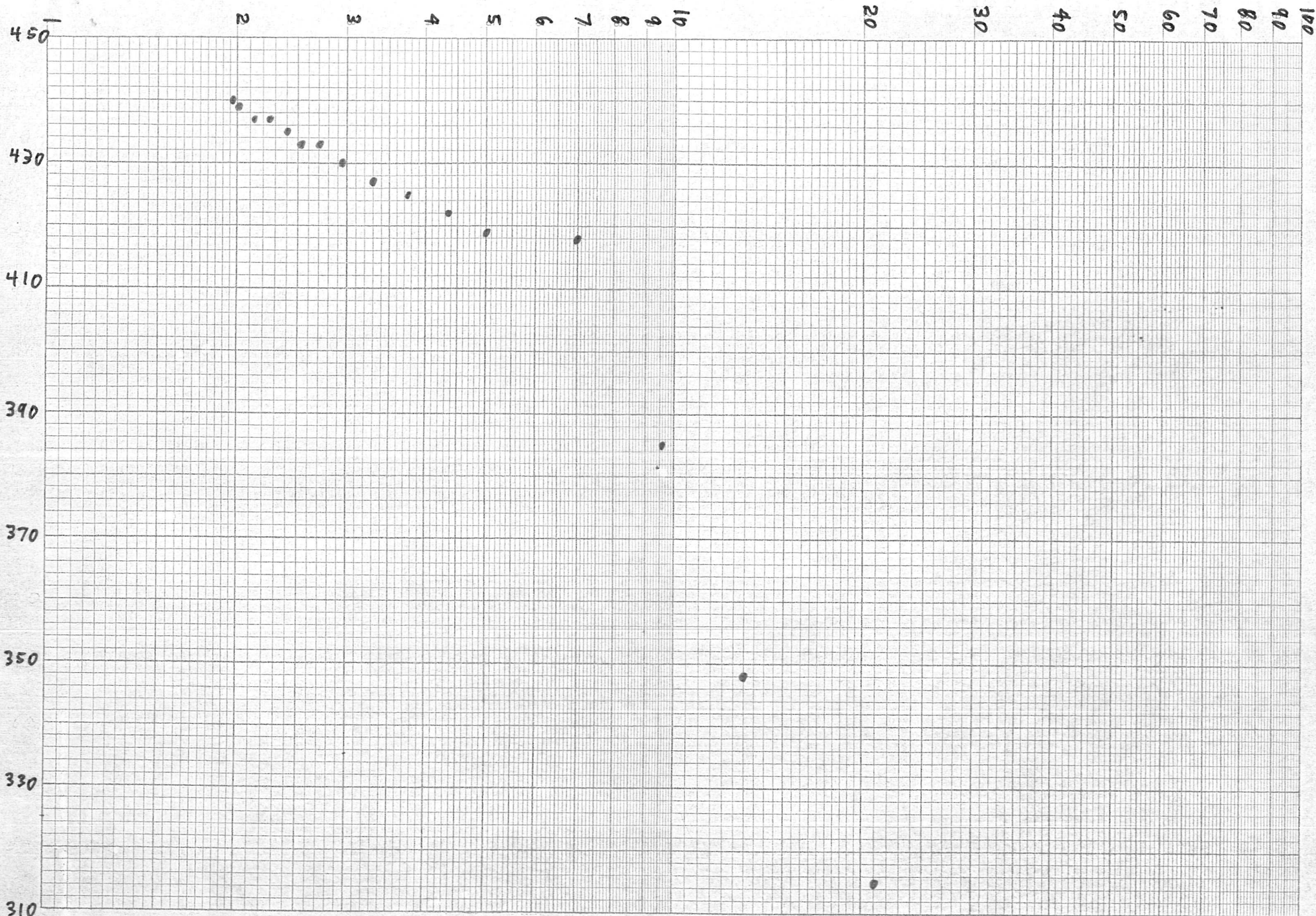
425.0000 ***

3.3000 ***

427.0000 ***

2.9400 ***

430.0000 ***

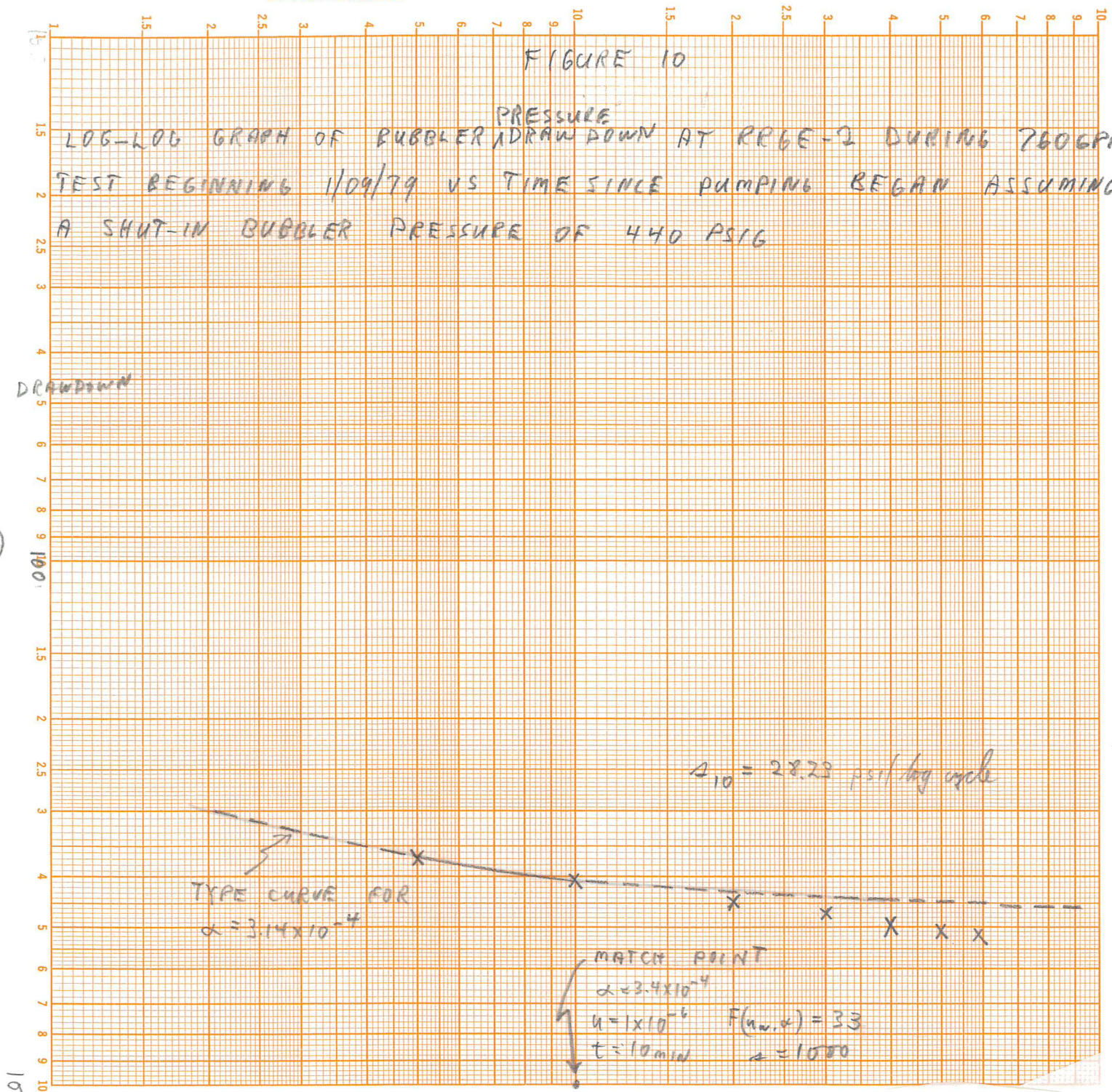


t MIN

FIGURE 10

PRESSURE
 LOG-LOG GRAPH OF BUBBLER DRAWDOWN AT RRE-2 DURING 7606PM
 TEST BEGINNING 1/09/79 VS TIME SINCE PUMPING BEGAN ASSUMING
 A SHUT-IN BUBBLER PRESSURE OF 440 PSIG

BUBBLER
 PRESSURE DRAWDOWN
 DURING
 Falloff
 (FT. OF
 WATER
 AT 270°F)



1000

have copy

MINNELL & FREER CO.

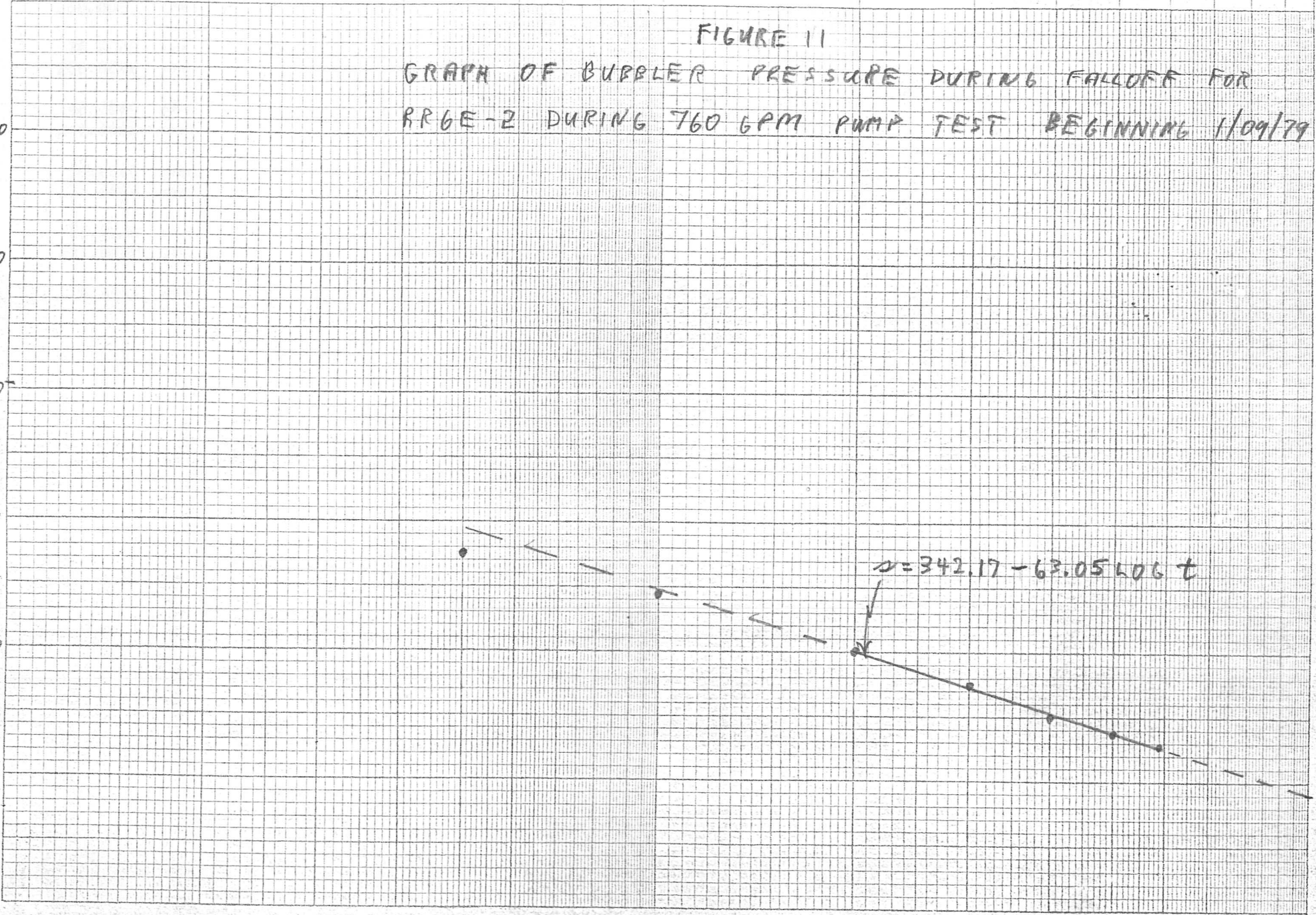
t_{MIN}

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100

FIGURE 11
GRAPH OF BUBBLER PRESSURE DURING FALLOFF FOR
RRGE-2 DURING 760 GPM PUMP TEST BEGINNING 1/09/79

BUBBLER PRESSURE
PSI

420
380
340
300
260
220
180

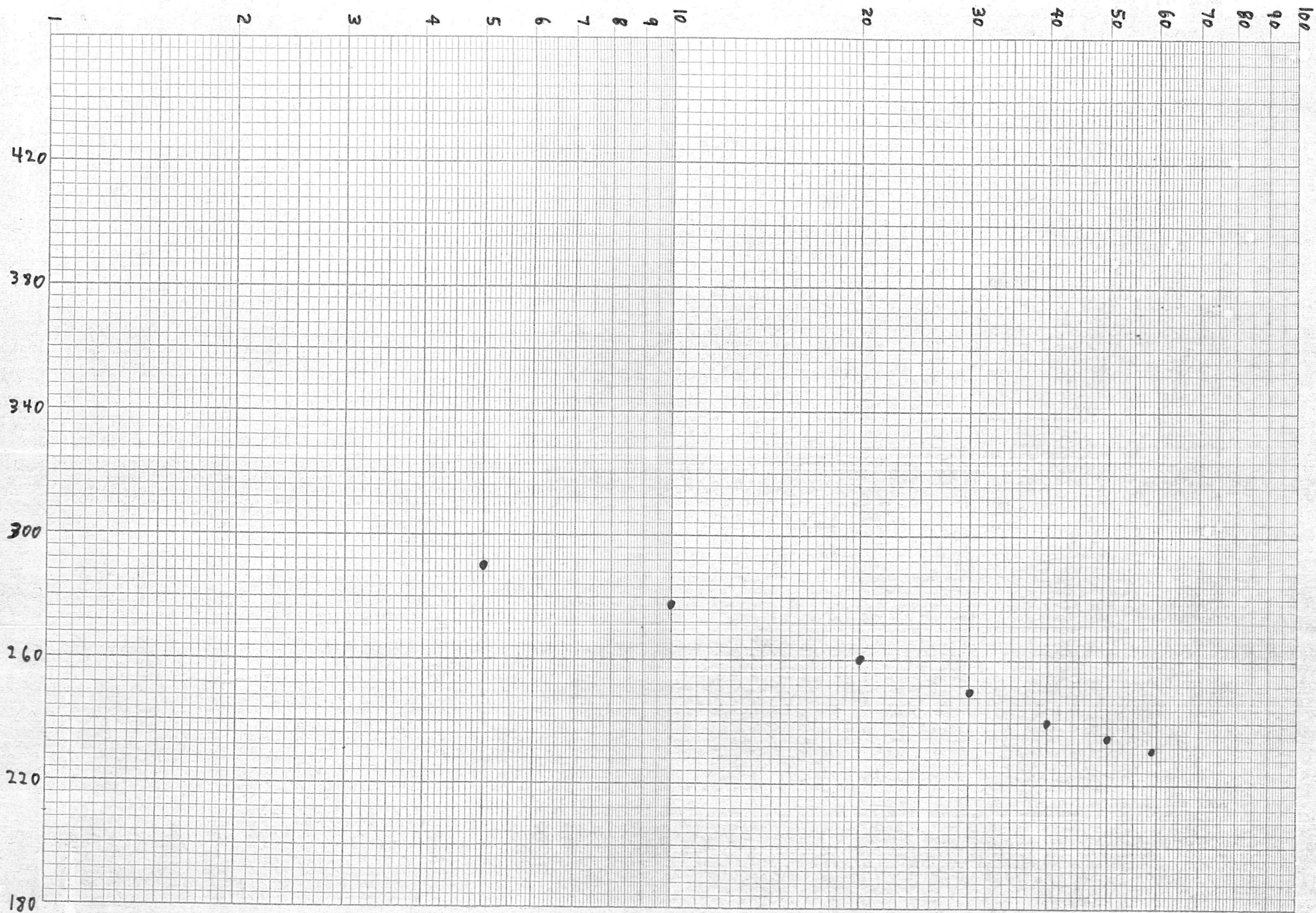


$$P = 342.17 - 63.05 \log t$$

760 RRGF 2 1/09/79
falloff

20.0000	***
260.0000	***
30.0000	***
250.0000	***
40.0000	***
240.0000	***
50.0000	***
235.0000	***
59.0000	***
231.0000	***
0.9954	***
342.1720	***
-27.3776	***
1.0000	***
342.1720	***
10.0000	***
279.1328	***
100.0000	***
216.0936	***
1000.0000	***
153.0543	***
2625728.000	***
-62.4326	***
333.0000	***
183.1591	***

63.0506



have copy

WELFEL & COOPER CO.

t/t'

1 2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100

FIGURE 12

GRAPH OF BUBBLER PRESSURE VS RATIO t/t' DURING BUILDUP FOR RRGE-2 FOLLOWING 760 GPM PUMP TEST BEGINNING 1/09/79

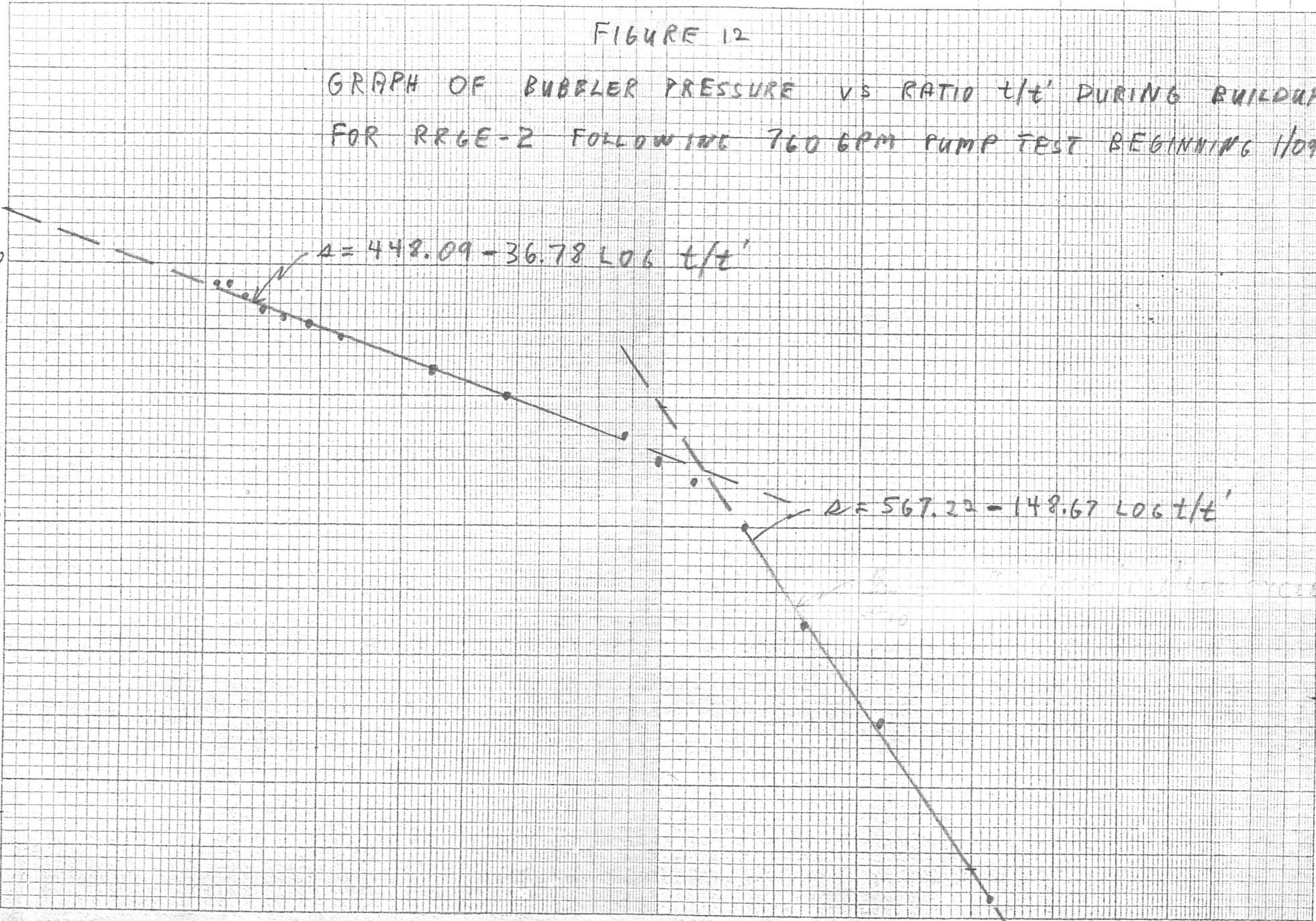
B
U
B
B
L
E
R

P
R
E
S
S
U
R
E

P
S
I
G
H

$A = 448.09 - 36.78 \text{ LOG } t/t'$

$B = 567.22 - 148.67 \text{ LOG } t/t'$



RR6E 2 760 6PM
1/09/79 2nd leg
t/ε'

RR6E 2 - 760 ppm 1/09/79
o vs t/ε'

8.7500 ***
414.0000 ***

5.7700 ***
426.0000 ***

4.4400 ***
424.0000 ***

~~3.7000~~ ***
~~421.0000~~ ***

3.2100 ***
429.0000 ***

2.8800 ***
431.0000 ***

2.6300 ***
432.0000 ***

2.4400 ***
433.0000 ***

2.2900 ***
435.0000 ***

2.1700 ***
437.0000 ***

2.0700 ***
437.0000 ***

-1.0000

3.7000 ***
421.0000 ***

0.9929 ***
448.0859 ***

26.7778 -15.9695 ***

1.0000 ***
448.0859 ***

10.0000 ***
411.3146 ***

32.0000 ***
343.0000 ***

21.7000 ***
378.0000 ***

16.5000 ***
385.0000 ***

15.4000 ***
400.0000 ***

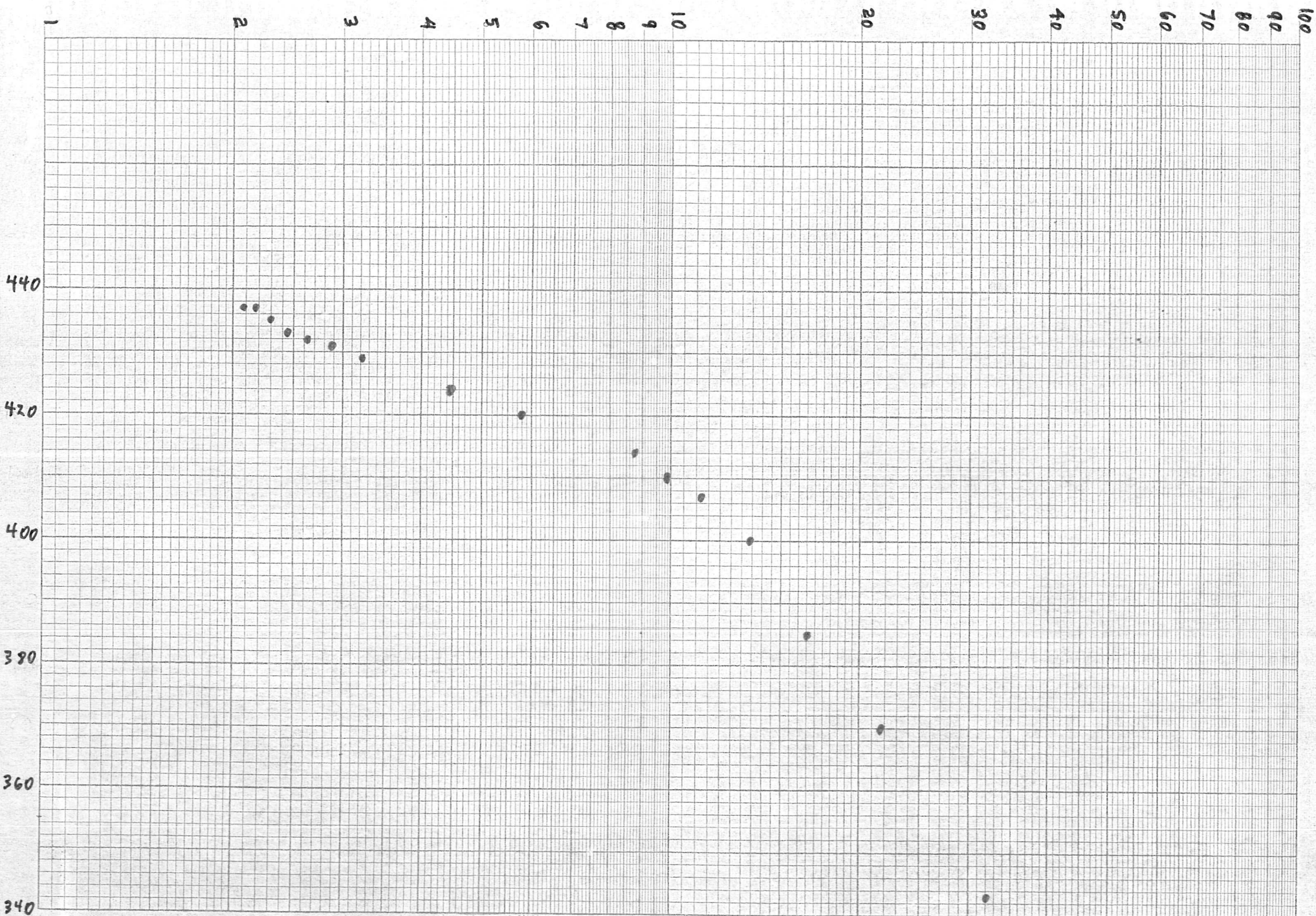
0.9978 ***
567.2164 ***
-64.5533 ***

10.0000 ***
418.5790 ***

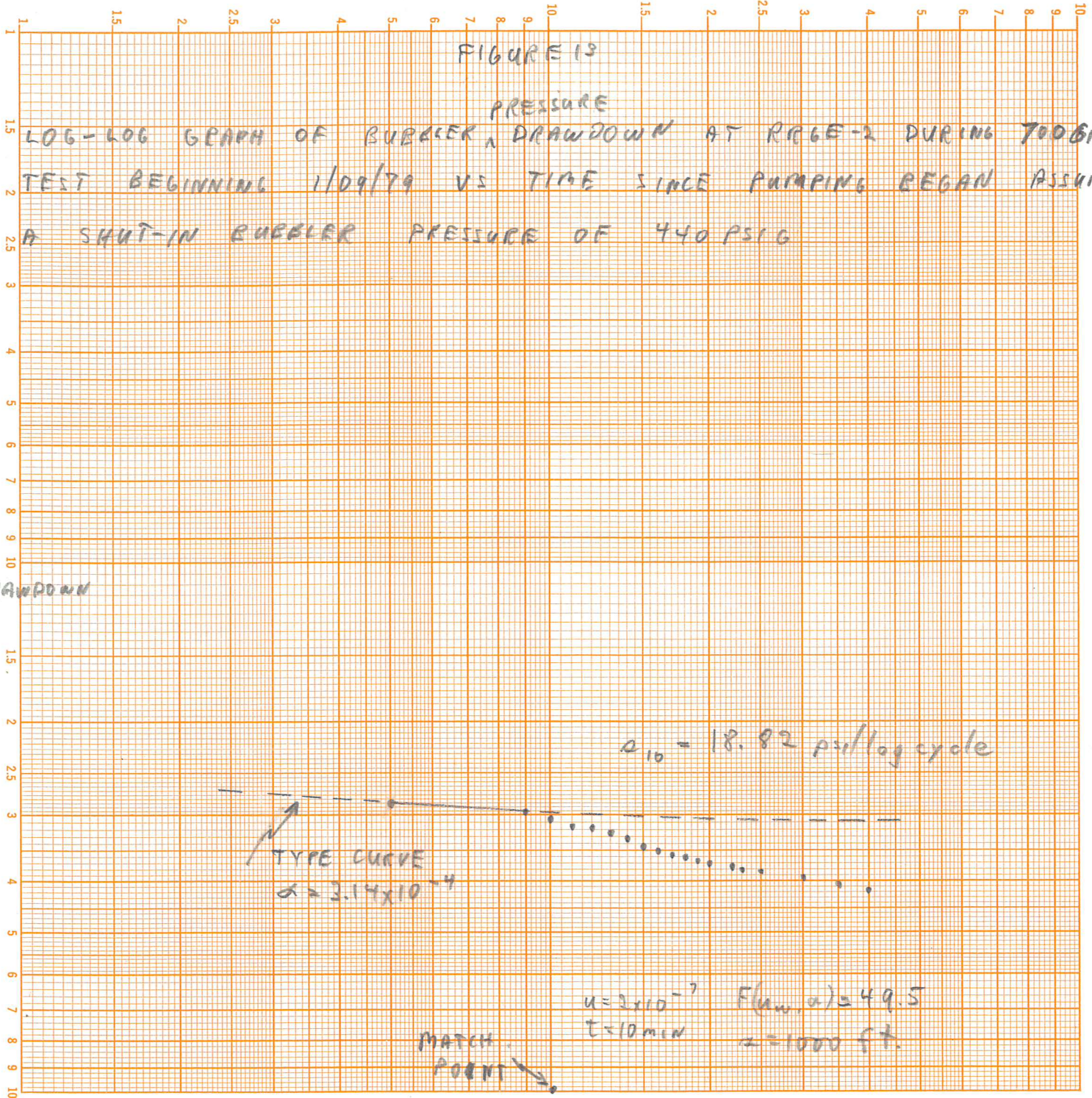
30.0000 ***
347.6559 ***

700 t/c'

KEUFFEL & ESSER CO.



t_{min}



BUBBLER 100
 PRESSURE DRAWDOWN
 DURING
 FALLOFF
 (FT. OF
 WATER AT
 270°F)

1000

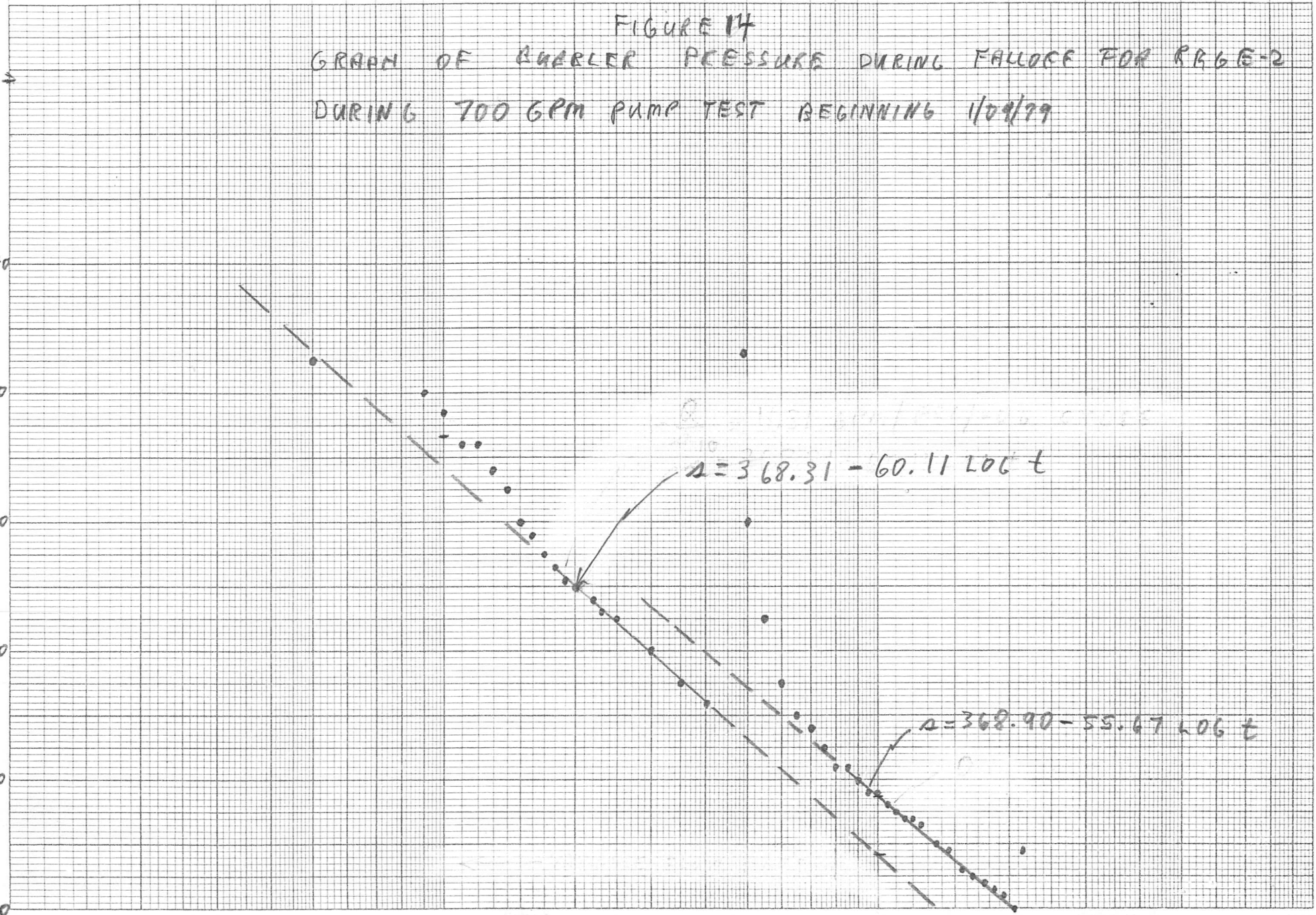
t min.

1 2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 100 200 300 400 500 600 700 800 900 1000

FIGURE 14
GRAM OF BARLER PRESSURE DURING FALLOFF FOR RB6E-2
DURING 700 GPM PUMP TEST BEGINNING 1/09/79

BARLER PRESSURE

340
320
300
270
260
240



REBE-2 700 (1)

1/09/79 fall off
before & after print ↓

18.0000 ***
293.0000 ***

19.0000 ***
291.0000 ***

20.0000 ***
290.0000 ***

22.0000 ***
288.0000 ***

23.0000 ***
286.0000 ***

25.0000 ***
285.0000 ***

30.0000 ***
280.0000 ***

35.0000 ***
275.0000 ***

40.0000 ***
272.0000 ***

0.5963 ***
368.3137 ***
-26.0991 ***

60.1062

1.0000 ***
368.3137 ***

10.0000 ***
308.2182 ***

100.0000 ***
248.1227 ***

1000.0000 ***
188.0272 ***

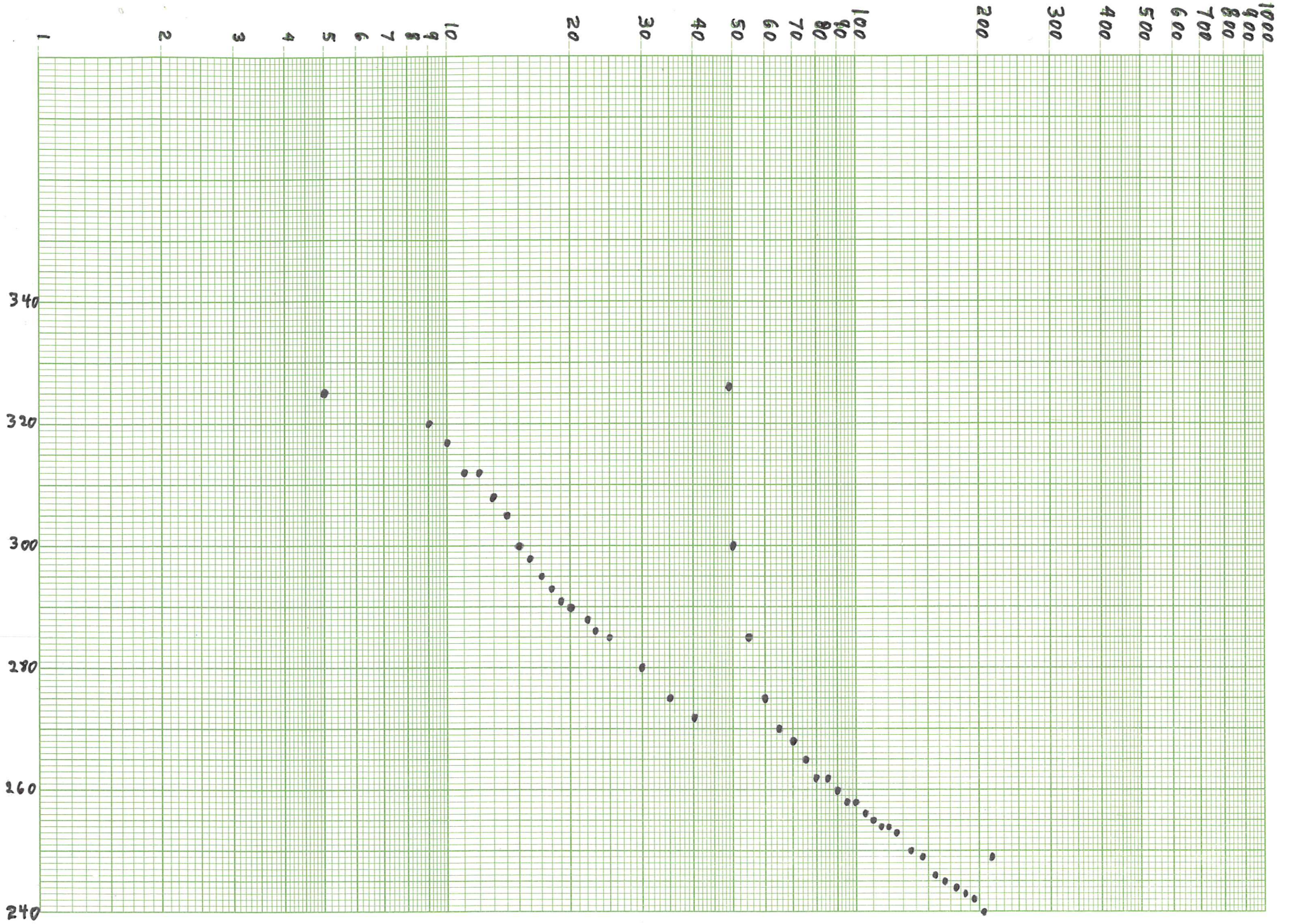
2625726.000 ***
-17.4543 ***

85.0000 ***
262.0000 ***

90.0000 ***
260.0000 ***

95.0000	***
258.0000	***
100.0000	***
258.0000	***
105.0000	***
256.0000	***
110.0000	***
255.0000	***
115.0000	***
254.0000	***
120.0000	***
254.0000	***
125.0000	***
253.0000	***
135.0000	***
250.0000	***
145.0000	***
249.0000	***
155.0000	***
246.0000	***
165.0000	***
245.0000	***
175.0000	***
244.0000	***
185.0000	***
243.0000	***
195.0000	***
242.0000	***
205.0000	***
240.0000	***
0.9937	***
368.8950	***
-24.1728	***
10.0000	***
313.2350	***
100.0000	***
257.5751	***
333.0000	***
228.4959	***
2625728.000	***
11.5999	***

SS. 6700



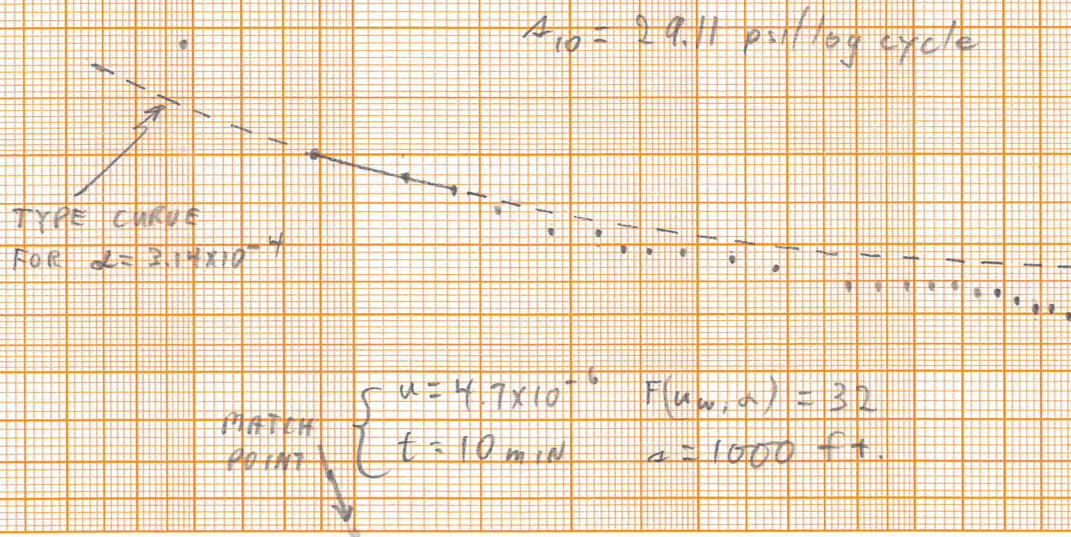
t_{MIN}

FIGURE 15

LOG-LOG GRAPH OF BUBBLER PRESSURE DRAWDOWN AT RRG-2
 DURING 700 GPM TEST BEGINNING 1/10/79 vs TIME SINCE PUMPING BEGAN
 ASSUMING A SHUT-IN BUBBLER PRESSURE OF 440 PSIG

100

1000



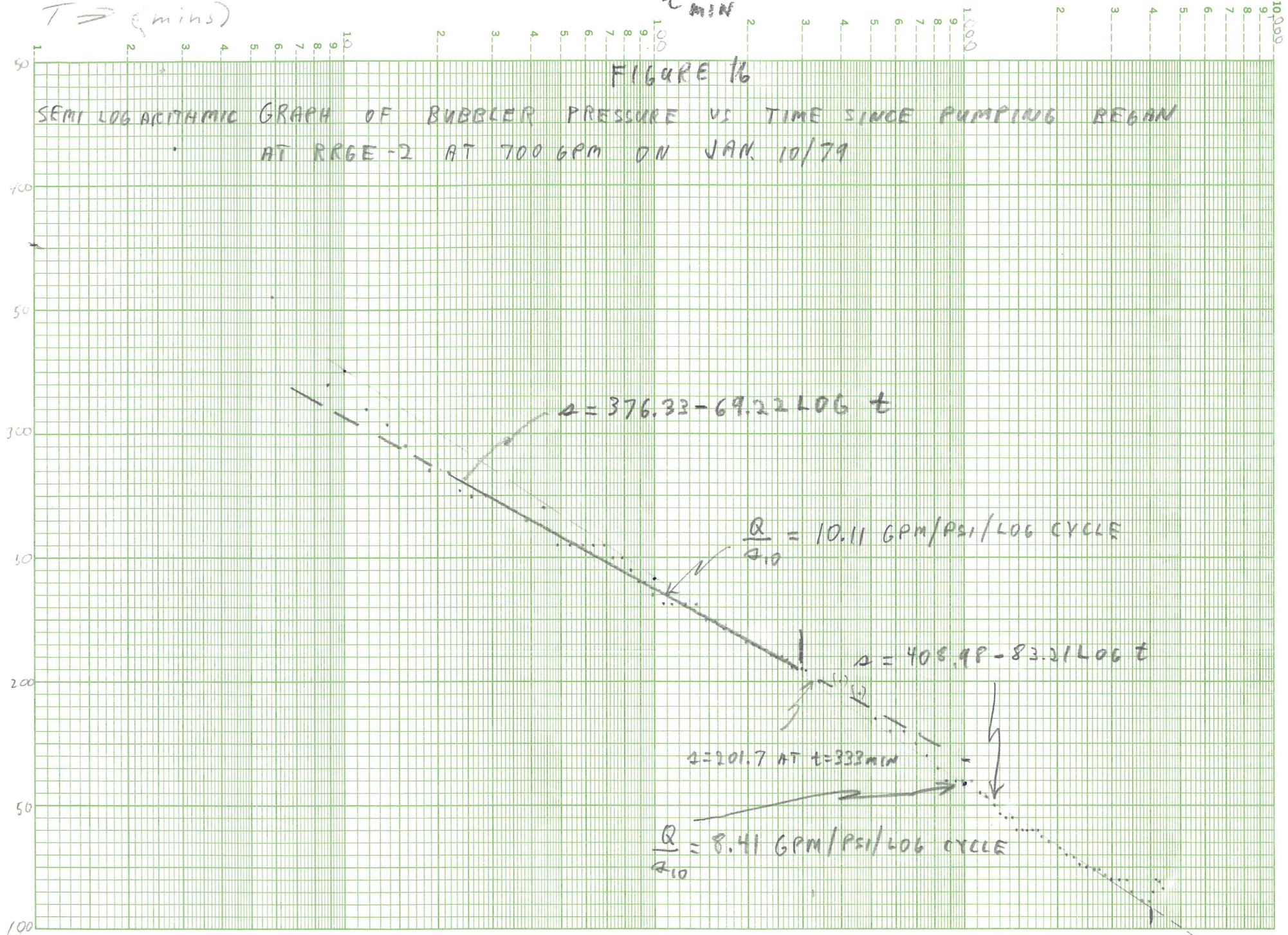
$T \Rightarrow$ (mins)

t MIN

FIGURE 16

SEMI LOGARITHMIC GRAPH OF BUBBLER PRESSURE VS TIME SINCE PUMPING BEGAN
 AT RRGE-2 AT 700 GPM ON JAN. 10/79

Pressure (Bubbler) - PSI \rightarrow



$a = 376.33 - 69.22 \text{ LOG } t$

$\frac{Q}{Q_{10}} = 10.11 \text{ GPM/PSI/LOG CYCLE}$

$a = 408.98 - 83.21 \text{ LOG } t$

$a = 201.7 \text{ AT } t = 333 \text{ MIN}$

$\frac{Q}{Q_{10}} = 8.41 \text{ GPM/PSI/LOG CYCLE}$

RR6E-2 700 (2)
1st pay 11/10/79
(5nd)
avst

21.8300	***
284.0000	***
23.8300	***
277.0000	***
25.8300	***
275.0000	***
28.8300	***
275.0000	***
33.8300	***
270.0000	***
38.8300	***
265.0000	***
43.8300	***
270.0000	***
48.8300	***
255.0000	***
53.8300	***
255.0000	***
58.8300	***
255.0000	***
63.8300	***
255.0000	***
68.8300	***
255.0000	***
73.8300	***
250.0000	***
78.8300	***
250.0000	***
83.8300	***
245.0000	***
88.8300	***
240.0000	***
93.8300	***
240.0000	***
98.8300	***
235.0000	***
108.8300	***
232.0000	***
113.8300	***
232.0000	***
118.8300	***
232.0000	***

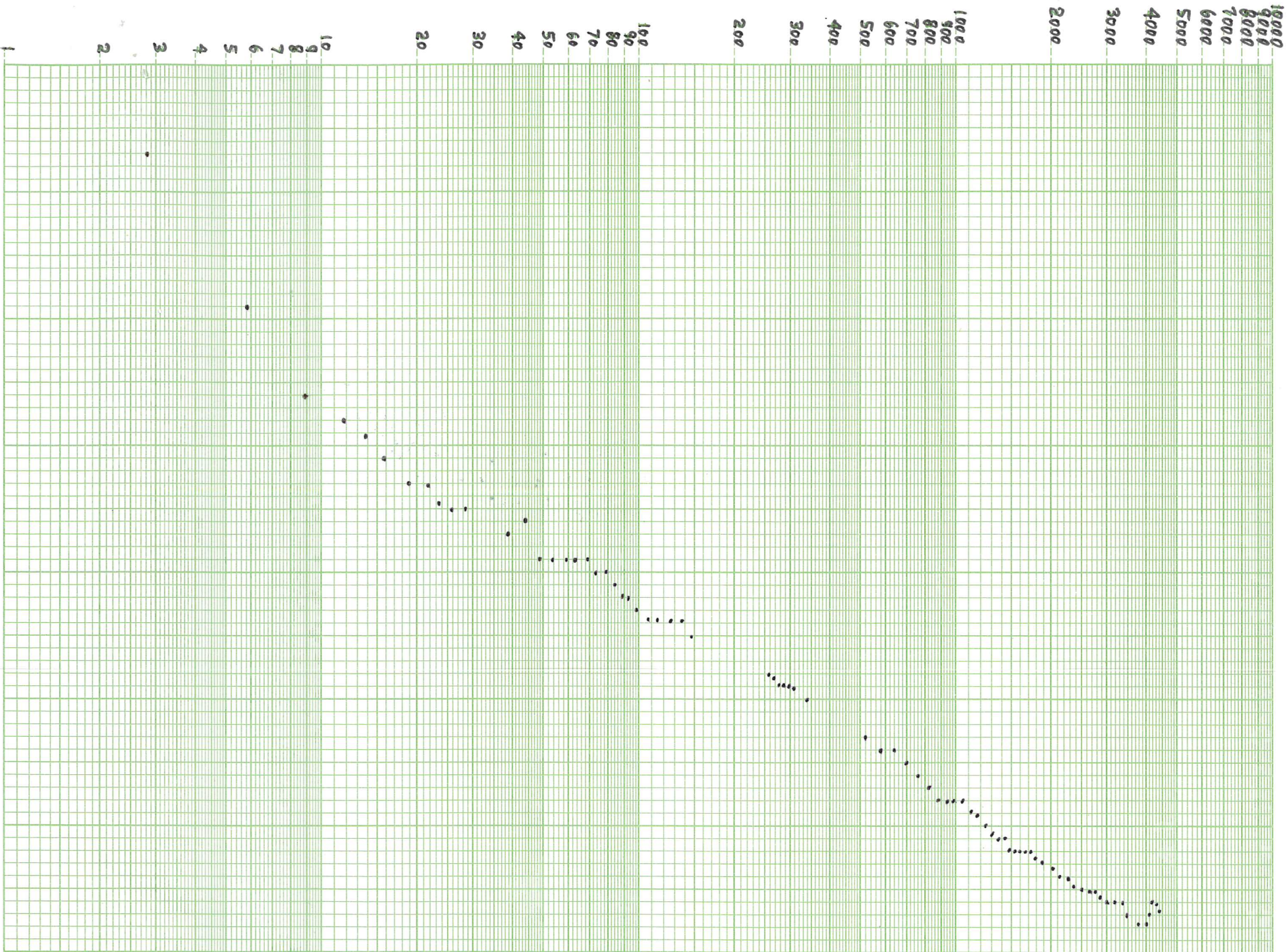
RR6I-2 700 (2)
11/10/79 3rd pay

298.83	***
205.00	***
306.83	***
204.00	***
338.83	***
200.00	***
516.83	***
165.00	***
578.83	***
160.00	***
638.83	***
180.00	***
698.83	***
175.00	***
758.83	***
170.00	***
818.83	***
165.00	***
878.83	***
160.00	***
938.83	***
160.00	***
998.83	***
160.00	***
1058.83	***
160.00	***
1118.83	***
155.00	***
1178.83	***
154.00	***
1238.83	***
147.00	***
1358.83	***
145.00	***
1418.83	***
145.00	***
1478.83	***
140.00	***
1538.00	***
140.00	***
1658.00	***

138.8300	***	1778.00	***
232.0000	***	137.00	***
148.8300	***	1838.00	***
225.0000	***	137.00	***
158.8300	***	1898.00	***
224.0000	***	136.00	***
168.8300	***	1958.00	***
222.0000	***	134.00	***
178.8300	***	2018.00	***
220.0000	***	133.00	***
188.8300	***	2078.00	***
218.0000	***	132.00	***
198.8300	***	2138.00	***
216.0000	***	130.00	***
208.8300	***	2198.00	***
215.0000	***	130.00	***
218.8300	***	2258.00	***
214.0000	***	129.00	***
228.8300	***	2318.00	***
213.0000	***	127.00	***
238.8300	***	2378.00	***
211.0000	***	126.00	***
248.8300	***	2438.00	***
210.0000	***	125.00	***
258.8300	***	2498.00	***
210.0000	***	125.00	***
268.8300	***	2558.00	***
208.0000	***	125.00	***
278.8300	***	2618.00	***
206.0000	***	124.00	***
288.8300	***	2678.00	***
206.0000	***	124.00	***
0.9877	***	2738.00	***
376.3314	***	124.00	***
69.2162 -30.0546	***	2798.00	***
1.0000	***	123.00	***
376.3314	***	2858.00	***
10.0000	***	122.00	***
307.1277	***	2918.00	***
100.0000	***	120.00	***
237.9239	***	2978.00	***
10000.0000	***	120.00	***
99.5165	***	3038.00	***
1000.0000	***	120.00	***
168.7202	***	3098.00	***
333.0000	***	120.00	***

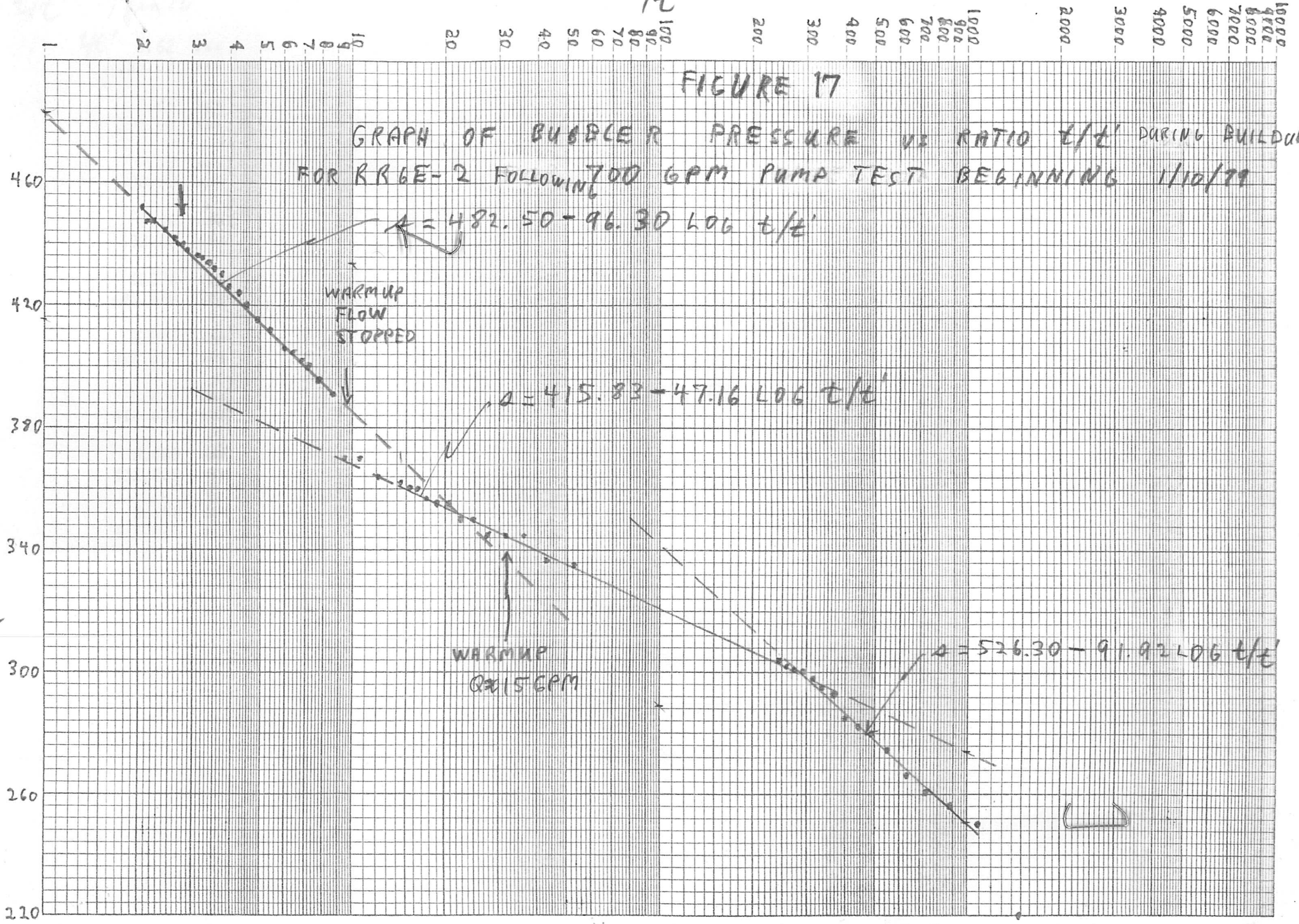
3218.00	***
120.00	***
3278.00	***
120.00	***
3338.00	***
120.00	***
3398.00	***
120.00	***
3418.00	***
120.00	***
3478.00	***
115.00	***
3538.00	***
115.00	***
3598.00	***
113.00	***
3658.00	***
112.00	***
3718.00	***
112.00	***
3778.00	***
111.00	***
3838.00	***
110.00	***
3898.00	***
111.00	***
0.99	***
408.58	***
-36.13	***
10.00	***
325.80	***
100.00	***
242.51	***

83-2074



have copy

t/t'



RRGE-2 700

t/t' - Jan 10

4e'	8.62	***
	385.00	***
	7.65	***
	395.00	***
	7.18	***
	400.00	***
	6.50	***
	402.00	***
	6.370	***
	405.000	***
	6.000	***
	407.000	***
	5.680	***
	410.000	***
	5.400	***
	412.000	***
	5.150	***
	415.000	***
	4.930	***
	415.000	***
	4.730	***
	418.000	***
	4.550	***
	420.000	***
	4.380	***
	421.000	***
	4.230	***
	424.000	***
	4.090	***
	425.000	***
	3.970	***
	426.000	***
	3.850	***
	425.000	***
	3.750	***
	430.000	***
	3.550	***
	432.000	***
	3.390	***

2

2

434.000 ***

3.240 ***

435.000 ***

3.110 ***

436.000 ***

2.990 ***

437.000 ***

2.890 ***

438.000 ***

2.800 ***

440.000 ***

2.710 ***

440.000 ***

2.640 ***

442.000 ***

2.530 ***

445.000 ***

2.440 ***

445.000 ***

2.360 ***

445.000 ***

2.290 ***

447.000 ***

2.220 ***

447.000 ***

2.160 ***

447.000 ***

2.110 ***

449.000 ***

2.080 ***

452.000 ***

0.992 ***

482.496 ***

96.2976
~~157.36~~

-41.314 ***

1.000 ***

482.496 ***

10.000 ***

386.218 ***

100.000 ***

289.937 ***

1000.000 ***

133.657 ***



SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6010

700 rpm

