BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G73.415.3
Issue 1, December, 1952
AT&T Co Standard

PRESSURE TESTING
LOCATION OF GAS LEAKS
PLOTTING PRESSURE GRADIENTS

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1. GENERAL

1.01 This section replaces the information previously contained in Section G73.245, Issue 1, covering the plotting of pressure gradient graphs for cables under gas pressure.

2. FORM E-1017—GRAPH OF PRESSURE READINGS

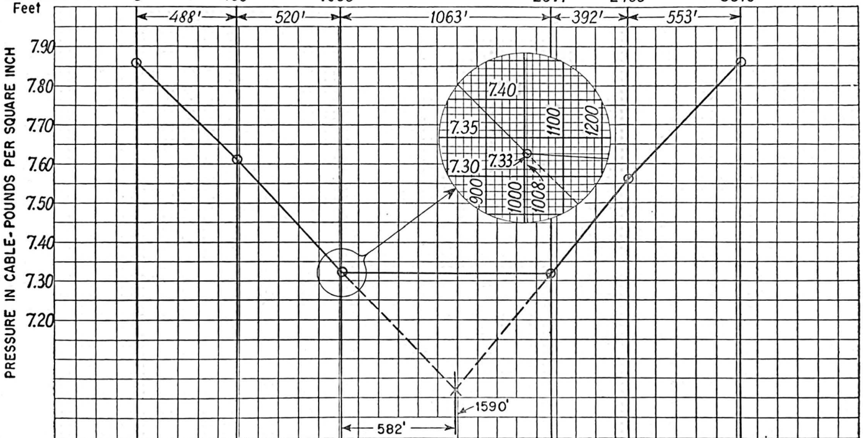
2.01 Form E-1017, Gas Pressure Testing—Graph of Pressure Readings has been made available to facilitate the plotting of pressure gradients. This form is 8-1/2 inches by 11 inches in size. Space is provided at the top of the form for entries of the valve location, measured pressure, corrected pressure and valve location in feet. Sufficient space is provided so that these entries may be made directly above the plotted location of the valve on the graph. At the bottom of the form there is space for general information including name of cable, date of test, weather conditions, and results of leak location test.

2.02 The graph portion of the form is 5-1/2 inches high and 10 inches long. The graph is divided by lightweight lines into 20 small blocks per inch. Every fifth horizontal and vertical line is marked by a mediumweight line. Every tenth line is marked by a heavy line to outline 1/2-inch blocks of 10 small blocks. Distances in feet are plotted along the horizontal scale. Pressures in pounds are plotted vertically.

2.03 Each form used should be complete with entries of all data pertinent to the test. Completed forms should be retained as part of the history record of the gas section for reference during subsequent maintenance work. Following is an illustration of Form E-1017 with typical entries:

GAS PRESSURE TESTING—GRAPH OF PRESSURE READINGS

Marker, Pole or M.H. No.	P-#242	P-#246	P-#250	P-#258	P-#261	P-#265
Pressure As Read	7.79	7.53	7.27	7.27	7.52	7.86
Pressure Corrected	7.86	7.61	7.33	7.32	7.56	7.86
Valve Location Feet	0'	488'	1008'	2071'	2463'	3016'



Cable ALPHA-BETA C
Gas Section No. 3
Made By G.D.F. Checked By C.N.

Plotted Location P# 250+582'
Actual Location P# 250+542'
Error in Feet 40
Cause of Leak Crack in Sheath

Testboard Report No. 17
Date of Test 11-15-51 Time (Start) 11⁰⁰AM (Finish) 2²⁰PM
Weather Clear Temp. 65

3. SELECTING PRESSURE SCALE

3.01 To select the proper pressure scale for plotting a leak gradient, determine the highest and lowest pressures that are to be plotted. Subtract to determine the pressure difference. Then select a scale so that this pressure difference will cover about one-half to two-thirds of the total pressure range on Form E-1017, as indicated in the following table:

Scale No.	Pressure Difference	Total Pressure Range of Graph	One-Half-Inch Block of 10	Small Block
	(Pounds)	(Pounds)	(Pounds)	(Pounds)
1	Less than .40	.55	.05	.005
2	.40 to .80	1.10	.10	.01
3	.80 to 1.40	2.20	.20	.02
4	1.40 to 1.90	2.75	.25	.025
5	1.90 to 3.0	4.40	.40	.04
6	3.0 to 4.0	5.00	.50	.05
7	4.0 to 6.0	8.80	.80	.08
8	over 6.0	11.00	1.00	.10

3.02 The eight pressure scales suggested in the above table provide a sufficient variety of ranges for practical purposes. The use of other scales having odd or fractional values of pressure per block will increase the difficulty of plotting the gradient and lead to errors without increasing the accuracy of the results.

3.03 When plotting gradients of a gas section as a whole using small distance scales of 1,000 to 3,000 feet per one-half-inch block, do not use a pressure scale larger than No. 6, .50 pound per one-half-inch block. Larger pressure scales will exaggerate small differences in pressure and make it harder to analyze the appearance of the over-all gradient.

4. SELECTING DISTANCE SCALE

4.01 The distance scale should be selected to fit the gas section or portion of a gas section in which the pressures are measured. First, add the valve spacings to determine the cumulative distance at each valve point and the total distance involved. Then select a scale from the following table which will provide sufficient range for this total distance. If the total distance falls between two of the suggested scales use the scale which provides the greater total distance.

Scale No.	Total Distance Range of Graph	One-Half-Inch Block of 10	Small Block
	(Feet)	(Feet)	(Feet)
1	1,000	50	5
2	2,000	100	10
3	3,000	150	15
4	4,000	200	20
5	5,000	250	25
6	8,000	400	40
7	10,000	500	50
8	15,000	750	75
9	20,000	1,000	100
10	30,000	1,500	150
11	40,000	2,000	200
12	60,000	3,000	300

4.02 The twelve distance scales suggested in the above table provide a sufficient variety of ranges for practical purposes. The use of other scales having odd or fractional distances in feet per block will increase the difficulty of plotting the gradient and lead to errors without increasing the accuracy of results.

5. PLOTTING GRADIENTS

5.01 Select the proper distance scale and enter the distance values along the top of the graph at about one-inch intervals. Using the cumulative distances for each valve point, mark each valve location along the top of the graph. Light vertical lines drawn the full height of the graph at these locations will simplify plotting pressure values.

5.02 Enter the marker, pole or manhole numbers of the valves, the measured pressures, and the corrected pressures across the top of the form directly above each valve location.

5.03 Select the proper pressure scale and enter the pressure values along the left-hand side of the graph at about one-inch intervals. The highest value to be plotted should be near the top of the graph in order to allow ample space for extending gradient lines and making a leak intersection on the graph below the lowest pressure value.

5.04 Plot the pressure readings using a sharp, hard pencil by marking a dot exactly at the proper value of distance and pressure for each valve point. Encircle these dots to facilitate reference. Complete the gradient by connecting these dots with straight lines drawn exactly through each dot.

5.05 The plotted gradient should then be analyzed for leak location as covered in another section on analysis of pressure gradients.