BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G73.418.2
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AT&T Co Standard

# PRESSURE TESTING
## LEAK LOCATION METHODS
## TWO-CABLE METHOD

## 1. GENERAL

1.01     This is a new section which describes the Two-Cable Method of leak location in cables maintained under pressure. This method is applicable to aerial gas sections where two cables with identical layout of valves and plugs are located on the same route.

1.02     When there are two cables under pressure on the same pole line the pressures in both cables will be affected in a similar manner by changes in temperature and differences in elevation along the route. This characteristic can be used to advantage when a gas leak exists in one of the two cables.

1.03     By measuring pressures in both cables at each valve point and then comparing the pressures measured in the leaky cable to the pressures measured in the good cable the effects of temperature and elevation are minimized. The differences in the shape of the pressure gradients in the two cables will be due to the effect of the leak on the gradient of the leaky cable.

## 2. LIMITATIONS IN APPLICATION

2.01 Good results in leak location will be obtained by this method only under the following conditions:

(a) The good cable must be gastight and must have had adequate time to equalize after the last charging operation.

(b) If the two cables are part of the same circular gas section and the leak is near the interconnection, it must be determined that the pressure disturbance due to the leak has not affected the pressure gradient of the good cable.

(c) If the cables differ considerably in size or make-up, the flow of gas may be slower through one cable than the other. In this case, the effects of temperature changes on the pressure gradient may not be the same in the two cables.

2.02 Where the above conditions are satisfactory the Two-Cable Method will permit the location of large or medium leaks in aerial cables when temperature conditions are not particularly favorable. In the case of a small leak the measurements should be made under reasonably stable temperature conditions.

2.03 The Two-Cable Method is not usually employed on buried or underground cable since temperature variation is not an important factor.

## 3. PROCEDURE IN MAKING TEST

3.01 Read the pressure at not less than three valve points on each side of the suspected leak location in both the leaky and the good cable. Add to the measured pressures of the leaky cable some number such as 10.00 which will raise the lowest pressure reading above the reading at the corresponding valve point in the good cable. From the resultant figures, subtract the pressure readings taken on the good cable at the corresponding locations.

3.02 Prepare a graph of pressure readings using the differences in pressure obtained in Paragraph 3.01 as the plotted values of pressure for the graph. The resultant gradient will have the same characteristics as a leak gradient plotted from actual pressure readings and should be analyzed in the same manner.

## 4. EXAMPLE

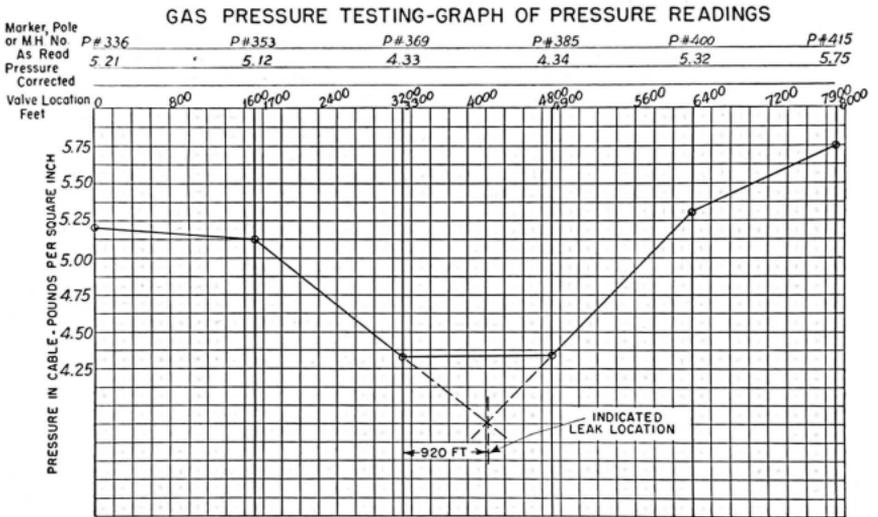4.01 Application of the Two-Cable Method is illustrated by the following example:

| Valve Location | Pressure Readings Leaky Cable | Pressure Readings Plus 10.00 | Pressure Readings Good Cable | Differences to be Plotted |
|---|---|---|---|---|
| P-No. 336 | 5.21 | 15.21 | 7.15 | 8.06 |
| 353 | 5.12 | 15.12 | 7.35 | 7.77 |
| 369 | 4.33 | 14.33 | 7.03 | 7.30 |
| 385 | 4.34 | 14.34 | 6.81 | 7.53 |
| 400 | 5.32 | 15.32 | 7.02 | 8.30 |
| 415 | 5.75 | 15.75 | 6.89 | 8.86 |

4.02 The leak intersection obtained from a plot of the differences in pressure readings is shown in the following graph. The shape of the gradient is normal and the graph appears dependable. The indicated leak location is at Pole No. 369 plus 720 feet.
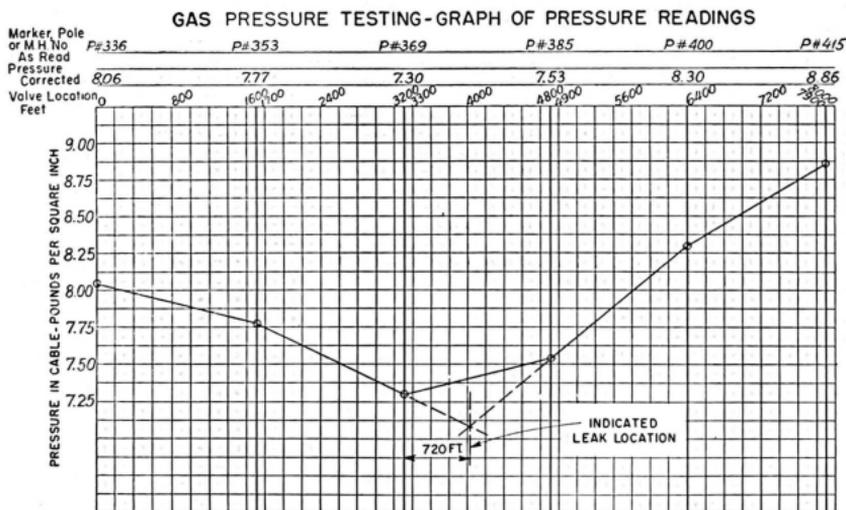


LOCATION OF MEDIUM LEAK
TWO-CABLE METHOD
GRAPH OF DIFFERENCES IN PRESSURE READINGS

4.03   For comparison, a plot of the measured pressure read-
ings of the leaky cable is shown in the following graph.
The effect of variations in temperature along the cable is
illustrated by the abrupt changes in shape which occur at Pole
No. 353 and Pole No. 400. The indicated leak location is at Pole
No. 369 plus 920 feet, a difference of 200 feet from the location
obtained by the graph in Paragraph 4.02. In an actual case it
is only necessary to plot the differences in pressure readings
as shown in Paragraph 4.02.

GAS PRESSURE TESTING-GRAPH OF PRESSURE READINGS

| Marker, Pole or M.H No. | P#336 | P#353 | P#369 | P#385 | P#400 | P#415 |
|---|---|---|---|---|---|---|
| Pressure As Read | 5.21 | 5.12 | 4.33 | 4.34 | 5.32 | 5.75 |
| Corrected | | | | | | |

LOCATION OF MEDIUM LEAK
TWO-CABLE METHOD
GRAPH OF MEASURED PRESSURE READINGS