

PRESSURE TESTING
CONTINUOUS FLOW SYSTEMS FOR
TRUNK CABLES

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1. GENERAL

1.01 This section provides information and instructions covering the design and construction of continuous flow pressure systems for trunk cables.

1.02 In general, cable sheaths containing both trunk and exchange compliments should be treated as exchange cables for continuous flow pressure operations.

2. DESIGN CONSIDERATIONS

2.01 For continuous flow pressure operations, each trunk cable leaving the Central Office may be designed as an individual pressure system, or where two or more trunk cables are in the same trunk route, they may be combined into one circular system.

2.02 Where the pressure source is at one end of the trunk cables only, it will be found advantageous to combine the cables into a circular system when possible to do so. With a single source of air pressure, the circular design has the following advantages:

- (a) provides a greater reservoir of air;
- (b) affords higher protective pressures at the far ends of the cables;
- (c) facilitates maintenance operations.

2.03 Where a continuous flow pressure source exists at both ends of a trunk cable or trunk cables in the same route, it will generally be most advantageous to design each individual cable as a separate pressure system with gas being introduced at both ends at the same pressure.

3. APPLIED AND PROTECTIVE PRESSURES

3.01 Dry air or nitrogen should be introduced into each trunk system at a source pressure of 10 psi. Each system must be constructed and maintained so that this source pressure will be adequate to provide the required protective pressures over the system.

3.02 On trunk systems with a pressure source at one end only, a minimum protective pressure of 6 psi should be maintained at the far end of such systems. Where air is introduced at both ends of a trunk system at the 10 psi source pressure, a minimum of 6 psi pressure should be maintained at the mid-point of this type of system.

3.03 Due to the nature of most trunk cables, they should be relatively free of gas leaks in order to attain the required pressures over the system. However, a reduction in source pressure at the far end of the system is normal, under continuous flow operation, even in a relatively gas tight cable. This gradual loss of pressure is due to the pneumatic resistance of the cable and will vary in accordance with the size and type of cable in the system.

4. PRESSURE PLUGS

4.01 Pressure plugs may be constructed in trunk cables in accordance with the Sections of the Practices covering Pressure Testing, Asphalt-Filled Plugs or Pressure Testing, Cold Resin Pressure Plugs.

4.02 Where the Cold Resin Pressure Plug is to be used on a new trunk cable, refer to the precautions covered in the section on Pressure Testing, Cold Resin Pressure Plug.

4.03 Pressure plugs should be installed on trunk cables in the terminating Central Office vaults only. In order to provide the essential free flow of gas throughout the trunk systems, existing plugs and restrictions in these systems between terminating points must be eliminated by the use of by-passes.

4.04 Pressure plugs should not be placed in trunk cables at an exchange or maintenance boundary except when the trunk cable is jointly owned with a foreign Telephone Company.

4.05 When space permits, trunk compliments entering an intermediate Central Office or Repeater Hut should be plugged in the entrance cable or terminal stubs in the building if gas-tight terminals are not used for termination of these facilities. This will afford protection for the entrance cables as well as the main trunk cable.

5. PERMANENT AND TEMPORARY PRESSURE-VALVES

5.01 Permanent pressure valves should be placed on a trunk cable or circular trunk system at the following locations:

(a) On the pressure side of the plug at each Central Office Vault. On circular systems of two or more cables, a valve should be placed on each cable in the system. Valves may be placed at any convenient location on the cable which will not interfere with future cable racking or splicing with the following exceptions:

(1) Do not place valves less than 36 inches from the pressure plug.

(2) Do not place valves in the first two splicing bays from the cable entrances to the vault.

(b) On trunk cables up to 25,000 feet in length, place a permanent valve at or near the mid-point of the cable. On circular trunk pressure systems, place the mid-point valves on each cable at a common location if possible. This will facilitate future maintenance operations.

(c) On trunk cables over 25,000 feet in length, place permanent valves at the quarter points in addition to the valve at the mid-point of each cable. When two or more trunk cables are in the same route, common permanent valve locations should be selected if possible.

(d) On trunk entrance cables into intermediate Central Office vaults or Repeater Huts, a permanent valve should be placed at any convenient location on the pressure side of the plug or gastight terminal. When the cable is plugged, the valve should be located not less than 36 inches from the pressure plug.

5.02 Other than at terminating points of a trunk cable, valves should be placed in a lead sleeve or mechanical splice case nearest to the indicated location rather than in the cable sheath. On lead sleeves where a C Pressure Testing Flange has not been placed previously, install the valve using a C Flange placed in accordance with the Section of the Practices covering Pressure Testing, Construction Tests, Procedure During Splicing. The large mechanical splice cases are equipped with a flange for either the pressure valve or C Plug as required.

5.03 Temporary valves may be placed as required for initial leak location work and maintenance operations. These temporary valves should be placed in accordance with Paragraph 5.02 of this Section. Upon completion of the leak location or maintenance work, temporary valves should be removed and plugs placed in the flanges.

5.04 When an existing static pressure system on a truck cable is to be converted to continuous flow operation, the existing permanent valves need not be relocated. The valves that most closely coincide with the provisions of Paragraph 5.01 (b) or 5.01 (c) should be designated as key permanent valves. Other valves may be removed at the time of conversion or may remain in plant until other work operations are to be performed at their particular location. In general, excess valves should not remain in plant longer than necessary because of potential gas leakage and deterioration of the valve core.

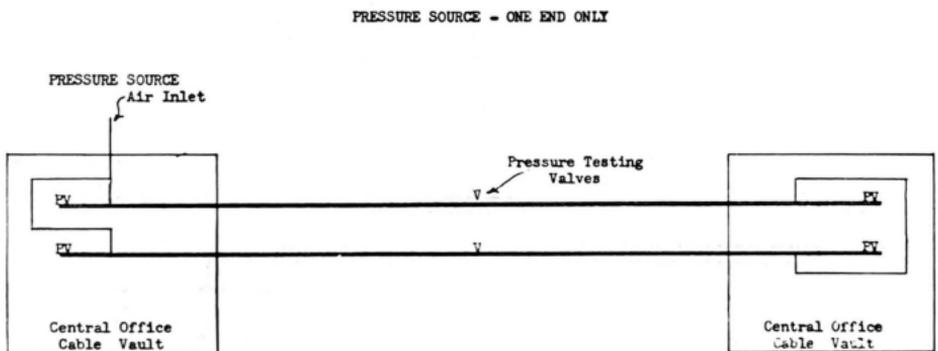
5.05 When permanent valves are to be installed on trunk cables in a manhole, select the manhole nearest the desired location that affords the best conditions for traffic, safety of workmen, accessibility, and water conditions. When a permanent valve must be placed in a manhole where these conditions are undesirable or where deep or tunnelled manholes are encountered, consideration should be given to placement of the valve in the neck of the manhole as covered in other Sections of the Practices.

6. GAS BY-PASSES AND BY-PASS VALVES

6.01 Any restriction to the free flow of gas or dry air throughout a trunk system under continuous flow pressure must be eliminated or by-passed.

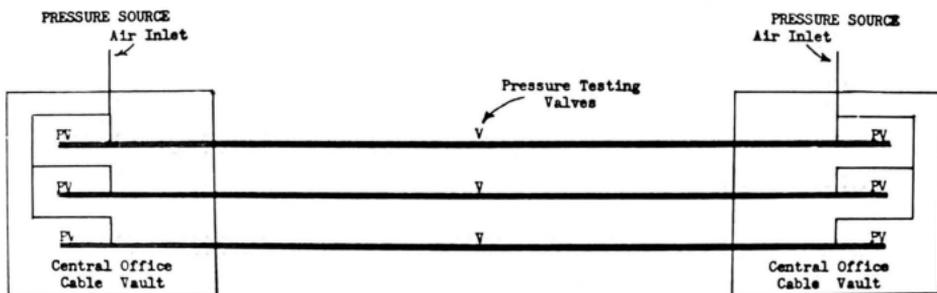
6.02 By-Passes should be constructed in accordance with the Section covering Pressure Testing, Arrangement of Gas By-Passes, with the exception that in general, By-Pass Valves should not be installed. At the discretion of the Plant Engineer, By-Pass Valves may be installed in the by-passes at certain locations to isolate individual cables in a multiple cable system for maintenance reasons. The illustrations on the following page show the air pipe arrangements on simple circular trunk systems.

(a) Pressure source at one end only.



(b) Pressure source at both ends of system.

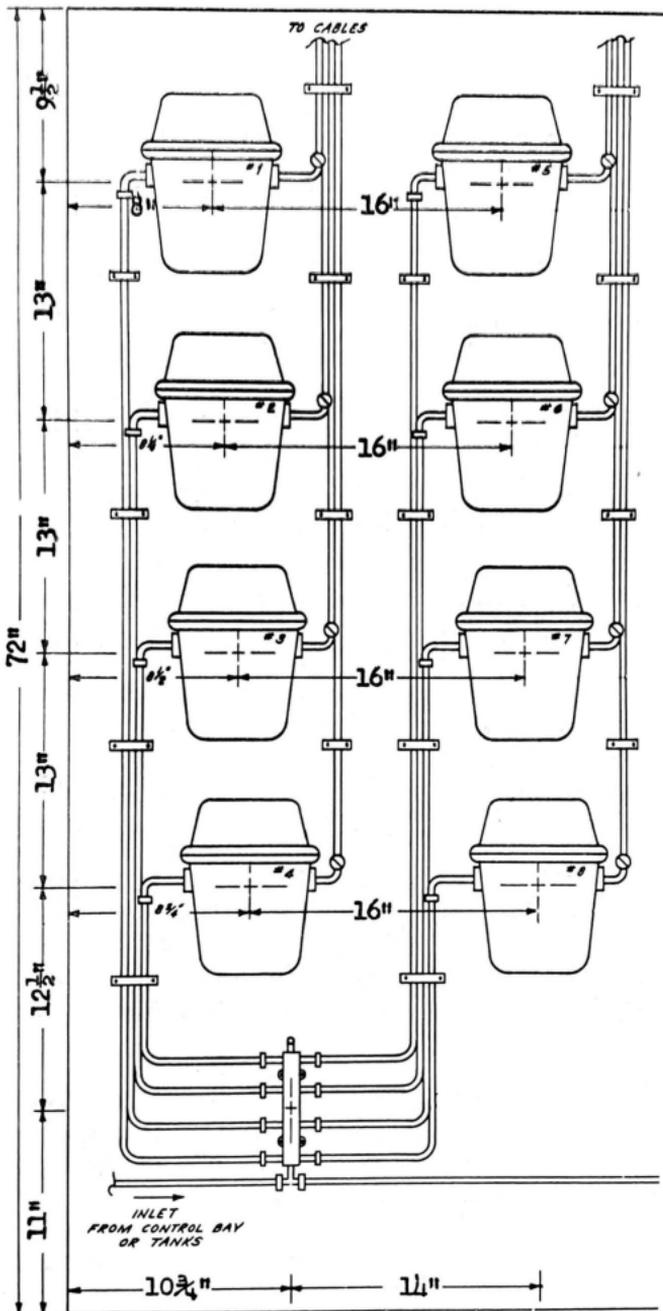
PRESSURE SOURCE - BOTH ENDS



7. METER, MANIFOLD, AND AIR PIPE ARRANGEMENTS AT PRESSURE SOURCE

7.01 A Gas Meter should be installed between the pressure source and the gas inlet to each trunk cable or circular trunk system. Gas meters should be mounted on a suitable backboard located reasonably close to the cable vault and pressure source. Backboard space will be provided and specified in the Central Office by the Engineer.

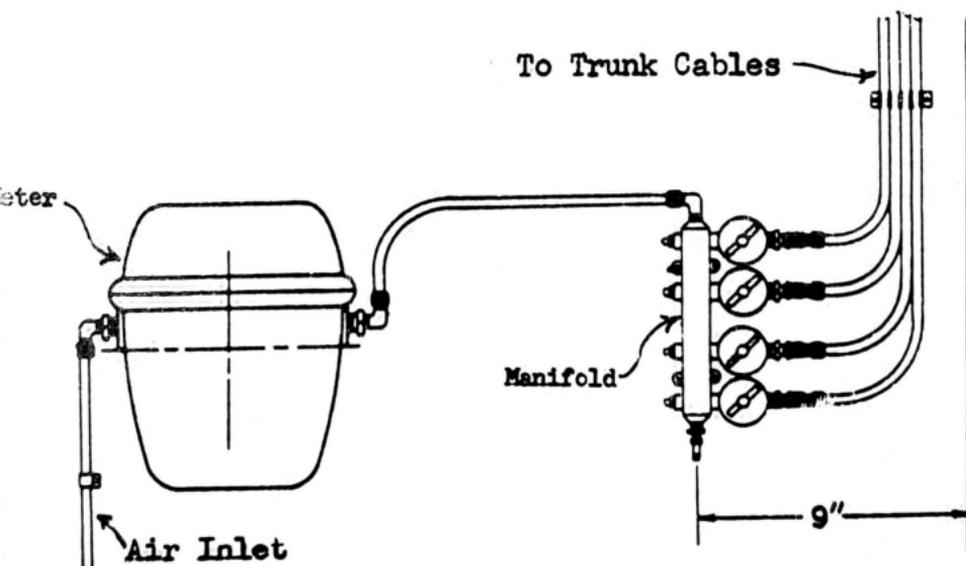
7.02 A typical arrangement of Copper Tubing, Manifolds and Gas Meters for several individual trunk cables or circular trunk systems is shown in the illustration on the following page.



7.03 It will be necessary to install an air pipe from the Gas Meter to each trunk cable that is not included in a circular gas system as shown in the illustration of Paragraph 7.03 (b). The shut-off valve will be installed at the meter on individual feed pipes. For circular trunk systems where two or more cables are to be connected to one Gas Meter, either of the two following methods may be used depending upon circumstances involved:

(a) A single feed pipe may be installed from the meter into the cable vault with branch pipes to each trunk cable in the circular system feeding from it. In this case Shut-Off Valves may be placed in branch pipes to each cable if specified on the detail plans.

(b) A Manifold may be installed, generally on the meter back-board, near the meter assigned to the circular system with individual air pipes feeding each cable from the manifold as illustrated below. Using this method, Shut-Off Valves may be installed at the Manifold.



7.04 Gas Meters for trunk cables should generally be mounted on the same backboard with that used for exchange cable metering at the same pressure source location. Unless otherwise specified or adequate space is not available, mount the meters at 16 inches on center horizontally and 13 inches on center vertically. Refer to other Sections of the Practice covering Pressure Testing, Continuous Flow Systems for Exchange Cables for other details on Gas Meter mounting and various fittings for installation of copper air pipe.

8. MONITORING

8.01 After the pressure characteristics of each particular trunk cable or circular trunk system have been established, daily reading and recording of the meters on these systems will indicate any large deviation from the normal volume of gas consumed for each separate pressure system.

8.02 When a large increase in volume is noted for a particular system, it will be necessary to check the mid-point valve on that system for adequate protective pressure. If the mid-point pressure is below 6 pounds or if the end point reading on a single feed non-circular trunk cable is below 6 pounds, further maintenance work will be necessary to determine the cause of the pressure loss and make required repairs.

8.03 Routine pressure checks at permanent valve locations need only be accomplished when deviations in volume of gas consumed by any individual trunk cable or system indicate that such action would be necessary or advisable. The need for such routine valve point readings and the interval between them can best be determined by maintenance forces based on the normal pressure characteristics of the particular system.