

## PNEUMATIC TICKET DISTRIBUTING SYSTEM INSTALLATION GENERAL EQUIPMENT REQUIREMENTS

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### 1. GENERAL

1.01 This section covers the general equipment requirements for installing the pneumatic ticket distributing system exclusive of the centrifugal exhauster sets and associated power equipment.

1.02 This section is reissued to incorporate previous addendum changes.

### 2. DESCRIPTION OF PNEUMATIC TICKET DISTRIBUTING SYSTEM

2.01 The function of the pneumatic ticket distributing system is to provide means for conveying toll tickets from ticket writing positions of a switchboard to desks, such as, ticket filing and rate quoting desks, ticket distributing desks, and from these desks to the various toll operating positions and other desks as shown in Fig. 1.

2.02 The equipment consists of a system of 2-3/4- by 3/8-inch rectangular brass tubing provided with ticket inlets called sending valves and ticket outlets called receiving valves. The tube which connects the switchboard with the desk terminates in a roller receiving valve and is called a common return tube. From 1 to 18 sending valves may be connected to a single common return tube in a switchboard line-up. A sending tube is open-ended and runs from the desk to the switchboard in the opposite direction from a common return tube. A sending tube terminates, in a hand receiving valve which is mounted in certain switchboard positions.

2.03 The system operates on a partial vacuum, air being constantly pumped from the tubes at the receiving valves by an exhaust piping system connected to a common motor-driven centrifugal exhauster set. Tickets folded with two flaps are inserted in the tube system and are carried along by the passage of air through the tubes at approximately 30 feet per second. Two types of receiving valves are used, the hand-operated type used at the termination of single tubes at switchboard positions and the motor-driven roller type arranged to terminate from one to four tubes at a desk. At each receiving valve an arrangement is provided for measuring the vacuum in the associated tube by means of a portable vacuum gauge. On large installations a mercury vacuum gauge is permanently connected to the exhaust system at a point close to the fan set. A key and lamp signal system and blockade alarms are provided in some cases for necessary signaling purposes.

### 3. EXHAUST PIPE

#### A. Types

3.01 For exhaust connections up to 5 inches in diameter, lightweight seamless steel tubing (Nos. 11, 13, or 16 gauge type "B.W.") and lightweight fittings shall be used. Joints for lightweight tubing shall be made in horizontal runs by butting the tubing and placing a steel rubber-lined sleeve over the joint as shown in Fig. 2. This sleeve should be tightened by turning down the nuts on the sleeve bolts. For joining vertical runs, a coupling should be used as shown in Fig. 3.

3.02 For exhaust connections above 5 inches in diameter, spiral galvanized

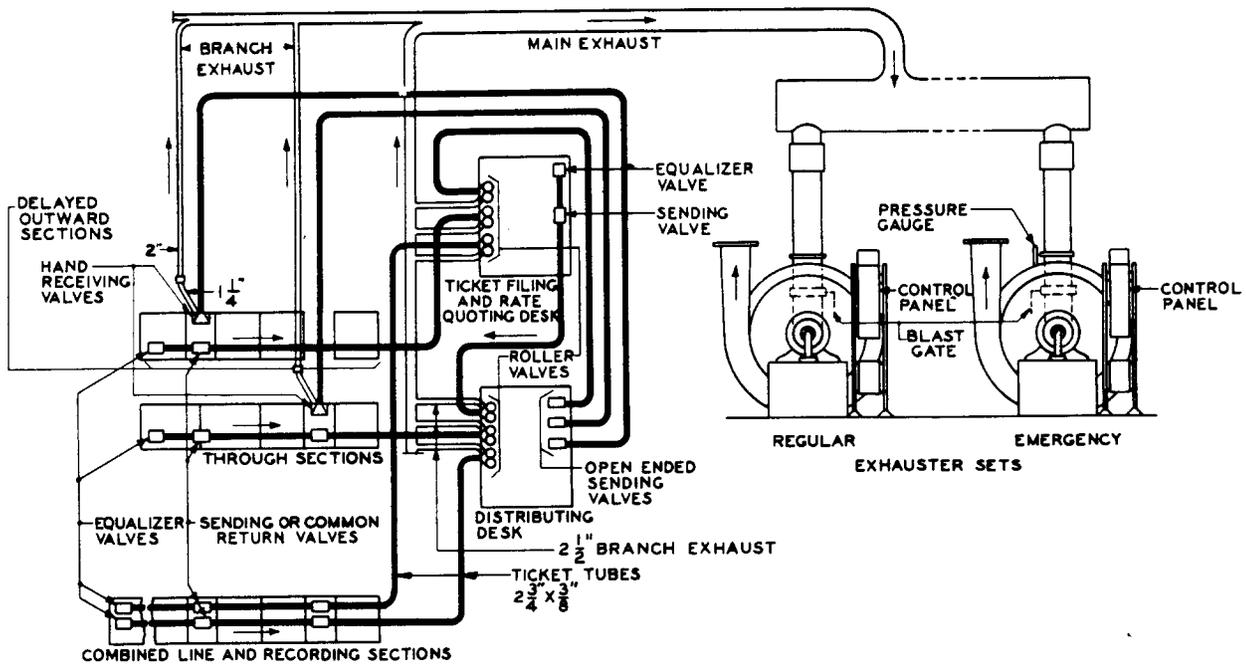


Fig. 1 - Typical Pneumatic Ticket Distributing System

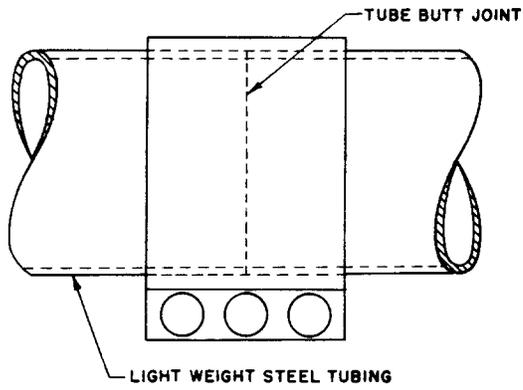


Fig. 2 - Sleeve-type Joint

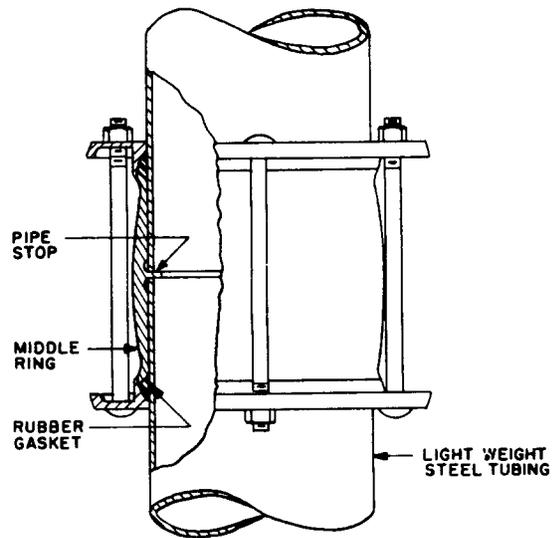


Fig. 3 - Coupling Joint in Vertical Run

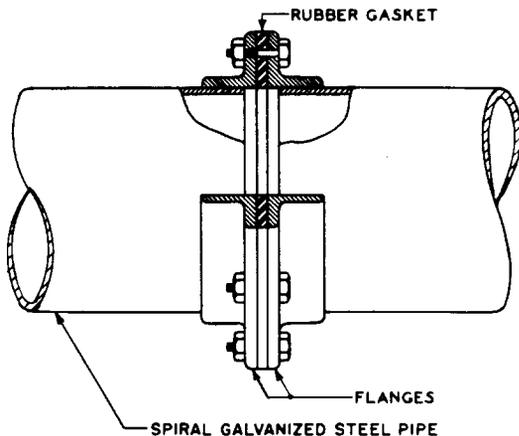


Fig. 4 - Flange-type Joint

pipe shall be used. A flange-type coupling having a rubber gasket shall be used for joints of spiral pipe. This type of joint is shown in Fig. 4.

3.03 The branch exhaust pipes connecting the receiving valves with the main exhaust pipe consist of asbestos-packed flexible steel tubing with associated fittings.

3.04 Lightweight steel tubing shall be shipped to the job in bulk and shall be cut to fit by the installer. The spiral pipe and flexible branch exhaust connections shall be furnished in proper lengths for the particular job. Each length of spiral pipe and each fitting is numbered at each outlet to correspond to a system of numbering shown on the exhaust pipe plan in order that the parts may be correctly assembled. This plan is laid out so that the lap on the inside of the spiral pipe will fall in the direction of the flow of air.

3.05 Job drawings and specifications shall show the details of assembly of the pipe supports and casings.

3.06 When a main exhaust is to be placed outside of the building, it is sometimes advisable to have the work done by a local contractor so that all permits and licenses, which must be observed, are complied with.

#### B. Assembly

3.07 All connections in the exhaust system shall be as air tight as practicable.

3.08 The bolts in the joints as shown in Figs. 2 and 3 for lightweight steel tubing and Fig. 4 for spiral pipe, should be securely tightened and the pressure exerted by the bolts should be evenly distributed to insure proper alignment.

#### C. Finish

3.09 Exposed surfaces of all types of exhaust pipes should be given the KS-8662 gray enamel finish, unless otherwise specified. Exhaust pipe outside of the building should be finished as specified by the telephone company.

#### 4. TICKET TUBES

##### A. Size and Length

4.01 The ticket tubes are rectangular brass tubes having inside dimensions of 2-3/4 by 3/8 inches, the straight lengths varying from 8 feet to 14 feet in length. Two types of straight lengths of tube are furnished, one type is expanded on both ends and the other has only one end expanded. The lengths with both ends expanded may be cut to supply additional shorter lengths with one end expanded. Bends, twists, etc., are furnished expanded on one end for making the joint with the next section of tube.

##### B. Handling

4.02 Ticket tubes should be carefully handled so as to avoid any possibility of bending or making dents. Long lengths of tubes should be carried on edge to reduce the liability of bending and buckling.

4.03 All ticket tubes are furnished with both ends closed with a wooden plug (P-156666 or P-232507) to keep out dust and moisture. These plugs shall not be permanently removed until just before assembling the tube into the tube run. This precaution against the entrance of dust or moisture is highly important and when carefully observed will considerably lessen subsequent cleaning operations.

##### C. Cleaning Before Assembly

4.04 Each section of tube should be cleaned before it is placed in a tube run by drawing through it a piece of clean 6-ounce canvas moistened with KS-19578 L1 trichloroethane followed by drawing dry canvas through the tube. Repeat until the canvas shows no dirt or grease remaining in the tube. Use two more dry swabs to insure that all fumes have also been removed. Make a visual examination of the interior by illuminating the tube from one end and viewing from the other end. On bends and twists make this examination from each end. All dirt must be removed. Tarnish spots caused by age and discolor caused by annealing the end of the tube to expand it, are not considered as dirt.

4.05 After cleaning, particular care shall be taken to prevent the entrance of dust or moisture into the tubes by carefully replacing the wooden plugs in all open ends

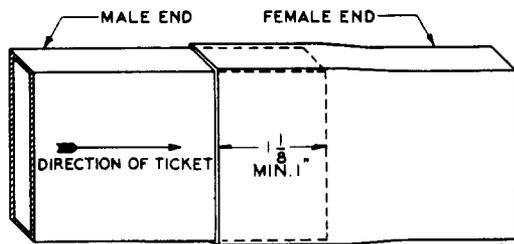


Fig. 5 - Ticket Tube Joint

and by tightly covering the distributing desk inlets with two layers of clean canvas.

#### D. Assembly

4.06 Tubes or tube details which are dented, buckled, or in any way so damaged as to impair their functioning, shall not be used. The ends of tube sections at joints should overlap approximately 1-1/8 inch but not less than 1 inch as shown in Fig. 5.

4.07 The layout of the equipment should be carefully analyzed and a definite plan established for the assembly of the tube sections. The exhaust pipes, both main and branch, normally, should be previously installed to avoid any possible delay in placing the ticket tubes. All tube supports should be in place, all cutting of floors and walls finished, and preparations for mounting the roller valves completed in order that the installation of the ticket tubes will be expedited. These arrangements are important since the longer the ticket tubes stand idle the greater the cleaning and preparation required before final testing due to dust and oxidation.

4.08 Tube supports and casings should be installed as shown on the job drawings. As many additional clamps should be installed between supports as appears necessary to properly secure the tubes. Defer the installation of such casings that will interfere with the placing of the tubes. Casings should be finished in accordance with the telephone company's requirements.

4.09 Joints in ticket tubes shall be made with the male end of the joint pointing in the direction of the travel of the ticket as shown in Fig. 5.

4.10 Joints in ticket tubes shall be made airtight by soldering unless the telephone company specifies the use of Permatex No. 1 cement, manufactured by the Permatex Company, Inc., Sheepshead Bay, N. Y.

- (a) Permatex No. 1 cement shall not be used in vertical runs between floors.
- (b) The joint between the pressure equalizer and ticket tube, and the joint between the pressure equalizer and the screen on the end of the equalizer should not be sealed or soldered.

4.11 Where soldering of joints in ticket tubes is required, a flux such as Allen's soldering stick (RM641552) shall be used. In soldering, particular care should be taken to prevent the solder from flowing into the tubes. An open flame shall not be used for soldering operations on tubes in desks, switchboards, cabinets, and any other locations where cabling and wiring might be subject to injury from the flame or there is any possibility of a fire hazard. In such cases electric heating units shall be used and adequate protection from the heat should be provided.

Caution: When soldering or unsoldering joints located within or just adjacent to cable holes or slots, it is advisable to remove any of the canvas bags containing mineral wool which come in contact with the pneumatic tubes within the hole or slot. This will prevent charring of the canvas by heat transmitted along the brass tubing.

#### E. Finish

4.12 All ticket tubes except the portion of common return tubes in keyshelves and casings under keyshelves should be given the KS-8662 gray enamel finish unless otherwise specified. The vacuum shall not be on the system when the finish is being applied to the ticket tubes. No finish should be applied to the rubber part of the removable edge sections.

#### F. Cleaning After Assembly

4.13 After the work of installing is complete, the tubes should be thoroughly cleaned by pulling swabs of clean 6-ounce canvas moistened with KS-19578 L1 trichloroethane through them to remove foreign matter such as dust and particles of solder. A tube will be considered clean when a 9-by-24-inch piece of canvas which has been moistened with three fluid ounces of KS-19578 L1 trichloroethane shows no traces of dirt or grease after passage through the tube. The canvas should be folded to 2-1/2 by 24 inches, looped in the middle, and pulled through the tube at a speed of not more than 2 feet per second.

#### 5. BLOCKADE ALARM EQUIPMENT

5.01 A blockade alarm operates when a ticket tube with which it is

associated becomes blocked and the tickets placed in the sending valves are not delivered to the receiving valves.

5.02 The operation of the alarm is caused by the blockade unbalancing the pressures normally set up in the two compartments of a pneumatic relay called a 50A Detector. When the pressures are unbalanced, an arm, which is normally centered between two contacts representing the two compartments of the detector, closes to one of these contacts. This establishes a relay and signal circuit to indicate the tube in which the blockade has occurred.

#### A. Blockade Detector - 50A Type

5.03 Both compartments of the pneumatic detector should be connected at points on the ticket tubes which are equidistant from the roller receiving valve and which are 4 to 8 feet from the valve.

5.04 Where the two tubes associated with a blockade detector terminate in the same roller valve and are of unequal length, the bottom compartment of the detector should be connected to the shorter tube.

#### B. Copper Tubing

5.05 The 3/16-inch copper tubes connecting the pneumatic detector to the ticket tubes should have no kinks or indentations and should be secured firmly to the framework of the various tube enclosure sections and roller valve casings so that no stress is placed on the mechanical connections to the relays or the ticket tubes.

#### C. Finish

5.06 The blockade detector should be retouched where necessary with the KS-8662 gray enamel finish. Exposed copper tubing should be given the KS-8662 gray enamel finish,

### 6. VALVES

#### A. Types

6.01 There are three general types of valves used in the pneumatic ticket distributing system:

- (a) Sending valves
- (b) Receiving valves
- (c) Pressure equalizing valves

6.02 Sending valves (27A) are used on the common return tubes at switchboard and certain desk positions. From 1 to 18 sending valves may be used on a single tube.

6.03 Receiving valves are of two general types:

(a) Hand-operated, which as the name implies, are operated manually to remove the tickets. They are placed at switchboard positions where tickets are delivered occasionally. These are coded 25A when arranged to mount at the top of the jack space and 26A when mounted at the piling rail.

(b) Roller valves (28A) are used at desks for continuous delivery of tickets. These valves are motor driven and deliver the tickets by means of rollers, into a ticket stacker as soon as they enter the valve. As many as four common return tubes may be terminated in one roller valve.

6.04 Pressure equalizing valves (29A) are mounted on the end of each common return tube to keep the air pressure equalized as the sending valves are opened and closed.

#### B. Adjustment

6.05 Cutoff valves, which are a part of the hand- and roller-type receiving valves should be adjusted to give the proper vacuum for the receiving valve when measured at the connection provided for the purpose. The approximate vacuum required is equal to the length of the tube in feet times 0.01 inch of mercury. For roller valves terminating two or more tubes of unequal length, the main cutoff valve should be adjusted to the vacuum required for the average length of tube. No allowance is necessary for the drop in pressure in the valves in computing the vacuum for the ticket tubes.

6.06 The 29A pressure equalizers should be adjusted so that the gate in the equalizer closes when the nearest sending valve is opened and opens when all sending valves are closed.

6.07 Motor-driven receiving valves require lubrication in accordance with the supplementary information and should not be operated, after installation, until properly lubricated.

#### C. Refinishing

6.08 Sending and hand receiving valves marred in installing should be retouched as necessary with one of the following finishes:

Pittsburgh Plate Glass Company's Focal Black Enamel No. 23-84

Pratt & Lambert's No. 61 Quick Drying Black Enamel

Dupont's "Dulux" Black Enamel No. 83.005

6.09 Roller valves should be retouched as necessary with KS-8662 gray enamel finish.