

**PIPE SYSTEMS
INSTALLATION
CABLE PRESSURE SYSTEMS**

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3. MANIFOLD INSTALLATION	2	1.01 This section describes the recommended methods and procedures for installing the outside plant portion of pipe systems for cable pressure systems. The outside plant portion of the system extends from the CA-3131 air feeder pipe connection at the meter-panel in the central office (CO) to the end of the pipe route.	
A. Special Banding of Lead Sleeves	4	1.02 This section is reissued to:	
B. Bonding Pipe to Cables	4	• Include CA-7011 air feeder pipe for use at underground locations where steam is a problem	
4. F TRANSDUCER OR HIGH-VALVE INSTALLATION	4	• Indicate that the C, E, F, and G plastic pipe fittings are no longer standard items but may be purchased as commercial items.	
A. F Transducer Installation	4	Revision arrows are used to emphasize the more significant changes.	
B. High-Valve Installation	4	1.03 Refer to Section 637-050-100 for a general description of the pipe system and its various related materials and equipment.	
C. Bonding Pipe to Cables	6	1.04 Details covering the C and D meter-panels and CO piping arrangements are outlined in Section 637-225-201.	
5. PIPE CONNECTIONS	6	1.05 The detailed engineering plans will indicate the designated pipe routes, manholes on each route, wall-to-wall measurements, duct assignment where practical, manholes where manifolds and high valves are to be located, and the cables to be connected to each manifold.	
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NOTICE

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2. ADVANCE PREPARATION

2.01 Good job planning is a necessity for obtaining the most efficient and economical installation. The general basic preparations are as follows:

- (a) Determine the placing method to be used (hand coil or cable reel method—see Part 6).
- (b) Be certain to have sufficient B pipe seals to permit, where practical, placing all pipes (for the various routes) with one pull into a single duct from the cable vault to the first manhole beyond the vault.
- (c) Plan the work so manhole openings will be kept to a minimum.
- (d) Generally, because of the appreciably longer time required to complete the work at monitoring and manifold manholes, install the F transducer or high-valve blocks, manifold assemblies, and plastic tubing connections to the assigned cables in advance of pipe placing. It also will be helpful if, at this time, proper cable identification is provided at the blocks and assemblies.

Note: See paragraph 3.10 for the banding of lead sleeves which is required at manifold locations. This work should be done at the time of manifold installation.

- (e) Give consideration to any extensive reinforcement of wrapped joints that may be anticipated. It may be desirable to combine such reinforcement (Section 633-300-204) with the pipe connection operations.
- (f) Where practical, plan at the time of making the permanent pipe connections in the manhole to make a rapid leak survey of cables in the manhole, using ultrasonic leak-locating equipment.

3. MANIFOLD INSTALLATION

3.01 At each manifold manhole, attach the C manifold assembly on the vertical surface of the manhole collar (Fig. 1). Locate the assembly so it will be off the line of pull for subsequent cable placing or removing operations. Where a second manifold assembly is required, remove the fitting and pressure testing valve from the right end of the first assembly

and connect the two assemblies with a short length of 3/8-inch plastic tubing and 3/8-inch B plastic tubing fittings.

Note: It is necessary to loosen the first manifold from the manhole collar in order to remove the fitting and valve from the right end of the manifold assembly.

3.02 Apply TEFLON* pipe sealing tape to all male threads before making the following connections:

- (1) Thread one end of the hex nipple (furnished with shutoff valve) into the shutoff valve and the other end into the elbow fitting on the manifold assembly.
- (2) Thread the tee fitting (furnished with shutoff valve) into the input port of the shutoff valve.
- (3) Install an F pressure testing valve in one flange of the tee fitting, and temporarily install a C pressure plug in the other flange. (This plug will be replaced later with a 3/8-inch B or C plastic tubing fitting for terminating the 3/8-inch plastic tubing connection for the CA-3131 air feeder pipe.)

3.03 Cut 3/8-inch plastic tubing into lengths sufficient to connect between the manifold assembly and the individual cables. Terminate one end of each tube in one of the plastic tubing fittings at the bottom of the manifold. Identify the other end of each tube with the proper cable designation.

3.04 Bundle and wrap the plastic tubes from each manifold with two layers of vinyl tape to protect them around the bend of the manhole roof (Fig. 1). Form the tubing bundle along the manhole roof and down the wall adjacent to the cable rack supports. Secure the tubing bundle to one of the rack supports with a lashed cable support. Wrap the bundle with two layers of vinyl tape under the lashed cable support.

3.05 Install a 3/8-inch plastic tubing elbow fitting in a pressure flange on the sleeve or splice case of each cable to be pressurized. Make certain to coat the threads of the fitting with TEFLON pipe sealing tape prior to installation.

3.06 Bring out each tube to its associated cable, and secure it to the cable a few inches from the

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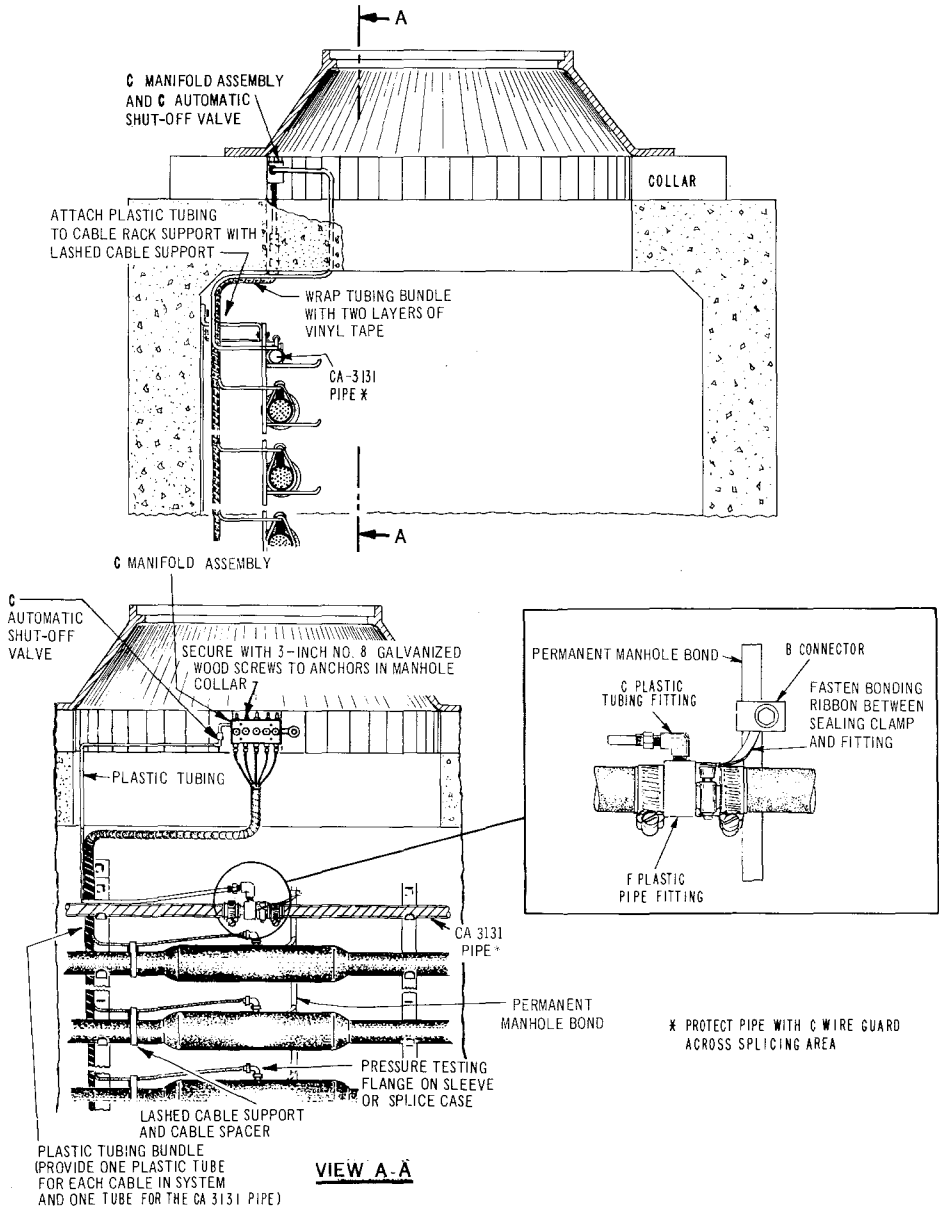


Fig. 1—Arrangement in Manhole Having Manifold Assembly and Automatic Shutoff Valve

sleeve or splice case with a lashed cable support and cable spacer. Protect the tubing under the support with a vinyl tape wrapping.

3.07 Close each of the five shutoff valves on the manifold assembly. This is necessary at this time to prevent any interflow between cables when the plastic tubing connection is made to each cable. Later, when the CA-3131 air feeder pipe has been extended to this manhole, it will be connected with 3/8-inch plastic tubing to the tee on the C automatic shutoff valve. **At that time, each shutoff valve (see Note) on the manifold assembly will be reopened** to permit dry air to be fed from the pipe to the individual cables.

Note: Where less than five cables are to be connected to the manifold, any nonworking shutoff valve shall be kept closed (turned clockwise to extreme position).

3.08 Connect each plastic tube to the plastic tubing fitting on the associated sleeve or splice case.

3.09 Make certain that each valve position on the manifold assembly is suitably tagged or marked with its identifying cable number, similar to the method described in Section 632-020-101.

A. Special Banding of Lead Sleeves

3.10 Reinforce the lead sleeve as follows:

(a) Each thin-walled lead (no ridge) or lead-antimony (three ridges), 4-1/2 inches and larger in diameter, and sleeves which show evidence of swelling under continuous pressure should be reinforced with lashed cable supports (Section 637-020-200).

(b) Where sleeve swelling is observed, the sleeve shall be immediately reinforced in the standard manner. The case should be referred to the supervisor so arrangements can be made to inspect sleeves in adjacent manholes.

B. Bonding Pipe to Cables

3.11 At each manifold location, it will be necessary to bond the CA-3131 or CA-3131 UM air feeder pipe to the permanent manhole bond with bonding ribbon (Fig. 1).

4. F TRANSDUCER OR HIGH-VALVE INSTALLATION

A. F Transducer Installation

4.01 If the F transducer is selected for use in a monitoring manhole, refer to the detailed installation instruction outlined in Section 637-222-101.

B. High-Valve Installation

4.02 If a B high-valve block is selected in lieu of or in addition to the F transducer, attach the high-valve block on the vertical surface of the manhole collar as shown in Fig. 2. Locate the block so that it will be off the line of pull for subsequent cable placing or removing operation. Where additional blocks are required, they should be installed adjacent to and at the same level as the first block.

4.03 Assign an F pressure testing valve and a 3/8-inch B plastic tubing fitting to those cables identified on the work print as being pressurized in the pipe route. Also assign a valve and fitting for connection to the CA-3131 air feeder pipe when placed. Make certain to coat the threads of the valves and fittings with TEFLON pipe sealing tape prior to installation.

4.04 Cut 3/8-inch plastic tubing into lengths sufficient to connect between the block and the individual cables and pipe. Connect one end of each tubing to a plastic tubing fitting in the block. Mark the other end of each tube to identify it for connection to the proper cable.

4.05 Bundle and wrap the plastic tubings from each block with two layers of vinyl tape, starting about 1 inch above the tubing clip and extending so as to protect the tubing around the bend of the manhole roof (Fig. 2). Bend the tubing clip around the taped bundle of tubing. Form the tubing bundle along the manhole roof and down the wall adjacent to the cable rack supports. Secure the tubing bundle to one of the rack supports with a lashed cable support. Wrap the bundle with two layers of vinyl tape under the lashed cable support.

4.06 Install a 3/8-inch plastic tubing elbow fitting in a pressure flange on the sleeve or splice case of each cable assigned to the pipe route. Make certain to coat the threads of the fittings with TEFLON pipe sealing tape prior to installation.

4.07 Bring out each tubing to its associated cable, and secure it to the cable a few inches from the

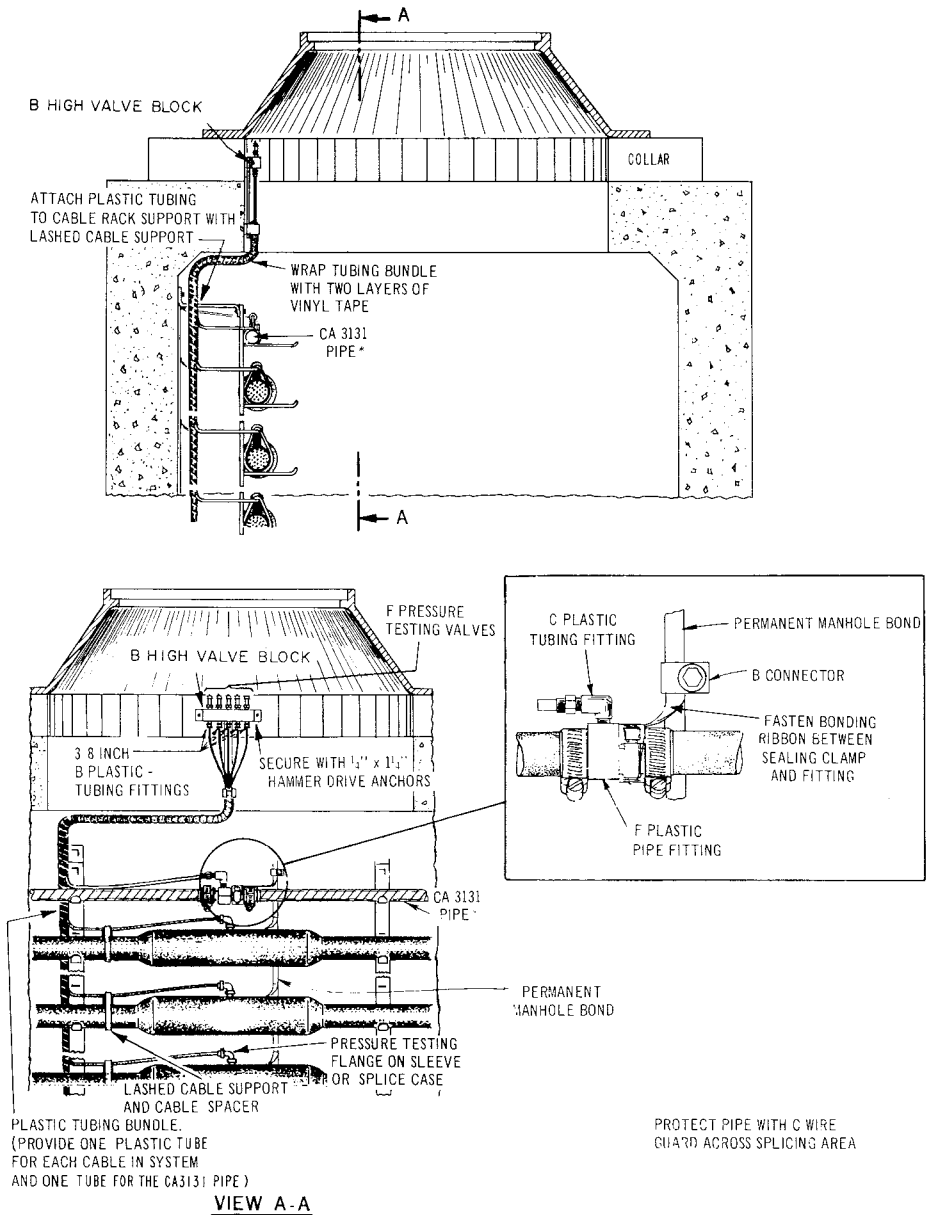


Fig. 2—Arrangement in Manhole Having High-Valve Block

sleeve or splice case with a lashed cable support and cable spacer. Protect the tubing under the support with a vinyl tape wrapping.

4.08 Connect each plastic tubing to the plastic tubing fitting on the associated sleeve or splice case.

4.09 Make certain that each valve on the high-valve block is suitably tagged or marked with its identifying cable number.

C. Bonding Pipe to Cables

4.10 At each monitoring manhole and all pipe splices, it will be necessary to bond the pipe to the permanent manhole bond with bonding ribbon, as illustrated in Fig. 2.

5. PIPE CONNECTIONS

5.01 ♦ *Typical examples of permanent connections made to CA-3131 and CA-3131 UM air feeder pipe using the C, E, F, or G plastic pipe fittings manufactured by Stryker Machine Products Company are illustrated in this section. Other manufacturers from which equivalent fitting may be obtained are listed in Table A. Installation instructions are furnished by the supplier.*♦

5.02 Temporary connections associated with pipe placing operations are made with the B pipe seal.

A. Permanent Connections

5.03 Referring to Fig. 3, permanent connections are made to the CA-3131 air feeder pipe as follows:

TABLE A

SUPPLIERS AND PART NUMBERS FOR PLASTIC TUBING FITTINGS (NOTE)

STRYKER	AMP	CHATLOS	LOURDES	MALOR	SEABEK
C	332824	N1200- 12×1/4	LC81586 LC81586-B*	—	PCT
E	332841	N1100 12-4×1/8	LC81712	—	PCE
F	332823	N1200 12×1/8	LC81753 LC81753-B*	622-7C	PCL
G	332842	N1000	—	—	—

Note: Addresses of the suppliers listed in table are as follows:

Stryker Machine Products Company
Box 1098
Trenton, New Jersey 08619
Tel. (609) 586-2500

AMP Inc.
3800 Reidsville Road
Box 55
Winston-Salem, North Carolina 27102
Tel. (919) 725-9222

Malor Manufacturing, Inc.
3245 St. Louis Avenue
Fort Worth, Texas 76110
Tel. (817) 926-0278

*The "B" indicates brass

Chatlos System Inc.
40 Leslie Court
Whippany, New Jersey 07981
Tel. (201) 887-1456

Lourdes Industries Inc.
65 Hoffman Avenue
Hauppauge, New York 11787
Tel. (516) 234-6600

Seabek Products, Inc.
Box 6727
Houston, Texas 77005
Tel. (713) 665-6484

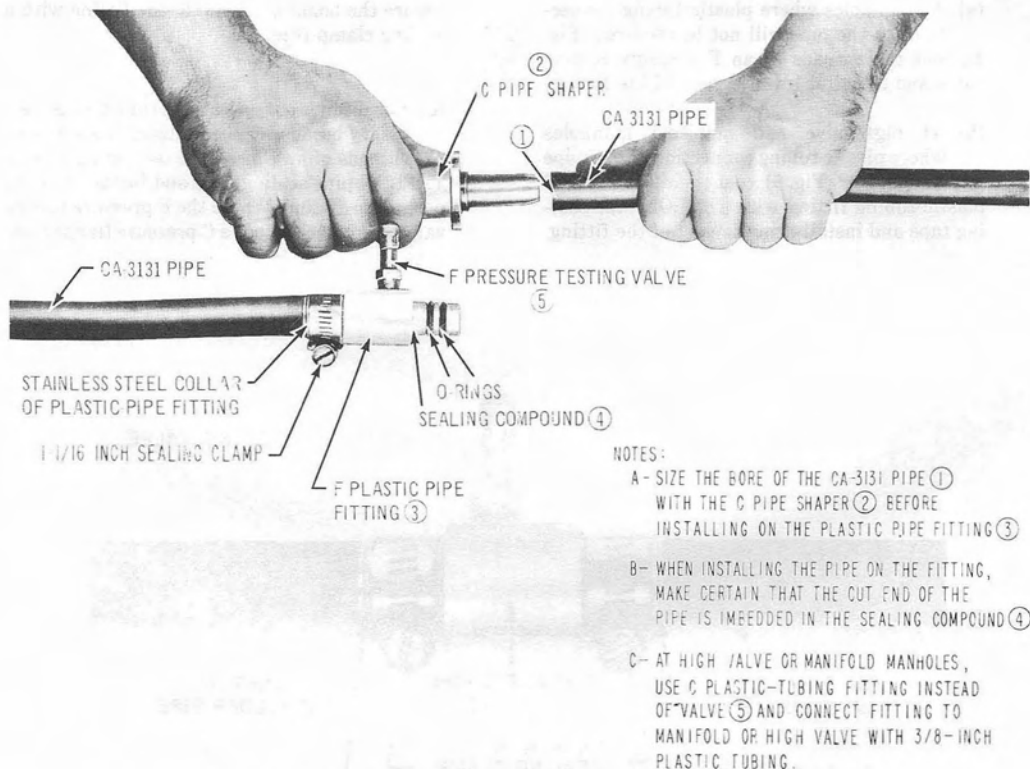


Fig. 3—Connecting Two Sections of CA-3131 Air Feeder Pipe

- (1) Rough cut the CA-3131 pipe with an R2761 skinning knife, leaving the pipe about 1/2 inch longer than required.
- (2) Insert the C pipe shaper, pushing it fully into the pipe. Now, with the aid of the shaper, finish cut the pipe, using a commercial tubing cutter.
- (3) Remove the C pipe shaper from the pipe, and slip the stainless steel collar and a 1-1/16 inch sealing clamp onto the pipe.
- (4) Insert the O-ring equipped end of the fitting fully into the pipe so that the end of the pipe is imbedded in the sealing compound of the fitting.
- (5) Slip the stainless steel collar of the fitting against the body of the fitting. Complete the connection by placing the 1-1/16 inch sealing clamp on the collar between the two ridges and tightening the clamp securely; the screw of the sealing clamp should be **away** from the collar opening.
- (6) The *F plastic pipe fitting* is used for making straight-through pipe connections as follows:

- (a) At manholes where plastic tubing connections to the pipe will not be required (Fig. 4), coat the threads of an F pressure testing valve and install it into the port of the fitting.
- (b) At high-valve and manifold manholes where plastic tubing connections to the pipe will be required (Fig. 5), coat the threads of a C plastic tubing fitting with TEFLON pipe sealing tape and install it in the port of the fitting.

Secure the bonding ribbon to the fitting with a sealing clamp (Fig. 5).

- (c) For piecing-out operations that may be necessary because of rearrangements, etc, coat the threads of an F pressure testing valve with TEFLON pipe sealing tape and install it in the port of the fitting. Where the F pressure testing valve is not needed, use a C pressure flange plug.

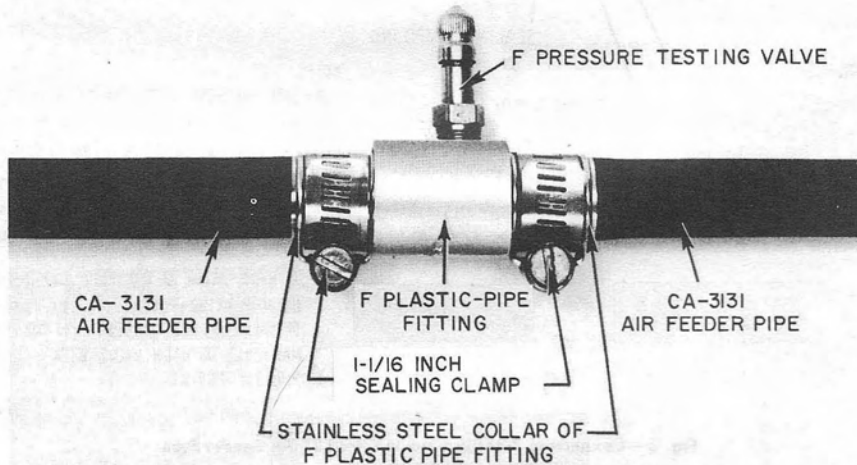


Fig. 4—Typical Arrangement for Pipe Connection Where Tubing Connection Is Not Required

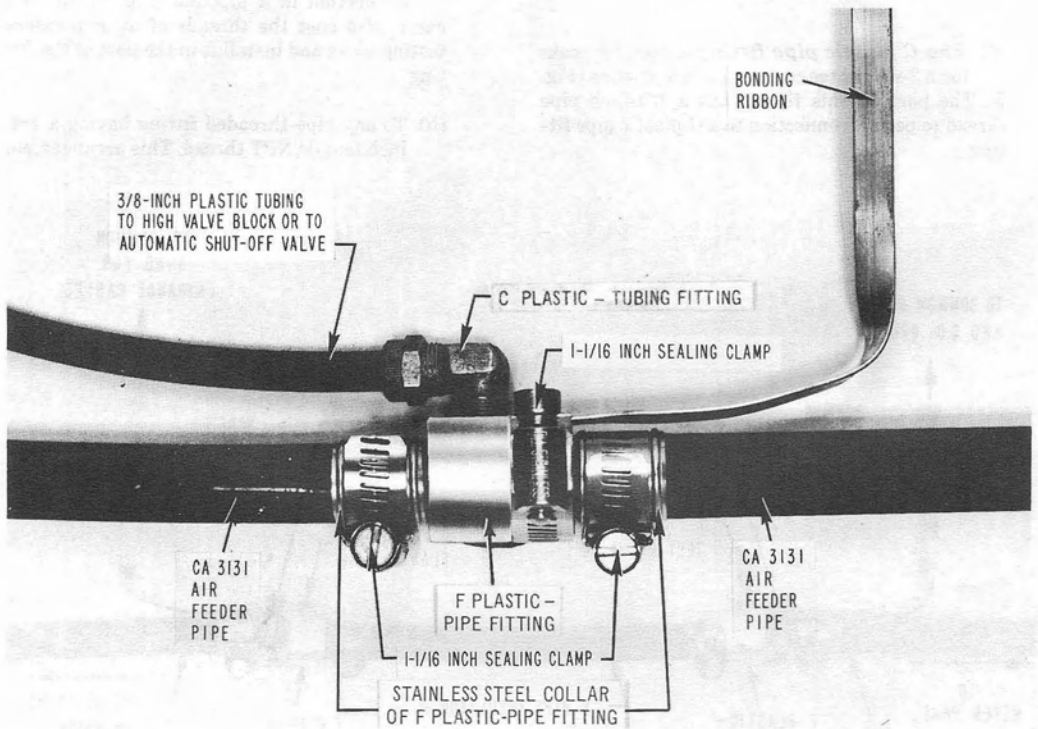


Fig. 5—Typical Arrangement for Pipe and Tubing Connections at Monitoring or Manifold Manholes

(d) With the B pipe insulator for making an insulated joint in CA-3131 air feeder pipe at CO vaults where insulating joints are required in the entering cables (Fig. 6).

(7) **The C plastic pipe fitting** is used for making a 3-way or tee connection in a pipeline (Fig. 7). The port on this fitting has a 1/4-inch pipe thread to permit connection to a G plastic pipe fitting.

(8) **The G plastic pipe fitting** is used for making connections as follows:

(a) To a C plastic pipe fitting for a 3-way or tee connection in a pipeline (Fig. 7). In such cases, also coat the threads of an F pressure testing valve and install it in the port of the fitting.

(b) To any pipe-threaded fitting having a 1/4-inch female NPT thread. This arrangement

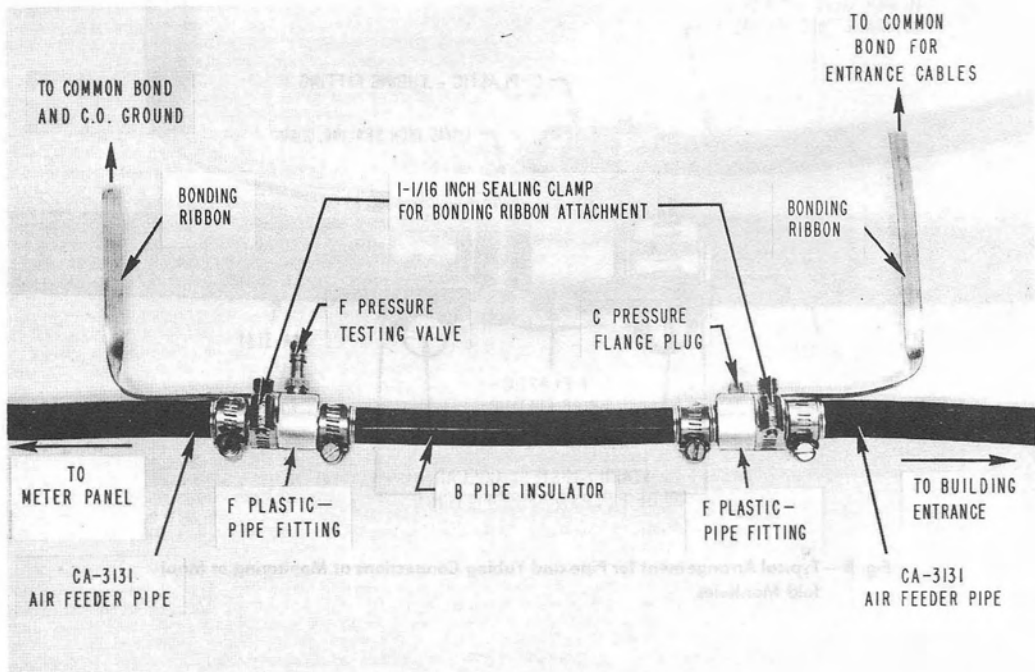


Fig. 6—Pipe Arrangement Where Insulating Joint Is Required

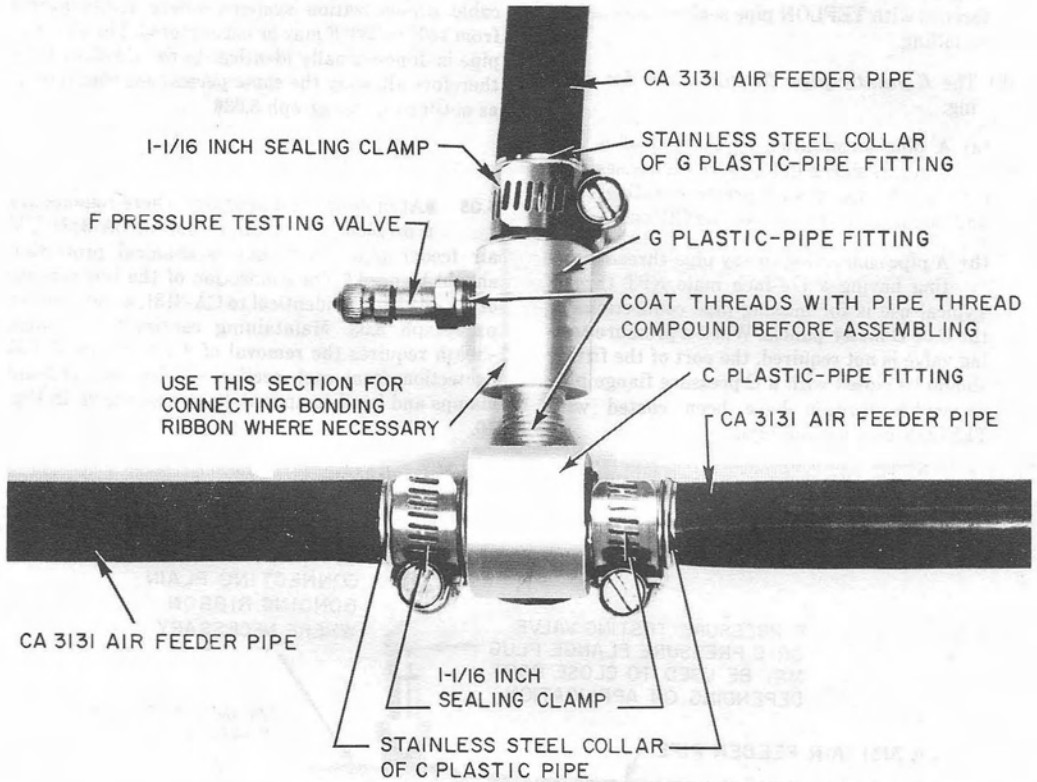


Fig. 7—Typical Arrangement for Pipe and Pressure Testing Valve Connections at Pipe Junction Manhole

is shown in Fig. 8. The port of the G plastic pipe fitting should be closed with a C pressure flange plug or an F pressure testing valve. Coat the threads with TEFLON pipe sealing tape before installing.

- (9) The **E plastic pipe fitting** is used for making:
- A pipe termination at the end of a pipe route, as shown in Fig. 9. In such cases, also coat the threads of an F pressure testing valve and install it in the port of the fitting.
 - A pipe connection to any pipe-threaded fitting having a 1/4-inch male NPT thread. Typical use is for making pipe connections at the C or D meter-panels. When a pressure testing valve is not required, the port of the fitting should be closed with a C pressure flange plug on which threads have been coated with TEFLON pipe sealing tape.

5.04 ♦ At underground locations where steam is a problem, CA-7011 air feeder pipe should be used. The CA-7011 pipe is recommended for use in cable pressurization systems where temperatures from 140° to 230°F may be encountered. The CA-7011 pipe is dimensionally identical to the CA-3131 pipe, therefore allowing the same permanent connections as outlined in paragraph 5.03♦

5.05 ♦ At underground locations where rodents are a problem, or for direct burial, CA-3131 UM air feeder pipe which has mechanical protection should be used.♦ The connection of the innersheath of CA-3131 UM is identical to CA-3131, as outlined in paragraph 5.03. Maintaining continuity of outer sheath requires the removal of 2-1/2 inches of UM protection from each section of pipe and D bond clamps and bond strap installation as shown in Fig. 10.

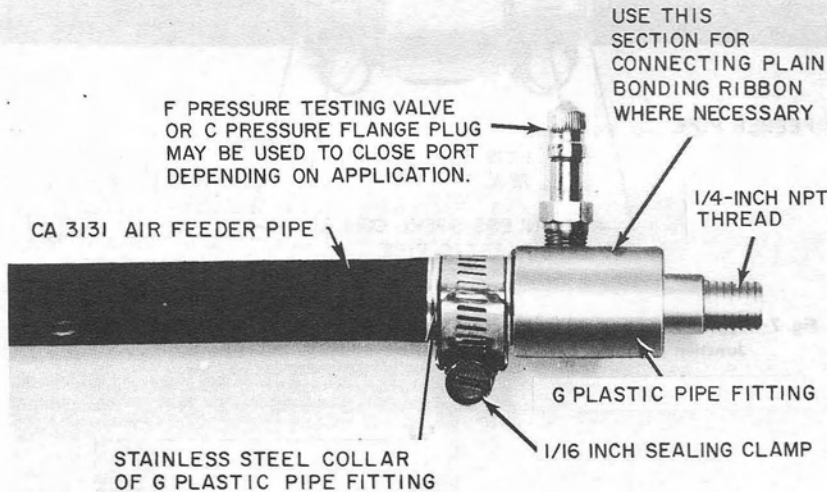


Fig. 8—Typical Arrangement for Pipe Connection to Any 1/4-Inch Female NPT Fitting

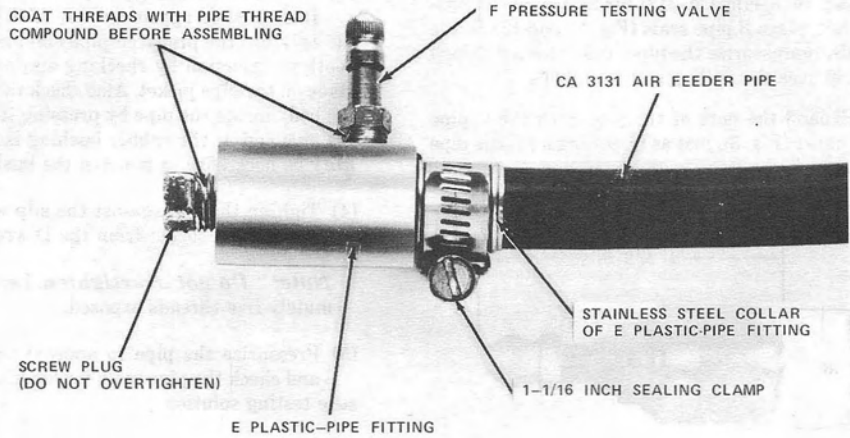


Fig. 9—Typical Arrangement for Pipe Connection at End Manhole

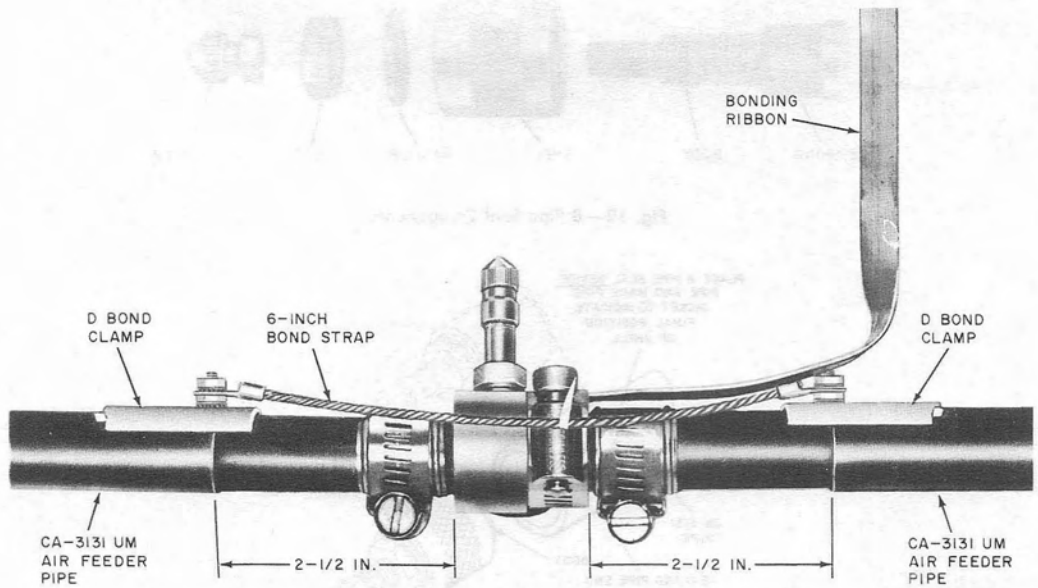


Fig. 10—Maintaining Continuity When Connecting Two Sections of CA-3131 UM Air Feeder Pipe

5.06 The installation of the D bond clamp is covered in detail in Section 081-852-118.

B. Temporary Connections

5.07 Before placing CA-3131 air feeder pipe in conduit, place B pipe seals (Fig. 11 and 12) on the pipe ends, repressurize the pipe, and place a 3/4-inch cable grip over the pulling end as follows:

(1) Expand the bore of the pipe with the C pipe shaper (Fig. 3), just as installing a plastic pipe fitting.

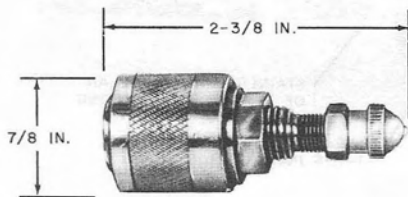


Fig. 11—B Pipe Seal

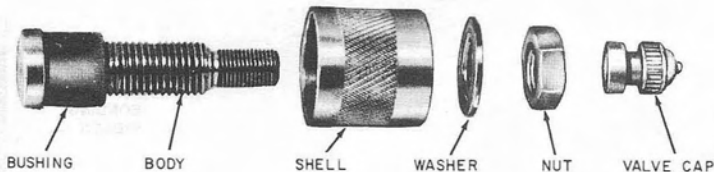


Fig. 12—B Pipe Seal Components

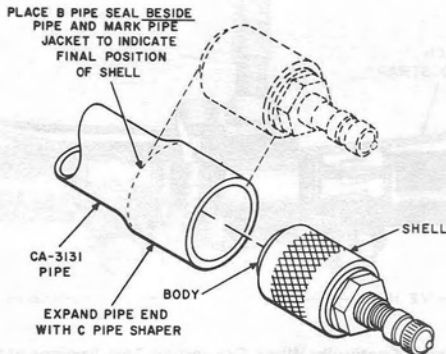


Fig. 13—Placing B Pipe Seal

(2) Using the B pipe seal as a gauge (Fig. 13), mark the feeder pipe jacket for depth of insertion.

(3) Loosen the nut of the B pipe seal to allow the shell to slide approximately 1/16 inch. Insert the seal into the prepared pipe end and verify the depth of insertion by checking against the mark made on the pipe jacket. Also check the position of the body inside the pipe by pressing it firmly into the pipe end. If the rubber bushing is too tight, it **may** be necessary to moisten the bushing.

(4) Tighten the nut against the slip washer with a 9/16-inch socket from the D wrench kit.

Note: Do not overtighten. Leave approximately five threads exposed.

(5) Pressurize the pipe to approximately 15 psi, and check the pipe seals for leaks with E pressure testing solution.

(6) Wrap the valve and threads of the seal with a few turns of friction tape.

- (7) Place a 3/4-inch cable grip over the pulling end of the pipe (Fig. 14).

Note: When joining pipe sections after placing, cut 2 feet from the pulling ends and salvage the B pipe seals for reuse.

6. PLACING PIPE IN UNDERGROUND CONDUIT

6.01 The CA-3131 air feeder pipe is furnished in either **hand coils** for use in specific manhole sections or on cable reels, depending on local arrangements. The method of pipe placing normally will be determined by the way the pipe is supplied. However, the general procedure is much the same as for placing a pulling-in line in a duct. With either method of placing, it is important to avoid overstressing, which would result in opening the bond between the aluminum and the polyethylene. **The maximum recommended pulling stress for the pipe is 150 pounds.**

6.02 Where possible, the pipe should be placed in a vacant duct. If it becomes necessary later to place cable in a duct occupied by pipe, the pipe can be disconnected temporarily and used as a pulling-in line for the placing of cable and new pipe in the same duct.

6.03 Where there is no vacant duct, the pipe can be placed in an occupied duct, preferably one occupied by small cable. It generally will not be practical to pull pipe into a duct occupied by a cable having a diameter of 2 inches or larger.

6.04 Unless a pulling-in wire is already in place, the duct should be rodded in the standard manner (Section 649-321-100). Where possible, the duct rodding and pipe placing operations should be coordinated to minimize the need for manhole re-opening.

6.05 *The CA-3131 air feeder pipe shall always be pulled in at a pressure of approximately 15 psi and shall be kept at that pressure until permanently connected to the dry air source at the CO. Every effort should be made to guard against the entrance of water into the ends of the pipe when making pipe connections and disconnections during the placing operations.*

A. Central Office End of Pipe Route

6.06 Several pipes may be placed in one duct between the cable vault and the first manhole or beyond, as necessary for the pipes to enter separate routes. The initial pull, however, should be between the vault and the first manhole. Where more than one pipe is being placed in a duct, it is recommended that each end of the pipe be marked for identification and placed as follows:

- Cut the pipes to the specific manhole section length and maintain at a pressure of 15 psi.
- When the first section of piping has been installed, the CO ends of the pipes should be connected to the air source through the meter-panels, as described in Section 637-225-201.

6.07 When the pipe routes separate so that only one pipe is to be placed in the duct, either of the following two placing methods can be used, depending on whether the pipe has been supplied in hand coils or reels.

B. Hand Coil Method

6.08 With this method, the pipe is cut to the section lengths in advance, the ends sealed, and the pipe pressurized and tagged for identification. After



Fig. 14 — Cable Grip and Winch Line Attached

the coil has been pulled in, it can be connected immediately to the pipe already placed and under pressure from the CO or left pressurized and connected at a later time. The 38Y3994A multicoil reel can be used for supporting several section lengths in the pipe placing operations.

C. Cable Reel Method

6.09 With this method, a cable reel setup is required at the manhole. After each section is pulled, the pipe is cut to length at the reel end and connected immediately to the pipe already placed and under pressure from the CO or the cut end is sealed temporarily with a pipe pressure seal and identified and the section repressurized with dry air. The cut end of pipe remaining on the reel must be capped with a pipe pressure seal and the pipe repressurized.

D. Arrangement in Manholes

6.10 Arrange and protect the pipe in manholes as follows:

- (1) Protect the pipe with a C wire guard where it comes out of the duct.
- (2) Place the pipe in the top position of the manhole rack and secure it to the rack with a B cable tie.
- (3) After making the required pipe connection or termination, place C wire guards on the pipe to protect it across the splicing area.
- (4) A typical arrangement at other than manifold or monitoring manholes is shown in Fig. 15. See Fig. 2 for details at a monitoring manhole.
- (5) When the pipe connections have been completed in a manifold manhole (Fig. 1), install 3/8-inch plastic tubing from the plastic pipe fitting to the tee on the automatic shutoff valve (paragraph 3.02). Open each of the individual shutoff valves on the manifold assembly where a plastic tube connection had been made to a cable (paragraph 3.07). Completing the manifold connections as soon as the pressurized pipe has been extended to the manifold manhole will provide immediate pressure protection to cable in the vicinity. In addition, it will provide higher pressure in the underground cables, thus facilitating any general leak surveying that may be done with ul-

trasonic leak locating equipment coincident with pipe placing operations.

7. PLACING PIPE ON POLE LINES

7.01 When a conduit section is blocked or it is desired to feed from a pole-mounted air dryer to a manifold in a manhole, it may be necessary to place CA-3131 or CA-3131 UM air feeder pipe along the pole line. In such cases, the pipe can be placed in one continuous length and lashed to an existing strand and cable. The pipe shall be bonded to existing cable at the first, last, and every fifth section as is required for polyethylene sheath cables. The bonding arrangement on the pipe is as shown in Fig. 5. Where an insulating joint is required, it also shall be placed in the pipe, as shown in Fig. 6. Where CA-3131 UM is used, continuity should be maintained as shown in Fig. 10 and bonded to existing cable at the same locations specified for CA-3131.

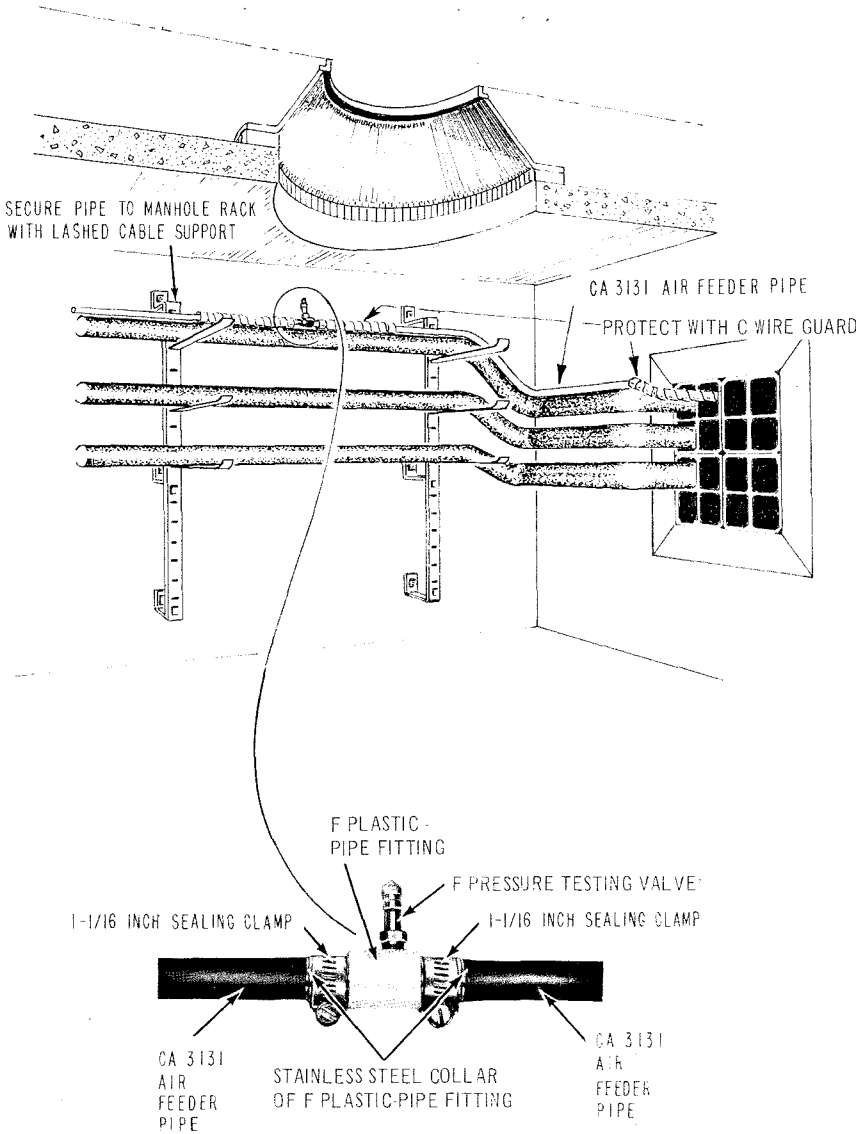
8. PRELIMINARY CHECK ON OBJECTIVE PRESSURES

8.01 It is presumed that the objective pressures have been established in advance for the pipe system being placed (Section 930-210-020). For example, a minimum of 5 psi is recommended for underground cables, and 2 psi for aerial cables. The selection of cables for pressurization is determined by Section 930-200-010.

8.02 As each pipe route is completed, it may take from several days to two weeks for flow to stabilize to any degree in the pipeline. Pressure in the cable system will build up gradually, first in the underground cables, then in the aerial feeders, and ultimately out to the smaller aerial cables.

8.03 Prior to making any specific pressure measurements or overall analysis, check to determine that the flow in the pipe has stabilized (airflow in two successive 24-hour periods does not vary by more than 50 cubic feet) as read manually (C meter-panel) or automatically by cable pressure monitoring system (CPMS) (D meter-panel).

8.04 When stabilized, the normal flow rate and the alarm flow rate (1200 scfd) should be posted on Form E-5403 (Section 637-050-300) for installations using the C meter-panel. When the D meter-panel is employed (with CPMS), the CPMS computer automatically computes the airflow rate and total air usage and issues an alarm bulletin when the airflow rate exceeds a predetermined value.



* SEE FIG. 1 AND 2 FOR ARRANGEMENT AT MONITORING AND MANIFOLD MANHOLES

SEE FIG 7 FOR ARRANGEMENT AT PIPE JUNCTION MANHOLES

Fig. 15—Typical Arrangements of CA-3131 Air Feeder Pipe (Other Than at Monitoring, Manifold, and Pipe Junction Manholes)

8.05 Check to determine cable pressure at each C or F pressure transducer associated with the pipe installation.

8.06 Proceeding outward from the CO, take and record cable and pipe flow and pressure readings at each manifold and monitoring manhole. Readings should be posted on Form E-5406, **Pressure Readings—Manifold and Monitoring Manholes**.

8.07 The data described in paragraphs 8.04, 8.05, and 8.06 provides a good overall picture of the pressure level in the pipe route and the associated underground cables. Analysis of the data will indicate areas that need immediate attention (Part 9).

8.08 A description of the various E forms recommended in connection with pipeline maintenance is included in Section 637-050-300.

8.09 A most important point to be kept in mind in connection with pipe systems is as follows:

As long as objective pressures are obtained in the underground cables, the amount of air loss or air usage is no cause for concern. There should be no attempt to strive for a straight-line pipe gradient. Each manifold probably will have a separate and distinct flow rate that is of interest only when leak locating becomes necessary to obtain objective pressure.

9. ATTAINMENT OF OBJECTIVE PRESSURES

9.01 Where objective pressures have not been obtained, analyze the basic data (Part 8) in order to determine the best course of action for improving the pressures.

9.02 The manifold assembly will not feed dry air to the cables unless the pipe pressure at the manifold manhole has reached at least 6.3 psi. However, the pneumatic resistance of CA-3131 air feeder pipe is small; and with an airflow of about 1000 standard cubic feet per day feeding a manifold 3 miles from

the pressure source at the CO, the pressure drop would be only about 3 psi. Therefore, it can be expected that the manifolds will open and feed the cables unless some significant pipe leakage existed. Accordingly, preparation of an overall analysis is recommended, using the high-valve and manifold flows to provide initial analysis. The manifold with the highest flow rate can be readily noted from the gradient.

9.03 Compare any low or zero cable pressures at monitoring manholes with the pressures at adjacent manifolds. A zero pressure may result from a restriction as well as a leak in a cable. A restriction normally can be confirmed from a **no-flow** rather than a **high-flow** indication at the manifold.

9.04 Sectionalize any significant leaks and locate and repair as necessary. In this connection, utilize the cable prints to plan additional pressure readings at the most favorable points so as to avoid entering manholes unnecessarily. It should be kept in mind that leaks in large aerial feeders near riser poles can produce the same results as large leaks in underground cables; also, when aerial feeders have not been pressurized previously, a likely location for a critical leak is in the vertical run on the riser pole.

9.05 Locate leads and repair as necessary to obtain objective pressures in the aerial cables. When these pressures have been obtained, arrange with the test center to have the cable pressure at each pressure transducer and at each contactor posted on the designated records. The contactors operating pressure and the transducer **alert** pressure also should be recorded. Form E-5405, **Contactor and Transducer Data**, should be used for posting this information.

9.06 Enter all pertinent analysis valve data on Form E-5407, **Pressure Reading—Lateral Distribution Cables**.

9.07 Upkeep of the completed pipe route is covered in Section 637-050-300.