

F UNDERGROUND PRESSURE TRANSDUCER SYSTEM USE, DESCRIPTION, AND INSTALLATION

| CONTENTS | PAGE | CONTENTS | PAGE |
|--|------|--|------|
| 1. GENERAL | 1 | 7. TRANSDUCER IDENTIFICATION | 15 |
| 2. PRECAUTIONS | 2 | 8. FILLING OR REPLACING E UNDERGROUND PRESSURE TRANSDUCER SYSTEM (SUPERSEDED) WITH COMPONENTS OF F UNDERGROUND PRESSURE TRANSDUCER SYSTEM | 15 |
| 3. TOOLS AND MATERIALS | 2 | TOOLS | 17 |
| 4. USE | 2 | MATERIALS | 17 |
| 5. DESCRIPTION | 2 | GENERAL ANALYSIS | 17 |
| F UNDERGROUND PRESSURE TRANSDUCER (AT-8772) | 2 | 9. INSTALLATION PROCEDURES FOR ADDING H TRANSDUCERS TO B PRESSURE TRANSDUCER HOUSING | 17 |
| C PRESSURE TRANSDUCER HOUSING (AT-8773) | 3 | 10. INSTALLATION PROCEDURES FOR ADDING C TRANSDUCER HOUSING AND F TRANSDUCERS | 19 |
| C JUNCTION BOX (AT-8746) | 4 | 11. INSTALLATION PROCEDURES FOR ADDING C TRANSDUCER HOUSING AND C JUNCTION BOX | 19 |
| 6. INSTALLATION | 5 | 1. GENERAL | |
| LOCATION WITHIN MANHOLE | 5 | 1.01 This section covers the use, description, and installation of the F Underground Pressure Transducer System used to monitor air pressure in underground cables. Also covered in this section are installation procedures for either filling or replacing components of in-plant E Underground Pressure Transducer Systems with components of the F Pressure Transducer System. | |
| FRAMING CHANNELS | 5 | 1.02 This section is revised to include information pertaining to the F Underground Pressure Transducer System which replaces the E Underground Pressure Transducer System. Also covered is the H Pressure Transducer which is used when transducers are required for existing E Pressure Transducer System installations. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted. | |
| MOUNTING TRANSDUCER HOUSINGS AND JUNCTION BOXES | 7 | | |
| A. Mounting Units to Manhole Wall Using Framing Channels | 7 | | |
| B. Mounting Units Directly to Manhole Wall | 7 | | |
| JOINING STUB CABLE TO MAIN CABLE | 7 | | |
| TERMINATING C TRANSDUCER HOUSING STUB CABLE AT C JUNCTION BOX | 8 | | |
| PRESSURE CONNECTIONS | 12 | | |
| TRANSDUCER TESTING AND ADJUSTMENT | 12 | | |
| INSTALLING ADDITIONAL TRANSDUCERS | 14 | | |

NOTICE

This document is either
AT&T - Proprietary, or WESTERN
ELECTRIC - Proprietary

Pursuant to Judge Greene's Order of August 5, 1963,
beginning on January 1, 1964, AT&T will cease to use
"Bell" and the Bell symbol, with the exceptions as set
forth in that Order. Pursuant thereto, any reference to
"BELL" and/or the BELL symbol in this document is here-
by deleted and "expunged".

1.03 The main difference between the E and F Underground Pressure Transducer Systems is that the components of the F System are considerably smaller than those of the E System.

2. PRECAUTIONS

2.01 Follow the procedures for testing and ventilating the manhole as covered in Section 620-140-150 of the Bell System Practices.

2.02 Bleed pressurized air from the B or C junction box before attempting to remove cover.

2.03 When flash testing splice case with E, F, or H transducers connected, remove the pneumatic connection before flash testing.

3. TOOLS AND MATERIALS

3.01 The following is a list of tools and materials required for the installation of the F Underground Pressure Transducer System:

TOOLS

Volt-Ohm-Milliammeter (KS-14510 L1)—For testing and adjusting F or H pressure transducers.

788D2 Tool—For terminating conductors and connecting block in C junction box.

C Pressure Gauge—For making pressure measurements.

Pneumatic Drill and Masonry Bit—For drilling holes in manhole wall.

Socket Wrench (1/2-inch)—For mounting C transducer housing and C junction box to the framing channels.

Two Adjustable Wrenches (6-inch)—For securing B stub cable fitting to C junction box.

C Test Cord (AT-8662)—For making test connections to the C junction box connecting block.

MATERIALS

B Stub Cable Fitting (AT-8756)—To seal stub cable entrance port of C junction box.

Framing Channels—For mounting C pressure transducer housing and C junction box. These channels may be obtained from Unistrut Corp., Wayne, Mich.

C Cement—For holding gaskets in place.

O Ring (Size No. 362)—For sealing cover of C junction box. The O ring material is Neoprene ASTM-D2000, 2BC415B14F17 or Buna N, ASTM-D2000, 2BF615B14E34F19 and may be obtained from Parker Seal Co., 2360 Palumbo Dr. Lexington, Ky.

C Plastic Tubing (3/8-in) and B Plastic Tubing Fitting—For making pressure connections between transducer cavity and cable or pipe to be monitored.

D Plastic Anchors (No. 12) and Screws (No. 12)—For securing framing channels to manhole wall.

4. USE

4.01 The F Underground Pressure Transducer System is designed to monitor pressures in as many as 25 individual cables at one location, and is used in lieu of high valves.

5. DESCRIPTION

5.01 The F Underground Pressure Transducer System consists of the following major components:

- F underground pressure transducer
- C pressure transducer housing
- C junction box

F UNDERGROUND PRESSURE TRANSDUCER (AT-8772)

5.02 The F pressure transducer (Fig. 1) is an air pressure activated stepped-switch instrument which converts cable pressure to electrical resistance. This transducer is capable of measuring pressures in the range of 0.0 to 9.5 psi (pounds per square inch) in 0.5 psi increments with corresponding resistance values from 100K ohms to 3.82M ohms.

5.03 The F transducer is for use on working pairs without affecting subscriber service and can be read using the Cable Pressure Monitoring System (CPMS) or manually from the test desk.

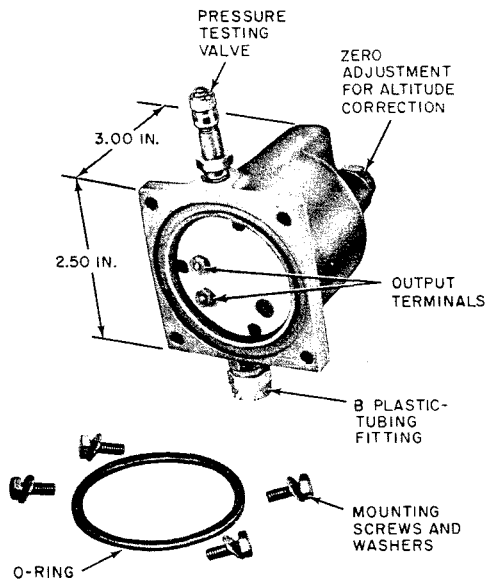


Fig. 1—F Underground Pressure Transducer

5.04 A pressure testing valve and a zero adjustment screw are mounted on the faceplate of the transducer. The zero adjustment allows the zero pressure output position to be adjusted for any local elevation from sea level to 10,000 feet. (See 6.21.)

5.05 Connection of the transducers to the assigned cable pairs is made through either the *C junction box* (which can cross-connect up to 25 transducers with their assigned cable pairs) or the *C pressure transducer housing stub cable can be bridged directly to the cable pairs in a splice closure*. The C junction box should be used when more than five transducers are required in one manhole.

5.06 The F transducer is not a self-contained unit and must be installed in a C pressure transducer housing (AT-8773).

5.07 F transducers may be ordered individually or in quantities of one to five as part of the C pressure transducer housing assembly.

C PRESSURE TRANSDUCER HOUSING (AT-8773)

5.08 The C pressure transducer housing (Fig. 2) can accommodate from one to five F pressure transducers in individual air-tight cavities. Each transducer has a plugged entrance (1/8-inch NPT) for connection by plastic tubing to the pressurized cable to be monitored. The pneumatic and electrical connections are independent.

5.09 The housing is equipped with a 15-foot, 6-pair, 22-gauge single sheath plastic stub cable. The stub cable conductors have standard PIC color code assignment. The first five pairs of the stub cable terminate on spade clips inside the five cavities for connection to the output terminals of the transducers. The sixth pair (BL-R) is cut and cleared at the sealing gland. The stub cable pairs may be terminated either on the connecting block of the C junction box (AT-8746) or bridged directly onto the assigned cable pairs in a splice case.

5.10 C pressure transducer housings may be ordered with one to five F transducers installed and terminated in the housing, or with no transducers installed. The unused cavities are sealed with blank plates and the spade clips insulated with rubber sleeves.

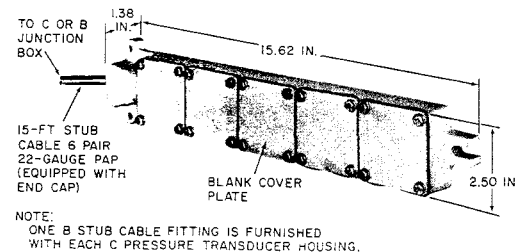


Fig. 2—C Pressure Transducer Housing

5.11 The housings are designed to be mounted on framing channels (Fig. 3). The following are furnished with each housing:

- Mounting bolts and nuts, three (3) each for mounting housing on framing channels.
- B stub cable fitting (AT-8756) for sealing cable entrance port in C junction box.

C JUNCTION BOX (AT-8746)

5.12 The C junction box (Fig. 4) encloses an 88-type connecting block factory wired to a 25-pair 22-gauge single sheath plastic stub cable. The junction box stub cable conductors have standard

PIC color code assignment. The conductors of up to five transducer housing stub cables can be terminated on the connecting block. Therefore, one C junction box has terminating facilities for up to 25 E or F underground pressure transducers.

5.13 The junction box contains five plugged cable entrance ports located on one side of the box. The cable entrance ports have 1/8-inch female pipe threads to mate with the B stub cable fitting furnished with the C pressure transducer housing.

5.14 The junction box is so designed that, after installation, the cover may be removed without loss of pressure in the system as described in 6.18.

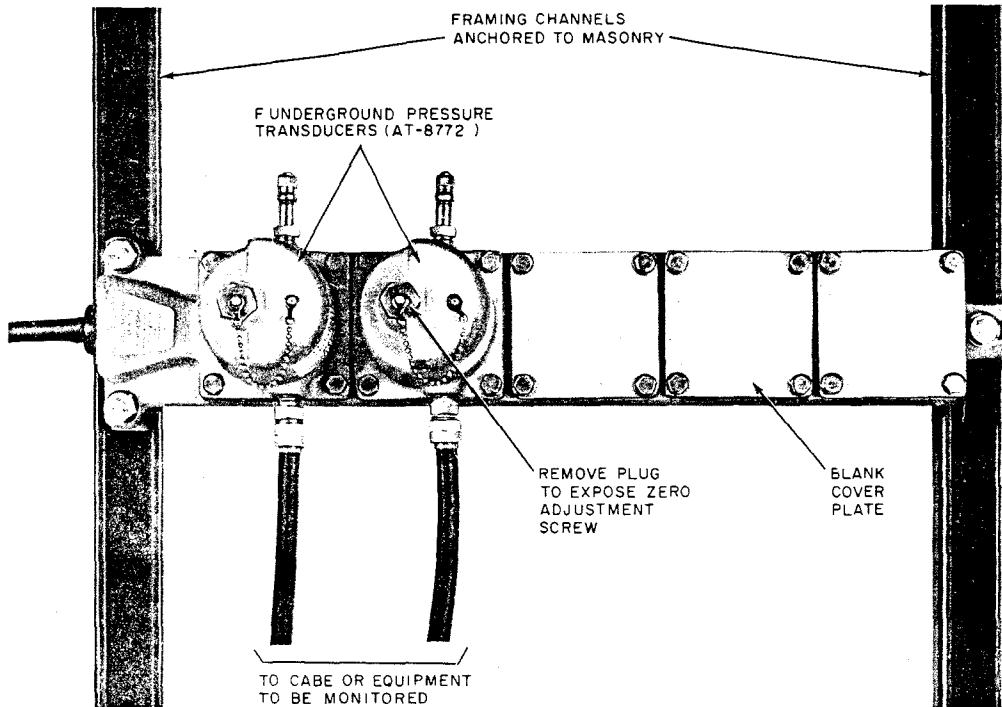


Fig. 3—C Transducer Housing Mounted on Framing Channels

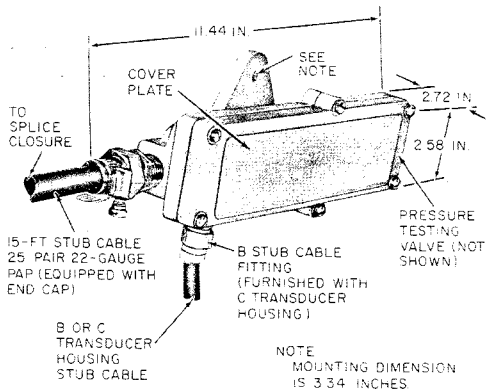


Fig. 4—C Junction Box

5.15 Two (2) mounting bolts and nuts are furnished with the junction box for mounting on framing channels (Fig. 5).

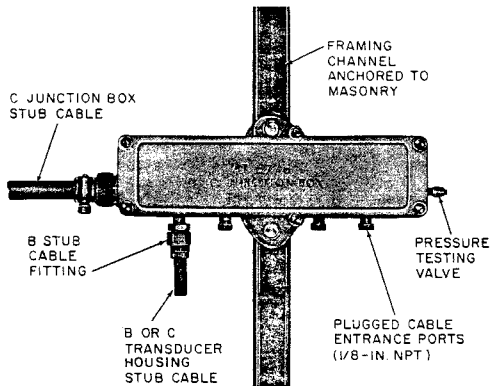


Fig. 5—C Junction Box Mounted on Framing Channels

6. INSTALLATION

6.01 An example of a typical F transducer system installation is shown in Fig. 6. Engineering work prints should include the following information:

- Manhole number and location
- Cable and pair assignment for bridging of C junction box or C transducer housing stub
- Pair assignment to each cable being monitored.

LOCATION WITHIN MANHOLE

6.02 *Locate the C transducer housing and C junction box in the manhole where they will not occupy space normally allocated for splice locations and cable racking. Also, they should not be located where they will interfere with cable placing or removing operations.*

6.03 The *C transducer housing* may be mounted in any position, horizontal or vertical, on manhole walls or ceilings.

6.04 The standard mounting position of the *C junction box* is either horizontal or vertical with the stub cable located at either the left or top, respectively.

Note: If it is not possible to follow the standard mounting arrangement (eg, if the stub cable must be located at either the right or bottom) consider that the binding posts are in sequence from the stub cable to the end of the terminal block.

FRAMING CHANNELS

6.05 Although the transducer housing and junction box may be mounted directly to the manhole masonry, the use of framing channels offer the following advantages:

- Convenience in positioning and mounting.
- Better mechanical strength when inferior masonry, such as bricks, is encountered.
- More than one unit may be attached to a pair of channels.

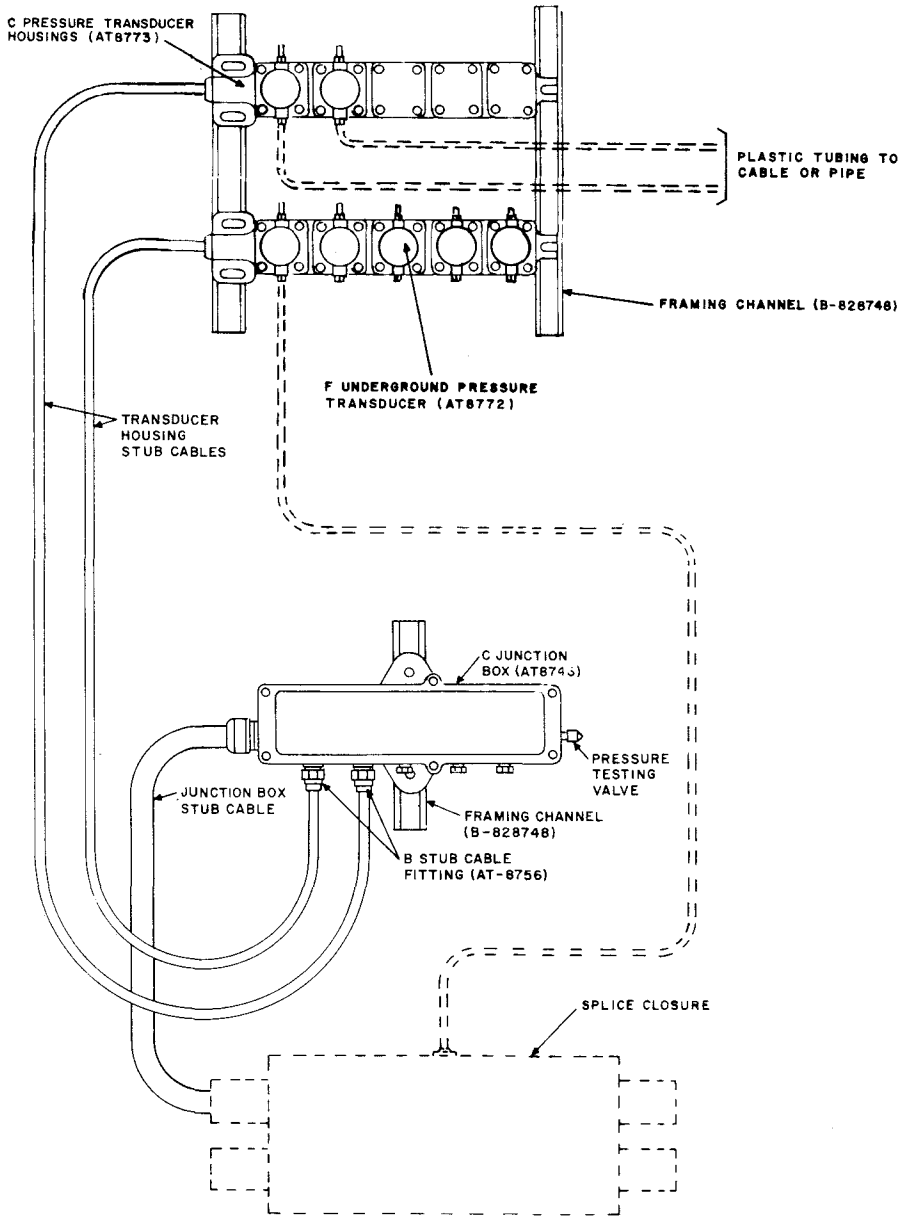


Fig. 6—Example of F Pressure Transducer Installation

- 6.06 Galvanized framing channels are available in 6-, 12-, 18-, and 24-inch lengths as follows:

| FRAMING CHANNEL NUMBER | LENGTH (IN.) |
|------------------------|--------------|
| B-828748-1 | 6 |
| B-828748-2 | 12 |
| B-828748-3 | 18 |
| B-828748-4 | 24 |

- 6.07 In selecting framing channel length, the following should be considered:

- Condition of masonry (long channels may be needed to obtain proper support in weak masonry).
- Possible future addition of housings.

MOUNTING TRANSDUCER HOUSINGS AND JUNCTION BOXES

A. Mounting Units to Manhole Wall Using Framing Channels

- 6.08 Mount the housing and junction box to manhole wall using framing channels as follows:

- (1) Select a location in the manhole for housing and junction box installation (6.02, 6.03, and 6.04).
- (2) Using the framing channels as a template, position each channel at the selected location and mark the holes to be drilled.
- (3) Drill holes in manhole wall. The diameter and depth of the drilled holes should correspond with the diameter and length of the anchor sleeve.
- (4) Insert anchor into each drilled hole tapping it lightly until the head is flush with the mounting surface.

- (5) Insert the #12 screws through each mounting hole and into the anchor and with a screwdriver turn it down until it seats firmly.
- (6) Remove plug from center entrance port of C junction box to allow mounting.
- (7) Using the 1/2-inch socket wrench, mount the C transducer housing and C junction box to the framing channels with the bolts and nuts provided.
- (8) Coat the threads of the plug removed in Step (6) with teflon tape or pipe compound and install in same entrance port if this port is not used.

B. Mounting Units Directly to Manhole Wall

- 6.09 Procedures for mounting the housing and junction box directly to manhole wall are as follows:

- (1) Select a location in the manhole for housing and junction box installation (6.02, 6.03, and 6.04).
- (2) Using the housing and junction box as a template, position each unit at the selected location and mark the holes to be drilled.
- (3) Drill holes in manhole wall at the marked location. The diameter and depth of the drilled holes should correspond with the diameter and length of the anchor sleeve.
- (4) Insert anchor into each drilled hole tapping it lightly until the head is flush with the mounting surface.
- (5) Insert the #12 screw through each units mounting holes into anchor and with a screwdriver turn it down until it seats firmly.

Caution: Care should be exercised in tightening anchor screws. Overtightening could fracture the cast-iron housings.

JOINING STUB CABLE TO MAIN CABLE

- 6.10 The stub cable of either the C junction box or C transducer housing may be bridged to the main cable as follows:

- (1) Identify the main cable and pair assignment as specified on the work print.
- (2) Open the splice closure and identify the specified pairs. (Procedures for opening and closing the splice closure are covered in detail in the 633 Division of Practices.)
- (3) Bridge the stub cable pairs to the main cable pairs identified in Step (2).
- (4) Verify with the test desk that the pairs are clear of trouble and close the splice.
- (3) Remove 1/8-inch of sheath to expose the inner aluminum shield as shown in Fig. 8.
- (4) Slide the components of the B stub cable fitting onto the stub cable in the order shown in Fig. 8.
- (5) Slit the exposed aluminum shield into eight equal sections and fold over butt of sheath (Fig. 9).
- (6) Trim the folded shield so that it does not extend beyond the cable sheath.

Note: Do not flash test the splice with transducers pneumatically connected.

TERMINATING C TRANSDUCER HOUSING STUB CABLE AT C JUNCTION BOX

6.11 Prepare the C junction box for termination of the C transducer housing stub cable conductors as illustrated in Fig. 7 and as follows:

- (1) Using a screwdriver, loosen the six captive screws securing the cover to the junction box to allow access to the connecting block.
- (2) With the 1/2-inch socket wrench, remove the plug from the selected entrance port in the junction box housing.
- (3) Coat the threads of the fitting body (part of B stub cable fitting) with teflon tape or thread compound.
- (4) Thread the fitting body into the cable entrance port of the junction box and with the 6-inch adjustable wrench securely tighten.

6.12 *Transducer housing stub cable sheath preparation:* Prepare the transducer housing stub cable for terminating in the junction box as follows:

- (1) Position the transducer housing stub cable in its approximate final position and cut off excess cable.
- (2) Remove the sheath and aluminum shield to expose approximately 18 inches of the core wrapped conductors.

- (7) Rotate the core wrapped conductors in a circular motion so as to enlarge opening at end of shield (Fig. 10).
- (8) Cut core wrap flush with end of sheath and twist end of conductors to retain pair identification.
- (9) Using an orange stick, push the core wrap down between the aluminum shield and cable conductors until none of the core wrap is exposed.
- (10) Since only pairs 1 through 5 are required, cut pair number 6 (blue-red) off approximately 1/2-inch beyond butt of sheath (Fig. 11).
- (11) Carefully insert the conductors through the fitting body (including blue-red pair) making certain the conductors are not skinned accidentally.
- (12) Force the sheath and aluminum shield over the fitting body stem until the folded shield **seats firmly against** the fitting.
- (13) Slip ferrule up against fitting body and screw gland nut onto the fitting body finger tight, then tighten gland nut approximately 2 1/2 turns.
- (14) Place split ring against gland nut and with one adjustable wrench hold the gland nut and with another adjustable wrench tighten the clamping nut onto the gland nut. **Make sure the gland nut is not moved.**

6.13 The above procedure allows the aluminum shield direct contact with the junction box for shield continuity.

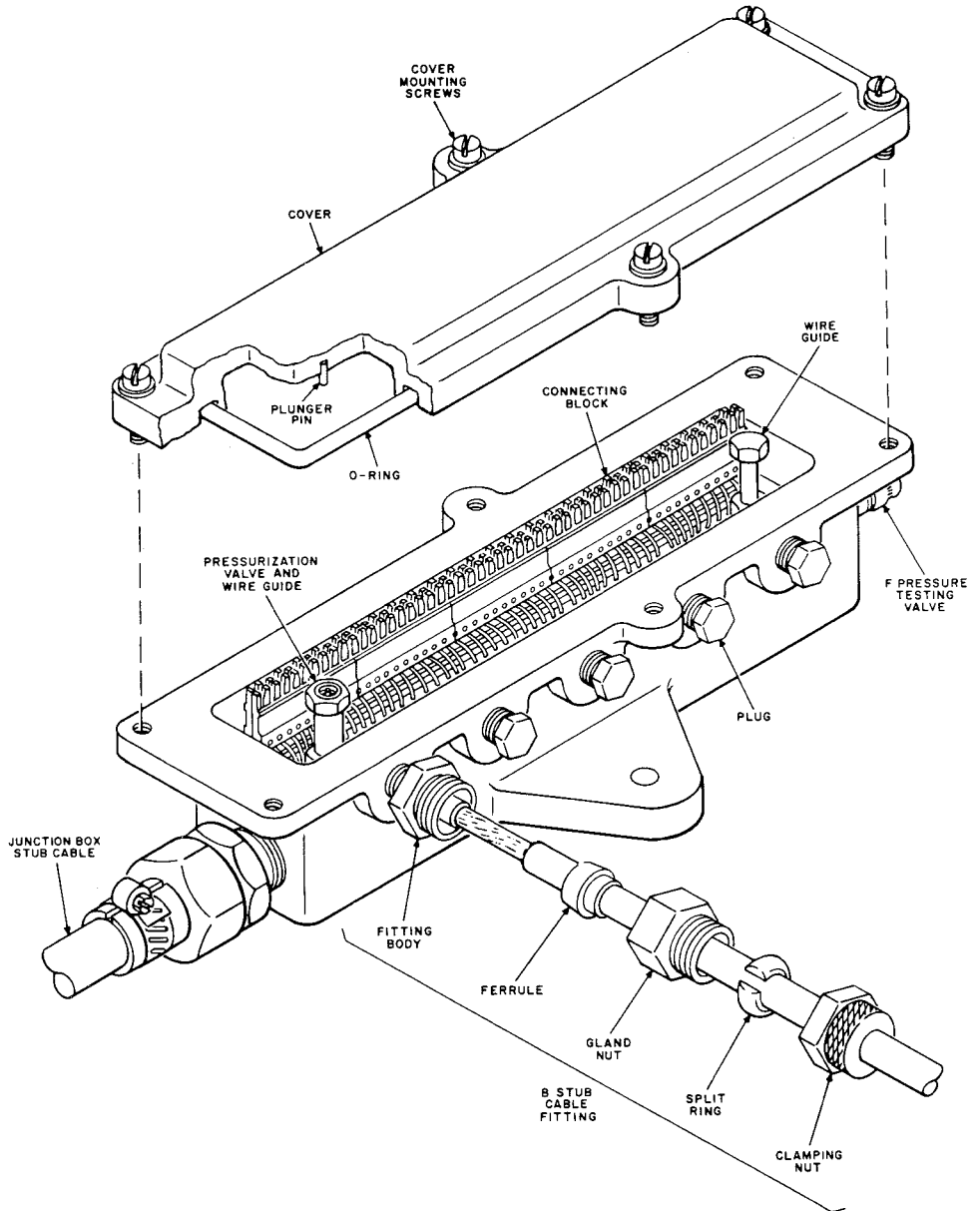


Fig. 7—Preparation of C Junction Box

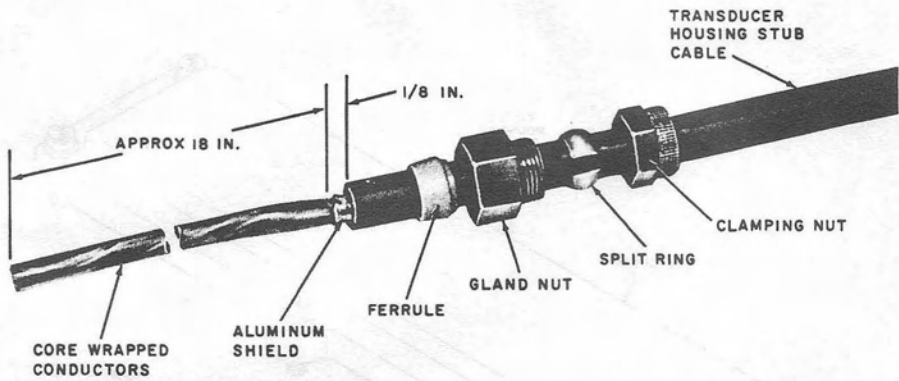


Fig. 8—Arrangement of B Stub Cable Fitting on Transducer Housing Stub Cable

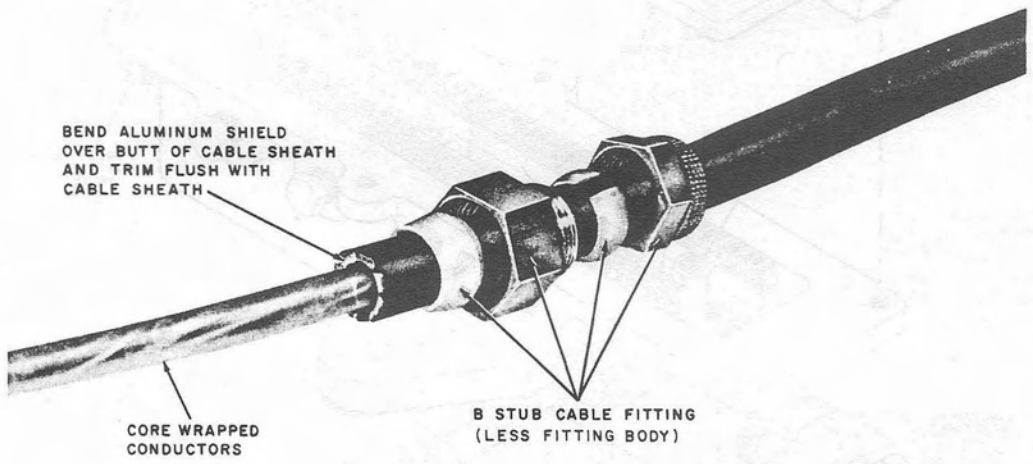
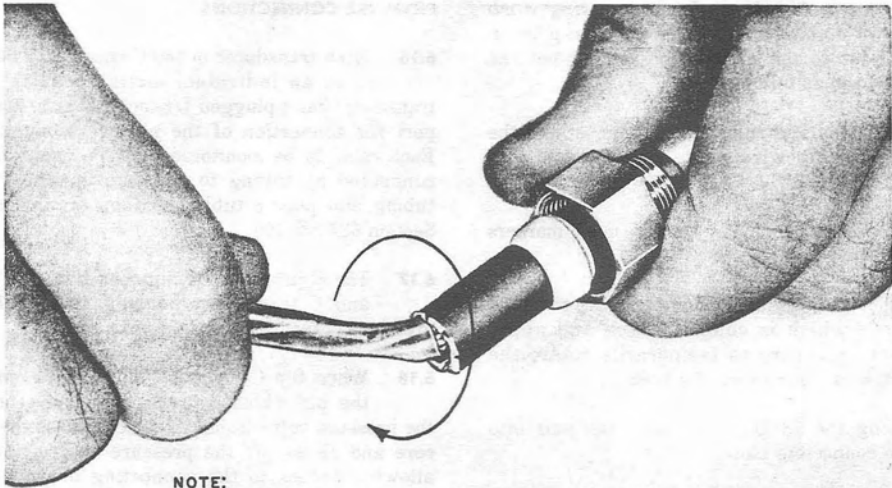


Fig. 9—Stub Cable Preparation

**NOTE:**

**ROTATE CORE WRAPPED CONDUCTORS IN A CIRCULAR MOTION
TO ENLARGE OPENING AT END OF CABLE SHIELD.**

Fig. 10—Preparation of Stub Cable End

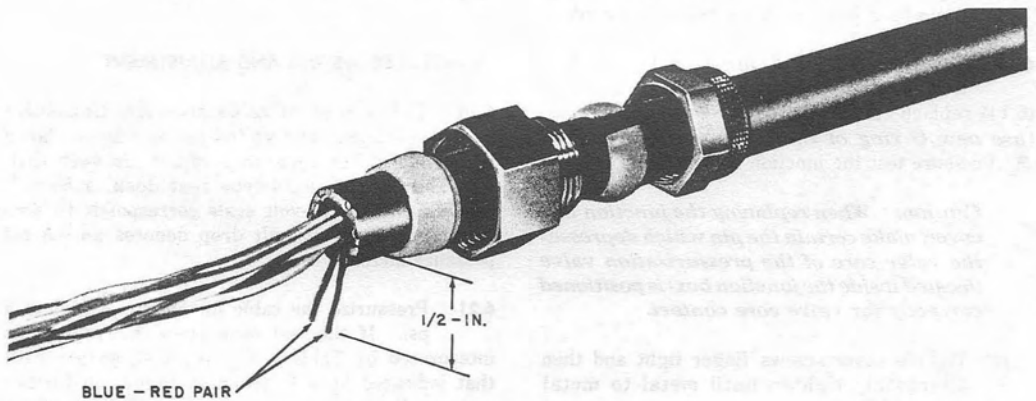


Fig. 11—Stub Cable (Cutting Blue-Red Conductors)

6.14 Terminating transducer housing stub cable conductors: Terminate five pairs in the stub cable to the connecting block as per the assignment and as follows:

- (1) Route the stub cable conductors around the appropriate wire guide as explained and shown in Fig. 12.
- (2) Pair identification may be made using markers as shown in Fig. 12.
- (3) Slip each pair of conductors over the high tooth which is colored black and apply sufficient pressure to temporarily retain the conductors in their proper location.
- (4) Using the 788D2 tool, seat each pair into the connecting block.

Warning: *A black mark on the side of the 788D2 tool identifies the cutting blade side. Ensure that the black side of the tool head is toward the ends of the stub cable conductors.*

- (5) Test connections may be made to the connecting block by using the C test cord.

6.15 Pressure testing C junction box: After terminating the transducer housing stub cable (6.14) replace the junction box cover and O ring (*use new O ring of the type specified in Part 3*). Pressure test the junction box as follows:

Caution: *When replacing the junction box cover, make certain the pin which depresses the valve core of the pressurization valve (located inside the junction box) is positioned correctly for valve core contact.*

- (1) Tighten cover screws finger tight and then alternately tighten until metal to metal contact is obtained.
- (2) Connect a C pressure gauge to the pressure testing valve to verify that the junction box is being pressurized through its stub cable.
- (3) Pressurize the junction box through the pressure testing valve to 10 psi.
- (4) Test for leaks around the cover and B stub cable fitting using E pressure testing solution.

PRESSURE CONNECTIONS

6.16 Each transducer in the C transducer housing is in an individual airtight cavity. The transducer has a plugged 1/8-inch pressure entrance port for connection of the plastic tubing fitting. Each cable to be monitored must be pneumatically connected by tubing to the transducer. Plastic tubing and plastic tubing fittings are covered in Section 637-235-100.

6.17 The C junction box, junction box stub cable, and C transducer housing stub cable are pressurized through the splice closure.

6.18 When the C junction box cover is removed, the pin which depresses the valve core of the pressure valve inside the box releases the valve core and closes off the pressure source, thereby, allowing access to the connecting block without disturbing the pressure integrity of the system.

6.19 Figure 6 shows an example of the tubing connections for the F Pressure Transducer System installation. After the tubing has been installed and pressurized, check all fittings with E pressure testing solution for leaks.

TRANSDUCER TESTING AND ADJUSTMENT

6.20 The relation of cable pressure, transducer resistance, and voltmeter reading is shown in Table A. The resistance values are such that, when read from a 14-type test desk, a 50-volt reading on the 120-volt scale corresponds to zero pressure. Each 2.5-volt drop denotes an 0.5 psf pressure increase.

6.21 Pressurize the cable in the range of 4 to 9 psi. If the test desk pressure reading, as interpreted by Table A (± 2.5 volts), agrees with that indicated by a C pressure gauge, no further test or adjustments are necessary. If the readings are not within the limits of Table A, proceed as follows:

- (1) Remove the plug to expose adjustment screw (Fig. 3).
- (2) Turn the transducer zero adjustment screw until the test desk voltmeter reading (± 2.5 volts) agrees with the cable pressure as indicated on the C pressure gauge.

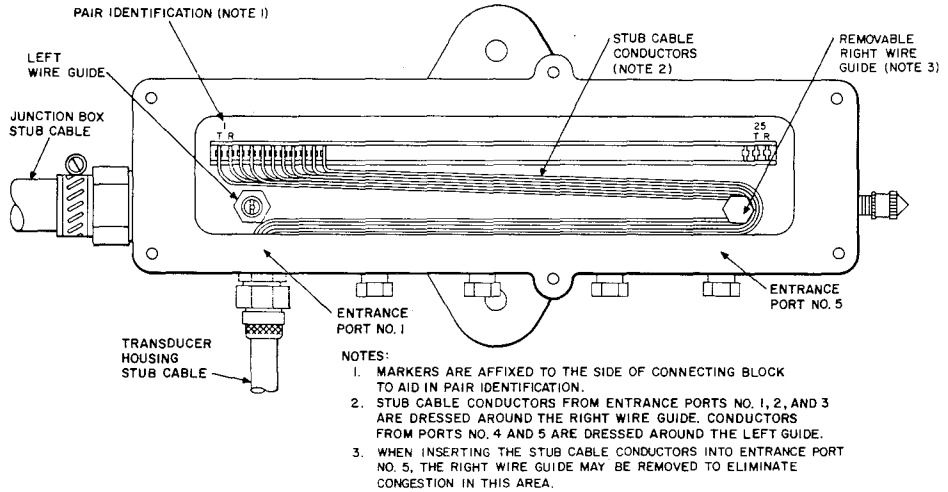


Fig. 12—Wiring Arrangement for C Junction Box

TABLE A

RELATION OF CABLE PRESSURE,
TRANSUCER RESISTANCE, AND
VOLTMETER READING

| NOMINAL PRESSURE RANGE AT TRANSUCER (psi) | ELECTRICAL RESISTANCE (kilohms) | VOLTMETER READING 120V SCALE |
|--|---------------------------------------|------------------------------------|
| 0.0 | 100 | 50.0 |
| 0.5 | 110 | 47.5 |
| 1.0 | 122 | 45.0 |
| 1.5 | 135 | 42.5 |
| 2.0 | 150 | 40.0 |
| 2.5 | 166 | 37.5 |
| 3.0 | 186 | 35.0 |
| 3.5 | 208 | 32.5 |
| 4.0 | 232 | 30.0 |
| 4.5 | 265 | 27.5 |
| 5.0 | 301 | 25.0 |
| 5.5 | 344 | 22.5 |
| 6.0 | 400 | 20.0 |
| 6.5 | 468 | 17.5 |
| 7.0 | 568 | 15.0 |
| 7.5 | 698 | 12.5 |
| 8.0 | 898 | 10.0 |
| 8.5 | 1200 | 7.5 |
| 9.0 | 1820 | 5.0 |
| 9.5 and higher | 3320 | 2.5 |

- (3) At zero pressure the test desk voltmeter reading must be 50.0 volts \pm 2.5 volts.
- (4) If the transducer adjustments per (2) and (3) cannot be accomplished, the following possibilities should be considered:

- If the transducer reading is **lower** than that indicated by the C pressure gauge the cable pair should be suspected. Verify that the pair resistance is greater than 10 megohms when the transducer pair is removed at the junction box (less than 1 volt as read at the test desk).
- If the transducer reading is **greater** than that indicated by the C pressure gauge the cable stub or splicing should be suspected. Verify that the loop resistance is less than 2000 ohms when the pair is shorted at the junction box (greater than 98 volts as read at the test desk).
- If the transducer adjustment has no effect or if cable pair test good, the transducer should be replaced.

Note: While the transducer is pressurized for electrical testing, the cover plate may be checked for leaks with E pressure testing solution.

INSTALLING ADDITIONAL TRANSDUCERS

6.22 As new cables are added, additional F transducers may be installed in the vacant cavities in the C transducer housing, as follows:

- (1) Remove the blank cover plate from the transducer housing to expose the stub cable pair inside the cavity (Fig. 13).
- (2) Place O ring in groove on rear flange of transducer. The use of a small amount of C cement on the O ring will aid in holding it in place.
- (3) Terminate the spade clips of the pair to the transducer output terminals (Fig. 14).
- (4) Insert the transducer into the cavity and securely tighten the four mounting bolts.

- (5) Connect the transducer cavity with tubing to the cable or pipe to be monitored.
- (6) Test, and adjust if required, the transducer as covered in 6.20 and 6.21.

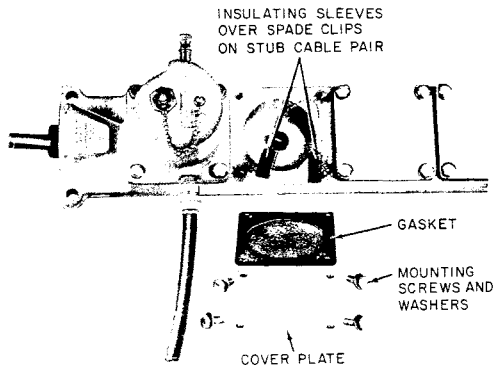


Fig. 13—Blank Cover Plate Removed from C Transducer Housing

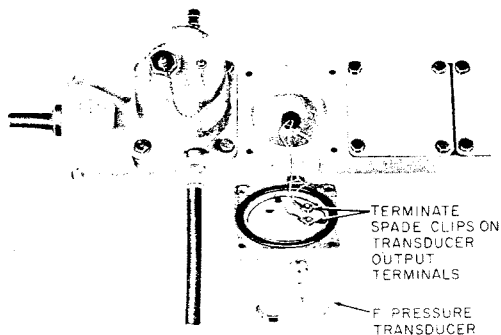


Fig. 14—Stub Cable Pair Terminated on Transducer

7. TRANSDUCER IDENTIFICATION

7.01 An individual transducer can be identified by a two digit number as follows:

First digit: Port on the C junction box as counted from the stub cable end.

Second digit: Transducer cavity on C transducer housing as counted from the stub cable end.

7.02 Figure 15 gives two examples of transducer identification.

8. FILLING OR REPLACING E UNDERGROUND PRESSURE TRANSDUCER SYSTEM (SUPERSEDED) WITH COMPONENTS OF F UNDERGROUND PRESSURE TRANSDUCER SYSTEM

8.01 A typical example of a superseded E Underground Pressure Transducer System installation is shown in Fig. 16. Variations of this installation may occur due to the introduction of the F Underground Pressure Transducer System.

8.02 Follow the precautions for ventilating the manhole and depressurizing junction box as covered in Part 2.

8.03 The following is a list of additional tools and materials which may be required for filling or replacing components of the superseded E pressure transducer system.

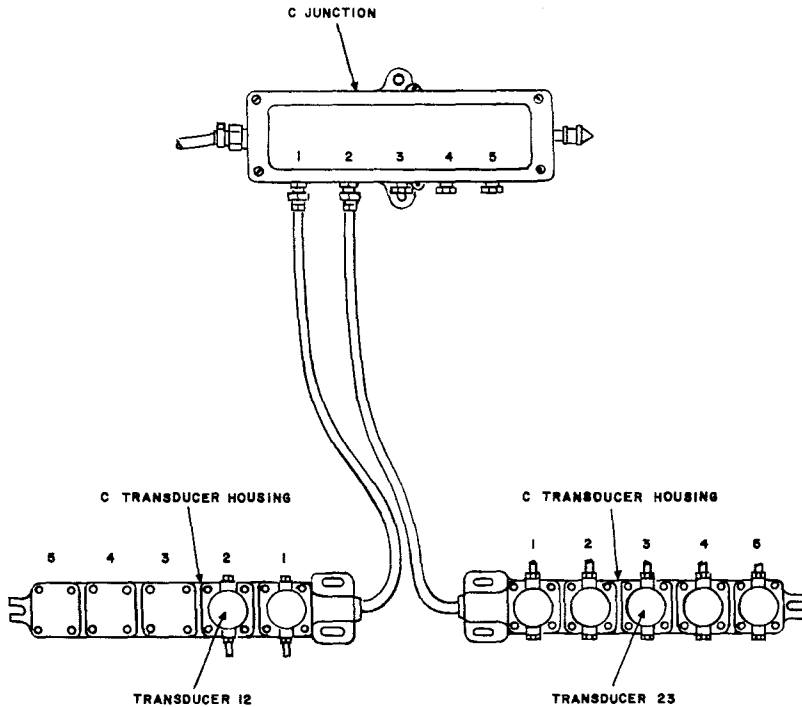


Fig. 15—Transducer Identification

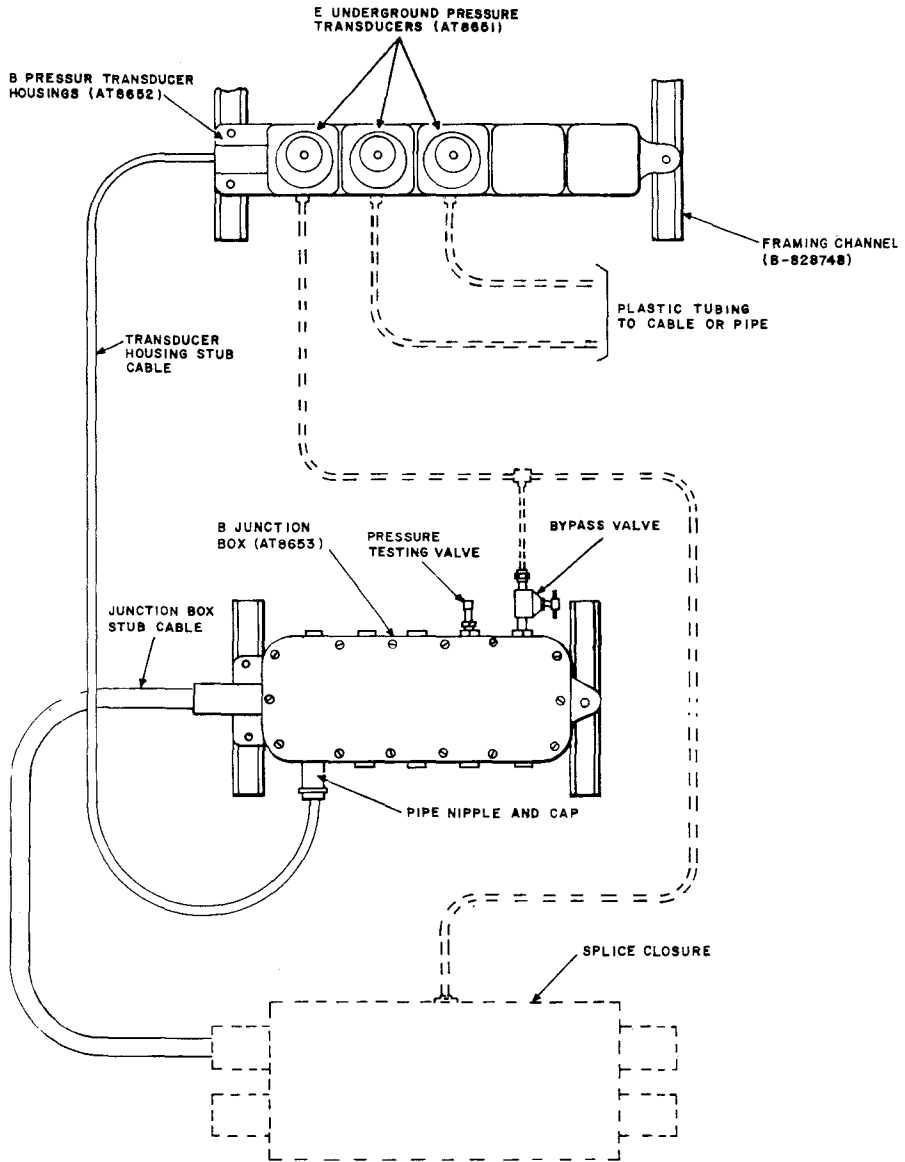


Fig. 16—Example of E Pressure Transducer System Installation (Superseded)

TOOLS

714B Tool—For terminating conductors on connecting block in B junction box.

Allen Wrench (9/16-inch)—For removing entrance port plug from B junction box.

Adjustable Wrench (12-inch)—For installing reducing bushing at B junction box entrance port.

MATERIALS

O Ring (Size No. 377)—For sealing cover of B junction box. The O ring material is ASTM-D2000, 2BC415B14F14 or Buna N, ASTM-D2000, 2BF615B14E34F19 and may be obtained from Parker Seal Co., 2360 Palumbo Dr., Lexington, Ky.

Reducing Bushing (3/4 × 1/8)—To allow acceptance of fitting body (part of B stub cable fitting) at B junction box entrance port. The reducing bushing may be obtained locally.

H Pressure Transducer—This transducer consists of an F transducer equipped with an adaptor plate which allows the transducer to be installed in the B transducer housing.

GENERAL ANALYSIS

8.04 In cases where additional transducers or a junction box are required to increase cable monitoring capabilities within a particular manhole having an E transducer system installation, consider the following situations:

- (1) If space is available in the existing B transducer housing, an H transducer(s) may be installed in the blank cavities of the housing as described in Part 9.
- (2) If space is not available in the B transducer housing, F transducers and a C transducer housing must be installed. The C transducer housing stub cable must be connected to the B junction box using a reducing bushing and B stub cable fitting as outlined in Part 10.
- (3) In cases where E transducers were connected directly to the assigned cable pairs without the use of a B junction box, plant growth may require installation of additional transducers and junction box. If space is available in the B

transducer housing, H transducers may be installed in these vacant cavities as described in Part 9. However, if no cavities are vacant it is recommended that a C transducer housing and C junction box be added (as outlined in Part 11) to the existing system.

- (4) In cases where a single transducer is required for either buried or underground routes, it is recommended that a G transducer be installed. The description and installation of the G transducer is covered in Section 637-222-103.

9. INSTALLATION PROCEDURES FOR ADDING H TRANSDUCCERS TO B PRESSURE TRANSDUCER HOUSING

9.01 When additional transducers are required for an existing E Pressure Transducer System installation and there are blank cavities available in the B transducer housing, H transducers may be installed in the vacant cavities. **The H transducer consists of an F transducer equipped with an adaptor plate and O ring (Fig. 17).**

NOTE:

THE H PRESSURE TRANSDUCER
CONSISTS OF AN F PRESSURE TRANSDUCER
EQUIPPED WITH AN ADAPTER PLATE

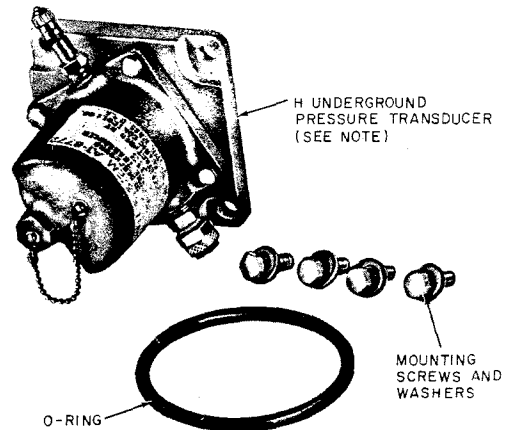


Fig. 17—H Underground Pressure Transducer

9.02 H transducers are installed in the vacant cavities of the B transducer housing as follows:

- (1) Remove the blank cover plate from the B transducer housing to expose the stub cable pair inside the cavity (Fig. 18).

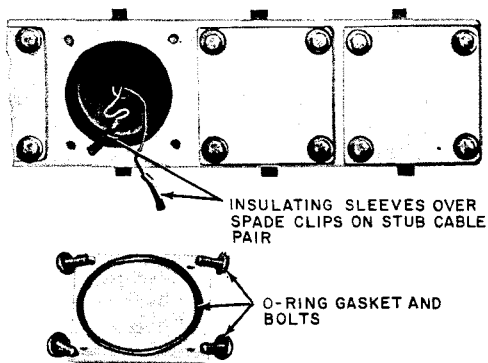


Fig. 18—Blank Cover Plate Removed from B Transducer Housing

- (2) Place O ring (furnished with H transducer) on rear flange of transducers adaptor plate. Cement may be used to aid in holding it in place.
- (3) Terminate the spade clips of the stub cable pair to the H transducer binding posts (Fig. 19).
- (4) Insert the terminated end of the transducer into the housing cavity and secure to the housing using the four bolts removed in Step (1). See Fig. 20.

- (5) Connect the transducer cavity with tubing to the cable or pipe to be monitored.
- (6) Test, and adjust if required, the transducer as described in 6.20 and 6.21.

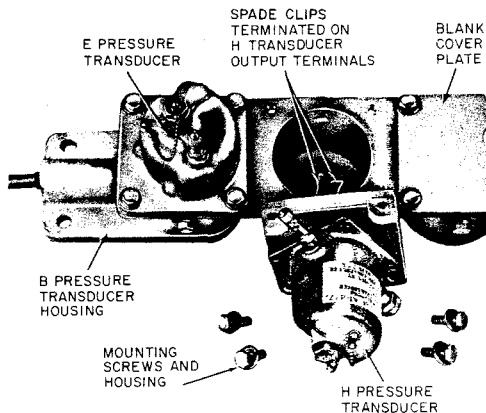


Fig. 19—Stub Cable Pair Terminated on H Transducer

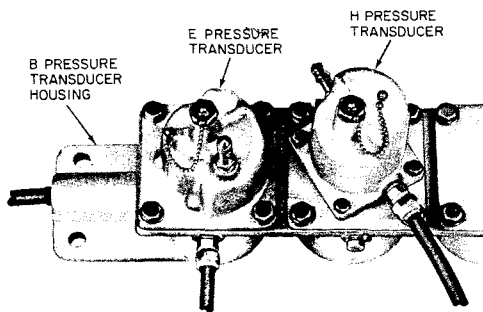


Fig. 20—H Transducer Installed in B Transducer Housing

10. INSTALLATION PROCEDURES FOR ADDING C TRANSDUCER HOUSING AND F TRANSDUCERS

10.01 If additional transducers are required at a particular manhole and if in this manhole exists an E Transducer System in which *no* blank cavities are available in its housing, but a vacant port(s) is available at the B junction box, it is recommended that F transducers and C transducer housing be installed.

10.02 An example of an E Pressure Transducer System installation with components of the F Pressure Transducer System added is illustrated in Fig. 21.

10.03 Install the C transducer housing to the manhole wall and install F transducers as outlined in 6.08 and 6.22, respectively.

10.04 Prepare the B junction box for termination of the C transducer housing stub cable conductors as illustrated in Fig. 22 and as follows:

- (1) Close bypass valve located on B junction box.
- (2) ***Bleed pressurized air from the case before attempting to remove the B junction box cover.***
- (3) Remove the twelve screws securing the cover to the junction box to allow access to the connecting block.
- (4) Using the 9/16-inch allen wrench, remove plug from selected entrance port in the B junction box housing.
- (5) Coat the 3/4-inch threaded end of the reducing bushing (Fig. 23) with thread compound and screw bushing into the selected entrance port.
- (6) Coat the 1/8-inch threaded end of the fitting body (part of B stub cable fitting furnished with C transducer housing) with pipe thread compound or teflon tape and screw fitting body into the reducing bushing.

10.05 ***Transducer housing stub cable sheath preparation:*** Prepare the C transducer housing stub cable for terminating in the B junction box as outlined in 6.12.

10.06 *Terminating stub cable conductors:*

Using the 714B tool, terminate 5 pairs of the stub cable conductors on the quick-clip connectors of the connecting block as per the assignment.

10.07 ***Pressure Testing B Junction Box:*** After terminating the transducer housing stub, replace the junction box cover and new O ring. The use of a small amount of C cement on the corners of the O ring will aid in holding it in place. Pressure test the junction box as follows:

- (1) Tighten cover screws finger tight and then alternately tighten until metal to metal contact is obtained.
- (2) Open bypass valve located on B junction box.
- (3) Connect C pressure gauge to pressure testing valve to verify that the junction box is being pressurized.
- (4) Close the junction box bypass valve.
- (5) Pressurize the junction box through the pressure testing valve to 10 psi.
- (6) Test for leaks around the cover plate and B stub cable fitting using E pressure testing solution.
- (7) Open bypass valve.

11. INSTALLATION PROCEDURES FOR ADDING C TRANSDUCER HOUSING AND C JUNCTION BOX

11.01 To add a C transducer housing and C junction box to the existing system illustrated in Fig. 24, proceed as follows:

- (1) Install the C transducer housing and C junction box to the manhole wall as outlined in 6.08 or 6.09.

Note: Locate the C junction box where the existing B transducer housing stub cable will reach any of the five C junction box ports.

- (2) Install F transducers in C transducer housing as described in 6.22 and make pressure connections per 6.16.

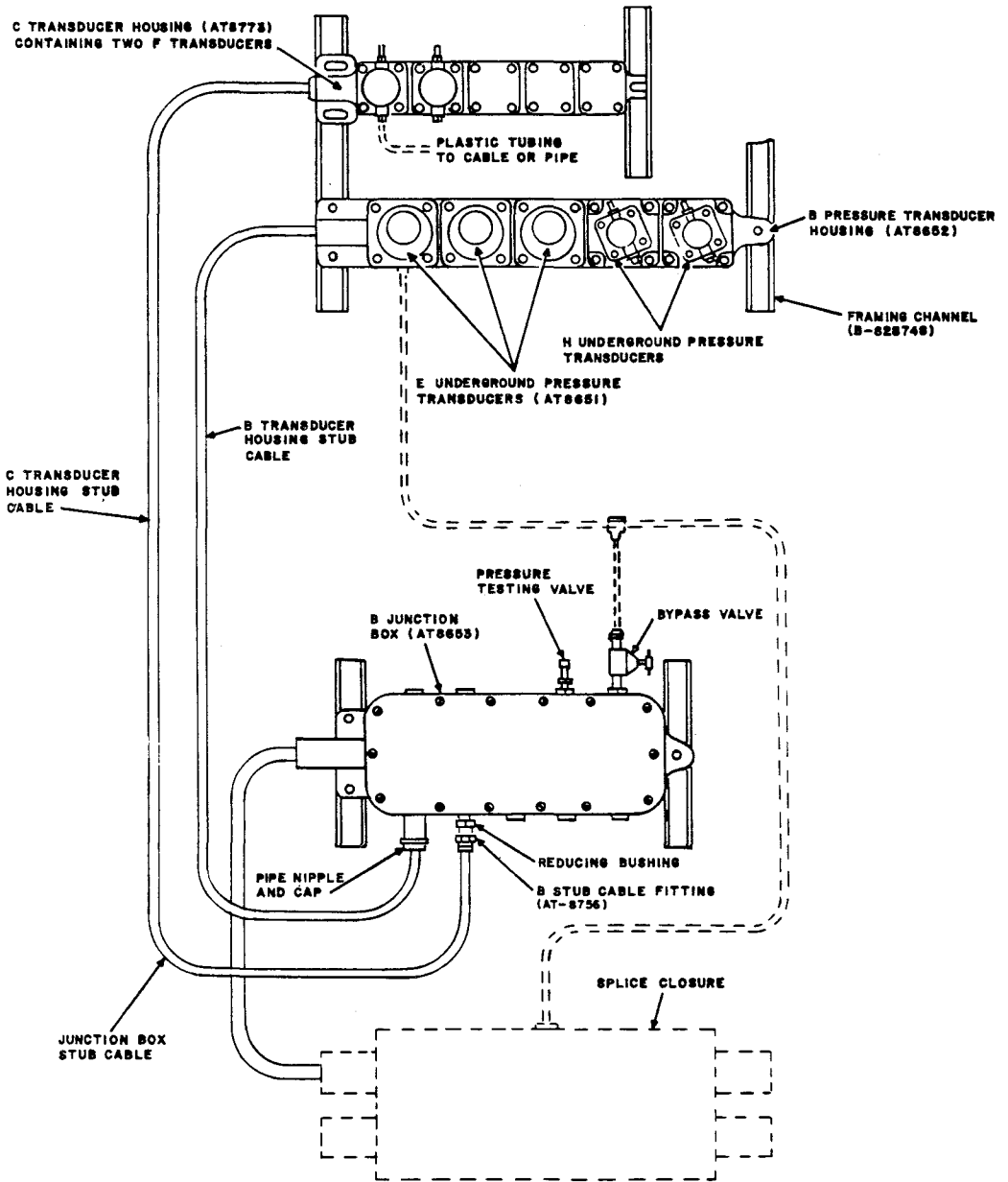


Fig. 21—Example of Superseded E Pressure Transducer System Installation with Components of the F Pressure Transducer System Installed

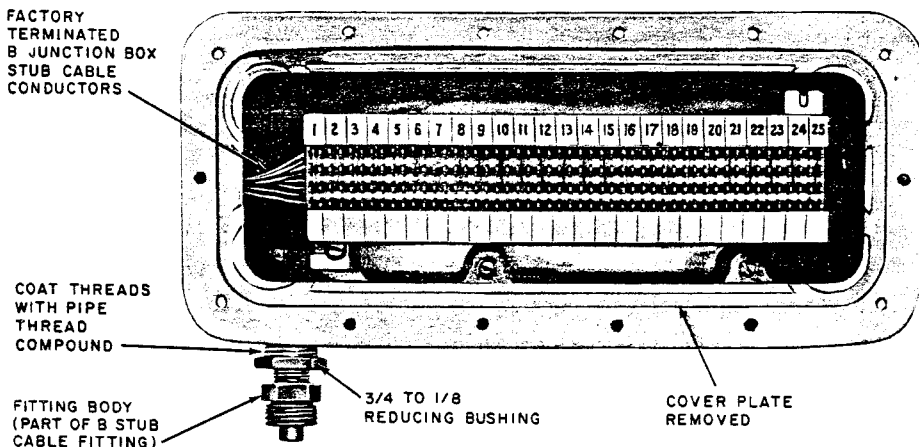
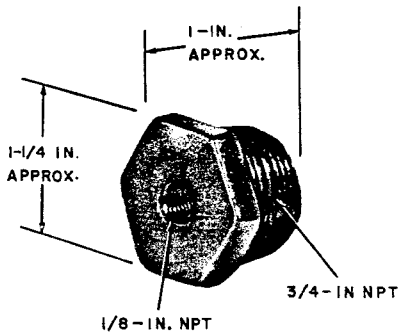


Fig. 22—B Junction Box—Cover Removed (Reducing Bushing and Fitting Body Installed)



NOTE:
MATERIAL IS GALVANIZED MALLEABLE
OR GALVANIZED CAST IRON

Fig. 23—Reducing Bushing (May be obtained locally)

- (3) Open the splice in which the B transducer housing stub cable is terminated. (Procedures for opening and closing the splice are covered in detail in the 633 Division of Practices.) Disconnect and remove the 5 pair B transducer housing stub cable from the cable pairs.
- (4) Prepare the B transducer housing stub cable sheath and terminate to the C junction box as described in 6.11 thru 6.14.

- (5) Bridge the C junction box stub cable to the main cable pairs as outlined in 6.10.
- (6) Pressure test C junction box as described in 6.15.

11.02 Transducers may be tested and adjusted as covered in 6.21.

11.03 The modified version, of the E Transducer System shown in Fig. 24, is illustrated in Fig. 25.

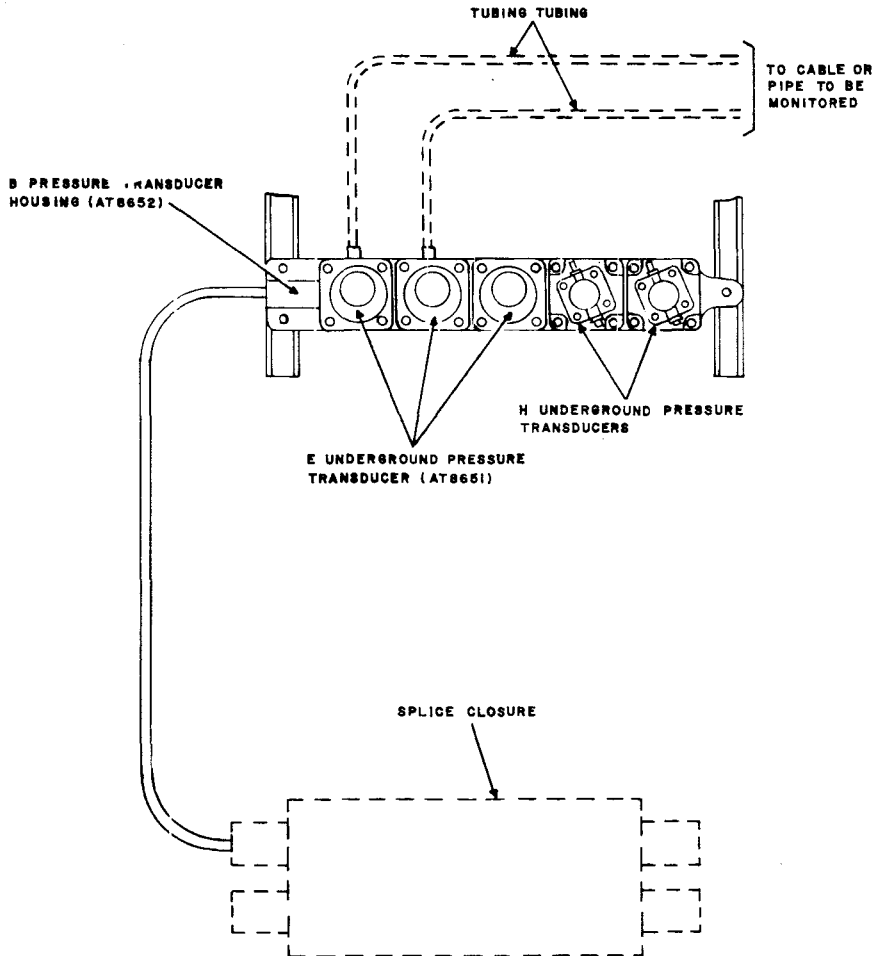


Fig. 24—E Transducers Connected Directly to the Assigned Cable Pairs

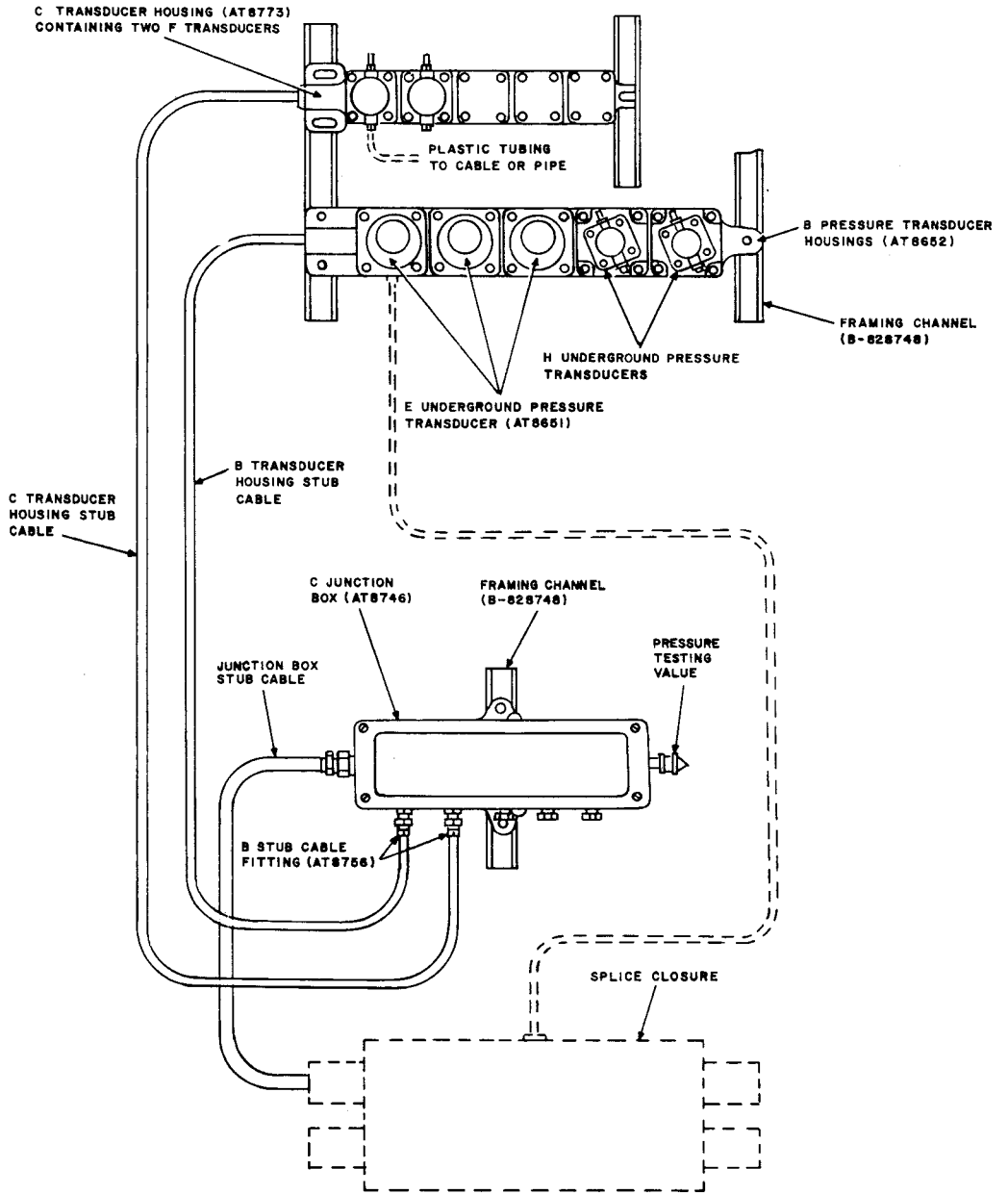


Fig. 25—Example of E Pressure Transducer Installation (C Transducer Housing and C Junction Box Added)