

TITLE

INSTRUMENTATION INFORMATION AND IDENTIFICATION SYSTEM

GENERAL

Instruments and instrumentation items shall be identified by a system of letters and numbers, together with a number of pictorial symbols, which are described in the following paragraphs.

IDENTIFICATION

The instrument identification number shall consist of the following sections:

General Identification	Instrument Number
FT - (Mark No.) -	80-986

Variable and function should always be separated by a slant-bar such as P/RC so as to clearly define the variable. In some cases multiple letters may be used to properly clarify the variable such as FPT/RL.

The "General Identification" section shall be made up of a combination of letters which represent the general function of the item. The following table gives the meaning of the letters and shall be used in selecting the letters to identify a particular instrument.

The "Instrument Number" section shall originate at number one (1) and proceed in sequence. The instrument number shall originate in and be assigned by Engineering.

Instrument number shall not appear on any drawing other than equipment schedule list.

BB 0015065

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TITLE INSTRUMENTATION INFORMATION AND IDENTIFICATION SYSTEM

UPPER CASE LETTERS	FIRST LETTER Process Variable or Actuation	SECOND LETTER Type Reading or Other Function	THIRD LETTER Additional Function
A	Analyzer	Alarm	Alarm
C	Conductivity	Control	Control
D	Density		
E	Extra	Element	
F	Flow	Function	
G			
H	Hand (Actuated)		
I	Interface	Indicating	Integrator
L	Level		
M	Moisture		
O		Operator	
P	Pressure		
R	Ratio	Recording (Recorder)	Relay
S		Switch	Switch
T	Temperature	Transmitter	Transmitter
V		Valve	Valve
W	Weight	Well	

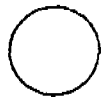
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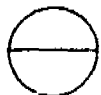
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TITLE INSTRUMENTATION INFORMATION AND IDENTIFICATION SYSTEM

PICTORIAL SYMBOLS



FIELD MOUNTED INSTRUMENTS



ITEM LOCATED IN INSTRUMENT ROOM PANEL OR CUBICLE



TWO WAY VALVE BODY



THREE WAY VALVE BODY



FOUR WAY VALVE BODY



SAFETY VALVE



RUPTURE SAFETY DISC OR VALVES



PNEUMATIC OPERATOR FOR ANY VALVE



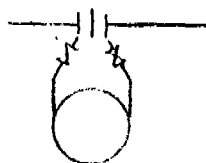
HYDRAULIC OPERATOR FOR ANY VALVE



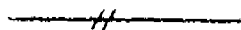
ELECTRIC OPERATOR FOR ANY VALVE



MANUAL OPERATOR FOR ANY VALVE



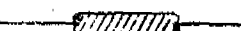
ALL ORIFICES



INSTRUMENT AIR PIPING OR TUBING



INSTRUMENT AIR TUBING WITH LINE NO. IDENTIFICATION



INSTRUMENT MULTITUBE BUNDLE



PROCESS PIPING TO INSTRUMENTS

1 BB 0015067 1

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TITLE INSTRUMENTATION INFORMATION AND IDENTIFICATION SYSTEM

PICTORIAL SYMBOLS



THERMOCOUPLE SYMBOL WITH IDENTIFICATION



pH ELECTRODE ASSEMBLY



CONDUCTIVITY CELL SYMBOL WITH IDENTIFICATION



INSTRUMENT CAPILLARY TUBING

| BB 0015068 |

TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

The following list should be used for selecting the types of materials to be used. The list is not complete but covers most of the major items. Deviation from this list will be necessary in some instances, but should be kept to a minimum.

Major equipment such as control valves, process transmitters, control board mounted instruments, pressure gauges, thermometers, process analyzers, etc., are not covered in this specification. The manufacturer and type of equipment will be specified by the Owner.

I. PNEUMATIC INSTRUMENTATION:

A. Tubing (Copper)

Single 1/4" O.D. x .030" wall polyethylene covered copper tubing

Dekoron #SL-4C-V or equal

B. Tubing (Plastic)

Single 1/4" O.D. x .040" wall

Dekoron type "P" or equal

C. Tubing Fittings Brass and Alloy Swagelok

D. Plastic multi-tube bundle 1/4" Polyethylene tubes, with two conductor cable, cushion tape, and polyethylene sheath.

Dekron Protecto-Pack, type R or equal.

E. Tubing Supports

1 - 10 single 1/4" O.D. x .030" wall tubing

PW 2" x 2" x 1/8" - AG-2 H.D. Galv. or equal

Multi-tube bundles

P-W Industries or equal tray system, 3" high channel with mesh bottom

Use Kindorf R-900, R-903, or R-907 channel for supports where structural steel is not adequate.

TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

I. PNEUMATIC INSTRUMENTATION: (Cont'd.)

F. Junction Boxes

Heavy duty #14 gauge hot dipped galvanized steel box with gasket on cover. Front cover dog-clamped. No hinges. NEMA 4 enclosure.

Hoffman or equal

G. Three Valve Instrument Manifold Anderson Greenwood Company

MBS or equal

H. Solenoid Valves

ASCO or equal

II. ELECTRICAL INSTRUMENTATION:

A. Conduit, conduit fittings, and wire are covered in electrical specification.

B. Thermocouple Wire - Elements and Extension Leads

This specification covers the use, size and type of all thermocouple wire used in extension lead service or for the actual thermocouple.

1. Thermocouple Wire Specifications

For temperatures of minus 300°F to plus 50°F, Copper-Constantan (T) couples of 16 gauge wire should be used. The wire must be equal to Leeds and Northrup Part No. 16-1-2 (Copper), 16-1-1 (Constantan). Double bore ceramic insulator shall be used on these couples. Material to be of premium grade and purchased as matched wire.

For temperatures of 0°F to plus 600°F, iron-Constantan (J) couple of 16 gauge wire will give the best response. The thermocouple shall be made of Thermo-Electric type G/G (fiber glass-fiber glass wire) wire or equal.

For temperatures of plus 400°F to plus 1400°F, iron Constantan (J) couple of 14 gauge wire should be used. The wire must be equal to Leeds and Northrup Part No. 14-1-4 (Iron), 14-1-10 (Constantan) or equal. Double bore ceramic insulators shall be used on these couples.

At times it may be necessary to use other base metal couples or noble metal couples to meet special requirements, at which times Engineering should be consulted for recommendations.

TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

II. ELECTRICAL INSTRUMENTATION: (Cont'd.)

2. Extension Wire Specifications

To secure the advantages of automatic reference junction compensation, the extension wires connecting couples to instruments must be of the same materials as the couples, or of materials having essentially the same temperature-EMF relationship. Several different types of insulation materials are available, but the following specified material should cover all present applications. If special insulation is required consult Engineering.

a. Two Conductor

Two conductor extension wire shall be twisted conductors, Dekoron type MX or equal. Engineering will specify type of extension wire required if electrostatic and electromagnetic noise rejection is required.

COPPER CONSTANTAN EXTENSION LEAD WIRE

<u>Wire Size</u>	<u>Insulation</u>	<u>Temp. Limits</u>	<u>MH</u>	<u>I&N</u>	<u>Dekoron</u>
#1 16 Ga.	Polyvinyl over Polyvinyl	200° F. Max.	1W2P4	NA	MX
#2 16 Ga.	Weatherproof braid over heat resistant rubber	175° F. Max.	NA	16-56-1	

IRON-CONSTANTAN EXTENSION LEAD WIRE

<u>Wire Size</u>	<u>Insulation</u>	<u>Temp. Limits</u>	<u>MH</u>	<u>I&N</u>	<u>Dekoron</u>
#1 16 Ga.	Polyvinyl over Polyvinyl	220° F. Max.	3W2P4	NA	MX
#2 16 Ga.	Weatherproof braid over Polyvinyl	220° F. Max.	3W2A14	16-51-7	
#3 16 Ga.	Weatherproof braid over heat resistant rubber	175° F. Max.	NA	16-51-1	
#4 16 Ga.	Asbestos over enameled wire	100° F. Max.	3W2P4	16-51-2	MX

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TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

II. ELECTRICAL INSTRUMENTATION: (Cont'd.)

CHROMEL-ALUMEL EXTENSION LEAD WIRE

<u>Wire Size</u>	<u>Insulation</u>	<u>Temp. Limit</u>	<u>MH</u>	<u>ISN</u>	<u>Dekoron</u>
#1 16 Ga.	Polyvinyl over Polyvinyl	220° F.	5W2F14	NA	NX
#2 16 Ga.	Weatherproof braid over Polyvinyl	220° F.	NA	16-59-10	
#3 16 Ga.	Weatherproof braid over heat resistant rubber	175° F.	NA	16-59-1	
#4 16 Ga.	Asbestos over enameled wire	1000° F.	5W2R14	16-59-2	

b. Multi-Conductor Extension Wire Cable

Multi-conductor extension wire cable should be Dekoron type M or equal. Conductors should be 18 gauge with each pair twisted.

Engineering will specify type of multi-conductor extension wire cable required if rejection of extraneous noise is required.

c. pH Lead Wire

Beckman #43104 or as specified by vendor

D. Electronic Control System Multi-Conductor Cable

Okonite Co. or Dekoron type 10K

18 Ga., 7 stranded copper, .020" Okolene, .010 Okoseal #500, solid color coded, twisted pairs, cabled, nylon tape, .040" Okoseal jacket, 600 V.

Engineering will specify type of cable required if electrostatic and electromagnetic noise rejection is required.

E. Electronic Control System Two Conductor Cable

2 conductor twisted pair, shielded, #16 gauge.

Belden #8780 or Dekoron type 10MX.

BB 0015072

TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

II. ELECTRICAL INSTRUMENTATION: (Cont'd.)

- F. Thermocouple multi-conductor extension cable and electronic control cable trays.

P-W Industries or equal tray system, 3" high channel sides, mesh bottom.

- G. Alarm & Instrumentation Electrical Control Wiring

All wiring from field devices to alarm panels shall be #16 gauge wire. A yellow wire shall be used for the common on alarm systems. Generally #14 gauge wire shall be used for control circuits; however, wire size shall depend upon the electrical load for conductors.

TITLE

PNEUMATIC INSTRUMENTS - AIR LINE IDENTIFICATION

GENERAL:

Pneumatic instrument air lines of instruments (field and Control Board) are to be identified and numbered as described in the following paragraph.

IDENTIFICATION:

<u>General Identification</u>	<u>Line No.</u>
TA (Transmitted Air)	TA-1
CA (Controlled Air)	CA-1
SP (Set Point)	SP-1
F (Feed Rack)	F-1
CO (Cut-Off Relay)	CO-1

TITLE

GENERAL INSTALLATION PRACTICES - THERMOCOUPLES AND THERMOCOUPLE
EXTENSION LEAD WIRE AND pH EXTENSION LEAD WIRE

1. Extension leads must be one continuous length from thermocouple to control room. This applies only if two conductor extension wire is used.
2. All bends in thermocouple conduit should be long radius bends. Conduit fittings should not be used except for pull point locations.
3. No other electrical wires should be run in the same conduit.
4. Conduit containing extension lead wire should not be run parallel to 480 volt or higher feeders. Consult Engineering.
5. The conduit should not be filled in excess of forty-five per cent (45%).
6. If thermocouple leads are required to pass in or through a dense electrical field each thermocouple must be run with shielded wire and the shield properly grounded at device end.
7. Thermocouples shall not be made from extension lead wire.
8. Thermocouple leads as well as extension leads should be carefully cleaned before fastening to the connection block.
9. Thermocouple polarity must be strictly observed.
10. pH lead wire and conduit shall conform to the specifications as given for thermocouples and thermocouple extension lead wire.
11. pH conduit and pH electrodes shall be designated in the same manner using "pH" as the identifying symbol.
12. Conductivity conduit and conductivity cells shall be designated in the same manner using "C" as the identifying symbol.
13. A junction box shall be provided at each end of a multiconductor extension wire cable for termination of two conductor extension wires in the process area and in the control room.
14. Multiconductor extension wire cable should generally be run in an instrument tray and fastened to bottom of instrument tray with plastic straps.
15. No mechanical type lug shall be used to terminate thermocouple lead wire.
16. Mechanical type lugs shall be used to terminate all control wiring and electronic wiring.

BB 0015075

TITLE

GENERAL INSTRUMENT PIPING SPECIFICATIONS

This specification includes special items regarding methods and materials which are not included in other specifications. It is the intention to use these specifications in design and engineering as well as in purchasing of materials.

1. Instrument piping which is used to measure flow and pressure, should be sloped a minimum of 1" per foot of horizontal run. The connections should be without summits or depressions. Wherever practical, pipe bends should be used in preference to elbows.
2. The piping must be laid out so that undue stresses are not exerted on the meter body and should be firmly supported to prevent sagging.
3. The piping between the orifice and the first plugged tee should be as straight as possible to permit cleaning with a rod.
4. The minimum pipe size should be 1/2". When instruments have connections smaller than 1/2", the lines should be reduced in size at the instrument or its adjacent manifold.
5. All pilot connections to panel mounted equipment should be avoided where possible.
6. Instrument air supply for field mounted instruments should be 1/2" size up to air filter. From filter and air reducing valves, all piping should be brass pipe or copper tubing, vinyl plastic covered where practical, unless otherwise specified.
7. All take off connections minimum 1/2" pipe.
8. All field instrument air take off valves should come from the side or top of the header and should conform to valve specifications.
9. Single tubing runs should be supported every 18". Multitube bundles less than seven tubes 4-1/2 feet, more than seven tubes 6 feet.
10. Multitube bundles should terminate in a hot dipped galvanized steel junction box in the process area. Multitube bundles entrance into junction boxes and control rooms should be made with a galvanized steel terminal fitting with a neoprene bushing (Prestent 25T Series or equal).
11. Single 1/4" O.D. x .030 wall polyethylene covered copper tubing, Prestent Cat. 21TH or equal, shall be run from tubing junction boxes to field located instruments. 1/4" copper tubing to enter tubing junction boxes by means of a tubing bulkhead fitting. All copper tubing fittings are to be wrapped with Scotch No. 33 electrical tape. 1/4" tubing lines should be supported by 2" x 2" x 1/8" FW AG-2 or equal.

TITLE

GENERAL INSTRUMENT PIPING SPECIFICATIONS

12. Each tube in a multitube bundle should be identified by means of a metal tag placed in tubing junction boxes.
13. Three valve manifolds should be used on differential pressure flow transmitters, unless otherwise specified. No three valve manifold shall be used on chlorine and hydrochloric acid streams. Line specifications valves shall be used for shut-off valves and equalizing valves.
14. Piping from three valve manifolds to differential pressure flow transmitters should be 3/4" SS tubing, unless otherwise specified. Consult line specifications also for materials. In some areas this tubing must be wrapped with #33 scotch tape. Consult engineering.
15. Instrument trays should be supported as per manufacturer's recommendations.
16. In areas of high corrosion 3/4" SS tubing should be wrapped with #33 scotch tape.

| BB 0015077 |

TITLE
GENERAL SPECIFICATIONS COVERING PRESSURE GAUGES

GENERAL

The specifications given herein apply to general purpose line mounted gauges other than panel mounted or special purpose gauges and are usually applied directly to processing vessels or piping either out of doors or inside plant buildings. The gauges covered are limited to the pressure range 1,000 PSI maximum and 15 PSI minimum, and a maximum temperature of 250° F.

All gauges for panel mounting or special services not covered by these specifications shall be approved and/or specified by the Engineering Department. The scale range of all general purpose gauges shall be selected to give approximate midscale operation under normal pressure conditions. If conditions of variable pressure exist, the scale range shall be selected to enable a minimum pressure indication not less than 20% and a maximum pressure indication not exceeding 80% of full scale range.

Gauges shall be protected against known conditions of momentary pressure shock or rapidly pulsating pressures. Under these conditions, pressure snubbers shall be used, and the scale range shall be selected in compliance with the above minimum and maximum limitations.

The pressure element shall be protected against conditions of direct exposure to corrosive fluids or temperatures above the specified maximum. Under conditions of corrosive fluids, diaphragm protectors shall be used. Traps or a called "pigtaills" or the equivalent shall be used to isolate the gauge element from direct exposure to high temperature fluids.

Mountings shall be vertical, and the gauges shall not be mounted directly onto a pipeline or structural member possessed of vibration. Under conditions of vibration in the pipe line or structural member, the gauge shall be mounted at a vibration free location and connected with flexible piping or suitable solid swing joint piping to isolate it from the disturbance.

Take-off connections at the piping header shall be:

1/2" N.P.T. for general purpose gauges

1" N.P.T. for chemical diaphragm gauges

In all cases, a shutoff valve shall be installed at the point of take-off, and all fittings shall comply with the piping specifications. Except under special conditions, all pressure take-off points shall be on top or side of piping headers.

Pressure take-off connections on intermediate holding tanks and storage vessels shall be 1" NPT female thread unless otherwise specified. Nozzles on reactors, processing vessels, and distillation columns shall be minimum schedule 80, 1-1/2" flanged, with reducing flange threaded per gauge requirements.

BB 0015078

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TITLE GENERAL SPECIFICATIONS COVERING PRESSURE GAUGES

GENERAL (contd.)

Pressure gauges with special features such as alarm contacts, internal illumination, differential linkage, suppressed ranges, etc., shall not be used except on special consideration.

Recommended vendors are:

Manning, Maxwell, & Moore

U. S. Gauge

| BB 0015079 |

TITLE GENERAL SPECIFICATIONS COVERING PRESSURE GAUGES

GAUGE SPECIFICATIONS

Unless otherwise specified, all gauges shall have the following common specifications pertaining to dial, case, and movement.

A. DIALS

4-1/2" circular, metallic, or plastic scale with black numbers on a white background, with the scale numerals being whole number multiples of unity or ten. The pointer shall rotate about a fixed center concentric and cover a minimum arc of 270° between minimum and maximum limits. The pointer shall have a micrometer adjustment.

B. CASE

Black finished phenol, turret type construction with snap ring and clear glass. Threaded dial cover rings of phenol construction with special glass retaining rings shall be acceptable but not preferred.

C. MOVEMENT

Geared, with hardened stainless steel pinion and stainless steel bearings. Nylon, hard rubber, or any other composition material shall not be used. The movement shall be provided with adjustable linkage and connecting link to enable zero and range span adjustment.

D. RANGES

The standard scale range of all gauges shall be as follows:

Range No. 1	0 - 15 PSIG
Range No. 2	0 - 30 PSIG
Range No. 3	0 - 60 PSIG
Range No. 4	0 - 100 PSIG
Range No. 5	0 - 200 PSIG
Range No. 6	0 - 400 PSIG
Range No. 7	0 - 600 PSIG
Range No. 8	0 - 800 PSIG
Range No. 9	0 - 1000 PSIG
Range No. 10	30" - 0-30 PSIG
Range No. 11	30" - 0-60 PSIG
Range No. 12	30" - 0-100 PSIG
Range No. 13	30" - 0-300 PSIG

E. BOURDON TUBE

Shall be 316 stainless steel with socket of S.A.E. 1019 alloy steel or equal, tip - S.A.E. 1020 alloy steel or equal. All joints shall be welded and stress relieved. Pipe connections shall be 1/2" N.P.T. bottom connection for all gauges with pressure range 0 -1000 PSIG

| BB 0015080 |

TITLE GENERAL SPECIFICATIONS COVERING PRESSURE GAUGES

GAUGE SPECIFICATIONS (contd.)

F. PANEL MOUNTED GAUGES (FLUSH)

These gauges shall meet the same specification as outlined for general line mounted gauges except case to be cast iron construction, 6" dial size, 1/4" N.P.T. back connected. The ring shall be held tightly at the top by a hinge pin and at the bottom by a clamp screw.

G. SPECIAL PURPOSE GAUGES

All small utility gauges such as used on instrument air supply and control air output shall be 2-1/2" size, stainless steel case, 1/4" bottom or back connected with bronze bourdon tube.

H. RECEIVING TYPE GAUGES

These gauges shall meet the same specification as outlined for the general line mounted or panel (flush) mounted gauge --- whichever applies.

I. CHEMICAL GAUGES

Gauges that are used with diaphragm protectors and are of the fluid filled type are called chemical gauges. The gauges shall meet the same specifications as the general line mounted type with the following additions.

1. A suitable bleeder shall be provided to enable pressure filling of the bourdon tube with a sealing fluid. This shall be an internal stainless steel capillary which extends completely to the tip of the tube and terminates outside the case on the back or side in a stainless steel pressure tight fitting.

2. The tube filling fluid shall be:

Dow Corning DC-703, 300° F. - 750° F. or equal
Dow Corning DC-200, -30° F. - 300° F. or equal

or

Manning, Maxwell, & Moore S-280, -30° F. - 300° F.
Manning, Maxwell, & Moore S-278, 300° F. - 775° F.

BB 0015081

TITLE
GENERAL SPECIFICATIONS COVERING PRESSURE GAUGES

J. THE CHEMICAL PROTECTOR

Unless otherwise specified, the upper housing shall always be carbon steel with the diaphragm and the bottom part to be of material specified to meet the application. The protector shall be of the non-cleanout type such as Manning, Maxwell, & Moore #1269 or equal. The gauge connection shall be 1/4" N.P.T., and the piping connection to the bottom part shall be 1". The top part shall be provided with a 1/8" N.P.T. bleeder screw and sealing ball.

Standard diaphragm materials shall be:

1. Tantalum
2. Monel
3. Pure Nickel
4. Stainless Steel (316 - 347)

Standard bottom material for gauge protectors shall be:

1. Monel
2. Nickel
3. Stainless Steel (316 - 347)

K. GAUGE SNUBBERS

Gauge snubbers shall be used on all gauges subject to pressure fluctuations or repetitive pulsations. These snubbers shall be:

1. Sintered metal type (all stainless steel) as catalogued by Helicoid Gauge Company Catalogue S-6, or Ashcroft type 1112S supplied by Manning, Maxwell, & Moore.
2. Piston type such as manufactured by Ray Snubber Company.

Snubbers shall not be used in direct contact with a process fluid which is corrosive or contaminated with impurities which will plug the pores. In such cases, gauges with chemical protectors and snubbers shall apply.

L. COIL PIPE SIPHONS (PIGTAILS)

Siphons or the equivalent seal pot or trap shall be used on all gauges in steam service. The siphon shall be uninsulated to enable free radiation of heat and condensation of steam within the loop. Installations subject to freezing shall utilize a seal pot and the gauge line filled with dibutyl phthalate or equal anti-freeze compound.

BB 0015082

TITLE

INSTRUMENT SPECIFICATIONS FOR ORIFICE PLATE AND METER RUN INSTALLATIONS

1. When metering compressible fluids, the meter range (in inches of water) should not exceed the absolute upstream static pressure (in PSIA).
2. The orifice and metering section of piping shall be sized to give an orifice diameter ratio of 0.5 to 0.6. Consult Engineering Department for special adaptations. In no case shall the orifice ratio be outside the limits of 0.3-0.75.
3. The orifice generally shall be sized to give a meter scale reading of 80% at normal maximum production rating.
4. When metering gases under low pressure, the pressure differential should be kept low to minimize permanent pressure loss and to reduce the sensitivity of the meter to the gas expansion factor Y.
5. Material for the thin plate orifice shall be 316 or 304 S.S. as standard. Consult Engineering for special adaptations.
6. Orifice runs shall have a minimum of 20 pipe diameters upstream and 10 pipe diameters downstream of straight run pipe.

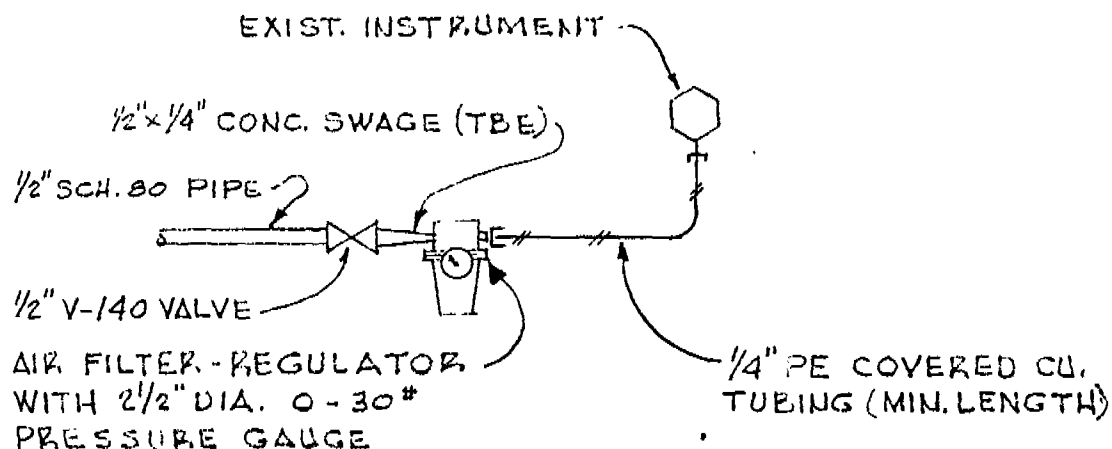


7. All orifice tap shutoff valves shall be gate type and shall conform to plant valve material specifications for the fluid being handled.
8. Orifice taps on orifice flanges, should be located horizontally.
9. All throttling control valves shall be located downstream side of orifice plate.

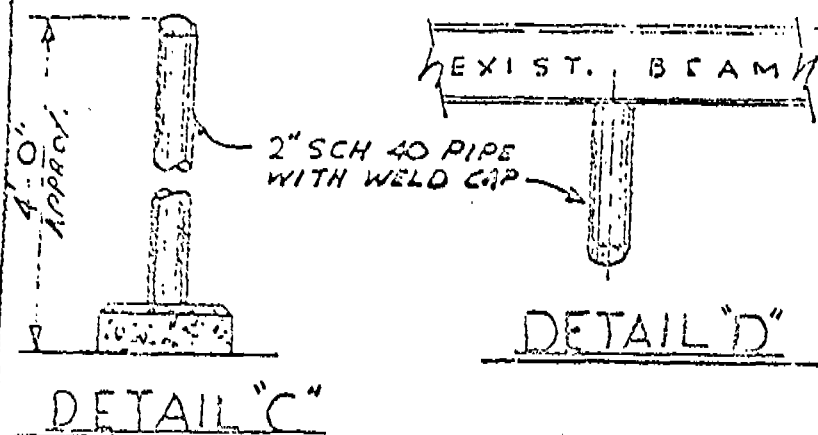
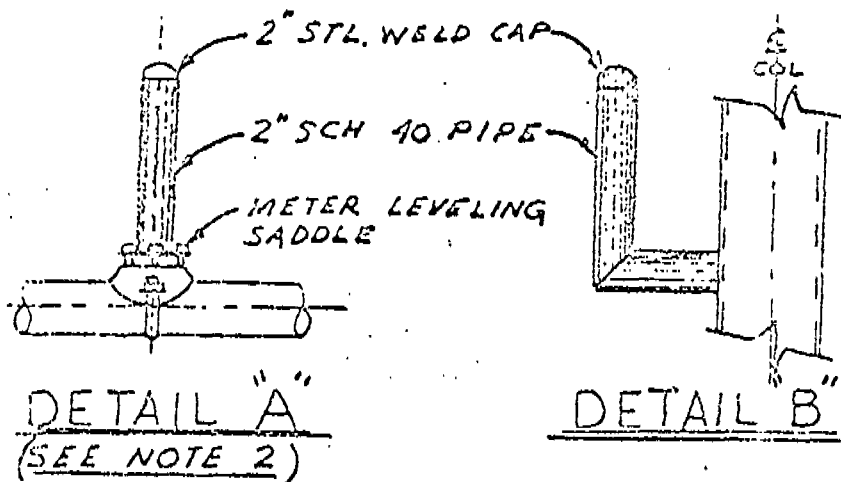
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TITLE
TYPICAL AIR SUPPLY HOOK-UP TO INSTRUMENT

MATERIAL	
ITEM	QTY.
1/2" SCH. 80 STEEL PIPE	-
1/2" V-140 BALL VALVE	1
1/2"x1/4" CONC. SWAGE (TBE)	1
AIR FILTER REGULATOR	1
2 1/2" DIA. 0-30# PRESS. GAGE	1
1/4" NPT x 1/4" TBG MALE	
TUBING CONNECTOR	2
1/4" PE COVERED CU. TUBING	-

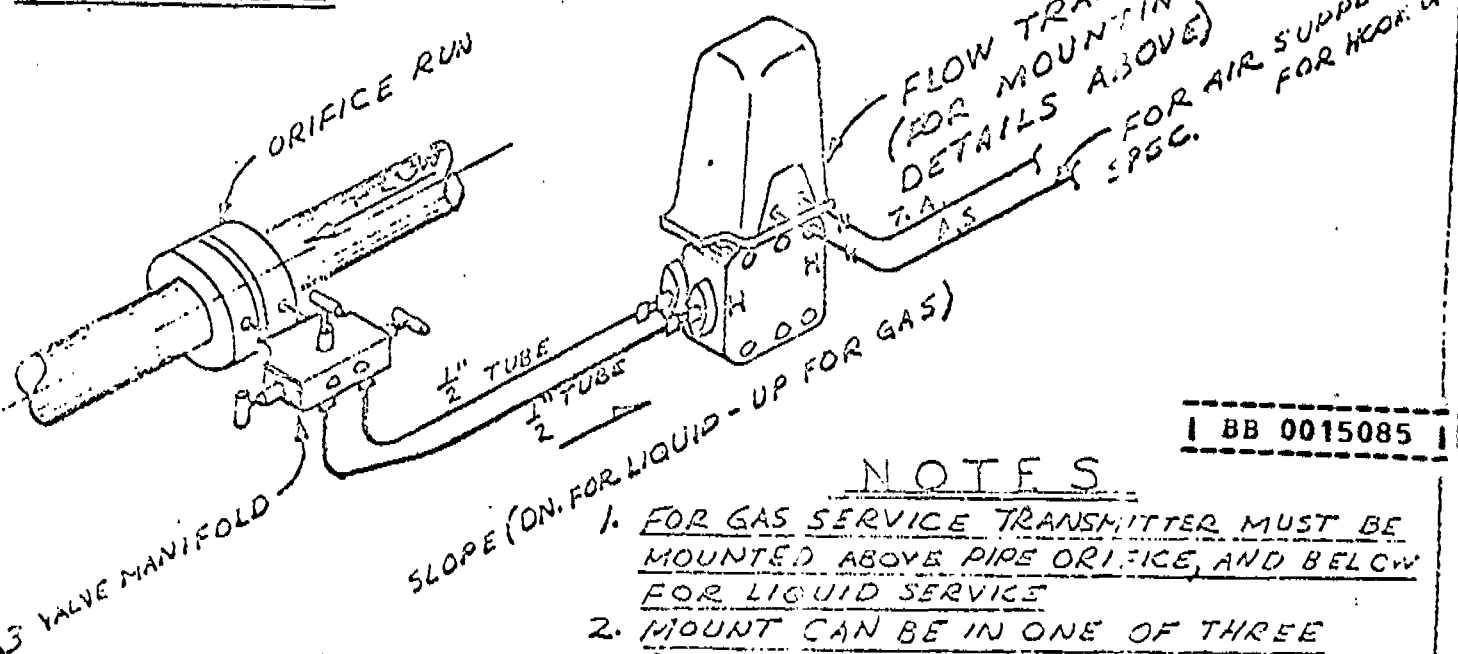


TITLE FLOW TRANSMITTER INST'L. - LIQUID
OR GAS, MANIFOLD & TUBE HOOK-UP



MATERIAL

ITEM	QTY
FLOW TRANSMITTER	1
3 VALVE MANIFOLD	1
1/2" X 2" 316 STAIN. STL. NIP	2
1/2" 316 STAIN. STL. TUBING	5'
1/2" MPT. X 1/2" TBG MALE TUBE CONNECTOR	1
1/4" MPT. X 1/4" TBG MALE TUBE CONNECTOR	1
MOUNTING	
2" SCH. 40 STL PIPE	-
2" SCH 40 WELD CAP	1
(PIPE SIZE) METER LEVELING SADDLE	1



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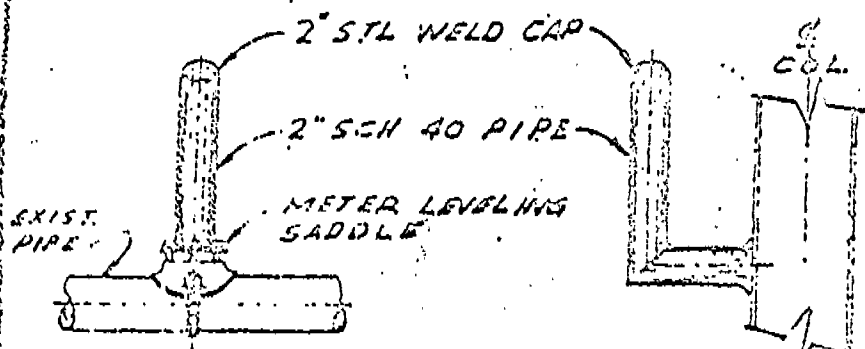
NOTES

1. FOR GAS SERVICE TRANSMITTER MUST BE MOUNTED ABOVE PIPE ORIFICE, AND BELOW FOR LIQUID SERVICE
2. MOUNT CAN BE IN ONE OF THREE POSITIONS. ADD A (-1) AFTER DETAIL A FOR VERTICAL MOUNT ABOVE PIPE, A(-2) FOR VERT. BELOW PIPE, OR A (-3) FOR HORIZONTAL TO PIPE MOUNT.

TITLE FLOW TRANSMITTER INST'L. - LIQUID
OR GAS, VALVE & PIPE HOOK-UP

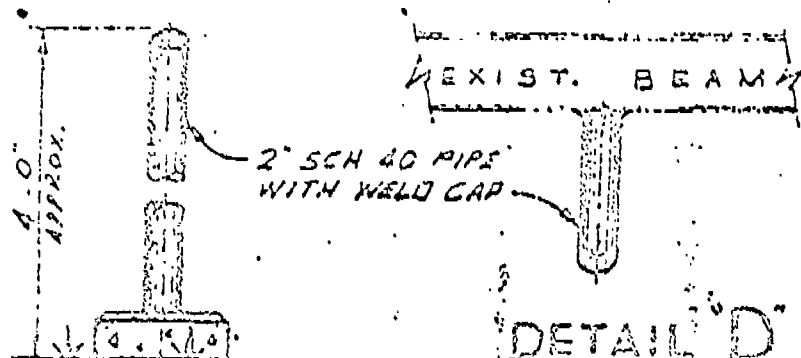
MATERIAL

ITEM	QTY.
FLOW TRANSMITTER	1
1/2" PIPE - LINE SPEC	-
1/2" VALVE - LINE SPEC	3
1/2" UNION - LINE SPEC	3
3/4" x 2" PIPE WIPP. LINE SPEC	7
1/2" 90° ELL - LINE SPEC	6
1/2" TEE - LINE SPEC	4
1" PIPE PLUG - LINE SPEC	2
1 NPT x 1/4 TBC. MALE	1
TUBING CONNECTOR	
MOUNTING	
2" SCH 40 STL. PIPE	-
2" SCH 40 STL. WELD CAP	1
(PIPE SIZE) METER	
LEVELING SADDLE	1



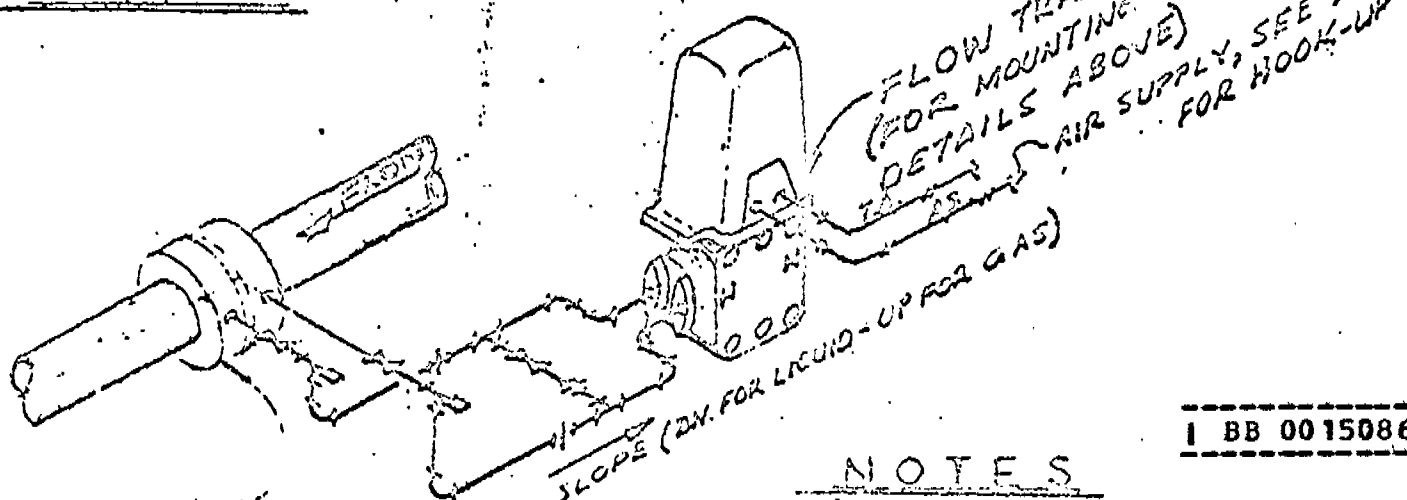
DETAIL "A"
(SEE NOTE 2)

DETAIL "B"



DETAIL "C"

DETAIL "D"



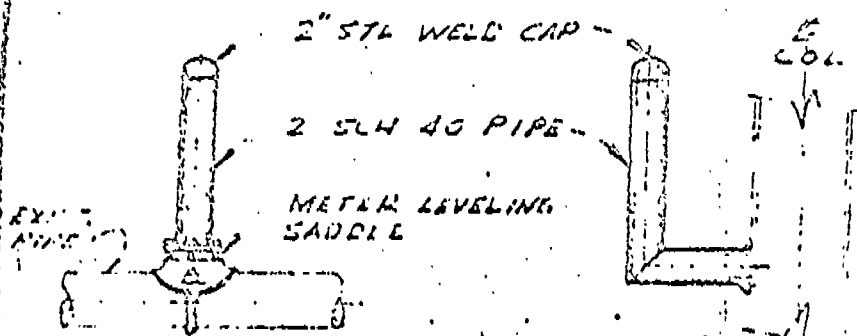
BB 0015086

NOTES

1. FOR GAS SERVICE TRANSMITTER MUST BE MOUNTED ABOVE PIPE ORIFICE, AND BELOW FOR LIQUID SERVICE.
2. MOUNT CAN BE IN ONE OF THREE POSITIONS. ADD A (-1) AFTER DETAIL A FOR VERTICAL MOUNT ABOVE PIPE, A(-2) FOR VERT. BELOW PIPE, OR A (-3) FOR HORIZONTAL TO PIPE MOUNT.

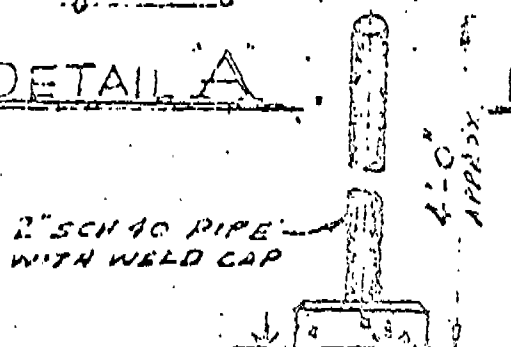
ORIFICE RUN -

TITLE PRESS. TRANSMITTER INST'L - PIPE LOOK-UP



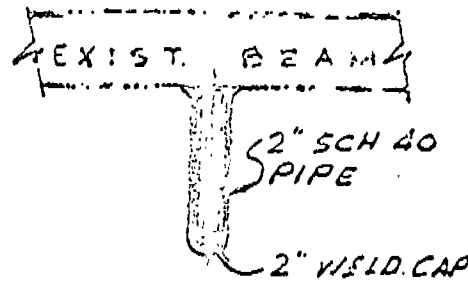
DETAIL A

DETAIL B

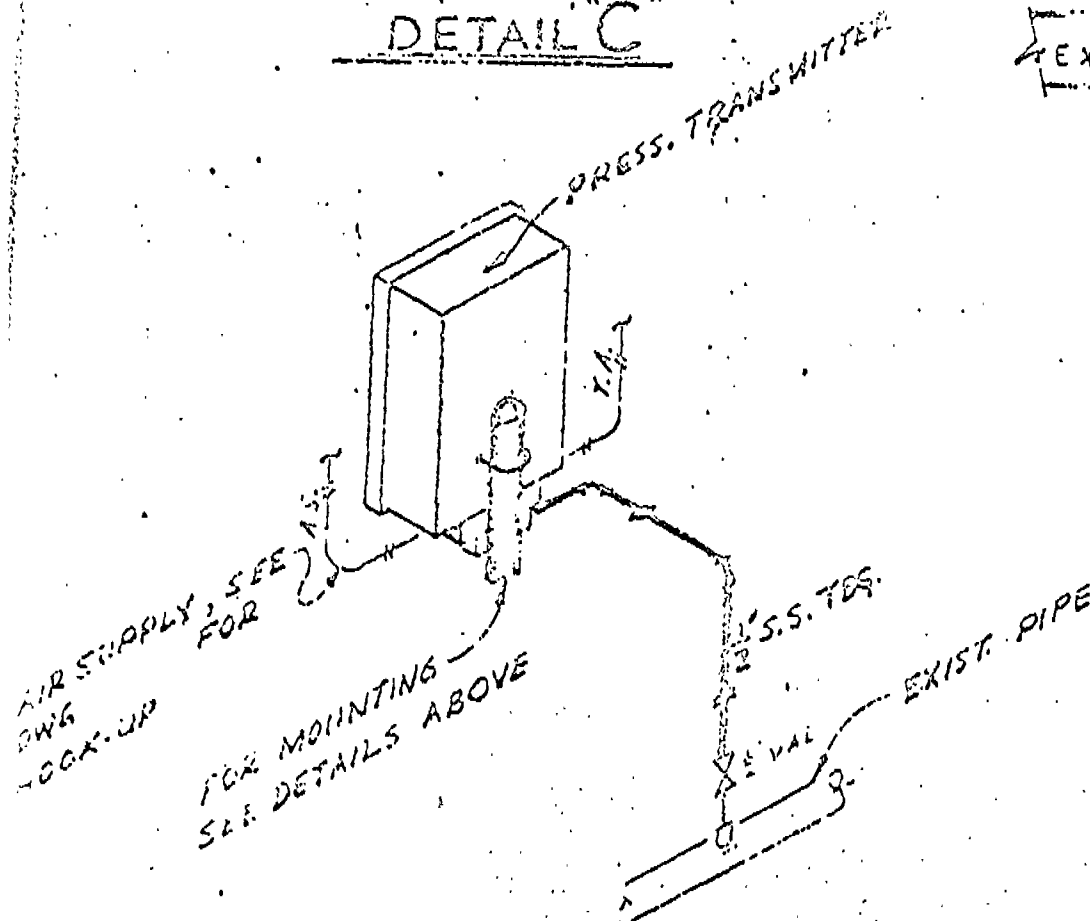


DETAIL C

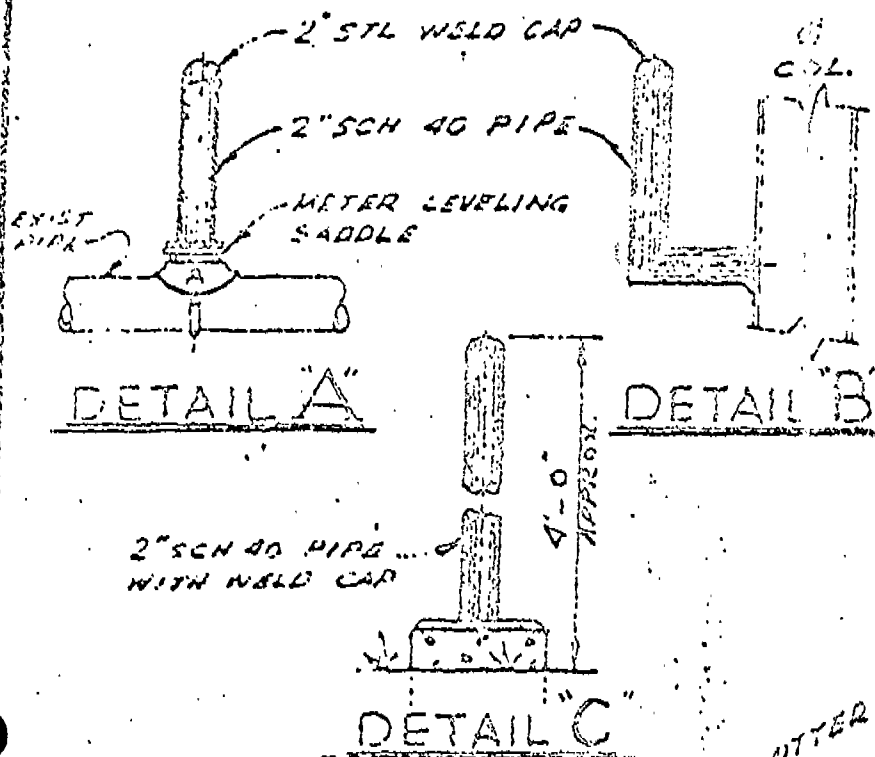
MATERIAL	
ITEM	QTY
PRESSURE TRANSMITTER	1
1" PIPE - LINE SPEC.	—
1/2" UNION - LINE SPEC.	1
1" VALVE - LINE SPEC.	1
1/2" 90° SCH. ELL. - LINE SPEC.	2
2" NPT x 1/2" TBG MALE TUBING CONNECTOR	1
MOUNTING	—
1" SCH 40 S.W. PIPE	—
2" SCH 40 STL WELD CAP	1
(PIPE SIZE) METER LEVELING SADDLE	—



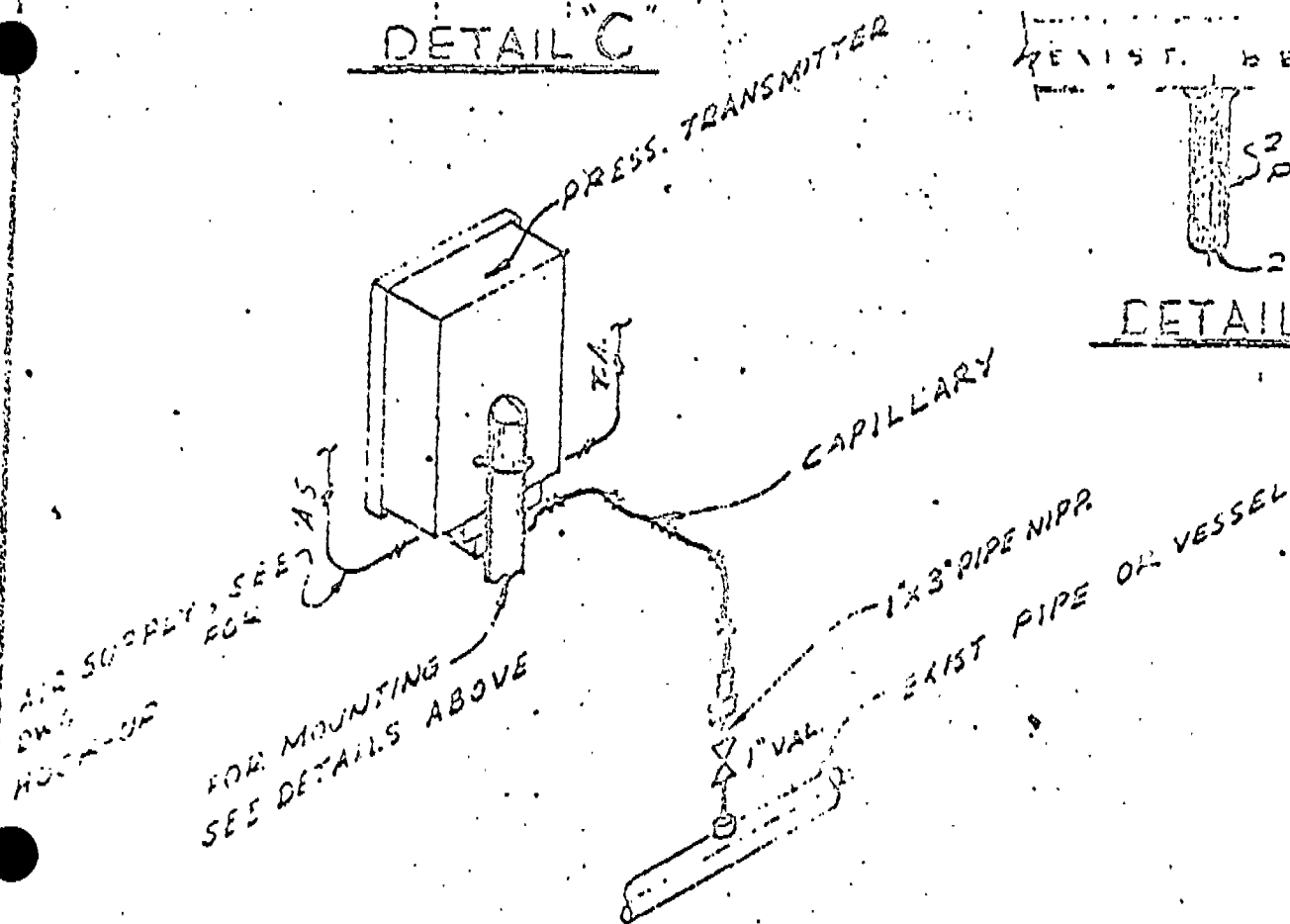
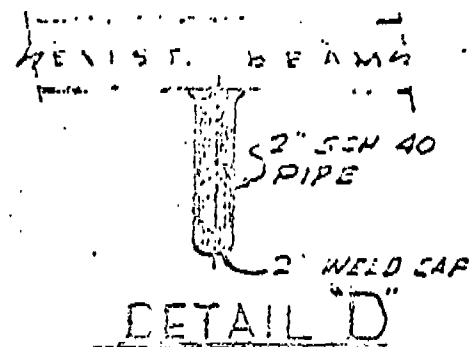
DETAIL D



TITLE PRESS. TRANSMITTER INSTL. - CAPILLARY HOOD-UP

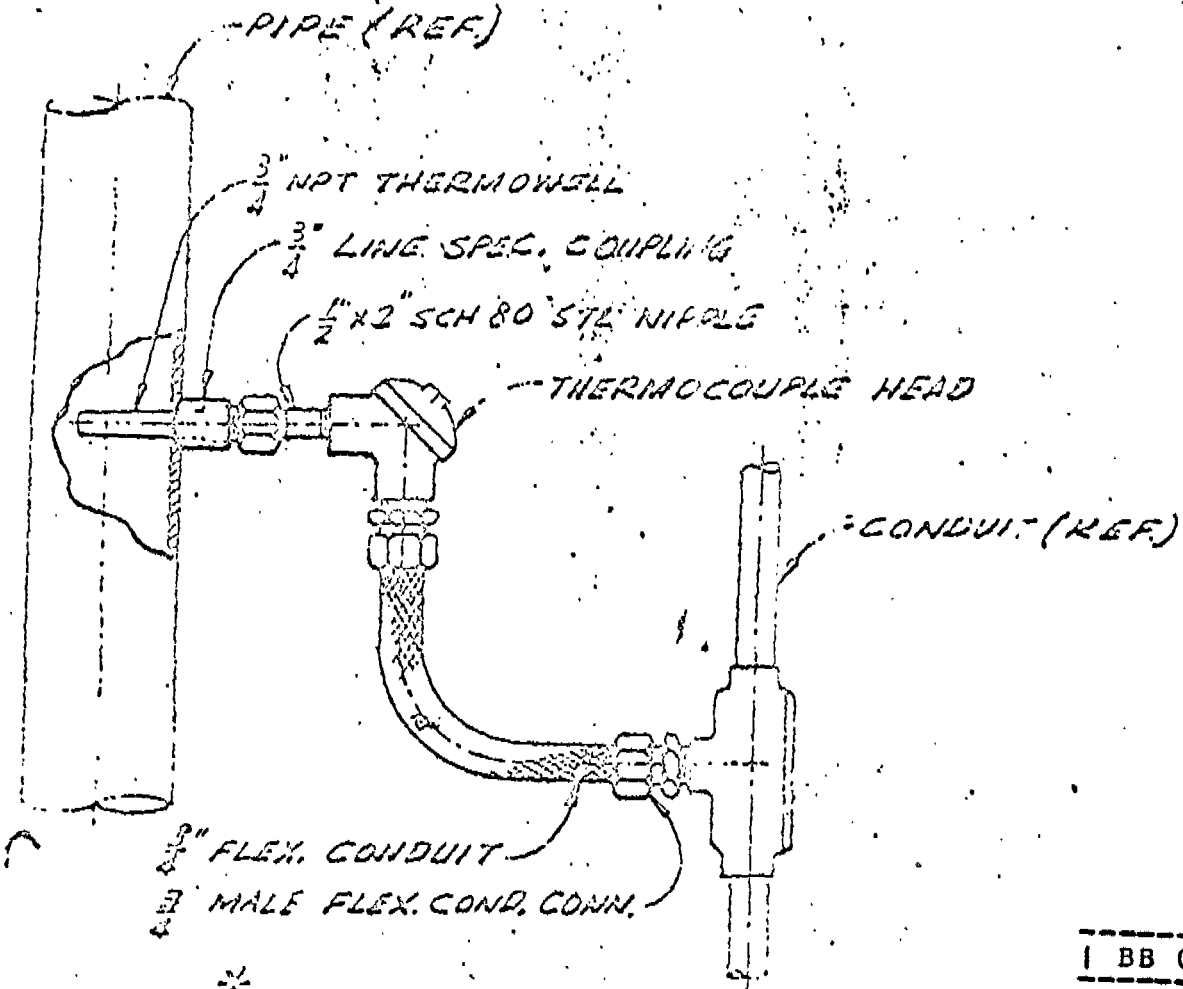


MATERIAL	
ITEM	QTY
PRESSURE TRANSMITTER	1
SEALED CAPILLARY SYS.	1
1"x3" PIPE NIPP LINE SPEC.	2
1" VALVE - LINE SPEC.	1
1" PVC COVERED CU TUBING	—
1/4" IPT x 1/2" TGS MALE TUBING CONNECTOR	1
MOUNTING	—
2" SCH 40 STL PIPE	—
2" SCH 40 STL WELD CAP	1
(PIPE SIZE) METER	—
LEVELING SADDLE	—



TITLE THERMOCOUPLE INSTL - IN PIPE

MATERIAL	
ITEM	QTY
3/4" NPT THERMOWELL, MATL. 316 STAIN. STL. OR LINE SPEC	1
1/2"-3000" LINE SPEC CPLG.	1
1/2" x 2" SCH 80 STL. NIPP.	1
THERMOCOUPLE HEAD	1
3/4" FLEX. CONDUIT	—
3/8" MALE FLEX. CONDUIT CONNECTOR	2



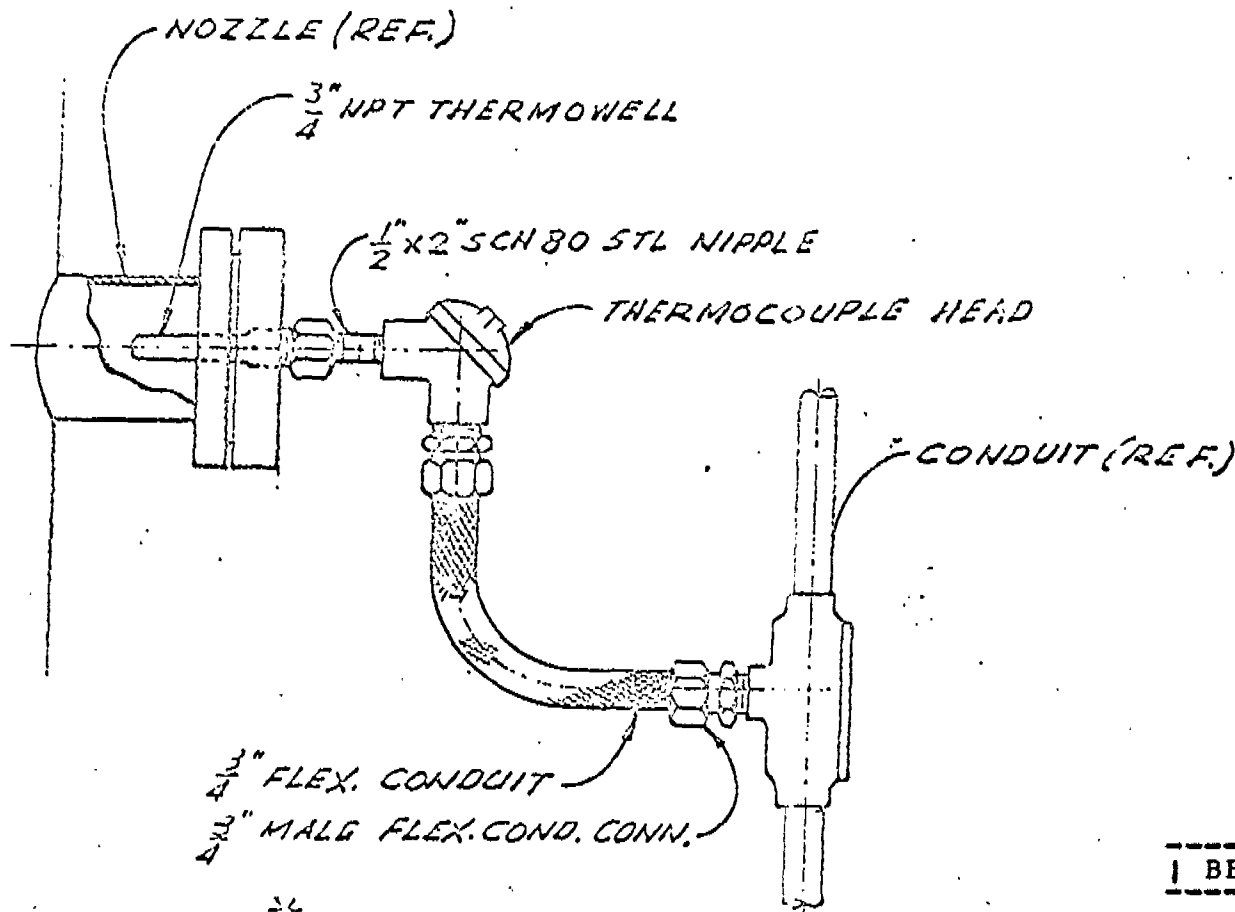
* NOTE: IN SOME CASES 316 STAIN. STL CAN NOT BE USED BECAUSE OF CORROSION; THEN LINE SPEC WILL DETERMINE THERMOWELL MATERIAL.

BB 0015089

TITLE THERMOCOUPLE INST'L - IN NOZZLE

MATERIAL

ITEM	QTY
3/4" NPT THERMOWELL, MATL. *	1
3/16 STAIN. STL. OR LINE SPEC.	
1/2" x 2" SCH 80 STL NIPPLE	1
THERMOCOUPLE HEAD	1
3/4" FLEX. CONDUIT	
3/4" MALE FLEX. CONDUIT CONNECTOR	2

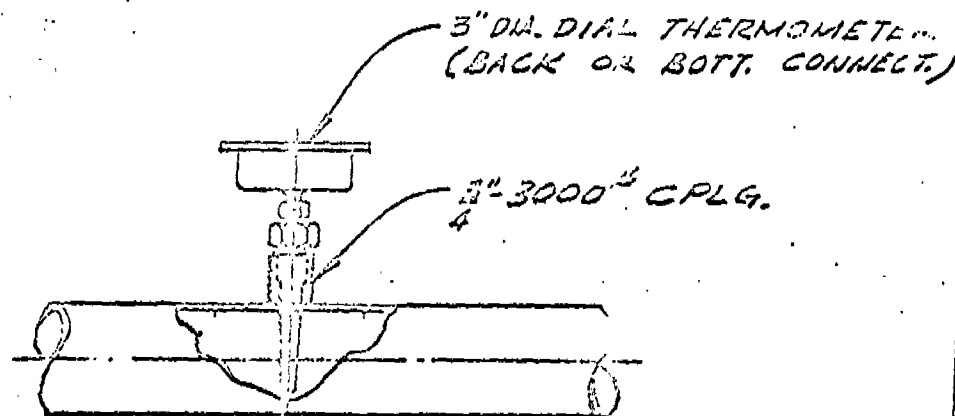
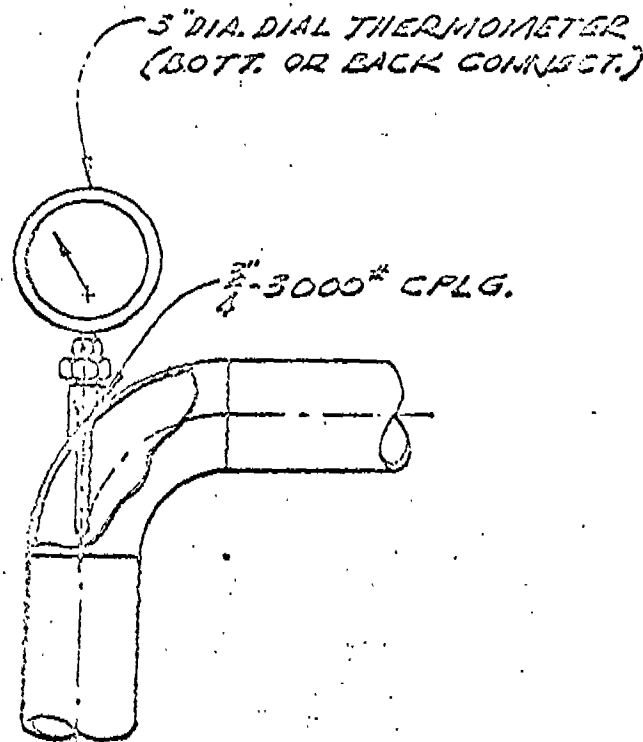


BB 0015090

* NOTE: IN SOME CASES 316 STAIN. STL. CAN NOT BE USED BECAUSE OF CORROSION; THEN LINE SPEC WILL DETERMINE THERMOWELL MATERIAL.

TITLE THERMOMETER INST'L. - IN 1 1/2" PIPE & OVER

MATERIAL	
ITEM	QTY.
3" DIA. DIAL THERMOMETER ASSY. W/ 3/16 STAIN. STL. OR LINE SPEC THERMOWELL (BACK OR BOTTOM CONNECT.)	1
3/4"-3000# CPLG. LINE SPEC.	1



NOTE: IN SOME CASES 316 STAIN. STL. CAN NOT BE USED BECAUSE OF CORROSION; THEN LINE SPEC WILL DETERMINE THERMOWELL MATERIAL

SPECIFICATION NO. DES-P799-IN-17
DATE IN '22-09 PAGE 1 OF 1
APPROVED: [Signature]

DEKRON TERM. BLOCKS TB-2 OR EQUAL

DEKRON # WITH ENTRY FITTING OR EQUAL

REGULATOR
NEEDLE VAL.

CU. TUBE W/ FITT.
N₂ FEED

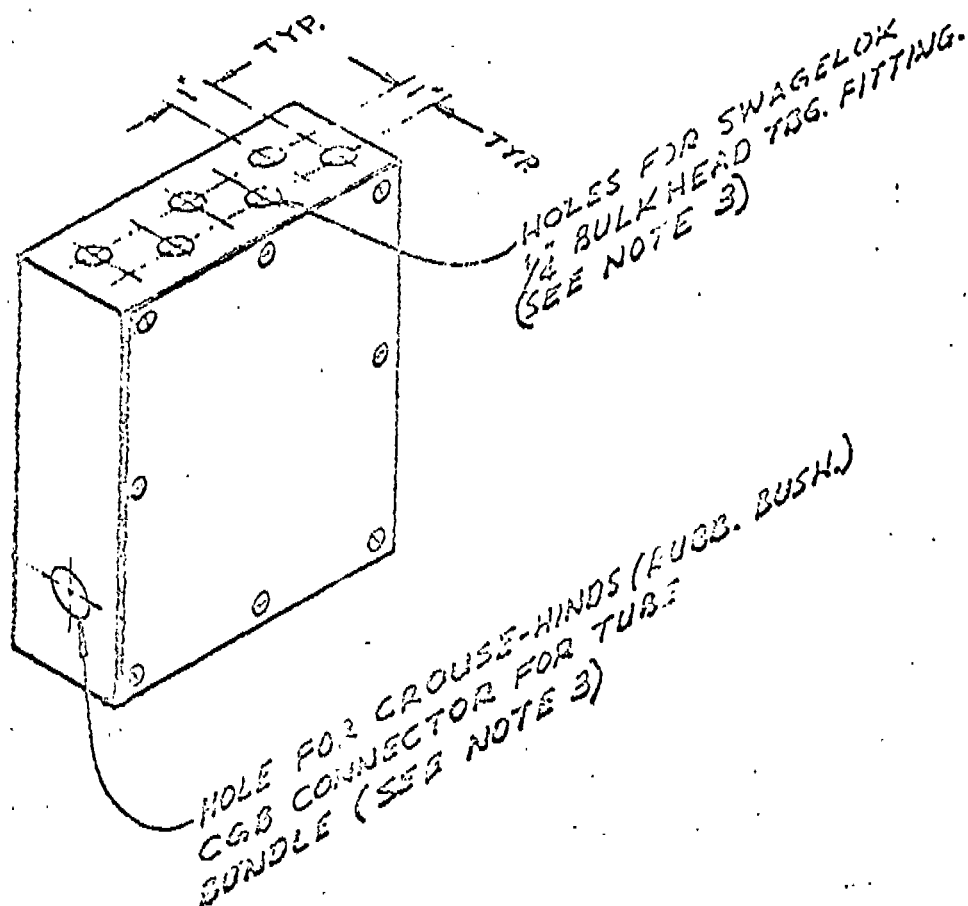
GROUP-HINDS CGB CONNECTOR OR EQUAL

ASPHENOL TYPE 60-PC 2F DOUBLE PIN POLARIZED FEM. RECP. V/ TYPE 75-CCC1 CAP & CHAIN OR EQUAL

BB 0015092

TITLE

JUNCTION BOX - PNEUMATIC



- NOTES:
1. SIZE OF BOX TO BE DETERMINED BY NUMBER & POSITION OF FITTINGS.
 2. ALL TUBES TO BE LONG ENOUGH TO REACH FROM FITTING TO ANY PART OF BOX.
 3. POSITION OF FITTINGS IN BOX DETERMINED BY LOCATION & MOUNTING OF BOX.