

PROG

Entering Pipe Parameters

PIPE

The second option in the Program Menu is PIPE which enables you to enter information for the pipe characteristics and the transducers. You must enter these parameters in order to operate the TransPort. These parameters were also discussed briefly in the Quick Start Flow Measurement Guide supplied separately.

The series of prompts that appear depend on the type of transducers you are using. The first prompt asks you to enter the transducer number which is engraved on the head of the transducer. This number signifies the type of transducer: wetted or clamp-on (standard or medium/high temperature). When you enter the transducer number, the Transport recognizes the type of transducer and proceeds to ask you for the needed pipe information for that transducer type.

This section describes how to enter pipe parameters for all standard transducer types. If you are using a special transducer and need to enter pipe parameters, refer to Appendix C. Use the steps that follow to program your unit.

To enter the PIPE option, press [F2]. The screen appears similar to Figure 3-3. The indicator box indicates you are at the beginning of the PIPE option. Refer to Appendix F, *Menu Maps*, Figure F-1B for a flow diagram of the PIPE option.

NOTE: Refer to Appendix A for additional information about transducers and configurations.

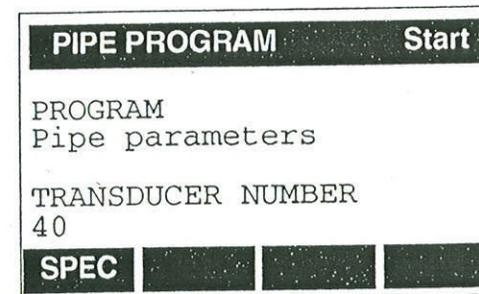


Figure 3-3 Screen After Pressing PIPE Key

Step 1: Entering the Transducer Number

Transducer numbers are broken down into the following categories:

- 1-3 indicates Rayleigh-wave type clamp-on transducers
- 10-39 indicates Shear wave clamp-on transducers
- 40-74 indicates wetted transducers
- 91-99 indicates special clamp-on application transducers
- 112-139 indicates medium and high temperature clamp-on transducers.

NOTE: Not all transducer numbers are valid. Invalid transducer numbers will be rejected.

Use the numeric keys to enter the transducer number and press [ENT].

Depending on the transducer you do one of the following:

- If you are using clamp-on transducers (# 1-3, 10-39, or 112-139), follow steps 2C through 11C on pages 3-12 to 3-19.
- If you are using wetted transducers (# 40-74), follow steps 2W through 8W on pages 3-20 to 3-24.
- If you are using special transducers (# 91-99), refer to Appendix C for instruction for entering pipe parameters.

Entering Parameters for Clamp-On Transducers

If you are using clamp-on transducers, you will get the following prompts:

- Wedge Temperature Input (for medium or high temperature)
- Pipe Material
- Pipe O.D. (pipe outside diameter)
- Pipe Wall Thickness
- Lining (material and thickness)
- Fluid Type
- Reynolds Correction Factor
- Calibration Factor
- # of Traverses
- Transducer Spacing

Step 2C: Entering the Wedge Temperature

If you are using medium to high temperature transducers, you must enter the wedge temperature. If not, proceed to Step 3C. Use the appropriate feature key to respond.

- Press [F1] for an active input, or (NOTE: not yet implemented)
- Press [F2] for a fixed input.

If you choose to have a fixed input the TransPort prompts you to enter a temperature for the transducer wedge. This temperature needs only be approximate and allows correction of the wedge sound speed for temperature.

Step 3C: Entering the Pipe Material

The next prompt asks you to enter the pipe material. Since clamp-on transducers send their ultrasonic signals through the pipe wall, the sound speed of the pipe material must be factored in to obtain an accurate flow measurement. Clamp-on transducers are applicable on a variety of pipe materials, only a few of which, are among the options for this prompt. If your pipe material is not among the options, select "OTHER" and enter the sound speed of your pipe material from the tables in Appendix B.

Use the following steps to enter the pipe material:

1. Use the [←] [→] keys to view all the pipe material choices. See Table 3-3 for the available materials.
2. Press the appropriate feature key to choose the desired materials.
3. Depending on the pipe material choice, the TransPort may ask for further information. See Table 3-3 for the various pipe materials available. If required, press the appropriate feature key to choose the desired material.

**Table 3-3:
Pipe Materials**

Pipe Material Category	Specific Material
Steel	Carbon Steel or Stainless Steel
Iron	Ductile Iron or Cast Iron
Cu - Copper	None
Al - Aluminum	None
Brass	None
CuNi - Copper/Nickel	70% Cu 30% Ni or 90% Cu 10% Ni
Glass	Pyrex, Flint, or Crown
Plastic	Nylon, Polyester, Polypropylene, PVC (CPVC), or Acrylic
Other*	Any material

*If you select "OTHER," the TransPort prompts you to enter the sound speed of the pipe material.

Step 4C: Entering the Outside Diameter of the Pipe

The next prompt for clamp-on transducers is pipe outside diameter (OD). If you do not know the outside diameter of your pipe, use either the on-line help or consult Appendix B which contains some standard pipe sizes with their corresponding outside diameters. For greater accuracy, measure the pipe OD at the location where the transducers will be mounted.

To enter the outside diameter:

1. Press the appropriate feature key to select the units.
2. Use the numeric keys to enter the outside diameter.
3. Press ENT.

Step 5C: Entering the Pipe Wall Thickness

The next prompt asks you to enter the thickness of the pipe wall. If you are not sure of the pipe wall thickness, use either the on-line help or consult Appendix B which contains some standard pipe sizes with their corresponding wall thicknesses. For greater accuracy, the pipe wall thickness can be determined by using the optional internal ultrasonic thickness gage as described in Section 9, *Using the Ultrasonic Thickness Gage*.

Use the numeric keys to enter the pipe wall thickness and press [ENT].

Step 6C: Entering Pipe Lining

The next prompt asks you to enter the pipe lining material. Clamp-on transducers can be used on pipes with a variety of pipe linings, however, only a few are among the available options. If your lining is not among the options, select "OTHER" and enter the sound speed of your lining material from the tables in Appendix B.

If your pipe does not have a lining, press [F1] to respond no and the TransPort proceeds to the next prompt.

If your pipe does have a lining use the following steps to enter lining information:

1. Press [F2].
2. The next prompt asks you to choose the lining material. Use the appropriate feature key to respond.

NOTE: *If you choose "OTHER," the TransPort then asks you to enter the lining sound speed. If you do not know the lining sound speed, Appendix B list some standard materials and their corresponding sound speeds.*

3. The next prompt asks you to enter the pipe lining thickness. Use the numeric keys to enter the lining thickness.
4. Press [ENT].

Step 7C: Entering the Fluid Type

The next prompt asks you to enter the fluid type. You may choose one of the following:

- water (normal or sea 25°C)
- water, glycol mixture (for energy option only)
- oil (lubè or crude)
- methanol
- ethanol
- LN2
- freon
- other

Use the appropriate feature key to make a choice.

Depending on the fluid type you choose, the TransPort may ask you for additional information.

Step 8C: Entering the Reynolds Correction Factor

The next prompt enables you to enable or disable the Reynolds Correction Factor which is a number based on the Kinematic Viscosity and flow rate of the fluid. Generally, it should only be enabled when using transducers mounted in a diametrical path (such as clamp-on or tilted diameter). If you enable the Reynolds Correction Factor, you will also need to enter the Kinematic Viscosity of the fluid (units are ft^2/sec or m^2/sec depending on the units selected). Refer to Appendix B for the Kinematic Viscosity of your fluid.

To disable the Reynolds Factor press [F1]. To enable it, do the following:

1. Press [F2].
2. The next prompt asks you to enter the Kinematic Viscosity. Use the numeric keys to enter the Kinematic Viscosity. The default value is for water at 20°C.
3. Press [ENT].

Step 9C: Entering the Calibration Factor

The next prompt asks you to enter a value for the Calibration Factor which is used as a reference for the flowmeter electronics to ensure accurate readings. Generally, if you enable the Reynolds Correction Factor, the correction factor should be set to 1.00. Otherwise the typical factor is between .90 and 1.00.

Use the numeric keys to enter a value and press [ENT].

Step 10C: Entering the Number of Traverses

The next prompt asks you to enter the number of times the ultrasonic signal will traverse the pipe (see Appendix A). The number of traverses is determined by such factors as pipe sizes, pipe wall absorption properties, and accuracy desired.

Use the [←] [→] keys to view all the options and press the appropriate feature key to respond.

Step 11C: Display of Transducer Spacing

The next prompt shows the actual spacing of the transducers calculated from the information entered. Use Appendix A as a guide to installing the transducers on the pipe with the spacing dimension (S) given here.

Set the transducers to the spacing shown at this prompt.

NOTE: *The spacing calculated by the meter can be overwritten (using the numeric keys) if necessary to match the actual physical spacing of the transducers. Do not change the spacing by more than + 10% from the S calculated by the meter.*

You have completed entering data into the PIPE option. You may at this time do one of the following:

- Use the up and down arrow keys to verify or change data.
- Continue to enter data using other Program Menu options as described in this section.
- Save the entered parameters as described on page 3-30.
- Press the [EXIT] key to begin taking measurements. If you press [EXIT] without saving, the TransPort gives you the opportunity to save. Refer to page 3-30 to save the site data.

If you do decide to exit, you must have already programmed the system parameters in order to make flow measurements.

Table 3 (cont.) Sound Speeds in Water

Temperature		Sound Speed in Water	
°C	°F	m/s	ft/s
177	350.0	1398	4587
182	360.0	1383	4538
188	370.0	1368	4488
193	380.0	1353	4439
199	390.0	1337	4387
204	400.0	1320	4331
210	410.0	1302	4272
216	420.0	1283	4210
221	430.0	1264	4147
227	440.0	1244	4082
232	450.0	1220	4003
238	460.0	1200	3937
243	470.0	1180	3872
249	480.0	1160	3806
254	490.0	1140	3740
260	500.0	1110	3642

Table 4
STANDARD ANSI PIPE DATA
Carbon and Alloy Steel -- Stainless Steel

- A. ANSI B 36.10 Steel pipe nominal wall thickness designation.
 B. ANSI B 36.10 Steel pipe schedule numbers.
 C. ANSI B 36.19 Stainless steel pipe schedule numbers.

Nominal Pipe Sizes Inches	Outside Diameter Inches	Identification			Wall Thickness Inches
		Steel		C. Stainless Steel Sched.	
		A. Wall Thickness Design- ation	B. Sched. No.		
1/8	0.405	-	-	10S	.049
		STD	40	40S	.068
		XS	80	80S	.095
1/4	0.540	-	-	10S	.065
		STD	40	40S	.088
		XS	80	80S	.119
3/8	0.675	-	-	10S	.065
		STD	40	40S	.091
		XS	80	80S	.126
1/2	0.840	-	-	5S	.065
		-	-	10S	.083
		STD	40	40S	.109
		XS	80	80S	.147
		-	160	-	.187
XXS	-	-	.294		
3/4	1.050	-	-	5S	.065
		-	-	10S	.083
		STD	40	40S	.113
		XS	80	80S	.154
		-	160	-	.218
XXS	-	-	.308		
1	1.315	-	-	5S	.065
		-	-	10S	.109
		STD	40	40S	.133
		XS	80	80S	.179
		-	160	-	.250
XXS	-	-	.358		

Nominal Pipe Sizes Inches	Outside Diameter Inches	Identification			Wall Thickness Inches
		Steel		C. Stainless Steel Sched.	
		A. Wall Thickness Designation	B. Sched. No.		
1 1/4	1.660	-	-	5S	.065
		-	-	10S	.109
		STD	40	40S	.140
		XS	80	80S	.191
		-	160	-	.250
		XXS	-	-	.382
1 1/2	1.900	-	-	5S	.065
		-	-	10S	.109
		STD	40	40S	.145
		XS	80	80S	.200
		-	160	-	.281
		XXS	-	-	.400
2	2.375	-	-	5S	.065
		-	-	10S	.109
		STD	40	40S	.154
		XS	80	80S	.218
		-	160	-	.344
		XXS	-	-	.436
2 1/2	2.875	-	-	5S	.083
		-	-	10S	.120
		STD	40	40S	.203
		XS	80	80S	.276
		-	160	-	.375
		XXS	-	-	.552
3	3.500	-	-	5S	.083
		-	-	10S	.120
		STD	40	40S	.216
		XS	80	80S	.300
		-	160	-	.438
		XXS	-	-	.600
3 1/2	4.000	-	-	5S	.083
		-	-	10S	.120
		STD	40	40S	.226
		XS	80	80S	.318
		-	-	-	.636
		XXS	-	-	

Nominal Pipe Sizes Inches	Outside Diameter Inches	Identification			Wall Thickness Inches
		Steel		C. Stainless Steel Sched.	
		A. Wall Thickness Designation	B. Sched. No.		
4	4.500	-	-	5S	.083
		-	-	10S	.120
		STD	40	40S	.237
		XS	80	80S	.337
		-	120	-	.438
		XXS	160	-	.531
5	5.536	-	-	5S	.109
		-	-	10S	.134
		STD	40	40S	.258
		XS	80	80S	.375
		-	120	-	.500
		XXS	160	-	.625
6	6.625	-	-	5S	.109
		-	-	10S	.134
		STD	40	40S	.280
		XS	80	80S	.432
		-	120	-	.562
		XXS	160	-	.719
8	8.625	-	-	5S	.109
		-	-	10S	.148
		-	20	-	.250
		-	30	-	.277
		STD	40	40S	.322
		XS	60	-	.406
-	80	80S	.500		
-	100	-	.594		
-	120	-	.719		
-	140	-	.812		
XXS	-	-	.875		
-	160	-	.906		