Appendix 4

INTRODUCTION

As part of the Dispatch Priorities function, PressureMAP assigns a specific Task Dispatching Procedure number for each of its prioritized dispatches and alarms. This number appears on the Detailed Task Report on the line below the Task # and Device # information (see REPORT A4-1). Detailed Task Reports are provided either by AlarmMAP (if the Full Report delivery mode is specified), or they can be obtained from PressureMAP's Dispatch Priorities option by entering the desired Task # at the **`Task Dispatching for which Task #?`** prompt.

There are six possible Task Dispatching Procedures recommended by PressureMAP. Each pertains to one or more possible dispatching or alarm conditions. The steps required to perform each of the Task Dispatching Procedures are described in the following pages. It must be understood that these simplified procedures have been provided to help in your leak locating efforts. In no way are they intended to substitute for formal leak locating training.

Procedures "1", "2", "3" and "6" reference one of System Studies' seven Leak Locating Worksheets. Once the initial analysis of the Detailed Task Report has been performed, these worksheets direct technician activity by providing a step-by-step approach to locating the condition causing the dispatch or alarm. Equipped with a Detailed Task Report, a copy of the office stickmap, a Device Log by Location Report, a set of Leak Locating Worksheets and a working knowledge of cable pressurization leak locating tools and techniques, technicians will be able to respond quickly and efficiently to pressurization dispatches and alarms.

What follows is a simplified explanation of each Task Dispatching Procedure.

Task Dispatch Procedure #1

Problem: A low pressure transducer reading

Procedure:

1. Analyze all data on the Task Dispatching Report for possible problematic field situations such as:

   - "Bad"/"Stuck" transducer. A non-varying transducer reading over an extended period of time can point to a transducer that is stuck or reading incorrectly.

   - Trouble on the pair. Extreme fluctuations in a device's readings can signify a conductor pair problem.

   - Maintenance intervention. Cheater hoses, auxiliary air sources and incorrect device calibration are examples of maintenance intervention. Occurrences such as these destroy the integrity of a cable pressurization monitoring system without PressureMAP to report them.

```
Task Dispatching Info for SCRUZ12, T -069              PressureMAP XX.XX.XX
01/02/2010  17:29                                 System Studies Incorporated
-------------------------------------------------------------------------------

Task #    Device #    Condition                                          Level
------- ----------- -------------------------------------------------- -----
00202E7 T -069     Manifold/meter panel flow gained 5.0 scfh in 24 hr   ****

                 Reading was 11.0 scfh at 17:18 on 01/02/05 VALIDATED

Task Dispatch Procedure #3

Probable Cause:  Leak Close to Flow Device, Construction
     Intervention, Pair Trouble.
Procedure:  Use Worksheets B or C to Determine Area of Search /
     Locate Trouble / Check the Cable Pair.

Device #:  T -069                        Type:  MF  Range: 20.0  S-M: 15.0
Address:   MH-5, CENTER AVE              Loc:   26  Pipe:     A  OAU: 18.7
Sheath(s): 01    07    13

Cable:    01     Prim Pair:    896       Sec Pair:    R     Sort Key:
Plat #:          Stickmap:       1       Phone:

Office 1 Loc:  25     Distance 1 (kf):  3.0     Field 1 Loc:  27
Office 2 Loc:         Distance 2 (kf):          Field 2 Loc:

Remarks:
Readings   Curr Last  Tdy  -1   -2   -3   -4   -5   -6  Wk-1 Wk-2 Wk-3 Wk-4
---------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
           11.0 11.0 11.0  6.0  5.5  6.0  6.0  5.5  6.0  6.0  6.0  6.0  6.0
===============================================================================
ASSOCIATED DEVICES TOWARD THE OFFICE
===============================================================================

Device #:  T -068                           Type:  UP
Address:   MH-4, CENTER AVE                 Loc:   25  Pipe:     A
Sheath(s): 01

Readings:  Curr Last  Tdy  -1   -2   -3   -4   -5   -6  Wk-1 Wk-2 Wk-3 Wk-4
---------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
            6.5  6.5  6.5  8.0  8.0  8.0  8.0  8.0  8.0  8.0  8.0  8.0  8.0

**********************  PROJECTED LEAK LOCATION  **********************
*                                                                       *
*                                                                       *
*                                  LOC   26                             *
*         <- OFFICE           MH-5, CENTER AVE                FIELD ->  *
*                            TD T -069     TYPE MF                      *
*  MH-4, CENTER AVE                  11.0 SCFH                          *
*                                      |                                *
*<  25>--------------------[  LEAK  ]  |                                *
*             <- 3.0KF ->             \ |                               *
*                                      \|                               *
*                                      |                                *
*                                                                       *
*************************************************************************
```

REPORT A4-1: DETAILED TASK REPORT

2. Use the Device History function to look up all devices on a pipe/sector, and to provide additional device history if needed.

3. If applicable, select "History of all devices at a manhole/address," and provide the technician with manhole/address information for devices in the dispatched transducer manhole. Repeat this procedure for manholes on either side of the dispatched pressure transducer manhole.

4. Using all the collected and analyzed data, determine the area of search

5. Dispatch the technician to commence leak locating and to complete Worksheet D.

(For additional information on pressure transducers, refer to the System Studies Incorporated ***Cable Pressurization Theory and Practice*** book: pages 2-33 through 2-39.)

Task Dispatch Procedure #2

Problem: A high flow increase at a pipe alarm panel, or a drop in endpoint pipe pressure on a system ***with or without*** flow transducers on air pipe manifolds.

Procedure:

1. Reference "History of all devices on a pipe/sector." Examine all pressure and flow transducer readings on the route for any significant changes.

2. If there is an air pipe manifold that shows a significant flow increase, dispatch the technician to the manifold to chase the highest flowing cable and to complete Worksheet B.

3. If there is either a decrease in air flow or no measurable change of flow at the manifold locations, dispatch the technician to perform air pipe purification procedures.

(For additional information, refer to the System Studies Incorporated ***Cable Pressurization Theory and Practice*** book: pages 3-31 and pages 3-51 through 3-54.)

Task Dispatch Procedure #3

Problem: A high flow at a distribution panel, or a high flow at an air pipe manifold, or a high flow at a lateral flow transducer on a system with flow transducers on the air pipe manifolds.

Procedure:

1. Reference "History of all devices on a pipe/sector." Examine all pressure and flow transducer readings on the route for any significant changes.

2. Using the stickmap listed in Specific Device Information, find the location of devices within the dispatched device's sphere of influence (in case of a distribution panel, the sphere of influence is, approximately, the first 3,000 feet out of the office).

3. For a dispatch at an air pipe manifold: A) examine flows at the manifolds on both sides of the dispatched manifold, and B) determine the manifold's Sphere of Influence. Dispatch the technician to commence leak locating and to complete Worksheet C.

Problem: A high flow at a distribution panel, or a high flow at an air pipe manifold, or a high flow at a lateral flow transducer on a system ***without*** flow transducers on the air pipe manifolds.

Procedure:

1. Select Option 3, Specific Device Information, for the dispatched device and note the following information: type, pipe, cable, pair, readings, OAU and stickmap.

2. Examine all pressure transducer readings on the route for any significant changes.

3. For a dispatch at a distribution panel: dispatch the technician to read all flows and to complete Worksheet C.

(For additional information, refer to the System Studies Incorporated ***Cable Pressurization Theory and Practice*** book: pages 3-32 and 3-54.)

Task Dispatch Procedure #4

Problem: A zero flow condition at a distribution panel, a zero flow condition at an air pipe manifold, or a zero flow condition at a pipe alarm panel on a system with flow transducers on air pipe manifolds.

Procedure:

1. Look at Device Histories for the dispatched device and note the following information: type, pipe, cable, pair, readings, OAU and stickmap.

2. Refer to "History of all devices on a pipe/sector" to examine flows and pressures for all devices located on the same pipe as the dispatched device.

3. Reference the stickmap listed in Specific Device Information to find the location of devices within the dispatched device's Sphere of Influence (in the case of the distribution panel, the Sphere of Influence is approximately the first 3,000 feet out of the office).

4. Dispatch technician to the device location to check for: A) a pipe alarm panel, distribution panel, or air pipe manifold that is turned off, or B) a transducer problem.

Problem: A zero flow condition at a distribution panel, or a zero flow condition at an air pipe manifold, or a zero flow condition at a pipe alarm panel on a system ***without*** flow transducers on air pipe manifolds.

Procedure:

1. Look at "History of all devices on a pipe/sector". Examine all pressure transducer readings on the route for any significant changes.

2. Reference the stickmap listed in Specific Device Information to find the location of devices within the dispatched device's Sphere of Influence.

3. Dispatch technician to the device location to check for: A) a pipe alarm panel or distribution panel that is turned off, or B) a transducer problem.

(For additional information, refer to the System Studies Incorporated ***Cable Pressurization Theory and Practice*** book: pages 2-10 through 2-23 for pipe alarm panels, distribution panels and air pipe manifolds; pages 2-39 through 2-37 for flow transducers.)

Task Dispatch Procedure #5

Problem: A device with an error reading

Procedure:

1. Refer to Specific Device Information for the dispatched device and note the following information: type, pipe, cable, pair, readings, OAU and stickmap.

2. Dispatch the technician to the device location to determine the cause of the error reading.

Task Dispatch Procedure #6

Problem: A high flow at a pipe alarm panel over an extended period of time, or a low delivery pressure at an end point pressure transducer over an extended period of time on a system with flow transducers on air pipe manifolds.

Procedure:

1. Look at Specific Device Information for the dispatched device and note the following information: type, pipe, cable, pair, readings, OAU (if applicable) and stickmap.

2. Refer to "History of all devices on a pipe/sector" to examine flows and pressures for all devices located on the same pipe as the dispatched device

3. Reference the stickmap listed in Specific Device Information to find the location of all air pipe manifolds on the same pipe as the dispatched device.

4. Compare the air pipe flow at pipe alarm panels with the total of all the air pipe manifold flows.

5. If the manifold flows do not add up to within 30 percent of the pipe flow, dispatch the technician to perform pipe purification procedures.

6. If the manifold flows add up to within 30 percent of the pipe flow, this signifies that the leak is located somewhere in the cables. Use Specific Device Information to compare flows at the manifolds with each manifold's OAU.

7. Dispatch the technician to the manifold that has the greatest difference between the OAU and the actual flow rate. Have the technician complete Worksheet B.

Problem: A high flow at a pipe alarm panel over an extended period of time, or a low delivery pressure at an end point pressure transducer over an extended period of time on a system without flow transducers on air pipe manifolds.

Procedure:

1. Look at Specific Device Information, for the dispatched device and note the following information: type, pipe, cable, pair, readings, OAU (if available) and stickmap.

2. Dispatch the technician to all air pipe manifolds on the pipe route to read flows. Have the technician compare these flows to manifold OAUs and complete Worksheet A.

3. Compare air pipe delivery flow to the total of all relevant manifolds flows.

4. If the manifold flows do not add up to within 30 percent of the total air pipe flow, dispatch the technician to perform air pipe purification procedures.

5. If the manifold flows add up to within 30 percent of the total air pipe flow, compare the actual flows at the manifold with each manifold's OAU. Dispatch technician to the manifold with the greatest difference between the OAU and the flow rate. Have the technician complete Worksheet B.

Leak Locating Worksheets

An integral part of the "field side" of PressureMAP, the Leak Locating Worksheets help to standardize the task dispatching procedures specified by the Dispatch Priorities option.

The best approach to leak locating is based on a logical and organized step-by-step method. With a leak locating strategy, the biggest, most damaging leaks in the system are identified first. These are the leaks that generally bring down route delivery pressure and reduce cable protection throughout the entire system. Only after the primary leaks have been located and repaired, should the emphasis shift to the smaller leaks.

Once the general location of the primary system leak is known, the technician is dispatched to the suspected leak area to verify monitoring device information and to begin a step-by-step leak locating effort.

In addition to providing the technician with the tools and methods for successful leak locating, the Worksheets reinforce and increase technician understanding of pressurization concepts. Zero leak projections and air flow calculations are reliable leak locating tools which eliminate the frustration of trial and error methods. The Worksheets stress the importance of these calculations by incorporating them into the various leak locating procedures. By utilizing the Worksheets and completing the procedures outlined on each, the technician will become a more knowledgeable and efficient leak locating specialist.

Examples of the seven specific Leak Locating Worksheets follow. Additional Worksheets can be ordered directly from System Studies Incorporated by calling (800) 247-8255 or (831) 475-5777.

Worksheet A

Reading Air Flows at Manifolds and Meter Panels

MANIFOLD 1 PRESSURE ____ PSI LOCATION _____ UTILITY HOLE # _____	MANIFOLD 2 PRESSURE ____ PSI LOCATION _____ UTILITY HOLE # _____	MANIFOLD 3 PRESSURE ____ PSI LOCATION _____ UTILITY HOLE # _____	MANIFOLD 4 PRESSURE ____ PSI LOCATION _____ UTILITY HOLE # _____	MANIFOLD 5 PRESSURE ____ PSI LOCATION _____ UTILITY HOLE # _____
1. cable # _____ flow _____ scfh	1. cable # _____ flow _____ scfh	1. cable # _____ flow _____ scfh	1. cable # _____ flow _____ scfh	1. cable # _____ flow _____ scfh
2. cable # _____ flow _____ scfh	2. cable # _____ flow _____ scfh	2. cable # _____ flow _____ scfh	2. cable # _____ flow _____ scfh	2. cable # _____ flow _____ scfh
3. cable # _____ flow _____ scfh	3. cable # _____ flow _____ scfh	3. cable # _____ flow _____ scfh	3. cable # _____ flow _____ scfh	3. cable # _____ flow _____ scfh
4. cable # _____ flow _____ scfh	4. cable # _____ flow _____ scfh	4. cable # _____ flow _____ scfh	4. cable # _____ flow _____ scfh	4. cable # _____ flow _____ scfh
5. cable # _____ flow _____ scfh	5. cable # _____ flow _____ scfh	5. cable # _____ flow _____ scfh	5. cable # _____ flow _____ scfh	5. cable # _____ flow _____ scfh
6. cable # _____ flow _____ scfh	6. cable # _____ flow _____ scfh	6. cable # _____ flow _____ scfh	6. cable # _____ flow _____ scfh	6. cable # _____ flow _____ scfh
7. cable # _____ flow _____ scfh	7. cable # _____ flow _____ scfh	7. cable # _____ flow _____ scfh	7. cable # _____ flow _____ scfh	7. cable # _____ flow _____ scfh
8. cable # _____ flow _____ scfh	8. cable # _____ flow _____ scfh	8. cable # _____ flow _____ scfh	8. cable # _____ flow _____ scfh	8. cable # _____ flow _____ scfh
9. cable # _____ flow _____ scfh	9. cable # _____ flow _____ scfh	9. cable # _____ flow _____ scfh	9. cable # _____ flow _____ scfh	9. cable # _____ flow _____ scfh
10. cable # _____ flow _____ scfh	10. cable # _____ flow _____ scfh	10. cable # _____ flow _____ scfh	10. cable # _____ flow _____ scfh	10. cable # _____ flow _____ scfh
11. cable # _____ flow _____ scfh	11. cable # _____ flow _____ scfh	11. cable # _____ flow _____ scfh	11. cable # _____ flow _____ scfh	11. cable # _____ flow _____ scfh
12. cable # _____ flow _____ scfh	12. cable # _____ flow _____ scfh	12. cable # _____ flow _____ scfh	12. cable # _____ flow _____ scfh	12. cable # _____ flow _____ scfh
13. cable # _____ flow _____ scfh	13. cable # _____ flow _____ scfh	13. cable # _____ flow _____ scfh	13. cable # _____ flow _____ scfh	13. cable # _____ flow _____ scfh
14. cable # _____ flow _____ scfh	14. cable # _____ flow _____ scfh	14. cable # _____ flow _____ scfh	14. cable # _____ flow _____ scfh	14. cable # _____ flow _____ scfh
15. cable # _____ flow _____ scfh	15. cable # _____ flow _____ scfh	15. cable # _____ flow _____ scfh	15. cable # _____ flow _____ scfh	15. cable # _____ flow _____ scfh
16. cable # _____ flow _____ scfh	16. cable # _____ flow _____ scfh	16. cable # _____ flow _____ scfh	16. cable # _____ flow _____ scfh	16. cable # _____ flow _____ scfh
17. cable # _____ flow _____ scfh	17. cable # _____ flow _____ scfh	17. cable # _____ flow _____ scfh	17. cable # _____ flow _____ scfh	17. cable # _____ flow _____ scfh
18. cable # _____ flow _____ scfh	18. cable # _____ flow _____ scfh	18. cable # _____ flow _____ scfh	18. cable # _____ flow _____ scfh	18. cable # _____ flow _____ scfh
19. cable # _____ flow _____ scfh	19. cable # _____ flow _____ scfh	19. cable # _____ flow _____ scfh	19. cable # _____ flow _____ scfh	19. cable # _____ flow _____ scfh
20. cable # _____ flow _____ scfh	20. cable # _____ flow _____ scfh	20. cable # _____ flow _____ scfh	20. cable # _____ flow _____ scfh	20. cable # _____ flow _____ scfh
TOTAL MANIFOLD FLOW _____ SCFH	TOTAL MANIFOLD FLOW _____ SCFH	TOTAL MANIFOLD FLOW _____ SCFH	TOTAL MANIFOLD FLOW _____ SCFH	TOTAL MANIFOLD FLOW _____ SCFH

System Studies Incorporated
(831) 475-5777 / (800) 247-8255 / (831) 475-9207 FAX

FIGURE A4-1: WORKSHEET A (SIDE 1)

Worksheet A

Reading Air Flows at Manifolds and Meter Panels

Task Number: _____

Review Checklist

Procedure:

At manifold and meter panel locations:

Step 1 Record meter panel designation or manifold location and associated air pipe. ☐

Step 2 Record delivery pressure. (Meter Panel should be 10 PSI; manifolds should be a minimum of 7.5 PSI.) ☐

Step 3 Record air flow in Standard Cubic Feet per Hour (SCFH) for each cable fed by the manifold or meter panel. If flow rater on meter panel is pegged, use portable flow rater (0–20 SCFH). Use Flow Gauge for readings on System Studies Distribution Panels. ☐

Date: _____

Hours Worked: _____

Office: _____

Pipe Route: _____

Name: _____

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Flow Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
- ☐ Calculator

Pipe Alarm Panel Flow _____ SCFD _____ SCFH

Pipe Delivery Pressure _____ PSI

Total Flow of all Manifolds _____ SCFH

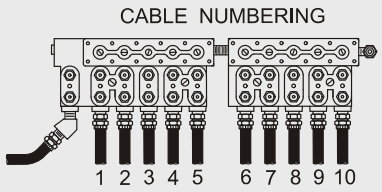

FIGURE A4-2: WORKSHEET A (SIDE 2)

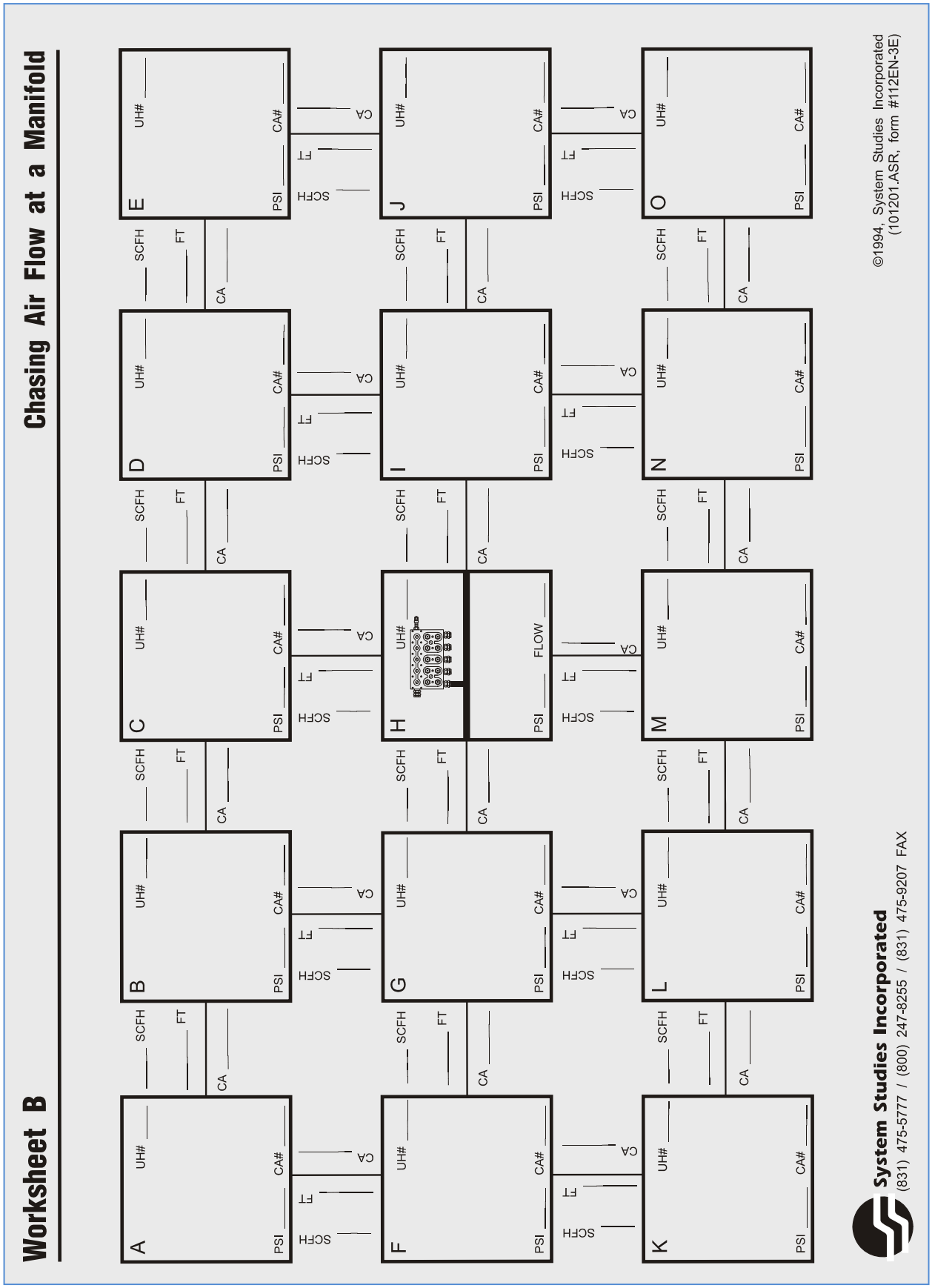

FIGURE A4-3: WORKSHEET B (SIDE 1)

Worksheet B

Chasing Air Flow at a Manifold

Review Checklist

Procedure:

Step 1 Take flow (SCFH) and pressure readings (PSI) for cable at manifold utility hole. Check for cable leaks. Manifold utility hole on worksheet is designated as Utility Hole H. ☐

Step 2 If there are two pressure testing valves on the high flowing cable in the manifold utility hole, use the Flow Direction Indicator to determine the direction of the leak. In this situation it is necessary to first turn off flow to the cable at the manifold before connecting the Flow Direction Indicator. Remember to turn flow back on after taking reading. ☐

Step 3 Visit utility hole on either side of manifold utility hole (go toward leak if flow direction is known.) Check for leaks. Calculate air flow between this utility hole and Utility Hole H. If calculated flow is more than 50% of measured air flow at manifold, continue in the same direction. If it is less than 50% and you have determined flow direction (as in Step 2), there is a leak on the cable in the section between this utility hole and the manifold utility hole. If no flow direction reading was taken on the cable at the manifold utility hole and the calculated flow is less than 50%, visit the utility hole on other side of the hole. ☐

Step 4 Using the calculated flow rate and cable pressure reading, calculate a Zero Leak Projection (ZLP) to determine the area of search. Record the ZLP footage calculation on the worksheet. ☐

Step 5 Continue chasing flow in the direction of the leak within the ZLP boundary. Calculate and record the flow between each utility hole. A new ZLP should be calculated each time the cable changes pneumatic resistance. Chase calculated flow until the leak is found. ☐

Step 6 Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet. ☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
  - ☐ Flow Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
  - ☐ Flow Direction Indicator
- ☐ Ultrasonic Leak Locator or Soap Bucket
- ☐ Calculator
- ☐ Pneumatic Resistance Charts
  - ☐ Zero Leak Projection

Task Number: _____

☐ Found
☐ Not Found

Date: _____

Hours Worked: _____

Office: _____

Pipe Route: _____

Name: _____

Cause of Problem:

- ☐ Leaking Closure
- ☐ Missing Plug
- ☐ Leaking Plug
- ☐ Leaking Valve
- ☐ Section Leak
- ☐ Leaking Hardware
- ☐ Other _____

_____

_____

_____

FIGURE A4-4: WORKSHEET B (SIDE 2)

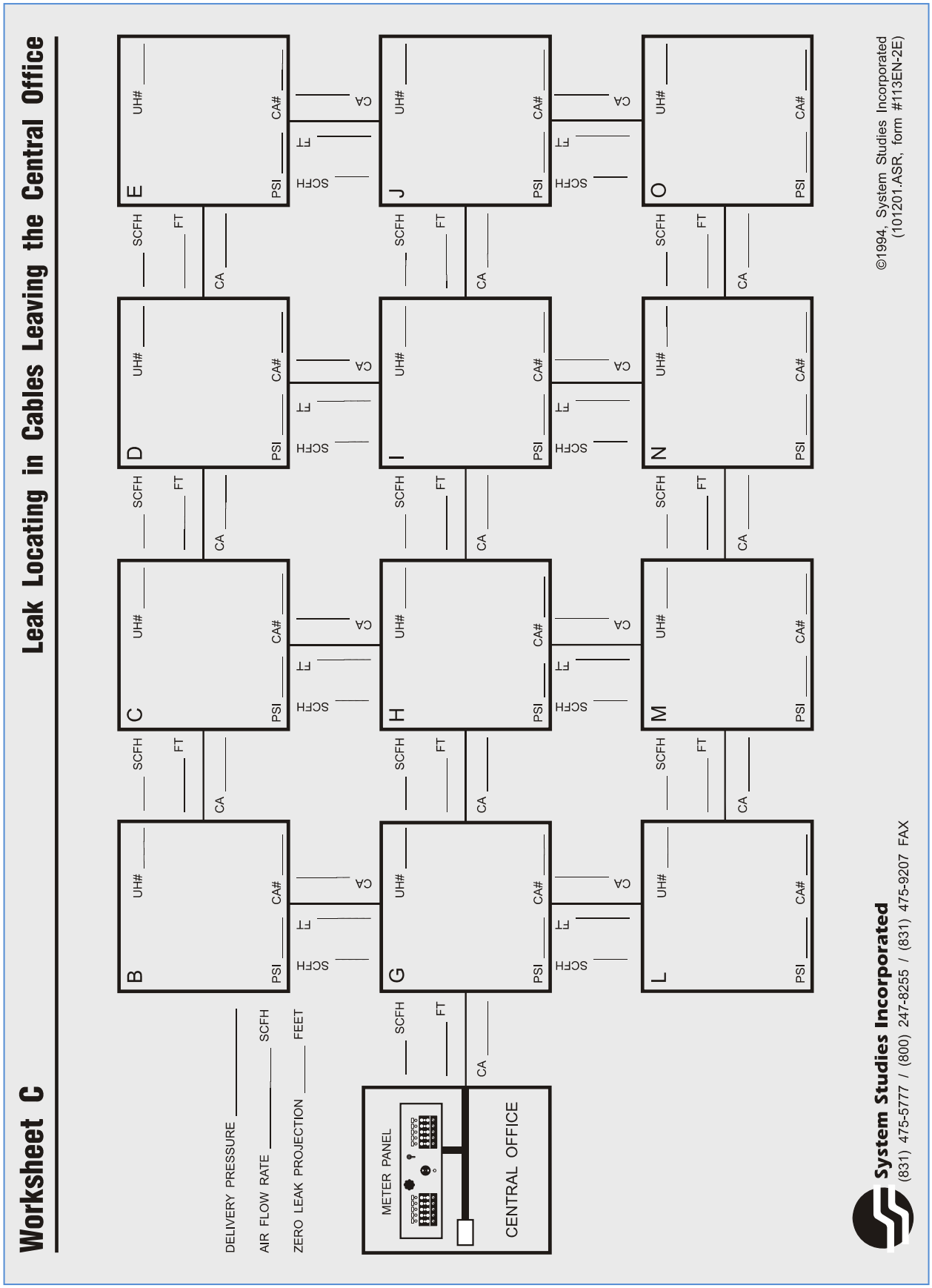

FIGURE A4-5: WORKSHEET C (SIDE 1)

Worksheet C

Leak Locating in Cables Leaving the Central Office

Procedure:

		Review Checklist
Step 1	Measure and record the flow rate and input pressure of cable. If flowrate is above 10 SCFH, use portable flow rater.	☐
Step 2	Calculate Zero Leak Projection to determine area of search.	☐
Step 3	Verify that the meter panel is installed on correct cable. Check plastictubing and central office (CO) plug for leaks.	☐
Step 4	Visit utility hole within Zero Leak Projection. Check for leaks. Recordpressure. Calculate flow between CO and utility hole. Calculate Zero Leak Projection for all directions cable leaves utility hole. Do not enter utility holes outside Zero Leak Projection.	☐
Step 5	Visit next utility hole or lateral utility hole if it is within new Zero Leak Projection. Check for leaks. Record pressure. Calculate air flow between the two utility holes. If a majority of the flow measured at the C.O. can be accounted for, continue in that direction. If not, check another lateral. Calculate Zero Leak Projection for cable where majority of air flow is calculated.	☐
Step 6	Continue chasing the measured CO flow up laterals until leak is found.	
Step 7	Enter all calculations, footages and cable size on diagram. All Air FlowCalculations and Zero Leak Projections should also be entered on worksheet.	☐
		☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
- ☐ Flow Direction Indicator
- ☐ Ultrasonic Leak Locator or Soap Bucket
- ☐ Calculator
- ☐ Pneumatic Resistance Charts
- ☐ Zero Leak Projection
- ☐ Air Flow Calculation
- ☐ Back Projection (Single Feed Systems Only)

Task Number: _____

☐ Found
☐ Not Found

Date: _____

Hours Worked: _____

Office: _____

Cable Number: _____

Transducer Number: _____

Name: _____

Cause of Problem:

- ☐ Leaking Closure
- ☐ Missing Plug
- ☐ Leaking Plug
- ☐ Leaking Valve
- ☐ Section Leak
- ☐ Leaking Hardware
- ☐ Other _____

_____

_____

_____

FIGURE A4-6: WORKSHEET C (SIDE 2)

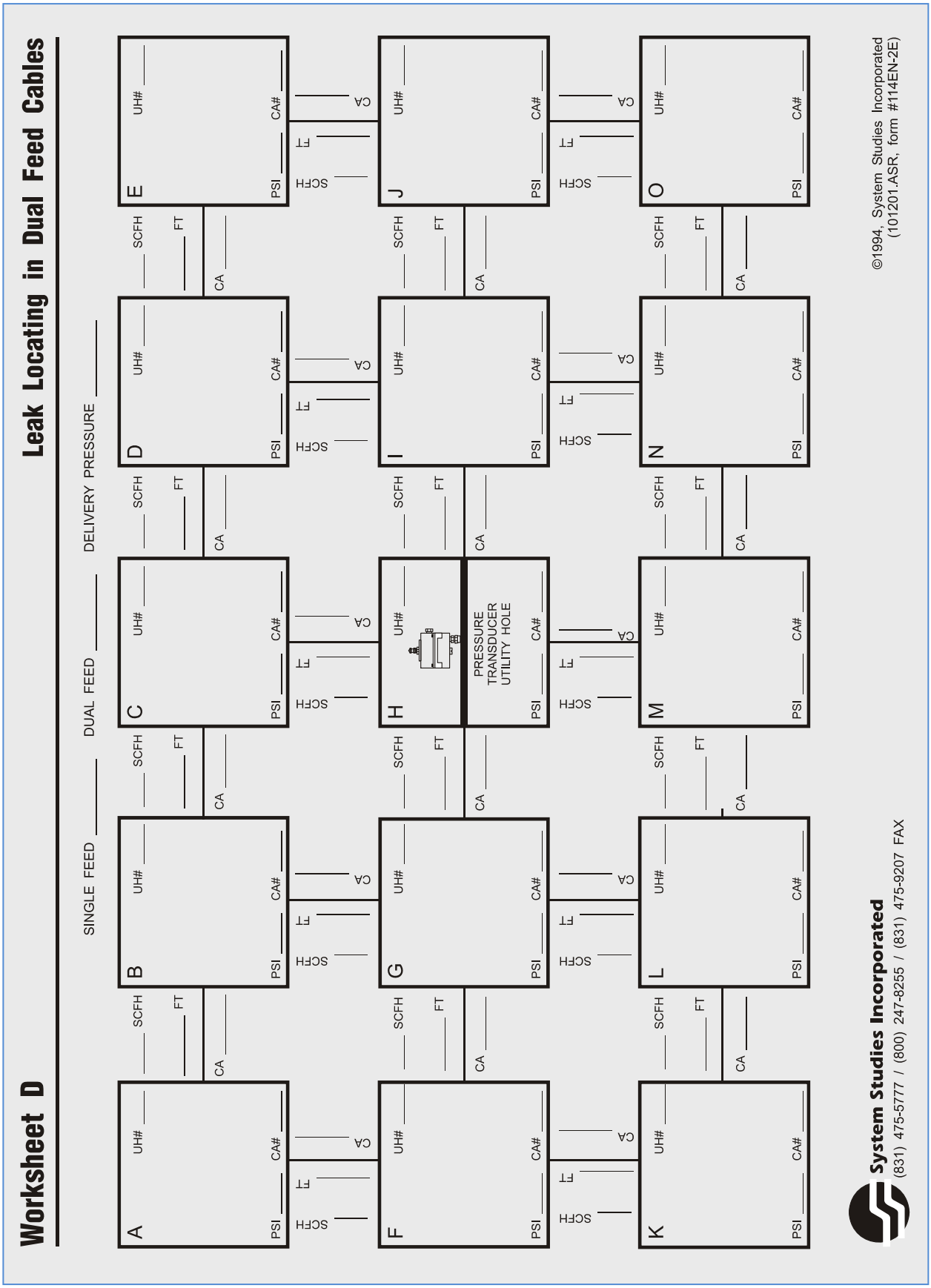

FIGURE A4-7: WORKSHEET D (SIDE 1)

Worksheet D

Leak Locating in Dual Feed Cables

Review Checklist

Procedure:

Step 1	Visit pressure transducer (Utility Hole H) to verify and record correct reading. Begin documentation in Utility Hole H. Check to make sure delivery pressure is above 7.5 PSI. This can be accomplished by reading pressure of pipe in pressure transducer (PTD) utility hole or on pipe pressure transducer printout.	☐
Step 2	Visit utility hole on either side of PTD location. Calculate flow through section. If pressure is dropping, continue in same direction. If pressure has leveled off or has increased, visit utility hole on other side of PTD utility hole. Calculate Zero Leak Projection in direction of leak.	☐
Step 3	Continue in direction of dropping pressure. Take pressure readings and record readings on laterals. Calculate air flow. The lateral consuming the majority of the calculated air flow is the one pulling the cable pressure down.	☐
Step 4	Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet.	☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Flow Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
- ☐ Flow Direction Indicator
- ☐ Ultrasonic Leak Locator or Soap Bucket
- ☐ Calculator
- ☐ Pneumatic Resistance Charts
- ☐ Zero Leak Projection
- ☐ Air Flow Calculation
- ☐ Back Projection (Single Feed System Only)

Task Number: _____

☐ Found
☐ Not Found

Date: _____

Hours Worked: _____

Office: _____

Pipe Route: _____

Name: _____

Cause of Problem:

- ☐ Leaking Closure
- ☐ Missing Plug
- ☐ Leaking Plug
- ☐ Leaking Valve
- ☐ Section Leak Leaking Hardware
- ☐ Other _____

_____

_____

_____

FIGURE A4-8: WORKSHEET D (SIDE 2)

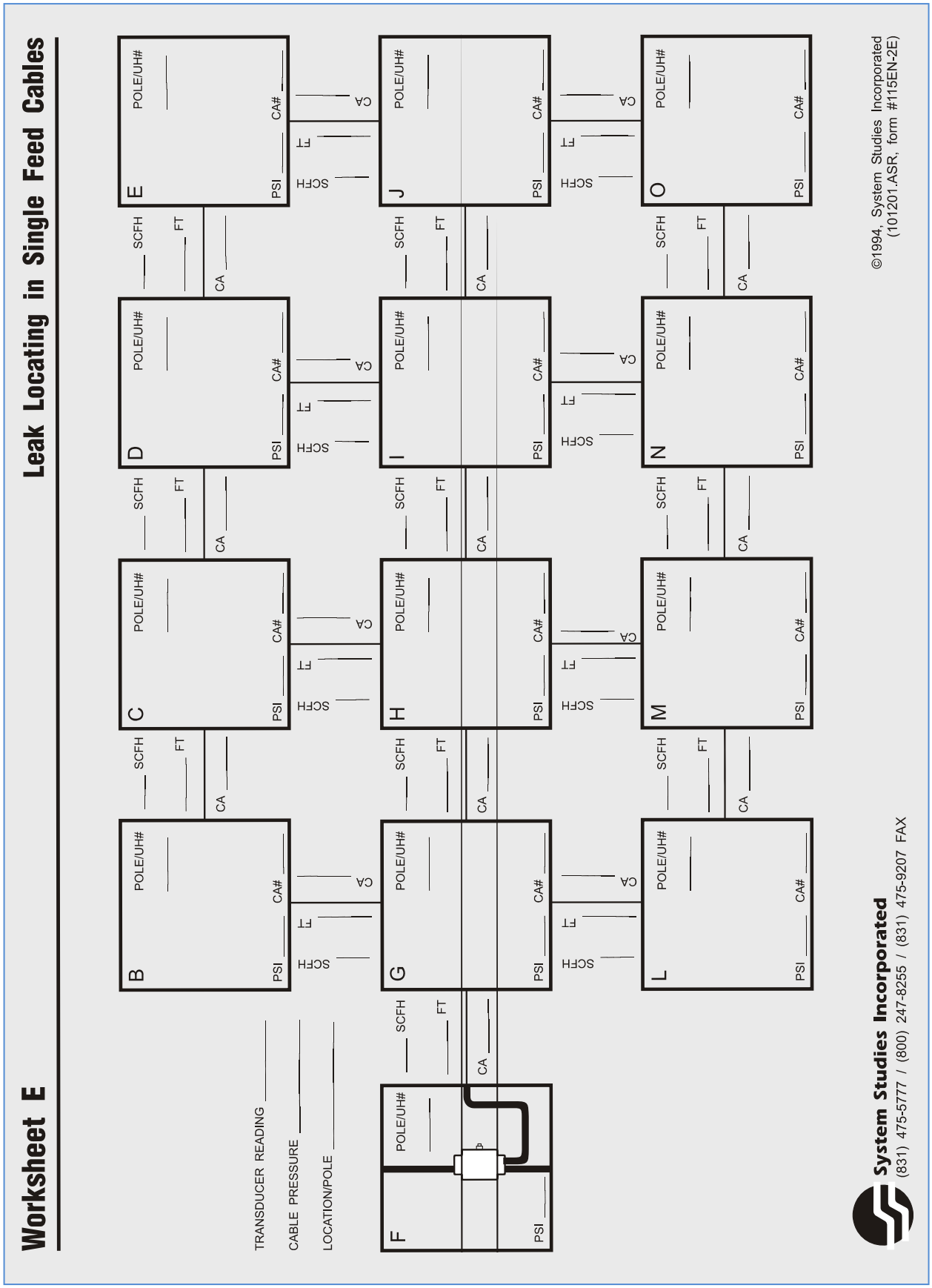

FIGURE A4-8: WORKSHEET E (SIDE 1)

Worksheet E

Leak Locating in Single Feed Cables

Procedure:

		Review Checklist
Step 1	Visit pressure transducer to verify and record cable pressure.	☐
Step 2	Begin leak locating at location where lateral “T's” from the major cable run (Location F on worksheet). Read and record cable pressure. Pressure at this point must be adequate to support minimum lateral cable pressure once leak is found and repaired.	☐
Step 3	Take pressure reading to field side of “T,” record reading (Location G), calculate and record flow for section.	☐
Step 4	Use this flow rate and pressure reading to make a Zero Leak Projection (ZLP). If possible, use pressure reading at transducer location to make Back Projection. Search for leak in this area.	☐
Step 5	If impossible to back project (change of cable resistance within ZLP area of search), take reading at next valve and calculate flow. If calculated flow is significantly less than last section, check this section for leaks.	☐
Step 6	Calculate flow up all risers that are within original ZLP. If one lateral has the majority of air being consumed, calculate another ZLP and make a Back Projection.	☐
Step 7	Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet.	☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Flow Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
- ☐ Flow Direction Indicator
- ☐ Ultrasonic Leak Locator or Soap Bucket
- ☐ Calculator
- ☐ Pneumatic Resistance Charts
- ☐ Zero Leak Projection
- ☐ Air Flow Calculation
- ☐ Back Projection (Single Feed System Only)

Task Number: _____

☐ Found
☐ Not Found

Date: _____

Hours Worked: _____

Office: _____

Pipe Route: _____

Name: _____

Cause of Problem:

- ☐ Leaking Closure
- ☐ Missing Plug
- ☐ Leaking Plug
- ☐ Leaking Valve
- ☐ Section Leak Leaking Hardware

☐ Other _____

_____

_____

_____

FIGURE A4-9: WORKSHEET E (SIDE 2)

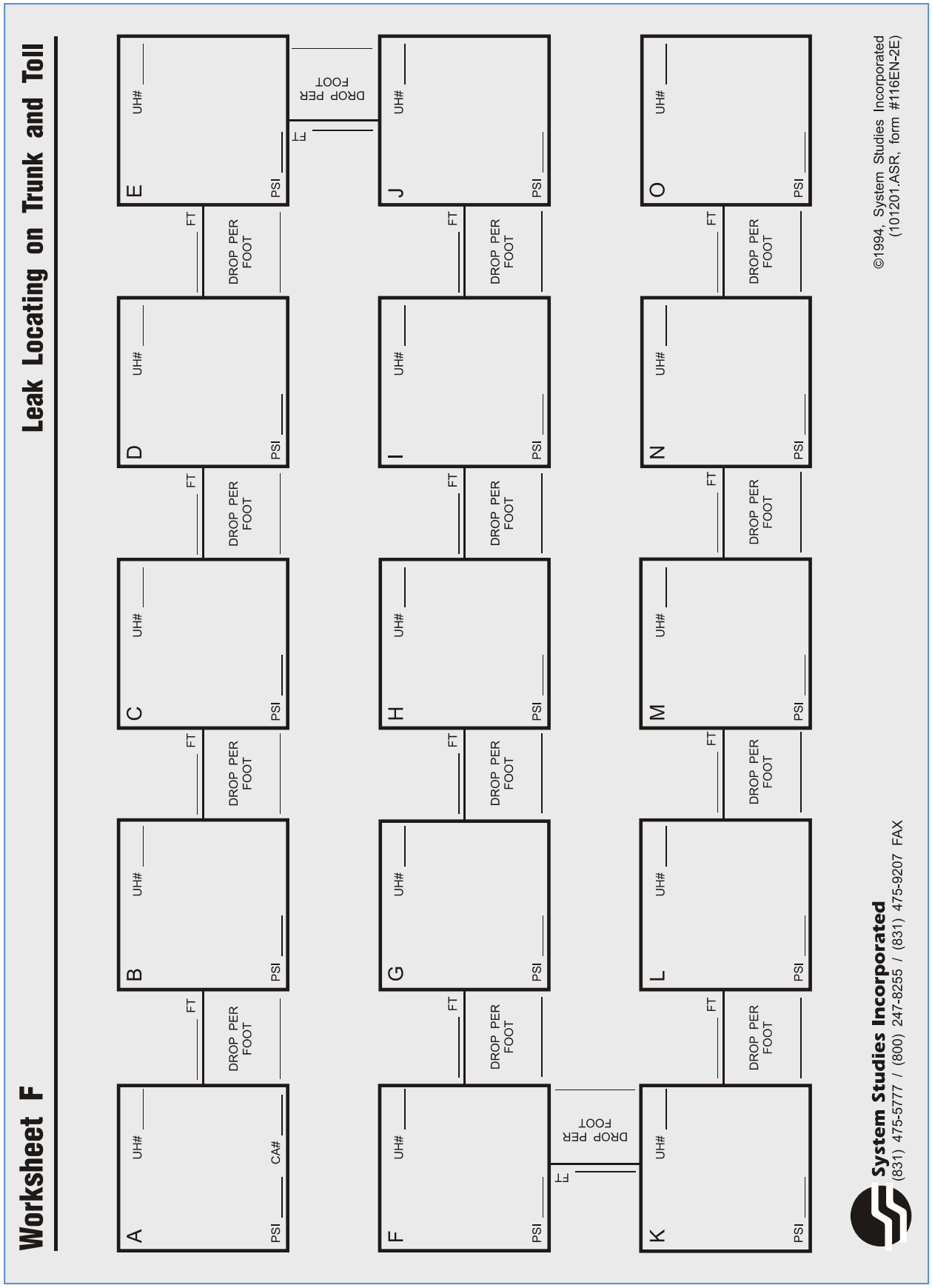

FIGURE A4-10: WORKSHEET F (SIDE 1)

Worksheet F

Leak Locating on Trunk and Toll

Procedure:

		Review Checklist
Step 1	Take pressure reading (PSI) two to three pressure testing valves away from suspected leak location. Record reading in Box A on worksheet.	☐
Step 2	Take a second pressure reading in direction of leak and record on worksheet. Use worksheet boxes in alphabetical order to record subsequent readings. Measure distance between pressure readings.	☐
Step 3	Calculate pressure drop per foot using the calculation boxes below. Record every digit in the calculation's display window. Pressure drop per foot will be the same for each section until leak is passed.	☐
Step 4	With second pressure reading and pressure drop per foot, calculate a Zero Leak Projection (ZLP) to limit area of search. Use the ZLP calculation boxes below and record ZLP area on worksheet.	☐
Step 5	Take pressure readings midway between 2nd pressure reading and ZLP boundary. Calculate pressure drop per foot and compare with other calculations. Continue calculating pressure drop per foot on worksheet.	☐
Step 6	Record all distance measurements, pressure readings, calculations and pressure drops per foot on worksheet.	☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Portable Flow Rater (0-20 SCFH)
- ☐ Flow Direction Indicator
- ☐ Ultrasonic Leak Locator or Soap Bucket
- ☐ Calculator
- ☐ Pneumatic Resistance Charts
- ☐ Zero Leak Projection
- ☐ Air Flow Calculation
- ☐ Back Projection

[ ] – [ ] ÷ [ ] = [ ]

Higher of Two Pressure Readings – Lower of Two Pressure Readings ÷ Footages Between Valves = Pressure Drop per Foot

[ ] ÷ [ ] = [ ]

Lower of Two Pressure Readings ÷ Pressure Drop per Foot = Zero Leak Projection

Task Number: _____

- ☐ Found
- ☐ Not Found

Date: _____

Hours Worked: _____

Office: _____

Cable Number: _____

Name: _____

Cause of Problem:

- ☐ Leaking Closure
- ☐ Missing Plug
- ☐ Leaking Plug
- ☐ Leaking Valve
- ☐ Section Leak
- ☐ Leaking Hardware
- ☐ Other _____

_____

_____

_____

FIGURE A4-11: WORKSHEET F (SIDE 2)

Worksheet G — Reading Flows at the Flow Bank

UTILITY HOLE # ____ FLOW BANK PRESSURE ____		UTILITY HOLE # ____ FLOW BANK PRESSURE ____		UTILITY HOLE # ____ FLOW BANK PRESSURE ____		UTILITY HOLE # ____ FLOW BANK PRESSURE ____		UTILITY HOLE # ____ FLOW BANK PRESSURE ____	
CABLE #	READINGS*	CABLE #	READINGS*	CABLE #	READINGS*	CABLE #	READINGS*	CABLE #	READINGS*
NOTES:		NOTES:		NOTES:		NOTES:		NOTES:	

*Indicate air flow reading and direction (either B = flow toward bank or C = flow toward cable)

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FIGURE A4-12: WORKSHEET G (SIDE 1)

Worksheet G

Reading Flows at the Flow Bank

Task Number: _____

Date: _____

Hours Worked: _____

Office: _____

Pipe Route: _____

Name: _____

Procedures at Flow Bank locations:		Review Checklist
Step 1	Zero adjust the Flow Direction Gauge if necessary.	☐
Step 2	Place the Flow Direction Sampler on the Flow Bank sampler valves to be read and obtain a flow measurement. The purple-colored quick connect valve attaches to the top tank valve. The yellow sampler valve is connected to one of the five Flow Bank cable ports. If the settled reading is pegged, depress the extended measurement button located on top of the Flow Direction Gauge.	☐
Step 3	Record the flow measurement for each cable connected to the Flow Bank. Along with the flow measurement, indicate the direction of the flow (either toward the Flow Bank or toward the cable) and the pressure reading for the Flow Bank.	☐

Equipment and Procedures Required:

- ☐ C Pressure Gauge
- ☐ Flow Gauge

Total Flow of all Flow Banks _____ SCFH

FIGURE A4-13: WORKSHEET G (SIDE 2)