# 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
                                          PressureMAP XX.XX.XX
Task # Device # Condition
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
                               Loc: 26 Pipe: A OAU: 18.7
Address: MH-5, CENTER AVE
Sheath(s): 01 07 13
Cable: 01 Prim Pair: 896 Sec Pair: R Sort Key: Plat #: Stickmap: 1 Phone:
Plat #: Stickmap:
Office 1 Loc: 25 Distance 1 (kf): 3.0 Field 1 Loc: 27
                                    Field 2 Loc:
Office 2 Loc:
               Distance 2 (kf):
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
______
ASSOCIATED DEVICES TOWARD THE OFFICE
______
Device #: T -068
                                  Type: UP
                                  Loc: 25 Pipe: A
Address: MH-4, CENTER AVE
Sheath(s): 01
Readings: Curr Last Tdy -1 -2 -3 -4 -5 -6 Wk-1 Wk-2 Wk-3 Wk-4
         6.5 \quad 6.5 \quad 6.5 \quad 8.0 \quad 8.0
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.

A4-2 28-00oA4.ASM

- 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:**

- Reference "History of all devices on a pipe/sector." Examine all pressure and flow transducer readings on the route for any significant changes.
- 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 <u>without</u> 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 <u>without</u> 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.

A4-4 28-00oA4.ASM

(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 <u>without</u> 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.

A4-6 28-00oA4.ASM

Read
œ
A
eed
ksheet
Nor

# Reading Air Flows at Manifolds and Meter Panels

MANIFOLD 1 PRES	PRESSUREPSI	MANIFOLD 2 PRESSURE	SURE PSI	MANIFOLD 3 PRE	PRESSURE PSI	MANIFOLD 4 PRES	PRESSURE PSI	MANIFOLD 5 PRESSURE	PS
LOCATION		LOCATION		LOCATION		LOCATION		LOCATION	
UTILITY HOLE #		UTILITY HOLE #		UTILITY HOLE #		UTILITY HOLE #		UTILITY HOLE #	
1. cable #	flow softh	1. cable # f	flow scfh	1. cable #	flow softh	1. cable #	flow scfh	1. cable # flow	scfh
2. cable #	flow scfh	2. cable # f	flow scfh	2. cable #	flow scfh	2. cable #	flow scfh	2. cable # flow	scfh
3. cable #	flow scfh	3. cable # f	flow softh	3. cable #	flow scfh	3. cable #	flow scfh	3. cable # flow	scfh
4. cable #	flow scfh	4. cable # f	flow scfh	4. cable #	flow scfh	4. cable #	flow scfh	4. cable # flow	scfh
5. cable #	flow scfh	5. cable # f	flow softh	5. cable #	flow scfh	5. cable #	flow scfh	5. cable # flow	scfh
6. cable #	flow scfh	6. cable # f	flow scfh	6. cable #	flow scfh	6. cable #	flow scfh	6. cable # flow	scfh
7. cable #	flow scfh	7. cable # f	flow scfh	7. cable #	flow scfh	7. cable #	flow scfh	7. cable # flow	scfh
8. cable #	flow scfh	8. cable #f	flow scfh	8. cable #	flow scfh	8. cable #	flow scfh	8. cable # flow	scfh
9. cable #	flow	9. cable # f	flow softh	9. cable #	flow scfh	9. cable #	flow scfh	9. cable # flow	scfh
10. cable #	flow scfh	10. cable # f	flow scfh	10. cable #	flowscfh	10. cable #	flow scfh	10. cable # flow	scfh
11. cable #	flow scfh	11. cable # f	flow scfh	11. cable #	flow scfh	11. cable #	flow scfh	11. cable # flow	scfh
12. cable #	flow	12. cable #	flow softh	12. cable #	flow scfh	12. cable #	flow scfh	12. cable # flow	scfh
13. cable #	flow scfh	13. cable #f	flow scfh	13. cable #	flowscfh	13. cable #	flow scfh	13. cable # flow	scfh
14. cable #	flow scfh	14. cable # f	flow scfh	14. cable #	flow scfh	14. cable #	flow scfh	14. cable # flow	scfh
15. cable #	flow	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 # f	flow softh	17. cable #	flow scfh	17. cable #	flow scfh	17. cable # flow	scfh
18. cable #	flow scfh	18. cable #f	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 sofh	20. cable # f	flow scfh	20. cable #	flow scfh	20. cable #	flow scfh	20. cable # flow	scfh
TOTAL MANIFOLD FLOW	LOW SCFH	TOTAL MANIFOLD FI	OW SCFH	TOTAL MANIFOLD FLOW	LOW SCFH	TOTAL MANIFOLD FLOW	OW SCFH	TOTAL MANIFOLD FLOWS	SCFH

FIGURE A4-1: WORKSHEET A (SIDE 1)

©1994, System Studies Incorporated (101201.ASR, form #111EN-2E)

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

Task Number:	Date:	©1994, System Studies Incorporated (101201.ASR, form #111EN-2E)
<b>Worksheet A</b> Reading Air Flows at Manifolds and Meter Panels	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.	Equipment and Procedures Required:  C Pressure Gauge  Flow Gauge  Calculator  Pipe Alarm Panel Flow SCFD  SCFH  Calculator  Pipe Alarm Panel Flow of all Manifolds  SCFH  CABLE NUMBERING  Pipe Delivery Pressure  SCFH  Total Flow of all Manifolds  SCFH  CABLE NUMBERING  SCFH  CABLE NUMBERING  SCFH  Total Flow of all Manifolds  SCFH  SCFH  CABLE NUMBERING  SCFH  SCFH  SCFH  CABLE NUMBERING  SCFH  SC

FIGURE A4-2: WORKSHEET A (SIDE 2)

A4-8 28-00oA4.ASM

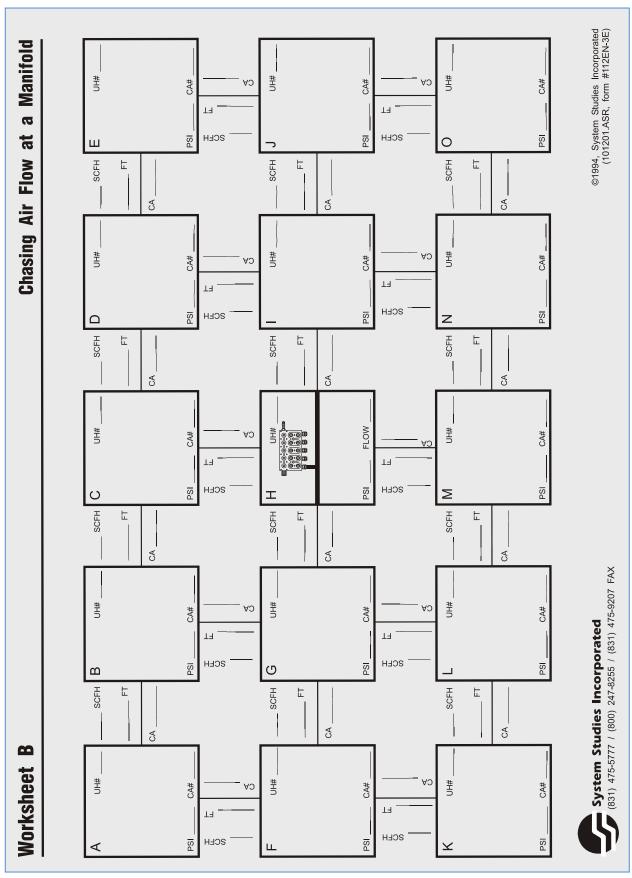


FIGURE A4-3: WORKSHEET B (SIDE 1)

Worksheet B Chasing Air Flow at a Manifold Procedure: Sep 1 Table flow (SCFH) and pressure readings (PSI) for cable at manifold utility hole on worksheet is designated as a Utility Pole to be the season of the least. In this situation it is recessary for first unto fill flow at manifold utility hole on either side of manifold utility hole (go toward leak if flow and the manifold before connecting the Flow Direction Indicator to determine the direction of the leak. In this situation it is recessary for first unto flow to the cable of manifold utility hole (go toward leak if flow and the manifold continue in the six and procedure flowers to the cable of manifold utility hole (go toward leak if flow and the manifold continue in the six and cable as a flow become activation. It is least hopefore connecting the Flow Direction Indicator on the cable of manifold utility hole (go toward leak if flow and the manifold continue in the six and Cable and the manifold utility hole in the cable at the manifold utility hole in the cable at the manifold utility hole in the cable and the and the manifold utility hole in the cable at the manifold utility hole in the cable at the manifold utility hole in the six and the cable at the manifold utility hole in the cable at the manifold utility hole in the cable at the manifold utility hole in the cable of the page.  Step 5 Continue chasing flow in the direction of the leak within the ZIP boundary. Cantinue chasing flow in the direction of the leak within the ZIP boundary.  Step 5 Continue chasing flow in the direction of the leak within the ZIP boundary.  Step 6 Central calculations, lookages and cable size on disparant All Al Flow calculated flow and the manifold utility hole in the cable changes preunator cass and cable at the cable changes and cable size on disparant All Al Flow calculations and Zero Leak Projections should also be entered on worksheet.  Equipment and Procedures Required:  Carculation and cable between each of the cable of the cable of the cable of the cable of th			_	T
adings (PSI) for cable at manifold utility old utility hole on worksheet is designated at selection Indicator to determine the direction cessary to first turn off flow to the cable at an incidentility hole (go toward leak if flow an incidentility hole (go toward leak if flow are setion). If it is less than 50% of measured air flow at eachor, if it is less than 50% and you have ep 2), there is a leak on the cable in the ditte manifold utility hole and the isi at leak on the cable in the ditte manifold utility hole and the sist the utility hole on other side of the hole.  Cause of P Cause of P Cause of D Cause of P Cause		heet B		lask Number:
dings (PSI) for cable at manifold utility hale on worksheet is designated ves on the high flowing cable in the infection indicator to determine the direction essary to first turn off flow to the cable at Flow Direction Indicator. Remember to turn infold utility hole (go toward leak if flow at citon. If it is less than 50% of measured air flow at citon. If it is less than 50% of measured air flow at citon. If it is less than 50% of measured air flow at citon. If it is less than 50% and you have by 2), there is a leak on the cable in the 1themanifold utility hole and the cable at the manifold utility hole. In of flow cable at the manifold utility hole and the cable at the manifold utility hole and the cable at the manifold utility hole. In of flow cable at the manifold utility hole and the cable at the cable at the manifold utility hole and the cable at the manifold utility hole and the cable at th		ıg Air Flow at a Manifold	Review Checklist	Found
dings (PSI) for cable at manifold utility Id utility hole on worksheet is designated  ves on the high flowing cable in the infection indicator to determine the direction essary to first turn off flow to the cable at Flow Direction Indicator. Remember to turn nifold utility hole (go toward leak if flow it is more than 50% and you have it is more than 50% and you have it is more than 50% of measured air flow at citon. If it is less than 50% and you have it is more than 50% and you have it is more than 50% and you have it is more than 50% and you have it is less than 50% and out have it is less than 50% and out have it is less than 50% and out have it is less than 50% and in the it is less than 50% and out have in the cable in the cable in the index.  I hours worther:  I hours worther	_	ıre:		□ Not Found
ves on the high flowing cable in the hirection lodicator to determine the direction essary to first turn off flow to the cable at Flow Direction Indicator. Remember to turn flow of measured air flow at tis nor than 50% of measured air flow at tis nor than 50% of measured air flow at tis nor flow between this utility hole. If no flow fir is manifold utility hole in the the manifold utility hole in the the manifold utility hole on other side of the hole. The manifold utility hole on other side of the hole. The manifold utility hole on other side of the hole. The manifold utility hole on other side of the hole. The manifold utility hole of the hole. The hole of the hole of the hole of the hole. The hole of the hole of the hole of the hole. The hole of the hole of the hole of the hole. The hole of the hole of the hole of the hole. The hole of the hole. The hole of the hole		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.	1 [	Date:
infold utility hole (go toward leak if flow at calculate air flow between this utility hole is more than 50% of measured air flow at ction. If it is less than 50% and you have p 2), there is a leak on the cable in the tite manifold utility hole. If no flow cable at the manifold utility hole and the sit the utility hole on other side of the hole. The area of search. Record the ZLP cable pressure reading, calculate a Zero the area of search. Record the ZLP boundary.  The area of search the ZLP boundary. Cable size on diagram. All Air Flow cable size on diagram.		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.	3	Hours Worked:Office:
the area of search. Record the ZLP the area of Leaking the area of Section the Leaking the Leaking the Section the Leaking the Section the Section the Section the Casical Secti		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.		Pipe Route:
on of the leak within the ZLP boundary.  een each utility hole. A new ZLP should be ages pneumatic resistance. Chase d.  cable size on diagram. All Air Flow ions should also be entered on worksheet.		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.		
cable size on diagram. All Air Flow ions should also be entered on worksheet.		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.		
□ Calculator		Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet.		
r (0-20 SCFH) ection Indicator cator or Soap Bucket  Calculator  Calculator  Calculator  Calculator		ent and Procedures Required:		
□ Calculator	a e	uge r (0-20 SCFH) sction Indicator	I	
	S =			©1995, System Studies Incorporated (101201 ASR, form #112EN:3E)

FIGURE A4-4: WORKSHEET B (SIDE 2)

A4-10 28-00oA4.ASM

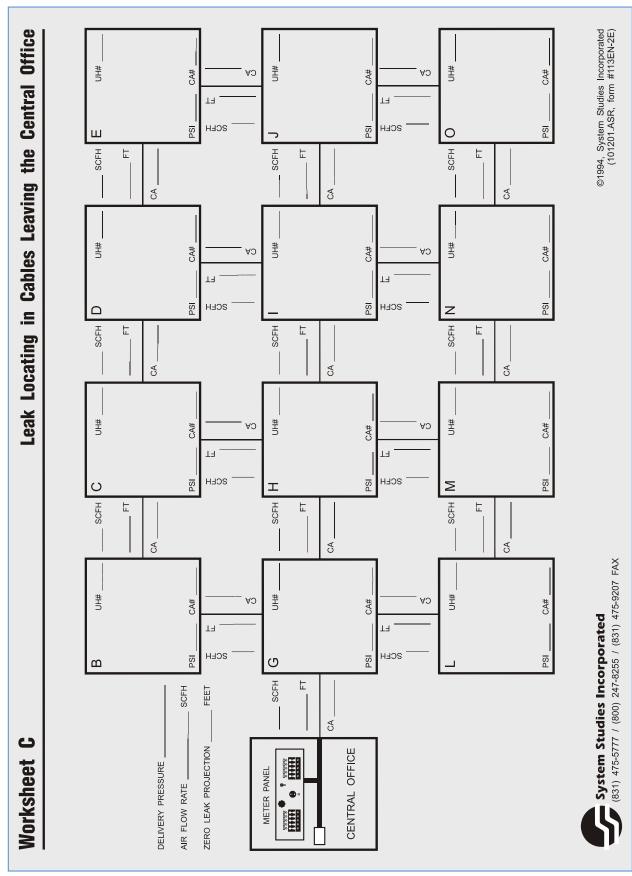


FIGURE A4-5: WORKSHEET C (SIDE 1)

Works	Worksheet C		Task Number:
Leak L	Leak Locating in Cables Leaving the Central Office		□ Found
	R	Review	□ Not Found
Procedure:		Checklist	
Step 1	Measure and record the flow rate and input pressure of cable. If flowrate is above 10 SCFH, use portable flow rater.		Date:
Step 2	Calculate Zero Leak Projection to determine area of search.		Hours Worked:
Step 3	Verify that the meter panel is installed on correct cable. Check plastictubing and central office (CO) plug for leaks.		Office:
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.		Cable Number:
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		Name:Cause of Problem:
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.		□ Leaking Valve □ Section Leak □ Leaking Hardware
Equipm	Equipment and Procedures Required:		
C Pre	C Pressure Gauge		
	Foliable Flow Nater (V-20 SOFT) Flow Direction Indicator		
☐ Ultrasonic☐ Calculator	Ultrasonic Leak Locator or Soap Bucket Calculator		
□ Pneur	Pneumatic Resistance Charts		
LI Zero I	Zero Leak Projection Air Flow Calculation		
□ Back	Back Projection (Single Feed Systems Only)		
			©1994, System Studies Incorporated (101201.ASR, form #113EN-2E)

FIGURE A4-6: WORKSHEET C (SIDE 2)

A4-12 28-00oA4.ASM

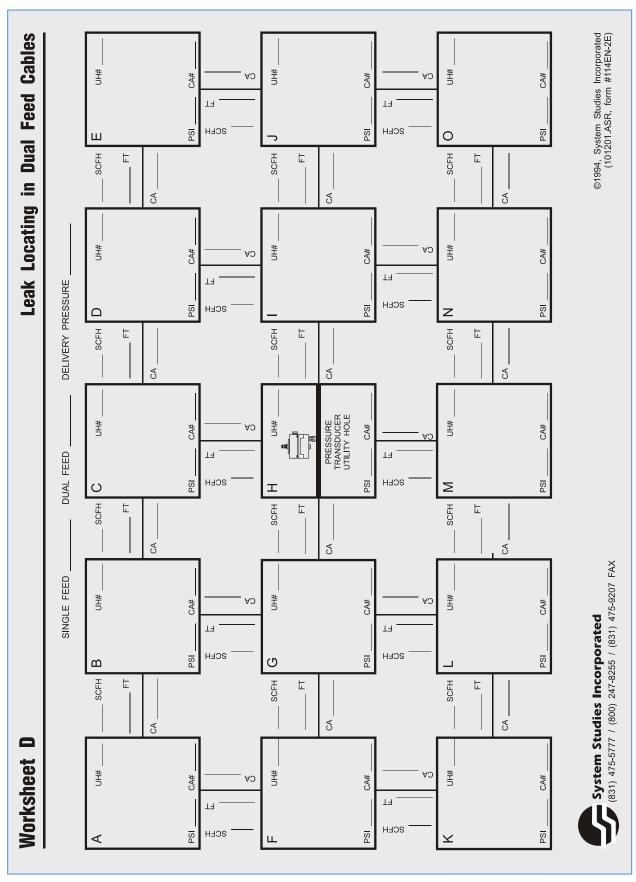


FIGURE A4-7: WORKSHEET D (SIDE 1)

Procedure:   Procedure:   Checklist   Checklist   Checklist   Siep 1 Visit pressure transducer (Utility Hole H) to verify and record correct reading. Begin documentation in Utility Hole H, Check to make sure develope pressure of pipe in pressur	Worksheet D	heet D		Task Number:
Next interest transducer (Utility Hole H) to verify and record correct carding Begind documentation in Utility Hole H. Check to make sure delivery pressure transducer (Utility Hole H) to verify and record correct carding Begind documentation in Utility Hole H. Check to make sure delivery pressure is about 7.5 PSI. This can be accomplished by reading pressure transducer (PTD) utility hole on on pipe pressure transducer printing. This can be accomplished by reading pressure transducer printing to make side of PTD location. Calculate flow through section. If pressure is dropping, continue in same direction. If pressure has section in direction of dropping pressure. Take pressure readings and readed of or mast increased, visit utility hole on other side of PTD utility hole. Calculate 2 are froleton in direction of dropping pressure. Take pressure readings and readings on laterals. Calculate air flow, it has one quiling the cable pressure down.  Continue in direction of dropping pressure. Take pressure readings and cable size on diagram. All Air Flow calculations and Zero Leak Projections should also be entered on worksheet.  Teresure Gauge  Worksheet.  Wauge  Therefore indicator asong Bucket  Therefore the calculation of the cable size on diagram. All Air Flow cauge  Therefore indicator asong bucket  Therefore indi	Leak L	ocating in Dual Feed Cables		□ Found
Active transducer (Utitity Hole H) to verify and record correct reading. Begin documentation in Utitity Hole H. Check to make sure reading. Begin documentation in Utitity Hole H. Check to make sure delivery pressure is above 7.6 PSI. This can be accomplished by reading pressure is above 7.6 PSI. This can be accomplished by reading pressure of pipe in pressure transducer (PTD) utility hole or on pipe pressure of pipe in pressure is dropping, continue in same direction. If pressure has section. If pressure is dropping, continue in direction of leak.  Continue in direction of dropping 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.  Enter all calculations and Zero Leak Projections should also be entered on down.  Enter and Procedures Required:  Enter and Procedures Required:  Enter and Procedures Required:  Section  I casking worksheet.  I calculation and Early Calculate air flow is the one pulling the cable pressure dauge worksheet.  I calculation and Early Calculate air flow is the one pulling the cable pressure dauge.  Enter and Procedures Required:  Enter all Locator or Soap Bucket  Unathor  Umatic Resistance Charts  Enter Resistan			Review	□ Not Found
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 is above 7.5 PSI. This can be accomplished by reading pressure printout.  Visit utility hole on either side of PTD location. Calculate flow through section. If pressure has brighted printons.  Visit utility hole on either side of PTD location. Calculate flow through section. If pressure is dropping, continue in same direction of feak.  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.  Enter all calculations, footages and cable size on diagram. All Air Flow down.  Enter all calculations footages and cable size on diagram. All Air Flow according to the calculations and Zero Leak Projections should also be entered on the pulling the cable Flow Rater (0-20 SCFH)  We Direction Indicator and Sero Leak System Only)	Procedu	ure:	Checklist	
Visit utility hole on either side of PTD location. Calculate flow through section. If pressure has section. If pressure has section. If pressure is dropping, continue in same direction. If pressure has hole. Calculate Zero Leak Projection of leak.  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.  Enter all calculations, footages and cable size on diagram. All Air Flow down.  Enter all calculations and Zero Leak Projections should also be entered on worksheet.  Tessure Gauge  W Gauge  W Direction Indicator  asonic Leak Locator or Soap Bucket  w Direction Indicator  asonic Leak Projection  Suldor  W Direction (Single Feed System Only)	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.		Hours Worked:
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.  Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet.  ment and Procedures Required:  ment and Procedures Required:  messure Gauge  w Gauge  w Direction Indicator  assonic Leak Locator or Soap Bucket  umatic Resistance Charts  o Leak Projection  allow Calculation  leak Projection (Single Feed System Only)	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.		Pipe Route:
Enter all calculations, footages and cable size on diagram. All Air Flow Calculations and Zero Leak Projections should also be entered on worksheet.  ment and Procedures Required: ressure Gauge w Gauge table Flow Rater (0-20 SCFH) w Direction Indicator assonic Leak Locator or Soap Bucket culator unmatic Resistance Charts to Leak Projection  o Leak Projection  culator strength of the Company of	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.		Name:
Other Other	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.	_	
	Equipm C Pres C Portat C Flow ( C Portat C Portat C Portat C Portat C Calcul C Calcul C Air Flo	ent and Procedures Required: ssure Gauge Gauge Gauge Jiection Indicator Onic Leak Locator or Soap Bucket lator natic Resistance Charts Leak Projection w Calculation Projection (Single Feed System Only)		Other

FIGURE A4-8: WORKSHEET D (SIDE 2)

A4-14 28-00oA4.ASM

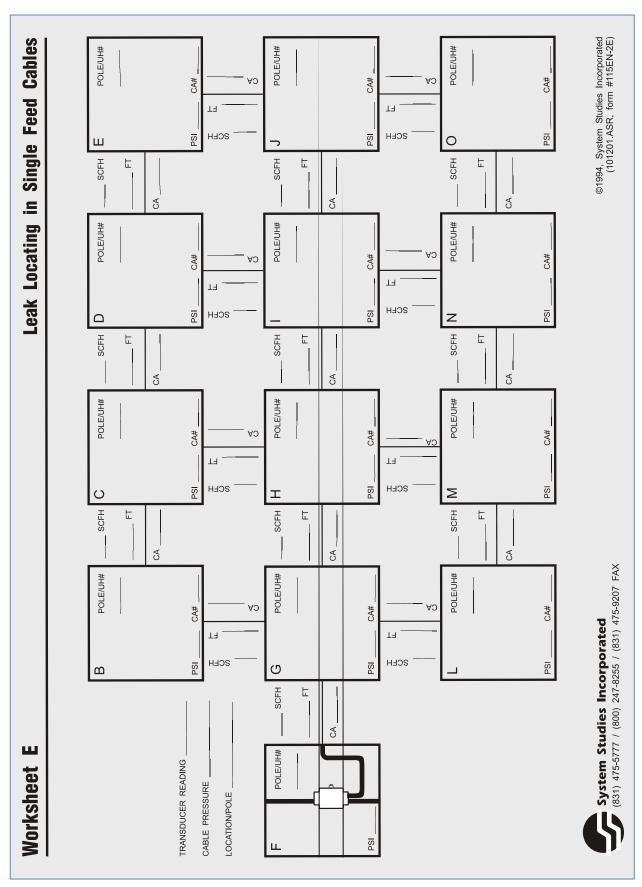


FIGURE A4-8: WORKSHEET E (SIDE 1)

Works	Worksheet E		Task Number:
Leak I	Leak Locating in Single Feed Cables		
1		Review	☐ Found☐ Not Found
Procedure:	ure:	Checklist	
Step 1	Visit pressure transducer to verify and record cable pressure.		Date:
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.		Hours Worked:
Step 3	Take pressure reading to field side of "T," record reading (Location G), calculate and record flow for section.		Office:
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.		Pipe Route:
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.		Cause of Problem:
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.	_	☐ Institute Plug ☐ Leaking Plug ☐ Leaking Valve
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.	_	_
Equipm C Pre	Equipment and Procedures Required:    C Pressure Gauge  Flow Gauge		
□ Porta	Portable Flow Rater (0-20 SCFH)		
□ Flow	Flow Direction Indicator		
□ Ultras	Ultrasonic Leak Locator or Soap Bucket		
☐ Calculator	Calculator Pneumatic Resistance Charts		
□ Zero	Zero Leak Projection		
□ Air Fļ	Air Flow Calculation		
□ Back	Back Projection (Single Feed System Only)		
			©1994, System Studies Incorporated (101201.ASR, form #115EN-2E)

FIGURE A4-9: WORKSHEET E (SIDE 2)

A4-16 28-00oA4.ASM

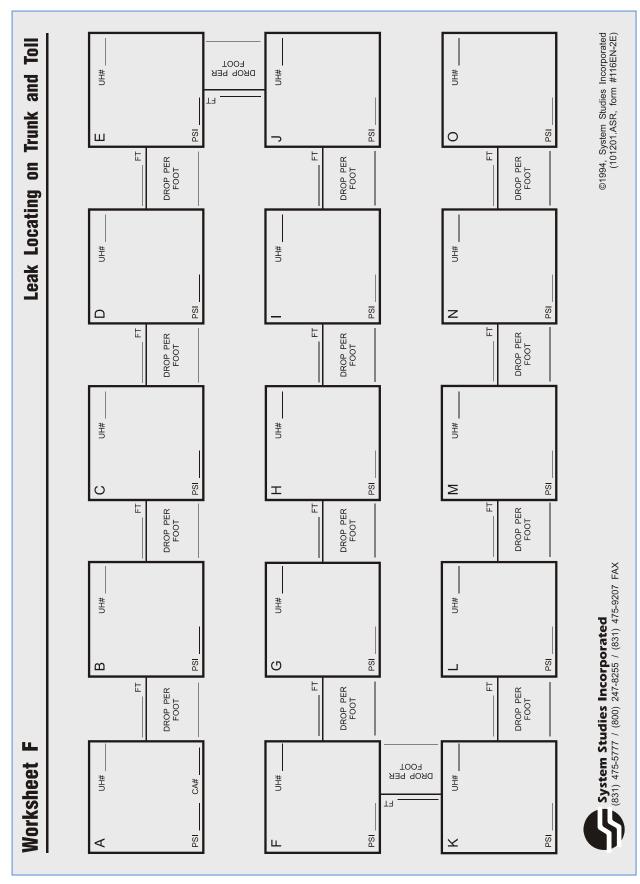


FIGURE A4-10: WORKSHEET F (SIDE 1)

Task Number:	Date:	Hours Worked:Office:	Cable Number:	Name:Cause of Problem:	☐ Leaking Closure☐ Missing Plug☐ Leaking Plug☐ ☐ Leaking Plug☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ Leaking Valve☐ Section Leak☐☐ Leaking Hardware☐ Leaking Hardware☐ Leaking Hardware☐ ☐ ☐ Leaking Hardware☐ ☐ ☐ Leaking Hardware☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	□ Other	©1994, System Studies Incorporated (101201.ASR, form #116EN-2E)
<b>Worksheet F</b> Leak Locating on Trunk and Toll Review	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.	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 □ Readings Readings Valves □ Zero Leak Projection □ Air Flow Calculation □ Back Projection □ Back Projection □ Readings □ Calculation □ Readings □ Calculation □ Air Flow Calculation □ Readings □ Calculation □ Calculation □ Air Flow Calculation □ Readings □ Calculation □ Calculation □ Air Flow Calculation □ Readings □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □ Calculation □ Calculation □ Calculation □ Calculation □ Air Flow Calculation □

FIGURE A4-11: WORKSHEET F (SIDE 2)

A4-18 28-00oA4.ASM

©1994, System Studies Incorporated (101201.ASR, form #141EN-2E)

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

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

# Reading Flows at the Flow Bank

Worksheet G

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

FIGURE A4-12: WORKSHEET G (SIDE 1)

Worksheet G Reading Flows at the Flow Bank	Task Number:	
np	ew Date:	1 1
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.)	Office:	1 1 1
Equipment and Procedures Required:    C Pressure Gauge  Flow Gauge		
Total Flow of all Flow Banks SCFH		
	©1994, System Studies Incorporated (101201.ASR, form #141EN-2E)	pə

FIGURE A4-13: WORKSHEET G (SIDE 2)

A4-20 28-00oA4.ASM