Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: Counsel/William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-1

Please refer to the Response to AG-VZ 1-1.
1) Please provide any and all documents which describe or discuss the results of the infrastructure evaluations completed in March and April 2009.
2) Please identify specifically the type (if applicable), number and locations of:
   a) each battery replaced
   b) each open plant area that was closed
   c) each area of lashing wire that was repaired or replaced including the length of the repair or replacement

3) Please provide a statement as to whether the specific field investigations committed to by Verizon for Williamstown, Shutesbury and Leverett have been completed.
4) Please provide any documentation that describes or discusses these specific field investigations.

REPLY:

Objection: Verizon MA objects to this request to the extent it seeks information protected from discovery by the attorney-client privilege or the work-product doctrine. Moreover, part 3 of the request mischaracterizes Verizon MA's prior comments, which did not "commit" Verizon MA to perform any field investigations.

Subject to these objections, Verizon MA states the following:
1. See Attachments AG-VZ 6-1(a, b, c, d).
2 a) Pole 20 Bridges Rd Williamstown. Five cells replaced
  b) Williamstown – 39 open plant items closed
    Leverett – 32 open plant items closed
    Shutesbury 55 open plant items closed
  c) Leverett – 13 locations completed
    Shutesbury – 9 locations completed .
3. Verizon MA has completed the evaluations.
4. See response to part 1.

Record Number	Completed Date	Work Completed	Hours	Tech ID	Location	le/Ped/MH Num	Record Date	Record Typ	Wire Center	Town	Originator
14516	9/8/2009		2	q71q58	Lake Dr	P 15	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14517	9/8/2009		4	q71q58	Lake Dr	P 20	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14519	5/17/2009		2		Lakeview Rd	P 147	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14522	5/17/2009		4		Lakeview Rd	P 152	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14523	5/17/2009		2		Lakeview Rd	P 152	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14541	9/11/2009		1	q58	Montague Rd	P 4	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14542	9/11/2009		1	q58	Montague Rd	P5	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14543	9/11/2009		1	q58	Montague Rd	P 6	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14544	9/11/2009		1	q58	Montague Rd	P 7	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14545	9/11/2009		1	q58	Montague Rd	P 18	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14546	9/11/2009		1	q58	Montague Rd	P 26	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14547	5/17/2009		4		Montague Rd	P 37	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14548	9/11/2009		1	q58	Montague Rd	P 44	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14553	9/15/2009		4	q58	West Pelham Rd	P 210	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14568	9/17/2009	8 step done and	2	q58	Baker Rd	P 6	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14569	9/17/2009	Closed.	1	Q58	Baker Rd	P 18	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14570	9/17/2009	Closed.	1	Q58	Baker Rd	P 26	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14572	9/15/2009		4	q58	Pelhan Hill Rd	P 21	11/13/2007	1	Amherst	Shutesbury	Bob Perham
14589	9/11/2009	Placed closure.	4	q71	Cave Hill Rd	P 11	11/14/2007	1	Amherst	Leverett	Bob Perham
14590	9/11/2009	8 step done and	2	q71	Cave Hill Rd	P 7	11/14/2007	1	Amherst	Leverett	Bob Perham
14593	9/8/2009	Placed closure.	4		N Leverett Rd	P 122-123	11/14/2007	1	Amherst	Leverett	Bob Perham
14595	9/8/2009	Placed closure.	4		N Leverett Rd	P 127	11/14/2007	1	Amherst	Leverett	Bob Perham
14596	9/8/2009	Placed closure.	4		N Leverett Rd	P 131	11/14/2007	1	Amherst	Leverett	Bob Perham
14597	9/10/2009	Placed closure.	4	q21	N Leverett Rd	P95	11/14/2007	1	Amherst	Leverett	Bob Perham
14598	9/8/2009	Placed closure.	4		N Leverett Rd	P 93	11/14/2007	1	Amherst	Leverett	Bob Perham
14599	9/8/2009	Placed closure.	4		N Leverett Rd	P 80-81	11/14/2007	1	Amherst	Leverett	Bob Perham
14601	9/8/2009	Placed closure.	4		N Leverett Rd	P 68	11/14/2007	1	Amherst	Leverett	Bob Perham
14602	9/8/2009	Placed closure.	4		N Leverett Rd	P 61	11/14/2007	1	Amherst	Leverett	Bob Perham
14603	9/8/2009	Placed closure.	4		N Leverett Rd	P 52	11/14/2007	1	Amherst	Leverett	Bob Perham
14604	9/8/2009	8 step done and	2		N Leverett Rd	P 38	11/14/2007	1	Amherst	Leverett	Bob Perham
14605	9/8/2009	Closed.	2		Richardson Rd	P 154-155	11/14/2007	1	Amherst	Leverett	Bob Perham
14610	9/17/2009	Placed closure.	4	q58	Long Plain Rd	P 155	11/14/2007	1	Amherst	Leverett	Bob Perham
14611	5/17/2009		2		Long Plain Rd	P 143	11/14/2007	1	Amherst	Leverett	Bob Perham
14612	5/17/2009		2		Long Plain Rd	P 138 1/2-139	11/14/2007	1	Amherst	Leverett	Bob Perham
14613	5/17/2009		2		Long Plain Rd	P 136 1/2	11/14/2007	1	Amherst	Leverett	Bob Perham
14614	9/17/2009	Placed closure.	4	q58	Long Plain Rd	P 135	11/14/2007	1	Amherst	Leverett	Bob Perham
14615	5/17/2009		1		Long Plain Rd	P 123-124	11/14/2007	1	Amherst	Leverett	Bob Perham
14616	9/17/2009	Placed closure.	4	q58	Long Plain Rd	P 106	11/14/2007	1	Amherst	Leverett	Bob Perham
14617	5/17/2009		2		Long Plain Rd	P 104 1/2	11/14/2007	1	Amherst	Leverett	Bob Perham
14626	9/11/2009	8 step done and	2	q58	Long Hill Rd	P17	11/14/2007	1	Amherst	Leverett	Bob Perham
14627	9/11/2009	Placed closure.	4	q58	Camp Rd	P 01	11/14/2007	1	Amherst	Leverett	Bob Perham
14630	9/11/2009	8 step done and	2	q58	Montague Rd	P 118	11/14/2007	1	Amherst	Leverett	Bob Perham
14631	9/11/2009	8 step done and	2		Montague Rd	P 121	11/14/2007	1	Amherst	Leverett	Bob Perham
14633	6/10/2009		4		Montague Rd	P 129	11/14/2007	1	Amherst	Leverett	Bob Perham
14636	9/28/2009	Placed closure.	4	q21	Shutesbury Rd	P 6	11/14/2007	1	Amherst	Leverett	Bob Perham
14638	9/8/2009	Placed closure.	1	q58	Old Mountain Rd	P 2	11/14/2007	1	Amherst	Leverett	Bob Perham
14639	9/11/2009	Replaced closure.	4	q21	Cushman Rd	P 147	11/14/2007	1	Amherst	Leverett	Bob Perham
14640	9/11/2009	8 step done and	2	q21	Cushman Rd	P 147	11/14/2007	1	Amherst	Leverett	Bob Perham
37122	9/14/2009	Cleaned and closed.	1	q58	Baker Rd	P22	4/7/2009	1	Amherst	Shutesbury	Bob Conte
37125	9/14/2009	Repaired lashing wire.	1	q58	Baker Rd	P1-P2	4/7/2009	1	Amherst	Shutesbury	Bob Conte
40020	9/21/2009	Placed 50 pair cable	8		Teawaddle St.	P7-5-2/1	6/19/2009	1	Amherst	Leverett	Wilson

Record Number	TU Number	Code 4 Volume	Condition Found	Work Required	Assigned To	Priority
14516			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14517			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14519			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14522			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14523			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14541			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14542			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14543			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14544			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14545			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14546			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14547			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14548			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14553			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14568			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14569			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14570			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
14572			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14589			Drape	Place 3M closure. Make over deteriorated conductors.	m	1
14590			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14593			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14595			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14596			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14597			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14598			Drape	Place 3M closure. Make over deteriorated conductors.	m	1
14599			Drape	Place 3M closure. Make over deteriorated conductors.	m	1
14601			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14602			Drape	Place 3M closure. Make over deteriorated conductors.	m	1
14603			Drape	Place 3M closure. Make over deteriorated conductors.	m	1
14604			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14605			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14610			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14611			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14612			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14613			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14614			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14615			105 Term Open	Inspect drop conductors for deterioration. Make over if	m	1
14616			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14617			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14626			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14627			Sheath Damage	Place 3M closure. Make over deteriorated conductors.	m	1
14630			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14631			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
14633			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14636			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14638			105 Term Open	Inspect drop conductors for deterioration. Make over if	m	1
14639			Splice Open	Place 3M closure. Make over deteriorated conductors.	m	1
14640			RA Term Open	8 Step RA terminal. Make over deteriorated conductors.	m	1
37122			SMT Open	Inspect drop conductors for deterioration. Make over if	m	1
37125			Broken Lashing Wire	Repair Lashing Wire	m	3
40020		0	Severe sheath pull out. Turnplate	Place 8 feet of 50 pair cable and section throw around pole.	m	1

Record Number	Completed Date	Work Completed	Hours	Record Date	Record Type	Wire Center	Town	Location
46665			5	10/22/2009	1	Amherst	Leverett	Long Plain Rd.
46667			4	10/22/2009	1	Amherst	Leverett	Long Plain Rd.
46670			4	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
46672			16	10/22/2009	1	Amherst	Leverett	Long Plain Rd.
46674			5	10/22/2009	1	Amherst	Leverett	Long Plain Rd.
46675			4	10/22/2009	1	Amherst	Leverett	Baker Rd.
46676			5	10/22/2009	1	Amherst	Leverett	W. Pelham Rd.
46677			4	10/22/2009	1	Amherst	Leverett	Montague Rd.
46680			2.5	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
46681			4	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
46682			8	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
46683			5	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
46684			8	10/22/2009	1	Amherst	Leverett	N. Leverett Rd.
14608	10/12/2009	8 stepped RA terminal. Made over conductors.	1	11/14/2007	1	Amherst	Leverett	Montague Rd
14588	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Montague Rd
14591	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	N Leverett Rd
14592	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	N Leverett Rd
14594	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	N Leverett Rd
14600	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	N Leverett Rd
14606	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Montague Rd
14607	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Montague Rd
14620	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Long Plain Rd
14622	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	J uggler Meadow Rd
14625	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Amherst Rd
14632	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Montague Rd
14635	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Shutesbury Rd
14637	9/9/2009	Relashed section.	2	11/14/2007	1	Amherst	Leverett	Shutesbury Rd
46678			5	10/22/2009	1	Amherst	Shutesbury	Lake Dr.
46679			5	10/22/2009	1	Amherst	Shutesbury	Lake Dr.
46860			5	10/27/2009	1	Amherst	Shutesbury	Leverett Rd.
14509	9/18/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Town Farm Rd
14510	9/21/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Cooleyville Rd
14520	9/16/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Lakeview Rd
14526	9/24/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Shore Dr
14527	9/24/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Shore Dr
14533	10/2/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14536	10/2/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14558	9/25/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14574	9/25/2009	8 stepped RA terminal. Made over conductors.	1	11/13/2007	1	Amherst	Shutesbury	Cushman Rd
29542	9/21/2009	Fault located wet section. Placed 3m closures.	8	6/6/2008	1	Amherst	Shutesbury	Cooleyville Rd.
14540	10/2/2009	Inspected and made over drops. Closed with two	1	11/13/2007	1	Amherst	Shutesbury	Pratt Corner Rd
37124	9/17/2009	Inspected drops and made over as necessary.	1	4/7/2009	1	Amherst	Shutesbury	Baker Rd
14508	9/21/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Cooleyville Rd
14512	9/21/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Wendale Rd
14521	9/17/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Lakeview Rd

14524	9/17/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Gass Light Ln
14525	9/24/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Shore Dr
14528	9/24/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Shore Dr
14529	9/21/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Carver Rd
14531	9/22/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Plaza Rd
14532	9/24/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14535	9/24/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14538	10/2/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14554	9/25/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14555	9/25/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14556	10/2/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14557	9/25/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14559	9/17/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14575	10/2/2009	Placed 3M closure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
29543	10/2/2009	Placed 3M closure. Made over conductors.	2.5	6/6/2008	1	Amherst	Shutesbury	Cushman Rd
37121	9/17/2009	Placed 3M closure. Made over conductors.	3	4/7/2009	1	Amherst	Shutesbury	West Pelham Rd.
37123	9/17/2009	Placed 3M closure. Made over conductors.	2	4/7/2009	1	Amherst	Shutesbury	Baker Rd
37126	10/2/2009	Placed 3M closure. Made over conductors.	3	4/7/2009	1	Amherst	Shutesbury	Baker Rd
14534	9/24/2009	Placed 3M clsoure. Made over conductors.	2.5	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14511	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14513	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Wendale Rd
14514	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Wendale Rd
14515	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Lockspond Rd
14518	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Lockspond Rd
14537	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Lakeview Rd
14539	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Leverett Rd
14549		Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Pratt Corner Rd
14567	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	West Pelham Rd
14576	9/9/2009	Relashed section.	2	11/13/2007	1	Amherst	Shutesbury	Baker Rd
14530	9/17/2009	Replaced SMT.	4	11/13/2007	1	Amherst	Shutesbury	January Hill Rd

Record Number	Pole/Ped/MH Number	Originator	TU Number	Code 4 Volume	Condition Found	Work Required	Assigned To	Priority
46665	p138 1/2 - P139 Midspan.	Bill wilson		0	Sheath not bonded in	Place 3M ITC terminal/closure and	c	
46667	P143	Bill Wilson		0	RA terminal has severe	Place 3M ITC terminal/closure. Make	c	
46670	P52	Bill Wilson		0	Conductors under new	Make over conductors.	c	
46672	P106	Bill Wilson		0	Conductors need to be	Make over conductors. Ensure all	c	
46674	P136 1/2	Bill Wilson		0	RA terminal has severe	Place 3M ITC terminal/closure. Make	c	
46675	P22	Bill Wilson		0	1005 terminal has	Place 3M ITC terminal/closure. Make	c	
46676	P210	Bill Wilson		0	5 new 3M closures	Make over conductors in two splices	c	
46677	P7	Bill Wilson		0	105 terminal has severe	Place 3M ITC terminal/closure. Make	c	
46680	P127	Bill Wilson		0	6A closure needs to be	Place 3M closure. Conductors do not	c	
46681	P122 - P123 Mid Span	Bill Wilson		0	6A closure needs to be	Place 3M closure. Make over	c	
46682	P95	Bill Wilson		0	Conductors need to be	Make over conductors. Ensure all	c	
46683	P80 - P81 Midspan	Bill Wilson		0	Pairs have severe	Make over conductors.	c	
46684	P68	Bill Wilson		0	Conductors have	Make over conductors. Ensure all	c	
14608	P 81-82	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14588	P 154-155	Bob Perham			Lashing Wire Broken	Relash	c	3
14591	P 105-107	Bob Perham			Lashing Wire Broken	Relash	c	3
14592	P 108-109	Bob Perham			Lashing Wire Broken	Relash	c	3
14594	P 122-123	Bob Perham			Lashing Wire Broken	Relash	c	3
14600	P 74-75	Bob Perham			Lashing Wire Broken	Relash	c	3
14606	P 90-92	Bob Perham			Lashing Wire Broken	Relash	c	3
14607	P 81-82	Bob Perham			Lashing Wire Broken	Relash	c	3
14620	P 64 1/2-64	Bob Perham			Lashing Wire Broken	Relash	c	3
14622	P 13 1/2-14	Bob Perham			Lashing Wire Broken	Relash	c	3
14625	P 61-62	Bob Perham			Lashing Wire Broken	Relash	c	3
14632	P 126-127	Bob Perham			Lashing Wire Broken	Relash	c	3
14635	P 189-188	Bob Perham			Lashing Wire Broken	Relash	c	3
14637	P 11-12	Bob Perham			Lashing Wire Broken	Relash	c	3
46678	P15	Bill Wilson		0	RA terminal has severe	Place 3M ITC terminal/closure. Make	c	
46679	P20	Bill Wilson		0	RA terminal has severe	Place 3M ITC terminal/closure. Make	c	
46860	P66	Bill Wilson		0	Drape on face of pole.	Place 3M closure. Make over	C	
14509	P 1	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14510	P 3	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14520	P 151	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14526	P 1	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14527	P 2	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14533	P 280	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14536	P 262	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14558	P 171-172	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
14574	P 12	Bob Perham			RA Term Open	8 Step RA terminal. Make over	c	1
29542	P304	Wilson			12 pair drop bypassing	Investigate& Repair for wet sections.	c	1
14540	P 99	Bob Perham			PMT Open	Inspect drop conductors for	c	1
37124	P12	Bob Conte			SMT Open	Inspect drop conductors for	c	1
14508	P 16	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14512	P 79	Bob Perham			Check sheath damage	Place 3M closure. Make over	c	1
14521	P 151	Bob Perham			Splice Open	Place 3M closure. Make over	c	1

14524	P 2-3	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14525	P 1	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14528	P 14	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14529	P 2	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14531	P 7	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14532	P 282	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14535	P 272	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14538	P 262	Bob Perham			Drape	Place 3M closure. Make over	c	1
14554	P 189	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14555	P 188	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14556	P 174	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14557	P 171-172	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14559	P 169-168	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14575	P 43	Bob Perham			Drape	Place 3M closure. Make over	c	1
29543	P29 to P31	Wilson			Drape. Conductors	Place 3M closure and make over	c	1
37121	P29	Bob Conte			18B1 Open	Place 3M closure. Make over	c	1
37123	P17-P18	Bob Conte			Drape in Section	Place 3M closure. Make over	c	1
37126	P26	Bob Conte			18C1 Closure Wide	Place 3M closure. Make over	c	1
14534	P 274	Bob Perham			Splice Open	Place 3M closure. Make over	c	1
14511	P 21-22	Bob Perham			Lashing Wire Broken	Relash	c	3
14513	P 79-80	Bob Perham			Lashing Wire Broken	Relash	c	3
14514	P 39-42	Bob Perham			Lashing Wire Broken	Relash	c	3
14515	P 2-3	Bob Perham			Lashing Wire Broken	Relash	c	3
14518	P 141-142	Bob Perham			Lashing Wire Broken	Relash	c	3
14537	P 258-259	Bob Perham			Lashing Wire Broken	Relash	c	3
14539	P 12-13	Bob Perham			Lashing Wire Broken	Relash	c	3
14549	P 243-244	Bob Perham			Lashing Wire Broken	Relash	c	3
14567	P 1-2	Bob Perham			Lashing Wire Broken	Relash	c	3
14576	P 12-13	Bob Perham			Lashing Wire Broken	Relash	c	3
14530	P 5	Bob Perham			SMT Cover Missing	Place 3M ITC terminal closure. Make	c	1

Record Number	Completed Date	Work Completed	Hours	Tech ID	Location	le/Ped/MH Num	Record Date	Record Type	Wire Center	Town
13748			4		Hancock Rd	P52	10/24/2007	1	Williamstown	Willimstown
36698			2		Church St	P11	3/25/2009	1	Williamstown	Williamstown
36699			2		Cole Ave	P25	3/25/2009	1	Williamstown	Williamstown
36700			2		Cole Ave	P23	3/25/2009	1	Williamstown	Williamstown
36701			1		Cole Ave	P23	3/25/2009	1	Williamstown	Williamstown
36702			1		Cole Ave	P20	3/25/2009	1	Williamstown	Williamstown
36703			1		Cole Ave	P18-P19	3/25/2009	1	Williamstown	Williamstown
36704			2		Cole Ave	P16	3/25/2009	1	Williamstown	Williamstown
36705			2		Cole Ave	P14	3/25/2009	1	Williamstown	Williamstown
36706			2		Cole Ave	P11-P12	3/25/2009	1	Williamstown	Williamstown
36707			4		Cole Ave	P11	3/25/2009	1	Williamstown	Williamstown
36708			2		Cole Ave	P10	3/25/2009	1	Williamstown	Williamstown
36709			2		Cole Ave	P3	3/25/2009	1	Williamstown	Williamstown
36710			1		Grandview Dr	P7	3/25/2009	1	Williamstown	Williamstown
36711			2		Grandview Dr	P8	3/25/2009	1	Williamstown	Williamstown
36712			1		Hall St	P6	3/25/2009	1	Williamstown	Williamstown
36713			1		Henderson Rd	P1	3/25/2009	1	Williamstown	Williamstown
36714			1		Henderson Rd	P10	3/25/2009	1	Williamstown	Williamstown
36715			1		Henderson Rd	P14-P15	3/25/2009	1	Williamstown	Williamstown
36716			2		Henderson Rd	P30	3/25/2009	1	Williamstown	Williamstown
36717			2		Henderson Rd	P32-P33	3/25/2009	1	Williamstown	Williamstown
36718			1		Henderson Rd	P34-P35	3/25/2009	1	Williamstown	Williamstown
36719			2		Henderson Rd	P59	3/25/2009	1	Williamstown	Williamstown
36720			1		Linden St	P4	3/25/2009	1	Williamstown	Williamstown
36721			1		Main St	P120-P121	3/25/2009	1	Williamstown	Williamstown
36722			1		Main St	P122-P123	3/25/2009	1	Williamstown	Williamstown
36723			2		Main St	P4	3/25/2009	1	Williamstown	Williamstown
36724			2		Main St	P3	3/25/2009	1	Williamstown	Williamstown
36725			2		Main St	P2	3/25/2009	1	Williamstown	Williamstown
36726			2		Main St	P62	3/25/2009	1	Williamstown	Williamstown
36727			2		Main St	P69	3/25/2009	1	Williamstown	Williamstown
36728			2		Main St	P70	3/25/2009	1	Williamstown	Williamstown
36729			2		Main St	P75	3/25/2009	1	Williamstown	Williamstown
36730			2		Main St	P58-1	3/25/2009	1	Williamstown	Williamstown
36731			2		Manning St	P2	3/25/2009	1	Williamstown	Williamstown
36732			2		N. Hoosac Rd	P3500	3/25/2009	1	Williamstown	Williamstown
36734	7/15/2009		2	nu2	N. Hoosac Rd	P3503	3/25/2009	1	Williamstown	Williamstown
36735	7/15/2009		2	nu2	N. Hoosac Rd	P3504	3/25/2009	1	Williamstown	Williamstown
36736	7/15/2009		2	nu2	N. Hoosac Rd	P3506	3/25/2009	1	Williamstown	Williamstown
36737			2		N. Hoosac Rd	P3508	3/25/2009	1	Williamstown	Williamstown
36738			2		N. Hoosac Rd	P3517	3/25/2009	1	Williamstown	Williamstown
36739			2		N. Hoosac Rd	P3491	3/25/2009	1	Williamstown	Williamstown
36740			2		N. Hoosac Rd	P49	3/25/2009	1	Williamstown	Williamstown
36741			2		N. Hoosac Rd	P53	3/25/2009	1	Williamstown	Williamstown
36743			1		N. Hoosac Rd	P87	3/25/2009	1	Williamstown	Williamstown
36746			2		Saulnier Dr	P13	3/25/2009	1	Williamstown	Williamstown
36747			2		School St	P3	3/25/2009	1	Williamstown	Williamstown

36748		1	Southworth St	P7	3/25/2009	1	Williamstown	Williamstown
36749		2	Southworth St	P19	3/25/2009	1	Williamstown	Williamstown
36750		2	Ballou Ln	P6	3/25/2009	1	Williamstown	Williamstown
36752		2	Bridges Rd	P3	3/25/2009	1	Williamstown	Williamstown
36754	6/19/2009	2	Bridges Rd	P9	3/25/2009	1	Williamstown	Williamstown
36755	6/19/2009	2	Bridges Rd	P9	3/25/2009	1	Williamstown	Williamstown
36756		2	Bridges Rd	P20	3/25/2009	1	Williamstown	Williamstown
36757		2	Bridges Rd	P20 at SLC	3/25/2009	1	Williamstown	Williamstown
36758		1	Harrison Ave	P4	3/25/2009	1	Williamstown	Williamstown
36759		2	McLain Ct	P1	3/25/2009	1	Williamstown	Williamstown
36760		2	McLain Ct	P4	3/25/2009	1	Williamstown	Williamstown
36761		2	McLain Ct	P7	3/25/2009	1	Williamstown	Williamstown
36762		3	McLain Ct	P8	3/25/2009	1	Williamstown	Williamstown
36763		2	Summer St	P5	3/25/2009	1	Williamstown	Williamstown
36764		1	Summer St	P4	3/25/2009	1	Williamstown	Williamstown
36765	6/19/2009	2	White Oaks Rd	P18	3/25/2009	1	Williamstown	Williamstown
36767	6/19/2009	2	White Oaks Rd	P4	3/25/2009	1	Williamstown	Williamstown
36769		2	Bachand	P6	3/25/2009	1	Williamstown	Williamstown
36770	6/19/2009	4	Champagne Ave	P3	3/25/2009	1	Williamstown	Williamstown
36771	6/19/2009	1	Champagne Ave	P3	3/25/2009	1	Williamstown	Williamstown
36772		1	Galvin Rd	P6	3/25/2009	1	Williamstown	Williamstown
36773		1	Luce Rd	P8	3/25/2009	1	Williamstown	Williamstown
36774		1	Luce Rd	P22	3/25/2009	1	Williamstown	Williamstown
36775		1	Luce Rd	P24	3/25/2009	1	Williamstown	Williamstown
36776		2	Luce Rd	P26	3/25/2009	1	Williamstown	Williamstown
36777		2	Main St	P77	3/25/2009	1	Williamstown	Williamstown
36778		2	Main St	P78	3/25/2009	1	Williamstown	Williamstown
36779		2	Main St	P79	3/25/2009	1	Williamstown	Williamstown
36780		2	Main St	P80	3/25/2009	1	Williamstown	Williamstown
36781		1	Main St	P104	3/25/2009	1	Williamstown	Williamstown
36782		2	Main St	PR #238 Main	3/25/2009	1	Williamstown	Williamstown
36783		1	Stratton Rd	P104	3/25/2009	1	Williamstown	Williamstown
36785		2	Stratton Rd	P5	3/25/2009	1	Williamstown	Williamstown
36786		2	Stratton Rd	P7	3/25/2009	1	Williamstown	Williamstown
36787		1	Stratton Rd	P7	3/25/2009	1	Williamstown	Williamstown
36788		1	Stratton Rd	P8	3/25/2009	1	Williamstown	Williamstown
36789		1	Stratton Rd	P30	3/25/2009	1	Williamstown	Williamstown
36790		1	Stratton Rd	P32	3/25/2009	1	Williamstown	Williamstown
36791		3	Stratton Rd	P27	3/25/2009	1	Williamstown	Williamstown
36792		2	Green River Rd	P50	3/25/2009	1	Williamstown	Williamstown
36793		2	Green River Rd	P52	3/25/2009	1	Williamstown	Williamstown
36794		2	Green River Rd	P52	3/25/2009	1	Williamstown	Williamstown
36795		2	Green River Rd	P55-P56	3/25/2009	1	Williamstown	Williamstown
36796		2	Green River Rd	P63	3/25/2009	1	Williamstown	Williamstown
36797		2	Green River Rd	P73	3/25/2009	1	Williamstown	Williamstown
36798		2	Green River Rd	P73	3/25/2009	1	Williamstown	Williamstown
36799		1	Green River Rd	P76	3/25/2009	1	Williamstown	Williamstown
36800		2	Green River Rd	P80	3/25/2009	1	Williamstown	Williamstown

36801			2	Green River Rd	P88	3/25/2009	1	Williamstown	Williamstown
36802			1	Green River Rd	P86	3/25/2009	1	Williamstown	Williamstown
36803			1	Green River Rd	P87-P88	3/25/2009	1	Williamstown	Williamstown
36804			2	Green River Rd	P101	3/25/2009	1	Williamstown	Williamstown
36805				Green River Rd	Ped #6	3/25/2009	1	Williamstown	Williamstown
36806			2	Water St	P17-P18	3/25/2009	1	Williamstown	Williamstown
36807	6/19/2009		2	Water St	P26	3/25/2009	1	Williamstown	Williamstown
36808	6/19/2009		4	Water St	P34	3/25/2009	1	Williamstown	Williamstown
36809	6/19/2009		2	Water St	P34-P35	3/25/2009	1	Williamstown	Williamstown
36810			2	Bee Hill Rd	P23	3/26/2009	1	Williamstown	Williamstown
36813			2	Cold Spring Rd	P124	3/25/2009	1	Williamstown	Williamstown
36814			1	Cold Spring Rd	P115	3/25/2009	1	Williamstown	Williamstown
36815	6/19/2009		1	Cold Spring Rd	P106	3/25/2009	1	Williamstown	Williamstown
36816	6/19/2009		2	Cold Spring Rd	P104	3/25/2009	1	Williamstown	Williamstown
36817	6/19/2009		2	Cold Spring Rd	P100	3/25/2009	1	Williamstown	Williamstown
36818			1	Cold Spring Rd	P98	3/25/2009	1	Williamstown	Williamstown
36819			4	Cold Spring Rd	P97	3/25/2009	1	Williamstown	Williamstown
36820			2	Cold Spring Rd	P84	3/25/2009	1	Williamstown	Williamstown
36822			1	Cold Spring Rd	P81	3/25/2009	1	Williamstown	Williamstown
36823			1	Cold Spring Rd	P79	3/25/2009	1	Williamstown	Williamstown
36824			1	Cold Spring Rd	P76	3/25/2009	1	Williamstown	Williamstown
36825			2	Cold Spring Rd	P73	3/25/2009	1	Williamstown	Williamstown
36826			2	Cold Spring Rd	P73	3/25/2009	1	Williamstown	Williamstown
36827			2	Cold Spring Rd	P69	3/25/2009	1	Williamstown	Williamstown
36828			2	Cold Spring Rd	P33	3/25/2009	1	Williamstown	Williamstown
36829	4/22/2009	Need new span for	4	Oblong Rd	P38-P39	3/26/2009	1	Williamstown	Williamstown
36830	4/22/2009	Make Over Bad Wires	2	Oblong Rd	P27	3/26/2009	1	Williamstown	Williamstown
36831	6/19/2009		2	Woodcock Rd	P5	3/26/2009	1	Williamstown	Williamstown
36832			2	Woodcock Rd	P6	3/26/2009	1	Williamstown	Williamstown
36833	6/19/2009		1	Woodcock Rd	P6	3/26/2009	1	Williamstown	Williamstown
36834			2	Woodcock Rd	P9	3/26/2009	1	Williamstown	Williamstown
36835			2	Woodcock Rd	P12	3/26/2009	1	Williamstown	Williamstown
36836			2	Woodcock Rd	P13 1/2	3/26/2009	1	Williamstown	Williamstown
36837	4/22/2009	Make Over Bad Wires	2	Oblong Rd	P66	3/26/2009	1	Williamstown	Williamstown
36838	4/22/2009	Make Over Bad Wires	2	Oblong Rd	P33	3/26/2009	1	Williamstown	Williamstown
36839			2	Sloan Rd	P21	3/26/2009	1	Williamstown	Williamstown
36841			2	Sloan Rd	P12	3/26/2009	1	Williamstown	Williamstown
36842			2	New Ashford Rd	P173	3/26/2009	1	Williamstown	Williamstown
36844			2	New Ashford Rd	P236	3/26/2009	1	Williamstown	Williamstown
36845			1	New Ashford Rd	P236-P237	3/26/2009	1	Williamstown	Williamstown
36846			4	New Ashford Rd	P238	3/26/2009	1	Williamstown	Williamstown
36847			2	New Ashford Rd	P287	3/26/2009	1	Williamstown	Williamstown
36848			1	New Ashford Rd	P289	3/26/2009	1	Williamstown	Williamstown
36849			2	New Ashford Rd	P295	3/26/2009	1	Williamstown	Williamstown
36850			1	New Ashford Rd	P301	3/26/2009	1	Williamstown	Williamstown
36851			2	New Ashford Rd	P308	3/26/2009	1	Williamstown	Williamstown
36852			2	Belden St	P2	3/25/2009	1	Williamstown	Williamstown
36853			2	Belden St	P4-P5	3/25/2009	1	Williamstown	Williamstown

36854	6/19/2009		2		Bulkley St	P21	3/25/2009	1	Williamstown	Williamstown
36855	6/19/2009		2		Bulkley St	P21	3/25/2009	1	Williamstown	Williamstown
36857			2		Bulkley St	P3	3/25/2009	1	Williamstown	Williamstown
36858			2		Buxton Hill	P1-P2	3/25/2009	1	Williamstown	Williamstown
36859			2		Hawthorne Rd	P4	3/25/2009	1	Williamstown	Williamstown
36860			2		Hoxsey St	P4	3/25/2009	1	Williamstown	Williamstown
36861			2		Hoxsey St	P5	3/25/2009	1	Williamstown	Williamstown
36862			2		Hoxsey St	P6	3/25/2009	1	Williamstown	Williamstown
36863			2		Hoxsey St	P7	3/25/2009	1	Williamstown	Williamstown
36864			2		Meacham St	P1-1	3/25/2009	1	Williamstown	Williamstown
36865			2		Meacham St	P2	3/25/2009	1	Williamstown	Williamstown
36866			1		Meacham St	P3	3/25/2009	1	Williamstown	Williamstown
36867			4		North St	P3	3/25/2009	1	Williamstown	Williamstown
36868			4		North St	P16	3/25/2009	1	Williamstown	Williamstown
36869			2		North St	P22	3/25/2009	1	Williamstown	Williamstown
36870			2		North St	P22	3/25/2009	1	Williamstown	Williamstown
36871			2		North St	P28	3/25/2009	1	Williamstown	Williamstown
36872			1		North St	P31	3/25/2009	1	Williamstown	Williamstown
36873			2		North St	P35	3/25/2009	1	Williamstown	Williamstown
36874			2		North St	P39	3/25/2009	1	Williamstown	Williamstown
36875			2		North St	P46	3/25/2009	1	Williamstown	Williamstown
36876			6		North St	P49	3/25/2009	1	Williamstown	Williamstown
36877			2		North St	P49	3/25/2009	1	Williamstown	Williamstown
36878			1		North St	P62	3/25/2009	1	Williamstown	Williamstown
36879			2		North St	P67	3/25/2009	1	Williamstown	Williamstown
36880			2		North St	P81	3/25/2009	1	Williamstown	Williamstown
36882			2		North St	P87	3/25/2009	1	Williamstown	Williamstown
36883			2		North St	P92	3/25/2009	1	Williamstown	Williamstown
36885			2		Northwest Hill Rd	P51	3/25/2009	1	Williamstown	Williamstown
36886			4		Northwest Hill Rd	P56-P58	3/25/2009	1	Williamstown	Williamstown
36888			2		Park St	P1	3/25/2009	1	Williamstown	Williamstown
36889	9/8/2009		2	nu2	Park St	P4	3/25/2009	1	Williamstown	Williamstown
36890	7/22/2009		2	nu2	Park St	P7	3/25/2009	1	Williamstown	Williamstown
36891	7/22/2009		2	nu2	Park St	P9	3/25/2009	1	Williamstown	Williamstown
36892	9/4/2009		2	nu2	Park St	P10	3/25/2009	1	Williamstown	Williamstown
36893	9/4/2009		2	nu2	Park St	P11	3/25/2009	1	Williamstown	Williamstown
36894	9/4/2009		2	nu2	Park St	P13	3/25/2009	1	Williamstown	Williamstown
36895	9/8/2009		2	nu2	Park St	P14	3/25/2009	1	Williamstown	Williamstown
36896	9/8/2009		2	nu2	Park St	P15	3/25/2009	1	Williamstown	Williamstown
36897			2		Park St	P18	3/25/2009	1	Williamstown	Williamstown
36898			2		South St	P2	3/25/2009	1	Williamstown	Williamstown
36899			2		South St	P4	3/25/2009	1	Williamstown	Williamstown
36900			2		South St	P12	3/25/2009	1	Williamstown	Williamstown
36901			2		South St	P14	3/25/2009	1	Williamstown	Williamstown
36902			2		South St	P18	3/25/2009	1	Williamstown	Williamstown
36903			3		Walden St	P6	3/25/2009	1	Williamstown	Williamstown
36904	6/19/2009		2		Waterman Place	P1	3/25/2009	1	Williamstown	Williamstown
36905	6/19/2009		2		Waterman Place	P3	3/25/2009	1	Williamstown	Williamstown

36906	6/19/2009		2	Waterman Place	P4	3/25/2009	1	Williamstown	Williamstown
36907	6/19/2009		2	Whitman St	P1	3/25/2009	1	Williamstown	Williamstown
36908	6/19/2009		2	Whitman St	P2	3/25/2009	1	Williamstown	Williamstown
36909	6/19/2009		2	Whitman St	P2	3/25/2009	1	Williamstown	Williamstown
36910	6/19/2009		2	Whitman St	P3	3/25/2009	1	Williamstown	Williamstown
36911	6/19/2009		4	Whitman St	P12-P15	3/25/2009	1	Williamstown	Williamstown
37217			8	Main St.	P65 - P66	4/10/2009	1	Williamstown	Williamstown

Record Number	Originator	TU Number	Code 4 Volume	Condition Found	Recommendation	Assigned To	Priority
13748	Bob Conte			RA Term Detached from Strand	Place ICT & Recon	m	1
36698	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36699	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36700	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36701	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36702	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36703	Bob Conte	1110		Splice Open	Close	m	1
36704	Bob Conte	1110		1C1 Open	Make over wires and place new closure	m	1
36705	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36706	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36707	Bob Conte	1110		2 1B1 closures open	Make over wires and place 2 new closures	m	1
36708	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36709	Bob Conte	1110		1A1 Open	Make over wires and place new closure	m	1
36710	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36711	Bob Conte	1110		1A1 Open	Make over wires and place new closure	m	1
36712	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36713	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36714	Bob Conte	1110		SMT Open	Close	m	1
36715	Bob Conte	1110		Broken Lashing Wire	Repair lashing wire	m	3
36716	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36717	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36718	Bob Conte	1110		Splice Open	Close	m	1
36719	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36720	Bob Conte	1110		TRAC Open	Close	m	1
36721	Bob Conte	1110		Broken Lashing Wire	Repair lashing wire	m	3
36722	Bob Conte	1110		Broken Lashing Wire	Repair lashing wire	m	3
36723	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36724	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36725	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36726	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36727	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36728	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36729	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36730	Bob Conte	1110		18C1 Open	Make over wires and place new closure	m	1
36731	Bob Conte	1110		1A1 Open	Make over wires and place new closure	m	1
36732	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36734	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36735	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36736	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36737	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36738	Bob Conte	1110		1A1 Open	Make over wires and place new closure	m	1
36739	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1
36740	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36741	Bob Conte	1110		18A1 Open	Make over wires and place new closure	m	1
36743	Bob Conte	1110		RA Term Open	8 step & Close	m	1
36746	Bob Conte	1110		1A1 Open	Make over wires and place new closure	m	1
36747	Bob Conte	1110		1B1 Open	Make over wires and place new closure	m	1

36748	Bob Conte	1110	RA Term Open	8 step & Close	m		1
36749	Bob Conte	1110	18A1 Open	Make over wires and place new closure	m		1
36750	Bob Conte	1114	18A1 Open	Make over wires and place new closure	m		1
36752	Bob Conte	1114	1A1 Open	Make over wires and place new closure	m		1
36754	Bob Conte	1114	18A1 Open	Make over wires and place new closure	m		1
36755	Bob Conte	1114	18B1 Open	Make over wires and place new closure	m		1
36756	Bob Conte	1114	18C1 Open	Make over wires and place new closure	m		1
36757	Bob Conte	1114	18B1 Open	Make over wires and place new closure	m		1
36758	Bob Conte	1114	RA Term Open	8 step & Close	m		1
36759	Bob Conte	1114	18B1 Open	Make over wires and place new closure	m		1
36760	Bob Conte	1114	Drape over splice	Make over wires and place new closure	m		1
36761	Bob Conte	1114	Drape over splice	Make over wires and place new closure	m		1
36762	Bob Conte	1114	RA term pulled apart	New SMT & Recon	m		1
36763	Bob Conte	1114	1A1 Open	Make over wires and place new closure	m		1
36764	Bob Conte	1114	RA Term Open	8 step & Close	m		1
36765	Bob Conte	1114	1A1 Open	Make over wires and place new closure	m		1
36767	Bob Conte	1114	18B1 Open	Make over wires and place new closure	m		1
36769	Bob Conte	2210	1B1 Open	Make over wires and place new closure	m		1
36770	Bob Conte	2210	2 1B1 closures open	Make over wires and place 2 new closures	m		1
36771	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36772	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36773	Bob Conte	2210	TRAC Open	Close	m		1
36774	Bob Conte	2210	Wide Open RA Term	8 step & Close	m		1
36775	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36776	Bob Conte	2210	18A1 Open	Make over wires and place new closure	m		1
36777	Bob Conte	2210	1B1 Open	Make over wires and place new closure	m		1
36778	Bob Conte	2210	1B1 Open	Make over wires and place new closure	m		1
36779	Bob Conte	2210	1B1 Open	Make over wires and place new closure	m		1
36780	Bob Conte	2210	1B1 Open	Make over wires and place new closure	m		1
36781	Bob Conte	2210	UCN Open	Check splice for corrosion and install new slide bar	m		1
36782	Bob Conte	2210	1A1 Open	Make over wires and place new closure	m		1
36783	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36785	Bob Conte	2210	18A1 Open	Make over wires and place new closure	m		1
36786	Bob Conte	2210	1A1 Open	Make over wires and place new closure	m		1
36787	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36788	Bob Conte	2210	RA Term Open	8 step & Close	m		1
36789	Bob Conte	2210	Splice Wide Open	Close	m		1
36790	Bob Conte	2210	Wide Open RA Term	8 step & Close	m		1
36791	Bob Conte	2210	SMT Damaged	New SMT & Recon	m		1
36792	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m		1
36793	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m		1
36794	Bob Conte	3306	1A1 Open	Make over wires and place new closure	m		1
36795	Bob Conte	3306	Sheath Missing/Exposed PIC	Make over wires and place new closure	m		1
36796	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m		1
36797	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m		1
36798	Bob Conte	3306	18A1 Open	Make over wires and place new closure	m		1
36799	Bob Conte	3306	Splice Open	Close	m		1
36800	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m		1

36801	Bob Conte	3306	1C1 Open	Make over wires and place new closure	m	1
36802	Bob Conte	3306	Splice Open	Close	m	1
36803	Bob Conte	3306	Broken Lashing Wire	Repair lashing wire	m	3
36804	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m	1
36805	Bob Conte	3306	Ped Damaged by Plow/ will not close	Issue 1840	m	1
36806	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m	1
36807	Bob Conte	3306	1B1 Open	Make over wires and place new closure	m	1
36808	Bob Conte	3306	2 1C1 Closures Open	Make over wires and place 2 new closures	m	1
36809	Bob Conte	3306	1C1 Open	Make over wires and place new closure	m	1
36810	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36813	Bob Conte	3310	1B1 Open	Make over wires and place new closure	m	1
36814	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36815	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36816	Bob Conte	3310	1B1 Open	Make over wires and place new closure	m	1
36817	Bob Conte	3310	1B1 Open	Make over wires and place new closure	m	1
36818	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36819	Bob Conte	3310	Drape Over RA Term	New SMT & Recon	m	1
36820	Bob Conte	3310	Drape over splice	Make over wires and place new closure	m	1
36822	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36823	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36824	Bob Conte	3310	RA Term Open	8 step & Close	m	1
36825	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36826	Bob Conte	3310	18B1 Open	Make over wires and place new closure	m	1
36827	Bob Conte	3310	18B1 Open	Make over wires and place new closure	m	1
36828	Bob Conte	3310	1B1 Open	Make over wires and place new closure	m	1
36829	Bob Conte	3310	Drops Jumping Section	Test & clear wet section	m	1
36830	Bob Conte	3310	1B1 Open	Make over wires and place new closure	m	1
36831	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36832	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36833	Bob Conte	3310	Splice Open	Close	m	1
36834	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36835	Bob Conte	3310	18A1 Open	Make over wires and place new closure	m	1
36836	Bob Conte	3310	1A1 Open	Make over wires and place new closure	m	1
36837	Bob Conte	3314	18A1 Open	Make over wires and place new closure	m	1
36838	Bob Conte	3314	1A1 Open	Make over wires and place new closure	m	1
36839	Bob Conte	3314	1A1 Open	Make over wires and place new closure	m	1
36841	Bob Conte	3314	1A1 Open	Make over wires and place new closure	m	1
36842	Bob Conte	3330	1B1 Open	Make over wires and place new closure	m	1
36844	Bob Conte	3330	1B1 Open	Make over wires and place new closure	m	1
36845	Bob Conte	3330	Splice Open	Close	m	1
36846	Bob Conte	3330	2 18B1 closures Open	Make over wires and place 2 new closures	m	1
36847	Bob Conte	3330	18A1 Open	Make over wires and place new closure	m	1
36848	Bob Conte	3330	RA Term Open	8 step & Close	m	1
36849	Bob Conte	3330	18A1 Open	Make over wires and place new closure	m	1
36850	Bob Conte	3330	RA Term Open	8 step & Close	m	1
36851	Bob Conte	3330	18B1 Open	Make over wires and place new closure	m	1
36852	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36853	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1

36854	Bob Conte	4450	18B1 birds nest	Make over wires and place new closure	m	1
36855	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36857	Bob Conte	4450	18B1 Open	Make over wires and place new closure	m	1
36858	Bob Conte	4450	Low Cable 6ft off ground	Raise	m	1
36859	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36860	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36861	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36862	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36863	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36864	Bob Conte	4450	Cable hitting Garage Roof	Raise	m	1
36865	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36866	Bob Conte	4450	RA Term Open	8 step & Close	m	1
36867	Bob Conte	4450	RA term pulled apart	New SMT & Recon	m	1
36868	Bob Conte	4450	2 1B1 closures open	Make over wires and place 2 new closures	m	1
36869	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36870	Bob Conte	4450	18B1 Open	Make over wires and place new closure	m	1
36871	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36872	Bob Conte	4450	Splice Open	Close	m	1
36873	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36874	Bob Conte	4450	4 Type Closure	Make over wires and place new closure	m	1
36875	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36876	Bob Conte	4450	3 1B1 Closures Open	Make over wires and place 3 new closures	m	1
36877	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36878	Bob Conte	4450	UC closure open	Properly close UC	m	1
36879	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36880	Bob Conte	4450	4 Type Closure	Make over wires and place new closure	m	1
36882	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36883	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36885	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36886	Bob Conte	4450	Drops Jumping Section	Test & clear wet section	m	1
36888	Bob Conte	4450	4 Type Closure	Make over wires and place new closure	m	1
36889	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36890	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36891	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36892	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36893	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36894	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36895	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36896	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36897	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36898	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36899	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36900	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36901	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36902	Bob Conte	4450	1B1 Open	Make over wires and place new closure	m	1
36903	Bob Conte	4450	Broken Lashing Wire & Low Cable	Raise & Relash	m	1
36904	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36905	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1

36906	Bob Conte	4450	18A1 Open	Make over wires and place new closure	m	1
36907	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36908	Bob Conte	4450	1A1 Open	Make over wires and place new closure	m	1
36909	Bob Conte	4450	18B1 Open	Make over wires and place new closure	m	1
36910	Bob Conte	4450	18B1 Open	Make over wires and place new closure	m	1
36911	Bob Conte	4450	Drops Jumping Section	Test & clear wet section	m	1
37217	Conte	0	Section bypassed with drop wire and	Fault locate and clear wet sections. Place #M closures and	M	

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-2	With respect to the infrastructure evaluation described above, how much did it cost to do this work in these communities? Please provide the estimated costs to a) replace a battery, b) replace a cable, c) repair or replace lashing wire (in $/ft)?
REPLY: **SUPPLEMENTAL**	Verizon MA estimates that the cost to conduct the field investigation in Williamstown, Leverett and Shutesbury was about $11,000. a) The estimated cost to replace a battery is dependent on the type, size and location. Verizon MA is determining the estimates and will provide that information when b) The cost to replace a cable is dependent on the size, length, gauge, type and location. An estimate is not possible without more specific information. c) Verizon MA estimates that replacement of lashing wire costs approximately $2.20/foot. Supplemental Reply: The average cost to replace the batteries indicated in AG-VZ 6-1 was about $600.

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-3	Who completed the infrastructure evaluation described above (identify the names, titles, and roles of all individuals involved in the infrastructure evaluation)? a) Please provide a copy of the evaluation. b) Verizon MA indicates that it "completed a number of projects to correct potential trouble areas" – were there any projects that the evaluation recommended that Verizon MA did not undertake? If yes, please identify and provide the rationale for not undertaking the project. c) What criteria did Verizon use to determine which projects to undertake?
REPLY:	a) See response to AG-VZ 6-1 Item 1 b and c) Verizon MA conducted the evaluation of its facilities to determine what, if any, corrective action was necessary. The investigation did not "recommend" projects, but instead, identified those areas where repair and/or replacement of elements of network infrastructure would be beneficial to the provision of quality service to customers. As described in AG-VZ 1-1, Verizon MA has completed a number of repairs/replacements and continues to work toward completion of all repairs/replacements identified in the evaluation.

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST:	Attorney General to Verizon, Set #6
DATED:	October 6, 2009
ITEM: AG-VZ 6-7	Absent the towns' specific and multiple complaints, when would Verizon conduct an infrastructure evaluation? a) What are Verizon's standard practices regarding infrastructure inspection and evaluation? b) Please provide all written policies, procedures, memoranda, manuals or other documents that describe the circumstances under which Verizon undertakes inspection and evaluation of its infrastructure.
REPLY:	Objection: The request mischaracterizes the towns' complaints. At the time the Request for Comments was issued, two municipalities in Western Massachusetts had complaint pending at the Department. Subject to this objection, Verizon MA states the following: .See responses to Information Requests AG-VZ 3-7 and AG-VZ 3-50.

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-8

Please list the ten most recent "infrastructure evaluations" that Verizon has undertaken and the outcome of each evaluations.

REPLY:

Town	# conditions found
Ashfield	45
Blandford	64
Charlemont	14
Colrain	55
Heath	67
Lee	228
Northfield	106
Rowe	7
Russell	34
Sandisfield	97

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-13

What would Verizon consider to be a physical plant condition where its engineering practices would dictate that plant be replaced rather than repaired regardless of cost effectiveness?

REPLY:

Verizon MA's practices generally call for replacement of plant that has been destroyed or is otherwise beyond repair, without regard to cost-effectiveness. For example, Verizon MA will replace a pole and associated facilities that have been knocked down by a vehicle or a storm. In addition, Verizon MA will remedy situations considered to be public safety issues without regard to cost-effectiveness.

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-16

Regarding response AG-VZ 1-4, please elaborate on the response provided.

a) For example, in many or most instances aren't NIDs located on the outside of customers' homes?
b) Please describe and quantify the situations where NIDs are located inside of customers' houses.
c) For the past 12 months, how many troubles related to inside wire?
d) How many customers in Western Massachusetts subscribe to Verizon's inside wire maintenance program?
e) How many of the inside wire problems related to customers that subscribe to Verizon's inside wire maintenance program.
f) Are inside wire maintenance troubles included in the trouble report rate?
g) In addition to the example of when the trouble indication is in the Central Office, in what other instances would a customer not need to be home to correct an OOS situation: please provide a comprehensive list.

REPLY:

Objection: Part d and e of the request seek information that is not reasonably calculated to lead to the discovery of admissible evidence.

a) Yes.
b) A NID may be located in a customer's home when the customer lives in a multi-dwelling unit, the customer has a buried service wire that terminates in the customer's home or when the customer demands that the NID be installed indoors for security reasons. In addition, early NID designs were installed indoors. Verizon MA does not have data for the number of NIDs located inside customer

homes.

c) In the past 12 months, there were 86,016 troubles in Massachusetts that were related to inside wire
d) Verizon MA does not track this data for Western Massachusetts.
e)
f) No
g) Generally a customer need not be home where Verizon can restore service without having access to the customer's premises, most often when the cause of the problem is with Verizon MA's outside plant.

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: William Wilson
Title: Area Manager

REQUEST:	Attorney General to Verizon, Set #6
DATED:	October 6, 2009
ITEM: AG-VZ 6-19	Regarding the response AG-VZ 1-7, please provide any and all studies, analyses, data, documents, memoranda prepared by or on behalf of Verizon that analyze weather, geography, or other characteristics of (a) Western MA; (b) Eastern MA and (c) Massachusetts. Please identify any and all steps that Verizon takes for preventive maintenance for its outside plant to address problems associated with (a) moisture (e.g., rain, sleet, snow); (b) high winds; (c) general wear and tear.
REPLY:	Part A: (a) through (c) Verizon MA does not have any data at the Western MA, Eastern MA or Massachusetts level, however, the Verizon Technology Office does a rainfall study that provides rainfall amounts at the New England level. The data is then used to correlate the impact of weather to Verizon MA's overall repair volumes. Please see Attachment (a). Part B: (a) through (c) Verizon utilizes the Proactive Cable Maintenance Program as a part of regular maintenance operation which aides in identifying potential areas that may be susceptible to moisture. Please see Proprietary Attachment AG-VZ 3-7. Verizon also maintains an air pressure program that aides in preventing moisture from entering cable. Please see Attachments (b) and (c).

VTO Adjustment Factors due to Weather - 2007													
Regions	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	YTD
NE	1.036532	1.023106	0.925752	0.909569	1.006011	0.960597	0.979683	1.179216	1.100178	1.468844	1.033669	0.979084	1.050187
VTO Adjustment Factors due to Weather - 2008													
Regions	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	YTD
NE	1.052065	0.77248	0.951821	1.019997	1.065619	0.94876	0.868099	0.921542	0.864409	1.13057	0.993063	0.883564	0.955999
VTO Adjustment Factors due to Weather - 2009													
Regions	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	YTD
NE	1.03322	1.113598	1.077346	0.999003	1.041146	1.046953	0.821345	1.034814	1.085767				1.028132

PRACTICE 926-000-084
ISSUE 1, DECEMBER 1989

AIR PRESSURE OUTSIDE PLANT - CENTRAL OFFICE AIR PRESSURE DESIGN

Contents

GENERAL

Purpose

This practice describes procedures for developing a Central Office air pressure design. The Central Office design phase of the re-engineering process is based primarily on the Outside Plant (OSP) design. If the OSP is updated or re-engineered, the Central Office must also be updated. This practice includes sections on:

- Central Office equipment selection and placement.
- Recommendations for using existing equipment.
- Specifications for sizing air dryers.
- Procedures for developing a Central Office pressure record.

Responsibility of the OSPE and COE

After the pressure record for the field sector is completed, the Outside Plant Engineer (OSPE) prepares and uses the Central Office pressure record to recommend the monitoring device and equipment to order so that the system is built as designed.

The Central Office Engineer (COE) makes arrangements for any special electrical wiring or alarm circuitry that is required for the new Central Office design.

Note: Unless otherwise specified, the engineering procedures described in this practice are the responsibility of the OSPE.

INFORMATION GATHERING

Identifying the Type and Size of the Equipment

Based on the information obtained during the design of the field sector, the OSPE develops a Central Office air pressure design that accommodates the requirements of the OSP. The OSPE determines the air pressure output requirements of the Central Office by evaluating one route at a time. The OSPE performs the following procedures to determine the type and size of Central Office equipment:

- Lists and evaluates the condition of existing office pressurization equipment for each pipe route or pressure sector based on stickmaps and pressure records.
- Determines space availability for the installation of Central Office equipment (information supplied by the COE).

(continued)

INFORMATION GATHERING, continued

Identifying the Type and Size of the Equipment, continued

- Lists the number of air pipes leaving the Central Office (dual feed systems). Records their direction, pipe panel association, and termination point.
- Identifies all cables leaving the Central Office (single feed and dual feed systems). Lists which cables are exchange cables and which are trunk and toll cables.
- Determines the number of pressurized sheath miles of cable per air pipe or pressure sector.
- Calculates air pipe Optimum Air Usage (OAU).
- Calculates pressure sector OAUs.
- Analyzes the need for additional air pipes, remote air dryers, and cables to provide efficient and economical future operations.
- Obtains emergency power requirements for the Central Office from the COE.

PLACING CENTRAL OFFICE EQUIPMENT

General

After the OSPE analyzes the new air pressure record and determines what is required to build the system as designed, the OSPE arranges the Central Office equipment by:

- Laying out pipe and distribution panels in an organized manner. (Panels must be segregated by function.)
- Installing equipment racks away from the wall (approximately 2 to 3 feet) to provide access to the back of the panels, if possible.
- Separating trunk and toll cables from exchange cables (if economically feasible) and directing them to different distribution panels.
- Grouping exchange cables by route and direction of departure from the Central Office. For example, routes may be designated as N1 (North 1 route), S2 (South 2 route), etc.
- Consulting with the COE regarding space allocation before the final positioning is determined.

EQUIPMENT REQUIREMENTS

Introduction

Proper selection, placement, and use of Central Office equipment is essential to maintain system pressurization needs. When engineering a Central Office, the OSPE must be aware of individual equipment requirements.

Pipe Alarm Panels

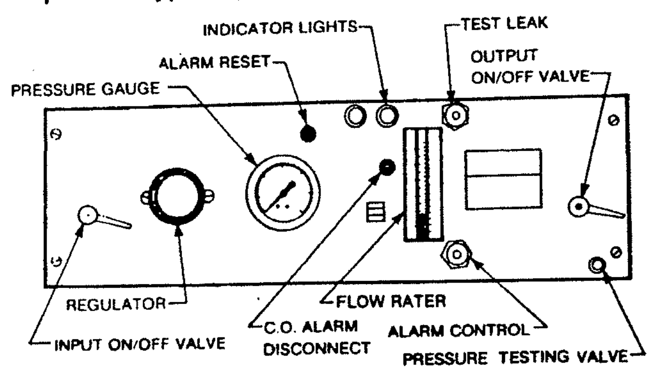
One air pipe panel is required for every air pipe leaving the Central Office. Model 1 offices require a pipe panel for every 12 sheath miles of pressurized cable. Model 2 offices require one pipe panel for every 20 sheath miles.

Each pipe alarm panel must be monitored by a flow transducer. A 0-50 standard cubic feet per hour (SCFH) transducer is the recommended flow range; however, a 0-100 SCFH transducer may be installed if route sheath mileage and actual air usage are high.

The standard equipment included on a typical pipe alarm panel includes a:

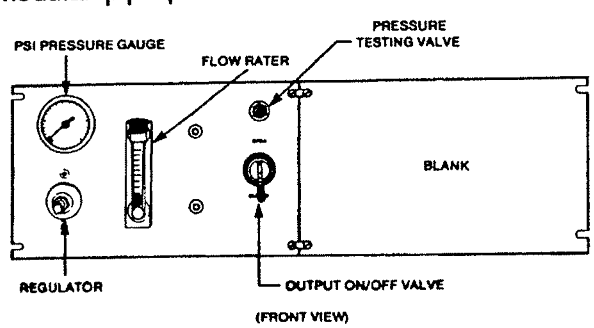
- 0-50 SCFH flow transducer.
- Flow rater.
- Pressure testing valve.
- 0-15 psi pressure gauge.
- Locking-type pressure regulator.
- On/Off toggle switch.

An example of a typical pipe alarm panel is shown below.



The illustration below shows a newer, modular pipe panel without the alarm components.

Note: Two modular pipe panels will fit into a standard rack assembly.



EQUIPMENT REQUIREMENTS, continued

Distribution Panels

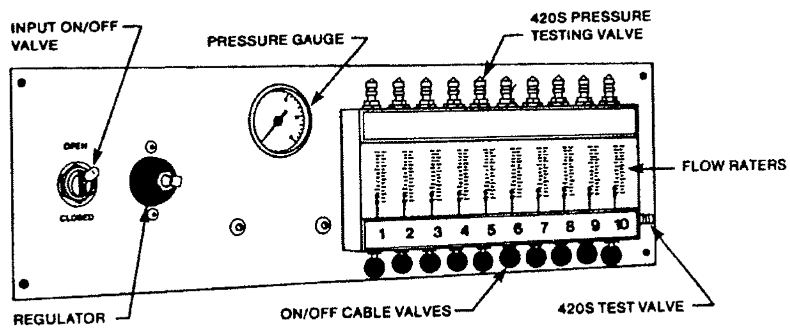
A distribution or meter panel feeds a maximum of ten cables. The number and size of distribution panels needed in a Central Office depends on the number of routes and the number of cables fed on each route.

Note: GTE can order 1-, 5-, and 10- position panels.

Each distribution panel must be monitored by a 0-50 SCFH flow transducer. If two distribution panels are joined together in series, they must be pneumatically separated. Distribution panels must include the following:

- 0-50 SCFH flow transducer.
- Preinstalled locking-type pressure regulator.
- 0-15 psi pressure gauge.
- Ten permanently-mounted flow raters.
- Pressure testing valves (one for each flow rater and one on the side of the flow rater assembly to measure panel delivery pressure).

Note: In offices where air pipe manifolds are used in place of distribution panels, replace the manifolds with standard distribution panels, as shown below.



(FRONT VIEW)

Central Office Manifold

The Central Office manifold combines the air output of two air dryer/compressors into a single air source. The size of the manifold is determined by the capacity of the air dryers.

The two types of Central Office manifolds used for cable pressurization are:

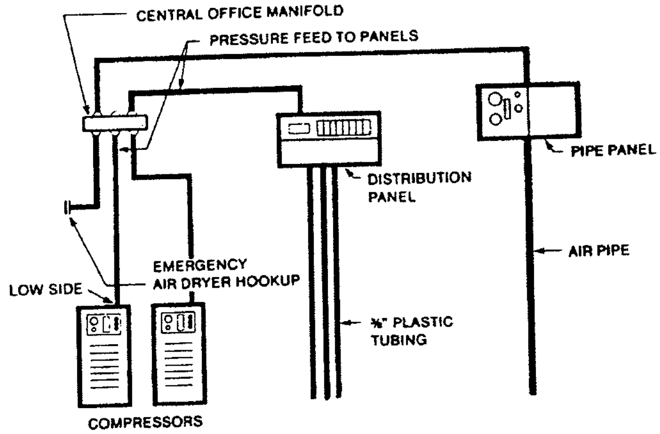
- Standard factory manifold.
- Two-inch plastic PVC pipe.

(continued)

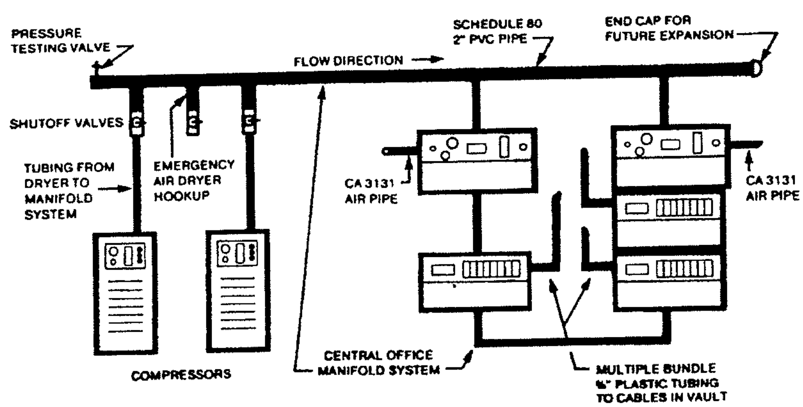
EQUIPMENT REQUIREMENTS, continued

Central Office Manifold, continued

Depending on the manufacturer, several adaptations of the standard factory manifold are available. An example of a standard factory manifold appears below.



A 2-inch plastic PVC pipe with a fitting for combining the output from two air dryers can be constructed with materials from normal retail outlets. An advantage of using the PVC manifold is that it is easily customized for individual office applications. See the illustration below.



Flow Transducers

Install a 0-50 SCFH flow transducer on all pipe panels (in some cases, a 0-100 SCFH transducer may be required). A 0-50 SCFH flow transducer is also recommended for all distribution panels (unless the panels serve cables in a Model 3 office). Distribution panels in these typically smaller, rural offices must be equipped with a 0-19 SCFH flow transducer.

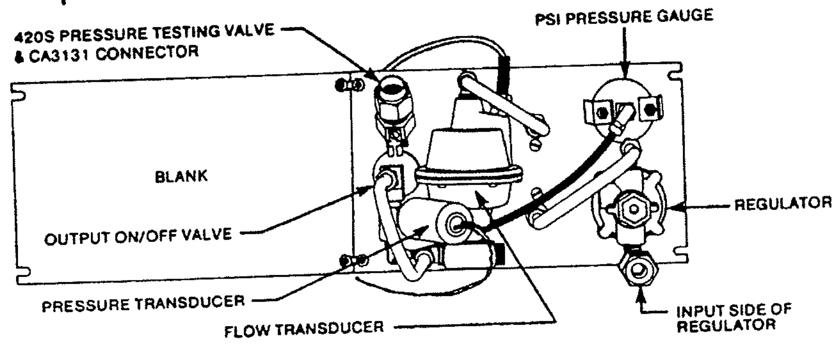
(continued)

EQUIPMENT REQUIREMENTS, continued

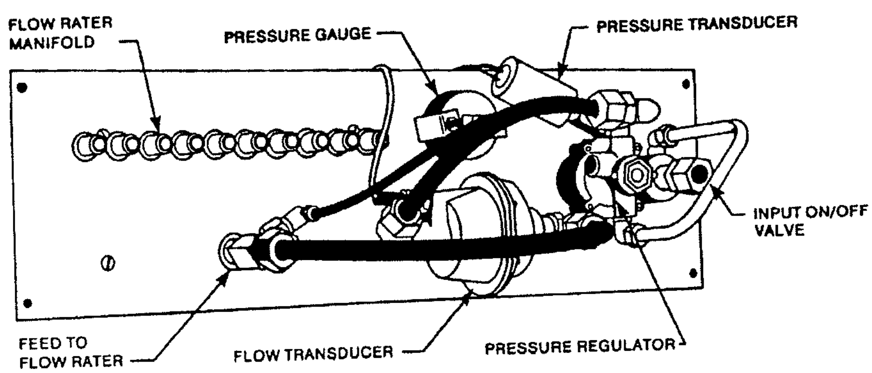
Flow Transducers, continued

The illustrations below provide installation details for flow transducers.

Note: Although pressure transducers can be installed on Central Office panels as shown, they are not required.



(REAR VIEW)



(REAR VIEW)

Plugs

Place pneumatic plugs on the Central Office side of all pressure input into cables. Install pressure testing valves on the Central Office side of these "block plugs," allowing enough room to pour an additional plug, if required. Use pressure testing valves to check for air leaks in the plug.

Check Valves

Install check valves in the vault on the pressure tubing from the distribution panels to the cables. The check valve prevents the loss of pressurized air from the cable if the pressure feed tubing from the distribution panels becomes disengaged. Place check valves on the tubing as close to the cable as possible.

USING EXISTING EQUIPMENT

General

A thorough evaluation of existing Central Office equipment is an important step before final equipment determinations are made. When existing pipe and distribution panels are incorporated into a new design, they must:

- Conform to the projected growth requirements of the service area.
- Be in good operating condition.

To ensure this, replace:

- All existing wall-mounted equipment including pipe panels, distribution panels, and Central Office manifolds.
- Used air pipe manifolds with standard distribution panels.
- Old style individual flow raters with distribution panels.
- Damaged panel flow raters.

Note: Oil-type compressors can contaminate air flow measuring devices. Check all flow raters to ensure oil has not damaged them.

FACTORY EQUIPMENT RACKS

General

If existing Central Office equipment does not meet pressurization standards, purchase and install rack assemblies. Individual panel arrangements must be designed before the racks are ordered. These racks can accommodate both traditional pipe and distribution panels and the newer modular panels. If only a few new panels are needed, locate manufactured equipment that is similar and compatible to the equipment in use.

Factory rack assemblies accommodate several types of panels. Factory racks are purchased with panels, without panels, or with panels and flow transducers. The OSPE orders racks with the following equipment:

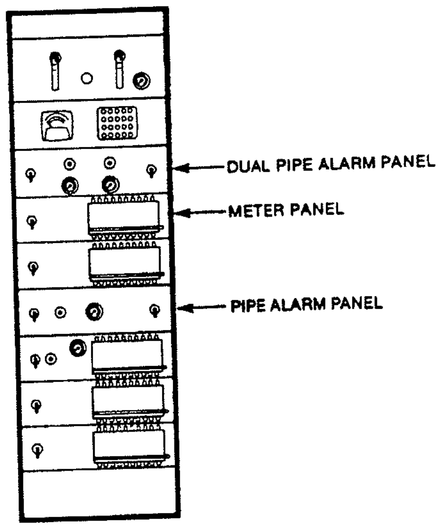
- Relay rack(s) to hold the various panels. The maximum number of panels per rack depends on company standards and the number of dual pipe panels. If the design requires one rack assembly containing close to the maximum number of panels, it is recommended that the OSPE design an additional rack to allow room for expansion at a later date.
- One pipe panel for each air pipe. Order a pipe panel with a 0-50 SCFH flow transducer, a locking-type pressure regulator, and a 0-15 psi pressure gauge.
- Distribution panels that include a 0-50 SCFH flow transducer, ten permanent flow raters, and a locking-type pressure regulator with a 0-15 psi gauge.

(continued)

FACTORY EQUIPMENT RACKS, continued

General, continued

The illustration below shows a factory rack assembly.



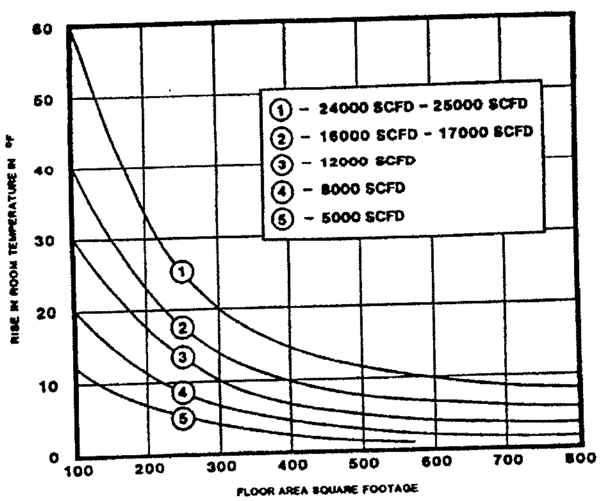
AIR DRYERS

Introduction

It is important to consider the choice, size, and use of air dryers in Central Office design. This section contains recommendations for the selection of air dryers in the Central Office.

Effects of Temperature

Air dryers generate heat. As room temperature increases, air dryer output capacity is reduced. The graph below shows the effects of air dryer size on room temperature in a room without air conditioning.

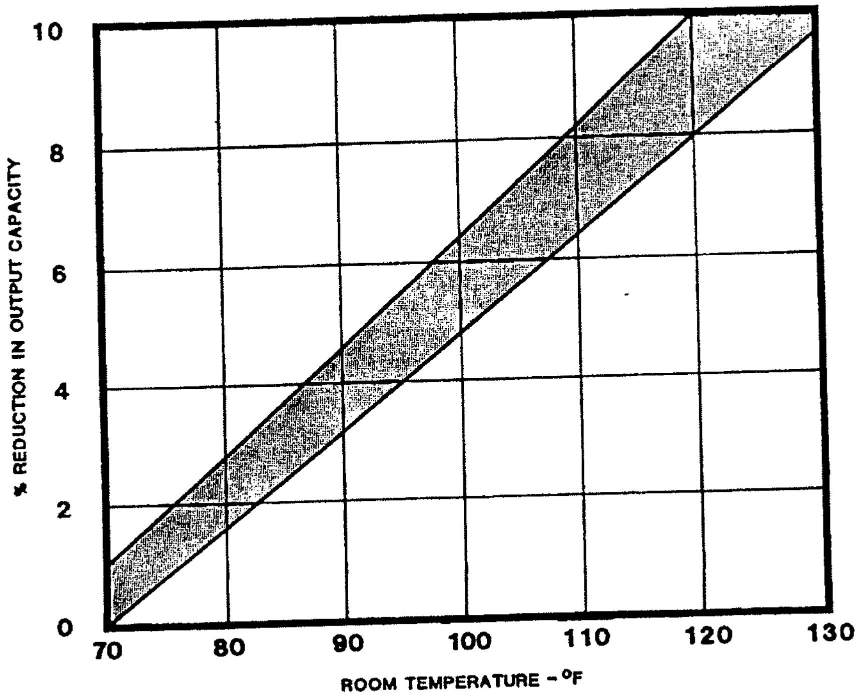


(continued)

AIR DRYERS, continued

Effects of Temperature, continued

The illustration below shows the effects of room temperature on dryer output capacity.



Dryer Output

Air dryers are classified by output capacity in standard cubic feet per day (SCFD), with the model number usually indicating the maximum emergency capacity of the dryer. This rated output is the maximum dryer air flow capacity in SCFD at all output pressures. Dryers range in size from 500 SCFD to 30,000 SCFD with different product lines offering a variety of features.

Confusion in rating dryer output arises when comparisons are made between standard cubic feet per day and cubic feet per day. Factory specifications list the cubic footage output of dryers at various output pressures. When these flow rates are converted to standard cubic foot flow rates, they always equal the listed output rating of the air dryer.

(continued)

AIR DRYERS, continued

Dryer Output, continued

For example, a dryer with an output capacity of 24,000 standard cubic feet per day operates at a capacity of 14,286 cubic feet per day when output pressure is 10 psi. The same dryer operates at a capacity of 11,880 cubic feet per day at 15 psi. At each output pressure, the maximum dryer output in standard cubic feet per day equals approximately 24,000. The following formula illustrates this point:

$$CF \times \frac{psi + 14.7}{14.7} = SCF$$

Where:

CF = Output in cubic feet

psi = Output pressure in pounds per square inch

14.7 = 14.7 psi absolute pressure

SCF = Standard cubic feet

Example:

A Chatlos 24,000 modular air dryer has a maximum output rating of 24,000 standard cubic feet per day. If it is operating at an output pressure of 15 psi, the air flow in cubic feet per day is 11,880 and the air flow in standard cubic feet per day is 24,000.

$$11{,}880 \times \frac{15\text{ psi} + 14.7}{14.7} = 23{,}997.6$$

The same dryer operating at 10 psi with an output of 14,286 cubic feet per day has a maximum output of approximately 24,000 SCFD.

$$14{,}286 \times \frac{10\text{ psi} + 14.7}{14.7} = 24{,}004.367$$

AIR DRYERS, continued

Dryer Sizing

Central Office dryers are sized by determining the total number of pressurized Central Office sheath miles and multiplying the figure by 200 SCFD for Office Model 1; by 100 SCFD for Office Models 2 and 3. Both of these SCFD figures include a growth percentage factor.

Examples of air dryer sizing procedures for Office Models 1 and 2 are below.

Example:

Total pressurized sheath miles for Office Model 1 with 2,000 foot manifold spacing: 95.2.

95.2 x 200 SCFD = 19,040 SCFD air requirement

In this example, a 24,000 SCFD dryer (the next size above the air supply requirement) must be installed.

Example:

Total pressurized sheath miles for Office Model 2 with 6,000 foot manifold spacing: 68.5.

68.5 x 100 SCFD = 6,850 SCFD air requirement

In this example, an 8,000 SCFD air dryer must be installed.

Multiple Dryers

When air consumption in an office exceeds 5,000 SCFD, multiple air dryers are required. If a dryer fails, it is extremely difficult to supply a large volume of air from an emergency source. Therefore, multiple dryers are used as a safety precaution.

Multiple dryers are also recommended for all Model 1 offices due to the high air usage requirements of these offices. Model 3 offices require a single air dryer since they are relatively small offices with comparatively low sheath mileage. See Telops Practice 926-000-080, "Engineering Overview" for a list of air dryer requirements.

When multiple dryers are used, the second dryer must be hooked up to the Central Office manifold. This manifold is used as:

- An emergency backup.
- The operating dryer when the primary dryer is routined.

(continued)

AIR DRYERS, continued

Multiple Dryers, continued

The use of two dryers requires an automatic alternator switch and manifold. Some guidelines for Central Offices requiring multiple air dryers are listed below:

- Multiple air dryer/compressor systems are sized to accommodate the OAU requirement of the existing Outside Plant with consideration for future growth. Backup dryers cannot be properly sized where no attempt has been made to maintain flow standards.

- When sizing air dryers, the rated value refers to the maximum emergency output in SCFD at all output pressures.

- All offices require the installation of an emergency air dryer hookup. This must be a locally obtainable, quick disconnect fitting placed in the manifold assembly.

- In Central Offices where demand exceeds 5,000 SCFD, backup dryers must be sized to support the calculated office air requirement.

- A portable backup dryer must be available in case of a primary dryer failure or when turn down is required for maintenance.

Decisions regarding the type of emergency backup system to use rest jointly with the OSPE and Cable Maintenance personnel. Each dryer location must be evaluated and engineered to conform to the guidelines presented in this section.

The use of an automatic dryer alternator system is recommended when both Central Office dryers are capable of carrying 100 percent of the Central Office air supply requirement. The automatic alternator system is used to:

- Automate the backup dryer function during stepped-up demand.
- Automatically alternate the on-line dryer on a recommended 30-day basis when demand is normal.

Note: Contact local staff regarding the automatic dryer alternator and the recommended dryer alternating cycle.

Emergency Power

Providing emergency power to compressor/dehydrators is an important precautionary measure. Many dryers are **not**:

- Classified as equipment that requires essential power treatment.
- Connected to emergency power circuits.

It is the responsibility of the OSPE to check each Central Office to determine if provisions for emergency power have been made. If offices are not equipped for emergency power, the OSPE must initiate the necessary requests for wiring modifications.

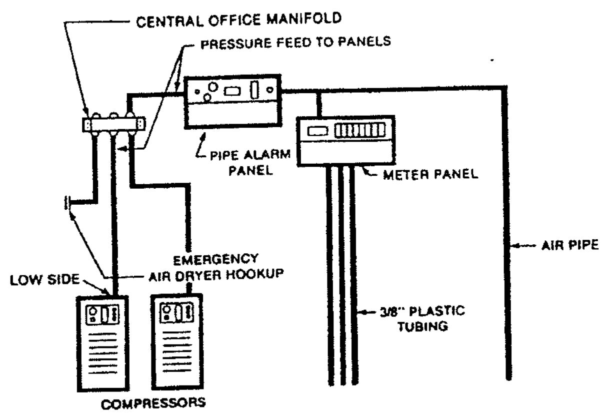
PANEL AIR SUPPLY

General

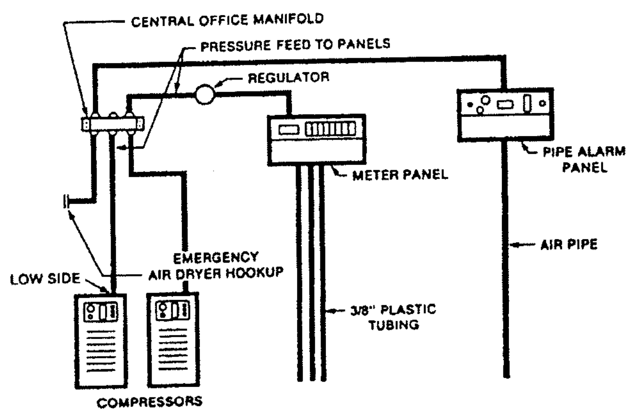
A primary concern when designing the Central Office is to ensure adequate delivery pressure to the pipe and distribution panels. Panel installations vary according to the:

- Number of compressors in the Central Office.
- Existence of a backup compressor.
- Proximity of panels to compressors.

This section includes examples of air dryer plumbing with acceptable and effective air supply paths to the Central Office panels. The illustration below shows dual compressors with the output taken from the low side and the high side capped. This arrangement requires that the low pressure side be regulated up to at least 15 psi. The pipe alarm panel serves as the regulator for the distribution panel. In this arrangement, the distribution panel is functionally the same as the first manifold on the run.



The illustration below shows a distribution panel that is receiving air supply independently of the route's pipe panel. Install a regulator set at 10 psi between the Central Office manifold and the distribution panels. In this plumbing arrangement, the Central Office pressure sector concept is used to compute Central Office OAU. See Telops Practice 926-000-082, "Final Design."



AUTOMATIC MONITORING EQUIPMENT

Introduction

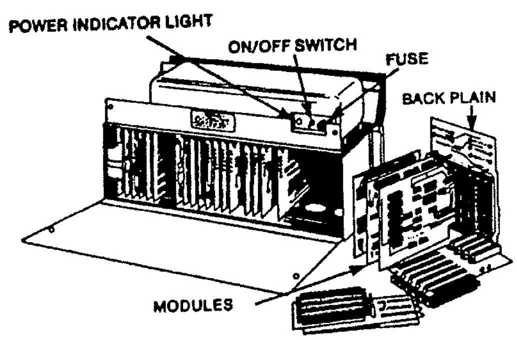
The OSPE is responsible for selecting and ordering the Cable Pressurization Automatic Monitoring System (CPAMS) and related components. The selection is generally based on system monitoring estimates determined at the conclusion of the preliminary design phase of the engineering process. The OSPE places an order with the CPAMS manufacturer for the required equipment and associated plug-in circuit boards.

Equipment Description

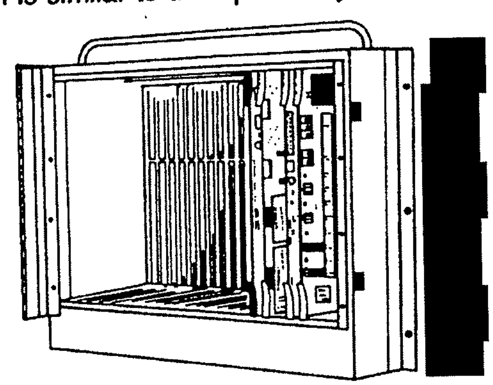
Two of the leading manufacturers of CPAMS equipment are Sparton Technology, Inc. and Chatlos Systems, Inc. These companies provide monitoring systems for most of the nation's operating companies.

Both Sparton and Chatlos offer microprocessor-based systems designed to remotely monitor the pressurized cable network. They are user-programmable systems that interface with standard teletype printers or computer terminals to provide pressure and flow information upon request and at predetermined intervals.

The illustration below shows a basic Sparton control and monitoring unit.



The illustration below shows a Chatlos automatic monitoring system. The Chatlos system is similar to the Sparton system in size, appearance, and function.



For more information on the CPAMS monitors, see Telops Practice 926-000-086.

(continued)

AUTOMATIC MONITORING EQUIPMENT, continued

Equipment Description, continued

The Sparton and Chatlos monitoring units are equipped with the following basic components:

- A single chassis designed to fit a 23-inch equipment bay.
- A system control and communication module (a specially designed communications modem).
- Data Sets and Automatic Calling Units for dual port communications capability.
- Associated dedicated and subscriber plug-in circuit boards for the system control and communications module.

THE BASICS OF PRESSURE

CONTENTS PAGE

1. GENERAL

1.01 This section discusses the benefits, fundamentals and basic structure of a cable pressurization system. It defines the various types of pneumatic sections and explains the relationships of the key pressurization components. By definition a pressurization system is a pressurized cable network contained within specified geographic boundaries. The system is made up of the following essential components:

- Pressurization Hardware. All hardware used either to introduce or to contain air within the cable network is considered part of the system. Examples of pressurization hardware include air dryers, air pipe manifolds, central office panels, and pneumatic plugs.

- Monitoring Equipment. All equipment used to detect changes in air activity in the cable network is included in the cable pressurization system. Examples include Cable Pressurization Automatic Monitoring System (CPAMS) equipment, transducers and contactors.

- Pressurization Tools. All tools, instruments, and procedures used to maintain pressure in a cable network are included in the system. Examples include the C pressure gauge, the portable flow rater, and the air pipe purification procedure.

1.02 The advantages of a cable pressurization system are fully realized when a cable network is well monitored and changes in the system are carefully analyzed. The benefits include reduced cable trouble, improved personnel management, and built-in buffering.

REDUCED CABLE TROUBLE

1.03 A well-designed system is one that provides pressurized air protection to each pneumatic section in a pressurization system. To insure this protection, each pneumatic section is monitored. Sections of cable that are poorly protected or unmonitored are reengineered. Adequate air supply to the cables via air pipe and remote dryers reduces cable trouble. A well conceived cable pressurization system provides consistent protection: one area is not "gold plated" at the expense of another.

IMPROVED PERSONNEL MANAGEMENT

1.04 Remote monitoring devices (pressure transducers. flow transducers and pressure contactors) help give an accurate picture of the condition of each pneumatic section in the outside plant. Increased information about the system allows for more efficient use of maintenance personnel in the following ways:

- Projecting labor hours is more accurate when the condition of the plant is known. Trends in the system are identified sooner. enabling routining on a programmed basis.
- Dispatching is more accurate in a well-monitored air pressure system. Repair time per leak is reduced.
- Routes within the pressurized cable network can be indexed. Once indexed. changes on the routes are more readily noticed and the effectiveness of the technician can be more accurately evaluated. Indexing is a way of measuring both the quality of the system and the efficiency of maintenance efforts. For additional information on indexing, refer to Section 926-000-006.

BUILT-IN BUFFERING

1.05 An effective buffering system is one of the side effects of correct air pipe manifold spacing. Protection to the cables is increased during splicing activity.

2. CABLE PRESSURIZATION ELEMENTS

2.01 All engineering, monitoring, and leak locating on pressurized cables are based on a thorough understanding of air pressure. air flow rates (volume or consumption). and the effects of pneumatic resistance within a cable network.

2.02 Knowledge of the way these three basic elements interrelate is essential to the design and maintenance of a successful pressurization system.

PRESSURE

2.03 Pressurized air is the result of the compression of air molecules. There are two major compression methods:

(a) Gravitation. The pull of the earth on molecules compresses them toward the earth's surface. The lower the altitude. the more compressed the molecules will be (Figure 1).

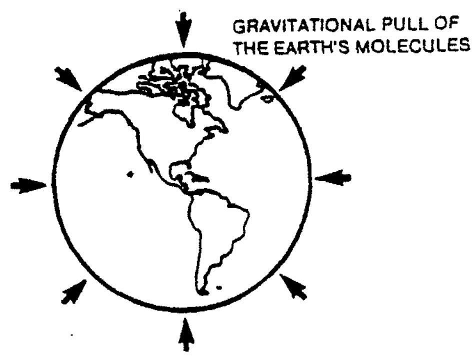


Figure 1—Gravitational Compression

(b) Mechanical compression. The density of molecules is increased as air volume is reduced. The air compressor is the machine used to compress air (Figure 2).

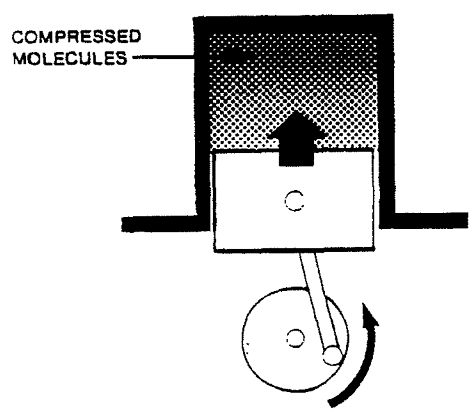


Figure 2—Mechanical Compression

2.04 In a cable network. mechanical compression is the principle method used to pressurize cables.

A. Standard of Air Pressure Measurement

2.05 Cables are pressurized to keep out moisture. If air pressure inside a cable is greater than the external pressure caused by water. moisture will be unable to penetrate the cable sheath and damage the cable. In other words. air pressure is what keeps cables dry and working.

2.06 The amount of air pressure required to keep water out of a cable is based on the outside pressure caused by the water. The more water there is above a cable, the more pressure is required inside the cable to keep the water out. About ½ pound per square inch (0.5 psi) of air pressure must be maintained inside the cable for every foot of depth. For example, 3 psi would protect a cable against moisture entry through a sheath break 6 feet below water level.

EXAMPLE:

A cable is 12 feet below a manhole cover. If the manhole fills up with water, how much pressure would be required to protect the cable?

Since 0.5 psi is required for each foot of depth, 6 psi will be needed to protect a cable at a depth of 12 feet.

$$12 \text{ feet} \times 0.5 \text{ psi} = 6 \text{ psi}$$

B. Pressure Measurement Tool

2.07 Pressure is measured in pounds per square inch gauge. Most of the time the word "gauge" is left off, and the expression is shortened to pounds per square inch. Pounds per square inch may again be shortened to psig or psi. They are simply different ways of describing the same measurement.

2.08 The standard tool for measuring pressure is the C pressure gauge. Most C pressure gauges read air pressures in the 0 psi to 12 psi range. For additional information on the use of the C pressure gauge, refer to Sections 081-266-100 and 926-000-003.

FLOW

2.09 The air flow or air consumed by a particular cable can be used to help locate a leak. The measure of air consumption is especially useful in prioritizing leak locating activities. Using flow measuring tools, the technician can determine where to look for the high flow, high damage leaks. Because flow measurement is so important to the analysis of a pressurization system, access points should be engineered into the system so that the technician can conveniently measure air flow.

2.10 The average air usage per sheath mile of cable is an excellent indication of the general shape of a pressurized system. A good system will use very little air while a system with many leaks will use a tremendous amount of air. The optimum usage per sheath mile of cable is 0.84 standard cubic feet per hour (scfh) for single feed systems and 1.25 scfh for dual feed systems. Refer to Section 926-000-004, Part 3.

2.11 The most accurate way to measure the amount of air is to count individual air molecules. Obviously this is not a practical approach. Besides, the resulting number would be too large to manage.

NOTE: The measurement problem is similar to that of a farmer who sells apples. He doesn't sell a particular number of apples, but rather boxes of apples. The telephone company does the same thing. Rather than measuring the total number of molecules that a compressor puts out in a day, the output is measured in boxes of molecules.

2.12 The measure (box size) that the telephone company uses is the standard cubic foot. A standard for pressure is also defined since it is possible to vary the total number of molecules that can fit in a cubic foot of space. When the input pressure is increased, the molecules are forced to compress. Atmospheric pressure changes with altitude, so a standard cubic foot is defined as the number of air molecules that would fit into a cubic foot of space at sea level.

2.13 The amount of air that a dryer produces, or how much air a cable uses is measured by counting the number of standard cubic feet produced or consumed over a period of time. The telephone company uses either the hour or the day (24 hours) as the unit of time. An air flow measurement is always based on time: an air flow rate is a measure of the flow at a particular point in time. A flow rater is calibrated to project the number of standard cubic feet that would pass a given point in one hour or in one day. Thus, what is measured is the rate of air usage. High flows, such as the output of an air dryer, are usually measured in standard cubic feet per day (scfd). Smaller flows, such as the air usage of an individual cable are usually measured in standard cubic feet per hour (scfh).

2.14 If necessary, a dryer's output can be measured in standard cubic feet per hour. Likewise, a cable's flow can be measured in standard cubic feet per day.

To convert scfh to scfd, multiply by 24.
To convert scfd into scfh, divide by 24.

EXAMPLE:

A compressor's rated maximum flow is 16,000 scfd. Another way to express the same flow rate is to use a rate per hour: 667 scfh. These are two ways of expressing the same output.

2.15 Flow raters, flow transducers, and other flow measuring devices always indicate how they are calibrated and, thus, how a measurement using one of these instruments is to be interpreted. However, regardless of the measuring device used, air flow rates are always measured in standard cubic feet, either per hour or per day (see Section 926-000-003, Paragraphs 5.01—6.18).

PNEUMATIC RESISTANCE

2.16 Pneumatic resistance is the structural blockage in a cable that restricts the flow of air through it. Resistance is affected by conductor insulation, number of pairs, and conductor gauge (size). Pneumatic resistance does not change with changes in flow or pressure. The resistance to air flow of any given cable system can be easily determined with charts and calculations.

2.17 An understanding of pneumatic resistance is absolutely essential to cable system monitoring, routining, and leak locating. When the effects of pneumatic resistance are understood, damaging leaks can be identified and leak locating activities can be prioritized. Unless the pneumatic resistance of a cable is known, it is impossible to gauge the effects that a cable leak has on the overall system.

2.18 The following example will help to further explain and clarify the importance of pneumatic resistance.

EXAMPLE:

In a public water system, water pressure and water flow rates must be measured. If a pipe were to break in the system, what would happen? The answer depends on which pipe was broken. The first question to ask is, how big is the pipe? Is it a faucet in a residential neighborhood, or is it the water main for an entire town?

To assess the damage and determine the appropriate action, the water pressure and flow rate needs to be known. Most importantly, the size of the pipe must be known. How "big" is the pipe? 10,000 gallons could flow out of a broken 15 inch main in 20 minutes. 10,000 gallons would take 20 hours to flow out of the ¾ inch broken faucet.

Fixing the faucet will have little effect on the overall system because there will be no measurable change in water pressure. Fixing the water main, on the other hand, will have a tremendous effect on the system. Therefore, there can be no question as to which leak should be repaired first.

When it comes to cable pressure, the pneumatic resistance of the cable is comparable to the size of the water pipe. Pneumatic resistance is a way of gauging a cable's capacity in terms of air flow. It is a way of expressing—for a given leak—how much air flow a certain cable will allow over a given period of time.

2.19 Pneumatic resistance is a key concept in the engineering and maintenance of a cable system. Manifold placements, for example, are based directly on resistance calculations. In turn, the placement of transducers is determined by the location of the air sources in the pressurized cable network.

A. Resistance Factors

2.20 Pneumatic resistance is calculated in "units" the same way that electrical resistance is measured in "Ohms". Like the Ohms measurement, the larger the number, the higher or greater the resistance. Each type of cable has been assigned a unit number (per 1,000 feet) based on the degree to which the flow of air through it is inhibited. The larger the unit number, the "tighter" the cable, and the more air flow is retarded. Three factors determine the resistance to air in a cable. These three factors or pneumatic resistance components are as follows:

(1) Conductor Insulation. Cable insulation is a major factor affecting pneumatic resistance. It is much easier for air to pass through a plastic insulated cable (PIC) than through a pulp or paper cable. Therefore, given equal leaks, pulp cable may have as much as 10 times more resistance to air flow than a PIC cable of the same size.

EXAMPLE:

The pneumatic resistance of a 900 pair, 24 gauge pulp cable is 1.9 units per 1,000 feet. The pneumatic resistance of a 900 pair, 24 gauge PIC cable is 0.4 units per 1,000 feet, or approximately 1/5 the resistance. In an hour, given equal delivery pressures and zero leaks, 1,000 feet of 900 pair, 24 gauge PIC cable will allow almost 5 times as much air to flow out the leak as would 1,000 feet of 900 pair, 24 gauge pulp cable.

NOTE: Throughout this section and other sections relating to cable pressurization, the number of pairs and conductor gauge of a cable are often abbreviated. For example, a 900 pair, 24 gauge cable is written 9-24; a 300 pair, 26 gauge cable is 3-26. Cables with a total number of pairs less than 100 are not abbreviated.

(2) Number of Conductors. The number of pairs also affects pneumatic resistance. A cable with more pairs has a greater overall diameter than a cable of the same conductor gauge with fewer pairs. Since there is more room for air to pass through, there is less pneumatic resistance. The number of conductor pairs is in inverse relation to the pneumatic resistance of a cable. Given equal cable lengths and identical conductor gauge, the cable with the higher pair number has less pneumatic resistance than the cable with the smaller pair number.

EXAMPLE:

A 1,000 foot, 26-gauge pulp cable with 300 pairs has a pneumatic resistance of 7.5 units. A 26-gauge pulp cable of the same length with 1200 pairs has a pneumatic resistance of 2.2 units. In this case, the cable with 4 times the number of pairs has less than ⅓ the pneumatic resistance of the other cable. All things being equal, approximately three times as much air will flow out the end of that 12-26 pulp cable as will flow out the end of the 3-26 pulp cable.

(3) Conductor Gauge. Gauge, or wire diameter, also affects pneumatic resistance (Figure 3). A higher gauge number indicates a smaller diameter. When the conductor diameter is smaller, more conductors can be packed in the same area. Pairs nest more closely together in the cable and create greater resistance to air flow. Thus, pneumatic resistance increases with an increase in gauge. In summary, the higher the conductor gauge, the higher the resistance.

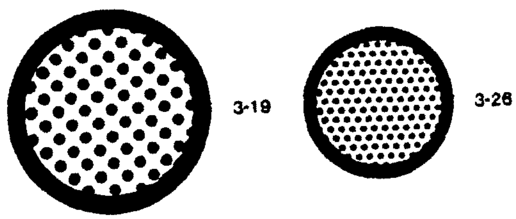


Figure 3—Gauge Differences

EXAMPLE:

A 1,000 foot 9-22 pulp cable has a resistance of 1.0 units—a relatively loose cable. The same length of 9-26 pulp cable has a resistance of 3.0 units—a much tighter cable. Given equal cable lengths and equal delivery pressures, three times the air will flow out of the 900 pair, 22-gauge cable as will flow from the 900 pair, 26-gauge cable.

B. Resistance Tables

2.21 Cable resistance tables (Tables 1 and 2) are available for most standard cables. All resistance units listed are based on a 1,000 foot cable.

To find the base pneumatic resistance:

PROCEDURE:

Step 1 Determine the type of cable (PIC or pulp). Use the table for that cable type.

Step 2 Determine the number of cable pairs. Find that number in the far left column.

Step 3 Determine the gauge of cable conductors. Find that number in the top row.

Step 4 Run down the column with the correct gauge number to the row with the pair number. The number indicated is the units of pneumatic resistance for that particular cable.

TABLE 1
PAPER OR PULP CABLES

NUMBER OF PAIRS	PULP CABLE RESISTANCE TOTAL PNEUMATIC RESISTANCE			
	19-GAUGE	22-GAUGE	24-GAUGE	26-GAUGE
3600	—	—	—	.6
3000	—	—	—	.7
2700	—	—	—	.8
2400	—	—	—	1.0
2100	—	—	—	1.3
1800	—	—	.7	1.6
1500	—	—	1.2	1.8
1200	—	—	1.5	2.2
1100	—	.8	—	—
900	—	1.0	1.9	3.0
600	—	1.5	2.5	4.5
450	7	1.8	—	—
400	8	2.0	4.0	6.0
300	1.0	3.0	5.0	7.5
200	1.5	4.0	8.0	11.5
150	2.0	5.0	10.0	15.0
100	3.0	7.5	13.0	20.0
75	4.0	10.0	16.0	25.0
50	6.0	15.0	20.0	40.0
25	10.0	25.0	40.0	50.0
16	15.0	40.0	50.0	80.0
11	20.0	50.0	60.0	90.0

TABLE 2
PLASTIC INSULATED CABLE

NUMBER OF PAIRS	PIC CABLE RESISTANCE TOTAL PNEUMATIC RESISTANCE			
	19-GAUGE	22-GAUGE	24-GAUGE	26-GAUGE
3600	—	—	—	1
3000	—	—	—	1
2700	—	—	—	2
2400	—	—	—	3
2100	—	—	—	4
1800	—	—	2	4
1500	—	—	3	5
1200	—	—	4	6
900	—	—	4	6
600	—	2	5	8
400	—	3	6	1.4
300	1	4	8	1.8
200	2	6	1.2	2.7
150	3	8	1.7	3.7
100	4	1.2	2.5	5.5
75	5	1.6	3.4	7.4
50	7	2.4	5.1	11.0
25	1.4	5.1	11.0	22.0
18	2.2	8.2	17.0	33.0
12	3.2	12.0	26.0	51.0
6	6.0	—	—	—

C. Composite Cable

2.22 The units of pneumatic resistance of a composite cable can easily be determined as long as the pneumatic resistance of each of the two parts is known. The method is expressed in the following formula:

$$Rt = \frac{R \times r}{R + r}$$

Where: Rt = units of pneumatic resistance of composite cable per 1.000 feet
R = pneumatic resistance of part one of composite cable per 1.000 feet
r = pneumatic resistance of part two of composite cable per 1.000 feet

EXAMPLE:

A composite cable is 1.000 feet long. The two part pulp cable is composed of 1200 pair. 22-gauge cable and 600 pair. 24-gauge cable. To find the total pneumatic resistance of the cable section:

Step 1 Find the pneumatic resistance of each cable type per 1.000 feet:

1200 pair. 22-gauge pulp cable—0.7 units
600 pair. 24-gauge pulp cable—2.5 units

Step 2 Multiply the pneumatic resistance figures:

$$0.7 \times 2.5 = 1.75$$

Step 3 Add these same pneumatic resistance figures:

$$0.7 + 2.5 = 3.2$$

Step 4 Divide the multiplied figure (step 2) by the added one (step 3) to determine the total units of pneumatic resistance of the cables per 1.000 feet:

$$1.75 \div 3.2 = 0.546875$$

Step 5 Round-off totaled units of pneumatic resistance per 1.000 feet to the nearest 1/10. The base pneumatic resistance (per 1.000 feet) for this cable is 0.5 units.

D. Cable Length

2.23 As long as the units of pneumatic resistance is known for a 1.000 foot cable section. the units of pneumatic resistance can be calculated for any length of the cable. The total units of pneumatic resistance of a cable varies with the length of the cable (Figure 4). In summary. the longer the cable. the greater the pneumatic resistance. If the length doubles. the resistance doubles. And if the length is halved. the resistance is also halved.

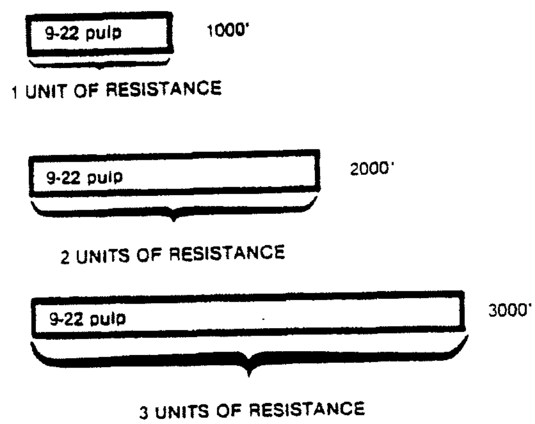


Figure 4—Cable Length And Pneumatic Resistance

2.24 Once the units of resistance per 1.000 feet is known. pneumatic resistance can easily be calculated for any length of cable by using the following formula:

Resistance Total (Rt) = units of pneumatic resistance per 1.000 feet (R) × the length of the cable section (L) ÷ 1.000.

$$Rt = R \times L \div 1.000.$$

(1) Find the pneumatic resistance (per 1.000 feet) on the appropriate table.

(2) Determine the total cable footage.

(3) Multiply the units of pneumatic resistance (per 1.000 feet) by the total number of cable feet.

(4) Divide by 1.000. The result of this calculation is the total pneumatic resistance of the entire cable section.

EXAMPLE:

A 1200 pair. 26-gauge pulp cable is 2.300 feet long. To calculate the total pneumatic resistance. gather the following information:

(a) The pneumatic resistance of a 1200 pair. 26-gauge pulp cable is 2.2 units per 1.000 feet.

(b) The cable is 2.300 feet long. Multiply the cable length times the units of pneumatic resistance: 2.2 × 2.300 = 5.060.

(c) Divide the product (step b) by 1.000 to determine pneumatic resistance of the entire cable section: 5.060 ÷ 1.000 = 5.06 units.

(d) Round-off to the nearest tenth (.0). The pneumatic resistance of a 12-26 pulp cable 2.300 feet long is 5.1 units.

3. BASIC PRESSURE RELATIONSHIPS

3.01 The basic law of cable pressurization states that pressure and flow are interdependent. Any change in pressure will automatically produce the opposite change in air flow. The amount of change will be determined by the pneumatic resistance in the section of cable.

3.02 When a leak develops in a pressurized cable. pressure will drop. causing air to flow toward the leak. The amount of pressure drop and flow increase is determined by the pneumatic resistance of the cable between the leak and the source of air.

3.03 Understanding the ways in which air pressure. air flow and pneumatic resistance affect one another is fundamental to all cable pressure engineering. monitoring and leak locating. Basic pressure relationships can be compared to the three equations of Ohm's Law where "E" equals electromotive force (or Volts) "I" equals current (or Amperes) and "R" equals electrical resistance (or Ohms). This relationship is illustrated in Figure 5.

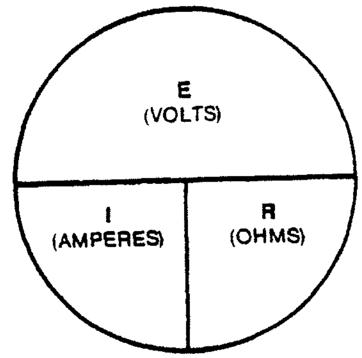


Figure 5—Ohm's Law Relationships

3.04 The circle in Figure 5 visually depicts the three physical components of an electric circuit. To determine any one of the three values. cover the unknown value in the circle and convert the remaining values into an equation. For example. to determine the current or amperes of an electrical circuit. divide the electromotive force (or number of volts) by the amount of resistance in Ohms. Conversely. to determine the volts. multiply the current by the electrical resistance in Ohms.

3.05 When determining basic pressure relationships it is possible to substitute "PD" (Pressure Drop in psi) for "E". "FC" (Flow Change in scfh) for "I". and "Rt" (units of Pneumatic Resistance) for "R" (Figure 6). The circle in Figure 5 can then be adapted to express the basic pressure relationships.

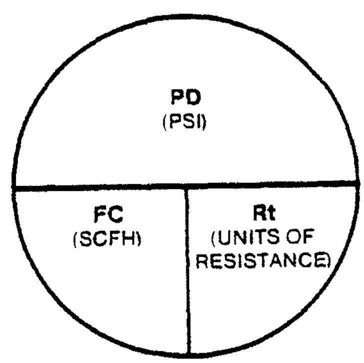


Figure 6—Pressure Relationships

3.06 This basic pressure relationship can also be expressed mathematically in different ways in the following equations:

$$\text{Flow Change} = \frac{\text{Pressure Drop}}{\text{Pneumatic Resistance}}$$

Flow Change is the change in air flow caused by the occurrence or introduction of a leak. The change in air flow through a cable is determined by the amount of pressure drop divided by pneumatic resistance.

EXAMPLE:

The input pressure into a 9-22 pulp cable is 10 psi. 500 feet away the air pressure on the same cable measures 4 psi. resulting in a pressure drop of 6 psi. The pneumatic resistance of the section of cable is 0.5 (half of the pneumatic resistance of 1.000 feet of 9-22 pulp cable). By inserting this information into the equation. it is possible to determine the flow change.

$$\text{Flow Change} = \frac{\text{Pressure Drop (6 psi)}}{\text{Pneumatic Resistance (.5)}}$$

Flow Change = 12 scfh

Pressure Drop = Flow Change × Pneumatic Resistance

A pressure drop is the difference in pressure between two points. It can easily be determined in a cable section by using the above equation.

EXAMPLE:

A flow change at an air pipe manifold is 12 scfh. The cable with the large flow is a 9-22 pulp lateral 500 feet long. It has a pneumatic resistance of 0.5. To find the pressure drop between the manifold and the leak. multiply the flow change in scfh by the total pneumatic resistance.

Pressure Drop = Flow Change (12 scfh) ×
Pneumatic Resistance (.5)

Pressure Drop = 6 psi

If the manifold has a delivery pressure of 10 psi. the pressure at the leak is 10 minus 6. or 4 psi.

$$\text{Pneumatic Resistance} = \frac{\text{Pressure Drop}}{\text{Flow Change}}$$

Pneumatic resistance is the calculated pneumatic resistance between two points. It can be determined by dividing a pressure drop by the change in air flow.

EXAMPLE:.

Air flow and pressure measurements taken at an air pipe manifold indicates a cable with a change in flow of 12 scfh and a drop in pressure of 6 psi. By using the third equation of the basic pressure. flow and pneumatic resistance relationship. the pneumatic resistance for that cable can be determined.

$$\text{Pneumatic Resistance} = \frac{\text{Pressure Drop (6 psi)}}{\text{Flow Change (12 scfh)}}$$

Pneumatic Resistance = 0.5

NOTE: The basic relationship as expressed in the above three equations is the foundation for building a comprehensive understanding of cable pressurization.

PNEUMATIC SECTIONS

3.07 The concept of the pneumatic section must also be understood before the basic law (pressure/flow/pneumatic resistance) can be put to work in a pressurized cable network.

3.08 A pneumatic section is the basic unit of cable pressurization. It is a section of cable whose pneumatic boundaries are defined by air sources or pneumatic plugs. The introduction of a new air source at any point in an existing pneumatic section (other than one of the end points) always creates at least one new pneumatic section. All cable and pressure elements within this span are included in the pneumatic section.

3.09 The end points of each pneumatic section determine how the section will respond when a leak develops. A pneumatic section is defined at its extreme ends by plugs. air sources. or a combination of the two. When this end-point pressure equipment is changed. a pneumatic section's response to leaks also changes.

3.10 There are three kinds of pneumatic sections. They are classified according to the method of air supply to the cable section:

- The static pressure pneumatic section
- The single feed pneumatic section
- The dual feed pneumatic section.

3.11 In the following discussion of pneumatic sections, it is assumed that the pneumatic section is made up of cable that is uniform in terms of pneumatic resistance. When a "zero leak" occurs on a cable, it creates zero pressure at a point where air is exiting a cable. The ultimate zero leak results when a cable is cut in half.

A. Static Pressure Systems

3.12 In the simplest pneumatic section, a section of cable is sealed at either end by pneumatic plugs (Figure 7). The entire length of cable between the two plugs is included in the pneumatic section. The cable will maintain a pressure of 10 psi without additional air supply if (1) the cable section has been pressurized to 10 psi, (2) there are no cable leaks, and (3) the ambient temperature does not change. Pressure within the pneumatic section will equalize and all points in the pneumatic section will register 10 psi.

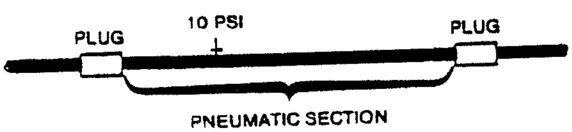


Figure 7—Pneumatic Section, Static Pressure

NOTE: It must be stated that it is possible for a static cable section to increase in pressure due to rapid or prolonged increases in atmospheric temperature.

3.13 When a leak occurs in a static cable pressure system, air flows toward the leak and escapes into the atmosphere. This causes a gradual pressure loss in the pneumatic section over a period of time (Figure 8).

3.14 Pressure decreases as a leak is approached along a cable section. The lowest pressure in the section will be found at the leak itself (see Figure 9). If the leak occurs near the center of a static pneumatic section where cable pressure has previously been stabilized, cable pressure will be highest at the plugged endpoints.

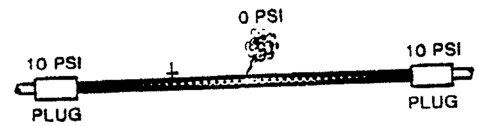


Figure 8—Leaking Pneumatic Section

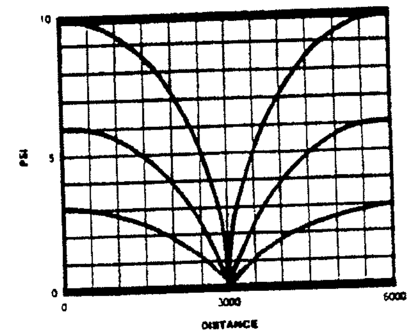


Figure 9—Graph, Leaking Static System

3.15 The time it takes for a static pneumatic section to "go flat" is a function of the pneumatic resistance of the cable. The greater the resistance to air flow, the slower the cable will depressurize. Eventually all the air will bleed from the cable section and pressure will equalize at zero psi (atmospheric pressure). High resistance pulp cables may take days to go flat because they restrict air flow. Conversely, in a "loose" PIC cable section, air will escape relatively quickly.

3.16 Although common in the early days of cable pressurization, the static pressure system is seldom encountered in a modern pressurized cable network. Given modern methods of cable manufacture and installation, as well as current labor costs, it is not economically feasible to set up and maintain a static pressurization system. Today's modern pressurization system is designed to tolerate a certain number of leaks. It is for this reason that air dryers and air pipe systems have been developed.

3.17 Because a certain amount of leakage is acceptable (0.84 scfh per sheath mile for single feed systems and 1.25 scfh per sheath mile for dual feed systems), it is important not merely to identify leaks in the pressurized cable network, but also to identify the big, high consumption leaks that most radically affect the system. If the technician cannot distinguish between a small leak and a major high consumption leak, prioritizing is impossible and maintenance becomes inefficient and wasteful.

B. Single Feed Pressure Systems

3.18 Perhaps the most common type of pressurized system is the single feed. A single feed system is one where cables are plugged at one end and fed with a source of pressurized air at the other end (Figure 10). The entire cable length between the air source and the pneumatic plug is included in the pneumatic section.

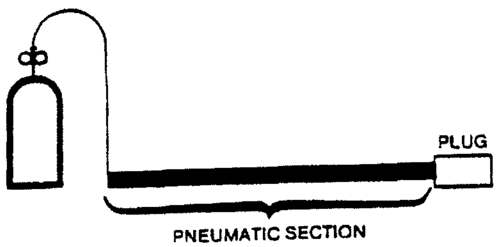


Figure 10—Single Feed Pneumatic Section

3.19 Unless a single feed pneumatic section is air tight, pressurized air is continually supplied to the pneumatic section. (It should be noted that a perfectly airtight cable is rarely encountered in a real world situation.)

3.20 In most situations, pressure within a pneumatic section cannot be higher than the delivery pressure at the air source. (An exception is when an increase in temperature causes an increase in cable pressure.) In Figure 11, for example, air is supplied to a pneumatic section at 8 psi. Regardless of where a pressure reading is taken in the pneumatic section, a reading greater than 8 psi will not occur if temperatures remain constant. There is no way to get more pressure out of a pressurized cable network than is being put into it. This is most important to remember when leak locating.

3.21 In the event of a leak in a single feed cable section, air pressure drops as the leak is approached. If the air source delivery pressure is 8 psi and air pressure at the leak is stabilized at 4 psi, then half way between the air source and the leak the cable pressure will be 6 psi (See Figure 11). Moving from the leak in the direction of the pneumatic plug, pressure is stabilized at the same level registered at the leak.

3.22 If two leaks develop within a single fed pneumatic section, the cable section will respond to both leaks. Figure 12 shows a nitrogen cylinder delivering 10 psi to a pneumatic section. A leak in the middle of the section has reduced cable pressure at the leak to 4 psi. Another smaller leak midway between the larger leak and the plugged cable end, has further reduced cable pressure to 3 psi.

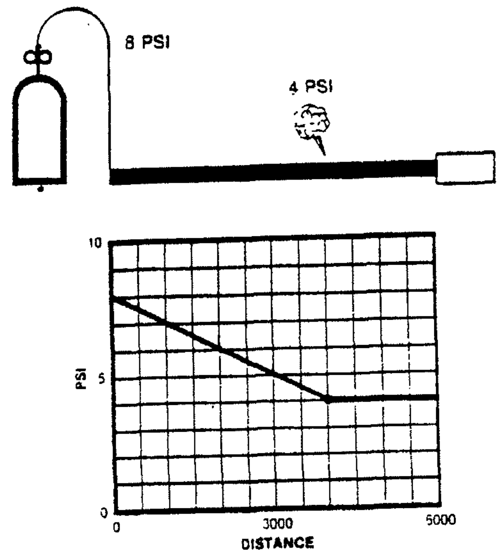


Figure 11—Leaking Single Feed Pneumatic Section

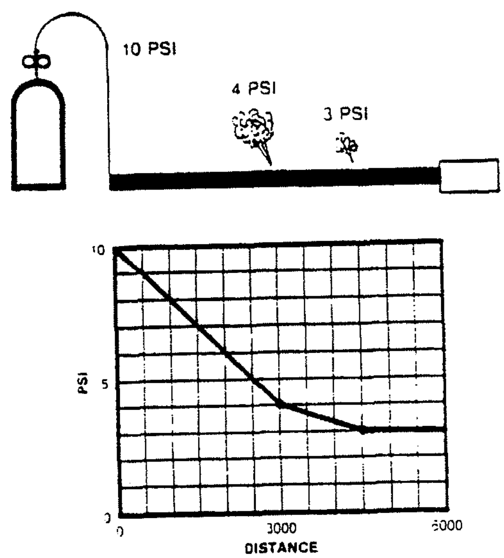


Figure 12—Two leaks in a Single Feed System

3.23 When a "zero leak" develops (at an open splice, for example) and consumes all the air being supplied to a cable section, part of the section will be nonpressurized and unprotected (Figure 13). This is the main drawback to a single feed air pressure system.

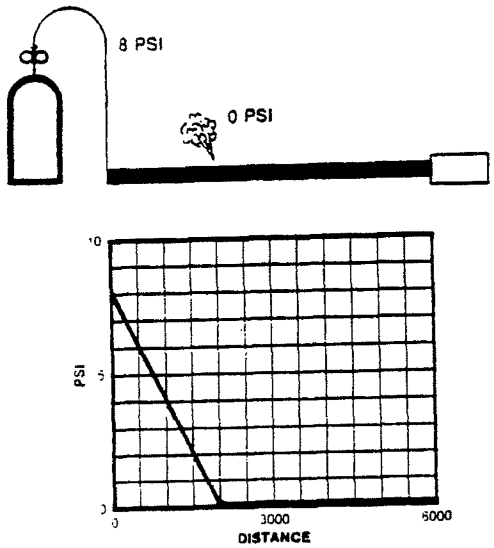


Figure 13—Zero Leak in a Single Feed System

3.24 It is important to emphasize that cable pressure always levels off in a single feed system after a leak has been encountered—unless there is another leak in the same pneumatic section (as in Figure 12). If the pressure at the location of the last leak is known, the pressure at the plugged end of the pneumatic section will also be known (they are the same). When pressure readings taken in a single feed pneumatic section level off after a pressure drop has been observed, the leak has been passed.

C. Dual Feed Pressure Systems

3.25 In a dual feed pneumatic section, both ends of the section are defined by air sources. The entire cable length between the two air sources is included in the pneumatic section. Cables in a dual feed pneumatic section are better protected than in a single feed section because, even in the event of a zero leak, the entire section remains pressurized to some degree (Figure 14).

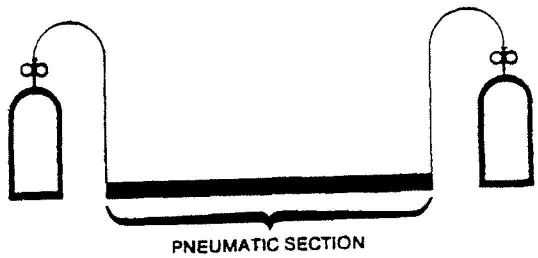


Figure 14—Dual Feed Pneumatic Section

3.26 Because air is supplied to the cable section from both ends, a dual feed system can be called a double single feed system. Although the designation is awkward, it is an accurate description of the way the system responds to a leak. When a leak develops in a dual feed system, there is no leveling off of pressure after a leak—as there is in a single feed system. If a dual feed pneumatic section develops a leak at the section midpoint, pressure on either side of the leak will drop from the air source delivery pressure to the pressure at the leak. Graphs of the pressure drops on either side of the leak would mirror one another (Figure 15).

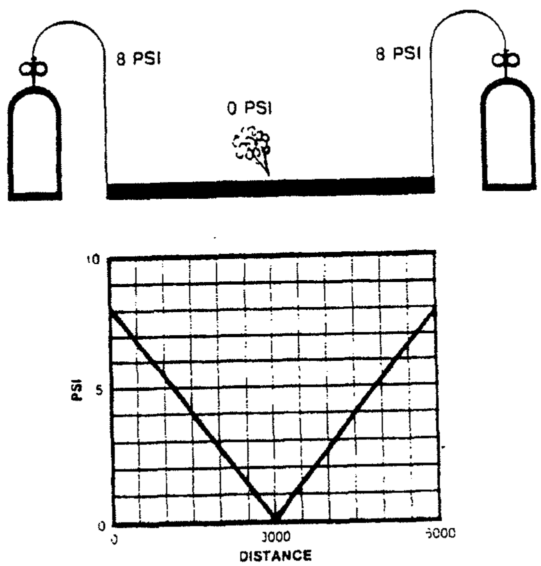


Figure 15—Graph, Leaking Dual Feed Section

MULTIPLE PNEUMATIC SECTIONS

3.27 In many cases, pneumatic sections do not occur in isolation. Although they are separately defined by air sources or plugs, they are actually parts of a continuous cable divided up for the purpose of cable protection (Figure 16). They are a means of organizing sections of cable to facilitate monitoring and leak locating. In fact, the pneumatic section defines the area of search when high cable consumption is investigated.

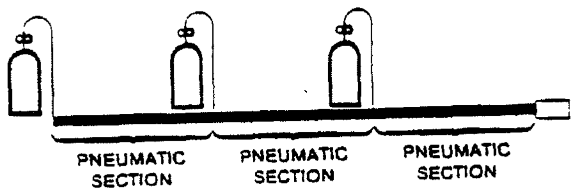


Figure 16—Adjoining Pneumatic Sections—No Leak

3.28 In Figure 16 there are three adjoining pneumatic sections. Air cylinders feed the cable and define the limits of each pneumatic section. If a leak were to develop somewhere in the middle of the second section, pressure would remain constant in the first and third sections, even though they each share a common air source. A pressure drop would be noticed in section one or three only if the delivery pressure of the cylinders were affected by the leak in section two. Figure 17 shows a leak in pneumatic section number two. It also includes a pressure graph that shows the response of the adjoining sections.

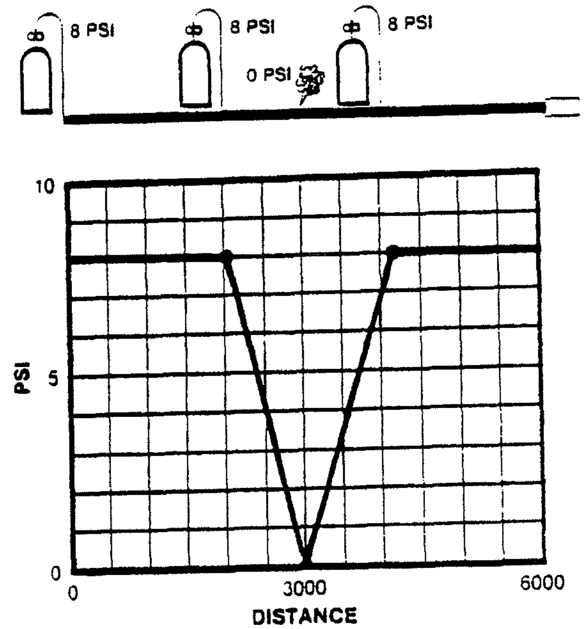


Figure 17—Adjoining Pneumatic Sections—Leak

Verizon New England Inc.
d/b/a Verizon Massachusetts

Commonwealth of Massachusetts

Docket No. D.T.C. 09-1

Respondent: Edward Gee
Title: Director-Engineering

REQUEST: Attorney General to Verizon, Set #6

DATED: October 6, 2009

ITEM: AG-VZ 6-27

Please refer to IBEW-VZ 1-22. Please identify each "local engineering office throughout the state." Please identify the street address and the number and job classification of all employees at each "local engineering office throughout the state."

REPLY:

See Attachment AG-VZ 6-27