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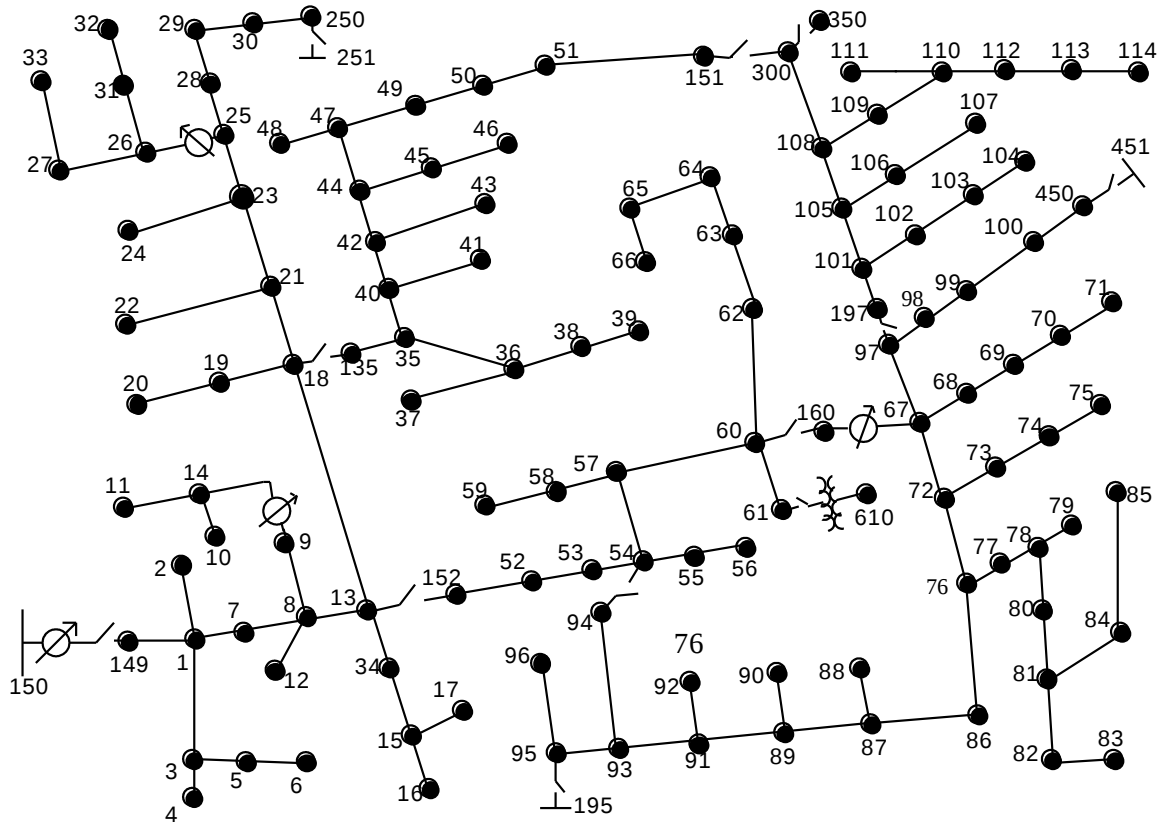Fax: 512-471-5532
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Distribution System Analysis Subcommittee

IEEE 123 Node Test Feeder

The Institute of Electrical and Electronics Engineers, Inc.

IEEE 123 Node Test Feeder

Line Segment Data

Node A	Node B	Length (ft.)	Config.
1	2	175	10
1	3	250	11
1	7	300	1
3	4	200	11
3	5	325	11
5	6	250	11
7	8	200	1
8	12	225	10
8	9	225	9
8	13	300	1
9	14	425	9
13	34	150	11
13	18	825	2
14	11	250	9
14	10	250	9
15	16	375	11
15	17	350	11
18	19	250	9
18	21	300	2
19	20	325	9
21	22	525	10
21	23	250	2
23	24	550	11
23	25	275	2
25	26	350	7
25	28	200	2
26	27	275	7
26	31	225	11
27	33	500	9
28	29	300	2
29	30	350	2
30	250	200	2
31	32	300	11
34	15	100	11
35	36	650	8
35	40	250	1
36	37	300	9
36	38	250	10
38	39	325	10
40	41	325	11
40	42	250	1
42	43	500	10

Node A	Node B	Length (ft.)	Config.
42	44	200	1
44	45	200	9
44	47	250	1
45	46	300	9
47	48	150	4
47	49	250	4
49	50	250	4
50	51	250	4
52	53	200	1
53	54	125	1
54	55	275	1
54	57	350	3
55	56	275	1
57	58	250	10
57	60	750	3
58	59	250	10
60	61	550	5
60	62	250	12
62	63	175	12
63	64	350	12
64	65	425	12
65	66	325	12
67	68	200	9
67	72	275	3
67	97	250	3
68	69	275	9
69	70	325	9
70	71	275	9
72	73	275	11
72	76	200	3
73	74	350	11
74	75	400	11
76	77	400	6
76	86	700	3
77	78	100	6
78	79	225	6
78	80	475	6
80	81	475	6
81	82	250	6
81	84	675	11
82	83	250	6
84	85	475	11
86	87	450	6
87	88	175	9
87	89	275	6

Line Segment Data (cont.)

89	90	225	10
89	91	225	6
91	92	300	11
91	93	225	6
93	94	275	9
93	95	300	6
95	96	200	10
97	98	275	3
98	99	550	3
99	100	300	3
100	450	800	3
101	102	225	11
101	105	275	3
102	103	325	11
103	104	700	11
105	106	225	10
105	108	325	3
106	107	575	10
108	109	450	9
108	300	1000	3
109	110	300	9
110	111	575	9
110	112	125	9
112	113	525	9
113	114	325	9
135	35	375	4
149	1	400	1
152	52	400	1
160	67	350	6
197	101	250	3

Overhead Line Configurations (Config.)

Config.	Phasing	Phase Cond.	Neutral Cond.	Spacing
		ACSR	ACSR	ID
1	A B C N	336,400 26/7	4/0 6/1	500
2	C A B N	336,400 26/7	4/0 6/1	500
3	B C A N	336,400 26/7	4/0 6/1	500
4	C B A N	336,400 26/7	4/0 6/1	500
5	B A C N	336,400 26/7	4/0 6/1	500
6	A C B N	336,400 26/7	4/0 6/1	500
7	A C N	336,400 26/7	4/0 6/1	505
8	A B N	336,400 26/7	4/0 6/1	505
9	A N	1/0	1/0	510
10	B N	1/0	1/0	510
11	C N	1/0	1/0	510

Underground Line Configuration (Config.)

Config.	Phasing	Cable	Spacing ID
12	A B C	1/0 AA, CN	515

Transformer Data

	kVA	kV-high	kV-low	R - %	X - %
Substation	5,000	115 - D	4.16 Gr-W	1	8
XFM - 1	150	4.16 - D	.480 - D	1.27	2.72

Three Phase Switches

Node A	Node B	Normal
13	152	closed
18	135	closed
60	160	closed
61	610	closed
97	197	closed
150	149	closed
250	251	open
450	451	open
54	94	open
151	300	open
300	350	open

Shunt Capacitors

Node	Ph-A	Ph-B	Ph-C
	kVAr	kVAr	kVAr
83	200	200	200
88	50		
90		50	
92			50
Total	250	250	250

Regulator Data

Regulator ID:	1		
Line Segment:	150 - 149		
Location:	150		
Phases:	A-B-C		
Connection:	3-Ph, Wye		
Monitoring Phase:	A		
Bandwidth:	2.0 volts		
PT Ratio:	20		
Primary CT Rating:	700		
Compensator:	Ph-A		
R - Setting:	3		
X - Setting:	7.5		
Voltage Level:	120		
Regulator ID:	2		
Line Segment:	9 - 14		
Location:	9		
Phases:	A		
Connection:	1-Ph, L-G		
Monitoring Phase:	A		
Bandwidth:	2.0 volts		
PT Ratio:	20		
Primary CT Rating:	50		
Compensator:	Ph-A		
R - Setting:	0.4		
X - Setting:	0.4		
Voltage Level:	120		

Regulator ID:	3		
Line Segment:	25 - 26		
Location:	25		
Phases:	A-C		
Connection:	2-Ph,L-G		
Monitoring Phase:	A & C		
Bandwidth:	1		
PT Ratio:	20		
Primary CT Rating:	50		
Compensator:	Ph-A	Ph-C	
R - Setting:	0.4	0.4	
X - Setting:	0.4	0.4	
Voltage Level:	120	120	
Regulator ID:	4		
Line Segment:	160 - 67		
Location:	160		
Phases:	A-B-C		
Connection:	3-Ph, LG		
Monitoring Phase:	A-B-C		
Bandwidth:	2		
PT Ratio:	20		
Primary CT Rating:	300		
Compensator:	Ph-A	Ph-B	Ph-C
R - Setting:	0.6	1.4	0.2
X - Setting:	1.3	2.6	1.4
Voltage Level:	124	124	124

Spot Loads							
Node	Load	Ph-1	Ph-1	Ph-2	Ph-2	Ph-3	Ph-4
	Model	kW	kVAr	kW	kVAr	kW	kVAr
1	Y-PQ	40	20	0	0	0	0
2	Y-PQ	0	0	20	10	0	0
4	Y-PQ	0	0	0	0	40	20
5	Y-I	0	0	0	0	20	10
6	Y-Z	0	0	0	0	40	20
7	Y-PQ	20	10	0	0	0	0
9	Y-PQ	40	20	0	0	0	0
10	Y-I	20	10	0	0	0	0
11	Y-Z	40	20	0	0	0	0
12	Y-PQ	0	0	20	10	0	0
16	Y-PQ	0	0	0	0	40	20
17	Y-PQ	0	0	0	0	20	10
19	Y-PQ	40	20	0	0	0	0
20	Y-I	40	20	0	0	0	0
22	Y-Z	0	0	40	20	0	0
24	Y-PQ	0	0	0	0	40	20
28	Y-I	40	20	0	0	0	0
29	Y-Z	40	20	0	0	0	0
30	Y-PQ	0	0	0	0	40	20
31	Y-PQ	0	0	0	0	20	10
32	Y-PQ	0	0	0	0	20	10
33	Y-I	40	20	0	0	0	0
34	Y-Z	0	0	0	0	40	20
35	D-PQ	40	20	0	0	0	0
37	Y-Z	40	20	0	0	0	0
38	Y-I	0	0	20	10	0	0
39	Y-PQ	0	0	20	10	0	0
41	Y-PQ	0	0	0	0	20	10
42	Y-PQ	20	10	0	0	0	0
43	Y-Z	0	0	40	20	0	0
45	Y-I	20	10	0	0	0	0
46	Y-PQ	20	10	0	0	0	0
47	Y-I	35	25	35	25	35	25
48	Y-Z	70	50	70	50	70	50
49	Y-PQ	35	25	70	50	35	20
50	Y-PQ	0	0	0	0	40	20
51	Y-PQ	20	10	0	0	0	0
52	Y-PQ	40	20	0	0	0	0
53	Y-PQ	40	20	0	0	0	0
55	Y-Z	20	10	0	0	0	0
56	Y-PQ	0	0	20	10	0	0
58	Y-I	0	0	20	10	0	0
59	Y-PQ	0	0	20	10	0	0
60	Y-PQ	20	10	0	0	0	0
62	Y-Z	0	0	0	0	40	20
63	Y-PQ	40	20	0	0	0	0
64	Y-I	0	0	75	35	0	0
65	D-Z	35	25	35	25	70	50
66	Y-PQ	0	0	0	0	75	35
68	Y-PQ	20	10	0	0	0	0
69	Y-PQ	40	20	0	0	0	0
70	Y-PQ	20	10	0	0	0	0
71	Y-PQ	40	20	0	0	0	0
73	Y-PQ	0	0	0	0	40	20
74	Y-Z	0	0	0	0	40	20
75	Y-PQ	0	0	0	0	40	20
76	D-I	105	80	70	50	70	50
77	Y-PQ	0	0	40	20	0	0
79	Y-Z	40	20	0	0	0	0
80	Y-PQ	0	0	40	20	0	0
82	Y-PQ	40	20	0	0	0	0
83	Y-PQ	0	0	0	0	20	10
84	Y-PQ	0	0	0	0	20	10
85	Y-PQ	0	0	0	0	40	20
86	Y-PQ	0	0	20	10	0	0
87	Y-PQ	0	0	40	20	0	0
88	Y-PQ	40	20	0	0	0	0
90	Y-I	0	0	40	20	0	0
92	Y-PQ	0	0	0	0	40	20
94	Y-PQ	40	20	0	0	0	0
95	Y-PQ	0	0	20	10	0	0
96	Y-PQ	0	0	20	10	0	0
98	Y-PQ	40	20	0	0	0	0
99	Y-PQ	0	0	40	20	0	0
100	Y-Z	0	0	0	0	40	20
102	Y-PQ	0	0	0	0	20	10
103	Y-PQ	0	0	0	0	40	20
104	Y-PQ	0	0	0	0	40	20
106	Y-PQ	0	0	40	20	0	0
107	Y-PQ	0	0	40	20	0	0
109	Y-PQ	40	20	0	0	0	0
111	Y-PQ	20	10	0	0	0	0
112	Y-I	20	10	0	0	0	0
113	Y-Z	40	20	0	0	0	0
114	Y-PQ	20	10	0	0	0	0
Total		1420	775	915	515	1155	635

IEEE 123 Node Test Feeder
Impedances

Configuration 1:

```
         Z (R +jX) in ohms per mile
 0.4576  1.0780    0.1560  0.5017    0.1535  0.3849
                   0.4666  1.0482    0.1580  0.4236
                                     0.4615  1.0651
         B in micro Siemens per mile
           5.6765   -1.8319   -0.6982
                     5.9809   -1.1645
                               5.3971
```

Configuration 2:

```
         Z (R +jX) in ohms per mile
 0.4666  1.0482    0.1580  0.4236    0.1560  0.5017
                   0.4615  1.0651    0.1535  0.3849
                                     0.4576  1.0780
         B in micro Siemens per mile
           5.9809   -1.1645   -1.8319
                     5.3971   -0.6982
                               5.6765
```

Configuration 3:

```
         Z (R +jX) in ohms per mile
 0.4615  1.0651    0.1535  0.3849    0.1580  0.4236
                   0.4576  1.0780    0.1560  0.5017
                                     0.4666  1.0482
         B in micro Siemens per mile
           5.3971   -0.6982   -1.1645
                     5.6765   -1.8319
                               5.9809
```

Configuration 4:

```
         Z (R +jX) in ohms per mile
 0.4615  1.0651    0.1580  0.4236    0.1535  0.3849
                   0.4666  1.0482    0.1560  0.5017
                                     0.4576  1.0780
         B in micro Siemens per mile
           5.3971   -1.1645   -0.6982
                     5.9809   -1.8319
                               5.6765
```

```
Configuration 5:

          Z (R +jX) in ohms per mile
 0.4666  1.0482   0.1560  0.5017   0.1580  0.4236
                  0.4576  1.0780   0.1535  0.3849
                                   0.4615  1.0651
        B in micro Siemens per mile
          5.9809   -1.8319   -1.1645
                    5.6765   -0.6982
                              5.3971


Configuration 6:

          Z (R +jX) in ohms per mile
 0.4576  1.0780   0.1535  0.3849   0.1560  0.5017
                  0.4615  1.0651   0.1580  0.4236
                                   0.4666  1.0482
        B in micro Siemens per mile
          5.6765   -0.6982   -1.8319
                    5.3971   -1.1645
                              5.9809


Configuration 7:

          Z (R +jX) in ohms per mile
 0.4576  1.0780   0.0000  0.0000   0.1535  0.3849
                  0.0000  0.0000   0.0000  0.0000
                                   0.4615  1.0651
        B in micro Siemens per mile
          5.1154    0.0000   -1.0549
                    0.0000    0.0000
                              5.1704


Configuration 8:

          Z (R +jX) in ohms per mile
 0.4576  1.0780   0.1535  0.3849   0.0000  0.0000
                  0.4615  1.0651   0.0000  0.0000
                                   0.0000  0.0000
        B in micro Siemens per mile
          5.1154   -1.0549    0.0000
                    5.1704    0.0000
                              0.0000
```

Configuration 9:

```
          Z (R +jX) in ohms per mile
 1.3292  1.3475    0.0000   0.0000    0.0000   0.0000
                   0.0000   0.0000    0.0000   0.0000
                                      0.0000   0.0000
          B in micro Siemens per mile
            4.5193     0.0000     0.0000
                       0.0000     0.0000
                                  0.0000
```

Configuration 10:

```
          Z (R +jX) in ohms per mile
 0.0000  0.0000    0.0000   0.0000    0.0000   0.0000
                   1.3292   1.3475    0.0000   0.0000
                                      0.0000   0.0000
          B in micro Siemens per mile
            0.0000     0.0000     0.0000
                       4.5193     0.0000
                                  0.0000
```

Configuration 11:

```
          Z (R +jX) in ohms per mile
 0.0000  0.0000    0.0000   0.0000    0.0000   0.0000
                   0.0000   0.0000    0.0000   0.0000
                                      1.3292   1.3475
          B in micro Siemens per mile
            0.0000     0.0000     0.0000
                       0.0000     0.0000
                                  4.5193
```

Configuration 12:

```
          Z (R +jX) in ohms per mile
 1.5209  0.7521    0.5198   0.2775    0.4924   0.2157
                   1.5329   0.7162    0.5198   0.2775
                                      1.5209   0.7521
          B in micro Siemens per mile
           67.2242     0.0000     0.0000
                      67.2242     0.0000
                                 67.2242
```

Power-Flow Results

```
-  R A D I A L   F L O W   S U M M A R Y - DATE:  6-24-2004 AT 16:54:14 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:   IEEE 123
-------------------------------------------------------------------------------
SYSTEM       PHASE              PHASE              PHASE              TOTAL
INPUT -------(A)-------|-------(B)-------|-------(C)-------|-----------------
kW   :      1463.861   |       963.484   |      1193.153   |      3620.498
kVAr :       582.101   |       343.687   |       398.976   |      1324.765
kVA  :      1575.351   |      1022.947   |      1258.092   |      3855.257
PF   :         .9292   |         .9419   |         .9484   |         .9391


LOAD  --(A-N)----(A-B)-|--(B-N)----(B-C)-|--(C-N)----(C-A)-|---WYE-----DELTA--
kW   : 1242.8    182.3| 822.8    108.1| 1026.3    142.6| 3091.9    433.0
 TOT :      1425.022   |       930.965   |      1168.900   |      3524.887
                       |                 |                 |
kVAr :  651.0    126.7| 447.3     77.2| 535.9    101.8| 1634.3    305.8
 TOT :       777.767   |       524.544   |       637.773   |      1940.083
                       |                 |                 |
kVA  : 1403.0    222.0| 936.6    132.9| 1157.8    175.2| 3497.3    530.1
 TOT :      1623.455   |      1068.570   |      1331.571   |      4023.524
                       |                 |                 |
PF   :  .8858    .8210| .8786    .8137| .8864    .8137| .8841    .8168
 TOT :         .8778   |         .8712   |         .8778   |         .8761


LOSSES ------(A)-------|-------(B)-------|-------(C)-------|-----------------
kW   :        50.540   |        10.134   |        34.937   |        95.611
kVAr :       102.653   |        38.837   |        52.237   |       193.727
kVA  :       114.420   |        40.137   |        62.844   |       216.036

CAPAC --(A-N)----(A-B)-|--(B-N)----(B-C)-|--(C-N)----(C-A)-|---WYE-----DELTA--
R-kVA:  250.0      .0| 250.0      .0| 250.0      .0| 750.0      .0
 TOT :       250.000   |       250.000   |       250.000   |       750.000
                       |                 |                 |
A-kVA:  271.3      .0| 268.0      .0| 269.7      .0| 809.0      .0
 TOT :       271.290   |       268.023   |       269.733   |       809.046
```

```
--- V O L T A G E   P R O F I L E ---- DATE:  6-24-2004 AT 16:54:32 HOURS ----
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
----------------------------------------------------------------------------
NODE |   MAG      ANGLE  |    MAG       ANGLE  |    MAG       ANGLE |mi.to SR
----------------------------------------------------------------------------
_____|_____ A-N _____ |_____ B-N _____ |_____ C-N _____ |
150  | 1.0000 at   .00  | 1.0000 at -120.00 | 1.0000 at  120.00 |   .000
RG1  | 1.0437 at   .00  | 1.0438 at -120.00 | 1.0438 at  120.00 |   .000
149  | 1.0436 at  -.02  | 1.0437 at -120.02 | 1.0436 at  119.98 |   .000
1    | 1.0311 at  -.66  | 1.0412 at -120.33 | 1.0348 at  119.60 |   .076
2    |                  | 1.0410 at -120.33 |                   |   .109
3    |                  |                   | 1.0331 at  119.57 |   .123
4    |                  |                   | 1.0326 at  119.56 |   .161
5    |                  |                   | 1.0318 at  119.55 |   .185
6    |                  |                   | 1.0311 at  119.53 |   .232
7    | 1.0218 at -1.13  | 1.0395 at -120.57 | 1.0291 at  119.35 |   .133
8    | 1.0158 at -1.44  | 1.0382 at -120.74 | 1.0253 at  119.18 |   .171
12   |                  | 1.0379 at -120.74 |                   |   .213
13   | 1.0079 at -1.87  | 1.0360 at -120.97 | 1.0196 at  118.90 |   .227
152  | 1.0078 at -1.88  | 1.0360 at -120.98 | 1.0196 at  118.89 |   .227
52   | 1.0018 at -2.26  | 1.0348 at -121.22 | 1.0164 at  118.64 |   .303
53   |  .9991 at -2.43  | 1.0340 at -121.34 | 1.0148 at  118.51 |   .341
54   |  .9976 at -2.53  | 1.0334 at -121.41 | 1.0138 at  118.43 |   .365
55   |  .9974 at -2.54  | 1.0334 at -121.42 | 1.0139 at  118.43 |   .417
56   |  .9974 at -2.53  | 1.0332 at -121.43 | 1.0140 at  118.43 |   .469
57   |  .9945 at -2.83  | 1.0306 at -121.61 | 1.0113 at  118.21 |   .431
58   |                  | 1.0300 at -121.63 |                   |   .478
59   |                  | 1.0296 at -121.63 |                   |   .526
60   |  .9880 at -3.51  | 1.0256 at -122.00 | 1.0052 at  117.76 |   .573
160  |  .9880 at -3.52  | 1.0256 at -122.01 | 1.0052 at  117.75 |   .573
RG4  | 1.0374 at -3.52  | 1.0320 at -122.01 | 1.0366 at  117.75 |   .573
67   | 1.0355 at -3.77  | 1.0311 at -122.19 | 1.0345 at  117.61 |   .640
68   | 1.0340 at -3.79  |                   |                   |   .677
69   | 1.0322 at -3.83  |                   |                   |   .730
70   | 1.0310 at -3.85  |                   |                   |   .791
71   | 1.0303 at -3.86  |                   |                   |   .843
72   | 1.0359 at -3.86  | 1.0302 at -122.29 | 1.0343 at  117.50 |   .692
73   |                  |                   | 1.0321 at  117.46 |   .744
74   |                  |                   | 1.0303 at  117.42 |   .810
75   |                  |                   | 1.0293 at  117.40 |   .886
76   | 1.0358 at -3.92  | 1.0297 at -122.38 | 1.0349 at  117.45 |   .730
77   | 1.0370 at -3.99  | 1.0308 at -122.46 | 1.0358 at  117.37 |   .805
78   | 1.0373 at -4.01  | 1.0312 at -122.48 | 1.0360 at  117.35 |   .824
79   | 1.0370 at -4.02  | 1.0313 at -122.48 | 1.0359 at  117.36 |   .867
80   | 1.0394 at -4.07  | 1.0329 at -122.54 | 1.0368 at  117.24 |   .914
81   | 1.0415 at -4.14  | 1.0352 at -122.57 | 1.0374 at  117.14 |  1.004
82   | 1.0424 at -4.18  | 1.0364 at -122.60 | 1.0382 at  117.11 |  1.052
83   | 1.0436 at -4.20  | 1.0375 at -122.63 | 1.0390 at  117.07 |  1.099
84   |                  |                   | 1.0348 at  117.09 |  1.132
85   |                  |                   | 1.0336 at  117.07 |  1.222
86   | 1.0349 at -3.95  | 1.0279 at -122.55 | 1.0364 at  117.42 |   .862
87   | 1.0342 at -3.97  | 1.0272 at -122.63 | 1.0369 at  117.39 |   .947
88   | 1.0342 at -4.00  |                   |                   |   .980
89   | 1.0338 at -3.96  | 1.0270 at -122.68 | 1.0373 at  117.38 |   .999
90   |                  | 1.0269 at -122.72 |                   |  1.042
```

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--- V O L T A G E   P R O F I L E ---- DATE:  6-24-2004 AT 16:54:32 HOURS ----
SUBSTATION:  IEEE 123;    FEEDER:   IEEE 123
-----------------------------------------------------------------------------
NODE  |   MAG      ANGLE   |    MAG       ANGLE   |    MAG      ANGLE  |mi.to SR
-----------------------------------------------------------------------------
91    | 1.0336 at  -3.96  | 1.0266 at -122.69  | 1.0376 at  117.36 |  1.042
92    |                   |                    | 1.0375 at  117.31 |  1.099
93    | 1.0333 at  -3.97  | 1.0265 at -122.71  | 1.0377 at  117.37 |  1.085
94    | 1.0326 at  -3.98  |                    |                   |  1.137
95    | 1.0332 at  -3.96  | 1.0261 at -122.73  | 1.0378 at  117.37 |  1.141
96    |                   | 1.0258 at -122.73  |                   |  1.179
97    | 1.0345 at  -3.82  | 1.0306 at -122.21  | 1.0338 at  117.60 |   .687
197   | 1.0345 at  -3.82  | 1.0306 at -122.21  | 1.0338 at  117.59 |   .687
101   | 1.0337 at  -3.86  | 1.0303 at -122.22  | 1.0332 at  117.59 |   .734
102   |                   |                    | 1.0318 at  117.56 |   .777
103   |                   |                    | 1.0301 at  117.53 |   .838
104   |                   |                    | 1.0283 at  117.49 |   .971
105   | 1.0323 at  -3.90  | 1.0301 at -122.27  | 1.0335 at  117.61 |   .786
106   |                   | 1.0290 at -122.29  |                   |   .829
107   |                   | 1.0275 at -122.32  |                   |   .938
108   | 1.0309 at  -3.97  | 1.0308 at -122.28  | 1.0334 at  117.65 |   .848
109   | 1.0267 at  -4.05  |                    |                   |   .933
110   | 1.0248 at  -4.09  |                    |                   |   .990
111   | 1.0240 at  -4.10  |                    |                   |  1.099
112   | 1.0241 at  -4.10  |                    |                   |  1.014
113   | 1.0220 at  -4.14  |                    |                   |  1.113
114   | 1.0216 at  -4.15  |                    |                   |  1.175
300   | 1.0309 at  -3.97  | 1.0308 at -122.28  | 1.0334 at  117.65 |  1.037
98    | 1.0343 at  -3.83  | 1.0303 at -122.22  | 1.0336 at  117.59 |   .739
99    | 1.0346 at  -3.82  | 1.0295 at -122.23  | 1.0332 at  117.55 |   .843
100   | 1.0348 at  -3.82  | 1.0294 at -122.21  | 1.0328 at  117.53 |   .900
450   | 1.0348 at  -3.82  | 1.0294 at -122.21  | 1.0328 at  117.53 |  1.052
61    |  .9880 at  -3.51  | 1.0256 at -122.00  | 1.0052 at  117.76 |   .677
XF1   |  .9880 at  -3.51  | 1.0256 at -122.00  | 1.0052 at  117.76 |   .677
610   |  .9880 at  -3.51  | 1.0256 at -122.00  | 1.0052 at  117.76 |   .677
62    |  .9872 at  -3.50  | 1.0245 at -121.98  | 1.0032 at  117.75 |   .620
63    |  .9866 at  -3.49  | 1.0236 at -121.97  | 1.0022 at  117.74 |   .654
64    |  .9863 at  -3.47  | 1.0217 at -121.93  | 1.0000 at  117.70 |   .720
65    |  .9856 at  -3.48  | 1.0214 at -121.89  |  .9970 at  117.70 |   .800
66    |  .9858 at  -3.51  | 1.0216 at -121.87  |  .9955 at  117.70 |   .862
18    |  .9988 at  -2.29  | 1.0319 at -121.22  | 1.0122 at  118.83 |   .384
135   |  .9988 at  -2.29  | 1.0318 at -121.23  | 1.0122 at  118.83 |   .384
35    |  .9960 at  -2.38  | 1.0293 at -121.31  | 1.0112 at  118.77 |   .455
36    |  .9951 at  -2.40  | 1.0288 at -121.36  |                   |   .578
37    |  .9943 at  -2.41  |                    |                   |   .635
38    |                   | 1.0282 at -121.37  |                   |   .625
39    |                   | 1.0278 at -121.38  |                   |   .687
40    |  .9945 at  -2.42  | 1.0282 at -121.36  | 1.0101 at  118.72 |   .502
41    |                   |                    | 1.0097 at  118.71 |   .564
42    |  .9929 at  -2.45  | 1.0270 at -121.41  | 1.0092 at  118.68 |   .549
43    |                   | 1.0257 at -121.43  |                   |   .644
44    |  .9918 at  -2.48  | 1.0263 at -121.44  | 1.0084 at  118.65 |   .587
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--- V O L T A G E   P R O F I L E ---- DATE:  6-24-2004 AT 16:54:32 HOURS ----
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
------------------------------------------------------------------------------
NODE | MAG        ANGLE  | MAG        ANGLE  | MAG        ANGLE  |mi.to SR
------------------------------------------------------------------------------
45   | .9913 at  -2.49   |                   |                   |   .625
46   | .9909 at  -2.50   |                   |                   |   .682
47   | .9908 at  -2.50   | 1.0253 at -121.47 | 1.0074 at  118.61 |   .635
48   | .9905 at  -2.51   | 1.0250 at -121.47 | 1.0072 at  118.60 |   .663
49   | .9905 at  -2.51   | 1.0247 at -121.48 | 1.0071 at  118.58 |   .682
50   | .9905 at  -2.52   | 1.0247 at -121.47 | 1.0067 at  118.57 |   .729
51   | .9903 at  -2.53   | 1.0248 at -121.47 | 1.0067 at  118.58 |   .777
151  | .9903 at  -2.53   | 1.0248 at -121.47 | 1.0067 at  118.58 |   .871
19   | .9975 at  -2.31   |                   |                   |   .431
20   | .9967 at  -2.33   |                   |                   |   .493
21   | .9983 at  -2.34   | 1.0320 at -121.22 | 1.0111 at  118.81 |   .441
22   |                   | 1.0305 at -121.25 |                   |   .540
23   | .9979 at  -2.39   | 1.0323 at -121.20 | 1.0100 at  118.79 |   .488
24   |                   |                   | 1.0085 at  118.77 |   .592
25   | .9972 at  -2.45   | 1.0328 at -121.20 | 1.0091 at  118.80 |   .540
28   | .9968 at  -2.48   | 1.0330 at -121.19 | 1.0087 at  118.80 |   .578
29   | .9967 at  -2.50   | 1.0332 at -121.19 | 1.0083 at  118.79 |   .635
30   | .9969 at  -2.50   | 1.0331 at -121.18 | 1.0078 at  118.77 |   .701
250  | .9969 at  -2.50   | 1.0331 at -121.18 | 1.0078 at  118.77 |   .739
RG3  | .9972 at  -2.45   |                   | 1.0028 at  118.80 |   .540
26   | .9970 at  -2.48   |                   | 1.0023 at  118.79 |   .606
27   | .9966 at  -2.49   |                   | 1.0022 at  118.79 |   .659
33   | .9953 at  -2.52   |                   |                   |   .753
31   |                   |                   | 1.0017 at  118.77 |   .649
32   |                   |                   | 1.0013 at  118.77 |   .706
34   |                   |                   | 1.0187 at  118.88 |   .256
15   |                   |                   | 1.0183 at  118.87 |   .275
16   |                   |                   | 1.0173 at  118.85 |   .346
17   |                   |                   | 1.0178 at  118.86 |   .341
9    | 1.0144 at  -1.47  |                   |                   |   .213
RG2  | 1.0080 at  -1.47  |                   |                   |   .213
14   | 1.0063 at  -1.50  |                   |                   |   .294
10   | 1.0060 at  -1.50  |                   |                   |   .341
11   | 1.0057 at  -1.51  |                   |                   |   .341
```

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
150	RG1	149	149	Phase A, 3 Phase Ganged Wye	RX	2.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		120.000	3.000	7.500	20.00	700.00	7

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
160	RG4	67	67	Phase A & B & C, Wye	RX	2.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		124.000	.600	1.300	20.00	300.00	8
2		124.000	1.400	2.600	20.00	300.00	1
3		124.000	.200	1.400	20.00	300.00	5

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
25	RG3	26	26	Phase A & C, Wye	RX	1.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		120.000	.400	.400	20.00	50.00	0
3		120.000	.400	.400	20.00	50.00	-1

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
9	RG2	14	14	Phase A, Wye	RX	2.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		120.000	.400	.400	20.00	50.00	-1

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-  R A D I A L   P O W E R   F L O W  --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
   SUBSTATION: IEEE 123;  FEEDER:  IEEE 123
-----------------------------------------------------------------------------
     NODE       VALUE       PHASE A          PHASE B          PHASE C      UNT O/L<
                           (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A--------*-------B-------*-------C-------*--------
NODE: 150      VOLTS:  1.000      .00  1.000 -120.00  1.000  120.00 MAG/ANG
kVll   4.160            NO LOAD OR CAPACITOR REPRESENTED AT SOURCE NODE

TO NODE RG1   <VRG>..: 655.91  -21.69 425.91 -139.63 523.82  101.51 AMP/DG <
<RG1   > LOSS=  .000:  (   .000)      (   .000)      (   .000)      kW
---------------------*--------A--------*-------B-------*-------C-------*--------
NODE: RG1      VOLTS:  1.044      .00  1.044 -120.00  1.044  120.00 MAG/ANG
               -LD:      .00      .00    .00      .00    .00      .00 kW/kVR
kVll   4.160   CAP:              .00             .00             .00 kVR

FROM NODE 150  <VRG>:  628.42  -21.69 408.06 -139.63 501.86  101.51 AMP/DG <
<RG1   > LOSS=  .000:  (   .000)      (   .000)      (   .000)      kW
TO NODE 149   .......: 628.42  -21.69 408.06 -139.63 501.86  101.51 AMP/DG <
<149   > LOSS=  .000:  (   .000)      (   .000)      (   .000)      kW
---------------------*--------A--------*-------B-------*-------C-------*--------
NODE: 149      VOLTS:  1.044     -.02  1.044 -120.02  1.044  119.98 MAG/ANG
               -LD:      .00      .00    .00      .00    .00      .00 kW/kVR
kVll   4.160   CAP:              .00             .00             .00 kVR

FROM NODE RG1  .....:  628.42  -21.69 408.06 -139.63 501.86  101.51 AMP/DG <
<149   > LOSS=  .000:  (   .000)      (   .000)      (   .000)      kW
TO NODE 1     .......: 628.42  -21.69 408.06 -139.63 501.86  101.51 AMP/DG <
<1     > LOSS= 19.159: ( 11.176)      (   .429)      (  7.554)      kW
---------------------*--------A--------*-------B-------*-------C-------*--------
NODE: 1        VOLTS:  1.031    -.66  1.041 -120.33  1.035  119.60 MAG/ANG
               Y-LD:  40.00   20.00    .00      .00    .00      .00 kW/kVR
kVll   4.160   Y CAP:           .00             .00             .00 kVR

FROM NODE 149  .....:  628.42  -21.69 408.06 -139.63 501.86  101.51 AMP/DG <
<1     > LOSS= 19.159: ( 11.176)      (   .429)      (  7.554)      kW
TO NODE 2     .......:                 8.94 -146.89                 AMP/DG
<2     > LOSS=  .004:                 (   .004)                     kW
TO NODE 3     .......:                                46.54   92.99 AMP/DG
<3     > LOSS=  .136:                                (   .136)      kW
TO NODE 7     .......: 610.45  -21.52 399.19 -139.47 455.89  102.38 AMP/DG <
<7     > LOSS= 13.090: (  8.408)      (   .167)      (  4.515)      kW
---------------------*--------A--------*-------B-------*-------C-------*--------
NODE: 2        VOLTS:                  1.041 -120.33                 MAG/ANG
               Y-LD:                  20.00   10.00                 kW/kVR
kVll   4.160   Y CAP:                           .00                 kVR

FROM NODE 1    .....:                  8.94 -146.89                 AMP/DG
<2     > LOSS=  .004:                 (   .004)                     kW
```

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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
------------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 3          VOLTS:                                        1.033  119.57 MAG/ANG
                  -LD:                                          .00      .00 kW/kVR
kVLL   4.160      CAP:                                                   .00 kVR

FROM NODE 1      .....:                                        46.54   92.98 AMP/DG
<3     > LOSS=   .136:                                        (   .136)    kW
TO NODE 4      .......:                                        18.03   93.00 AMP/DG
<4     > LOSS=   .016:                                        (   .016)    kW
TO NODE 5      .......:                                        28.51   92.98 AMP/DG
<5     > LOSS=   .066:                                        (   .066)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 4          VOLTS:                                        1.033  119.56 MAG/ANG
                 Y-LD:                                         40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                                   .00 kVR

FROM NODE 3      .....:                                        18.03   93.00 AMP/DG
<4     > LOSS=   .016:                                        (   .016)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 5          VOLTS:                                        1.032  119.55 MAG/ANG
                 Y-LD:                                         20.64   10.32 kW/kVR
kVLL   4.160    Y CAP:                                                   .00 kVR

FROM NODE 3      .....:                                        28.51   92.97 AMP/DG
<5     > LOSS=   .066:                                        (   .066)    kW
TO NODE 6      .......:                                        19.20   92.97 AMP/DG
<6     > LOSS=   .023:                                        (   .023)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 6          VOLTS:                                        1.031  119.53 MAG/ANG
                 Y-LD:                                         42.53   21.27 kW/kVR
kVLL   4.160    Y CAP:                                                   .00 kVR

FROM NODE 5      .....:                                        19.20   92.97 AMP/DG
<6     > LOSS=   .023:                                        (   .023)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 7          VOLTS:  1.022   -1.13  1.039 -120.57  1.029  119.35 MAG/ANG
                 Y-LD:  20.00   10.00    .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00            .00 kVR

FROM NODE 1      .....:  610.45  -21.52  399.19 -139.47  455.89  102.38 AMP/DG <
<7     > LOSS= 13.090:  (  8.408)      (   .167)      (  4.515)    kW
TO NODE 8      .......:  601.39  -21.43  399.19 -139.47  455.89  102.38 AMP/DG <
<8     > LOSS= 8.583:  (  5.420)      (   .184)      (  2.979)    kW
```

The Institute of Electrical and Electronics Engineers, Inc.

```
- R A D I A L   P O W E R   F L O W --- DATE: 6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION: IEEE 123;  FEEDER:  IEEE 123
--------------------------------------------------------------------------
   NODE        VALUE        PHASE A          PHASE B          PHASE C     UNT O/L<
                           (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 8         VOLTS:  1.016   -1.44  1.038 -120.74  1.025  119.18 MAG/ANG
                -LD:     .00      .00    .00     .00    .00      .00 kW/kVR
kVll   4.160    CAP:             .00            .00             .00 kVR

FROM NODE 7     .....: 601.39  -21.43 399.19 -139.47 455.89  102.38 AMP/DG <
<8     > LOSS= 8.583: (   5.420)     (    .184)     (   2.979)     kW
TO NODE 12     .......:                8.97 -147.31                 AMP/DG
<12    > LOSS=  .005:                (    .005)                     kW
TO NODE 13     .......: 555.51  -20.88 390.31 -139.29 455.89  102.38 AMP/DG <
<13    > LOSS= 11.745: (   6.704)     (    .700)     (   4.341)     kW
TO NODE 9      .......:  46.22  -28.05                              AMP/DG
<9     > LOSS=  .122: (    .122)                                    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 12        VOLTS:                 1.038 -120.74                 MAG/ANG
                Y-LD:                  20.00   10.00                 kW/kVR
kVll   4.160    Y CAP:                         .00                   kVR

FROM NODE 8     .....:                  8.97 -147.31                 AMP/DG
<12    > LOSS=  .005:                (    .005)                     kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 13        VOLTS:  1.008   -1.87  1.036 -120.97  1.020  118.90 MAG/ANG
                -LD:     .00      .00    .00     .00    .00      .00 kW/kVR
kVll   4.160    CAP:             .00            .00             .00 kVR

FROM NODE 8     .....: 555.51  -20.88 390.31 -139.29 455.89  102.38 AMP/DG <
<13    > LOSS= 11.745: (   6.704)     (    .700)     (   4.341)     kW
TO NODE 152    .......: 332.01  -14.31 244.34 -129.30 265.02  112.07 AMP/DG
<152   > LOSS=  .000: (    .000)     (    .000)     (    .000)     kW
TO NODE 18     .......: 228.85  -30.43 155.56 -155.10 153.35   88.61 AMP/DG
<18    > LOSS= 4.907: (   2.436)     (    .341)     (   2.131)     kW
TO NODE 34     .......:                              46.42   92.30 AMP/DG
<34    > LOSS=  .081:                                (    .081)     kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 152       VOLTS:  1.008   -1.88  1.036 -120.98  1.020  118.89 MAG/ANG
                -LD:     .00      .00    .00     .00    .00      .00 kW/kVR
kVll   4.160    CAP:             .00            .00             .00 kVR

FROM NODE 13    .....: 332.01  -14.31 244.34 -129.30 265.02  112.07 AMP/DG
<152   > LOSS=  .000: (    .000)     (    .000)     (    .000)     kW
TO NODE 52     .......: 332.01  -14.31 244.34 -129.30 265.02  112.07 AMP/DG <
<52    > LOSS= 5.621: (   3.538)     (    .363)     (   1.719)     kW
```

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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-----------------------------------------------------------------------------
    NODE        VALUE       PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 52        VOLTS:   1.002   -2.26   1.035 -121.22   1.016  118.64 MAG/ANG
                Y-LD:   40.00   20.00     .00     .00     .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00             .00 kVR

FROM NODE 152   .....:  332.01  -14.31  244.34 -129.30  265.02  112.07 AMP/DG <
<52    > LOSS=  5.621:  (  3.538)    (   .363)    (  1.719)    kW
TO NODE 53      .......: 314.05  -13.46  244.34 -129.30  265.02  112.07 AMP/DG
<53    > LOSS=  2.663:  (  1.555)    (   .271)    (   .837)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 53        VOLTS:    .999   -2.43   1.034 -121.34   1.015  118.51 MAG/ANG
                Y-LD:   40.00   20.00     .00     .00     .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00             .00 kVR

FROM NODE 52    .....:  314.05  -13.46  244.34 -129.30  265.02  112.07 AMP/DG
<53    > LOSS=  2.663:  (  1.555)    (   .271)    (   .837)    kW
TO NODE 54      .......: 296.14  -12.50  244.34 -129.30  265.02  112.07 AMP/DG
<54    > LOSS=  1.580:  (   .846)    (   .226)    (   .508)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 54        VOLTS:    .998   -2.53   1.033 -121.41   1.014  118.43 MAG/ANG
                 -LD:     .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160     CAP:            .00             .00             .00 kVR

FROM NODE 53    .....:  296.14  -12.50  244.34 -129.30  265.02  112.07 AMP/DG
<54    > LOSS=  1.580:  (   .846)    (   .226)    (   .508)    kW
TO NODE 55      .......:   9.28  -29.09    9.01 -147.98     .00     .00 AMP/DG
<55    > LOSS=   .003:  (   .003)    (   .000)    (   .000)    kW
TO NODE 57      .......: 287.25  -11.97  235.82 -128.60  265.02  112.07 AMP/DG
<57    > LOSS=  4.240:  (  1.543)    (  1.328)    (  1.369)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 55        VOLTS:    .997   -2.54   1.033 -121.42   1.014  118.43 MAG/ANG
                Y-LD:   19.90    9.95     .00     .00     .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00             .00 kVR

FROM NODE 54    .....:    9.29  -29.10    9.01 -147.99     .00     .00 AMP/DG
<55    > LOSS=   .003:  (   .003)    (   .000)    (   .000)    kW
TO NODE 56      .......:    .00     .00    9.01 -147.99     .00     .00 AMP/DG
<56    > LOSS=   .002:  (   .000)    (   .002)    (   .000)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 56        VOLTS:    .997   -2.53   1.033 -121.43   1.014  118.43 MAG/ANG
                Y-LD:     .00     .00   20.00   10.00     .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00             .00 kVR

FROM NODE 55    .....:     .00     .00    9.01 -147.99     .00     .00 AMP/DG
<56    > LOSS=   .002:  (   .000)    (   .002)    (   .000)    kW
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- R A D I A L   P O W E R   F L O W --- DATE: 6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION: IEEE 123;  FEEDER:  IEEE 123
-----------------------------------------------------------------------------
    NODE        VALUE        PHASE A         PHASE B         PHASE C     UNT O/L<
                            (LINE A)        (LINE B)        (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 57        VOLTS:    .994   -2.83  1.031 -121.61  1.011  118.21 MAG/ANG
                 -LD:      .00     .00    .00     .00    .00      .00 kW/kVR
kVll   4.160    CAP:              .00            .00            .00 kVR

FROM NODE 54    .....:  287.25  -11.97 235.82 -128.60 265.02  112.07 AMP/DG
<57   > LOSS=  4.240:   (  1.543)     (  1.328)     (  1.369)    kW
TO NODE 58   .......:                  18.35 -148.19              AMP/DG
<58   > LOSS=   .021:                 (   .021)                   kW
TO NODE 60   .......:  287.25  -11.97 218.62 -126.99 265.02  112.07 AMP/DG
<60   > LOSS=  8.780:   (  3.190)     (  2.296)     (  3.294)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 58        VOLTS:                 1.030 -121.63              MAG/ANG
                Y-LD:                  20.60   10.30              kW/kVR
kVll   4.160  Y CAP:                           .00               kVR

FROM NODE 57    .....:                  18.35 -148.19              AMP/DG
<58   > LOSS=   .021:                 (   .021)                   kW
TO NODE 59   .......:                   9.04 -148.19              AMP/DG
<59   > LOSS=   .005:                 (   .005)                   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 59        VOLTS:                 1.030 -121.63              MAG/ANG
                Y-LD:                  20.00   10.00              kW/kVR
kVll   4.160  Y CAP:                           .00               kVR

FROM NODE 58    .....:                   9.04 -148.20              AMP/DG
<59   > LOSS=   .005:                 (   .005)                   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 60        VOLTS:    .988   -3.51  1.026 -122.00  1.005  117.76 MAG/ANG
                Y-LD:   20.00   10.00    .00     .00    .00      .00 kW/kVR
kVll   4.160  Y CAP:              .00            .00            .00 kVR

FROM NODE 57    .....:  287.25  -11.97 218.62 -126.99 265.02  112.07 AMP/DG
<60   > LOSS=  8.780:   (  3.190)     (  2.296)     (  3.294)    kW
TO NODE 160  .......:  240.09   -5.95 172.00 -120.02 191.06  120.31 AMP/DG
<160  > LOSS=   .000:   (   .000)     (   .000)     (   .000)    kW
TO NODE 61   .......:     .00     .00    .00     .00    .00      .00 AMP/DG
<61   > LOSS=   .000:   (   .000)     (   .001)     (   .000)    kW
TO NODE 62   .......:   45.37  -41.35  52.24 -150.54  80.73   92.22 AMP/DG
<62   > LOSS=   .565:   (   .072)     (   .151)     (   .341)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 160       VOLTS:    .988   -3.52  1.026 -122.01  1.005  117.75 MAG/ANG
                 -LD:      .00     .00    .00     .00    .00      .00 kW/kVR
kVll   4.160    CAP:              .00            .00            .00 kVR

FROM NODE 60    .....:  240.09   -5.95 172.00 -120.02 191.06  120.31 AMP/DG
<160  > LOSS=   .000:   (   .000)     (   .000)     (   .000)    kW
TO NODE RG4  .<VRG>.:  240.09   -5.95 172.00 -120.02 191.06  120.31 AMP/DG <
<RG4  > LOSS=   .000:   (   .000)     (   .000)     (   .000)    kW
```

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- R A D I A L   P O W E R   F L O W  --- DATE: 6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION: IEEE 123;  FEEDER:  IEEE 123
------------------------------------------------------------------------------
    NODE       VALUE        PHASE A          PHASE B          PHASE C    UNT O/L<
                          (LINE A)         (LINE B)         (LINE C)       60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: RG4       VOLTS:  1.037   -3.52  1.032 -122.01  1.037  117.75 MAG/ANG
                 -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:           .00            .00            .00 kVR

FROM NODE 160  <VRG>: 228.66   -5.95 170.93 -120.02 185.27  120.31 AMP/DG
<RG4  > LOSS=  .000:  (   .000)      (   .000)      (   .000)      kW
TO NODE 67     .......: 228.66   -5.95 170.93 -120.02 185.27  120.31 AMP/DG
<67   > LOSS= 2.371:  (   .940)      (   .429)      (  1.001)      kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 67        VOLTS:  1.036   -3.77  1.031 -122.19  1.035  117.61 MAG/ANG
                 -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:           .00            .00            .00 kVR

FROM NODE RG4  .....: 228.66   -5.95 170.93 -120.02 185.27  120.31 AMP/DG
<67   > LOSS= 2.371:  (   .940)      (   .429)      (  1.001)      kW
TO NODE 68     .......:  54.15  -30.40                            AMP/DG
<68   > LOSS=  .148:  (   .148)                                   kW
TO NODE 72     .......: 118.75   22.68 126.10 -108.04 132.91  134.06 AMP/DG
<72   > LOSS=  .769:  (   .117)      (   .396)      (   .256)      kW
TO NODE 97     .......:  82.68  -30.60  54.30 -148.83  64.43   90.97 AMP/DG
<97   > LOSS=  .206:  (   .094)      (   .035)      (   .077)      kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 68        VOLTS:  1.034   -3.79                            MAG/ANG
                Y-LD:  20.00   10.00                            kW/kVR
kVll   4.160    Y CAP:          .00                             kVR

FROM NODE 67   .....:  54.15  -30.40                            AMP/DG
<68   > LOSS=  .148:  (   .148)                                   kW
TO NODE 69     .......:  45.14  -30.41                            AMP/DG
<69   > LOSS=  .141:  (   .141)                                   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 69        VOLTS:  1.032   -3.83                            MAG/ANG
                Y-LD:  40.00   20.00                            kW/kVR
kVll   4.160    Y CAP:          .00                             kVR

FROM NODE 68   .....:  45.14  -30.41                            AMP/DG
<69   > LOSS=  .141:  (   .141)                                   kW
TO NODE 70     .......:  27.10  -30.42                            AMP/DG
<70   > LOSS=  .060:  (   .060)                                   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 70        VOLTS:  1.031   -3.85                            MAG/ANG
                Y-LD:  20.00   10.00                            kW/kVR
kVll   4.160    Y CAP:          .00                             kVR

FROM NODE 69   .....:  27.10  -30.42                            AMP/DG
<70   > LOSS=  .060:  (   .060)                                   kW
TO NODE 71     .......:  18.07  -30.43                            AMP/DG
<71   > LOSS=  .023:  (   .023)                                   kW
```

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- R A D I A L   P O W E R   F L O W --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-------------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 71        VOLTS:   1.030   -3.86                                      MAG/ANG
                Y-LD:   40.00   20.00                                       kW/kVR
kVll   4.160    Y CAP:           .00                                        kVR

FROM NODE 70    .....:   18.07  -30.43                                      AMP/DG
<71    > LOSS=  .023:   (   .023)                                           kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 72        VOLTS:   1.036   -3.86   1.030 -122.29   1.034  117.50 MAG/ANG
                -LD:      .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160    CAP:             .00             .00             .00 kVR

FROM NODE 67    .....:  118.75   22.68  126.10 -108.04  132.91  134.06 AMP/DG
<72    > LOSS=  .769:   (   .117)       (   .396)       (   .256)      kW
TO NODE 73      .......:                                 55.31   90.86 AMP/DG
<73    > LOSS=  .212:                                   (   .212)      kW
TO NODE 76      .......: 118.75   22.68  126.10 -108.04  100.03  156.30 AMP/DG
<76    > LOSS=  .473:   (   .168)       (   .284)       (   .020)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 73        VOLTS:                                   1.032  117.46 MAG/ANG
                Y-LD:                                   40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                          .00 kVR

FROM NODE 72    .....:                                   55.31   90.86 AMP/DG
<73    > LOSS=  .212:                                   (   .212)      kW
TO NODE 74      .......:                                 37.27   90.85 AMP/DG
<74    > LOSS=  .122:                                   (   .122)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 74        VOLTS:                                   1.030  117.42 MAG/ANG
                Y-LD:                                   42.46   21.23 kW/kVR
kVLL   4.160    Y CAP:                                          .00 kVR

FROM NODE 73    .....:                                   37.27   90.85 AMP/DG
<74    > LOSS=  .122:                                   (   .122)      kW
TO NODE 75      .......:                                 18.09   90.84 AMP/DG
<75    > LOSS=  .033:                                   (   .033)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 75        VOLTS:                                   1.029  117.40 MAG/ANG
                Y-LD:                                   40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                          .00 kVR

FROM NODE 74    .....:                                   18.09   90.84 AMP/DG
<75    > LOSS=  .033:                                   (   .033)      kW
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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-----------------------------------------------------------------------------
   NODE        VALUE        PHASE A          PHASE B          PHASE C     UNT O/L<
                           (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 76        VOLTS:  1.036   -3.92  1.030 -122.38  1.035  117.45 MAG/ANG
                D-LD:  107.59   81.97  72.32   51.66  72.97   52.12 kW/kVR
kVll   4.160    Y CAP:           .00            .00            .00 kVR

FROM NODE 72    .....:  118.75   22.68  126.10 -108.04  100.03  156.30 AMP/DG
<76    > LOSS=  .473:  (    .168)    (    .284)    (    .020)    kW
TO NODE 77      .......:  77.82   60.48  77.40  -57.30  77.45 -177.48 AMP/DG
<77    > LOSS=  .418:  (    .101)    (    .151)    (    .166)    kW
TO NODE 86      .......:  32.69    5.55  57.67 -129.86  21.03  157.54 AMP/DG
<86    > LOSS=  .229:  (    .075)    (    .191)    (   -.036)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 77        VOLTS:  1.037   -3.99  1.031 -122.46  1.036  117.37 MAG/ANG
                Y-LD:    .00     .00  40.00   20.00    .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00            .00            .00 kVR

FROM NODE 76    .....:  77.82   60.48  77.40  -57.30  77.45 -177.48 AMP/DG
<77    > LOSS=  .418:  (    .101)    (    .151)    (    .166)    kW
TO NODE 78      .......:  77.82   60.48  80.01  -44.26  77.45 -177.48 AMP/DG
<78    > LOSS=  .108:  (    .034)    (    .031)    (    .043)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 78        VOLTS:  1.037   -4.01  1.031 -122.48  1.036  117.35 MAG/ANG
                -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:             .00            .00            .00 kVR

FROM NODE 77    .....:  77.82   60.48  80.01  -44.26  77.45 -177.48 AMP/DG
<78    > LOSS=  .108:  (    .034)    (    .031)    (    .043)    kW
TO NODE 79      .......:  19.31  -30.58    .00     .00    .00     .00 AMP/DG
<79    > LOSS=  .007:  (    .008)    (    .000)    (    .000)    kW
TO NODE 80      .......:  80.52   74.35  80.01  -44.26  77.45 -177.48 AMP/DG
<80    > LOSS=  .524:  (    .126)    (    .139)    (    .259)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 79        VOLTS:  1.037   -4.02  1.031 -122.48  1.036  117.36 MAG/ANG
                Y-LD:  43.01   21.51    .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00            .00            .00 kVR

FROM NODE 78    .....:  19.31  -30.59    .00     .00    .00     .00 AMP/DG
<79    > LOSS=  .007:  (    .008)    (    .000)    (    .000)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 80        VOLTS:  1.039   -4.07  1.033 -122.54  1.037  117.24 MAG/ANG
                Y-LD:    .00     .00  40.00   20.00    .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00            .00            .00 kVR

FROM NODE 78    .....:  80.52   74.35  80.01  -44.26  77.45 -177.48 AMP/DG
<80    > LOSS=  .524:  (    .126)    (    .139)    (    .259)    kW
TO NODE 81      .......:  80.52   74.35  86.40  -32.63  77.45 -177.48 AMP/DG
<81    > LOSS=  .562:  (    .175)    (    .120)    (    .267)    kW
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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;  FEEDER:  IEEE 123
----------------------------------------------------------------------------
    NODE       VALUE       PHASE A          PHASE B          PHASE C      UNT O/L<
                          (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 81        VOLTS:  1.042   -4.14  1.035 -122.57  1.037  117.14 MAG/ANG
                 -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:            .00            .00            .00 kVR

FROM NODE 80    .....:  80.52   74.35  86.40  -32.63  77.44 -177.48 AMP/DG
<81   > LOSS=  .562:   (   .175)       (   .120)       (   .267)      kW
TO NODE 82    .......:  80.52   74.35  86.40  -32.63  82.90 -158.48 AMP/DG
<82   > LOSS=  .304:   (   .091)       (   .112)       (   .100)      kW
TO NODE 84    .......:                                 27.01   90.52 AMP/DG
<84   > LOSS=  .124:                                  (   .124)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 82        VOLTS:  1.042   -4.18  1.036 -122.60  1.038  117.11 MAG/ANG
                Y-LD:  40.00   20.00    .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:          .00            .00            .00 kVR

FROM NODE 81    .....:  80.52   74.35  86.40  -32.63  82.90 -158.48 AMP/DG
<82   > LOSS=  .304:   (   .091)       (   .112)       (   .100)      kW
TO NODE 83    .......:  86.90   85.80  86.40  -32.63  82.90 -158.48 AMP/DG
<83   > LOSS=  .318:   (   .081)       (   .102)       (   .135)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 83        VOLTS:  1.044   -4.20  1.038 -122.63  1.039  117.07 MAG/ANG
                Y-LD:    .00     .00    .00     .00   20.00   10.00 kW/kVR
kVll   4.160    Y CAP:        217.81          215.30         215.91 kVR

FROM NODE 82    .....:  86.90   85.80  86.40  -32.63  82.90 -158.48 AMP/DG
<83   > LOSS=  .318:   (   .081)       (   .102)       (   .135)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 84        VOLTS:                                 1.035  117.09 MAG/ANG
                Y-LD:                                 20.00   10.00 kW/kVR
kVLL   4.160    Y CAP:                                         .00 kVR

FROM NODE 81    .....:                                 27.01   90.52 AMP/DG
<84   > LOSS=  .124:                                  (   .124)      kW
TO NODE 85    .......:                                 18.01   90.51 AMP/DG
<85   > LOSS=  .039:                                  (   .039)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 85        VOLTS:                                 1.034  117.07 MAG/ANG
                Y-LD:                                 40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                         .00 kVR

FROM NODE 84    .....:                                 18.01   90.51 AMP/DG
<85   > LOSS=  .039:                                  (   .039)      kW
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- R A D I A L   P O W E R   F L O W --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
---------------------------------------------------------------------------
   NODE       VALUE       PHASE A          PHASE B          PHASE C      UNT O/L<
                          (LINE A)         (LINE B)         (LINE C)       60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 86       VOLTS:  1.035   -3.95  1.028 -122.55  1.036  117.42 MAG/ANG
               Y-LD:    .00     .00  20.00   10.00    .00     .00 kW/kVR
kVll   4.160   Y CAP:          .00             .00             .00 kVR

FROM NODE 76   .....:  32.69    5.55  57.67 -129.86  21.02  157.54 AMP/DG
<86    > LOSS=  .229:  (   .075)      (   .191)      (  -.036)      kW
TO NODE 87     .......: 32.69    5.55  49.21 -126.38  21.02  157.54 AMP/DG
<87    > LOSS=  .116:  (   .059)      (   .066)      (  -.009)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 87       VOLTS:  1.034   -3.97  1.027 -122.63  1.037  117.39 MAG/ANG
               Y-LD:    .00     .00  40.00   20.00    .00     .00 kW/kVR
kVll   4.160   Y CAP:          .00             .00             .00 kVR

FROM NODE 86   .....:  32.69    5.55  49.21 -126.39  21.02  157.54 AMP/DG
<87    > LOSS=  .116:  (   .059)      (   .066)      (  -.009)      kW
TO NODE 88     .......: 21.00   35.93                               AMP/DG
<88    > LOSS=  .019:  (   .019)                                    kW
TO NODE 89     .......: 18.03  -30.54  33.25 -114.18  21.02  157.54 AMP/DG
<89    > LOSS=  .040:  (   .019)      (   .031)      (  -.009)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 88       VOLTS:  1.034   -4.00                               MAG/ANG
               Y-LD:  40.00   20.00                               kW/kVR
kVll   4.160   Y CAP:        53.48                               kVR

FROM NODE 87   .....:  21.00   35.93                               AMP/DG
<88    > LOSS=  .019:  (   .019)                                    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 89       VOLTS:  1.034   -3.96  1.027 -122.68  1.037  117.38 MAG/ANG
                -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:          .00             .00             .00 kVR

FROM NODE 87   .....:  18.03  -30.54  33.25 -114.19  21.02  157.53 AMP/DG
<89    > LOSS=  .040:  (   .019)      (   .031)      (  -.009)      kW
TO NODE 90     .......:               21.16  -84.64                 AMP/DG
<90    > LOSS=  .025:                 (   .025)                     kW
TO NODE 91     .......: 18.03  -30.54  18.15 -149.29  21.02  157.53 AMP/DG
<91    > LOSS=  .018:  (   .009)      (   .008)      (   .001)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 90       VOLTS:                 1.027 -122.72                 MAG/ANG
               Y-LD:                 41.08   20.54                 kW/kVR
kVll   4.160   Y CAP:                       52.72                 kVR

FROM NODE 89   .....:                 21.16  -84.64                 AMP/DG
<90    > LOSS=  .025:                 (   .025)                     kW
```

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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
------------------------------------------------------------------------------
   NODE        VALUE       PHASE A          PHASE B          PHASE C     UNT O/L<
                          (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 91        VOLTS:  1.034  -3.96   1.027 -122.69   1.038  117.36 MAG/ANG
                 -LD:     .00    .00     .00     .00     .00     .00 kW/kVR
kVll   4.160     CAP:            .00             .00             .00 kVR

FROM NODE 89    .....:  18.03 -30.54   18.15 -149.29   21.02  157.53 AMP/DG
<91   > LOSS=  .018:  (   .009)      (   .008)       (   .001)     kW
TO NODE 92     .......:                                 21.02  157.53 AMP/DG
<92   > LOSS=  .033:                                  (   .033)     kW
TO NODE 93     .......:  18.03 -30.54   18.15 -149.29     .00     .00 AMP/DG
<93   > LOSS=  .011:  (   .010)      (   .001)       (   .000)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 92        VOLTS:                                  1.037  117.31 MAG/ANG
                Y-LD:                                  40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                         53.82 kVR

FROM NODE 91    .....:                                  21.02  157.53 AMP/DG
<92   > LOSS=  .033:                                  (   .033)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 93        VOLTS:  1.033  -3.97   1.026 -122.71   1.038  117.37 MAG/ANG
                 -LD:     .00    .00     .00     .00     .00     .00 kW/kVR
kVll   4.160     CAP:            .00             .00             .00 kVR

FROM NODE 91    .....:  18.03 -30.54   18.15 -149.29     .00     .00 AMP/DG
<93   > LOSS=  .011:  (   .010)      (   .001)       (   .000)     kW
TO NODE 94     .......:  18.03 -30.55                           AMP/DG
<94   > LOSS=  .023:  (   .023)                                 kW
TO NODE 95     .......:    .00    .00   18.15 -149.29     .00     .00 AMP/DG
<95   > LOSS=  .009:  (   .000)      (   .008)       (   .000)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 94        VOLTS:  1.033  -3.98                            MAG/ANG
                Y-LD:  40.00   20.00                           kW/kVR
kVll   4.160    Y CAP:            .00                           kVR

FROM NODE 93    .....:  18.03 -30.55                            AMP/DG
<94   > LOSS=  .023:  (   .023)                                 kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 95        VOLTS:  1.033  -3.96   1.026 -122.73   1.038  117.37 MAG/ANG
                Y-LD:     .00    .00   20.00   10.00     .00     .00 kW/kVR
kVll   4.160    Y CAP:            .00             .00             .00 kVR

FROM NODE 93    .....:    .00    .00   18.15 -149.29     .00     .00 AMP/DG
<95   > LOSS=  .009:  (   .000)      (   .008)       (   .000)     kW
TO NODE 96     .......:                 9.08 -149.29            AMP/DG
<96   > LOSS=  .004:                  (   .004)                 kW
--------------------*--------A-------*-------B-------*-------C-------*--------
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-  R A D I A L   P O W E R   F L O W  --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
  SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
 -----------------------------------------------------------------------------
    NODE       VALUE       PHASE A         PHASE B         PHASE C     UNT O/L<
                          (LINE A)        (LINE B)        (LINE C)       60.%
 --------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 96        VOLTS:                 1.026 -122.73                 MAG/ANG
                Y-LD:                  20.00   10.00                 kW/kVR
 kVll   4.160   Y CAP:                          .00                 kVR

 FROM NODE 95    .....:                 9.08 -149.30                 AMP/DG
 <96    > LOSS=   .004:                (    .004)                    kW
 -----------------------------------------------------------------------------
NODE: 97        VOLTS:   1.035   -3.82  1.031 -122.21  1.034  117.60 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
 kVll   4.160    CAP:             .00            .00            .00 kVR

 FROM NODE 67    .....:  82.68  -30.60  54.30 -148.83  64.43   90.97 AMP/DG
 <97    > LOSS=   .206:  (    .094)     (    .035)     (    .077)    kW
 TO NODE 197   .......:  64.68  -30.66  36.21 -148.86  45.20   90.96 AMP/DG
 <197   > LOSS=   .000:  (    .000)     (    .000)     (    .000)    kW
 TO NODE 98    .......:  18.00  -30.38  18.08 -148.77  19.23   90.98 AMP/DG
 <98    > LOSS=   .016:  (    .004)     (    .007)     (    .005)    kW
 --------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 197       VOLTS:   1.034   -3.82  1.031 -122.21  1.034  117.59 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
 kVll   4.160    CAP:             .00            .00            .00 kVR

 FROM NODE 97    .....:  64.68  -30.66  36.21 -148.86  45.20   90.96 AMP/DG
 <197   > LOSS=   .000:  (    .000)     (    .000)     (    .000)    kW
 TO NODE 101   .......:  64.68  -30.66  36.21 -148.86  45.20   90.96 AMP/DG
 <101   > LOSS=   .114:  (    .060)     (    .010)     (    .044)    kW
 --------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 101       VOLTS:   1.034   -3.86  1.030 -122.22  1.033  117.59 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
 kVll   4.160    CAP:             .00            .00            .00 kVR

 FROM NODE 197   .....:  64.68  -30.66  36.21 -148.86  45.20   90.96 AMP/DG
 <101   > LOSS=   .114:  (    .060)     (    .010)     (    .044)    kW
 TO NODE 102   .......:                                 45.20   90.96 AMP/DG
 <102   > LOSS=   .116:                                (    .116)    kW
 TO NODE 105   .......:  64.68  -30.66  36.21 -148.86    .01     .00 AMP/DG
 <105   > LOSS=   .114:  (    .133)     (   -.019)     (    .000)    kW
 --------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 102       VOLTS:                                 1.032  117.56 MAG/ANG
                Y-LD:                                  20.00   10.00 kW/kVR
 kVLL   4.160   Y CAP:                                          .00 kVR

 FROM NODE 101   .....:                                 45.20   90.96 AMP/DG
 <102   > LOSS=   .116:                                (    .116)    kW
 TO NODE 103   .......:                                 36.18   90.95 AMP/DG
 <103   > LOSS=   .107:                                (    .107)    kW
 --------------------*--------A-------*-------B-------*-------C-------*--------
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----------------------------------------------------------------------------
    NODE        VALUE       PHASE A           PHASE B          PHASE C      UNT O/L<
                           (LINE A)          (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 103       VOLTS:                                      1.030  117.53 MAG/ANG
                Y-LD:                                       40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 102   .....:                                      36.18   90.95 AMP/DG
<103  > LOSS=   .107:                                       (   .107)    kW
TO NODE 104    .......:                                     18.11   90.93 AMP/DG
<104  > LOSS=   .058:                                       (   .058)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 104       VOLTS:                                      1.028  117.49 MAG/ANG
                Y-LD:                                       40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 103   .....:                                      18.11   90.93 AMP/DG
<104  > LOSS=   .058:                                       (   .058)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 105       VOLTS:  1.032   -3.90  1.030 -122.27  1.034  117.61 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:            .00            .00            .00 kVR

FROM NODE 101   .....:  64.68  -30.66  36.21 -148.86    .00     .00 AMP/DG
<105  > LOSS=   .114:  (   .133)     ( -.019)      (   .000)    kW
TO NODE 106    .......:                36.22 -148.87             AMP/DG
<106  > LOSS=   .074:                ( .074)                    kW
TO NODE 108    .......:  64.68  -30.66    .00     .00    .00     .00 AMP/DG
<108  > LOSS=   .119:  (   .119)     (   .000)    (   .000)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 106       VOLTS:                 1.029 -122.29             MAG/ANG
                Y-LD:                  40.00   20.00             kW/kVR
kVll   4.160    Y CAP:                         .00              kVR

FROM NODE 105   .....:                 36.22 -148.87             AMP/DG
<106  > LOSS=   .074:                 (   .074)                  kW
TO NODE 107    .......:                 18.12 -148.88             AMP/DG
<107  > LOSS=   .048:                 (   .048)                  kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 107       VOLTS:                 1.028 -122.32             MAG/ANG
                Y-LD:                  40.00   20.00             kW/kVR
kVll   4.160    Y CAP:                         .00              kVR

FROM NODE 106   .....:                 18.12 -148.88             AMP/DG
<107  > LOSS=   .048:                 (   .048)                  kW
---------------------*--------A-------*-------B-------*-------C-------*--------
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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-------------------------------------------------------------------------------
    NODE         VALUE         PHASE A           PHASE B           PHASE C     UNT O/L<
                              (LINE A)          (LINE B)          (LINE C)       60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 108      VOLTS:  1.031   -3.97  1.031 -122.28  1.033  117.65 MAG/ANG
               -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160   CAP:            .00            .00            .00 kVR

FROM NODE 105  .....:  64.68  -30.66    .00     .00    .00     .00 AMP/DG
<108  > LOSS=  .119:  (   .119)      (   .000)      (   .000)    kW
TO NODE 109  .......:  64.68  -30.66                               AMP/DG
<109  > LOSS=  .474:  (   .474)                                  kW
TO NODE 300  .......:    .00     .00    .00     .00    .00     .00 AMP/DG
<300  > LOSS=  .000:  (   .000)      (  -.001)      (   .001)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 109      VOLTS:  1.027   -4.05                               MAG/ANG
               Y-LD:   40.00   20.00                               kW/kVR
kVll   4.160   Y CAP:          .00                               kVR

FROM NODE 108  .....:  64.68  -30.67                               AMP/DG
<109  > LOSS=  .474:  (   .474)                                  kW
TO NODE 110  .......:  46.54  -30.69                               AMP/DG
<110  > LOSS=  .164:  (   .164)                                  kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 110      VOLTS:  1.025   -4.09                               MAG/ANG
               -LD:     .00     .00                               kW/kVR
kVll   4.160   CAP:            .00                               kVR

FROM NODE 109  .....:  46.54  -30.69                               AMP/DG
<110  > LOSS=  .164:  (   .164)                                  kW
TO NODE 111  .......:   9.09  -30.66                               AMP/DG
<111  > LOSS=  .012:  (   .012)                                  kW
TO NODE 112  .......:  37.45  -30.69                               AMP/DG
<112  > LOSS=  .044:  (   .044)                                  kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 111      VOLTS:  1.024   -4.10                               MAG/ANG
               Y-LD:   20.00   10.00                               kW/kVR
kVll   4.160   Y CAP:          .00                               kVR

FROM NODE 110  .....:   9.09  -30.67                               AMP/DG
<111  > LOSS=  .012:  (   .012)                                  kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 112      VOLTS:  1.024   -4.10                               MAG/ANG
               Y-LD:   20.48   10.24                               kW/kVR
kVll   4.160   Y CAP:          .00                               kVR

FROM NODE 110  .....:  37.45  -30.69                               AMP/DG
<112  > LOSS=  .044:  (   .044)                                  kW
TO NODE 113  .......:  28.14  -30.70                               AMP/DG
<113  > LOSS=  .105:  (   .105)                                  kW
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- R A D I A L   P O W E R   F L O W --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
  SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
------------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 113      VOLTS:   1.022   -4.14                                     MAG/ANG
               Y-LD:   41.78   20.89                                      kW/kVR
kVll   4.160   Y CAP:            .00                                      kVR

FROM NODE 112   .....:  28.14  -30.70                                     AMP/DG
<113  > LOSS=   .105:  (   .105)                                          kW
TO NODE 114    .......:   9.11  -30.71                                    AMP/DG
<114  > LOSS=   .007:  (   .007)                                          kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 114      VOLTS:   1.022   -4.15                                     MAG/ANG
               Y-LD:   20.00   10.00                                      kW/kVR
kVll   4.160   Y CAP:            .00                                      kVR

FROM NODE 113   .....:   9.11  -30.71                                     AMP/DG
<114  > LOSS=   .007:  (   .007)                                          kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 300      VOLTS:   1.031   -3.97   1.031 -122.28   1.033  117.65 MAG/ANG
               -LD:      .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160   CAP:             .00             .00             .00 kVR

FROM NODE 108   .....:    .00     .00     .00     .00     .00     .00 AMP/DG
<300  > LOSS=   .000:  (   .000)   (  -.001)   (   .001)   kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 98       VOLTS:   1.034   -3.83   1.030 -122.22   1.034  117.59 MAG/ANG
               Y-LD:   40.00   20.00     .00     .00     .00     .00 kW/kVR
kVll   4.160   Y CAP:            .00             .00             .00 kVR

FROM NODE 97    .....:  18.00  -30.38  18.08 -148.78  19.23   90.98 AMP/DG
<98   > LOSS=   .016:  (   .004)   (   .007)   (   .005)   kW
TO NODE 99     .......:    .00     .00  18.08 -148.78  19.23   90.98 AMP/DG
<99   > LOSS=   .028:  (   .000)   (   .028)   (   .000)   kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 99       VOLTS:   1.035   -3.82   1.029 -122.23   1.033  117.55 MAG/ANG
               Y-LD:     .00     .00  40.00   20.00     .00     .00 kW/kVR
kVll   4.160   Y CAP:            .00             .00             .00 kVR

FROM NODE 98    .....:    .00     .00  18.08 -148.78  19.23   90.97 AMP/DG
<99   > LOSS=   .028:  (   .000)   (   .028)   (   .000)   kW
TO NODE 100    .......:    .00     .00     .00     .00  19.23   90.97 AMP/DG
<100  > LOSS=   .010:  (   .000)   (   .000)   (   .010)   kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 100      VOLTS:   1.035   -3.82   1.029 -122.21   1.033  117.53 MAG/ANG
               Y-LD:     .00     .00     .00     .00  42.67   21.33 kW/kVR
kVll   4.160   Y CAP:            .00             .00             .00 kVR

FROM NODE 99    .....:    .00     .00     .00     .00  19.23   90.97 AMP/DG
<100  > LOSS=   .010:  (   .000)   (   .000)   (   .010)   kW
TO NODE 450    .......:    .00     .00     .00     .00     .00     .00 AMP/DG
<450  > LOSS=   .000:  (   .000)   (  -.001)   (   .001)   kW
```

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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
---------------------------------------------------------------------------
   NODE       VALUE        PHASE A          PHASE B          PHASE C       UNT O/L<
                          (LINE A)         (LINE B)         (LINE C)         60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 450      VOLTS:   1.035   -3.82  1.029 -122.21  1.033  117.53 MAG/ANG
               -LD:      .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160   CAP:              .00            .00            .00 kVR

FROM NODE 100  .....:     .00     .00    .00     .00    .00     .00 AMP/DG
<450   > LOSS=  .000:   (   .000)      (  -.001)      (   .001)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 61       VOLTS:    .988   -3.51  1.026 -122.00  1.005  117.76 MAG/ANG
               -LD:      .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160   CAP:              .00            .00            .00 kVR

FROM NODE 60   .....:     .00     .00    .00     .00    .00     .00 AMP/DG
<61    > LOSS=  .000:   (   .000)      (   .001)      (   .000)    kW
TO NODE XF1    .......:    .00     .00    .00     .00    .00     .00 AMP/DG
<XF1   > LOSS=  .000:   (   .000)      (   .000)      (   .000)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: XF1      VOLTS:    .988   -3.51  1.026 -122.00  1.005  117.76 MAG/ANG
               -LD:      .00     .00    .00     .00    .00     .00 kW/kVR
kVll    .480   CAP:              .00            .00            .00 kVR

FROM NODE 61   .....:     .00     .00    .00     .00    .00     .00 AMP/DG
<XF1   > LOSS=  .000:   (   .000)      (   .000)      (   .000)    kW
TO NODE 610    .......:    .00     .00    .00     .00    .00     .00 AMP/DG
<610   > LOSS=  .000:   (   .000)      (   .000)      (   .000)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 610      VOLTS:    .988   -3.51  1.026 -122.00  1.005  117.76 MAG/ANG
               -LD:      .00     .00    .00     .00    .00     .00 kW/kVR
kVll    .480   CAP:              .00            .00            .00 kVR

FROM NODE XF1  .....:     .00     .00    .00     .00    .00     .00 AMP/DG
<610   > LOSS=  .000:   (   .000)      (   .000)      (   .000)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 62       VOLTS:    .987   -3.50  1.024 -121.98  1.003  117.75 MAG/ANG
               Y-LD:     .00     .00    .00     .00  40.25   20.13 kW/kVR
kVll   4.160   Y CAP:            .00            .00            .00 kVR

FROM NODE 60   .....:   45.37  -41.36  52.24 -150.55  80.73   92.21 AMP/DG
<62    > LOSS=  .565:   (   .072)      (   .151)      (   .341)    kW
TO NODE 63     .......:  45.37  -41.36  52.24 -150.55  62.06   92.52 AMP/DG
<63    > LOSS=  .295:   (   .065)      (   .106)      (   .125)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 63       VOLTS:    .987   -3.49  1.024 -121.97  1.002  117.74 MAG/ANG
               Y-LD:   40.00   20.00    .00     .00    .00     .00 kW/kVR
kVll   4.160   Y CAP:            .00            .00            .00 kVR

FROM NODE 62   .....:   45.37  -41.36  52.25 -150.56  62.06   92.52 AMP/DG
<63    > LOSS=  .295:   (   .065)      (   .106)      (   .125)    kW
TO NODE 64     .......:  27.12  -49.20  52.25 -150.56  62.06   92.52 AMP/DG
<64    > LOSS=  .533:   (   .032)      (   .245)      (   .256)    kW
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-  R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-------------------------------------------------------------------------------
    NODE       VALUE        PHASE A           PHASE B           PHASE C      UNT O/L<
                           (LINE A)          (LINE B)          (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 64        VOLTS:    .986   -3.47   1.022 -121.93   1.000  117.70 MAG/ANG
                Y-LD:     .00     .00   76.63   35.76     .00     .00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 63    .....:   27.13  -49.22   52.25 -150.57   62.06   92.51 AMP/DG
<64    > LOSS=  .533:   (   .032)       (   .245)       (   .256)    kW
TO NODE 65      .......:  27.13  -49.22   17.99 -157.50   62.06   92.51 AMP/DG
<65    > LOSS=  .452:   (   .024)       (   .031)       (   .398)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 65        VOLTS:    .986   -3.48   1.021 -121.89    .997  117.70 MAG/ANG
                D-LD:   34.68   24.77   35.79   25.57   69.60   49.72 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 64    .....:   27.14  -49.24   18.00 -157.54   62.07   92.50 AMP/DG
<65    > LOSS=  .452:   (   .024)       (   .031)       (   .398)    kW
TO NODE 66      .......:    .01     .00     .01     .00   34.61   92.69 AMP/DG
<66    > LOSS=  .112:   (   .000)       (   .000)       (   .112)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 66        VOLTS:    .986   -3.51   1.022 -121.87    .996  117.70 MAG/ANG
                Y-LD:     .00     .00     .00     .00   75.00   35.00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 65    .....:     .00     .00     .00     .00   34.62   92.68 AMP/DG
<66    > LOSS=  .112:   (   .000)       (   .000)       (   .112)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 18        VOLTS:    .999   -2.29   1.032 -121.22   1.012  118.83 MAG/ANG
                -LD:      .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160    CAP:            .00             .00             .00 kVR

FROM NODE 13    .....:  228.85  -30.43  155.56 -155.10  153.36   88.61 AMP/DG
<18    > LOSS= 4.907:   (  2.436)       (   .341)       (  2.131)    kW
TO NODE 135     .......: 135.82  -31.42  136.56 -156.13   98.12   86.58 AMP/DG
<135   > LOSS=  .000:   (   .000)       (   .000)       (   .000)    kW
TO NODE 19      .......:  37.29  -28.89                               AMP/DG
<19    > LOSS=  .087:   (   .087)                                     kW
TO NODE 21      .......:  55.79  -29.05   19.19 -147.79   55.41   92.21 AMP/DG
<21    > LOSS=  .125:   (   .011)       (  -.002)       (   .116)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 135       VOLTS:    .999   -2.29   1.032 -121.23   1.012  118.83 MAG/ANG
                -LD:      .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160    CAP:            .00             .00             .00 kVR

FROM NODE 18    .....:  135.82  -31.42  136.56 -156.13   98.12   86.58 AMP/DG
<135   > LOSS=  .000:   (   .000)       (   .000)       (   .000)    kW
TO NODE 35      .......: 135.82  -31.42  136.56 -156.13   98.12   86.58 AMP/DG
<35    > LOSS= 1.026:   (   .555)       (   .397)       (   .074)    kW
```

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 -  R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:   IEEE 123
---------------------------------------------------------------------------
    NODE       VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                           (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 35        VOLTS:    .996   -2.38   1.029 -121.31   1.011  118.77 MAG/ANG
                D-LD:   40.00   20.00    .00     .00     .00      .00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 135   .....: 135.82  -31.42  136.56 -156.13   98.12   86.58 AMP/DG
<35    > LOSS= 1.026:   (   .555)       (   .397)       (   .074)      kW
TO NODE 36     .......:  18.51  -28.97   18.37 -147.93                  AMP/DG
<36    > LOSS=  .032:   (   .030)       (   .003)                       kW
TO NODE 40     .......: 108.64  -34.95  108.47 -155.43   98.12   86.58 AMP/DG
<40    > LOSS=  .482:   (   .246)       (   .126)       (   .110)      kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 36        VOLTS:    .995   -2.40   1.029 -121.36                  MAG/ANG
                -LD:      .00     .00     .00     .00                   kW/kVR
kVLL   4.160    CAP:            .00             .00                    kVR

FROM NODE 35    .....:   18.51  -28.98   18.37 -147.94                  AMP/DG
<36    > LOSS=  .032:   (   .030)       (   .003)                       kW
TO NODE 37     .......:  18.51  -28.98                                  AMP/DG
<37    > LOSS=  .026:   (   .026)                                       kW
TO NODE 38     .......:                  18.37 -147.94                  AMP/DG
<38    > LOSS=  .021:                   (   .021)                       kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 37        VOLTS:    .994   -2.41                                  MAG/ANG
                Y-LD:   39.55   19.77                                   kW/kVR
kVll   4.160    Y CAP:          .00                                    kVR

FROM NODE 36    .....:   18.51  -28.98                                  AMP/DG
<37    > LOSS=  .026:   (   .026)                                       kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 38        VOLTS:                   1.028 -121.37                  MAG/ANG
                Y-LD:                   20.56   10.28                   kW/kVR
kVll   4.160    Y CAP:                          .00                    kVR

FROM NODE 36    .....:                   18.37 -147.94                  AMP/DG
<38    > LOSS=  .021:                   (   .021)                       kW
TO NODE 39     .......:                   9.06 -147.94                  AMP/DG
<39    > LOSS=  .007:                   (   .007)                       kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 39        VOLTS:                   1.028 -121.38                  MAG/ANG
                Y-LD:                   20.00   10.00                   kW/kVR
kVll   4.160    Y CAP:                          .00                    kVR

FROM NODE 38    .....:                    9.06 -147.94                  AMP/DG
<39    > LOSS=  .007:                   (   .007)                       kW
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- R A D I A L   P O W E R   F L O W --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-----------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 40        VOLTS:    .994   -2.42  1.028 -121.36  1.010  118.72 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:             .00             .00             .00 kVR

FROM NODE 35    .....:  108.64  -34.95 108.47 -155.43  98.12   86.58 AMP/DG
<40    > LOSS=  .482:   (   .246)      (   .126)      (   .110)      kW
TO NODE 41    .......:                                  9.22   92.15 AMP/DG
<41    > LOSS=  .007:                                  (   .007)      kW
TO NODE 42    .......:  108.64  -34.95 108.47 -155.43  88.95   86.00 AMP/DG
<42    > LOSS=  .459:   (   .265)      (   .110)      (   .083)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 41        VOLTS:                                 1.010  118.71 MAG/ANG
                Y-LD:                                  20.00   10.00 kW/kVR
kVLL   4.160    Y CAP:                                         .00 kVR

FROM NODE 40    .....:                                  9.22   92.15 AMP/DG
<41    > LOSS=  .007:                                  (   .007)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 42        VOLTS:    .993   -2.45  1.027 -121.41  1.009  118.68 MAG/ANG
                Y-LD:   20.00   10.00   .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:           .00             .00             .00 kVR

FROM NODE 40    .....:  108.64  -34.95 108.47 -155.43  88.95   86.00 AMP/DG
<42    > LOSS=  .459:   (   .265)      (   .110)      (   .083)      kW
TO NODE 43    .......:                  19.10 -148.00                AMP/DG
<43    > LOSS=  .046:                  (   .046)                    kW
TO NODE 44    .......:   99.32  -35.51  89.57 -157.01  88.95   86.00 AMP/DG
<44    > LOSS=  .299:   (   .151)      (   .063)      (   .086)      kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 43        VOLTS:                  1.026 -121.43                MAG/ANG
                Y-LD:                   42.08   21.04                kW/kVR
kVll   4.160    Y CAP:                          .00                 kVR

FROM NODE 42    .....:                  19.10 -148.00                AMP/DG
<43    > LOSS=  .046:                  (   .046)                    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 44        VOLTS:    .992   -2.48  1.026 -121.44  1.008  118.65 MAG/ANG
                 -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:             .00             .00             .00 kVR

FROM NODE 42    .....:   99.32  -35.51  89.57 -157.01  88.95   86.00 AMP/DG
<44    > LOSS=  .299:   (   .151)      (   .063)      (   .086)      kW
TO NODE 45    .......:   18.71  -29.06                              AMP/DG
<45    > LOSS=  .018:   (   .018)                                  kW
TO NODE 47    .......:   80.76  -37.00  89.57 -157.01  88.95   86.00 AMP/DG
<47    > LOSS=  .327:   (   .125)      (   .117)      (   .085)      kW
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The Institute of Electrical and Electronics Engineers, Inc.

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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-----------------------------------------------------------------------------
   NODE        VALUE        PHASE A         PHASE B         PHASE C      UNT O/L<
                           (LINE A)        (LINE B)        (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 45        VOLTS:   .991   -2.49                                      MAG/ANG
                Y-LD:  19.83    9.91                                       kW/kVR
kVll   4.160    Y CAP:           .00                                       kVR

FROM NODE 44    .....:  18.71  -29.06                                      AMP/DG
<45    > LOSS=   .018:  (   .018)                                          kW
TO NODE 46    .......:   9.40  -29.06                                      AMP/DG
<46    > LOSS=   .007:  (   .007)                                          kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 46        VOLTS:   .991   -2.50                                      MAG/ANG
                Y-LD:  20.00   10.00                                       kW/kVR
kVll   4.160    Y CAP:           .00                                       kVR

FROM NODE 45    .....:   9.40  -29.06                                      AMP/DG
<46    > LOSS=   .007:  (   .007)                                          kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 47        VOLTS:   .991   -2.50  1.025 -121.47  1.007  118.61 MAG/ANG
                Y-LD:  34.68   24.77  35.88   25.63  35.26   25.18 kW/kVR
kVll   4.160    Y CAP:           .00           .00           .00 kVR

FROM NODE 44    .....:  80.76  -37.00  89.57 -157.01  88.95   86.00 AMP/DG
<47    > LOSS=   .327:  (   .125)     (   .117)     (   .085)   kW
TO NODE 48    .......:  35.48  -38.05  36.71 -157.01  36.07   83.06 AMP/DG
<48    > LOSS=   .034:  (   .012)     (   .015)     (   .007)   kW
TO NODE 49    .......:  27.40  -34.98  34.95 -157.01  35.15   90.51 AMP/DG
<49    > LOSS=   .047:  (   .010)     (   .030)     (   .007)   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 48        VOLTS:   .990   -2.51  1.025 -121.47  1.007  118.60 MAG/ANG
                Y-LD:  68.68   49.05  73.54   52.53  71.01   50.72 kW/kVR
kVll   4.160    Y CAP:           .00           .00           .00 kVR

FROM NODE 47    .....:  35.48  -38.05  36.71 -157.01  36.07   83.06 AMP/DG
<48    > LOSS=   .034:  (   .012)     (   .015)     (   .007)   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 49        VOLTS:   .991   -2.51  1.025 -121.48  1.007  118.58 MAG/ANG
                Y-LD:  35.00   25.00  70.00   50.00  35.00   20.00 kW/kVR
kVll   4.160    Y CAP:           .00           .00           .00 kVR

FROM NODE 47    .....:  27.40  -34.98  34.95 -157.01  35.15   90.51 AMP/DG
<49    > LOSS=   .047:  (   .010)     (   .030)     (   .007)   kW
TO NODE 50    .......:   9.40  -29.08    .00     .00  18.49   92.02 AMP/DG
<50    > LOSS=   .008:  (  -.002)     (   .000)     (   .010)   kW
```

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-  R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
----------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 50        VOLTS:    .990   -2.52   1.025 -121.47   1.007  118.57 MAG/ANG
                Y-LD:     .00     .00     .00     .00    40.00   20.00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 49    .....:   9.40  -29.08     .00     .00    18.49   92.01 AMP/DG
<50    > LOSS=  .008:   (  -.002)      (   .000)      (   .010)     kW
TO NODE 51      .......:  9.40  -29.08     .00     .00     .00     .00 AMP/DG
<51    > LOSS=  .002:   (   .002)      (   .000)      (   .000)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 51        VOLTS:    .990   -2.53   1.025 -121.47   1.007  118.58 MAG/ANG
                Y-LD:   20.00   10.00     .00     .00     .00     .00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 50    .....:   9.40  -29.09     .00     .00     .00     .00 AMP/DG
<51    > LOSS=  .002:   (   .002)      (   .000)      (   .000)     kW
TO NODE 151     .......:   .00     .00     .00     .00     .00     .00 AMP/DG
<151   > LOSS=  .000:   (   .000)      (   .000)      (   .001)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 151       VOLTS:    .990   -2.53   1.025 -121.47   1.007  118.58 MAG/ANG
                -LD:      .00     .00     .00     .00     .00     .00 kW/kVR
kVll   4.160     CAP:          .00             .00             .00 kVR

FROM NODE 51    .....:    .00     .00     .00     .00     .00     .00 AMP/DG
<151   > LOSS=  .000:   (   .000)      (   .000)      (   .001)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 19        VOLTS:    .998   -2.31                              MAG/ANG
                Y-LD:   40.00   20.00                               kW/kVR
kVll   4.160    Y CAP:          .00                                 kVR

FROM NODE 18    .....:  37.29  -28.89                               AMP/DG
<19    > LOSS=  .087:   (   .087)                                   kW
TO NODE 20      .......:  18.62  -28.89                             AMP/DG
<20    > LOSS=  .028:   (   .028)                                   kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 20        VOLTS:    .997   -2.33                              MAG/ANG
                Y-LD:   39.87   19.93                               kW/kVR
kVll   4.160    Y CAP:          .00                                 kVR

FROM NODE 19    .....:  18.62  -28.90                               AMP/DG
<20    > LOSS=  .028:   (   .028)                                   kW
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-  R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 21         VOLTS:    .998   -2.34  1.032 -121.22  1.011  118.81 MAG/ANG
                   -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:            .00              .00              .00 kVR

FROM NODE 18     .....:   55.80  -29.06  19.19 -147.80  55.41   92.21 AMP/DG
<21    > LOSS=  .125:   (   .011)       (  -.002)       (   .116)     kW
TO NODE 22    .......:                   19.19 -147.81                AMP/DG
<22    > LOSS=  .049:                   (   .049)                     kW
TO NODE 23    .......:   55.80  -29.06    .00     .00   55.41   92.21 AMP/DG
<23    > LOSS=  .112:   (  -.006)       (   .000)       (   .117)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 22         VOLTS:                  1.031 -121.25                MAG/ANG
                  Y-LD:                  42.48   21.24                kW/kVR
kVll   4.160     Y CAP:                          .00                  kVR

FROM NODE 21     .....:                  19.19 -147.81                AMP/DG
<22    > LOSS=  .049:                   (   .049)                     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 23         VOLTS:    .998   -2.39  1.032 -121.20  1.010  118.79 MAG/ANG
                   -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:            .00              .00              .00 kVR

FROM NODE 21     .....:   55.80  -29.06    .00     .00   55.41   92.21 AMP/DG
<23    > LOSS=  .112:   (  -.006)       (   .000)       (   .117)     kW
TO NODE 24    .......:                                   18.46   92.21 AMP/DG
<24    > LOSS=  .047:                                   (   .047)     kW
TO NODE 25    .......:   55.80  -29.06    .00     .00   36.95   92.21 AMP/DG
<25    > LOSS=  .091:   (   .021)       (   .000)       (   .070)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 24         VOLTS:                                  1.009  118.77 MAG/ANG
                  Y-LD:                                  40.00   20.00 kW/kVR
kVLL   4.160     Y CAP:                                          .00 kVR

FROM NODE 23     .....:                                  18.46   92.20 AMP/DG
<24    > LOSS=  .047:                                   (   .047)     kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 25         VOLTS:    .997   -2.45  1.033 -121.20  1.009  118.80 MAG/ANG
                   -LD:    .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160     CAP:            .00              .00              .00 kVR

FROM NODE 23     .....:   55.80  -29.06    .00     .00   36.95   92.21 AMP/DG
<25    > LOSS=  .091:   (   .021)       (   .000)       (   .070)     kW
TO NODE 28    .......:   37.18  -29.05    .00     .00   18.47   92.21 AMP/DG
<28    > LOSS=  .026:   (   .011)       (   .000)       (   .015)     kW
TO NODE RG3  .<VRG>.:   18.62  -29.08                   18.47   92.21 AMP/DG
<RG3   > LOSS=  .000:   (   .000)                       (   .000)     kW
```

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- R A D I A L   P O W E R   F L O W --- DATE: 6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
-----------------------------------------------------------------------------
    NODE        VALUE       PHASE A          PHASE B          PHASE C     UNT O/L<
                           (LINE A)         (LINE B)         (LINE C)       60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 28        VOLTS:   .997   -2.48  1.033 -121.19  1.009  118.80 MAG/ANG
                Y-LD:  39.87   19.94    .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 25    .....:  37.18  -29.05    .00     .00  18.47   92.21 AMP/DG
<28   > LOSS=  .026:   (   .011)       (   .000)       (   .015)    kW
TO NODE 29    .......:  18.56  -29.05    .00     .00  18.47   92.21 AMP/DG
<29   > LOSS=  .015:   (  -.001)       (   .000)       (   .015)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 29        VOLTS:   .997   -2.50  1.033 -121.19  1.008  118.79 MAG/ANG
                Y-LD:  39.73   19.87    .00     .00    .00     .00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 28    .....:  18.56  -29.06    .00     .00  18.47   92.21 AMP/DG
<29   > LOSS=  .015:   (  -.001)       (   .000)       (   .015)    kW
TO NODE 30    .......:    .00     .00    .00     .00  18.47   92.21 AMP/DG
<30   > LOSS=  .010:   (   .000)       (   .000)       (   .010)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 30        VOLTS:   .997   -2.50  1.033 -121.18  1.008  118.77 MAG/ANG
                Y-LD:    .00     .00    .00     .00  40.00   20.00 kW/kVR
kVll   4.160    Y CAP:          .00             .00             .00 kVR

FROM NODE 29    .....:    .00     .00    .00     .00  18.47   92.21 AMP/DG
<30   > LOSS=  .010:   (   .000)       (   .000)       (   .010)    kW
TO NODE 250   .......:    .00     .00    .00     .00    .00     .00 AMP/DG
<250  > LOSS=  .000:   (   .000)       (   .000)       (   .000)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 250       VOLTS:   .997   -2.50  1.033 -121.18  1.008  118.77 MAG/ANG
                -LD:     .00     .00    .00     .00    .00     .00 kW/kVR
kVll   4.160    CAP:            .00             .00             .00 kVR

FROM NODE 30    .....:    .00     .00    .00     .00    .00     .00 AMP/DG
<250  > LOSS=  .000:   (   .000)       (   .000)       (   .000)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: RG3       VOLTS:   .997   -2.45                 1.003  118.80 MAG/ANG
                -LD:     .00     .00                    .00     .00 kW/kVR
kVll   4.160    CAP:            .00                             .00 kVR

FROM NODE 25    <VRG>:  18.62  -29.08                 18.59   92.21 AMP/DG
<RG3  > LOSS=  .000:   (   .000)                      (   .000)    kW
TO NODE 26    .......:  18.62  -29.08                 18.59   92.21 AMP/DG
<26   > LOSS=  .017:   (   .001)                      (   .016)    kW
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- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
----------------------------------------------------------------------------
    NODE       VALUE        PHASE A          PHASE B         PHASE C      UNT O/L<
                           (LINE A)         (LINE B)        (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 26        VOLTS:    .997   -2.48                     1.002  118.79 MAG/ANG
                 -LD:     .00      .00                       .00      .00 kW/kVR
kVll   4.160    CAP:             .00                                .00 kVR

FROM NODE RG3   .....:   18.62  -29.08                    18.59   92.21 AMP/DG
<26    > LOSS=  .017:    (    .001)                       (    .016)    kW
TO NODE 27     .......:  18.62  -29.08                      .00      .00 AMP/DG
<27    > LOSS=  .008:    (    .009)                       (    .000)    kW
TO NODE 31     .......:                                   18.59   92.21 AMP/DG
<31    > LOSS=  .020:                                     (    .020)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 27        VOLTS:    .997   -2.49                     1.002  118.79 MAG/ANG
                 -LD:     .00      .00                       .00      .00 kW/kVR
kVll   4.160    CAP:             .00                                .00 kVR

FROM NODE 26    .....:   18.62  -29.08                      .00      .00 AMP/DG
<27    > LOSS=  .008:    (    .009)                       (    .000)    kW
TO NODE 33     .......:  18.62  -29.08                              AMP/DG
<33    > LOSS=  .044:    (    .044)                                 kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 33        VOLTS:    .995   -2.52                              MAG/ANG
                Y-LD:    39.81   19.91                              kW/kVR
kVll   4.160    Y CAP:           .00                                kVR

FROM NODE 27    .....:   18.62  -29.08                              AMP/DG
<33    > LOSS=  .044:    (    .044)                                 kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 31        VOLTS:                                     1.002  118.77 MAG/ANG
                Y-LD:                                      20.00   10.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 26    .....:                                    18.59   92.21 AMP/DG
<31    > LOSS=  .020:                                     (    .020)    kW
TO NODE 32     .......:                                    9.30   92.20 AMP/DG
<32    > LOSS=  .007:                                     (    .007)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 32        VOLTS:                                     1.001  118.77 MAG/ANG
                Y-LD:                                      20.00   10.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 31    .....:                                     9.30   92.20 AMP/DG
<32    > LOSS=  .007:                                     (    .007)    kW
```

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-  R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
------------------------------------------------------------------------------
    NODE        VALUE        PHASE A          PHASE B          PHASE C      UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 34        VOLTS:                                       1.019  118.88 MAG/ANG
                Y-LD:                                       41.51   20.75 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 13    .....:                                      46.42   92.30 AMP/DG
<34    > LOSS=  .081:                                       (   .081)    kW
TO NODE 15      .......:                                    27.45   92.30 AMP/DG
<15    > LOSS=  .019:                                       (   .019)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 15        VOLTS:                                       1.018  118.87 MAG/ANG
                -LD:                                          .00     .00 kW/kVR
kVLL   4.160     CAP:                                              .00 kVR

FROM NODE 34    .....:                                      27.45   92.30 AMP/DG
<15    > LOSS=  .019:                                       (   .019)    kW
TO NODE 16      .......:                                    18.30   92.29 AMP/DG
<16    > LOSS=  .032:                                       (   .032)    kW
TO NODE 17      .......:                                     9.15   92.30 AMP/DG
<17    > LOSS=  .007:                                       (   .007)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 16        VOLTS:                                       1.017  118.85 MAG/ANG
                Y-LD:                                       40.00   20.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 15    .....:                                      18.30   92.29 AMP/DG
<16    > LOSS=  .032:                                       (   .032)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 17        VOLTS:                                       1.018  118.86 MAG/ANG
                Y-LD:                                       20.00   10.00 kW/kVR
kVLL   4.160    Y CAP:                                              .00 kVR

FROM NODE 15    .....:                                       9.15   92.30 AMP/DG
<17    > LOSS=  .007:                                       (   .007)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 9         VOLTS:  1.014   -1.47                                     MAG/ANG
                Y-LD:  40.00   20.00                                      kW/kVR
kVll   4.160    Y CAP:           .00                                      kVR

FROM NODE 8     .....:  46.22  -28.05                                     AMP/DG
<9     > LOSS=  .122:  (   .122)                                          kW
TO NODE RG2  .<VRG>.:  27.86  -28.07                                      AMP/DG
<RG2   > LOSS=  .000:  (   .000)                                          kW
```

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```
- R A D I A L   P O W E R   F L O W  --- DATE:  6-24-2004 AT 16:54:45 HOURS ---
SUBSTATION:  IEEE 123;   FEEDER:  IEEE 123
--------------------------------------------------------------------------
    NODE        VALUE         PHASE A          PHASE B          PHASE C      UNT O/L<
                              (LINE A)         (LINE B)         (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: RG2       VOLTS:  1.008   -1.47                                       MAG/ANG
                 -LD:     .00     .00                                       kW/kVR
kVll   4.160     CAP:             .00                                       kVR

FROM NODE 9     <VRG>:  28.03  -28.07                                       AMP/DG
<RG2  > LOSS=  .000:   (   .000)                                            kW
TO NODE 14     .......:  28.03  -28.07                                      AMP/DG
<14   > LOSS=  .084:   (   .084)                                            kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 14        VOLTS:  1.006   -1.50                                       MAG/ANG
                 -LD:     .00     .00                                       kW/kVR
kVll   4.160     CAP:             .00                                       kVR

FROM NODE RG2   .....:  28.04  -28.07                                       AMP/DG
<14   > LOSS=  .084:   (   .084)                                            kW
TO NODE 10     .......:   9.31  -28.07                                      AMP/DG
<10   > LOSS=  .005:   (   .005)                                            kW
TO NODE 11     .......:  18.73  -28.07                                      AMP/DG
<11   > LOSS=  .022:   (   .022)                                            kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 10        VOLTS:  1.006   -1.50                                       MAG/ANG
                Y-LD:  20.12   10.06                                        kW/kVR
kVll   4.160    Y CAP:           .00                                        kVR

FROM NODE 14    .....:   9.31  -28.07                                       AMP/DG
<10   > LOSS=  .005:   (   .005)                                            kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 11        VOLTS:  1.006   -1.51                                       MAG/ANG
                Y-LD:  40.45   20.23                                        kW/kVR
kVll   4.160    Y CAP:           .00                                        kVR

FROM NODE 14    .....:  18.73  -28.08                                       AMP/DG
<11   > LOSS=  .022:   (   .022)                                            kW
```

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