IEEE POWER ENGINEERING SOCIETY
Power System Analysis, Computing and Economics Committee

Chair
MARTIN L. BAUGHMAN
Professor Emeritus
The University of Texas at Austin
5703 Painted Valley Drive
Austin, TX 78759
Vox: 512-345-8255
Fax: 512-345-9880
baughman@mail.utexas.edu

Vice Chair
CHEN-CHING LIU
Dept. of Electrical Eng.
University of Washington
Box 352500
Seattle, WA 98195
Vox: 206-543-2198
Fax: 206-543-3842
liu@ee.washington.edu

Secretary
ROGER C. DUGAN
Sr. Consultant
Electrotek Concepts, Inc.
408 N Cedar Bluff Rd
Knoxville, TN 37923
Vox: 865-470-9222
Fax: 865-470-9223
r.dugan@ieee.org

Subcommittee Chairs

Computer & Analytical Methods
EDWIN LIU, Chair
Nexant, Inc.
101, 2nd street, 11F
San Francisco CA 94105
Vox: 415-369-1088
Fax: 415-369-0894
exliu@nexant.com

Distribution Systems Analysis
SANDOVAL CARNEIRO, JR, Chair
Dept. of Electrical Engineering
Federal Univ. of Rio de Janeiro
Rio de Janeiro, RJ, Brazil
Vox: 55-21-25628025
Fax: 55-21-25628628
sandoval@coep.ufrj.br

Intelligent System Applications
DAGMAR NIEBUR, Chair
Department of ECE
Drexel University
3141 Chestnut Street
Philadelphia, PA 19104
Vox: (215) 895 6749
Fax: (215) 895 1695
niebur@cbis.ece.drexel.edu

Reliability, Risk & Probability Applications
JAMES D. MCCALLEY, Chair
Iowa State University
Room 2210 Coover Hall
Ames, Iowa 50011
Vox: 515-294-4844
Fax: 515-294-4263
jdm@iastate.edu

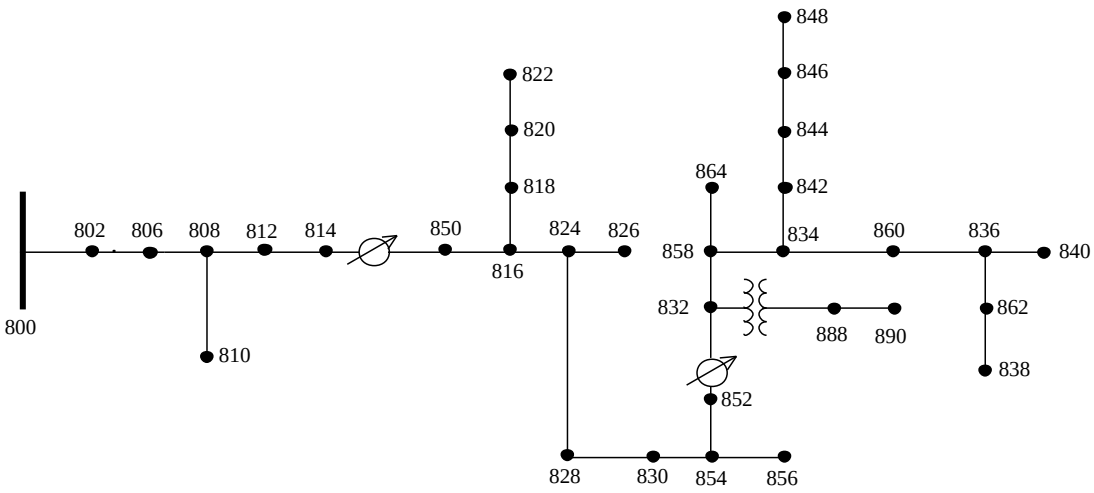
Systems Economics
ROSS BALDICK, Chair
ECE Dept. , ENS 502
The University of Texas at Austin
Austin, TX 78712
Vox: 512-471-5879
Fax: 512-471-5532
baldick@ece.utexas.edu

Past Chair
JOANN V. STARON
Nexant Inc/ PCA
1921 S. Alma School Road
Suite 207
Mesa, AZ 85210
Vox: 480-345-7600
Fax: 480-345-7601
joann.staron@pca-corp.com

Distribution System Analysis Subcommittee

IEEE 34 Node Test Feeder

IEEE 34 Node Test Feeder



Overhead Line Configurations (Config.)

Config.	Phasing	Phase ACSR	Neutral ACSR	Spacing ID
300	B A C N	1/0	1/0	500
301	B A C N	#2 6/1	#2 6/1	500
302	A N	#4 6/1	#4 6/1	510
303	B N	#4 6/1	#4 6/1	510
304	B N	#2 6/1	#2 6/1	510

Line Segment Data

Node A	Node B	Length(ft.)	Config.
800	802	2580	300
802	806	1730	300
806	808	32230	300
808	810	5804	303
808	812	37500	300
812	814	29730	300
814	850	10	301
816	818	1710	302
816	824	10210	301
818	820	48150	302
820	822	13740	302
824	826	3030	303
824	828	840	301
828	830	20440	301
830	854	520	301
832	858	4900	301
832	888	0	XFM-1
834	860	2020	301
834	842	280	301
836	840	860	301
836	862	280	301
842	844	1350	301
844	846	3640	301
846	848	530	301
850	816	310	301
852	832	10	301
854	856	23330	303
854	852	36830	301
858	864	1620	302
858	834	5830	301
860	836	2680	301
862	838	4860	304
888	890	10560	300

Transformer Data

	kVA	kV-high	kV-low	R - %	X - %
Substation:	2500	69 - D	24.9 -Gr. W	1	8
XFM -1	500	24.9 - Gr.W	4.16 - Gr. W	1.9	4.08

Spot Loads

Node	Load	Ph-1	Ph-1	Ph-2	Ph-2	Ph-3	Ph-4
	Model	kW	kVAr	kW	kVAr	kW	kVAr
860	Y-PQ	20	16	20	16	20	16
840	Y-I	9	7	9	7	9	7
844	Y-Z	135	105	135	105	135	105
848	D-PQ	20	16	20	16	20	16
890	D-I	150	75	150	75	150	75
830	D-Z	10	5	10	5	25	10
Total		344	224	344	224	359	229

Distributed Loads

Node	Node	Load	Ph-1	Ph-1	Ph-2	Ph-2	Ph-3	Ph-3
A	B	Model	kW	kVAr	kW	kVAr	kW	kVAr
802	806	Y-PQ	0	0	30	15	25	14
808	810	Y-I	0	0	16	8	0	0
818	820	Y-Z	34	17	0	0	0	0
820	822	Y-PQ	135	70	0	0	0	0
816	824	D-I	0	0	5	2	0	0
824	826	Y-I	0	0	40	20	0	0
824	828	Y-PQ	0	0	0	0	4	2
828	830	Y-PQ	7	3	0	0	0	0
854	856	Y-PQ	0	0	4	2	0	0
832	858	D-Z	7	3	2	1	6	3
858	864	Y-PQ	2	1	0	0	0	0
858	834	D-PQ	4	2	15	8	13	7
834	860	D-Z	16	8	20	10	110	55
860	836	D-PQ	30	15	10	6	42	22
836	840	D-I	18	9	22	11	0	0
862	838	Y-PQ	0	0	28	14	0	0
842	844	Y-PQ	9	5	0	0	0	0
844	846	Y-PQ	0	0	25	12	20	11
846	848	Y-PQ	0	0	23	11	0	0
Total			262	133	240	120	220	114

Shunt Capacitors

Node	Ph-A kVAr	Ph-B kVAr	Ph-C kVAr
844	100	100	100
848	150	150	150
Total	250	250	250

Regulator Data

Regulator ID:	1		
Line Segment:	814 - 850		
Location:	814		
Phases:	A - B -C		
Connection:	3-Ph,LG		
Monitoring Phase:	A-B-C		
Bandwidth:	2.0 volts		
PT Ratio:	120		
Primary CT Rating:	100		
Compensator Settings:	Ph-A	Ph-B	Ph-C
R - Setting:	2.7	2.7	2.7
X - Setting:	1.6	1.6	1.6
Volltage Level:	122	122	122

Regulator ID:	2		
Line Segment:	852 - 832		
Location:	852		
Phases:	A - B -C		
Connection:	3-Ph,LG		
Monitoring Phase:	A-B-C		
Bandwidth:	2.0 volts		
PT Ratio:	120		
Primary CT Rating:	100		
Compensator Settings:	Ph-A	Ph-B	Ph-C
R - Setting:	2.5	2.5	2.5
X - Setting:	1.5	1.5	1.5
Volltage Level:	124	124	124

IEEE 34 Node Test Feeder

Impedances

Configuration 300:

--------- Z & B Matrices Before Changes ---------

```
           Z (R +jX) in ohms per mile
 1.3368  1.3343   0.2101  0.5779   0.2130  0.5015
                  1.3238  1.3569   0.2066  0.4591
                                   1.3294  1.3471
          B in micro Siemens per mile
            5.3350   -1.5313   -0.9943
                      5.0979   -0.6212
                                4.8880
```

Configuration 301:

```
           Z (R +jX) in ohms per mile
 1.9300  1.4115   0.2327  0.6442   0.2359  0.5691
                  1.9157  1.4281   0.2288  0.5238
                                   1.9219  1.4209
          B in micro Siemens per mile
            5.1207   -1.4364   -0.9402
                      4.9055   -0.5951
                                4.7154
```

Configuration 302:

```
           Z (R +jX) in ohms per mile
 2.7995  1.4855   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
            4.2251    0.0000    0.0000
                      0.0000    0.0000
                                0.0000
```

Configuration 303:

```
           Z (R +jX) in ohms per mile
 0.0000  0.0000   0.0000  0.0000   0.0000  0.0000
                  2.7995  1.4855   0.0000  0.0000
                                   0.0000  0.0000
          B in micro Siemens per mile
            0.0000    0.0000    0.0000
                      4.2251    0.0000
                                0.0000
```

Configuration 304:

```
           Z (R +jX) in ohms per mile
0.0000  0.0000   0.0000  0.0000   0.0000  0.0000
                 1.9217  1.4212   0.0000  0.0000
                                  0.0000  0.0000
         B in micro Siemens per mile
           0.0000    0.0000    0.0000
                     4.3637    0.0000
                               0.0000
```

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 16:34:11 HOURS --
-
 SUBSTATION:  IEEE 34;   FEEDER:  IEEE 34
 ------------------------------------------------------------------------------
-
 SYSTEM        PHASE             PHASE             PHASE             TOTAL
 INPUT -------(A)-------|-------(B)-------|-------(C)-------|------------------
 kW   :       759.136   |       666.663   |       617.072   |      2042.872
 kVAr :       171.727   |        90.137   |        28.394   |       290.258
 kVA  :       778.318   |       672.729   |       617.725   |      2063.389
 PF   :        .9754    |        .9910    |        .9989    |        .9901

 LOAD  --(A-N)----(A-B)-|--(B-N)----(B-C)-|--(C-N)----(C-A)-|---WYE-----DELTA--
 kW   :   359.9    246.4|   339.3    243.3|   221.8    359.0|   921.0    848.8
  TOT :       606.322   |       582.662   |       580.840   |      1769.824
                        |                 |                 |
 kVAr :   230.9    128.7|   216.9    128.7|   161.8    184.6|   609.6    441.9
  TOT :       359.531   |       345.609   |       346.407   |      1051.547
                        |                 |                 |
 kVA  :   427.6    278.0|   402.7    275.3|   274.6    403.7|  1104.5    957.0
  TOT :       704.903   |       677.452   |       676.293   |      2058.647
                        |                 |                 |
 PF   :   .8417    .8864|   .8425    .8840|   .8078    .8894|   .8339    .8870
  TOT :        .8601    |        .8601    |        .8589    |        .8597

 LOSSES ------(A)-------|-------(B)-------|-------(C)-------|------------------
 kW   :       114.836   |        80.389   |        77.824   |       273.049
 kVAr :        14.200   |        10.989   |         9.810   |        34.999
 kVA  :       115.711   |        81.137   |        78.440   |       275.283

 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:   265.7       .0|   264.8       .0|   265.9       .0|   796.3       .0
  TOT :       265.658   |       264.760   |       265.869   |       796.287
```

--- **V O L T A G E P R O F I L E** ---- DATE: 6-24-2004 AT 16:34:18 HOURS ----
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	MAG ANGLE A-N	MAG ANGLE B-N	MAG ANGLE C-N	mi.to SR
800	1.0500 at .00	1.0500 at -120.00	1.0500 at 120.00	.000
802	1.0475 at -.05	1.0484 at -120.07	1.0484 at 119.95	.489
806	1.0457 at -.08	1.0474 at -120.11	1.0474 at 119.92	.816
808	1.0136 at -.75	1.0296 at -120.95	1.0289 at 119.30	6.920
810		1.0294 at -120.95		8.020
812	.9763 at -1.57	1.0100 at -121.92	1.0069 at 118.59	14.023
814	.9467 at -2.26	.9945 at -122.70	.9893 at 118.01	19.653
RG10	1.0177 at -2.26	1.0255 at -122.70	1.0203 at 118.01	19.654
850	1.0176 at -2.26	1.0255 at -122.70	1.0203 at 118.01	19.655
816	1.0172 at -2.26	1.0253 at -122.71	1.0200 at 118.01	19.714
818	1.0163 at -2.27			20.038
820	.9926 at -2.32			29.157
822	.9895 at -2.33			31.760
824	1.0082 at -2.37	1.0158 at -122.94	1.0116 at 117.76	21.648
826		1.0156 at -122.94		22.222
828	1.0074 at -2.38	1.0151 at -122.95	1.0109 at 117.75	21.807
830	.9894 at -2.63	.9982 at -123.39	.9938 at 117.25	25.678
854	.9890 at -2.64	.9978 at -123.40	.9934 at 117.24	25.777
852	.9581 at -3.11	.9680 at -124.18	.9637 at 116.33	32.752
RG11	1.0359 at -3.11	1.0345 at -124.18	1.0360 at 116.33	32.752
832	1.0359 at -3.11	1.0345 at -124.18	1.0360 at 116.33	32.754
858	1.0336 at -3.17	1.0322 at -124.28	1.0338 at 116.22	33.682
834	1.0309 at -3.24	1.0295 at -124.39	1.0313 at 116.09	34.786
842	1.0309 at -3.25	1.0294 at -124.39	1.0313 at 116.09	34.839
844	1.0307 at -3.27	1.0291 at -124.42	1.0311 at 116.06	35.095
846	1.0309 at -3.32	1.0291 at -124.46	1.0313 at 116.01	35.784
848	1.0310 at -3.32	1.0291 at -124.47	1.0314 at 116.00	35.885
860	1.0305 at -3.24	1.0291 at -124.39	1.0310 at 116.09	35.169
836	1.0303 at -3.23	1.0287 at -124.39	1.0308 at 116.09	35.677
840	1.0303 at -3.23	1.0287 at -124.39	1.0308 at 116.09	35.839
862	1.0303 at -3.23	1.0287 at -124.39	1.0308 at 116.09	35.730
838		1.0285 at -124.39		36.650
864	1.0336 at -3.17			33.989
XF10	.9997 at -4.63	.9983 at -125.73	1.0000 at 114.82	32.754
888	.9996 at -4.64	.9983 at -125.73	1.0000 at 114.82	32.754
890	.9167 at -5.19	.9235 at -126.78	.9177 at 113.98	34.754
856		.9977 at -123.41		30.195

---------- **VOLTAGE REGULATOR DATA** ---- DATE: 6-24-2004 AT 16:34:22 HOURS --
SUBSTATION: IEEE 34; FEEDER: IEEE 34

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
814	RG10	850	850	Phase A & B & C, Wye	RX	2.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		122.000	2.700	1.600	120.00	100.00	12
2		122.000	2.700	1.600	120.00	100.00	5
3		122.000	2.700	1.600	120.00	100.00	5

[NODE]	[VREG]	[SEG]	[NODE]	MODEL	OPT	BNDW
852	RG11	832	832	Phase A & B & C, Wye	RX	2.00

PHASE	LDCTR	VOLT HOLD	R-VOLT	X-VOLT	PT RATIO	CT RATE	TAP
1		124.000	2.500	1.500	120.00	100.00	13
2		124.000	2.500	1.500	120.00	100.00	11
3		124.000	2.500	1.500	120.00	100.00	12

```
- R A D I A L   P O W E R   F L O W  ---  DATE:  6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION:  IEEE 34;   FEEDER:  IEEE 34
-------------------------------------------------------------------------------
   NODE      VALUE         PHASE A         PHASE B         PHASE C     UNT O/L<
                           (LINE A)        (LINE B)        (LINE C)        60.%
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 800       VOLTS:   1.050     .00   1.050 -120.00   1.050  120.00 MAG/ANG
kVll  24.900           NO LOAD OR CAPACITOR REPRESENTED AT SOURCE NODE

TO NODE 802   .......:   51.56  -12.74   44.57 -127.70   40.92  117.37 AMP/DG
<802   > LOSS=  3.472:    (  1.637)       (   .978)       (   .858)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 802       VOLTS:   1.047    -.05   1.048 -120.07   1.048  119.95 MAG/ANG
                 -LD:     .00     .00     .00     .00     .00     .00 kW/kVR
kVll  24.900     CAP:             .00             .00             .00 kVR

FROM NODE 800   .....:   51.58  -12.80   44.57 -127.76   40.93  117.31 AMP/DG
<802   > LOSS=  3.472:    (  1.637)       (   .978)       (   .858)    kW
TO NODE 806   .......:   51.58  -12.80   44.57 -127.76   40.93  117.31 AMP/DG
<806   > LOSS=  2.272:    (  1.102)       (   .618)       (   .552)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 806       VOLTS:   1.046    -.08   1.047 -120.11   1.047  119.92 MAG/ANG
                 -LD:     .00     .00     .00     .00     .00     .00 kW/kVR
kVll  24.900     CAP:             .00             .00             .00 kVR

FROM NODE 802   .....:   51.59  -12.83   42.47 -126.83   39.24  118.52 AMP/DG
<806   > LOSS=  2.272:    (  1.102)       (   .618)       (   .552)    kW
TO NODE 808   .......:   51.59  -12.83   42.47 -126.83   39.24  118.52 AMP/DG
<808   > LOSS= 41.339:    ( 20.677)       ( 10.780)       (  9.882)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 808       VOLTS:   1.014    -.75   1.030 -120.95   1.029  119.30 MAG/ANG
                 -LD:     .00     .00     .00     .00     .00     .00 kW/kVR
kVll  24.900     CAP:             .00             .00             .00 kVR

FROM NODE 806   .....:   51.76  -13.47   42.46 -127.59   39.28  117.76 AMP/DG
<808   > LOSS= 41.339:    ( 20.677)       ( 10.780)       (  9.882)    kW
TO NODE 810   .......:                    1.22 -144.62                 AMP/DG
<810   > LOSS=   .002:                    (   .002)                    kW
TO NODE 812   .......:   51.76  -13.47   41.30 -127.10   39.28  117.76 AMP/DG
<812   > LOSS= 47.531:    ( 24.126)       ( 11.644)       ( 11.761)    kW
---------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 810       VOLTS:                   1.029 -120.95                 MAG/ANG
                 -LD:                      .00     .00                 kW/kVR
kVll  24.900     CAP:                              .00                 kVR

FROM NODE 808   .....:                     .00     .00                 AMP/DG
<810   > LOSS=   .002:                    (   .002)                    kW
```

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)		PHASE B (LINE B)		PHASE C (LINE C)		UNT O/L< 60.%
NODE: 812	VOLTS:	.976	-1.57	1.010	-121.92	1.007	118.59	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 808 ....:		51.95	-14.18	41.29	-127.99	39.33	116.90	AMP/DG
<812 > LOSS= 47.531:		(24.126)		(11.644)		(11.761)		kW
TO NODE 814 .....:		51.95	-14.18	41.29	-127.99	39.33	116.90	AMP/DG
<814 > LOSS= 37.790:		(19.245)		(9.140)		(9.404)		kW
NODE: 814	VOLTS:	.947	-2.26	.994	-122.70	.989	118.01	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 812 ....:		52.10	-14.73	41.29	-128.69	39.37	116.23	AMP/DG
<814 > LOSS= 37.790:		(19.245)		(9.140)		(9.404)		kW
TO NODE RG10 .<VRG>.:		52.10	-14.73	41.29	-128.69	39.37	116.23	AMP/DG
<RG10 > LOSS= .000:		(.000)		(.000)		(.000)		kW
NODE: RG10	VOLTS:	1.018	-2.26	1.026	-122.70	1.020	118.01	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 814 <VRG>:		48.47	-14.73	40.04	-128.69	38.17	116.23	AMP/DG
<RG10 > LOSS= .000:		(.000)		(.000)		(.000)		kW
TO NODE 850 .....:		48.47	-14.73	40.04	-128.69	38.17	116.23	AMP/DG
<850 > LOSS= .017:		(.008)		(.005)		(.005)		kW
NODE: 850	VOLTS:	1.018	-2.26	1.026	-122.70	1.020	118.01	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE RG10 .....:		48.47	-14.73	40.04	-128.69	38.17	116.23	AMP/DG
<850 > LOSS= .017:		(.008)		(.005)		(.005)		kW
TO NODE 816 .....:		48.47	-14.73	40.04	-128.69	38.17	116.23	AMP/DG
<816 > LOSS= .538:		(.254)		(.145)		(.139)		kW
NODE: 816	VOLTS:	1.017	-2.26	1.025	-122.71	1.020	118.01	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 850 .....:		48.47	-14.74	40.04	-128.70	38.17	116.23	AMP/DG
<816 > LOSS= .538:		(.254)		(.145)		(.139)		kW
TO NODE 818 .....:		13.02	-26.69					AMP/DG
<818 > LOSS= .154:		(.154)						kW
TO NODE 824 .....:		35.83	-10.42	40.04	-128.70	38.17	116.23	AMP/DG
<824 > LOSS= 14.181:		(4.312)		(5.444)		(4.425)		kW

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)	PHASE B (LINE B)	PHASE C (LINE C)	UNT O/L< 60.%
NODE: 818	VOLTS:	1.016 -2.27			MAG/ANG
	-LD:	.00 .00			kW/kVR
kVll 24.900	CAP:	.00			kVR
FROM NODE 816	:	13.03 -26.77			AMP/DG
<818 > LOSS= .154	:	(.154)			kW
TO NODE 820	:	13.03 -26.77			AMP/DG
<820 > LOSS= 3.614	:	(3.614)			kW
NODE: 820	VOLTS:	.993 -2.32			MAG/ANG
	-LD:	.00 .00			kW/kVR
kVll 24.900	CAP:	.00			kVR
FROM NODE 818	:	10.62 -28.98			AMP/DG
<820 > LOSS= 3.614	:	(3.614)			kW
TO NODE 822	:	10.62 -28.98			AMP/DG
<822 > LOSS= .413	:	(.413)			kW
NODE: 822	VOLTS:	.990 -2.33			MAG/ANG
	-LD:	.00 .00			kW/kVR
kVll 24.900	CAP:	.00			kVR
FROM NODE 820	:	.00 .00			AMP/DG
<822 > LOSS= .413	:	(.413)			kW
NODE: 824	VOLTS:	1.008 -2.37	1.016 -122.94	1.012 117.76	MAG/ANG
	-LD:	.00 .00	.00 .00	.00 .00	kW/kVR
kVll 24.900	CAP:	.00	.00	.00	kVR
FROM NODE 816	:	35.87 -10.70	39.82 -129.02	38.05 116.25	AMP/DG
<824 > LOSS= 14.181	:	(4.312)	(5.444)	(4.425)	kW
TO NODE 826	:		3.10 -148.92		AMP/DG
<826 > LOSS= .008	:		(.008)		kW
TO NODE 828	:	35.87 -10.70	36.93 -127.39	38.05 116.25	AMP/DG
<828 > LOSS= 1.108	:	(.361)	(.393)	(.354)	kW
NODE: 826	VOLTS:		1.016 -122.94		MAG/ANG
	-LD:		.00 .00		kW/kVR
kVll 24.900	CAP:		.00		kVR
FROM NODE 824	:		.00 .00		AMP/DG
<826 > LOSS= .008	:		(.008)		kW

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)	PHASE B (LINE B)	PHASE C (LINE C)	UNT O/L< 60.%
NODE: 828	VOLTS:	1.007 -2.38	1.015 -122.95	1.011 117.75	MAG/ANG
	-LD:	.00 .00	.00 .00	.00 .00	kW/kVR
kVll 24.900	CAP:	.00	.00	.00	kVR
FROM NODE 824	.....:	35.87 -10.72	36.93 -127.41	37.77 116.42	AMP/DG
<828 > LOSS= 1.108:		(.361)	(.393)	(.354)	kW
TO NODE 830	.....:	35.87 -10.72	36.93 -127.41	37.77 116.42	AMP/DG
<830 > LOSS= 26.587:		(8.443)	(9.214)	(8.930)	kW
NODE: 830	VOLTS:	.989 -2.63	.998 -123.39	.994 117.25	MAG/ANG
	D-LD:	9.95 4.98	9.86 4.93	24.55 9.82	kW/kVR
kVll 24.900	Y CAP:	.00	.00	.00	kVR
FROM NODE 828	.....:	35.43 -11.06	36.91 -127.92	37.79 115.96	AMP/DG
<830 > LOSS= 26.587:		(8.443)	(9.214)	(8.930)	kW
TO NODE 854	.....:	34.22 -9.97	36.19 -127.47	36.49 116.26	AMP/DG
<854 > LOSS= .635:		(.197)	(.227)	(.211)	kW
NODE: 854	VOLTS:	.989 -2.64	.998 -123.40	.993 117.24	MAG/ANG
	-LD:	.00 .00	.00 .00	.00 .00	kW/kVR
kVll 24.900	CAP:	.00	.00	.00	kVR
FROM NODE 830	.....:	34.23 -9.99	36.19 -127.48	36.49 116.25	AMP/DG
<854 > LOSS= .635:		(.197)	(.227)	(.211)	kW
TO NODE 852	.....:	34.23 -9.99	35.93 -127.72	36.49 116.25	AMP/DG
<852 > LOSS= 44.798:		(13.996)	(15.778)	(15.023)	kW
TO NODE 856	.....:		.31 -98.70		AMP/DG
<856 > LOSS= .001:			(.001)		kW
NODE: 852	VOLTS:	.958 -3.11	.968 -124.18	.964 116.33	MAG/ANG
	-LD:	.00 .00	.00 .00	.00 .00	kW/kVR
kVll 24.900	CAP:	.00	.00	.00	kVR
FROM NODE 854	.....:	34.35 -11.00	35.90 -128.66	36.52 115.41	AMP/DG
<852 > LOSS= 44.798:		(13.996)	(15.778)	(15.023)	kW
TO NODE RG11	.<VRG>.:	34.35 -11.00	35.90 -128.66	36.52 115.41	AMP/DG
<RG11 > LOSS= .000:		(.000)	(.000)	(.000)	kW
NODE: RG11	VOLTS:	1.036 -3.11	1.035 -124.18	1.036 116.33	MAG/ANG
	-LD:	.00 .00	.00 .00	.00 .00	kW/kVR
kVll 24.900	CAP:	.00	.00	.00	kVR
FROM NODE 852	<VRG>:	31.77 -11.00	33.59 -128.66	33.98 115.41	AMP/DG
<RG11 > LOSS= .000:		(.000)	(.000)	(.000)	kW
TO NODE 832	.....:	31.77 -11.00	33.59 -128.66	33.98 115.41	AMP/DG
<832 > LOSS= .011:		(.003)	(.004)	(.004)	kW

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)		PHASE B (LINE B)		PHASE C (LINE C)		UNT	O/L< 60.%
NODE: 832	VOLTS:	1.036	-3.11	1.035	-124.18	1.036	116.33	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 24.900	CAP:		.00		.00		.00	kVR	
FROM NODE RG11	:	31.77	-11.00	33.59	-128.66	33.98	115.41	AMP/DG	
<832 > LOSS= .011:		(.003)		(.004)		(.004)		kW	
TO NODE 858	:	21.31	.47	23.40	-116.89	24.34	128.36	AMP/DG	
<858 > LOSS= 2.467:		(.643)		(.997)		(.827)		kW	
TO NODE XF10	:	11.68	-32.29	11.70	-152.73	11.61	87.39	AMP/DG	<
<XF10 > LOSS= 9.625:		(3.196)		(3.241)		(3.187)		kW	
NODE: 858	VOLTS:	1.034	-3.17	1.032	-124.28	1.034	116.22	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 24.900	CAP:		.00		.00		.00	kVR	
FROM NODE 832	:	20.86	.86	23.13	-116.39	24.02	128.48	AMP/DG	
<858 > LOSS= 2.467:		(.643)		(.997)		(.827)		kW	
TO NODE 834	:	20.73	1.01	23.13	-116.39	24.02	128.48	AMP/DG	
<834 > LOSS= 2.798:		(.717)		(1.145)		(.936)		kW	
TO NODE 864	:	.14	-22.82					AMP/DG	
<864 > LOSS= .000:		(.000)						kW	
NODE: 834	VOLTS:	1.031	-3.24	1.029	-124.39	1.031	116.09	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 24.900	CAP:		.00		.00		.00	kVR	
FROM NODE 858	:	20.29	2.18	22.37	-116.07	23.23	130.06	AMP/DG	
<834 > LOSS= 2.798:		(.717)		(1.145)		(.936)		kW	
TO NODE 842	:	14.75	34.68	16.30	-95.63	15.12	151.05	AMP/DG	
<842 > LOSS= .064:		(.015)		(.032)		(.017)		kW	
TO NODE 860	:	11.16	-43.05	9.09	-154.82	10.60	99.34	AMP/DG	
<860 > LOSS= .141:		(.021)		(.104)		(.017)		kW	
NODE: 842	VOLTS:	1.031	-3.25	1.029	-124.39	1.031	116.09	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 24.900	CAP:		.00		.00		.00	kVR	
FROM NODE 834	:	14.74	34.67	16.30	-95.64	15.12	151.03	AMP/DG	
<842 > LOSS= .064:		(.015)		(.032)		(.017)		kW	
TO NODE 844	:	14.74	34.67	16.30	-95.64	15.12	151.03	AMP/DG	
<844 > LOSS= .306:		(.068)		(.156)		(.083)		kW	

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)		PHASE B (LINE B)		PHASE C (LINE C)		UNT O/L< 60.%
NODE: 844	VOLTS:	1.031	-3.27	1.029	-124.42	1.031	116.06	MAG/ANG
	Y-LD:	143.41	111.54	142.97	111.20	143.51	111.62	kW/kVR
kVll 24.900	Y CAP:		106.23		105.90		106.31	kVR
FROM NODE 842 ....:		14.47	37.12	16.29	-95.71	15.11	150.97	AMP/DG
<844 > LOSS= .306:		(.068)		(.156)		(.083)		kW
TO NODE 846 .....:		9.83	78.88	9.40	-63.87	9.40	-170.67	AMP/DG
<846 > LOSS= .323:		(.043)		(.212)		(.068)		kW
NODE: 846	VOLTS:	1.031	-3.32	1.029	-124.46	1.031	116.01	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 844 ....:		9.76	78.80	9.40	-52.54	9.78	-161.93	AMP/DG
<846 > LOSS= .323:		(.043)		(.212)		(.068)		kW
TO NODE 848 .....:		9.76	78.80	9.40	-52.54	9.78	-161.93	AMP/DG
<848 > LOSS= .048:		(.007)		(.031)		(.010)		kW
NODE: 848	VOLTS:	1.031	-3.32	1.029	-124.47	1.031	116.00	MAG/ANG
	D-LD:	20.00	16.00	20.00	16.00	20.00	16.00	kW/kVR
kVll 24.900	Y CAP:		159.43		158.86		159.56	kVR
FROM NODE 846 ....:		9.76	78.79	9.77	-42.47	9.78	-161.94	AMP/DG
<848 > LOSS= .048:		(.007)		(.031)		(.010)		kW
NODE: 860	VOLTS:	1.030	-3.24	1.029	-124.39	1.031	116.09	MAG/ANG
	Y-LD:	20.00	16.00	20.00	16.00	20.00	16.00	kW/kVR
kVll 24.900	Y CAP:		.00		.00		.00	kVR
FROM NODE 834 ....:		5.87	-33.62	7.68	-156.52	5.29	86.10	AMP/DG
<860 > LOSS= .141:		(.021)		(.104)		(.017)		kW
TO NODE 836 .....:		4.16	-30.19	5.96	-154.63	3.60	90.25	AMP/DG
<836 > LOSS= .039:		(-.035)		(.103)		(-.028)		kW
NODE: 836	VOLTS:	1.030	-3.23	1.029	-124.39	1.031	116.09	MAG/ANG
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR
kVll 24.900	CAP:		.00		.00		.00	kVR
FROM NODE 860 ....:		1.49	-19.83	4.42	-150.74	1.74	68.08	AMP/DG
<836 > LOSS= .039:		(-.035)		(.103)		(-.028)		kW
TO NODE 840 .....:		1.50	-20.01	2.33	-151.97	1.75	68.00	AMP/DG
<840 > LOSS= .002:		(-.014)		(.026)		(-.010)		kW
TO NODE 862 .....:		.00	.00	2.09	-149.38	.00	.00	AMP/DG
<862 > LOSS= .000:		(-.005)		(.009)		(-.004)		kW

- **R A D I A L P O W E R F L O W** --- DATE: 6-24-2004 AT 16:34:32 HOURS ---
SUBSTATION: IEEE 34; FEEDER: IEEE 34

NODE	VALUE	PHASE A (LINE A)		PHASE B (LINE B)		PHASE C (LINE C)		UNT	O/L< 60.%
NODE: 840	VOLTS:	1.030	-3.23	1.029	-124.39	1.031	116.09	MAG/ANG	
	Y-LD:	9.27	7.21	9.26	7.20	9.28	7.22	kW/kVR	
kVll 24.900	Y CAP:		.00		.00		.00	kVR	
FROM NODE 836	.....:	.79	-41.11	.79	-162.26	.79	78.21	AMP/DG	
<840 > LOSS=	.002:	(-.014)		(.026)		(-.010)		kW	
NODE: 862	VOLTS:	1.030	-3.23	1.029	-124.39	1.031	116.09	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 24.900	CAP:		.00		.00		.00	kVR	
FROM NODE 836	.....:	.00	.00	2.09	-149.50	.00	.00	AMP/DG	
<862 > LOSS=	.000:	(-.005)		(.009)		(-.004)		kW	
TO NODE 838	.....:			2.09	-149.50			AMP/DG	
<838 > LOSS=	.004:			(.004)				kW	
NODE: 838	VOLTS:			1.029	-124.39			MAG/ANG	
	-LD:			.00	.00			kW/kVR	
kVll 24.900	CAP:				.00			kVR	
FROM NODE 862	.....:			.00	.00			AMP/DG	
<838 > LOSS=	.004:			(.004)				kW	
NODE: 864	VOLTS:	1.034	-3.17					MAG/ANG	
	-LD:	.00	.00					kW/kVR	
kVll 24.900	CAP:		.00					kVR	
FROM NODE 858	.....:	.00	.00					AMP/DG	
<864 > LOSS=	.000:	(.000)						kW	
NODE: XF10	VOLTS:	1.000	-4.63	.998	-125.73	1.000	114.82	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 4.160	CAP:		.00		.00		.00	kVR	
FROM NODE 832	.....:	69.90	-32.29	70.04	-152.73	69.50	87.39	AMP/DG	<
<XF10 > LOSS=	9.625:	(3.196)		(3.241)		(3.187)		kW	
TO NODE 888	.....:	69.90	-32.29	70.04	-152.73	69.50	87.39	AMP/DG	
<888 > LOSS=	.000:	(.000)		(.000)		(.000)		kW	
NODE: 888	VOLTS:	1.000	-4.64	.998	-125.73	1.000	114.82	MAG/ANG	
	-LD:	.00	.00	.00	.00	.00	.00	kW/kVR	
kVll 4.160	CAP:		.00		.00		.00	kVR	
FROM NODE XF10	.....:	69.90	-32.29	70.04	-152.73	69.50	87.39	AMP/DG	
<888 > LOSS=	.000:	(.000)		(.000)		(.000)		kW	
TO NODE 890	.....:	69.90	-32.29	70.04	-152.73	69.50	87.39	AMP/DG	
<890 > LOSS=	32.760:	(11.638)		(9.950)		(11.173)		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 16:34:32 HOURS ---
SUBSTATION:  IEEE 34;   FEEDER:  IEEE 34
-------------------------------------------------------------------------------
   NODE      VALUE          PHASE A          PHASE B          PHASE C     UNT O/L<
                            (LINE A)         (LINE B)         (LINE C)        60.%
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 890       VOLTS:    .917   -5.19    .924 -126.78    .918  113.98 MAG/ANG
                 D-LD:  139.11   69.55  137.56   68.78  137.01   68.50 kW/kVR
kVll   4.160    Y CAP:             .00             .00             .00 kVR

FROM NODE 888   .....:   69.91  -32.31   70.05 -152.75   69.51   87.37 AMP/DG
<890   > LOSS= 32.760:    ( 11.638)       (  9.950)       ( 11.173)    kW
--------------------*--------A-------*-------B-------*-------C-------*--------
NODE: 856       VOLTS:                    .998 -123.41                 MAG/ANG
                  -LD:                     .00     .00                 kW/kVR
kVll  24.900      CAP:                             .00                 kVR

FROM NODE 854   .....:                     .00     .00                 AMP/DG
<856   > LOSS=   .001:                   (   .001)                     kW
```