

# APPENDICES

## NATIONAL SUDANESE GRID DATA

### Appendix (A) Bus Data

Bus number	Type*	Pg	Qg	Pd	Qd	Bs	Base
		MW	MVAr	MW	MVAr	MVAr	KV
1	3	0	0	0	0	-125	500
2	1	0	0	0	0	-125	500
3	1	0	0	0	0	-250	500
4	1	0	0	0	0	0	500
5	1	0	0	14.36	11.483	-30	220
6	1	0	0	0	0	-40	220
7	1	0	0	33.456	23.961	0	220
8	1	0	0	0	0	0	220
9	1	0	0	50.32	46.148	0	220
10	1	0	0	29.808	20.496	0	220
11	1	0	0	0	0	0	220
12	1	0	0	101.338	70.734	0	220
13	1	0	0	33.264	20.615	0	220
14	1	0	0	0	0	0	220
15	1	0	0	0	0	0	220
16	1	0	0	0	0	0	220
17	1	0	0	13.574	8.661	0	220
18	2	186	0	0	0	0	220
19	1	0	0	0	0	0	220
20	1	0	0	60.883	37.732	0	220
21	1	0	0	0	0	0	220
22	1	0	0	0	0	0	220
23	1	0	0	14.112	8.746	0	220
24	1	0	0	0	0	0	220
25	1	0	0	0	0	0	220
26	1	0	0	0	0	0	220
27	1	0	0	6.989	25.534	0	220
28	2	85	0	46.704	32.357	0	220
29	1	0	0	16.464	8.842	0	220
30	1	0	0	12.029	5.585	0	220
31	2	148	0	8.333	5.76	-15	220
32	1	0	0	0.403	22.385	0	220
33	1	0	0	1.546	0.958	0	220
34	1	0	0	19.757	31.778	0	220
35	1	0	0	3.629	25.117	0	220
36	1	0	0	1.008	5.56	0	220
37	1	0	0	6.25	3.939	0	220
38	1	0	0	3.36	23.764	0	220
39	1	0	0	6.72	4.568	-15	220
40	1	0	0	3.36	2.503	0	220
41	1	0	0	0	0	-30	220

42	1	0	0	0	0	0	220
43	1	0	0	0.672	12.515	0	220
44	1	0	0	12.029	8.021	0	220
45	1	0	0	0	0	0	220
46	1	0	0	16.666	10.678	0	220
47	1	0	0	0	0	0	220
48	1	0	0	0	0	0	220
49	2	38	0	0	0	-30	220
50	1	0	0	81.917	53.127	0	110
51	1	0	0	68.006	39.992	0	110
52	1	0	0	41.328	17.854	0	110
53	2	76	0	0	0	0	110
54	1	0	0	44.621	20.718	0	110
55	1	0	0	74.189	46.562	0	110
56	1	0	0	12.634	8.128	15	110
57	1	0	0	50.266	33.255	0	110
58	1	0	0	17.203	8.477	0	110
59	1	0	0	40.387	18.165	0	110
60	1	0	0	85.344	58.018	0	110
61	1	0	0	64.915	40.06	0	110
62	1	0	0	75.466	42.566	0	110
63	1	0	0	59.069	30.588	0	110
64	1	0	0	81.312	54.43	0	110
65	1	0	0	0	0	0	110
66	1	0	0	0	0	0	110
67	1	0	0	36.49	24.236	0	110
68	1	0	0	0	0	0	110
69	1	0	0	0	0	0	110
70	1	0	0	24.73	12.738	0	110
71	1	0	0	11.088	5.864	0	110
72	1	0	0	27.821	14.253	0	110
73	1	0	0	56.717	26.986	0	110
74	1	0	0	10.886	4.058	0	110
75	1	0	0	0.336	1.476	0	110
76	1	0	0	0	0	0	110
77	1	0	0	7.594	4.037	0	110
78	2	7	0	4.704	2.238	0	110
79	1	0	0	14.381	9.552	0	110
80	1	0	0	11.021	6.539	0	110
81	1	0	0	18.614	12.315	0	110
82	2	2	0	15.254	8.604	0	66

\*1 = PQ, 2 = PV, 3 = Slack, Base MVA=1000.

## Appendix (B) Line Data

From bus	To bus	R	X	B	rating	ratio
		p.u.	p.u.	p.u.	MVA	
67	69	0.086281	0.10438	9.81E-05	93.5	1
6	5	0.283781	1.279132	4.07E-02	213.84	1
11	10	0.054252	0.287679	4.74E-03	187	1
9	7	0.218861	1.16054	1.91E-02	187	1
12	13	0.096901	0.436777	5.56E-02	213.84	1
10	7	0.218421	1.158209	1.91E-02	187	1
11	8	0.272988	1.447553	2.38E-02	187	1
9	6	0.114897	0.461302	6.59E-02	275	1
9	8	0.218861	1.16054	1.91E-02	187	1
2	1	0.02651	0.261317	2.43E-01	1064	1
1	3	0.019376	0.190992	7.11E-01	1064	1
4	3	0.004122	0.040627	3.78E-02	1064	1
13	17	0.079597	0.319576	4.57E-02	275	1
18	17	0.003461	0.013895	1.99E-03	275	1
16	19	0.020764	0.093595	1.19E-02	213.84	1
52	51	0.030455	0.122273	1.09E-03	137.5	1
54	50	0.00886	0.03557	3.18E-04	137.5	1
53	52	0.033223	0.133388	1.19E-03	137.5	1
55	56	0.022149	0.088926	7.94E-04	137.5	1
54	53	0.00714	0.056157	3.25E-04	132	1
53	55	0.033223	0.133388	1.19E-03	137.5	1
14	20	0.014535	0.058357	8.34E-03	275	1
59	58	0.030455	0.122273	1.09E-03	137.5	1
58	57	0.03876	0.15562	1.39E-03	137.5	1
59	54	0.052488	0.228653	1.05E-03	85.8	1
59	60	0.008306	0.033347	2.98E-04	137.5	1
60	61	0.021595	0.086702	7.74E-04	137.5	1
61	62	0.030455	0.122273	1.09E-03	137.5	1
62	63	0.010521	0.04224	3.77E-04	137.5	1
64	63	0.016335	0.065583	5.86E-04	137.5	1
56	64	0.025748	0.10376	9.23E-04	137.5	1
65	63	0.045682	0.183409	1.64E-03	137.5	1
21	24	0.007851	0.041632	2.74E-03	187	1
24	23	0.025909	0.137386	9.05E-03	187	1
68	67	0.517686	0.626281	5.88E-04	31.57	1
59	68	0.287603	0.347934	3.27E-04	31.57	1
61	66	0.107975	0.433512	3.87E-03	137.5	1
23	22	0.024917	0.100041	1.43E-02	275	1
23	25	0.067521	0.358037	2.36E-02	187	1
69	71	2.214545	2.679091	2.52E-03	31.57	1
71	70	0.013843	0.055579	4.96E-04	137.5	1
71	72	0.041529	0.166736	1.49E-03	137.5	1
71	73	1.581818	1.913636	1.80E-03	31.57	1
22	27	0.10223	0.410447	5.87E-02	275	1
27	28	0.074198	0.297901	4.26E-02	275	1
25	26	0.043182	0.228977	1.51E-02	187	1
74	73	0.566653	1.559645	2.40E-03	55	1
26	29	0.06595	0.349711	2.30E-02	187	1
73	77	1.006612	1.217769	1.14E-03	31.57	1
77	78	1.72562	2.087603	1.96E-03	31.57	1
76	78	0.287603	0.347934	3.27E-04	31.57	1

75	76	2.760992	3.340165	3.14E-03	31.57	1
78	79	1.984463	2.400744	2.26E-03	31.57	1
73	80	2.041983	2.470331	2.32E-03	31.57	1
29	30	0.039256	0.208161	1.37E-02	187	1
30	31	0.139752	0.741054	4.88E-02	187	1
31	32	0.096901	0.38905	5.56E-02	275	1
30	33	0.062293	0.250103	3.57E-02	275	1
28	36	0.076829	0.308461	4.41E-02	275	1
35	34	0.174421	0.700289	2.50E-02	275	1
34	37	0.123202	0.494649	1.77E-02	275	1
37	38	0.091364	0.366818	1.31E-02	275	1
38	39	0.164731	0.661384	2.36E-02	275	1
39	40	0.10936	0.43907	1.57E-02	275	1
36	35	0.054195	0.21759	3.11E-02	275	1
28	32	0.11282	0.452965	6.47E-02	275	1
33	41	0.069215	0.277893	3.97E-02	275	1
42	46	0.065754	0.263998	3.77E-02	275	1
41	43	0.005707	0.022912	3.27E-03	275	1
43	42	0.04845	0.194525	2.78E-02	275	1
42	44	0.033825	0.135806	1.94E-02	275	1
46	45	0.030288	0.121606	1.74E-02	275	1
14	47	0.006229	0.02501	3.57E-03	275	1
47	15	0.01938	0.07781	1.11E-02	275	1
16	17	0.026302	0.105599	1.51E-02	275	1
43	48	0.01938	0.07781	1.11E-02	275	1
18	19	0.041529	0.166736	2.38E-02	275	1
19	21	0.00969	0.038905	5.56E-03	275	1
41	49	0.134277	0.539112	7.71E-02	275	1
81	80	4.400331	5.019917	5.21E-03	40.7	1
22	15	0.01938	0.087355	1.11E-02	213.84	1
25	70	0	0.511333	0	300	0.905
59	21	0	0.596	0	300	0.922
52	19	0	0.643333	0	450	0.905
12	2	0	0.393333	0	600	0.905
16	4	0	0.56	0	600	0.915
3	14	0	0.56	0	900	0.911
41	81	0	1.2	0	200	0.975
42	82	0	1.253	0	200	0.905
26	73	0	0.7045	0	200	0.918
69	23	0	1.34	0	150	0.905
29	76	0	1.424545	0	110	0.945
56	20	0	0.844667	0	450	0.975
15	65	0	0.858	0	300	0.925
1	11	0	0.243778	0	900	0.967
22	66	0	0.866667	0	150	0.913

## Appendix (C) Transformers Data

From bus	To bus	Name	Type	Ur1 kV	Ur2 kV	Sr MVA	Tap
1	11	MWP3TR6	3-Phase	500	205	900	0
12	2	ATB TR	3-Phase	220	500	600	0
16	4	KAB3 TR	3-Phase	220	500	600	0
52	19	IBA 3TR	3-Phase	110	220	450	0
3	14	MRK 3TR	3-Phase	500	220	900	0
56	20	MHD TR	3-Phase	110	220	450	0
59	21	KLX TR	3-Phase	110	220	300	0
15	65	GAM TR	3-Phase	220	110	300	0
66	22	MRK 3TR	3-Phase	220	110	150	0
69	23	GAD TR	3-Phase	110	220	150	0
26	73	MAR TR	3-Phase	220	110	200	0
29	76	SNJ TR	3-Phase	220	110	110	0
25	70	NHAS TR	3-Phase	220	110	300	0
41	81	GDF TR	3-Phase	225	104	200	0
42	82	GRB TR	3-Phase	220	66	200	0