

Japan International Cooperation Agency (JICA)

**Ministry of Energy and Mineral Resources (MEMR),
The Republic of Indonesia**

**Study on The Optimal Electric Power
Development and Operation
in Indonesia**

**FINAL REPORT
(Attachment)**

August, 2002

**Chubu Electric Power Co., INC.
The Institute of Energy Economics, Japan**

MPN

JR

02-131

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Tables and Figures on Transmission Planning and System Analysis

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Table A-8.1.1 Data of Generators No.1

Power Station	No.	Data of Step-Up Transformers					Data of Generators								Note
		V(kV) primary	Capacity (MVA)	X (%)	X (%)	Note	Capacity (MW)	Capacity (MVA)	Xu' (%)	Xu'' (%)	Xs' (%)	Xs'' (%)	H (G+T) (s)		
				1000MVAbase	M base										
Muara Tawar	11	500	190	71.05	13.50		140	210	29.60	21.40	26.60	17.40	5.91	Grati-GT Data	
Muara Tawar	12	500	190	71.05	13.50		140	210	29.60	21.40	26.60	17.40	5.91	Grati-GT Data	
Muara Tawar	13	500	190	65.79	12.50		140	210	29.60	21.40	26.60	17.40	5.91	Grati-GT Data	
Muara Tawar	10	500	305	49.18	15.00		210	287.875	28.50	22.30	25.70	18.00	4.96	Grati-ST Data	
Muara Tawar	21	500	190	71.05	13.50		140	210	29.60	21.40	26.60	17.40	5.91	Grati-GT Data	
Muara Tawar	22	500	190	71.05	13.50		140	210	29.60	21.40	26.60	17.40	5.91	Grati-GT Data	
Suralaya	1	500	470	25.53	12.00	Mistubishi Data	400.35	471			29.40	25.20	3.45	Mistubishi Data	
Suralaya	2	500	470	25.53	12.00	Mistubishi Data	400.35	471			29.70	26.00	3.45	Mistubishi Data	
Suralaya	3	500	470	25.53	12.00	Mistubishi Data	400.35	471			31.90	26.10	3.45	Mistubishi Data	
Suralaya	4	500	470	25.53	12.00	Mistubishi Data	400.35	471			31.60	26.80	3.45	Mistubishi Data	
Suralaya	5	500	767	16.95	13.00	Mistubishi Data	651.95	767			26.40	21.80	2.80	Mistubishi Data	
Suralaya	6	500	767	16.95	13.00	Mistubishi Data	651.95	767			26.40	21.80	2.80	Mistubishi Data	
Suralaya	7	500	767	16.95	13.00	Mistubishi Data	651.95	767			26.40	21.80	2.80	Mistubishi Data	
Cirata	1	500	140	92.59	12.96		126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	2	500	140	92.59	12.96		126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	3	500	140	92.59	12.96		126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	4	500	140	92.59	12.96		126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	5	500	140	92.59	12.96	Cirata 1-4	126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	6	500	140	92.59	12.96	Cirata 1-4	126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	7	500	140	92.59	12.96	Cirata 1-4	126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Cirata	8	500	140	92.59	12.96	Cirata 1-4	126	140	30.00	23.00	30.00	23.00	3.45	Standard Data	
Saguling	1	500	206	87.38	18.00		175	206.1	30.00	23.00	30.00	23.00	4.00	Standard Data	
Saguling	2	500	206	87.38	18.00		175	206.1	30.00	23.00	30.00	23.00	4.00	Standard Data	
Saguling	3	500	206	87.38	18.00		175	206.1	30.00	23.00	30.00	23.00	4.00	Standard Data	
Saguling	4	500	206	87.38	18.00		175	206.1	30.00	23.00	30.00	23.00	4.00	Standard Data	
Grati	11	500	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Grati	12	500	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Grati	13	500	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Grati	10	500	250	40.00	10.00		160	251.8	28.50	22.30	25.70	18.00	3.50	Mitsubishi Data	
Grati	21	150	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Grati	22	150	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Grati	23	150	154	64.94	10.00		101	153.8	29.60	21.40	26.60	17.40	3.95	Mitsubishi Data	
Gresik	1	150	125	80.00	10.00		100	125	27.30	20.00	24.00	15.00	3.00	Toshiba Data	
Gresik	2	150	125	80.00	10.00		100	125	27.30	20.00	24.00	15.00	3.00	Toshiba Data	
Gresik	3	150	250	40.00	10.00		200	250	30.80	25.60	27.10	19.20	3.00	Toshiba Data	
Gresik	4	150	250	40.00	10.00		200	250	30.80	25.60	27.10	19.20	3.24	Toshiba Data	
Gresik	11	150	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	12	150	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	13	150	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	10	150	250	40.00	10.00		189	251.75	28.50	22.30	25.70	18.00	3.50	Grati-ST Data	
Gresik	21	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	22	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	23	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	20	500	250	40.00	10.00		189	251.75	28.50	22.30	25.70	18.00	3.50	Grati-ST Data	
Gresik	31	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	32	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	33	500	153	65.36	10.00		113	153.75	29.60	21.40	26.60	17.40	3.95	Grati-GT Data	
Gresik	30	500	250	40.00	10.00		189	251.75	28.50	22.30	25.70	18.00	3.50	Grati-ST Data	
Paiton	1	500	471	21.23	10.00		400	473	32.60	27.50	30.40	24.40	3.45	Toshiba Data	
Paiton	2	500	471	21.23	10.00		400	473	32.60	27.50	30.40	24.40	3.45	Toshiba Data	
Paiton	5	500	468	21.37	10.00		615	846.231	24.50	19.50	22.00	15.50	2.77	Paiton7.8 Data	
Paiton	6	500	468	21.37	10.00		615	846.231	24.50	19.50	22.00	15.50	2.77	Paiton7.8 Data	
Paiton	7	500	468	21.37	10.00	HITACHI Data	610	846.231	24.50	19.50	22.00	15.50	2.77	GE Data	
Paiton	8	500	468	21.37	10.00	HITACHI Data	610	846.231	24.50	19.50	22.00	15.50	2.77	GE Data	

Table A-8.1.2 Data of Generators No.2

Power Station	No.	Data of Step-Up Transformers					Data of Generators							
		V(kV) primary	Capacity (MVA)	X (%) 1000MVAbase	X (%) M base	Note	Capacity (MW)	Capacity (MVA)	Xu' (%)	Xu'' (%)	Xs' (%)	Xs'' (%)	H (G+T) (s)	Note
Tambak Lorok	1	150	67.2	148.81	10.00		50	62.5	21.60	12.40	21.60	12.40	2.06	Muara Karang 1G Data
Tambak Lorok	2	150	67.2	148.81	10.00		50	62.5	21.60	12.40	21.60	12.40	2.06	Muara Karang 1G Data
Tambak Lorok	3	150	268.8	43.90	11.80		200	250	28.00	21.60	28.00	21.60	3.24	Muara Karang 4G Data
Tambak Lorok	11	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	12	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	13	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	10	150	250	43.60	10.90		185	237.5	28.50	22.30	25.70	18.00	5.72	Grati-ST Data
Tambak Lorok	21	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	22	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	23	150	145	75.86	11.00		110	143.4	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Tambak Lorok	20	150	250	43.60	10.90		185	237.5	28.50	22.30	25.70	18.00	5.72	Grati-ST Data
Muara Karan	1	150	125	104.20	13.03		100	125			21.60	12.40	3.25	Mitsubishi Data
Muara Karan	2	150	125	104.20	13.03		100	125			21.60	12.40	3.25	Mitsubishi Data
Muara Karan	3	150	125	104.20	13.03		100	125			21.60	12.40	3.25	Mitsubishi Data
Muara Karan	4	150	250	56.00	14.00	Mistubishi Data	200	250			28.00	21.60	3.24	Mitsubishi Data
Muara Karan	5	150	250	56.00	14.00	Mistubishi Data	200	250			28.00	21.60	3.24	Mitsubishi Data
Muara Karan	11	150	125	85.68	10.71		108	142	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Muara Karan	12	150	125	85.68	10.71		108	142	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Muara Karan	13	150	125	85.68	10.71		108	142	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Muara Karan	10	150	188	53.19	10.00		185	237.5	28.50	22.30	25.70	18.00	5.72	Grati-ST Data
Tanjung Priok	3	150	60	255.25	15.32		50	62.5	28.50	22.30	25.70	18.00	4.00	Muara Karang 1G Data
Tanjung Priok	4	150	60	255.25	15.32		50	62.5	28.50	22.30	25.70	18.00	4.00	Muara Karang 1G Data
Tanjung Priok	11	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	12	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	13	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	10	150	251	54.14	13.59		200	223	28.50	22.30	25.70	18.00	3.50	Grati-ST Data
Tanjung Priok	21	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	22	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	23	150	177	88.24	15.62		130	210	29.60	21.40	26.60	17.40	3.95	Grati-GT Data
Tanjung Priok	20	150	251	54.14	13.59		200	223	28.50	22.30	25.70	18.00	3.50	Grati-ST Data
Tanjung Juti B	1	500	468	21.37	10.00	Paiton7.8	660	846.231	24.50	19.50	22.00	15.50	2.77	Paiton7.8
Tanjung Juti B	2	500	468	21.37	10.00	Paiton7.8	660	846.231	24.50	19.50	22.00	15.50	2.77	Paiton7.8
Muara Karan	21	150	300	33.33	10.00		250	300	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Muara Karan	22	150	300	33.33	10.00		250	300	29.60	21.40	26.60	17.40	6.34	Grati-GT Data
Muara Tawar	23	500	190	71.05	13.50	Muara Tawar 22	140	210	29.60	21.40	26.60	17.40	5.91	Muara Tawar 22
Muara Tawar	20	500	305	49.18	15.00	Muara Tawar 10	210	287.875	28.50	22.30	25.70	18.00	4.96	Muara Tawar 10
Muara Tawar	31	500	300	46.67	14.00		250	300	29.60	21.40	26.60	17.40	5.91	Grati-GT Data
Muara Tawar	32	500	300	46.67	14.00		250	300	29.60	21.40	26.60	17.40	5.91	Grati-GT Data
Muara Tawar	30	500	300	46.67	14.00		250	300	28.50	22.30	25.70	18.00	4.96	Grati-ST Data
Muara Tawar	41	500	300	46.67	14.00		250	300	29.60	21.40	26.60	17.40	5.91	Grati-GT Data
Muara Tawar	42	500	300	46.67	14.00		250	300	29.60	21.40	26.60	17.40	5.91	Grati-GT Data
Muara Tawar	40	500	300	46.67	14.00		250	300	28.50	22.30	25.70	18.00	4.96	Grati-ST Data
Upper Cisokan	1	500	300	46.67	14.00		250	300	30.00	23.00	30.00	23.00	4.00	Standard Data
Upper Cisokan	2	500	300	46.67	14.00		250	300	30.00	23.00	30.00	23.00	4.00	Standard Data
Upper Cisokan	3	500	300	46.67	14.00		250	300	30.00	23.00	30.00	23.00	4.00	Standard Data
Upper Cisokan	4	500	300	46.67	14.00		250	300	30.00	23.00	30.00	23.00	4.00	Standard Data
NEW Coal-Fired		500	720	19.44	14.00		600	720	24.50	19.50	22.00	15.50	2.77	Paiton7.8
NEW CC(GT)		500	180	77.78	14.00		150	180	29.60	21.40	26.60	17.40	5.91	Grati-GT Data
NEW CC(ST)		500	180	77.78	14.00		150	180	28.50	22.30	25.70	18.00	4.96	Grati-ST Data

Table A-8.2.1 Data of Transmission lines (500kV) No.1

1000 MVA Base														
From	To	Number of cct	Voltage (kV)	Conductors per phase (mm ²)	Code Name	Length (km)	R (Ohm/km)	X (Ohm/km)	B (μ S/km)	%R (%)	%X (%)	%Y (%)	Amps.	Thermal Capacity (MVA)
Cibinong	Saguling	2	500	4X337.8	GANNET	80.35	0.0251	0.2808	4.0490	0.804	9.023	8.131	2500	2165
Cirata	Cibatu	2	500	4X337.8	GANNET	46.76	0.0251	0.2808	4.0490	0.468	5.251	4.732	2500	2165
Gandul	Kembangan	2	500	4X337.8	GANNET	30.14	0.0251	0.2808	4.0490	0.301	3.385	3.050	2500	2165
Grati	Paiton	2	500	4X337.8	GANNET	88.83	0.0251	0.2808	4.0490	0.888	9.976	8.990	2500	2165
Krian	Grati	2	500	4X337.8	GANNET	79.41	0.0251	0.2808	4.0490	0.794	8.918	8.036	2500	2165
Saguling	BandungSel	2	500	4X337.8	GANNET	37.51	0.0251	0.2808	4.0490	0.375	4.212	3.796	2500	2165
Suralaya	CilegonBaru	2	500	4X337.8	GANNET	12.48	0.0251	0.2808	4.0490	0.125	1.402	1.263	2500	2165
BandungSel	Cirebon	1	500	4X282	DOVE	85.30	0.0293	0.2815	4.0320	0.998	9.605	8.598	2000	1732
BandungSel	Ungaran	1	500	4X282	DOVE	342.80	0.0293	0.2815	4.0320	4.011	38.599	34.554	2000	1732
Cirebon	Ungaran	1	500	4X282	DOVE	257.50	0.0293	0.2815	4.0320	3.013	28.995	25.956	2000	1732
Cawang	Bekasi	1	500	4X282	DOVE	16.80	0.0293	0.2815	4.0320	0.197	1.892	1.693	2000	1732
Cawang	Cibinong	1	500	4X282	DOVE	54.50	0.0293	0.2815	4.0320	0.638	6.137	5.494	2000	1732
Cibinong	Bekasi	1	500	4X282	DOVE	37.92	0.0293	0.2815	4.0320	0.444	4.270	3.822	2000	1732
CilegonBaru	Cibinong	1	500	4X282	DOVE	130.80	0.0293	0.2815	4.0320	1.530	14.728	13.185	2000	1732
Gandul	Cibinong	2	500	4X282	DOVE	21.30	0.0293	0.2815	4.0320	0.249	2.398	2.147	2000	1732
Krian	Gresik	2	500	4X282	DOVE	23.90	0.0293	0.2815	4.0320	0.280	2.691	2.409	2000	1732
Muara Tawar	Cibatu	2	500	4X282	DOVE	48.16	0.0293	0.2815	4.0320	0.563	5.423	4.855	2000	1732
Saguling	Cirata	2	500	4X282	DOVE	25.17	0.0293	0.2815	4.0320	0.294	2.834	2.537	2000	1732
Suralaya	Gandul	2	500	4X282	DOVE	111.00	0.0293	0.2815	4.0320	1.299	12.499	11.189	2000	1732
Ungaran	Krian	2	500	4X282	DOVE	251.10	0.0293	0.2815	4.0320	2.938	28.274	25.311	2000	1732
Ungaran	Klaten	1	500	4X282	DOVE	75.00	0.0293	0.2815	4.0320	0.878	8.445	7.560	2000	1732
Paiton	Kediri	2	500	4X337.8	GANNET	200.00	0.0251	0.2808	4.0490	2.000	22.460	20.240	2500	2165
Kediri	Klaten	2	500	4X337.8	GANNET	202.81	0.0251	0.2808	4.0490	2.028	22.775	20.524	2500	2165
Klaten	Tasikmalaya	2	500	4X337.8	GANNET	306.00	0.0251	0.2808	4.0490	3.060	34.364	30.967	2500	2165
Tasikmalaya	Depok	2	500	4X337.8	GANNET	272.00	0.0251	0.2808	4.0490	2.720	30.546	27.526	2500	2165
Gandul	Depok	2	500	4X282	DOVE	15.00	0.0293	0.2815	4.0320	0.176	1.689	1.512	2000	1732
Depok	Cibinong	2	500	4X282	DOVE	15.00	0.0293	0.2815	4.0320	0.176	1.689	1.512	2000	1732
Tanjung Juti B	Ungaran	2	500	4X337.8	GANNET	145.00	0.0251	0.2808	4.0490	1.450	16.284	14.674	2500	2165
Tanjung Juti B	Purwodadi (A31)	2	500	4X337.8	GANNET	90.00	0.0251	0.2808	4.0490	0.900	10.107	9.108	2500	2165
Purwodadi (A31)	Ungaran	2	500	4X282	DOVE	55.00	0.0293	0.2815	4.0320	0.644	6.193	5.544	2000	1732
Purwodadi (A31)	Krian	2	500	4X282	DOVE	196.10	0.0293	0.2815	4.0320	2.294	22.081	19.767	2000	1732
Tanjung Juti B	Ungaran	1	500			145.00				1.54	16.30	14.65		
Tanjung Juti B	Krian	1	500			286.10				3.19	32.19	28.87		
Grati	SurabayaSel	2	500	4X282	DOVE	65.00	0.0293	0.2815	4.0320	0.761	7.319	6.552	2000	1732
Nimbang	Krian	1	500	4X282	DOVE	30.00	0.0293	0.2815	4.0320	0.351	3.378	3.024	2000	1732
Ungaran	Nimbang	1	500	4X282	DOVE	230.00	0.0293	0.2815	4.0320	2.691	25.898	23.184	2000	1732
Purwodadi	Nimbang	1	500	4X282	DOVE	175.00	0.0293	0.2815	4.0320	2.048	19.705	17.640	2000	1732
Paiton	Kapal	2	500	4X282	DOVE	240.00	0.0293	0.2815	4.0320	2.808	27.024	24.192	2000	1732
Suralaya	Balaraja	2	500	4X282	DOVE	55.50	0.0293	0.2815	4.0320	0.649	6.249	5.594	2000	1732
Balaraja	Gandul	2	500	4X282	DOVE	55.50	0.0293	0.2815	4.0320	0.649	6.249	5.594	2000	1732

Table A-8.2.2 Data of Transmission lines (500kV) No.2

1000 MVA Base														
From	To	Number of cct	Voltage (kV)	Conductors per phase (mm ²)	Code Name	Length (km)	R (Ohm/km)	X (Ohm/km)	B (μ S/km)	%R (%)	%X (%)	%Y (%)	Amps.	Thermal Capacity (MVA)
Muara Tawar	Bekasi	1	500	4X282	DOVE	53.00	0.0293	0.2815	4.0320	0.620	5.968	5.342	2000	1732
Muara Tawar	Cibinong	1	500	4X282	DOVE	64.92	0.0293	0.2815	4.0320	0.760	7.310	6.544	2000	1732
Muara Tawar	Tambun	2	500	4X337.8	GANNET	40.00	0.0251	0.2808	4.0490	0.400	4.492	4.048	2500	2165
Cibinong	Tambun	2	500	4X282	DOVE	24.92	0.0293	0.2815	4.0320	0.292	2.806	2.512	2000	1732
Cawang	Tambun	1	500	4X282	DOVE	29.58	0.0293	0.2815	4.0320	0.346	3.331	2.982	2000	1732
Bekasi	Tambun	1	500	4X282	DOVE	13.00	0.0293	0.2815	4.0320	0.152	1.464	1.310	2000	1732
Upper Cisokan	Cibinong	1	500	4X337.8	GANNET	91.00	0.0251	0.2808	4.0490	0.910	10.219	9.209	2500	2165
Upper Cisokan	Saguling	1	500	4X337.8	GANNET	20.00	0.0251	0.2808	4.0490	0.200	2.246	2.024	2500	2165
Upper Cisokan	Depok	1	500	4X337.8	GANNET	155.00	0.0251	0.2808	4.0490	1.550	17.407	15.686	2500	2165
Upper Cisokan	Tasikmalaya	1	500	4X337.8	GANNET	145.00	0.0251	0.2808	4.0490	1.450	16.284	14.674	2500	2165
Klaten	Rawalo	2	500	4X337.8	GANNET	195.00	0.0251	0.2808	4.0490	1.950	21.899	19.734	2500	2165
Rawalo	Tasikmalaya	2	500	4X337.8	GANNET	111.00	0.0251	0.2808	4.0490	1.110	12.465	11.233	2500	2165
Gandul	A11	1	500	4X337.8	GANNET	15.07	0.0251	0.2808	4.0490	0.151	1.692	1.525	2500	2165
A11	Kembangan	1	500	4X337.8	GANNET	15.07	0.0251	0.2808	4.0490	0.151	1.692	1.525	2500	2165
Suralaya	Balaraja	2	500	4X282	DOVE	55.50	0.0293	0.2815	4.0320	0.649	6.249	5.594	2000	1732
BandungSel	A21	1	500	4X282	DOVE	30.00	0.0293	0.2815	4.0320	0.351	3.378	3.024	2000	1732
A21	Cirebon	1	500	4X282	DOVE	55.30	0.0293	0.2815	4.0320	0.647	6.227	5.574	2000	1732
Upper Cisokan	A22	1	500	4X337.8	GANNET	80.00	0.0251	0.2808	4.0490	0.800	8.984	8.096	2500	2165
Depok	A22	1	500	4X337.8	GANNET	207.00	0.0251	0.2808	4.0490	2.070	23.246	20.948	2500	2165
Tasikmalaya	A22	1	500	4X337.8	GANNET	65.00	0.0251	0.2808	4.0490	0.650	7.300	6.578	2500	2165
ST11,ST15	Depok3	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165
ST12	CilegonBaru	2	500	4X337.8	GANNET	10.00	0.0251	0.2808	4.0490	0.100	1.123	1.012	2500	2165
ST13	Gandul	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165
ST14	Cibinong	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165
ST21	Tasikmalaya	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST22	Cirebon	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST23	A22	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST31	Purwodadi (A31)	2	500	4X337.8	GANNET	90.00	0.0251	0.2808	4.0490	0.900	10.107	9.108	2500	2165
CC31	Ungaran	2	500	4X337.8	GANNET	20.00	0.0251	0.2808	4.0490	0.200	2.246	2.024	2500	2165
ST32	Rawalo	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST33	Klaten	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST41	Paiton	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165
ST42 (CC41)	Grati	2	500	4X337.8	GANNET	10.00	0.0251	0.2808	4.0490	0.100	1.123	1.012	2500	2165
ST43	Ngimbang	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
ST44	Kediri	2	500	4X337.8	GANNET	50.00	0.0251	0.2808	4.0490	0.500	5.615	5.060	2500	2165
Paiton	A41	2	500	4X337.8	GANNET	200.00	0.0251	0.2808	4.0490	2.000	22.460	20.240	2500	2165
A41	Klaten	2	500	4X337.8	GANNET	203.00	0.0251	0.2808	4.0490	2.030	22.797	20.544	2500	2165
Klaten	A23	2	500	4X337.8	GANNET	306.00	0.0251	0.2808	4.0490	3.060	34.364	30.967	2500	2165
A23	Saguling	2	500	4X337.8	GANNET	145.00	0.0251	0.2808	4.0490	1.450	16.284	14.674	2500	2165
ST22	A23	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165
ST44	A41	2	500	4X337.8	GANNET	100.00	0.0251	0.2808	4.0490	1.000	11.230	10.120	2500	2165

Table A-8.2.3 Data of Transmission Lines (150kV) No.1

1000MVA Base								
From-To	Voltage (kV)	Code Name	Number of cct	Length (km)	%R (%)	%X (%)	%Y (%)	Thermal Capacity (MVA)
GRESIK-B-TNDES	150	4*ACSR240	2	13.76	8.2	23.8	0.088	769
TNDES-SWHAN	150	2*ACSR340	2	3.20	1.7	5.7	0.021	390
KRIAN-TNDES	150	2*ACSR340	2	14.78	2.5	18.4	0.134	390
WARU-DARMO	150	ACSR340	2	12.73	3.9	13.3	0.048	192
DARMO-TNDES	150	ACSR340	2	2.47	3.5	12	0.043	192
WARU-KRPLG	150	2*ACSR340	2	10.74	3.8	13	0.047	390
GRESIK-WARU	150	2*ACSR330	2	24.70	12.9	43.9	0.158	385
KRIAN-ALTAF	150	2*ACSR340	2	17.97	5.2	17.8	0.064	385
GRESIK-ALTAF	150	2*ACSR340	1	4.93	5.2	17.8	0.064	385
GRESIK-SGMDU3	150	2*ACSR330	1	6.03	1.7	5.7	0.021	385
KRIAN-SWHAN	150	2*ACSR340	2	16.08	8.4	28.6	0.103	390
GRESIK-SGMDU12	150	ACSR330	2	3.90	1.7	5.7	0.021	192
ALTAF-SGMDU	150	2*ACSR340	1	1.00	5.2	17.8	0.064	385
KRIAN-KRPLG	150	2*ACSR340	2	6.85	3.8	13	0.047	390
TOROK-A-B	150	AL800	2	1.00	0.2	0.5	0.255	190
BAWEN-UNGAR	150	2*Zebra	2	8.28	3.1	23.2	0.16	416
TBROK-C-BAWEN	150	4*Zebra	2	37.98	3.4	38.7	0.429	831
TBROK-B-PDLAM	150	2*ACSR240	2	6.30	3.8	11.7	0.039	312
TBROK-B-KLSRI	150	ACSR240	1	7.40	2.7	11.5	0.075	156
PDLAM-UNGAR	150	ACSR240	2	18.00	13.3	40.6	0.135	156
KLSRI-SPLMA	150	Cu240	1	2.66	1.3	2.1	0.575	156
SPLMA-PDLAM	150	Cu240	1	3.18	1.3	2.1	0.575	156
TBROK-B-KRPYK	150	ACSR240	1	15.56	2.5	10.8	0.07	156
KRPYK-UNGAR	150	2*ACSR240	2	21.82	6.7	29.1	0.188	312
PDLAM-SRDOL	150	ACSR240	2	8.05	4.9	15	0.05	156
KRPYK-SRDOL	150	ACSR240	2	13.14	8	24.4	0.081	156
KLSRI-KRPYK	150	ACSR240	1	8.67	2.3	9.9	0.064	156
KLATEN-KLATEN	150	ACSR240	2	12.74	5.38	16.4	0.0545	135
UNGARAN-PWRDI	150	ACSR240	2	56.77	27.7	84.7	0.281	156
KUDUS-PWRDI	150	ACSR240	2	31.46	19.2	58.7	0.195	156
TBROK-DEMAK	150	ACSR240	2	12.01	7.3	22.4	0.074	156
DEMAK-KUDUS	150	ACSR240	2	34.20	4.9	14.9	0.052	156
TBROK-UNGAR	150	2*ACSR240	2	29.10	17.7	54.2	0.18	312
BAWEN-KLATEN	150	2*Zebra	2	64.76	10.8	80	0.552	416
MKRNG-MKBRU	150	2*Drake	2	0.70	0.104	0.339	0.183	405
DUKSBA-MKBRU	150	2*Drake	2	12.20	2.418	15.773	0.109	405
DUKSBB-MKRNG	150	2*Drake	2	12.90	2.557	16.678	0.115	405
ANGKEA-MKRNG	150	TACSR410	2	4.10	1.5	7.087	0.027	364
BDKML-MKRNG	150	Cu800	2	10.20	1.532	4.973	2.681	239
DUKSBB-KBJRK	150	Cu800	2	10.02	1.291	4.81	2.593	239
CNKG-DUKSBA	150	Drake	2	10.33	3.778	18.654	0.065	203
CNKG-TGRNG	150	Drake	2	9.23	2.926	14.446	0.051	203
JTAKE-TGRNG	150	Drake	2	10.30	1.794	13.289	0.092	203
JTAKE-MAXIM	150	Cu240	2	1.70	0.414	0.628	0.176	120
CKUPA-KBANG	150	4*Zebra	2	7.20	2.653	30.533	0.339	831
CKUPA-JTAKE	150	2*Zebra	2	11.20	1.315	8.998	0.065	416
CKUPA-PSKMS	150	Zebra	2	5.70	1.041	7.124	0.052	208
BLRJA-CKUPA	150	2*Drake	2	11.32	1.947	14.122	0.102	405
CIBNG-CMGIS	150	2*Dove	2	6.60	1	4.9	0.037	286
CMGIS-GNDUL	150	2*Dove	2	15.88	5.4	25.4	0.189	286
GNDUL-PTKGN	150	2*Drake	2	14.10	2.576	17.622	0.127	405
PTKGN-SNYAN	150	Cu800	2	9.25	1.205	4.488	2.419	239
DUKSBB-PTKGN	150	2*Drake	2	11.55	2.289	14.933	0.103	405
SPTAN-TLKNG	150	2*Zebra	2	9.20	1.72	12.476	0.091	405
BLRJA-CBTAT	150	2*Zebra	2	13.00	2.95	21.396	0.155	416
PTKNG-SRPNG	150	Hen	2	18.00	4.472	32.436	0.235	156
LKONG-SRPNG	150	Zebra	2	6.00	2.248	11.987	0.039	208
LEGOK-LKONG	150	2*Zebra	2	14.00	1.376	9.98	0.072	416
CITRA-LEGOK	150	2*Zebra	2	15.90	1.376	9.98	0.072	416
DUKSBB-KBANG	150	Cu800	2	3.42	0.676	1.642	0.885	239
BDKML-KSRIH	150	UC.240	2	2.80	1.083	1.643	0.46	120
DUKSBA-GRGOL	150	Cu800	2	18.00	1.052	3.413	1.84	239
PSKMS-SPTAN	150	2*Zebra	2	12.00	1.827	12.498	0.09	416
CBTAT-TGRSA	150	2*Zebra	2	5.80	0.989	7.173	0.052	416
CNKG-TGRBR	150	2*Zebra	2	8.00	2.926	14.446	0.051	416
KARETB-KBJRK	150	Cu240	2	5.47	2.115	3.209	0.898	120
MPGLM-SNYAN	150	Cu240	2	5.40	2.088	3.168	0.887	120

Table A-8.2.4 Data of Transmission Lines (150kV) No.2

1000MVA Base								
From-To	Voltage (kV)	Code Name	Number of cct	Length (km)	%R (%)	%X (%)	%Y (%)	Thermal Capacity (MVA)
KARET-MPBRU	150	Drake	2	10.00	3.658	18.058	0.063	203
MPBRU-ABADI	150	Cu240	2	3.00	1.16	1.76	0.493	120
DRTGA-MPBRU	150	4*Zebra	2	5.00	0.264	5.089	0.057	779
CNANG-PLMAS	150	2*Zebra	2	3.93	0.676	4.903	0.036	416
PLMAS-MGRAI	150	Cu800	2	3.70	1.431	2.171	0.608	239
ANGKEA-KTPNG	150	Cu240	2	5.50	1.088	2.64	1.423	120
ANGKEA-KARETA	150	TACSR410	2	7.90	2.89	13.655	0.052	364
CWANG-SBUDI	150	Cu800	2	14.00	1.804	6.72	3.623	239
CNANG-CWBRU	150	2*Zebra	2	3.43	0.59	4.279	0.031	416
CWBRU-DRTGA	150	4*Zebra	2	5.00	0.264	5.089	0.057	779
CWANG-GNDUL	150	2*Drake	2	16.00	2.923	20.068	0.144	405
BGBRU-CNJR	150	Dove	2	45.13	23.3	79.4	0.286	143
BGBRU-CIBNG	150	Dove	2	22.30	11.6	39.7	0.143	143
ANGKE-ANCOL	150	Zebra	2	4.58	2.789	8.509	0.028	208
KMYRN-MGBSR	150	CU.800	2	4.20	0.523	2.427	0.641	239
PRIOK-KMYRN	150	2*Zebra	2	4.51	0.786	5.819	0.04	416
DKATS-SBUDI	150	Cu240	2	2.20	0.851	1.291	0.361	239
PRIOK-PLPNG	150	2*TACSR410	2	5.10	1.435	5.85	0.05	421
DWUAN	150	Hawk	2	9.00	4.688	16.012	0.058	156
KSBRU-KTMKR	150	2*Zebra	1	7.46	1.283	9.307	0.068	416
KSBRU-MLIGI	150	2*Zebra	1	6.70	1.152	8.359	0.061	416
MLIGI-PRMYA	150	2*Zebra	1	2.60	0.447	3.244	0.024	416
KTMKR-PRMYA	150	2*Zebra	1	5.11	0.879	6.375	0.046	416
PRMYA-PRURI	150	2*Zebra	1	3.73	0.642	4.653	0.034	416
PRMYA-PNYNG	150	2*Zebra	1	7.69	1.323	9.594	0.07	416
PRURI-PNYNG	150	2*Zebra	1	4.51	0.776	5.626	0.041	416
TGHRG	150	2*Zebra	2	4.99	0.858	6.225	0.045	416
PRMYA-TLJBE	150	2*Zebra	2	1.70	0.292	2.121	0.015	416
PNYNG-MKSRI	150	2*Zebra	2	4.30	0.785	5.393	0.039	416
CBATU-MKSRI	150	2*Zebra	2	9.05	1.557	11.29	0.082	416
JBBKA-CIKRG	150	2*Zebra	2	2.15	0.37	2.682	0.019	416
CBATU-JBBKA	150	2*Zebra	2	14.64	2.551	18.889	0.131	416
CBATU-GDMKR	150	2*Zebra	2	13.09	2.281	16.889	0.117	416
CIKRG-GDMKR	150	2*Zebra	2	2.89	0.504	3.729	0.026	416
CWANG-CWBRU	150	AL800	1	0.20	0.04	0.096	0.052	190
PRIOK-PGSAN	150	2*TACSR410	2	11.48	1.73	14.368	0.14	709
PGSAN-PGLMA	150	2*TACSR410	1	1.10	0.192	1.419	0.01	457
PGSAN-PGLGN	150	2*Drake	1	5.40	1.07	7.051	0.052	405
PGLMA-PGBRU	150	2*Drake	1	0.25	0.05	0.326	0.002	709
PGBRU-PGLGN	150	2*Drake	1	4.30	0.785	5.393	0.039	405
BKASI-PGLGN	150	2*Drake	2	4.30	0.785	5.393	0.039	405
PLPNG-GMBRU	150	CU800	1	5.00	1.256	2.5	1.125	239
PLPNG-GMBRU	150	OFCAL630	2	5.00	1.256	2.5	1.125	151
GMBRU-GDPLA	150	CU800	2	8.00	2.009	4	1.8	151
ANCOL-KMYRN	150	2*Zebra	2	8.55	1.49	11.031	0.076	416
PRTMR-PLPNG	150	AL630	2	6.70	1.682	3.35	1.508	151
WHNGL	150	CU240	1	1.10	0.215	0.284	0.008	286
PGLMA-TOSAN	150	CU240	1	2.00	0.773	1.173	0.329	143
TOSAN-PGBRU	150	CU240	1	2.00	0.773	1.173	0.329	143
GDMKR-TMBUN	150	2*Zebra	2	7.20	1.254	9.29	0.064	416
TMBUN-PDKLP	150	2*Zebra	2	13.98	2.405	17.441	0.127	416
CIBNG-JTRGN	150	2*Drake	2	19.50	3.354	24.327	0.177	405
CSW-KARET	150	ACSR240	2	4.50	1.764	8.046	0.029	169
GNDUL-KMANG	150	CU800	2	11.34	4.385	6.653	1.863	143
ANCOL-PRTMR	150	AL800	2	7.00	1.384	3.36	1.811	190
PRIOK-PRTMR	150	XLPECU2x14	2	0.75	0.188	0.375	0.169	112
PLPNG-PKRNG	150	2*TACSR410	1	3.05	0.525	3.805	0.028	355
PKRNG-PGSAN	150	2*Drake	1	1.10	0.192	1.419	0.01	416
PLPNG-PGSAN	150	2*TACSR410	1	3.05	0.525	3.805	0.028	355
BKASI-PDKLP	150	2*Drake	2	4.89	0.841	6.101	0.044	405
BKASI-PDKLP	150	2*Zebra	2	1.11	0.191	1.385	0.01	416
JTRGN-PDKLP	150	2*Zebra	2	3.57	0.614	4.454	0.032	416
JTRGN-PDKLP	150	2*Drake	2	8.44	1.452	10.529	0.076	405
CIKRG-FJRWS	150	Hen	1	2.95	1.8	5.411	0.018	156
FJRWS-BKASI	150	Hen	1	24.44	14.914	44.828	0.152	156
CIKRG-KSBRU	150	Hen	1	36.97	22.56	67.811	0.23	156
KSBRU-BKASI	150	Hen	1	52.02	31.744	95.416	0.323	156
PLPNG-KSAPI	150	2*Drake	2	16.10	3.191	21.023	0.155	405

Table A-8.3 Data of Transformers

Name	No.	V (kV) Primary	V (kV) Secondary	Capacity (MVA)	X(%) Machine base	X(%) 1000MVA base
Bekasi	1	500	150	500	12.0	24.0
Bekasi	2	500	150	500	12.0	24.0
Cibinong	1	500	150	500	12.0	24.0
Cibinong	2	500	150	500	12.0	24.0
CilegonBaru	1	500	150	500	12.0	24.0
CilegonBaru	2	500	150	500	12.0	24.0
Cawang	1	500	150	500	12.0	24.0
Cawang	2	500	150	500	12.0	24.0
Gandul	1	500	150	500	12.0	24.0
Gandul	2	500	150	500	12.0	24.0
Kembangan	1	500	150	500	12.0	24.0
Kembangan	2	500	150	500	12.0	24.0
Suralaya	1	500	150	500	12.0	24.0
Suralaya	2	500	150	500	12.0	24.0
BandungSel	1	500	150	500	12.0	24.0
BandungSel	2	500	150	500	12.0	24.0
Cibatu	1	500	150	500	12.0	24.0
Cibatu	2	500	150	500	12.0	24.0
Cirata	1	500	150	500	12.0	24.0
Cirata	2	500	150	500	12.0	24.0
Cirebon	1	500	150	500	12.0	24.0
Cirebon	2	500	150	500	12.0	24.0
Klaten	1	500	150	500	12.0	24.0
Klaten	2	500	150	500	12.0	24.0
Ungaran	1	500	150	500	12.0	24.0
Ungaran	2	500	150	500	12.0	24.0
Grati	1	500	150	500	12.0	24.0
Gresik	1	500	150	500	12.0	24.0
Krian	1	500	150	500	12.0	24.0
Krian	2	500	150	500	12.0	24.0
Paiton	1	500	150	500	12.0	24.0
Paiton	2	500	150	500	12.0	24.0
Depok	1	500	150	500	12.0	24.0
Tasikmalaya	1	500	150	500	12.0	24.0
Kediri	1	500	150	500	12.0	24.0
Kediri	2	500	150	500	12.0	24.0
SurabayaSel	1	500	150	500	12.0	24.0
SurabayaSel	2	500	150	500	12.0	24.0
Rawalo	1	500	150	500	12.0	24.0
Tambun	1	500	150	500	12.0	24.0
Ngimbang	1	500	150	500	12.0	24.0
Balaraja	1	500	150	500	12.0	24.0
Balaraja	2	500	150	500	12.0	24.0
Other New Transformers		500	150	500	12.0	24.0

Table A-8.4.1 Power Flows of 500kV Substations for Short-term Planning

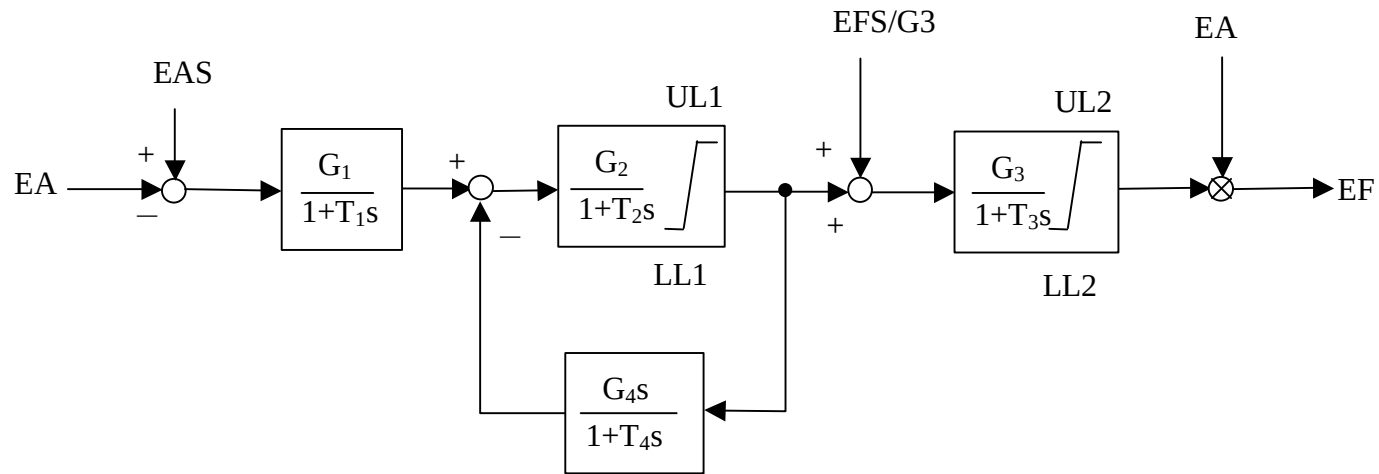
			2002		2003		2004		2005	
			P(MW)	Q(MVAR)	P(MW)	Q(MVAR)	P(MW)	Q(MVAR)	P(MW)	Q(MVAR)
AREA 1	Substation	Suralaya	210	90	245	103	230	69	287	86
		Cilegon	468	206	467	189	500	167	607	202
		Kembangan	589	131	627	123	682	167	692	170
		Gandul	465	186	506	11	558	173	653	203
		Cawang	459	80	490	147	552	42	614	47
		Cibinong	417	325	456	184	495	328	464	307
		DepokIII					327	72	378	83
		Bekasi	454	220	500	156	321	106	470	156
		Balaraja								
	Subtotal	3,062		3,291		3,665		4,165		
	Power station	Muara Karan	1,135		1,135		1,135		1,135	
		Tanjung Priok	835		835		835		835	
		Others	733		786		736		620	
Subtotal(Demand)			5,765		6,047		6,371		6,755	
AREA 2	Substation	Cibatu	413	141	508	112	512	134	542	142
		Cirata	560	174	592	143	523	163	554	172
		Bandung Selatan	649	332	731	300	623	274	659	290
		Cirebon	419	140	437	118	553	298	585	315
		Tasikmalaya					284	90	301	95
		Subtotal	2,041		2,268		2,495		2,641	
	Power station	Others	453		357		279		314	
Subtotal(Demand)			2,494		2,625		2,774		2,955	
AREA 3	Substaion	Ungaran	272	98	227	99	292	193	240	133
		Klaten	301	144	431	119	491	152	610	201
		Rawalo								
		Subtotal	573		658		783		850	
	Power station	Tambaklorok	1,285		1,285		1,285		1,285	
		Others	241		259		248		316	
Subtotal(Demand)			2,099		2,202		2,316		2,451	
AREA 4	Substation	Krian	778	343	612	296	687	316	682	314
		Gresik	34	8	-19	-11	7	0	69	0
		Grati	304	128	380	79	36	9	203	53
		Paiton	548	61	482	8	570	14	611	15
		Kediri			342	3	387	8	396	8
		Surabaya Selatan								
		Ngimbang								
		Subtotal	1,664		1,797		1,687		1,961	
	Power station	Gresik(150kV)	1,116		1,116		1,116		1,116	
		Grati(150kV)	0		0		302		302	
		Others	683		710		700		645	
Subtotal(Demand)			3,463		3,623		3,805		4,024	
Total Demand			13,821		14,497		15,266		16,185	

Table A-8.4.2 Power Flows of 500kV Substations for Long-term Planning

			2010		2015	
			P (MW)	Q (MVar)	P (MW)	Q (MVar)
AREA 1	Substation	Suralaya	660	132	990	198
		Cilegon	660	132	990	198
		Kembangan	660	132	990	198
		Gandul	715	143	851	170
		Cawang	660	132	990	198
		Cibinong	660	132	990	198
		DepokIII	660	132	990	198
		Bekasi	660	132	660	132
		Tambun	660	132	990	198
		Balaraja	660	132	990	198
		Muara Tawar			660	132
		A11			660	132
		Subtotal	6,655		10,751	
	Power station	Muara Karan	1,229		1,229	
		Tanjung Priok	1,180		1,180	
		NEW GT	600		840	
Others		413		413		
Subtotal(Demand)		10,077		14,413		
AREA 2	Substation	Cibatu	712	142	790	158
		Cirata	990	198	990	198
		Bandung Selatan	990	198	990	198
		Cirebon	660	132	990	198
		Tasikmalaya	660	132	990	198
		A21(A23)			660	132
		A22			660	132
		Subtotal	4,012		6,070	
	Power station	Others	531		531	
	Subtotal(Demand)		4,543		6,601	
AREA 3	Substaion	Ungaran	668	134	941	188
		Klaten	990	198	990	198
		Rawalo	660	132	990	198
		A31			990	198
		Subtotal	2,318		3,911	
	Power station	Tambaklorok	1,034		1,034	
		Others	337		337	
	Subtotal(Demand)		3,689		5,282	
AREA 4	Substation	Krian	660	132	990	198
		Gresik	240	48	526	105
		Grati	660	132	990	198
		Paiton	660	132	990	198
		Kediri	660	132	990	198
		Surabaya Selatan	660	132	990	198
		Ngimbang	660	132	990	198
		Kapal	660	132	990	198
		Subtotal	4,860		7,456	
	Power station	Gresik(150kV)	526		526	
		Grati(150kV)	0		0	
		Others	602		522	
	Subtotal(Demand)		5,988		8,504	
Total Demand			24,297		34,800	

Figure A-8.1 AVR Data for Stability Analysis (Thyristor-type Excitation System(Self-Excitation System))
[Standard Data]

G1	T1	G2	T2	UL1	LL1	G3	T3	UL2	LL2	G4	T4
1.0	0.0	1.0	0.1	100.0	-100.0	150.0	0.0	5.0	-5.0	0.05	0.2



EA : Terminal Voltage of Generator
EAS : Setting of Terminal Voltage of Generator
EF : Field Voltage
EFS : Setting of Field Voltage

Figure A-8.2.1 Governor Data for Stability Analysis (Hydro Power Station)
[Standard Data]

δ (%)	K	T1 (s)	T2 (s)	T3 (s)	T4 (s)	T5 (s)	T6 (s)	U (pu)	L (pu)	G (s)
5.0	1.0	10.0	0.3	10.0	-	10.0	-0.001	1.05	0.0	-

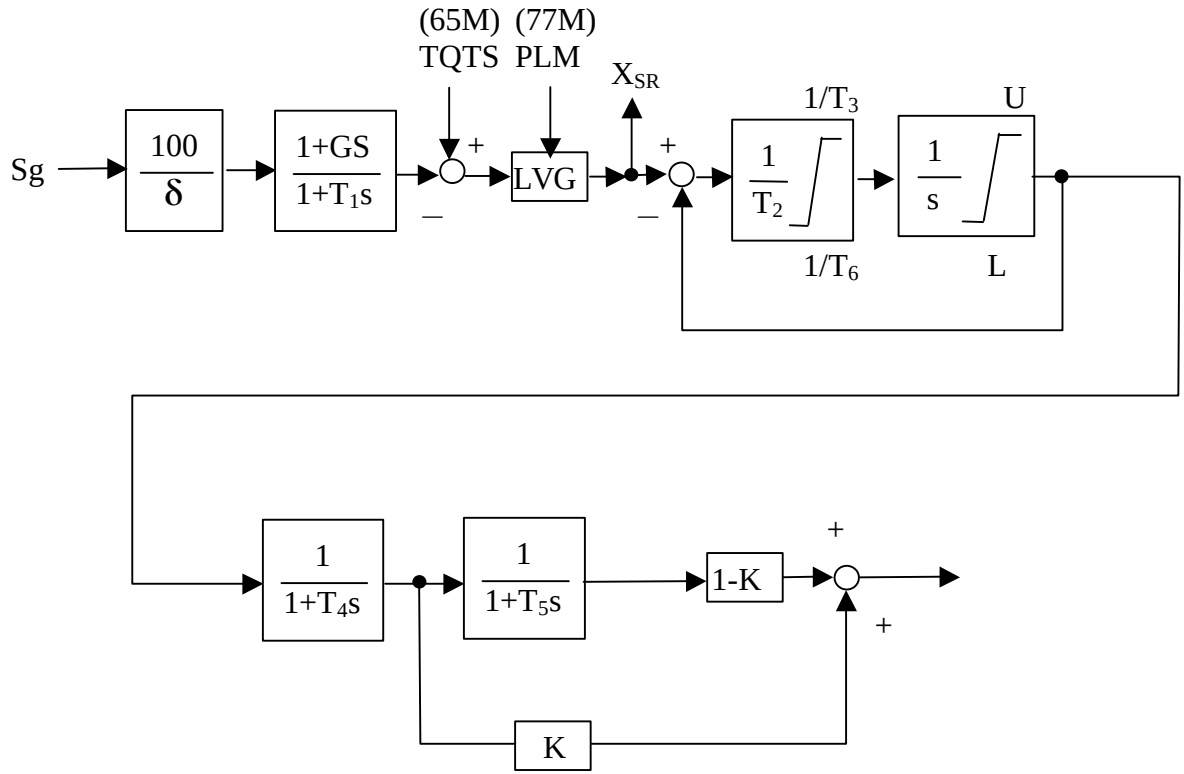


Figure A-8.2.2 Governor Data for Stability Analysis (Thermal Power Station)
[Standard Data]

δ (%)	K (pu)	T1 (s)	T2 (s)	T3 (s)	T4 (s)	T5 (s)	T6 (s)	U (pu)	L (pu)	G (s)
4.0	0.3	0.2	0.2	5.0	0.25	9.0	-0.001	1.05	0.0	0.0

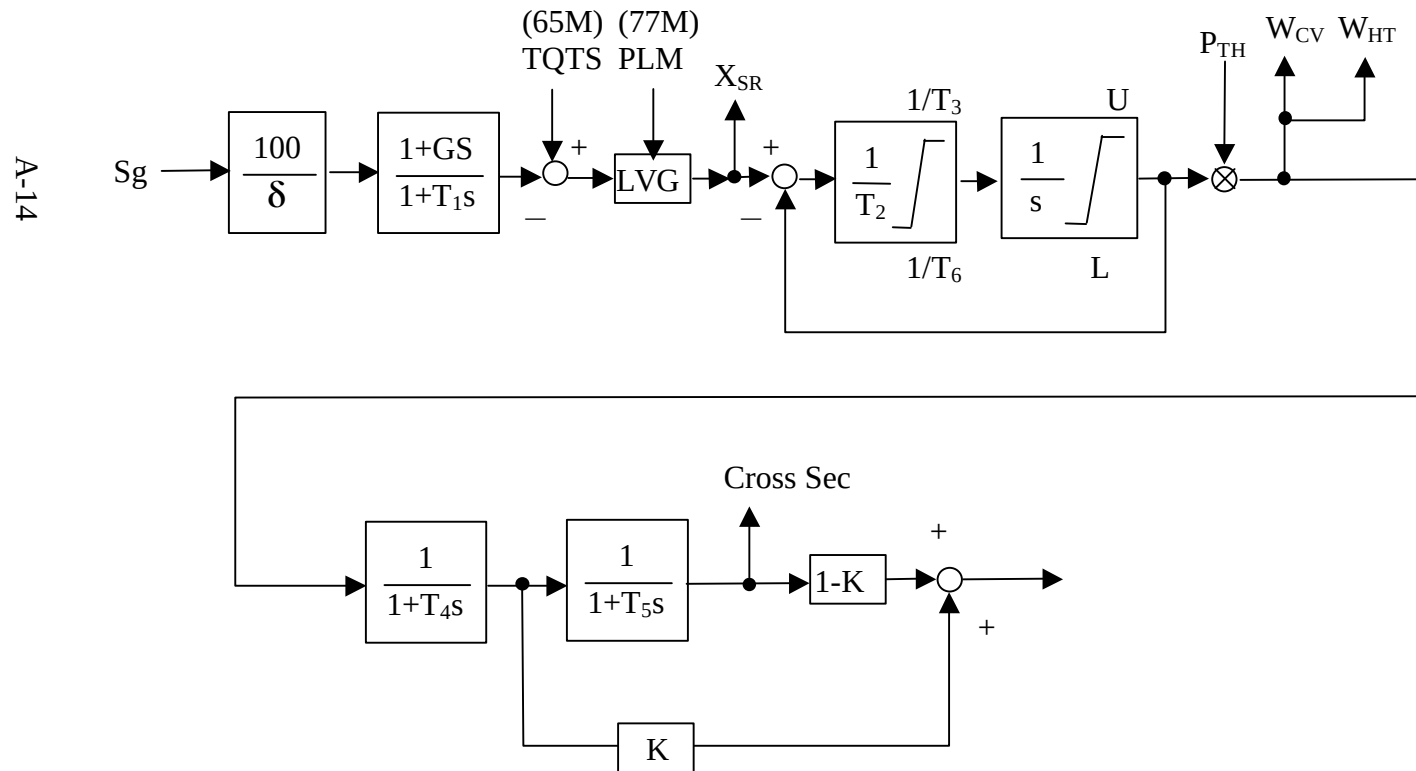


Figure A-8.3.1 [2002] No southern 500kV transmission lines (1600MW)

SQ Name: KRIAN-UNGARAN 3LGO

FL Name: YHOFLO:

Aug-06-2002

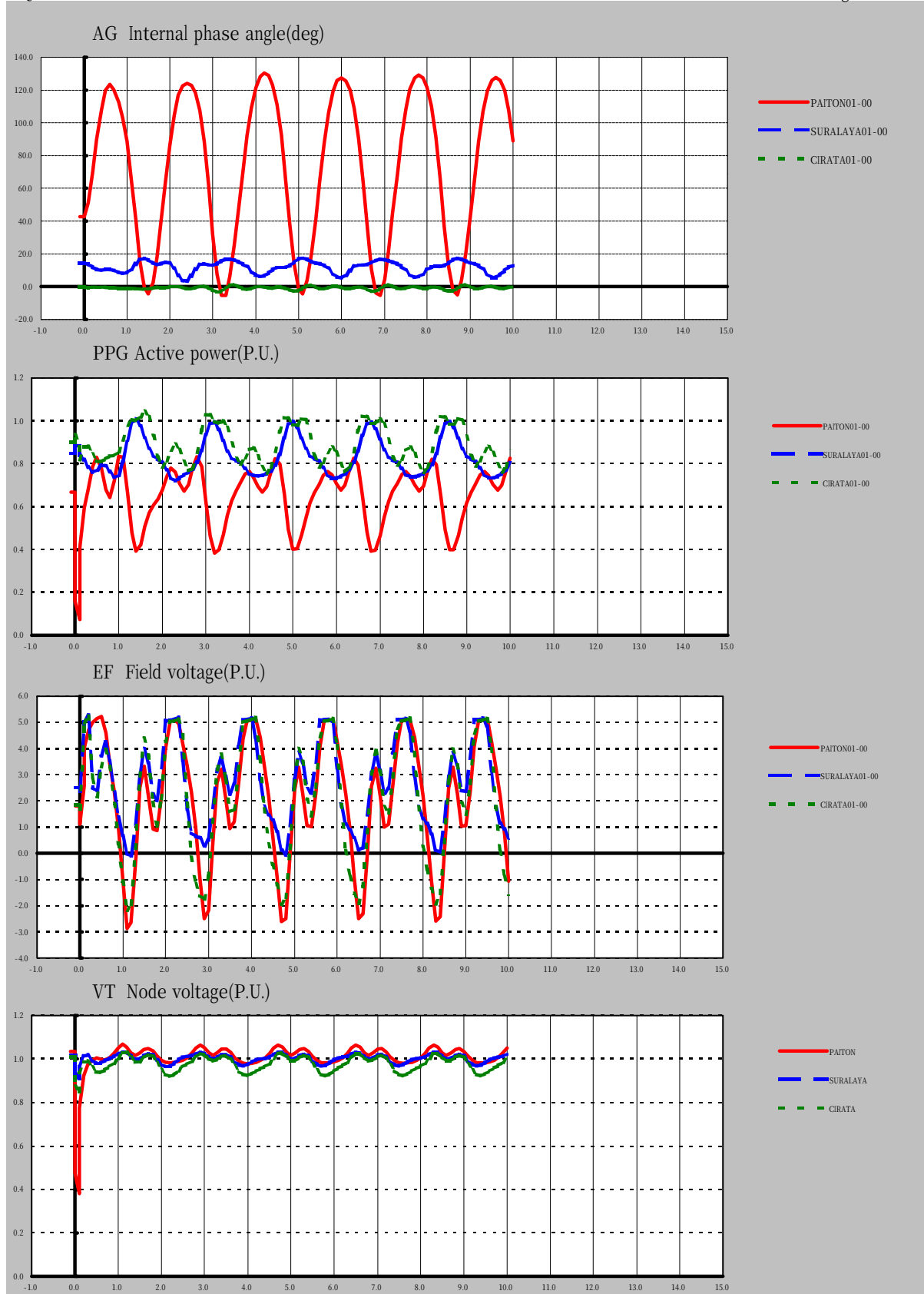


Figure A-8.3.2 [2002] No southern 500kV transmission (1500MW)

SQ Name: KRIAN-UNGARAN 3LGO

FL Name: YHOFL0:

Aug-06-2002

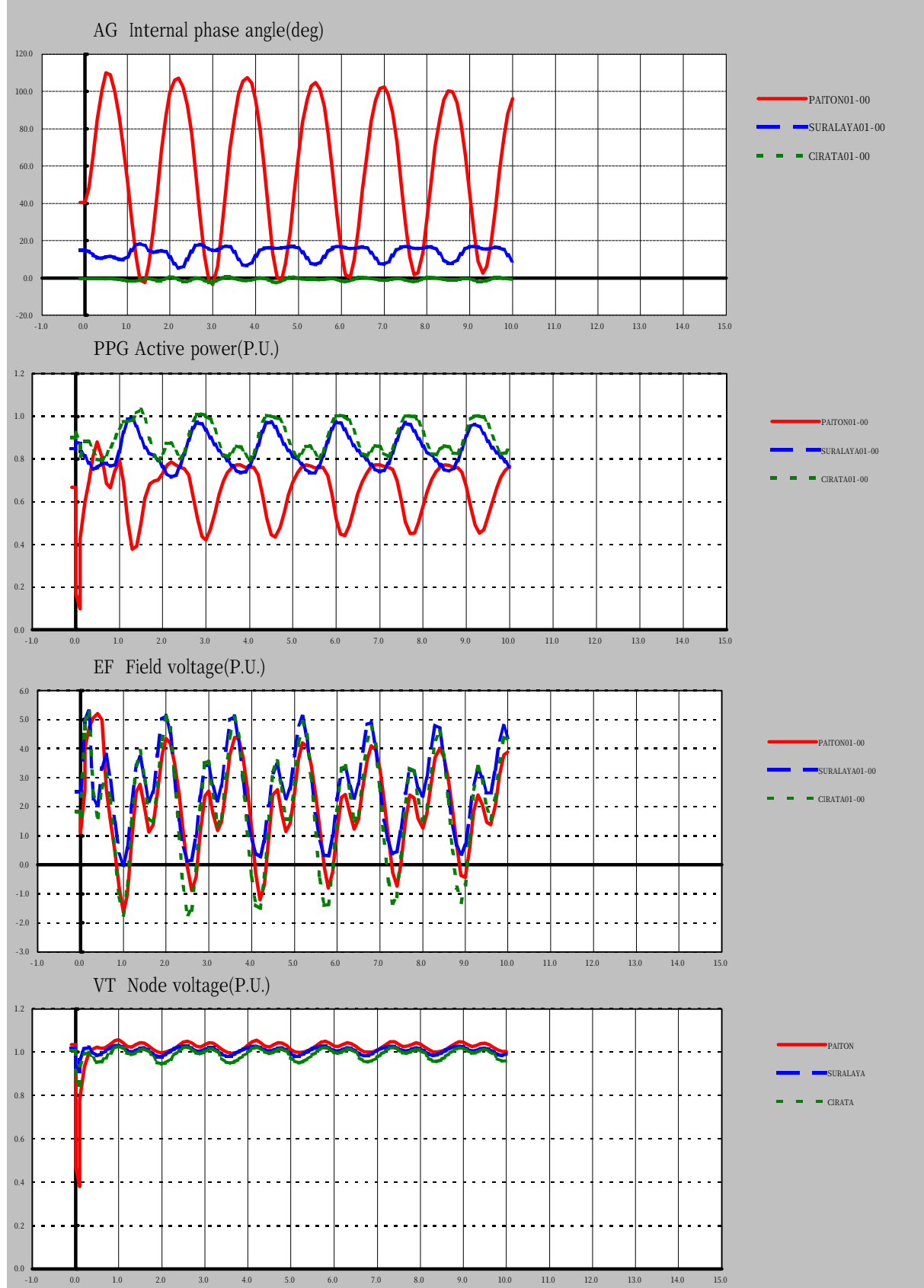


Figure A-8.3.3 [2002] Operation of one circuit between Paiton and Klaten (1400MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

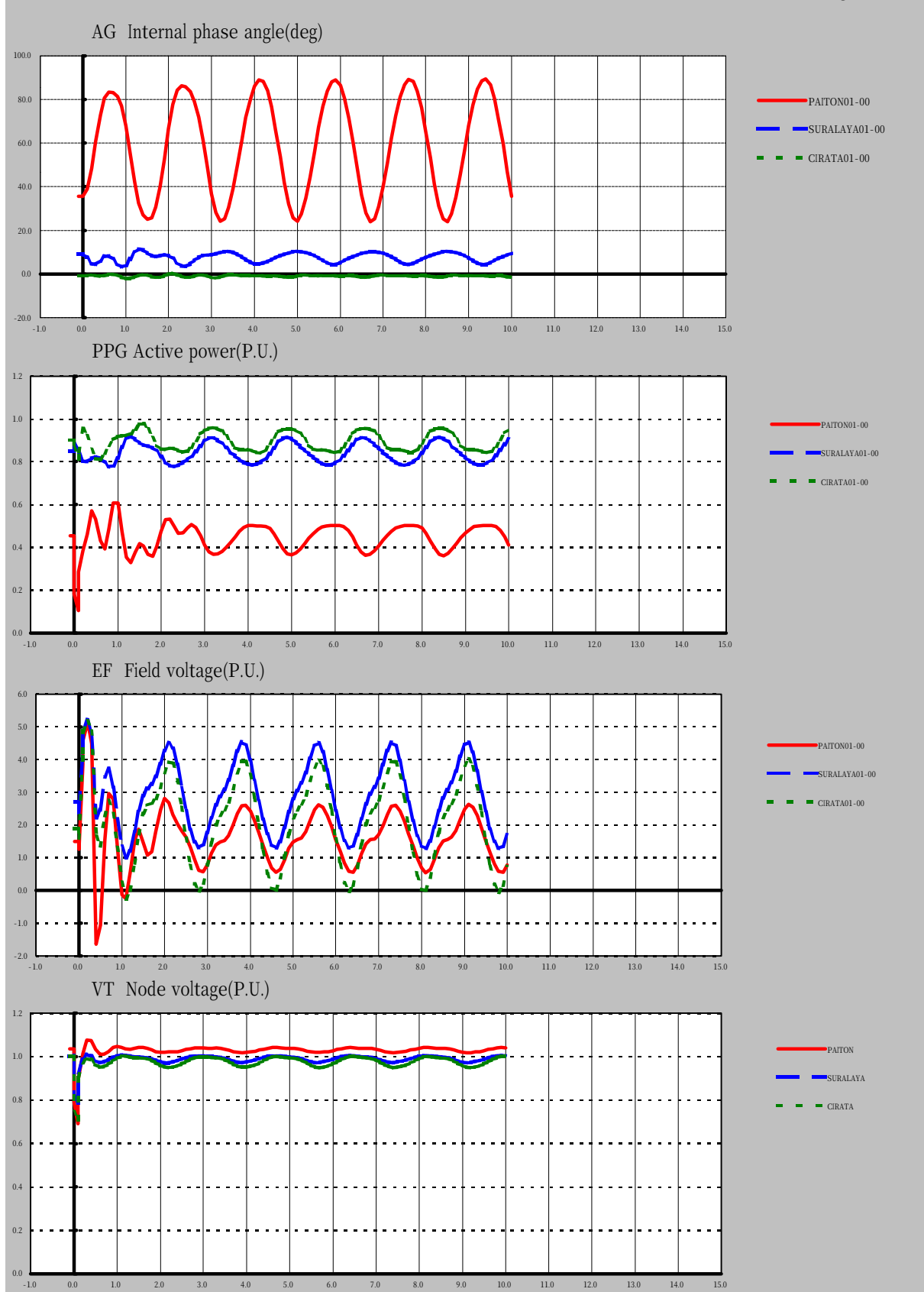


Figure A-8.3.4 [2002] Operation of one circuit between Paiton and Klaten (1300MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

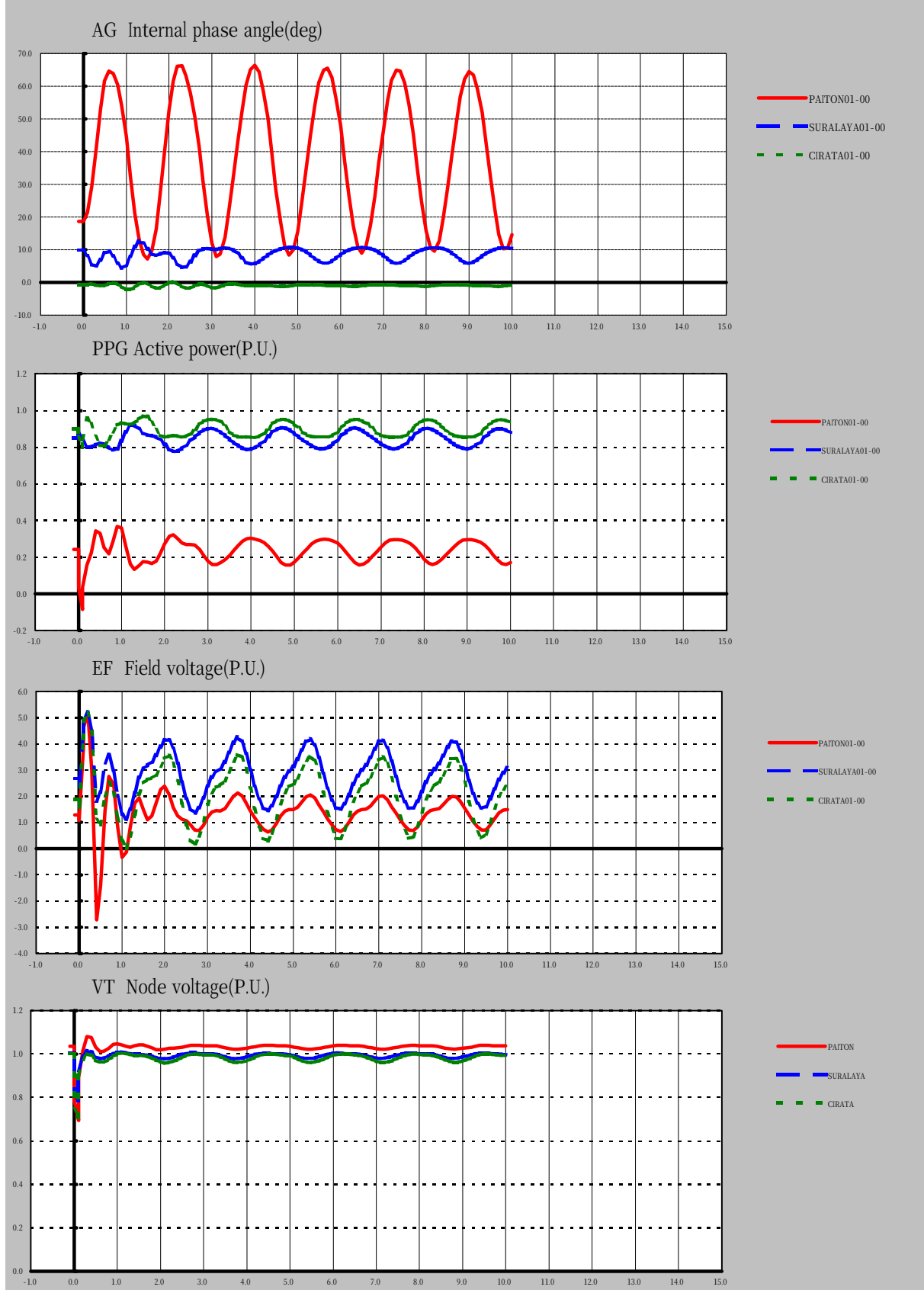


Figure A-8.3.5 [2003] Operation of two circuits between Paiton and Klaten (1400MW)
 SQ Name: UNGARAN-CIREBON 3LGO FL Name: YHOFL0: Aug-06-2002

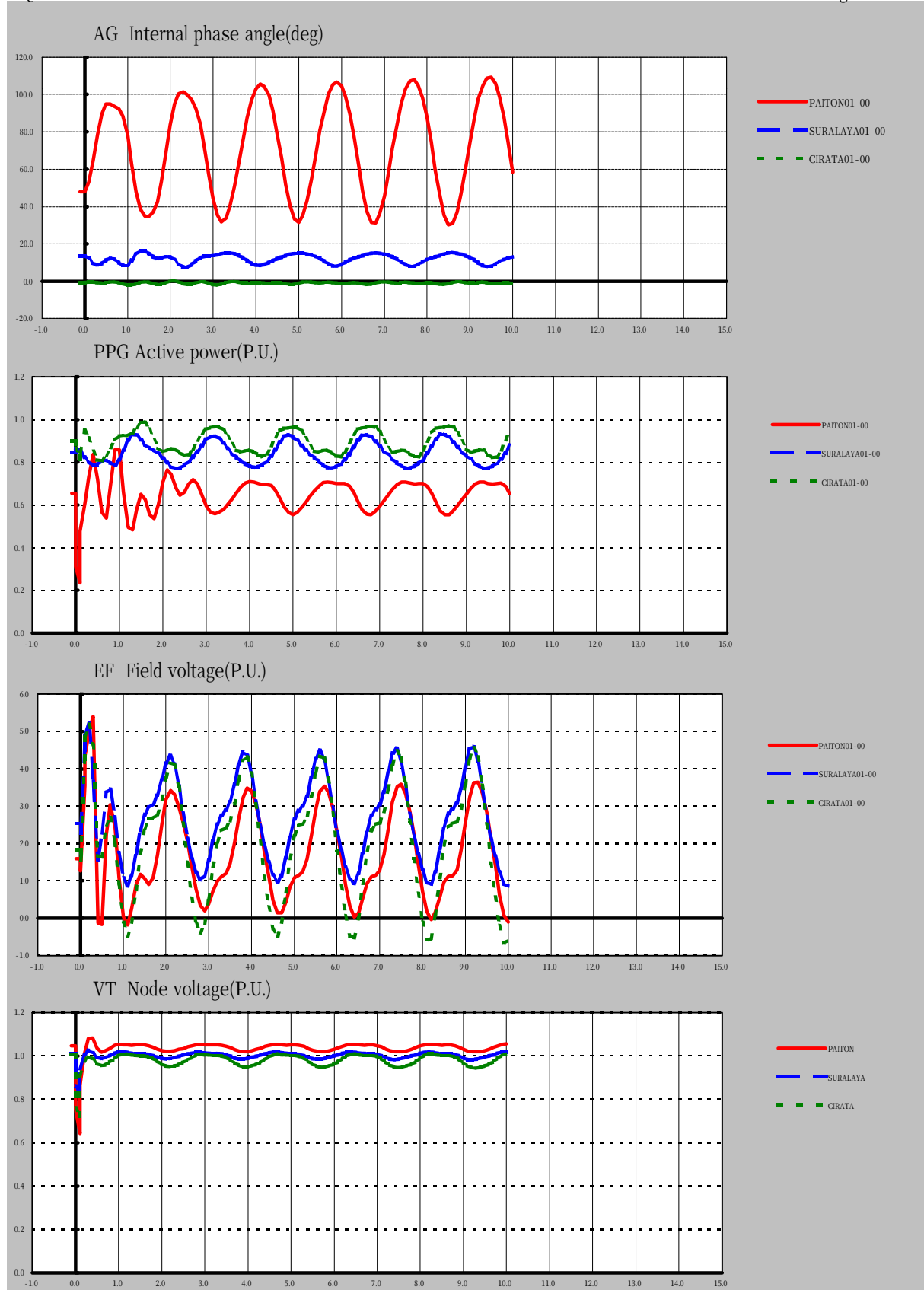


Figure A-8.3.6 [2003] Operation of two circuits between Paiton and Klaten (1300MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

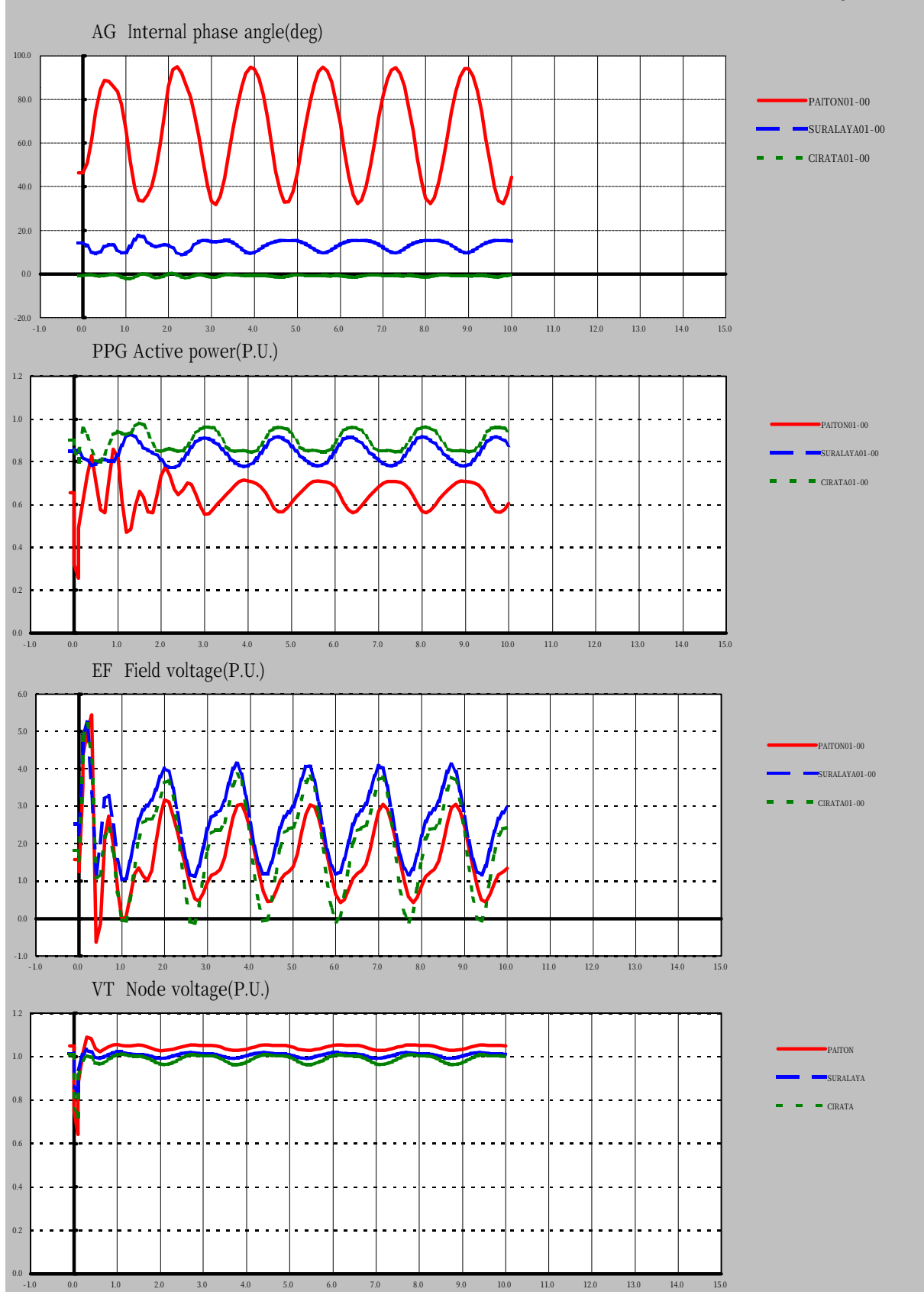


Figure A-8.3.7 [2003] After double pi connection at Cirebon (1500MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

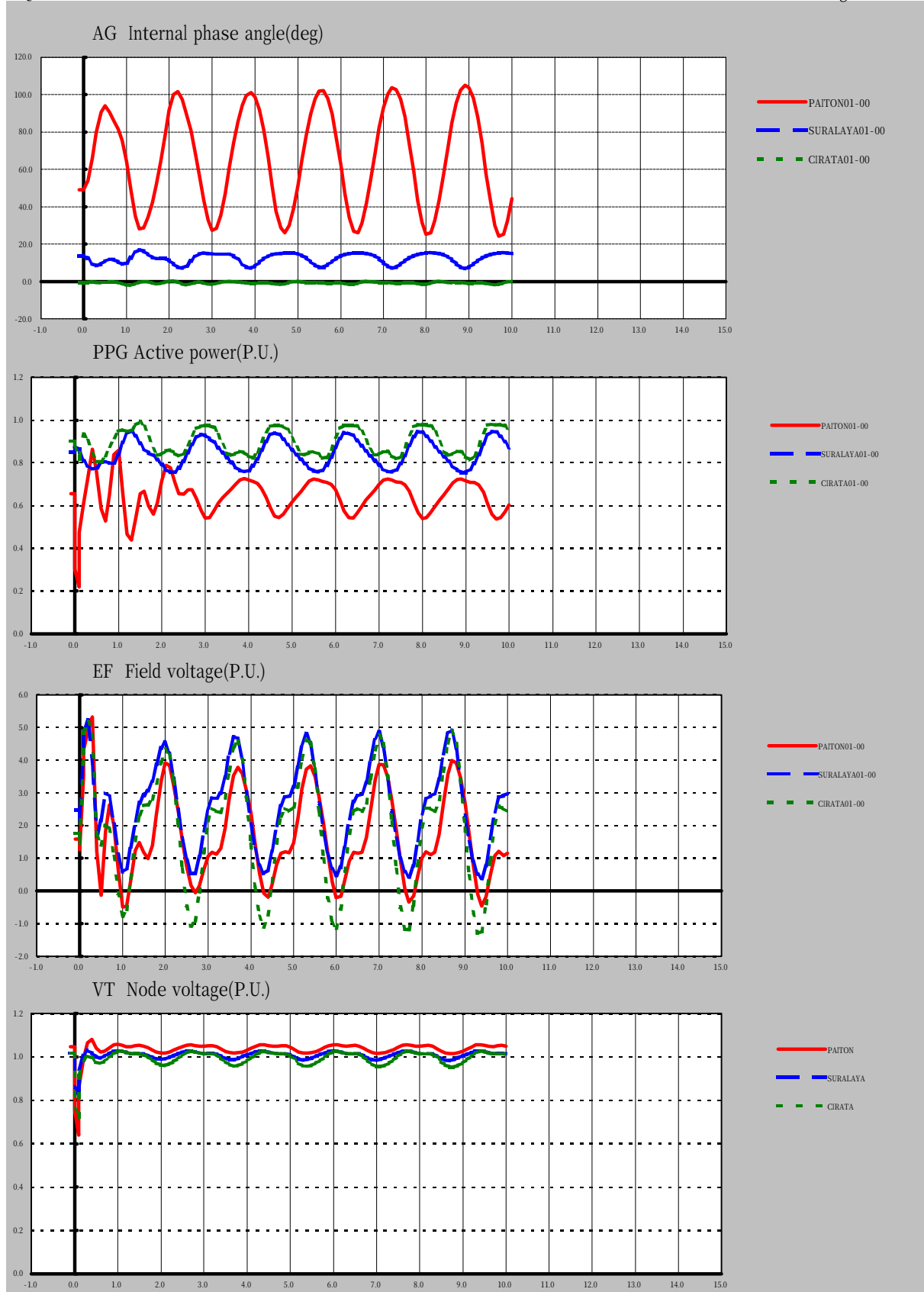


Figure A-8.3.8 [2003] After double pi connection at Cirebon (1400MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

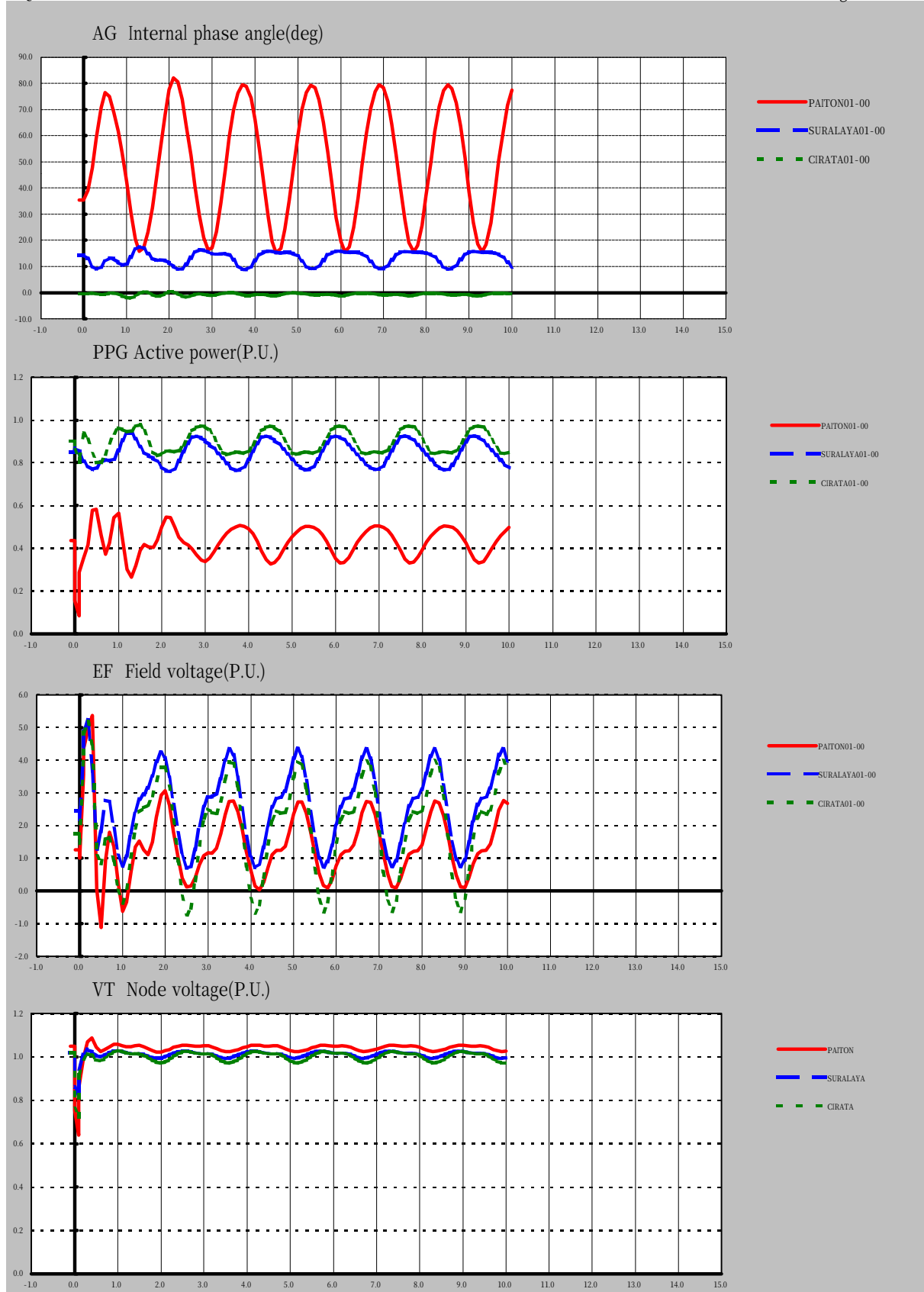


Figure A-8.3.9 [2004] Operation of entire southern 500kV transmission lines (1655MW)

SQ Name: KRIAN-UNGARAN

FL Name: YHOFL0:

Aug-06-2002

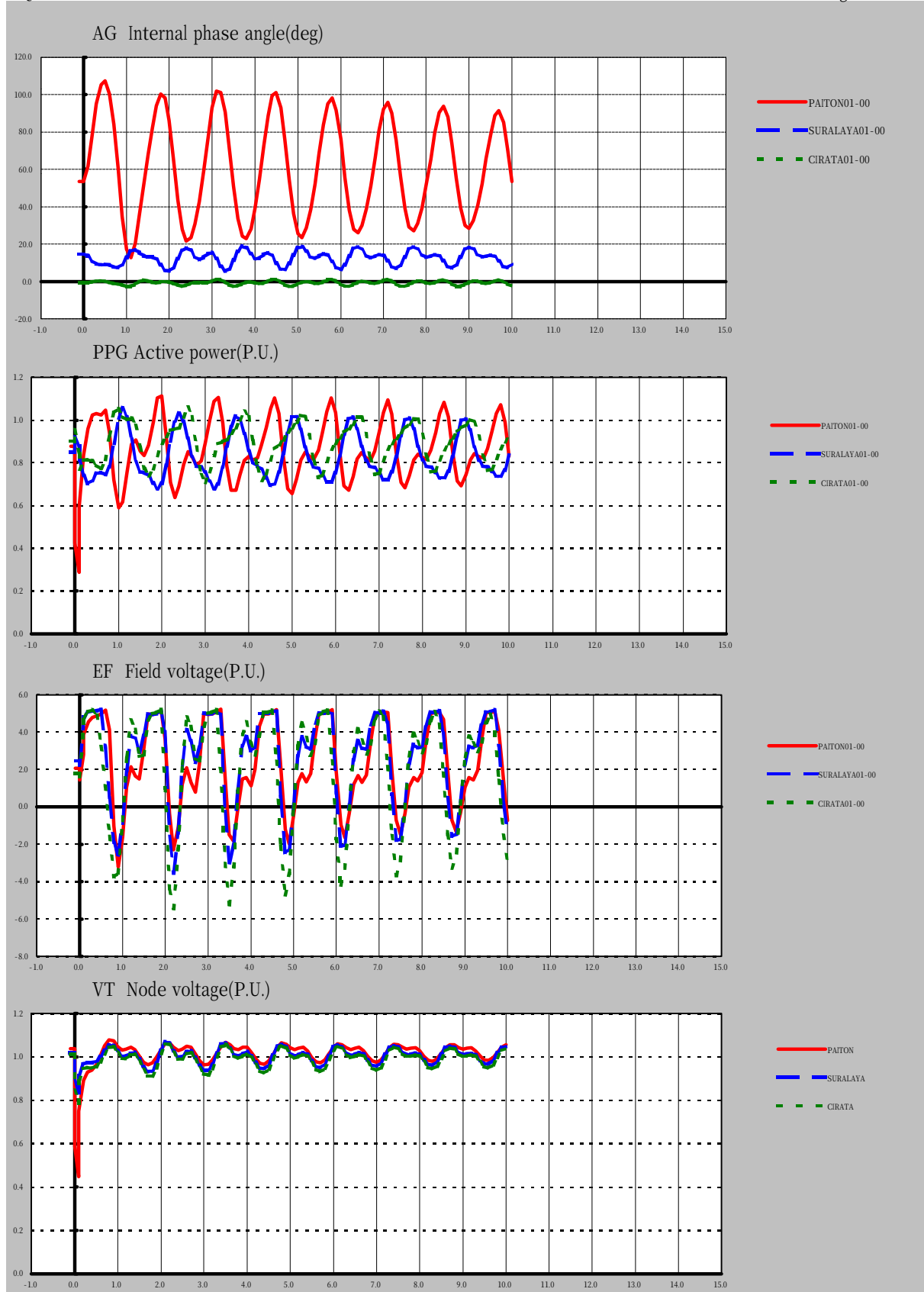


Figure A-8.3.10 [2005] Operation of Tanjung Jati B
Connected to the northern line (Krian - Ungaran)

SQ Name: KRIAN-UNGARAN

FL Name: YHOFL0:

Aug-06-2002

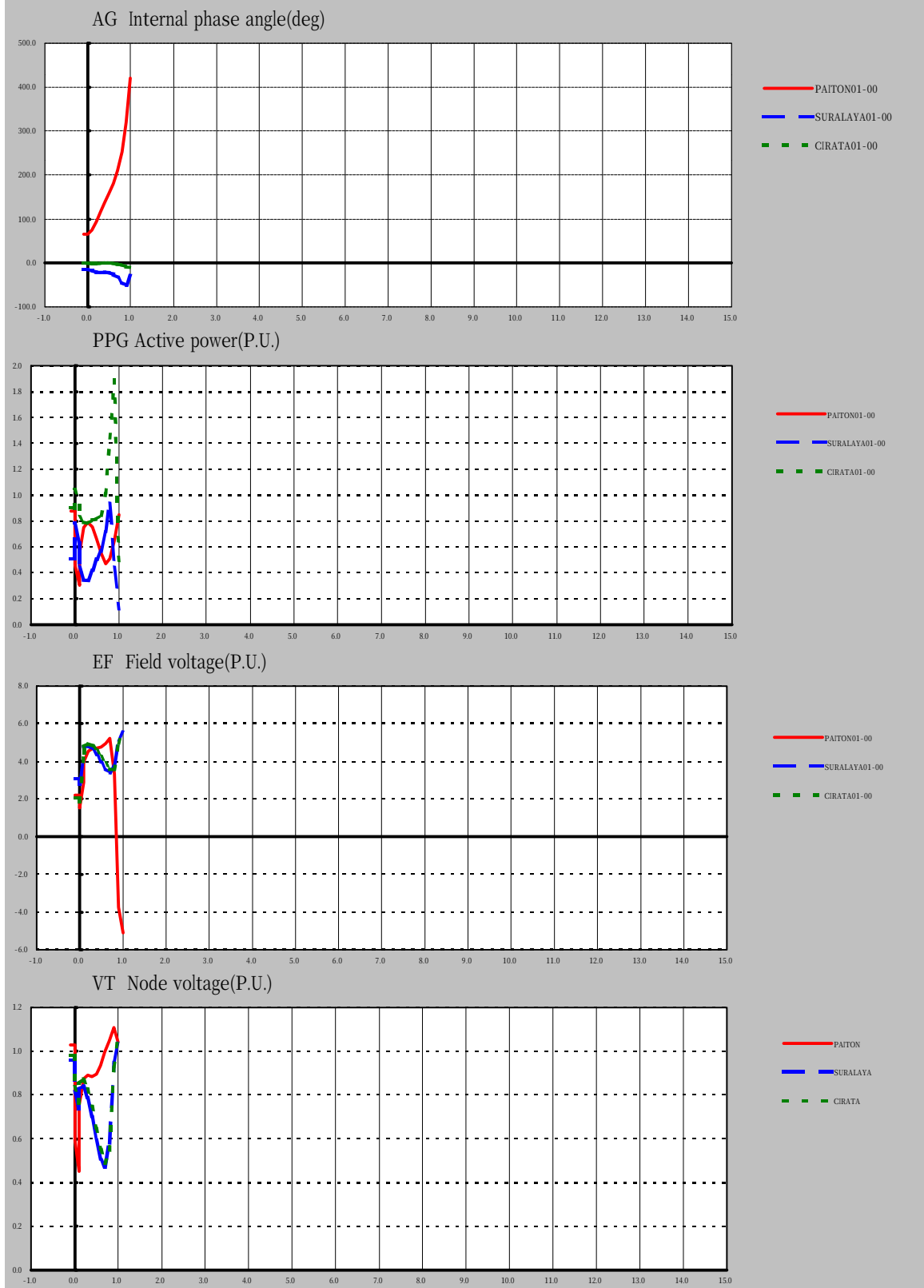


Figure A-8.3.11 [2005] Operation of Tanjung Jati B
Connected to the northern line (Tanjung Jati B - Ungaran)

SQ Name: TJB-UNGARAN 3LGO

FL Name: YHOFL0:

Aug-06-2002

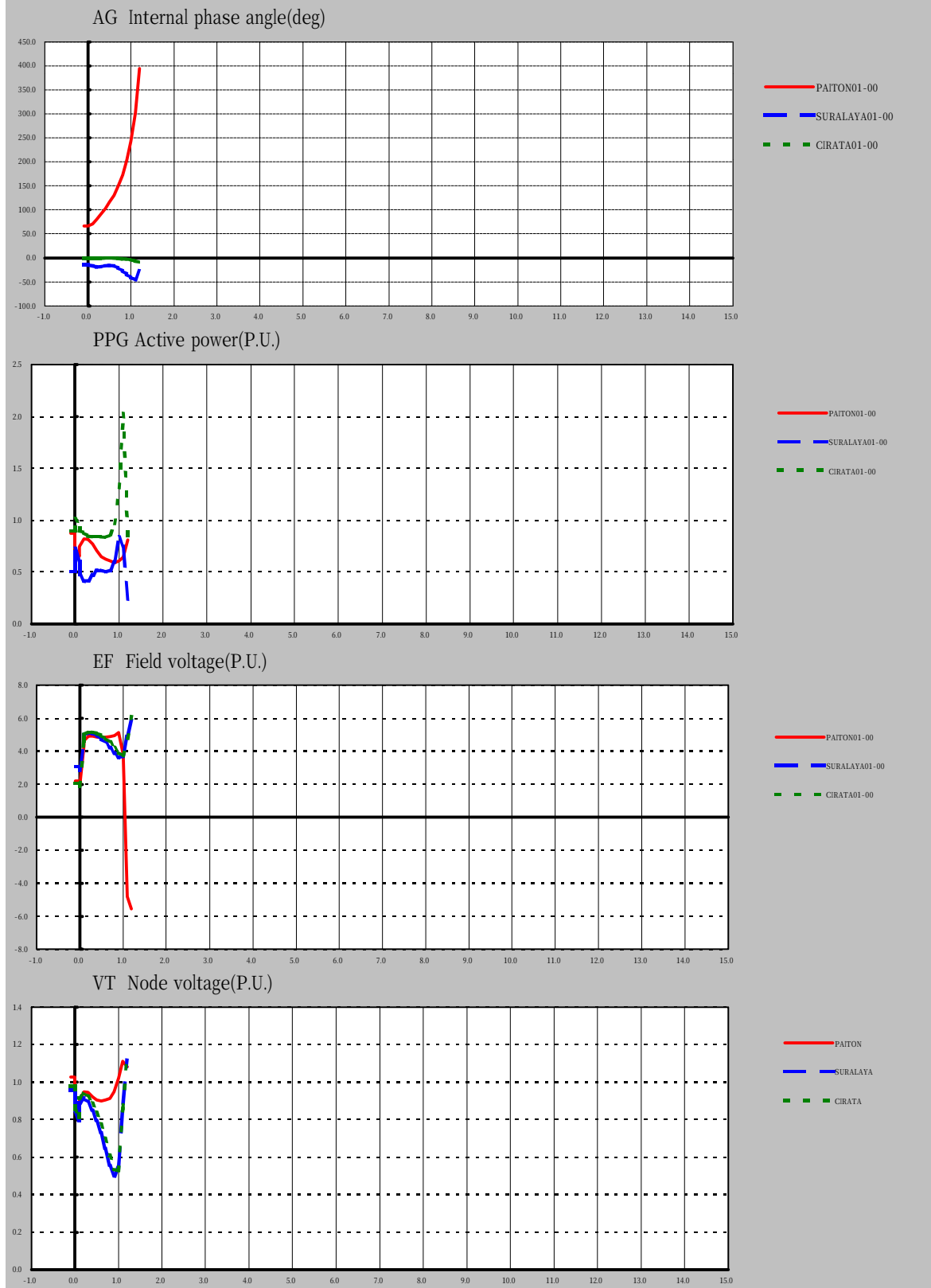


Figure A-8.3.12 [2005] Operation of Tanjung Jati B; Connected to the northern line,
(Krian - Ungaran) Generation shut down (Paiton 610MW, T.J.-B 660MW)

SQ Name: KRIAN-UNGARAN

FL Name: YHOFL0:

Aug-06-2002

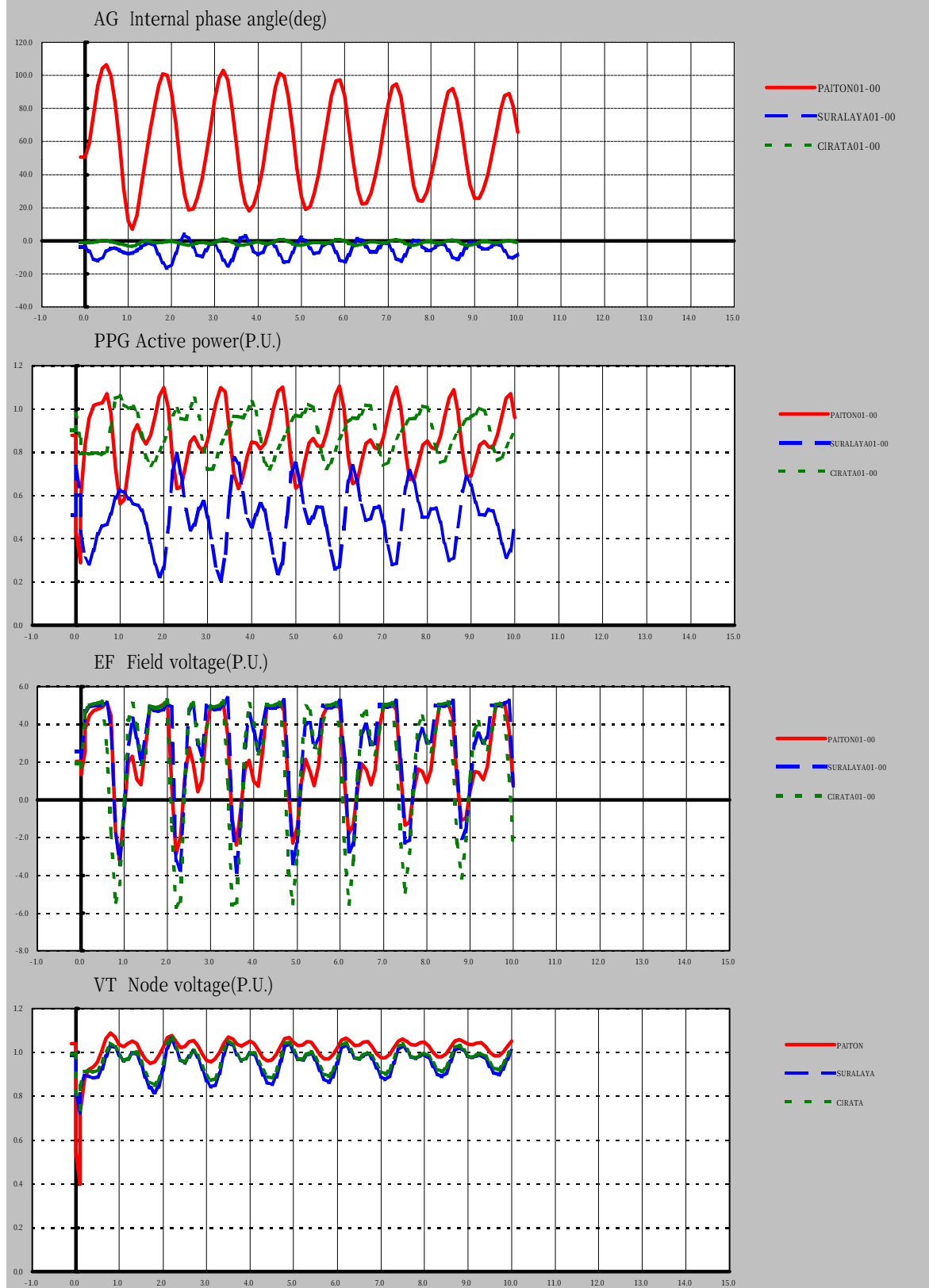


Figure A-8.3.13 [2005] Operation of Tanjung Jati B; Connected to the northern line,
(Tanjung Jati B - Ungaran) Generation shut down (Paiton 610MW, T.J.-B 660MW)

SQ Name: TJB-UNGARAN 3LGO

FL Name: YHOFLO:

Aug-06-2002

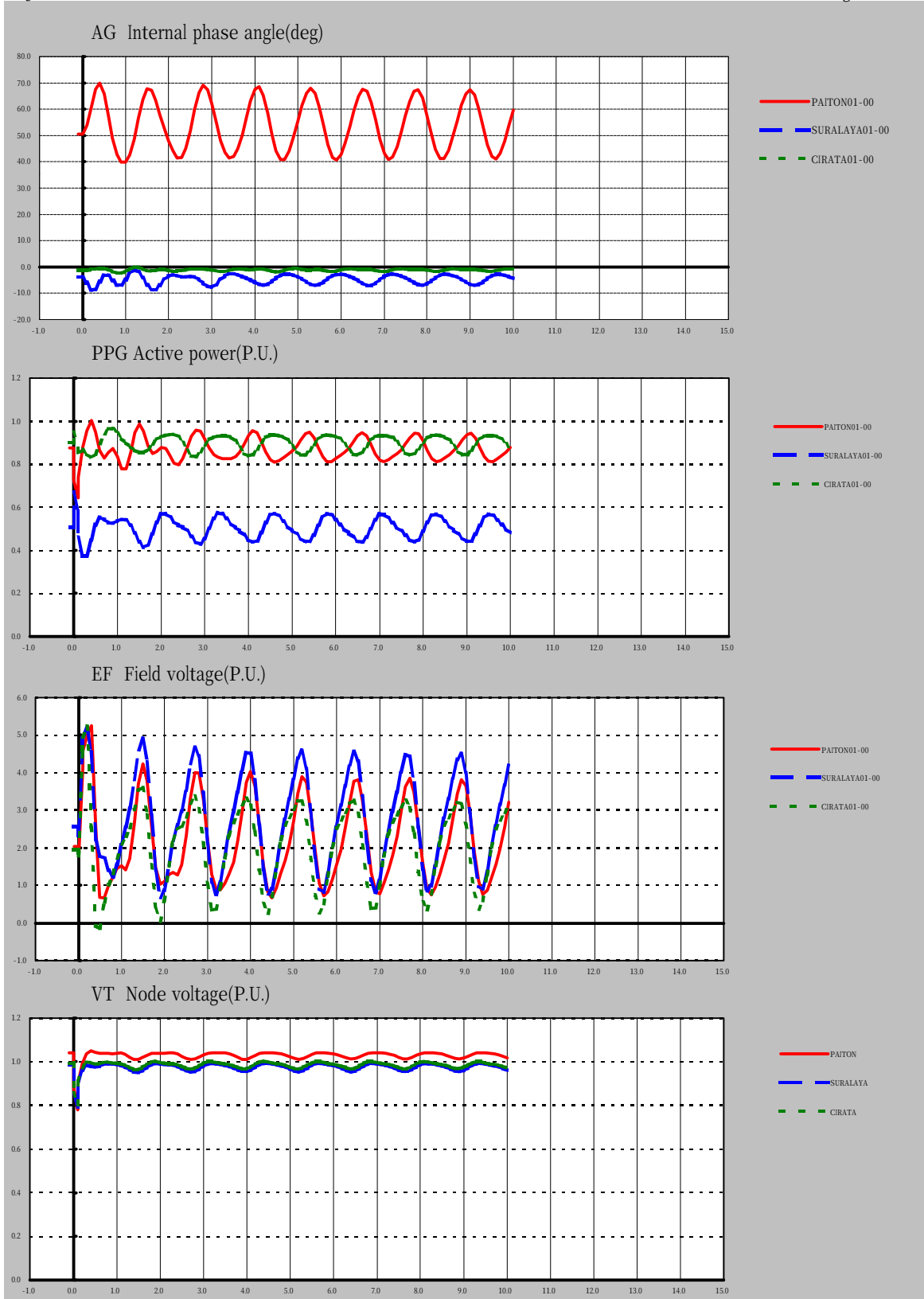


Figure A-8.3.14 [2005] Operation of Tanjung Jati B: Connected to Ungaran

SQ Name: KRIAN-UNGARAN

FL Name: YHOFL0:

Aug-06-2002

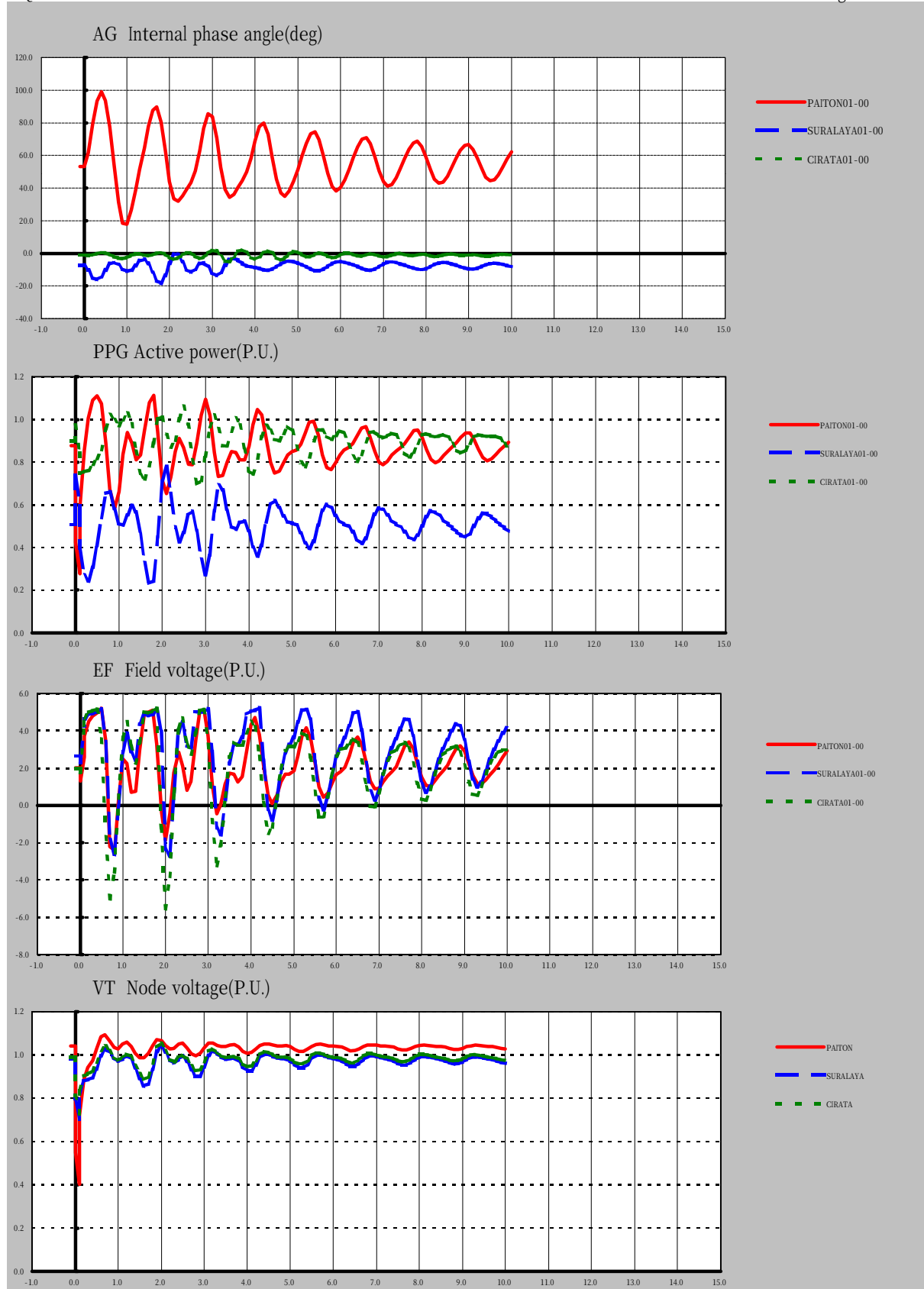


Figure A-8.3.15 [2005] Operation of Tanjung Jati B : Connected to Ungaran

SQ Name: TJB-UNGARAN 3LGO

FL Name: YHOFL0:

Aug-06-2002

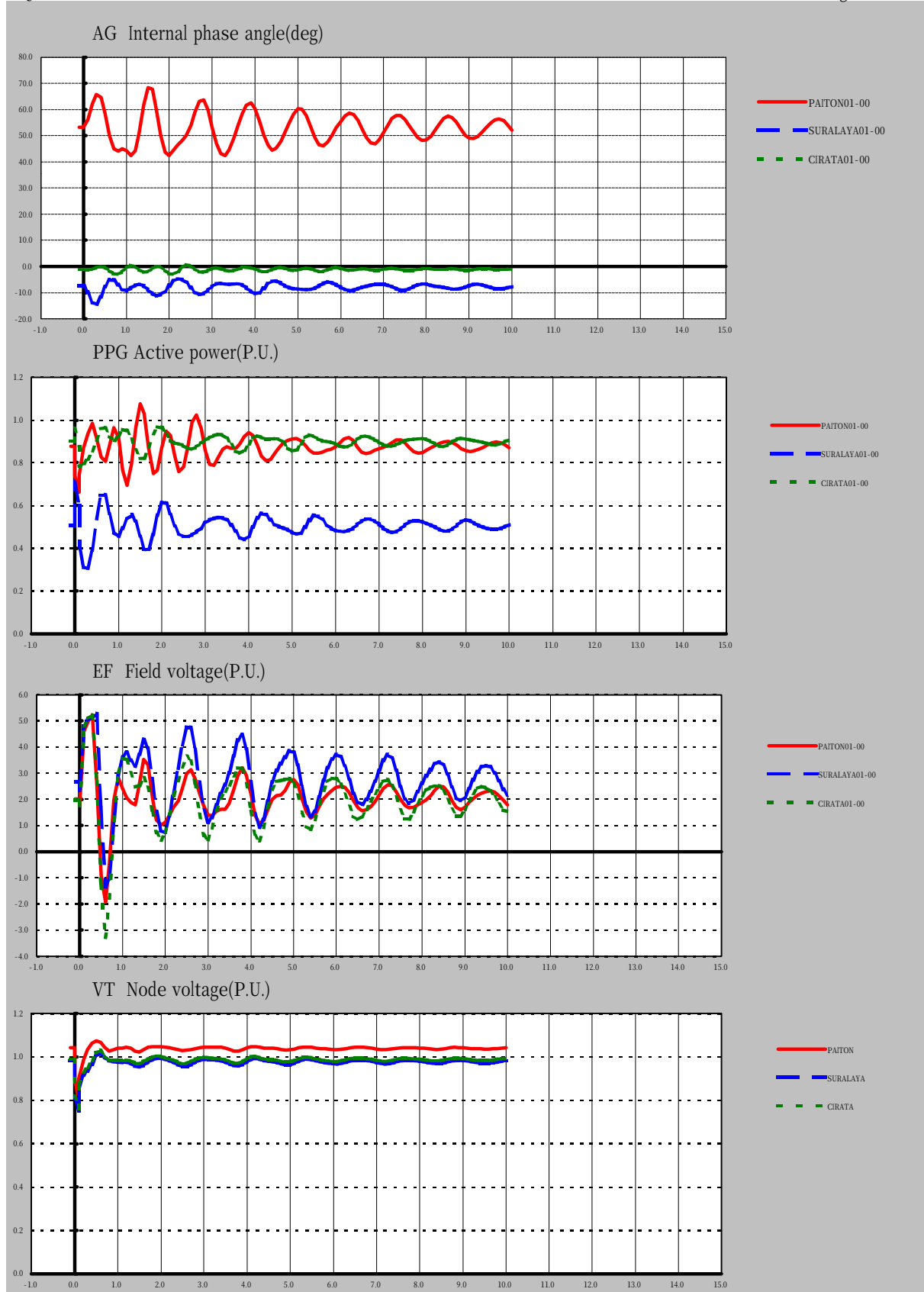


Figure A-8.3.16 [2005] Delay of southern transmission lines and operation of Tanjung Jati B:
Connected to Ungaran (T.J.B660MW UNGARAN-CIREBON1800MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFLO:

Aug-06-2002

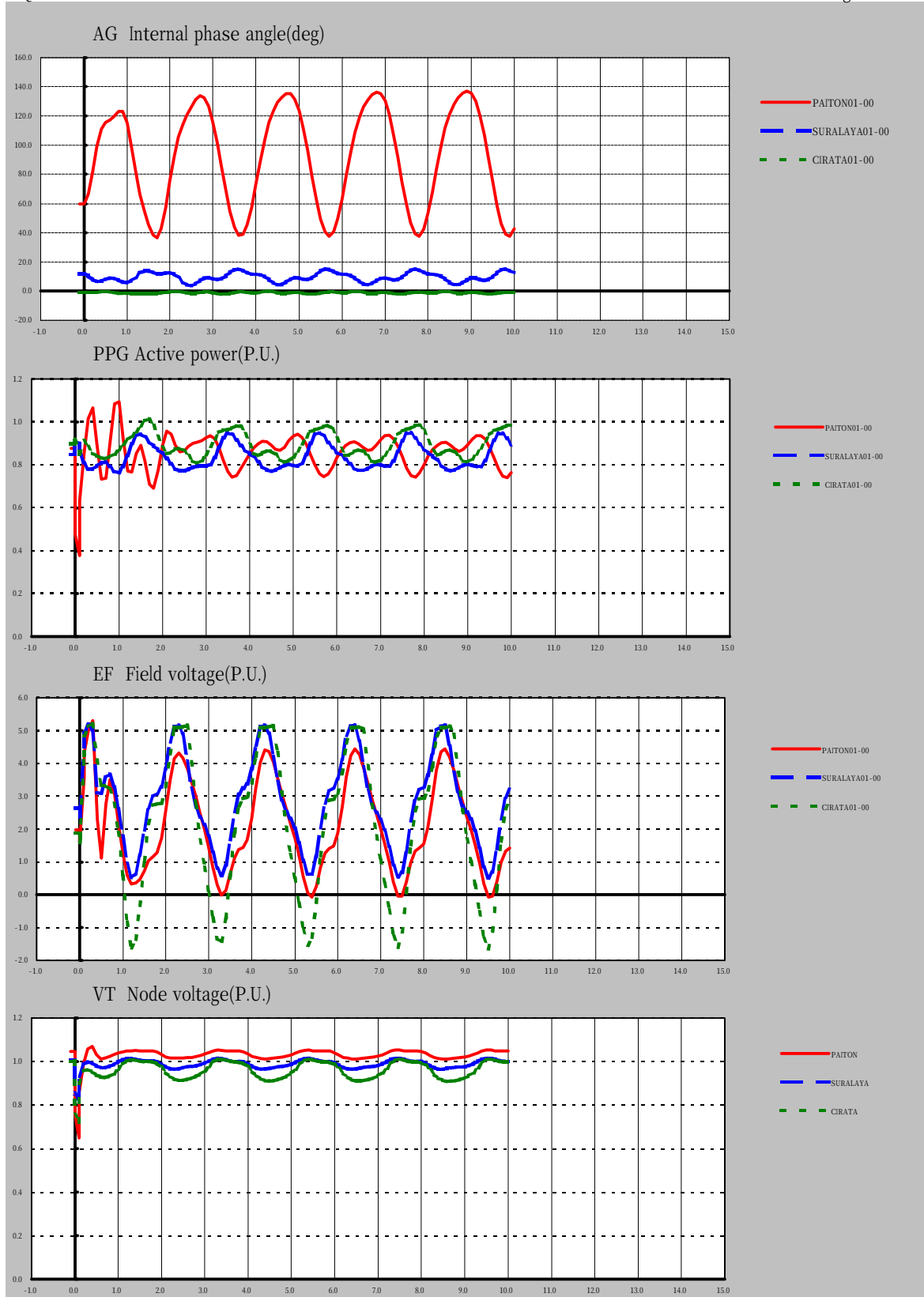


Figure A-8.3.17 [2005] Delay of southern transmission lines and operation of Tanjung jati B:
Connected to Ungaran (T.J.B660MW UNGARAN-CIREBON1700MW)

SQ Name: UNGARAN-CIREBON 3LGO

FL Name: YHOFL0:

Aug-06-2002

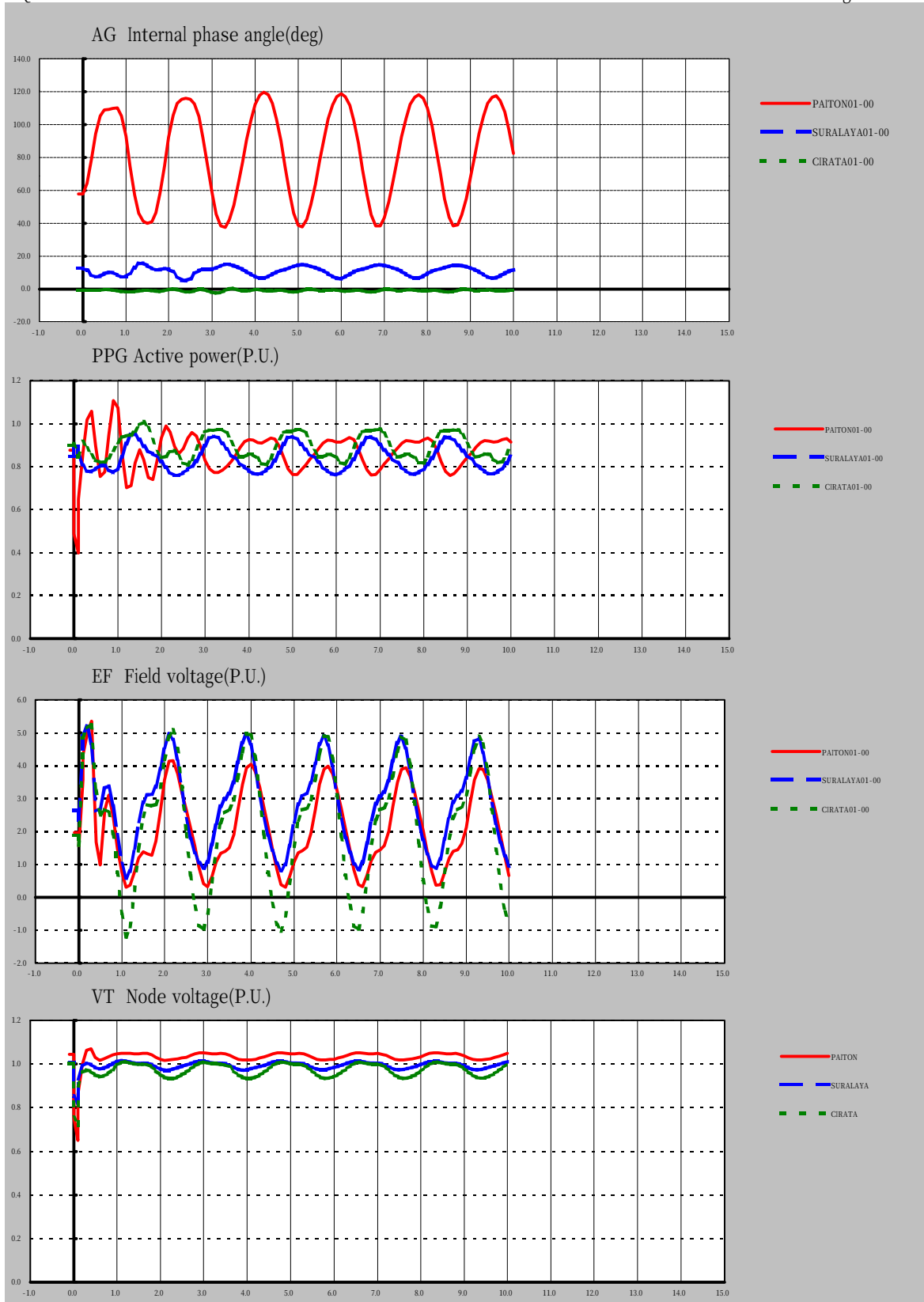


Figure A-8.3.18 [2005] Delay of southern transmission lines and operation of Tanjung Jati B:
Connected to Ungaran (T.J.B 1320MW UNGARAN-CIREBON 1900MW)

SQ Name: UNGARAN-CIREBON 3LGO FL Name: YHOFL0:

Aug-06-2002

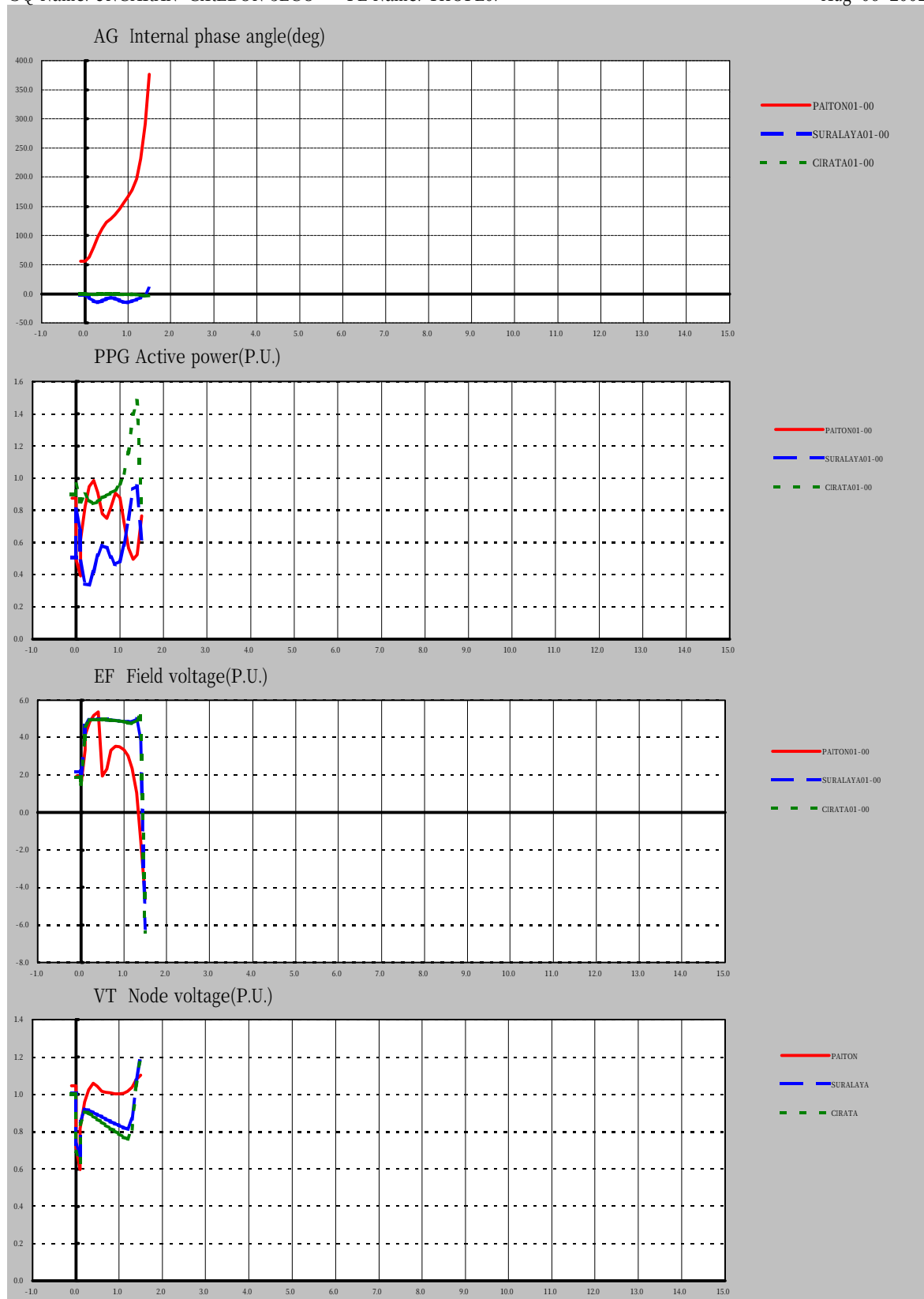


Figure A-8.3.19 [2005] Delay of southern transmission lines and operation of Tanjung Jati B:
Connected to Ungaran (T.J.B 1320MW UNGARAN-CIREBON 1800MW)

SQ Name: UNGARAN-CIREBON 3LGO FL Name: YHOFL0:

Aug-06-2002

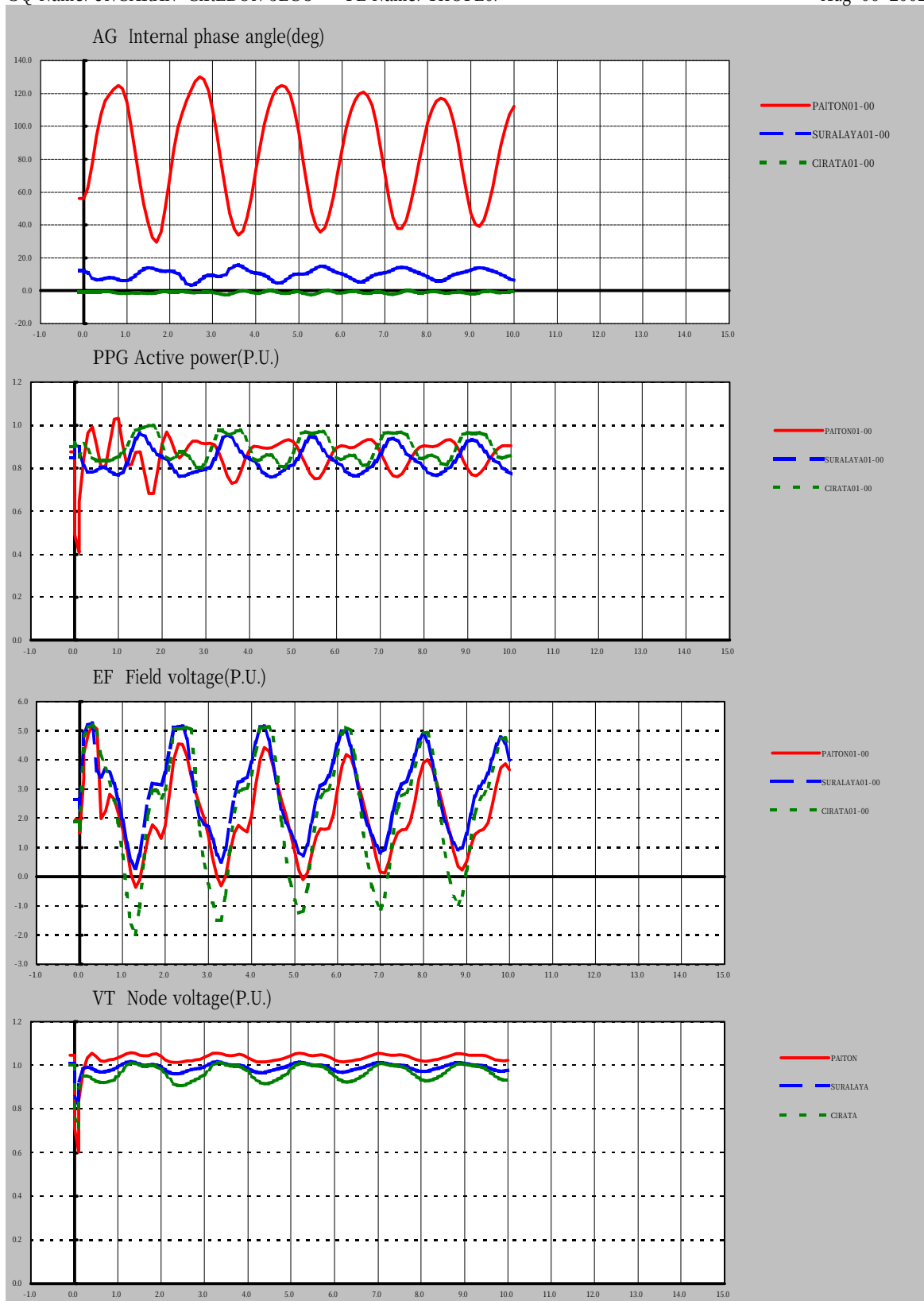


Figure A-8.4.1 Muara Karang Repowering (off-peak)

SQ Name: MuaraKarang(PLTU)-DuriKosambi 3LGO FL Name: YHOFL0:

Aug-06-2002

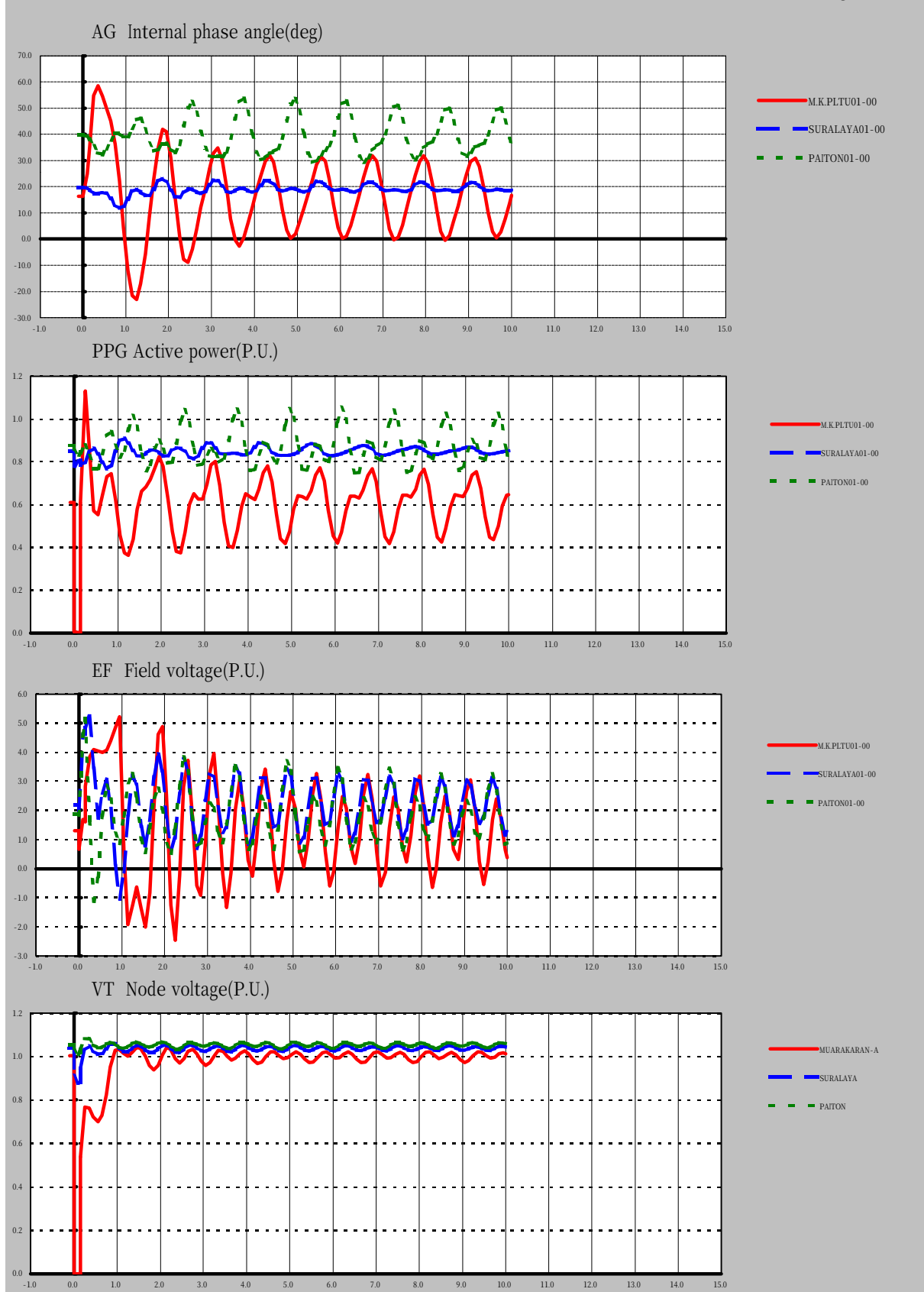


Figure A-8.4.2 Muara Karang Repowering (off-peak)

SQ Name: DuriKosambi-Petukangan 3LGO FL Name: YHOFL0:

Aug-06-2002

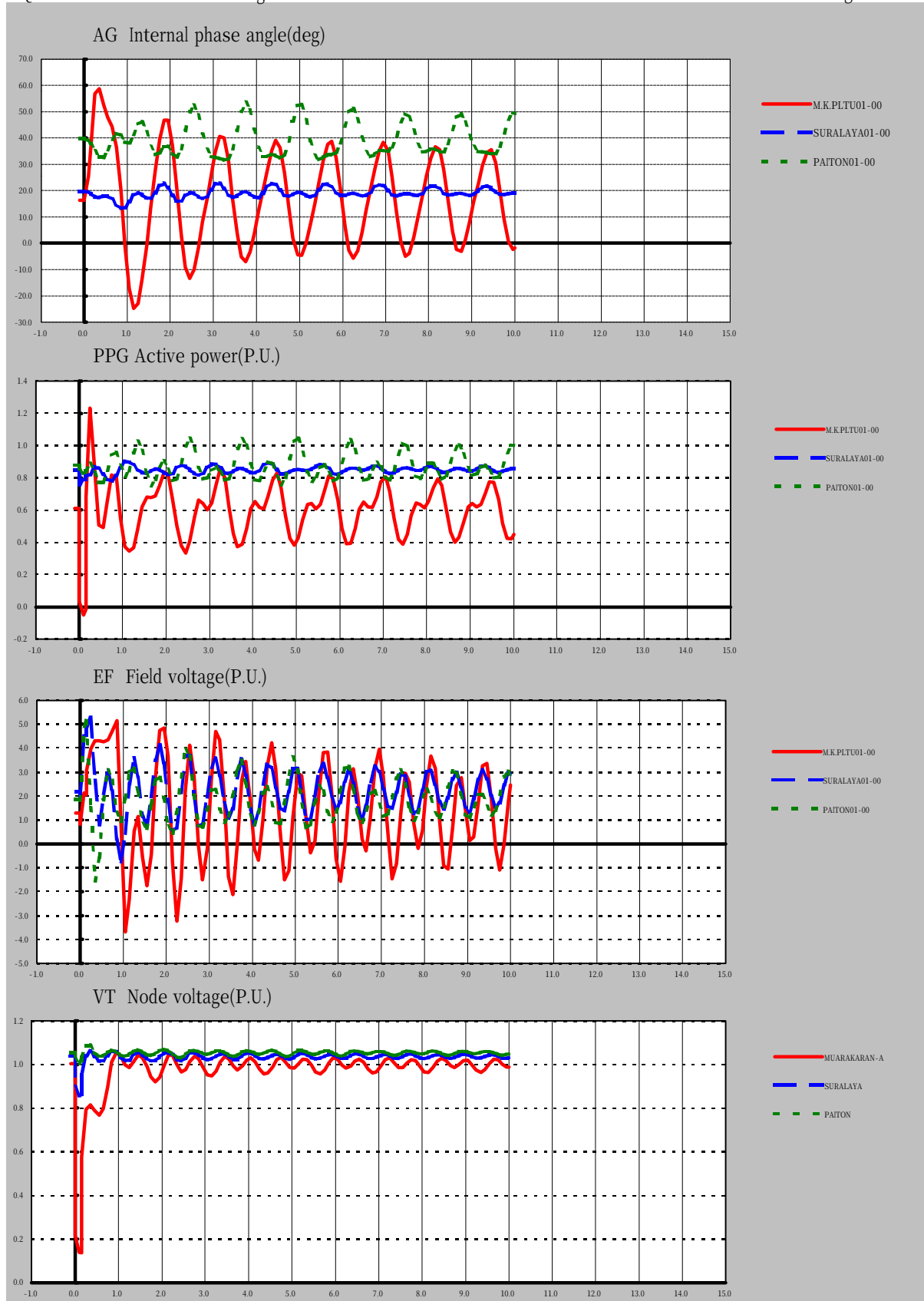


Figure A-8.5.1 Muara Tawar Block II Expansion [2007]

SQ Name: MuaraTawar-Cibatu 3LGO

FL Name: YHOFL0:

Aug-06-2002

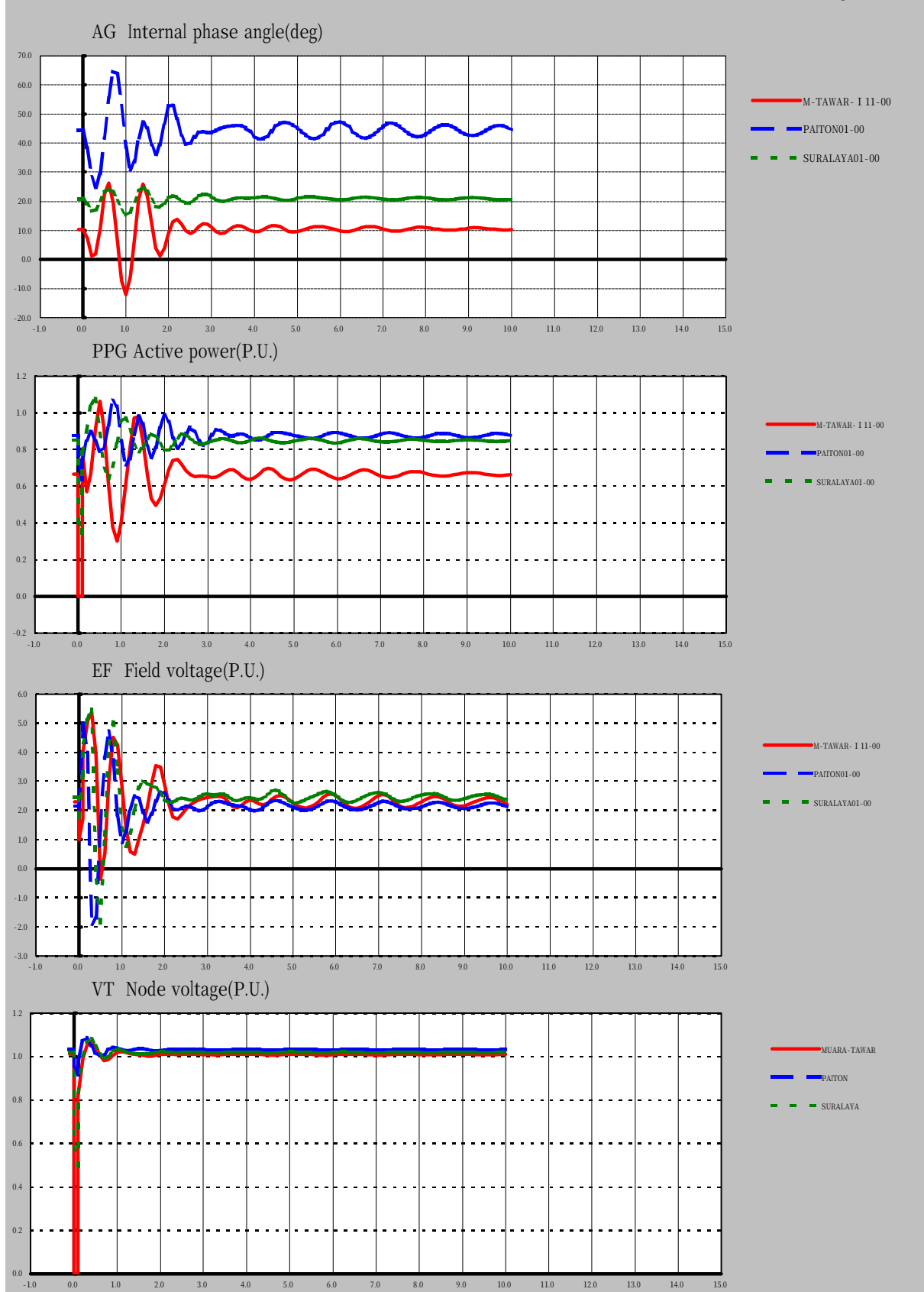


Figure A-8.5.2 Muara Tawar BlockIII Extension [2007]

SQ Name: MuaraTawar-Cibatu 3LGO

FL Name: YHOFL0:

Aug-06-2002

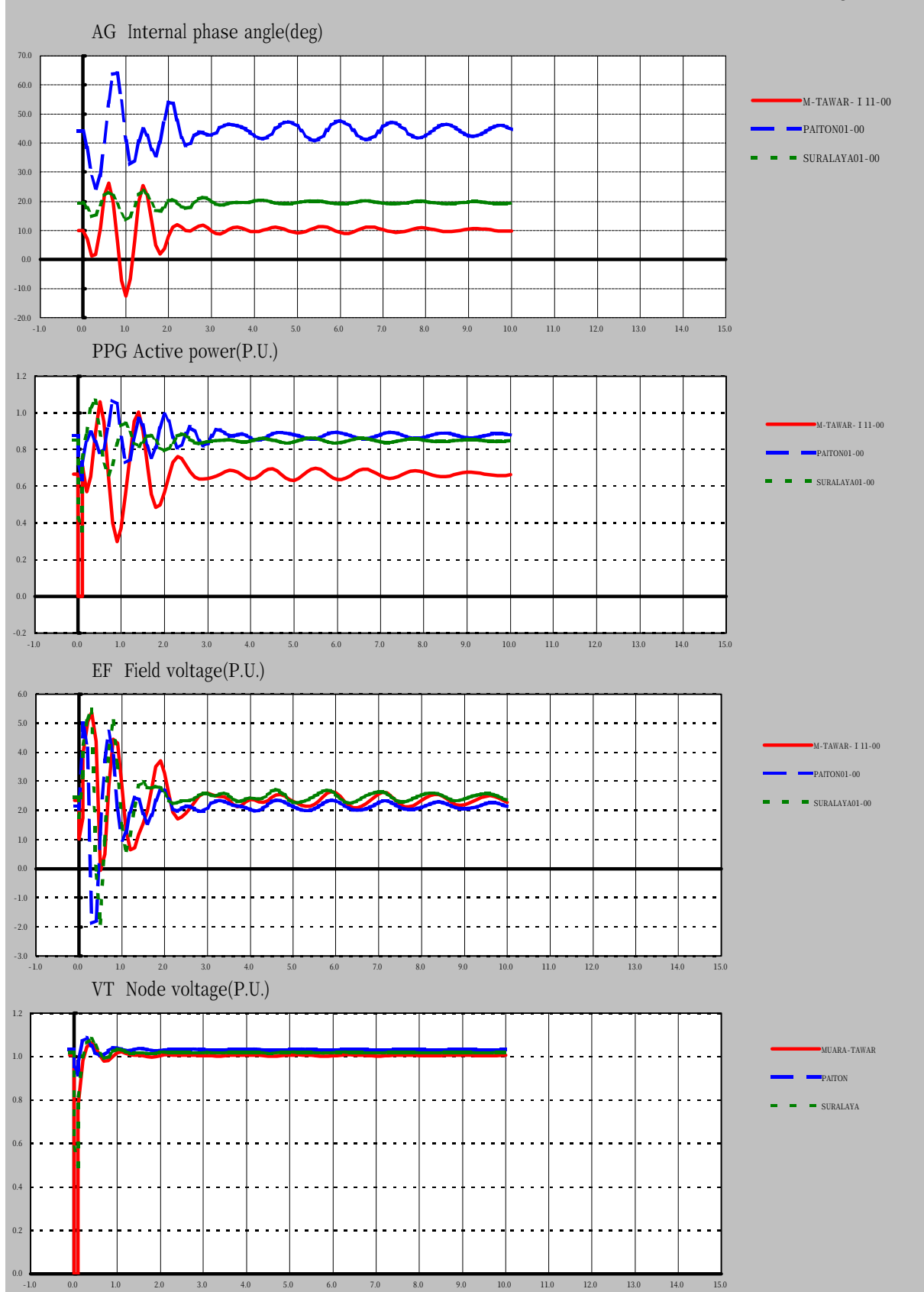


Figure A-8.5.3 Muara Tawar Block II Expansion and III Extension[2007](Without measure)

SQ Name: MuaraTawar-Cibatu 3LGO

FL Name: YHOFL0:

Aug-06-2002

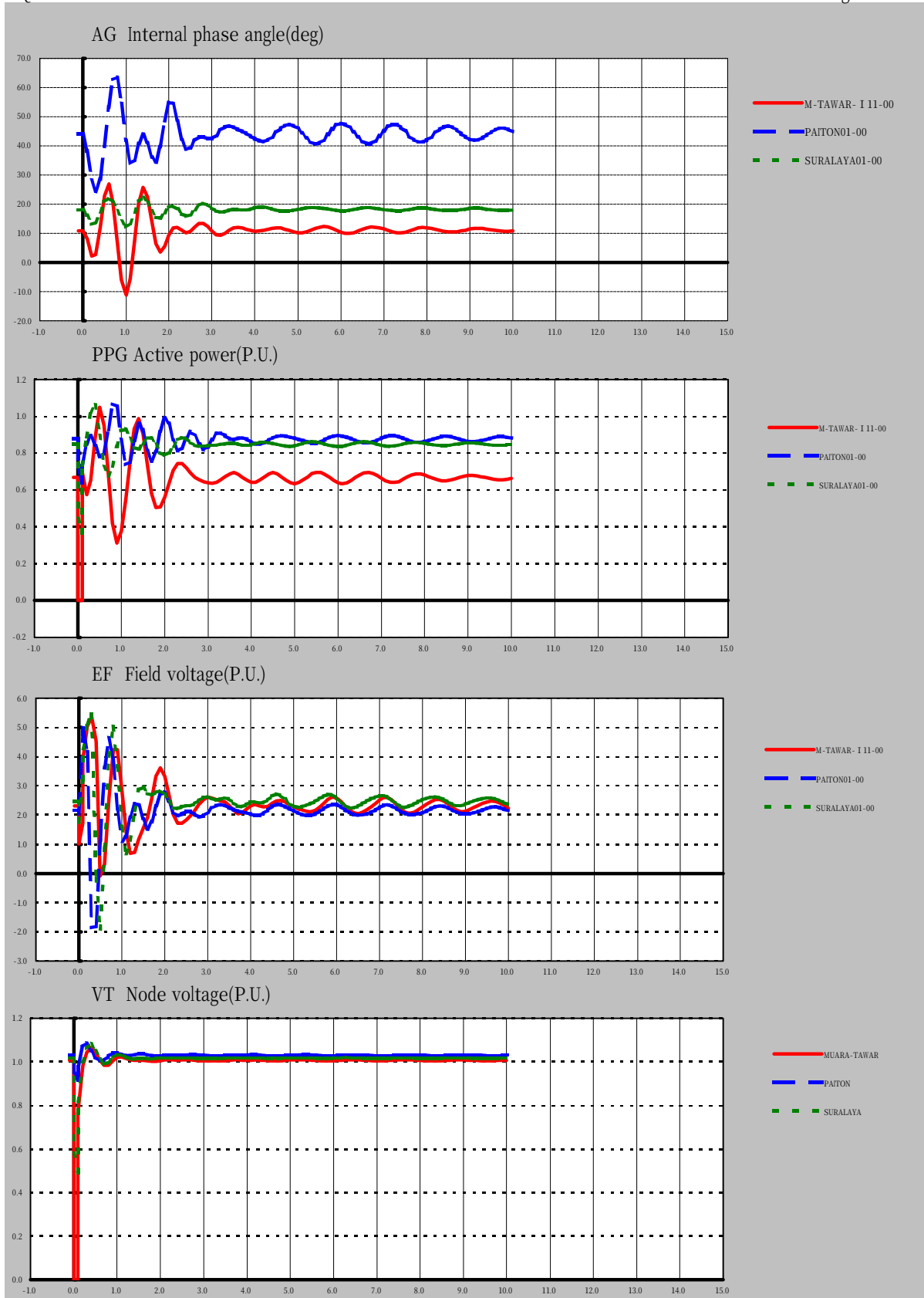


Figure A-8.6.1 Result of Short Circuit Analysis (2010 Balance Case)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2005

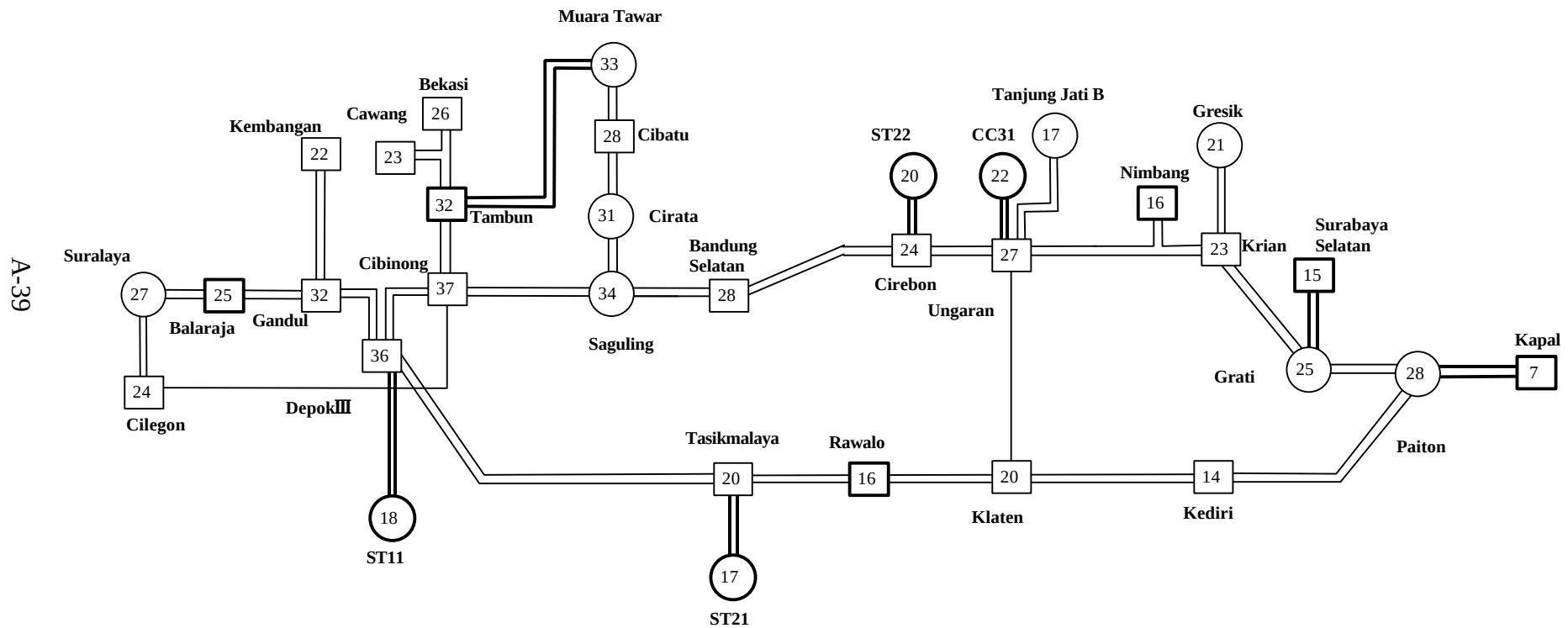


Figure A-8.6.2 Result of Short Circuit Analysis (2010 West Case)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2005

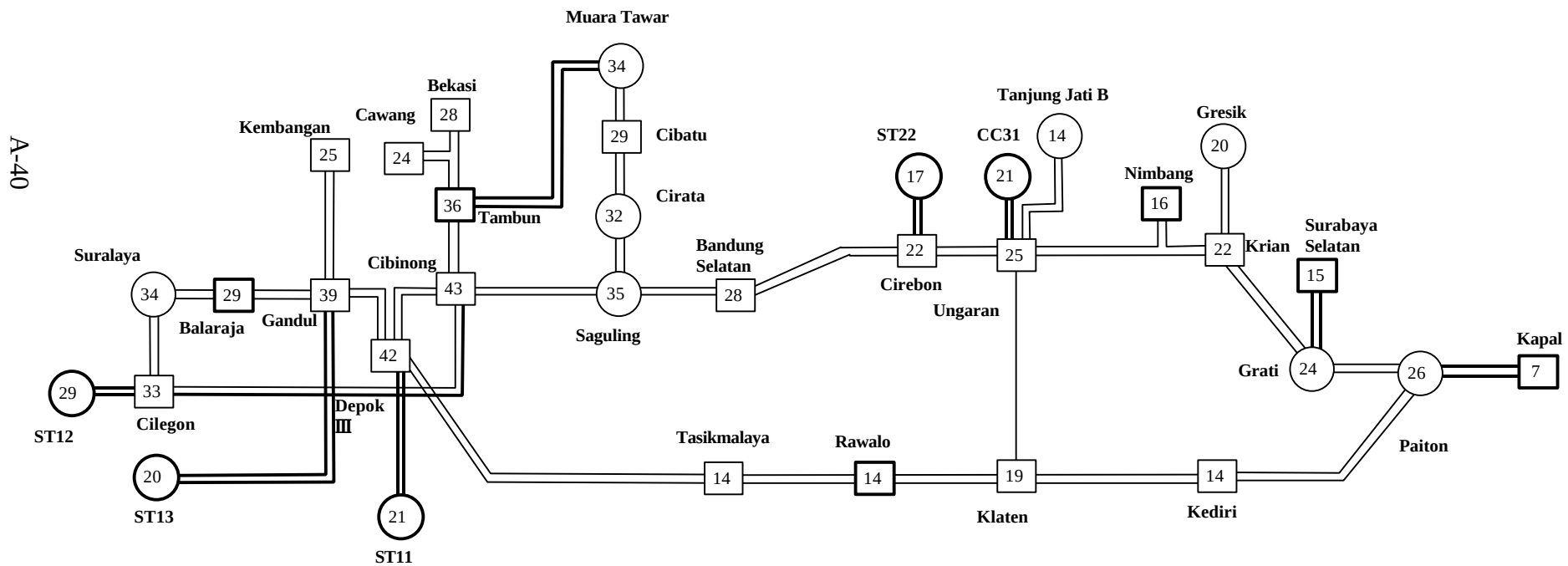


Figure A-8.6.3 Result of Short Circuit Analysis (2010 West Case DepokIII-Cibinong CB-off)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2005

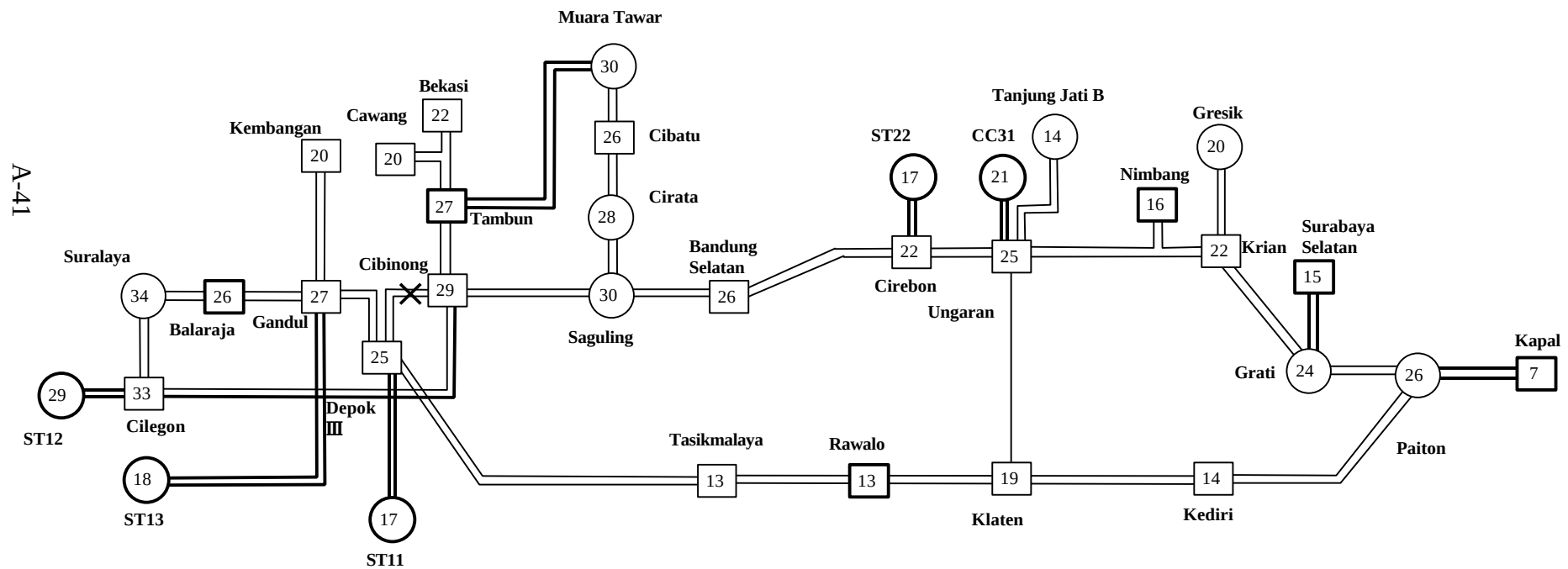
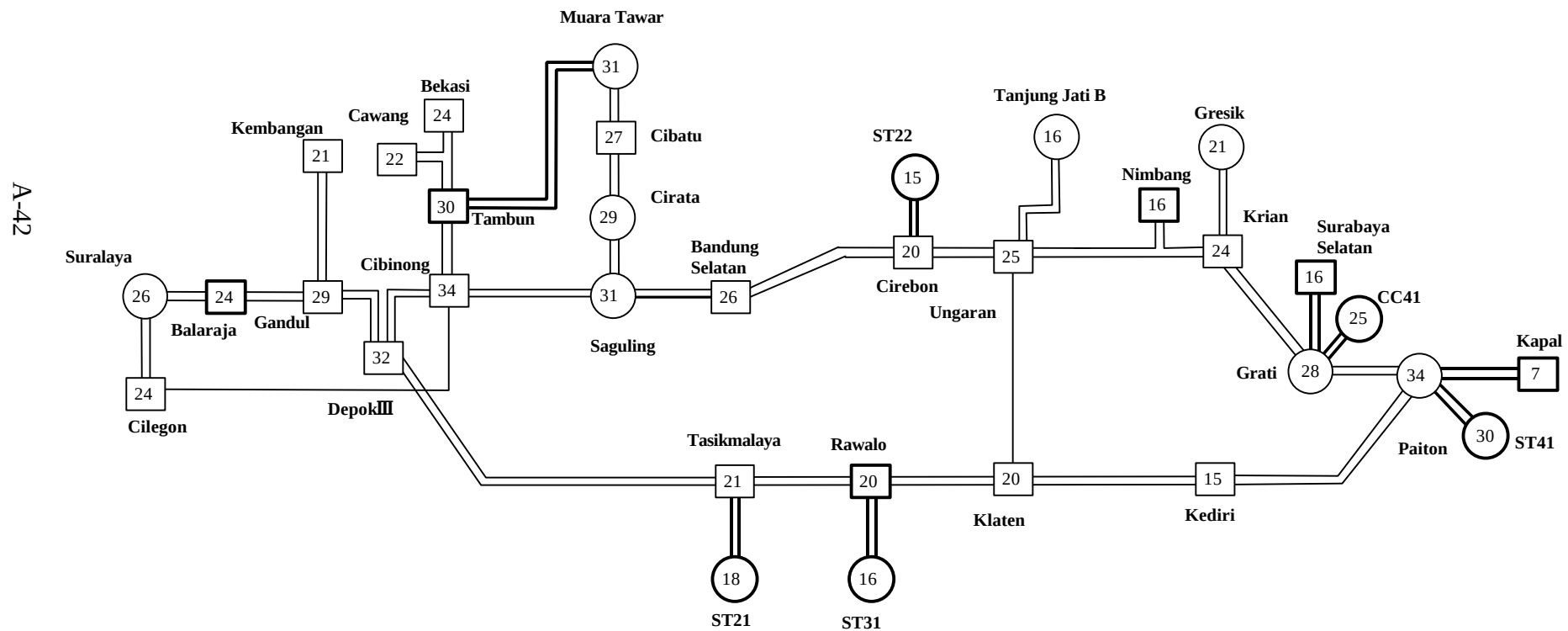


Figure A-8.6.4 Result of Short Circuit Analysis (2010 East Case)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2005



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The circles show the power stations,
and the rectangles show the substations.

A-43

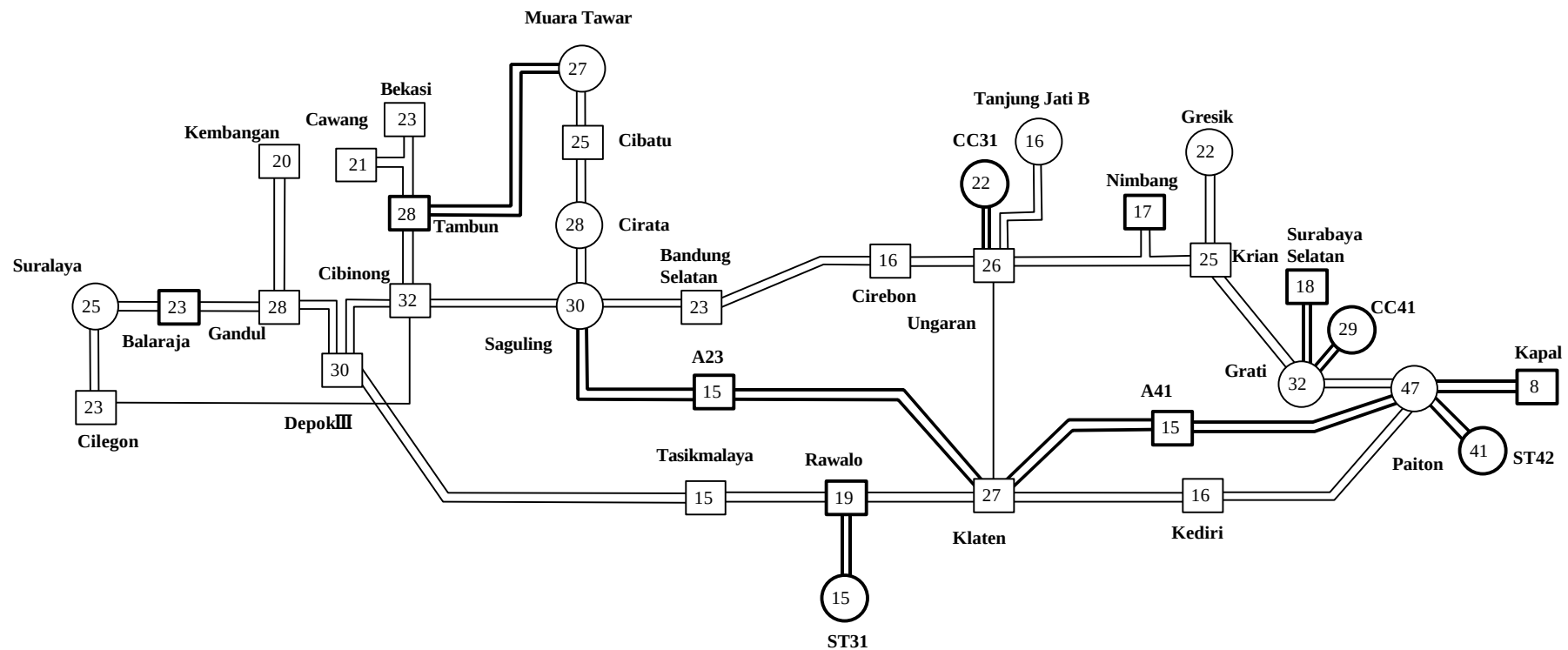


Figure A-8.6.6 Result of Short Circuit Analysis (2015 Balance Case)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

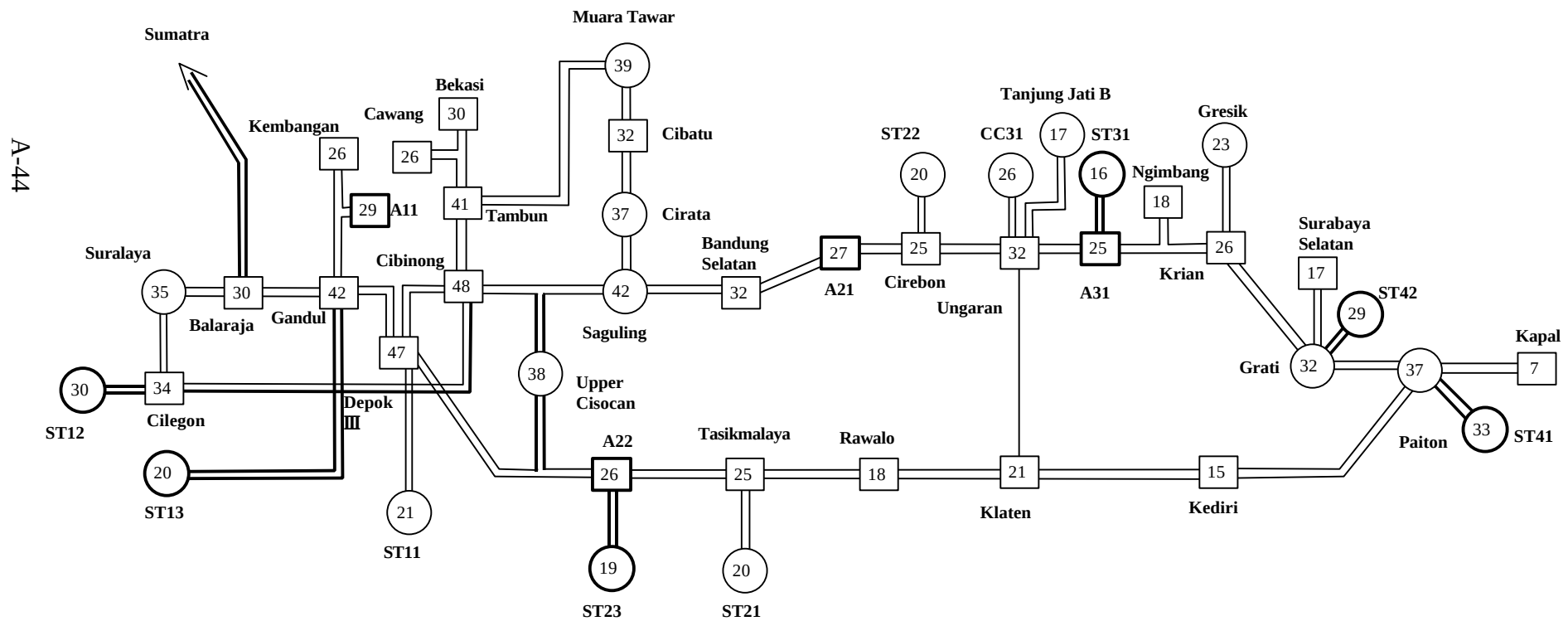


Figure A-8.6.7 Result of Short Circuit Analysis (2015 Balance Case DepokIII-Cibinong CB-off)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

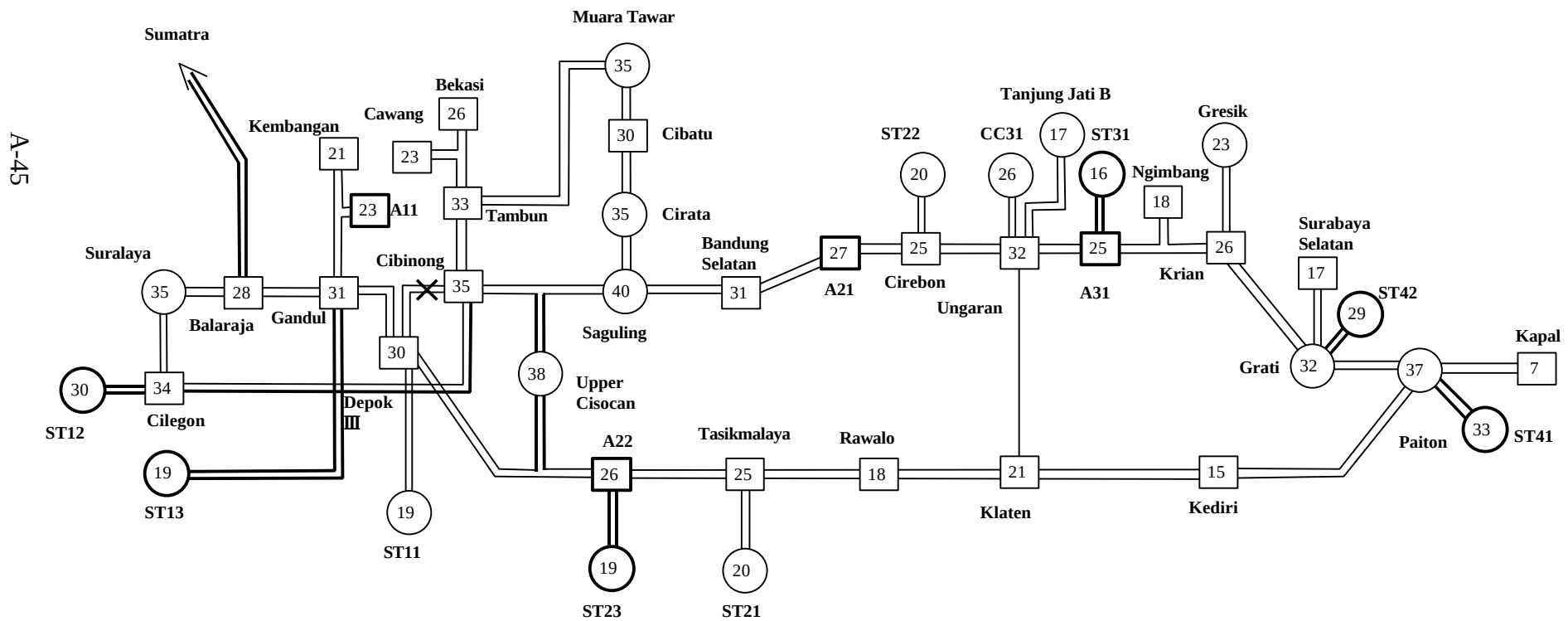


Figure A-8.6.8 Result of Short Circuit Analysis (2015 West Case)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

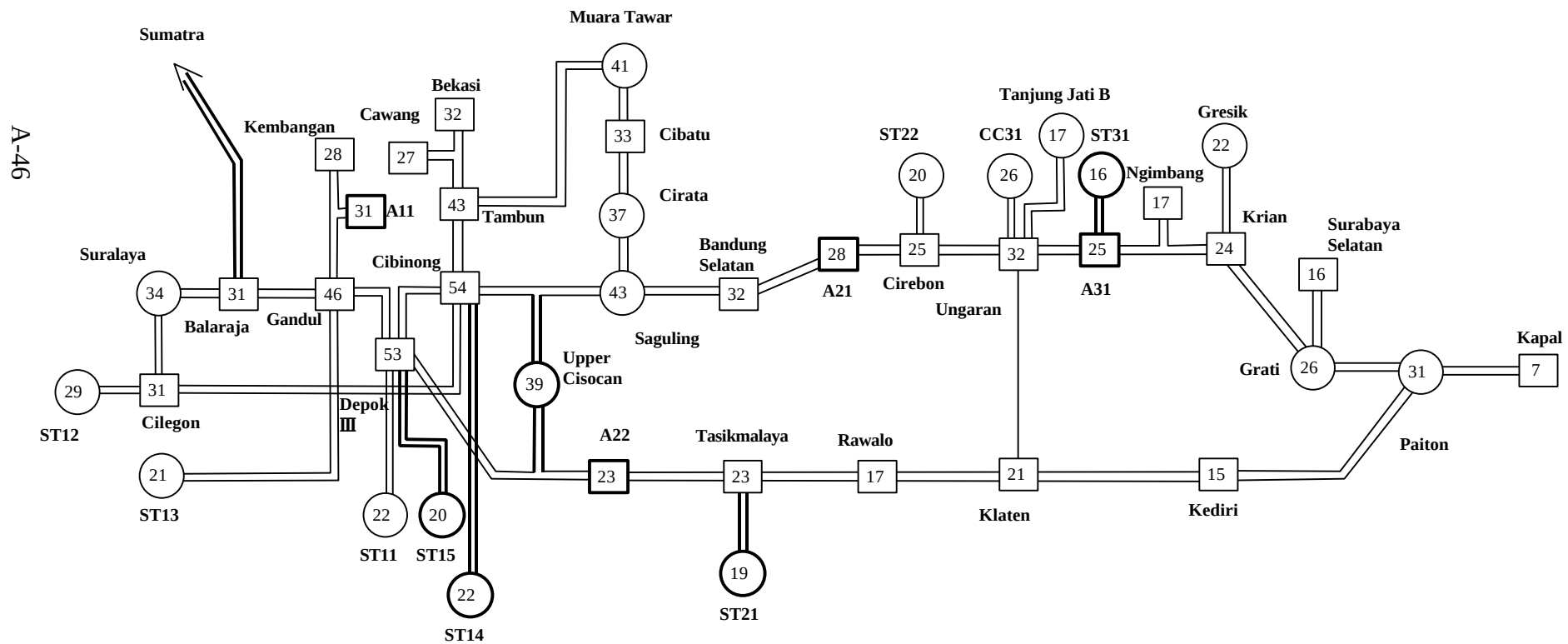


Figure A-8.6.9 Result of Short Circuit Analysis (2015 West Case DepokIII-Cibinong CB-off, Upper-Cisokan bus-tie CB-off)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

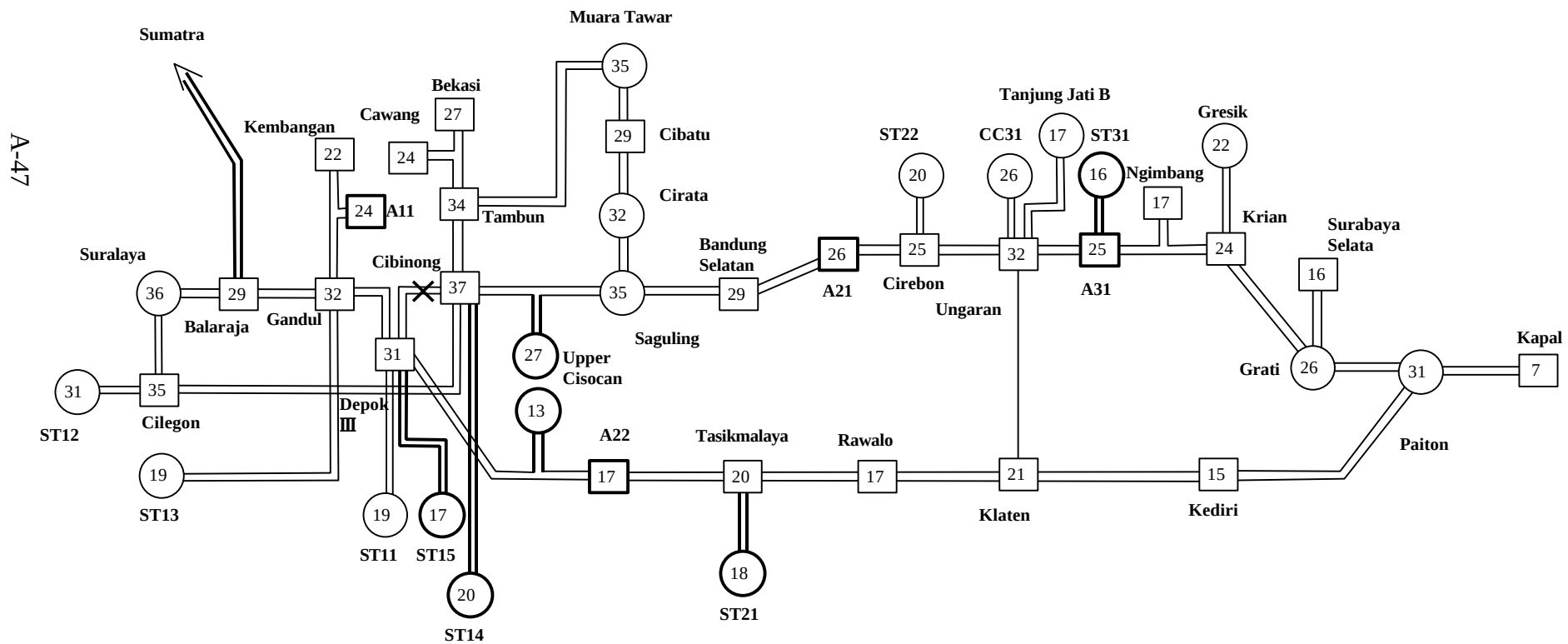


Figure A-8.6.10 Result of Short Circuit Analysis (2015 East Case)

Unit : kA

The circles show the power stations,

and the rectangles show the substations.

The thick lines show the new facilities after 2010

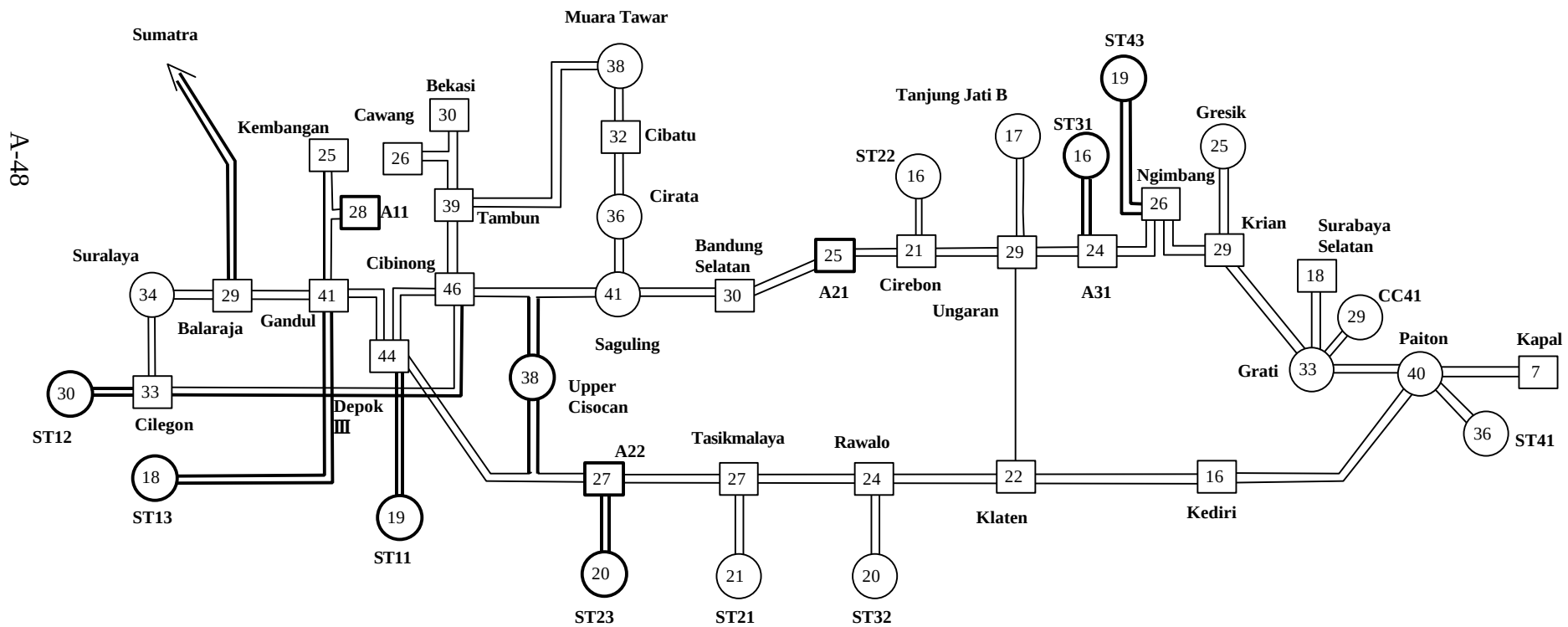


Figure A-8.6.11 Result of Short Circuit Analysis (2015 East Case DepokIII-Cibinong CB-off)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

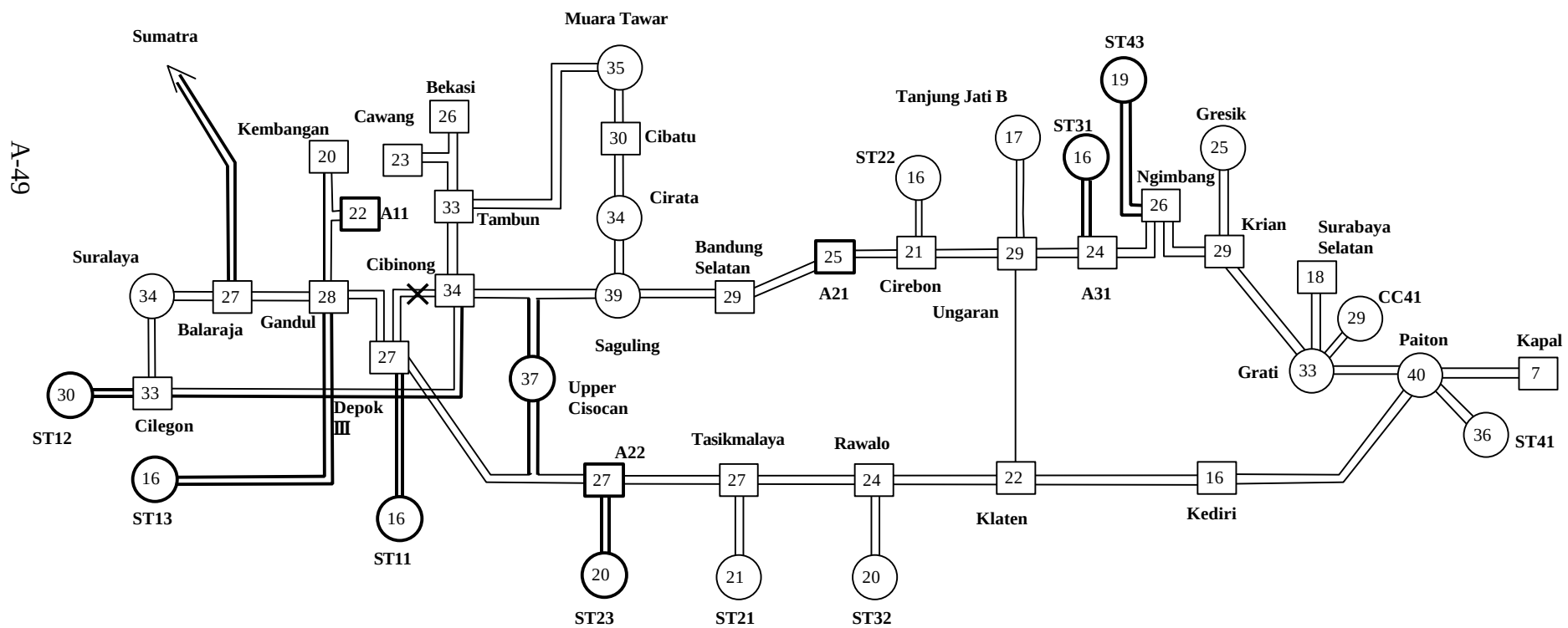


Figure A-8.6.12 Result of Short Circuit Analysis (2015 Heavy-East Case : with measures)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

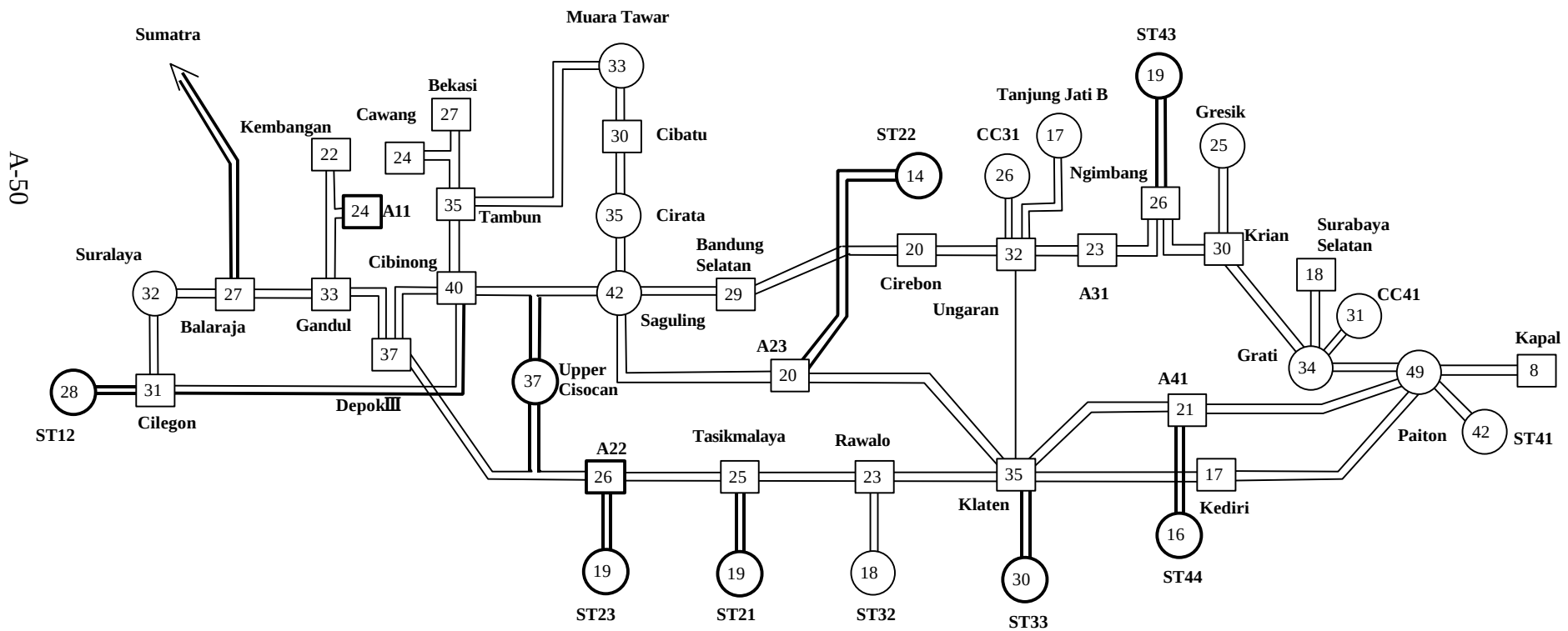


Figure A-8.6.13 Result of Short Circuit Analysis (2015 Heavy-East Case Upper-Cisokan bus-tie CB-off: with measures)

Unit : kA

The circles show the power stations,
and the rectangles show the substations.

The thick lines show the new facilities after 2010

