

Power System Expansion Program

in

East Java



1. Estimated Schedule

83/84	84/85	85/86	86/87	87/88	88/89	89/90
<p>F/S Jica</p> <p>2</p> <p>10</p> <p>3</p> <p>Loan request to OECF for E/S, C/S and Project</p>	<p>10</p> <p>3</p>	<p>E/S</p> <p>10</p> <p>3</p> <p>L/A &amp; Contract for E/S, C/S</p>	<p>7</p> <p>1</p> <p>Tender close</p> <p>Invitation to Penderer</p>	<p>Commencement of construction</p>	<p>6</p> <p>1st Stage completion</p>	<p>6</p> <p>2nd Stage completion</p>
<p>Desira-ble Schedule</p> <p>2</p> <p>3</p> <p>10</p> <p>3</p>	<p>10</p> <p>3</p>	<p>7</p> <p>1</p>				
<p>Generation Project</p> <p>T/L, S/S &amp; D/L Project</p>			<p>Gresik No.3</p> <p>○</p> <p>200 MW</p>	<p>Gresik No.4</p> <p>○</p> <p>200 MW</p>	<p>Paiton</p> <p>○</p> <p>400 MWx1</p>	<p>Paiton</p> <p>○</p> <p>400 MWx1</p>
			<p>EHV</p> <p>○</p> <p>Incoming to Krian</p>			
<p>-----&gt; BELGIA LOAN</p> <p>-----&gt; ACCELERATION PROJECT (Export Credit)</p> <p>-----&gt; GRESIK &amp; KRIAN (TEPSCO) (OECF LOAN)</p> <p>-----&gt; INGGRIS LOAN (PCR)</p> <p>-----&gt; SENGGURUH (N.KOEI) (ADB)</p> <p>-----&gt; Surabaya City (ADB LOAN)(Export Credit) (NEWJEC)</p> <p>-----&gt; Five Cities Project (ADB, EXPORT CREDIT)</p>						

Construction Cost for Priority 1

x 10<sup>3</sup> US\$

		86/87	87/88	88/89	89/90	Total
Price Cost	F	3,850	12,572	17,442	9,739	43,603
	L	-	4,636	14,241	9,605	28,482
	T	3,850	17,208	31,683	19,344	72,085
Contingency	F	385	1,257	1,744	974	4,360
	L	-	464	1,424	960	2,848
	T	385	1,721	3,168	1,934	7,208
En. service	F	872	872	872	872	3,488
	L	89	89	89	89	356
	T	961	961	961	961	3,844
Economic Cost	F	5,107	14,701	20,058	11,585	51,451
	L	89	5,189	15,754	10,654	31,686
	T	5,196	19,890	35,812	22,239	83,137
Price Contingency	F	1,226	4,410	7,421	4,982	18,039
	L	62	4,514	16,699	13,424	34,699
	T	1,288	8,924	24,120	18,406	52,738
Construction Cost	F	6,333	19,411	27,479	16,567	69,490
	L	151	9,703	32,453	24,078	66,385
	T	6,484	28,814	59,932	40,645	135,875
En. service						
8% x 43,603 = 3488 (F.C)						¥ 235 = 105\$
1.25% x 28,482 = 356 (L.C)						¥ 16.33 x 10 <sup>9</sup>
F.C.	0.24	0.30	0.37	0.43		
L.C.	0.7	0.87	1.06	1.26		

## Construction Cost for Priority 1 + 2

		x10 <sup>3</sup> US\$				
		86/87	87/88	88/89	89/90	Total
Price Cost	F	3,850	17,007	26,309	18,607	65,773
	L	-	4,636	20,912	16,276	41,824
	T	3,850	21,643	47,221	34,883	107,597
Contingency	F	385	1,701	2,631	1,861	6,578
	L	-	463	2,091	1,628	4,182
	T	385	2,164	4,722	3,489	10,760
En. service	F	1,316	1,316	1,316	1,316	5,264
	L	131	131	131	131	524
	T	1,447	1,447	1,447	1,447	5,788
Economic Cost	F	5,551	20,024	30,256	21,784	77,615
	L	131	5,230	23,134	18,035	46,530
	T	5,682	25,254	53,390	39,819	124,145
Price Contingency	F	1,332	6,007	11,195	9,367	27,901
	L	92	4,550	24,522	22,724	51,888
	T	1,424	10,557	35,717	32,091	79,789
Construction Cost	F	6,883	26,031	41,451	31,151	105,516
	L	223	9,780	47,656	40,759	98,418
	T	7,106	35,811	89,107	71,910	203,934
En. Service		$8\% \times 65,773 = 5,261.8$ (F.C)				} $\begin{matrix} ¥ 235 = 10US\$ \\ ¥ 24.8 \times 10.9 \end{matrix}$
		$1.25\% \times 41,824 = 522.8$ (L.C)				
Escalation Ratio :						
	F.C.	0.24	0.30	0.37	0.43	
	L.C.	0.7	0.87	1.06	1.26	

## Scope of Work

## (1) Transmission line

No.	Name of line	Voltage	cct	Length	Operation time	Note
1	Sukolilo-Kenjeran	150	2nd	6	1st Stage	1st stage up to 88/89
②	Branch for big customer from Segoromadu	70	2cct	10	2nd	2nd stage up to 89/90
3	Ngawi incomer	150	2cct	10	1st	
4	Branch for Darmo Grande	150	2cct	5	1st	
5	Babat-Tuban	150	2cct	20	1st	
6	Tulungagung-Kediri	70	2nd	30	1st	
7	Krian-Babatan (118)	150	2cct	9	2nd	
8	Sukolilo-Ngagel	150	2cct (UGC)	3	1st	
9	Ngagel-Simpang	150	2cct (UGC)	7	1st	
⑩	Krian-Tandes	150	2cct	13	2nd	
11	Probolinggo-Kraksaan	150	2cct	30	2nd	
12	Kraksaan-Paiton	150	2cct	30	2nd	
13	Gilitimur-Bangkalan	150	1/2cct	160	2nd	
14	Bangkalan-Sampang	150	1/2cct			
15	Sampang-Pamekasan	150	1/2cct			
16	Pamekasan-Sumenep	150	1/2cct			
⑪	Karangploso Branch	150	2cct	1km	2nd	
⑫	Tanggul Branch	150	1/2cct	1km	2nd	
⑬	No.16 S/S Branch	150	2cct	2km	2nd	
⑭	Tandes-simpang	150	2cct (UGC)	10km	2nd	
⑮	Genteng Branch	150	1/2cct	1km	2nd	
22	Runkut Branch	150	2cct	0.1km	1st	
⑯	No.12A S/S Branch	150	4cct	1km	2nd	
⑰	No.13 S/S Branch	150	2cct	10km	2nd	
25	Waru-Sawahan-Mojokerto (Rehabilitation)	70	2cct	50km	1st	

## (2) Substation 150/70 kV

No.	Name	Cap.	Stage	Priority	Note
1	Segoromadu	50x2	1st	1	
2	New Kediri	50	1st	1	
3	Mojokerto	50	2nd	1	

## 1st priority

1st stage            50x3

2nd stage            50x1

total                200MVA

No.	Name	Voltage	Capacity	Stage	Priority	Note	
	1	Rungkut	150/20	50	1st	1	
△	2	Darmo Grande	150/20	50	1st	1	
△	3	Ngagel	150/20	20	1st	1	GIS
△	4	Simpang	150/20	50	1st	1	GIS
△	5	Babatan	150/20	50	2nd	1	
	6	Segoromadu	150/20	50	1st	1	
	7	Probolinggo	150/20	20	1st	1	
	8	New Madiun	150/20	20	2nd	1	
	9	Ngawi	150/20	10	1st	1	
	10	Movable unit S/S	150(70)/20	10x2	1st	1	
△	11	Kraksaan	150/20	20	2nd	1	
△	12	Tuban	150/20	20	2nd	1	
△	13	Bangkalan	150/20	10	2nd	1	Madura
△	14	Sampang	150/20	10	2nd	1	"
△	15	Pamekasan	150/20	10	2nd	1	"
△	16	Sumenep	150/20	10	2nd	1	"
	17	Kertosono (Jombang)	70/20	10	2nd	2	1st priority
	18	Kenjeran	150/20	50	2nd	2	1st stage 2nd stage
	19	Sukolilo	150/20	50	2nd	2	150/20 50x4 20x2 10x3 50x1 20x3 10x4
△	20	Segoromadu	150/20	50	2nd	2	
	21	Karangploso	150/20	20	2nd	2	
	22	Mojokerto	150/20	20	2nd	2	70/20 - -
	23	Jember	150/20	20	2nd	2	270 150 420
△	24	Tanggul	150/20	10	2nd	2	
	25	Sidoarjo	70/20	30	2nd	2	2nd priority
	26	Bangil/New Pleret	70/20	20	2nd	2	1st stage 2nd stage
△	27	Genteng	150/20	10	2nd	2	
	28	Tulungagung	70/20	10	2nd	2	150/20 50x6 20x3 10x2
	29	Trenggalek	70/20	10	2nd	2	
△	30	No.16	150/20	50	2nd	2	70/20 30x1 20x1 10x3
△	31	No.12A	150/20	50	2nd	2	
△	32	No.13	150/20	50	2nd	2	460 460
	33	Shunt capacitor	20kV	47MVR	1st	1	880

△ : New construction

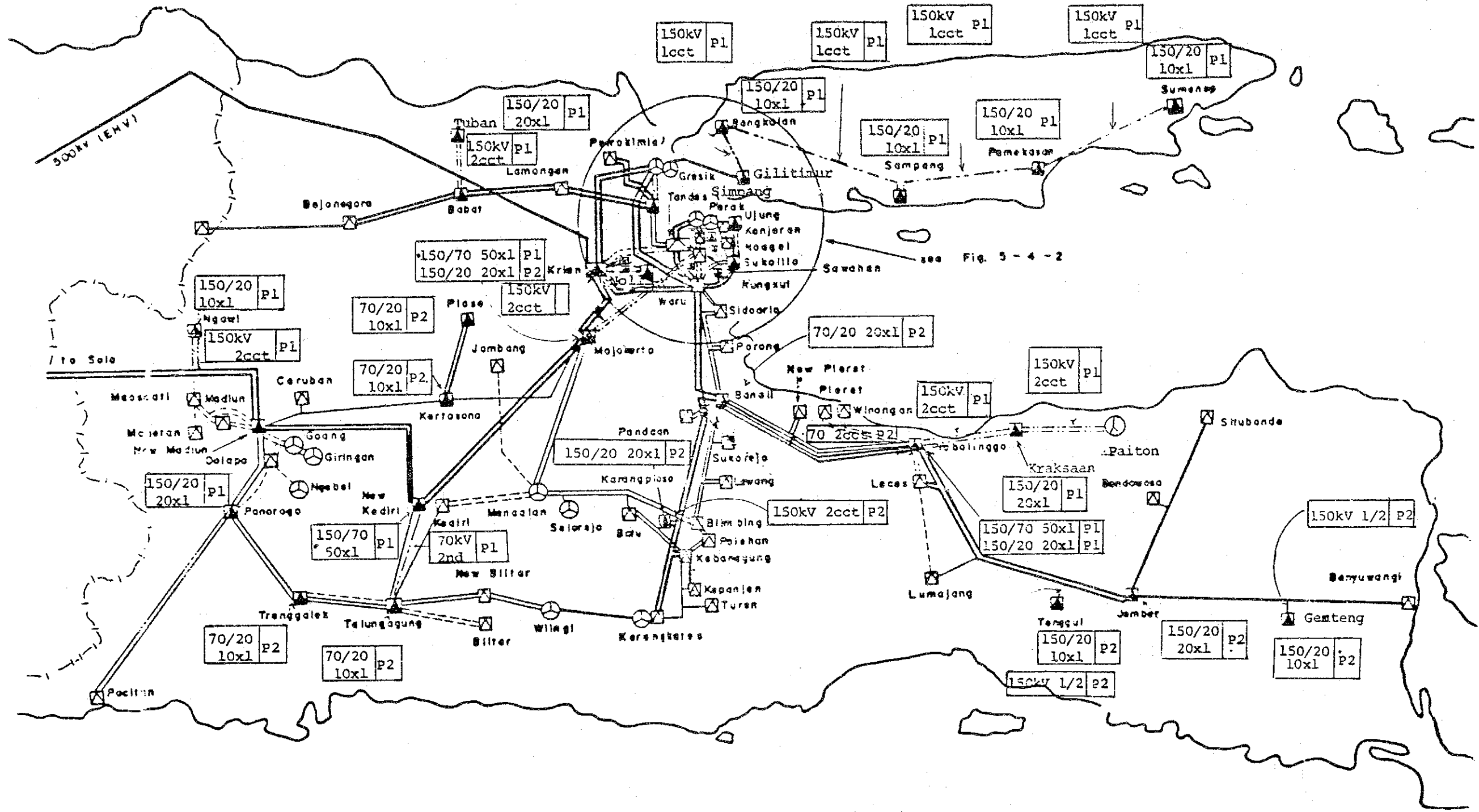


(4) Distribution

MV line km 400 km (1st P200km 2ndP,200km)

Transformer 200 MVA (1st P,100 MVA 2ndP,100 MVA)

### East Java Power System Map (1985/86 ~ 1989/90 Phase)



——— 150 kv  
 - - - - 70 kv  
 - - - - 25 ~ 30 kv

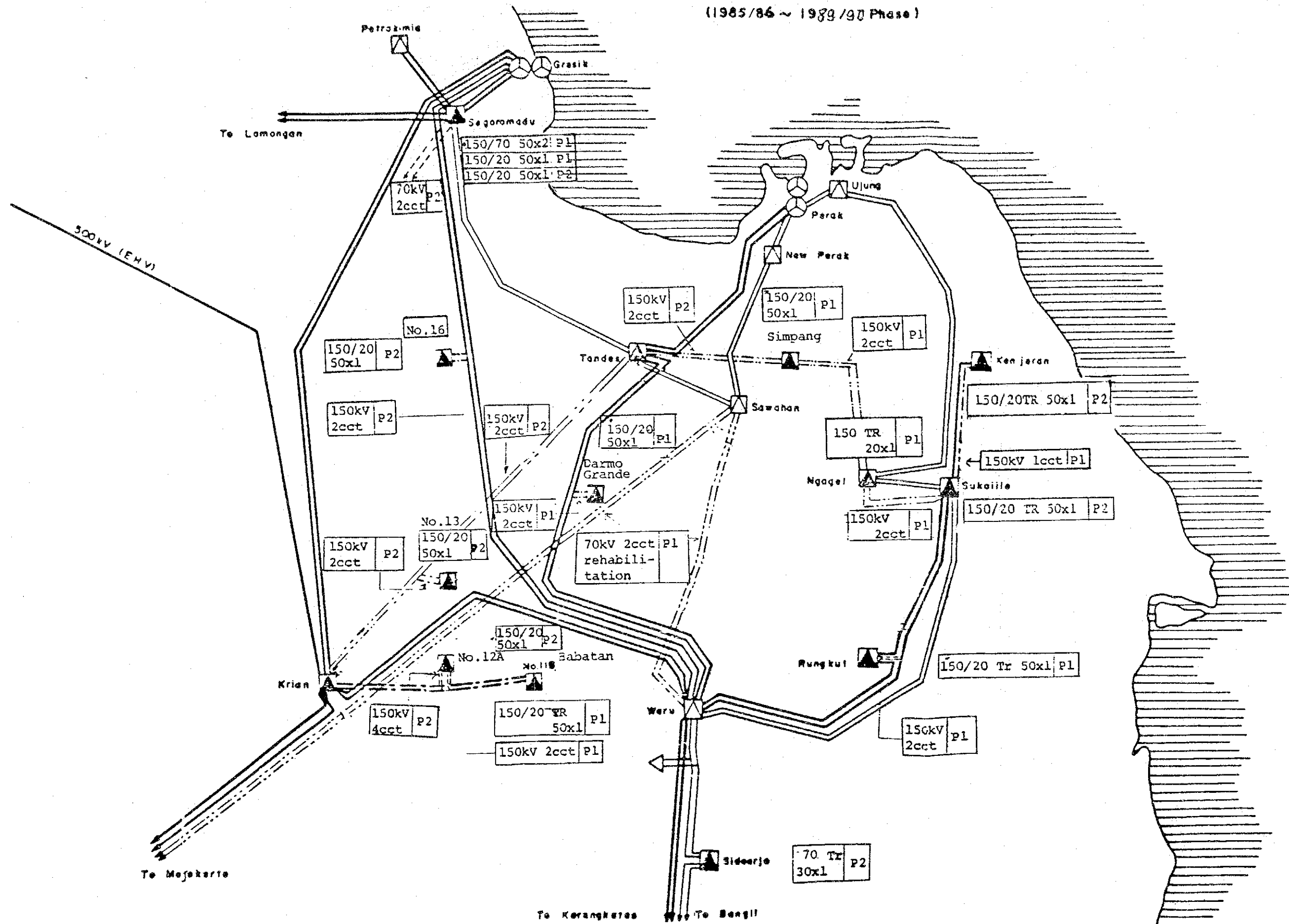
⊕ Power plant  
 ⊠ Substation

This Phase



20kv	
Shunt capacitor 47 MVAR	P1
Unit S/S 150(70)/20 10x2	P1

### East Java Power System Map (Surabaya City) (1985/86 ~ 1989/90 Phase)



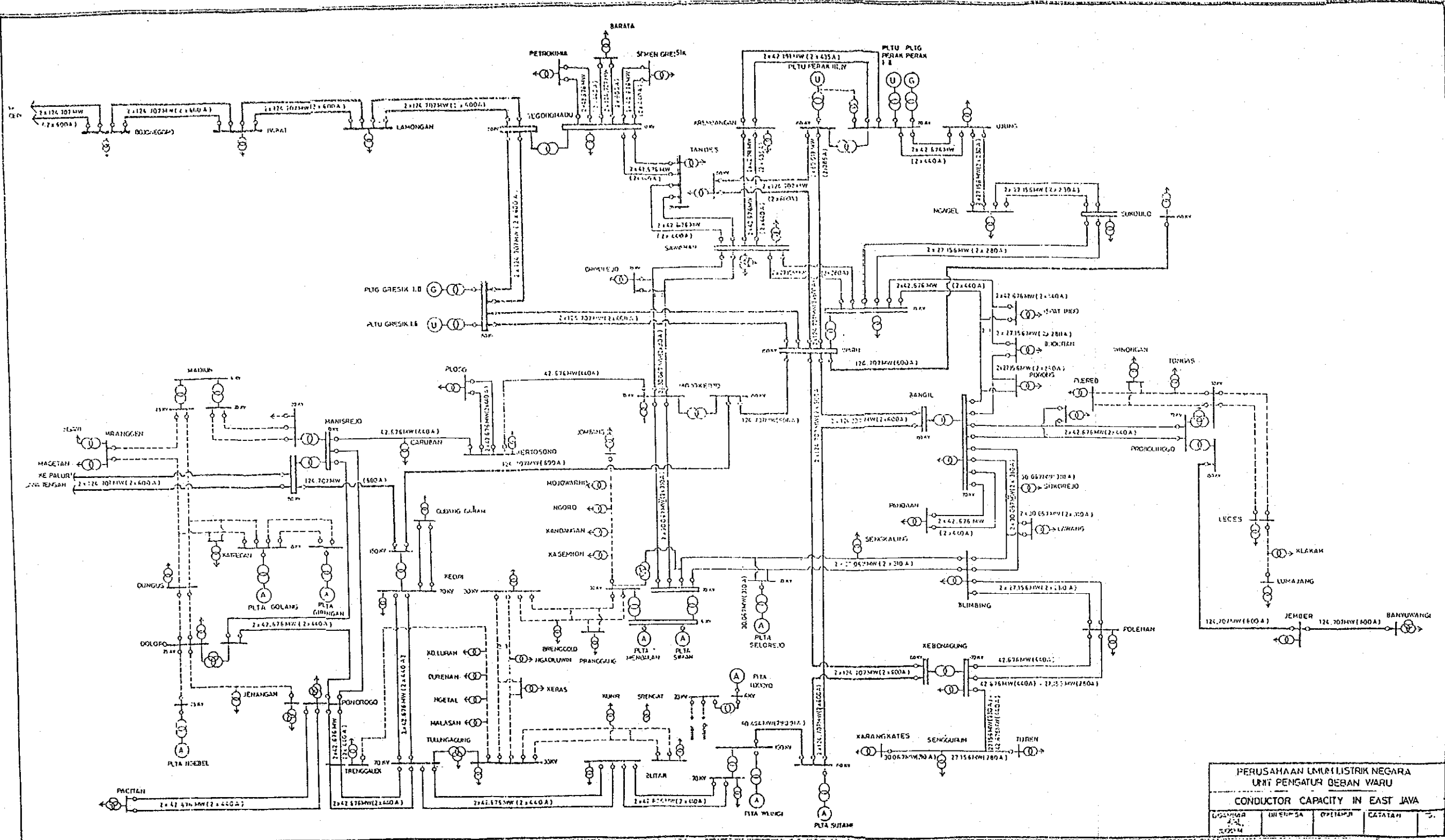


Transmission System Diagram

in

East Java





PERUSAHAAN LISTRIK NEGARA  
 UNIT PENGATUR BEBAN WARU  
 CONDUCTOR CAPACITY IN EAST JAVA

LOKASI	UMUR SA	PELEMPA	KEKAPASITAN	...



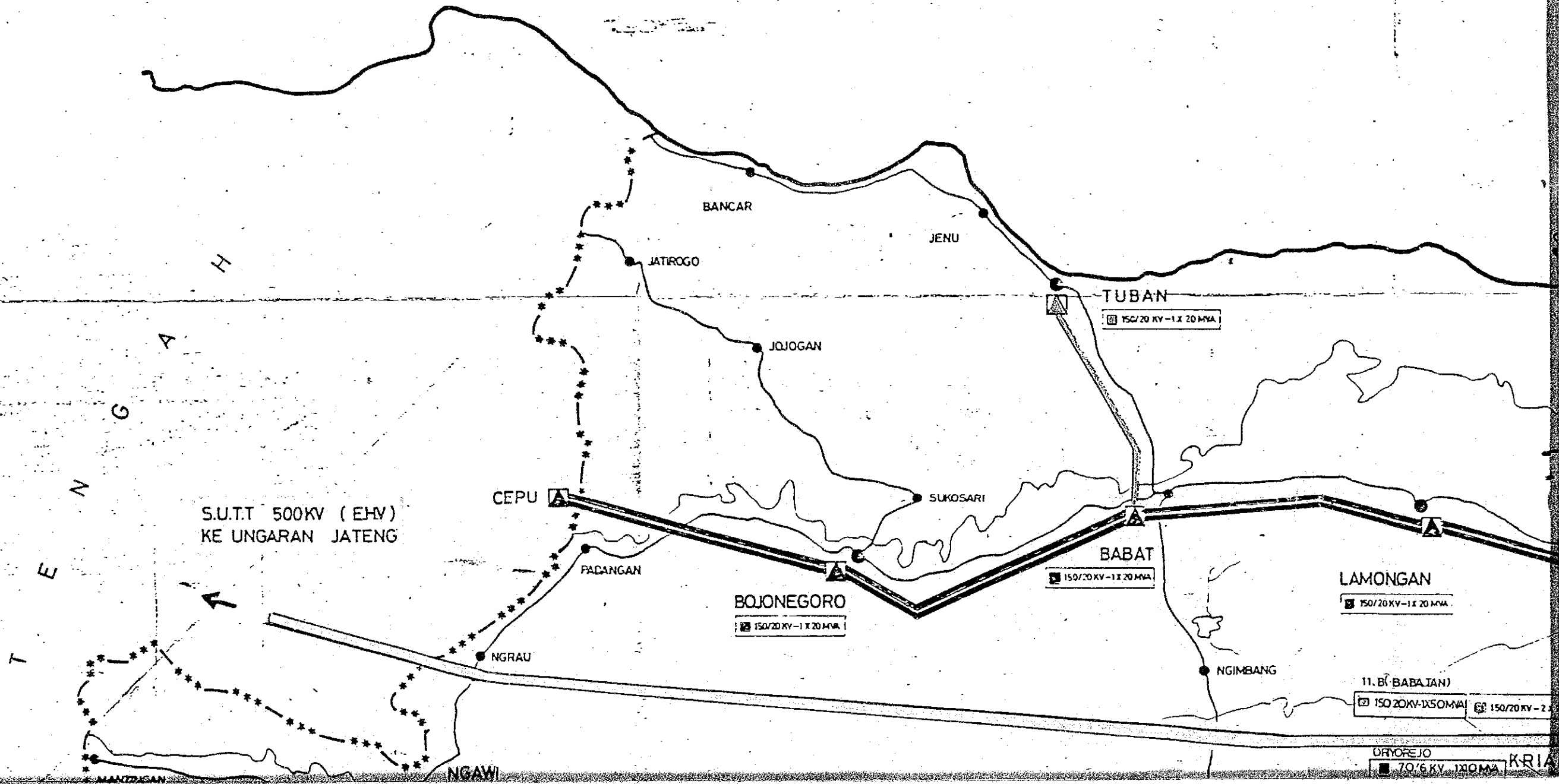




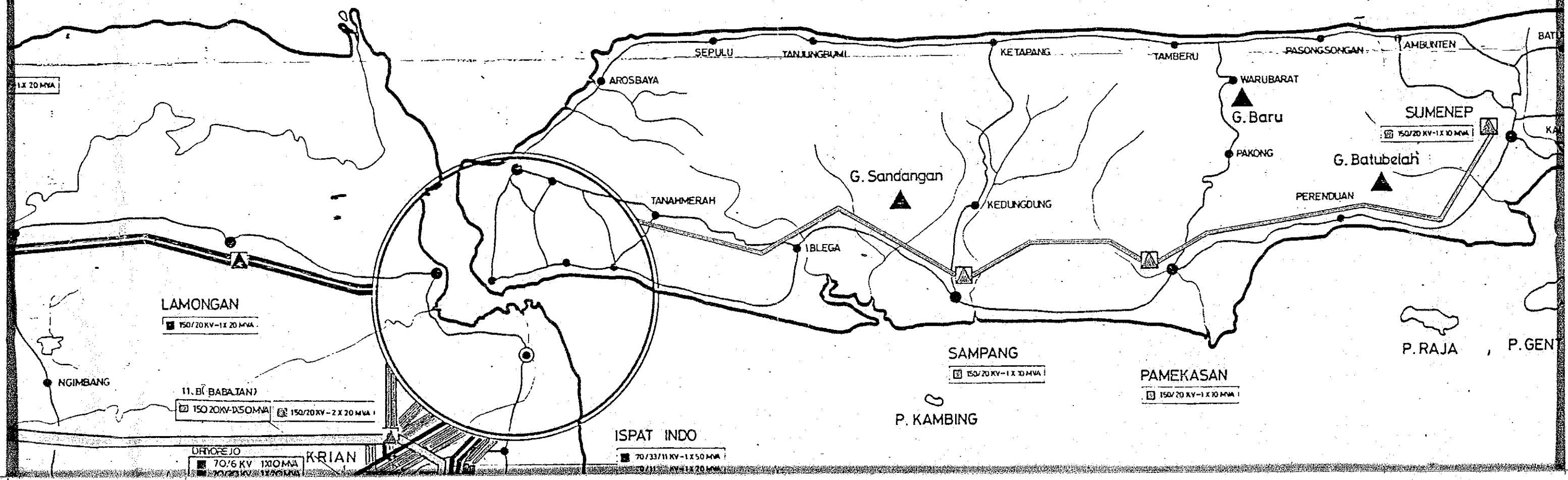




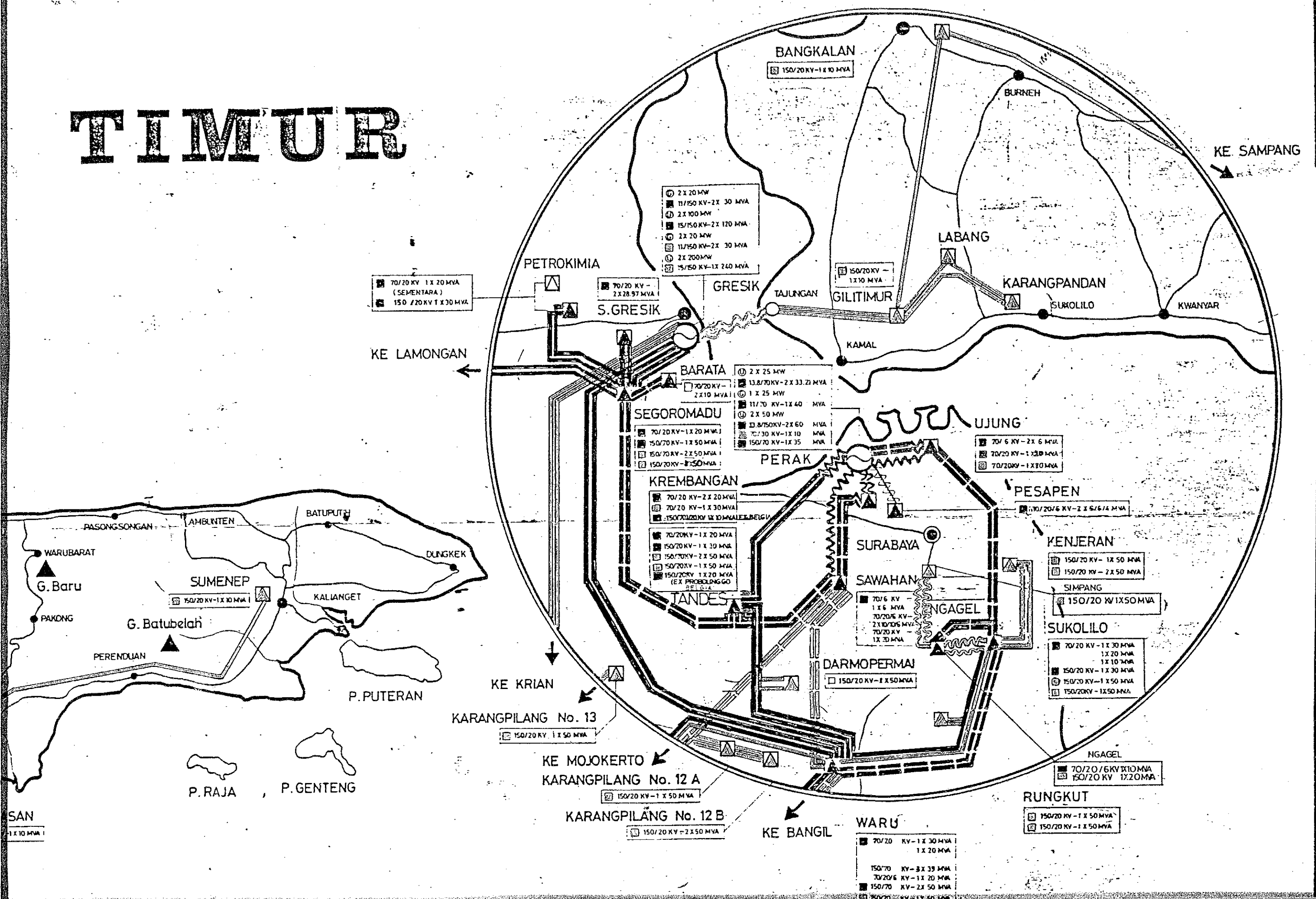
# PETA KELIST



# ELISTRIKAN JAWA TIMU



# TIMUR



70/20 KV - 1X 20 MVA  
 (SEMENTARA)  
 150 /20 KV - 1X 30 MVA

2 X 20 MW  
 11/150 KV - 2X 30 MVA  
 2 X 100 MW  
 15/150 KV - 2X 120 MVA  
 2 X 20 MW  
 11/150 KV - 2X 30 MVA  
 2 X 200 MW  
 15/150 KV - 1X 240 MVA

2 X 25 MW  
 13.8/70KV - 2 X 33.23 MVA  
 1 X 25 MW  
 11/70 KV - 1X 40 MVA  
 2 X 50 MW  
 13.8/150KV - 2X 60 MVA  
 70/30 KV - 1X 10 MVA  
 150/70 KV - 1X 35 MVA

70/6 KV - 2X 6 MVA  
 70/20 KV - 1 X 20 MVA  
 70/20KV - 1 X 10 MVA

70/20 KV - 1X 20 MVA  
 150/70 KV - 1X 50 MVA  
 150/70 KV - 2X 50 MVA  
 150/20KV - 8X 50 MVA  
 70/20KV - 1X 20 MVA  
 150/20 KV - 1 X 30 MVA  
 150/70KV - 2X 50 MVA  
 150/20KV - 1X 50 MVA  
 150/20KV - 1X 70 MVA  
 (EX PHOENIXGO BELGIA)

110/20/6 KV - 2 X 6/6/4 MVA

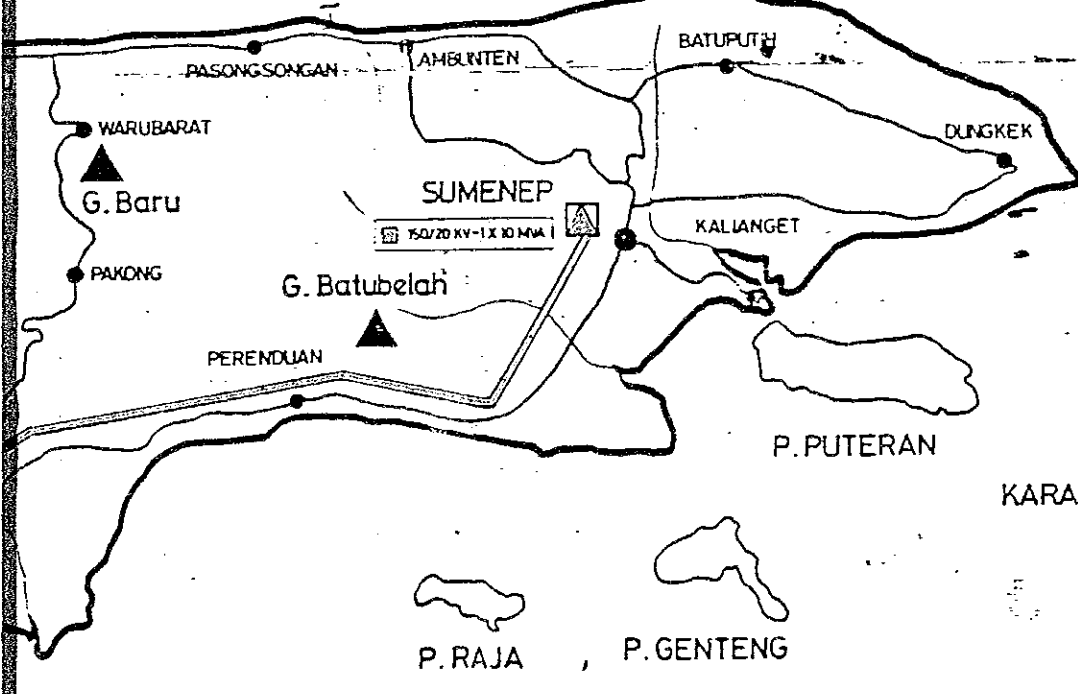
150/20 KV - 1X 50 MVA  
 150/20 KV - 2X 50 MVA  
 SIMPANG  
 150/20 KV 1X 50 MVA

70/20 KV - 1X 30 MVA  
 1X 20 MVA  
 1X 10 MVA  
 150/20 KV - 1X 30 MVA  
 150/20 KV - 1 X 50 MVA  
 150/20KV - 1X 50 MVA

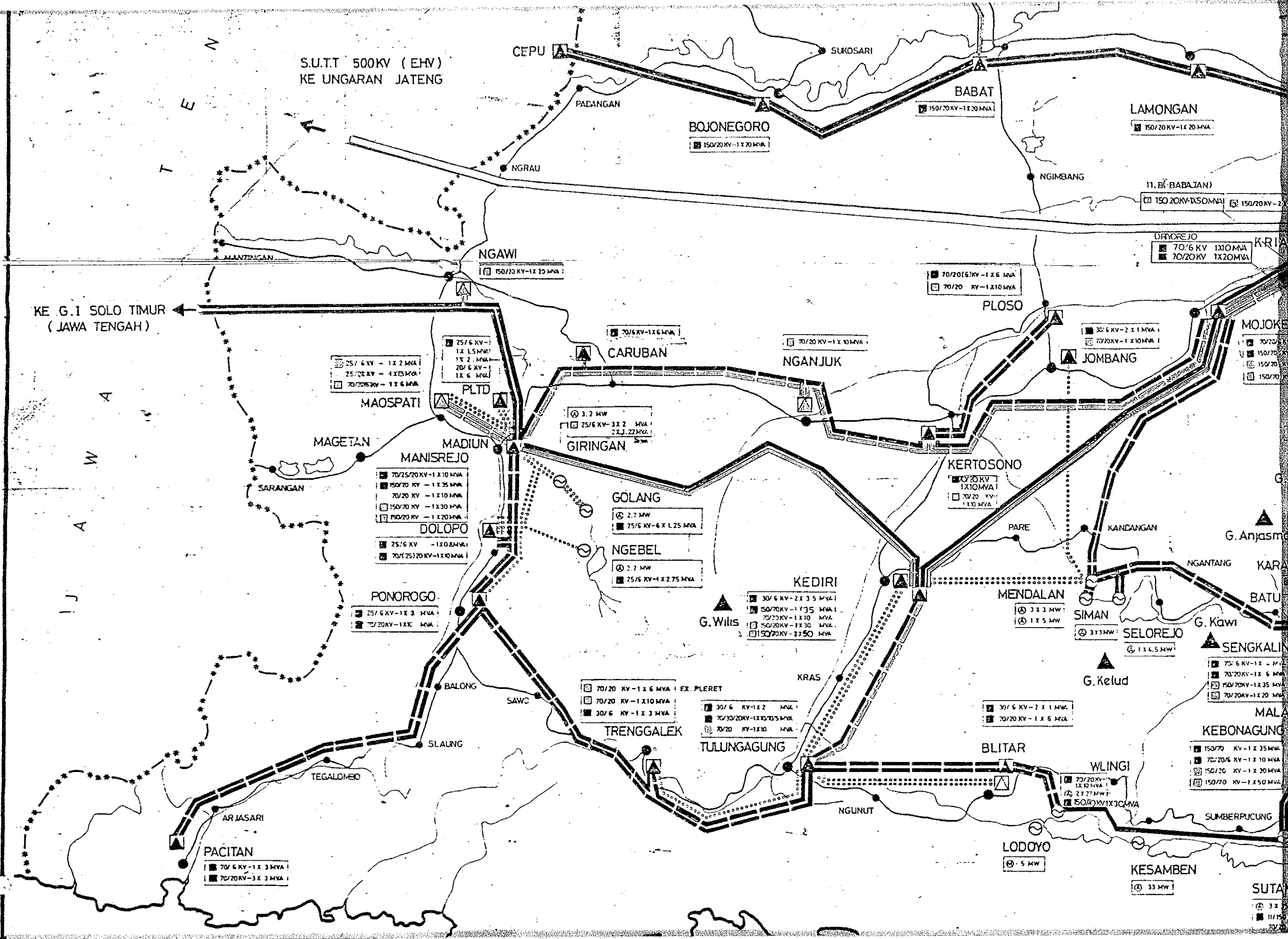
70/20/6KV 1X10MVA  
 150/20 KV 1X20MVA

150/20 KV - 1 X 50 MVA  
 150/20 KV - 1 X 50 MVA

70/20 KV - 1 X 30 MVA  
 1X 20 MVA  
 150/70 KV - 3X 39 MVA  
 70/20/6 KV - 1X 20 MVA  
 150/70 KV - 2X 50 MVA  
 150/20 KV - 1X 40 MVA



SAN  
 1 X 10 MVA



S.U.T.T 500KV (EHV)  
KE UNGARAN JATENG

KE G.I SOLO TIMUR  
(JAWA TENGAH)

PACITAN  
70/6 KV - 1 X 3 MVA  
70/20KV - 3 X 3 MVA

MAOSPATI  
25/6 KV - 1 X 2 MVA  
25/20 KV - 4 X 2 MVA  
70/20KV - 1 X 6 MVA

MANISREJO  
70/25/20 KV - 1 X 10 MVA  
150/70 KV - 1 X 35 MVA  
70/20 KV - 1 X 10 MVA  
150/70 KV - 1 X 30 MVA  
150/20 KV - 1 X 20 MVA  
25/6 KV - 1 X 0.8 MVA  
70/25/20 KV - 1 X 10 MVA

PONOROGO  
25/6 KV - 1 X 3 MVA  
70/20KV - 1 X 6 MVA

TRENGGALEK  
70/20 KV - 1 X 6 MVA  
70/20 KV - 1 X 10 MVA  
30/6 KV - 1 X 3 MVA

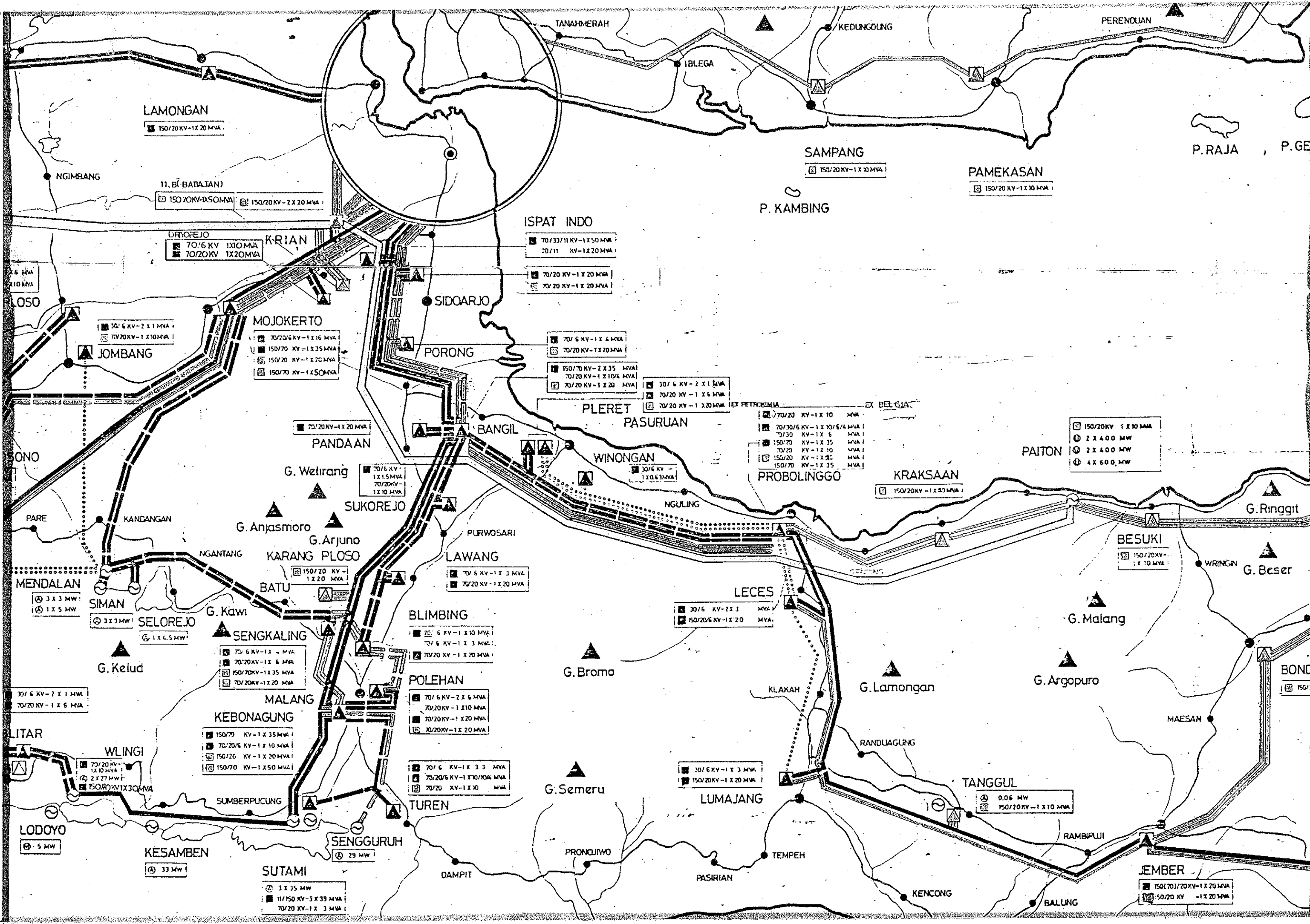
KEDIRI  
30/6 KV - 2 X 3.5 MVA  
150/70KV - 1 X 35 MVA  
70/20KV - 1 X 10 MVA  
50/20KV - 1 X 10 MVA  
150/20KV - 2 X 5 MVA

SELOREJO  
3 X 3 MW  
1 X 5 MW  
3 X 3 MW  
1 X 4.5 MW

SENGKALIN  
70/6 KV - 1 X 6 MVA  
70/20KV - 1 X 6 MVA  
150/20KV - 1 X 35 MVA  
70/20KV - 1 X 20 MVA

KEBONAGUNG  
150/70 KV - 1 X 35 MVA  
70/20KV - 1 X 10 MVA  
150/20 KV - 1 X 30 MVA  
150/70 KV - 1 X 50 MVA

SUTAN  
3 X  
11/15  
70/20



LAMONGAN  
150/20 KV - 1 X 20 MVA

11. B. (BABAJAN)  
150/20 KV - 1 X 20 MVA  
150/20 KV - 2 X 20 MVA

DRYOPEJO  
70/6 KV - 1 X 10 MVA  
70/20 KV - 1 X 20 MVA

MOJOKERTO  
70/20 KV - 1 X 16 MVA  
150/70 KV - 1 X 35 MVA  
150/20 KV - 1 X 20 MVA  
150/70 KV - 1 X 50 MVA

ISPAT INDO  
70/33/11 KV - 1 X 50 MVA  
70/11 KV - 1 X 20 MVA  
70/20 KV - 1 X 20 MVA  
70/20 KV - 1 X 20 MVA

PORONG  
70/6 KV - 1 X 4 MVA  
70/20 KV - 1 X 20 MVA  
150/70 KV - 2 X 35 MVA  
70/20 KV - 1 X 10/4 MVA  
70/20 KV - 1 X 20 MVA

PLERET  
30/6 KV - 2 X 1 MVA  
70/20 KV - 1 X 6 MVA  
70/20 KV - 1 X 20 MVA

PASURUAN  
70/20 KV - 1 X 10 MVA  
70/30/6 KV - 1 X 10/5/4 MVA  
70/30 KV - 1 X 6 MVA  
150/70 KV - 1 X 35 MVA  
70/20 KV - 1 X 10 MVA  
150/20 KV - 1 X 20 MVA  
150/70 KV - 1 X 35 MVA

PROBOLINGGO  
150/20 KV - 1 X 20 MVA  
2 X 400 MW  
2 X 400 MW  
4 X 600 MW

PAMEKASAN  
150/20 KV - 1 X 20 MVA

PANDAAN  
70/20 KV - 1 X 20 MVA  
70/6 KV - 1 X 1.5 MVA  
70/20 KV - 1 X 10 MVA

SUKOREJO  
70/6 KV - 1 X 3 MVA  
70/20 KV - 1 X 20 MVA

LAWANG  
70/6 KV - 1 X 3 MVA  
70/20 KV - 1 X 20 MVA

BLIMBING  
70/6 KV - 1 X 10 MVA  
70/6 KV - 1 X 3 MVA  
70/20 KV - 1 X 20 MVA

POLEHAN  
70/6 KV - 2 X 6 MVA  
70/20 KV - 1 X 10 MVA  
70/20 KV - 1 X 20 MVA  
70/20 KV - 1 X 20 MVA

TUREN  
70/6 KV - 1 X 3.3 MVA  
70/20/6 KV - 1 X 10/10/4 MVA  
70/20 KV - 1 X 10 MVA

LECES  
30/6 KV - 2 X 3 MVA  
150/20 KV - 1 X 20 MVA

LUMAJANG  
30/6 KV - 1 X 3 MVA  
150/20 KV - 1 X 20 MVA

TANGGUL  
0.06 MW  
150/20 KV - 1 X 10 MVA

MENDALAN  
3 X 3 MW  
1 X 5 MW

SIMAN  
3 X 3 MW  
SELOREJO  
1 X 4.5 MW

SENGKALING  
70/6 KV - 1 X 6 MVA  
70/20 KV - 1 X 6 MVA  
150/70 KV - 1 X 35 MVA  
70/20 KV - 1 X 20 MVA

MALANG  
KEBONAGUNG  
150/70 KV - 1 X 35 MVA  
70/20/6 KV - 1 X 10 MVA  
150/20 KV - 1 X 20 MVA  
150/70 KV - 1 X 50 MVA

LITAR  
30/6 KV - 2 X 1 MVA  
70/20 KV - 1 X 6 MVA

WLINGI  
70/20 KV - 1 X 10 MVA  
2 X 27 MW  
150/20 KV - 1 X 20 MVA

LODOYO  
5 MW

KESAMBEN  
33 MW

SUTAMI  
3 X 35 MW  
11/150 KV - 3 X 33 MVA  
70/20 KV - 1 X 3 MVA

DAMPIT

PRONJIWO

PASIRIAN

TEMPEH

KENCONG

BALUNG

JEMBER  
150/70/20 KV - 1 X 20 MVA  
150/20 KV - 1 X 20 MVA

BONDOWONEGO  
150/20 KV

G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

G. Bromo

G. Semeru

G. Kelud

G. Anjasmoro

G. Arjuno

KARANG PLOSO

G. Kawi

G. Kelud

NGIMBANG

SONO

PARE

KANDANGAN

SUMBERPUCUNG

LODOYO

KESAMBEN

SUTAMI

DAMPIT

PRONJIWO

PASIRIAN

TEMPEH

KENCONG

BALUNG

JEMBER

BONDOWONEGO

G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

G. Bromo

G. Semeru

G. Kelud

G. Anjasmoro

G. Arjuno

KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

LITAR

WLINGI

LODOYO

KESAMBEN

SUTAMI

DAMPIT

PRONJIWO

PASIRIAN

TEMPEH

KENCONG

BALUNG

JEMBER

BONDOWONEGO

G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

G. Bromo

G. Semeru

G. Kelud

G. Anjasmoro

G. Arjuno

KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

LITAR

WLINGI

LODOYO

KESAMBEN

SUTAMI

DAMPIT

PRONJIWO

PASIRIAN

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BALUNG

JEMBER

BONDOWONEGO

G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

G. Bromo

G. Semeru

G. Kelud

G. Anjasmoro

G. Arjuno

KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

LITAR

WLINGI

LODOYO

KESAMBEN

SUTAMI

DAMPIT

PRONJIWO

PASIRIAN

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G. Argopuro

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G. Bromo

G. Semeru

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KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

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G. Arjuno

KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

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G. Arjuno

KARANG PLOSO

G. Kawi

SENGKALING

MALANG

KEBONAGUNG

LITAR

WLINGI

LODOYO

KESAMBEN

SUTAMI

DAMPIT

PRONJIWO

PASIRIAN

TEMPEH

KENCONG

BALUNG

JEMBER

BONDOWONEGO

G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

G. Bromo

G. Semeru

G. Kelud

G. Anjasmoro

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G. Ringgit

G. Beser

G. Malang

G. Argopuro

G. Lamongan

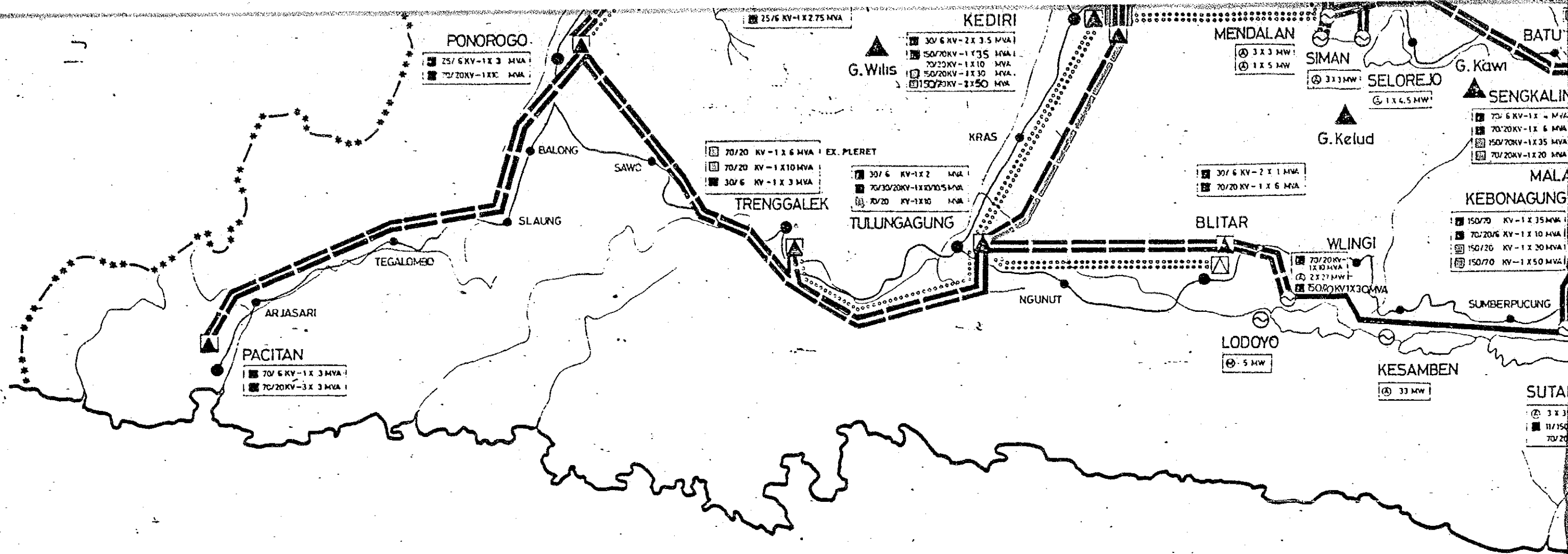
G. Bromo

G. Semeru


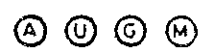


G. Kelud


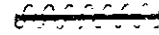












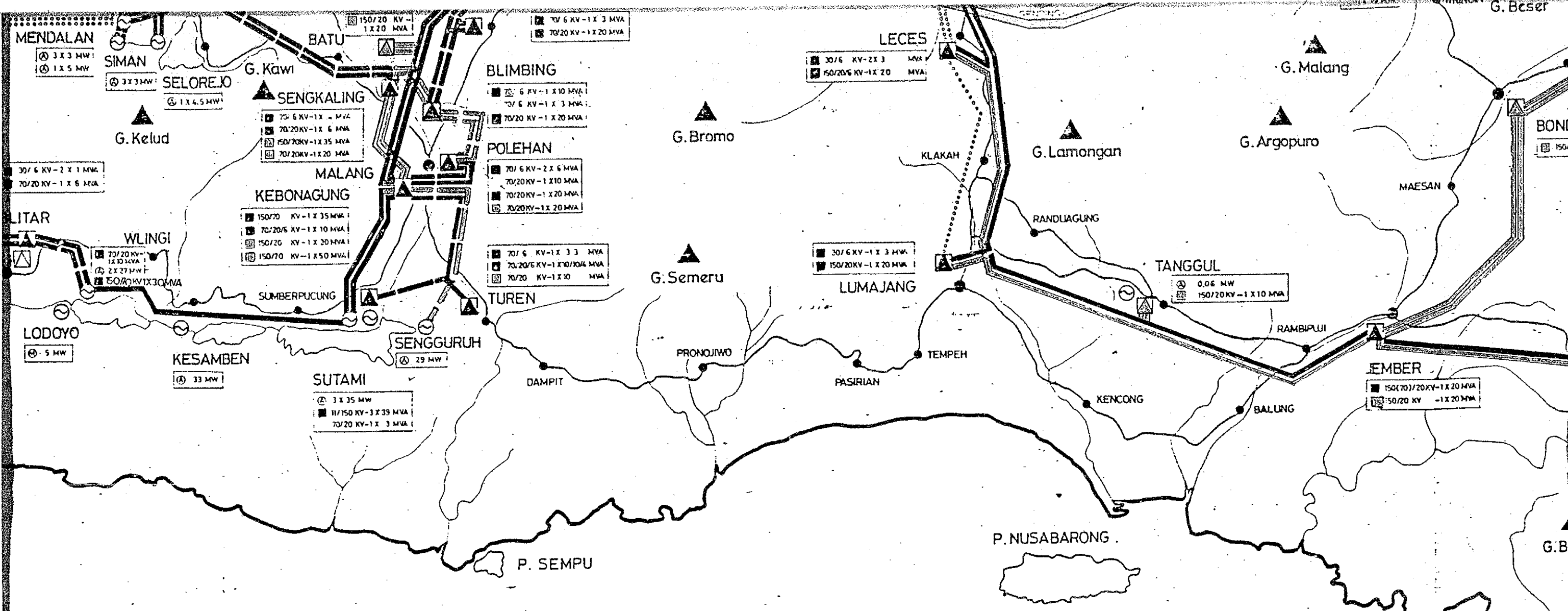




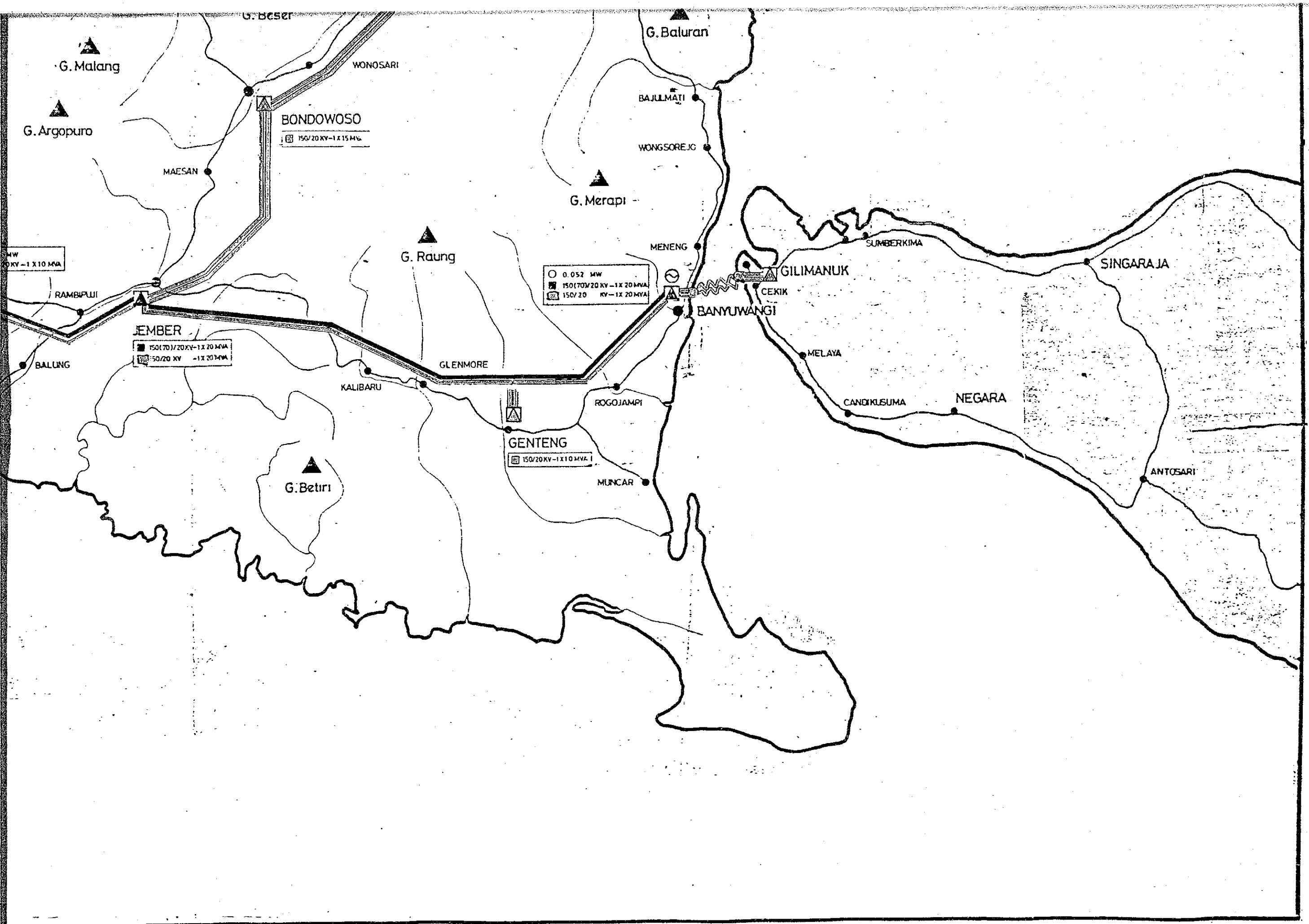
LEGENDA :

-  POWER PLANT
-  GENERATING CAPACITY (HYDRO/STEAM/GAS/MICRO HYDRO)
-  SUBSTATION
-  MAIN TRANSFORMER

ITEM.	EXISTING	UNDER CONST.
T/L AND CABLE 30/20KV.		
T/L AND CABLE 70 KV		
T/L AND CABLE 150 KV		
POWER PLANT		
SUBSTATION		
TRANSFORMER.		



		P L A N.	
EXISTING	UNDER CONSTRUCTION	LOAN COMMITTED	NOT YET COMMITED
		<p>SBY CITY PROGRAM AKSELERASI</p> <p>FIVE CITIES</p> <p>TEPSCO PCR</p>	
		<p>SBY CITY PROGRAM AKSELERASI</p> <p>FIVE CITIES</p> <p>TEPSCO PCR</p>	







JICA