

## Attachment - A BID FORM "A"

## Technical schedule

Item	unit	specification
1. Excitation Power Transformer		
(1) Applied Standard		
(2) Ambient Conditions		
(a) Altitude (above sea level)	m	
(b) Design ambient temperature	°C	
(c) Relative humidity (maximum)	%	
(3) Location		
(4) Type		
(5) Quantity of Power Transformer		
(6) Cooling System		
(7) Panel Configuration		
(a) Panel size (wide×depth×height)	mm	
(b) Painting Color		
- Exterior		
- Interior		
(c) Panel thickness	mm	
- Front door		
- Rear cover		
- Side panel		
(d) Dust proofing		
(8) Dimension of Power Transformer (Wide×Depth×height)	mm	
(9) Rating		
(a) Rated capacity	kVA	
(b) Frequency	Hz	
(c) Rated primary voltage	kV	

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(d) Rated secondary voltage	kV	
(e) Phase displacement		
(f) Basic insulation level	kV	
(g) Impedance	%	
(h) Insulation class		
(10) Terminal Connection		
(a) Primary terminals		
(b) Secondary terminals		
(11) Current Transformer		
(a) Primary side		
(b) Secondary side		
(c) Accuracy	%	
(12) Accessories		
(a) over current relay		
(b) over temperature relay		
(c) other protection relay		
(13) Weight	kg	
2. Thyristor Rectifier Cubicle		
(1) Applied Standard		
(2) Ambient Conditions		
(a) Altitude (above sea level)	m	
(b) Design ambient temperature	°C	
(c) Relative humidity (maximum)	%	
(3) Location		
(4) Type and Composition of Rectifier		

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(5) Quantity of Rectifier		
(6) Cooling System		
(7) Panel Configuration		
(a) Panel size (wide × depth × height)	mm	
(b) Painting Color		
- exterior		
- interior		
(c) Panel thickness	mm	
- front door		
- rear cover		
- side panel		
(d) Dust proofing		
(8) Rating		
(a) Rated output	kW	
(b) Output voltage	V DC	
(c) Output current	A DC	
(c) Rated current of thyristor cell	A	
(d) Rated voltage of thyristor cell	V	
(9) Redundant design		
(a) Continuous rating (redundancy to permit operation at full excitation power)		
(b) Short time rating		
(10) Weight	kg	
3. Field Circuit Breaker (FCB) Cubicle		
(1) Applied Standard		
(2) Ambient Conditions		

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(a) Altitude (above sea level)	m	
(b) Design ambient temperature	°C	
(c) Relative humidity (maximum)	%	
(3) Location		
(4) Type of FCB		
(5) Quantity		
(6) Panel Configuration		
(a) Panel size (wide × depth × height)	mm	
(b) Painting Color		
- exterior		
- interior		
(c) Panel thickness	mm	
- front door		
- rear cover		
- side panel		
(d) Dust proofing		
(7) Rating of FCB		
(a) Rated voltage	V DC	
(b) Rated current	A DC	
(c) Rated interrupting current	kA, V	
(d) Control voltage	V DC	
(8) Rating of discharge resistor		
(a) Rated current	A, sec	
(b) Resistance	ohms	
(9) Accessories		
(a) Field ground relay (64)		

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(b) Over current relay (51)		
(c) other protection relay		
(10) Weight	kg	
4. Auto Voltage Regulator (AVR) Cubicle		
(1) Applied Standard		
(2) Ambient Conditions		
(a) Altitude (above sea level)	m	
(b) Design ambient temperature	°C	
(c) Relative humidity (maximum)	%	
(3) Location		
(4) Type of AVR		
(5) Quantity		
(6) Panel Configuration		
(a) Panel size (wide × depth × height)	mm	
(b) Painting Color		
- exterior		
- interior		
(c) Panel thickness	mm	
- front door		
- rear cover		
- side panel		
(d) Dust proofing		
(7) Function for Excitation Control		
(a) Automatic excitation controller		

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(b) Manual excitation controller		
(c) Voltage setter		
(d) Under excitation limiter		
(e) Over excitation limiter		
(f) Volt per frequency limiter		
(g) Automatic follow-up		
(h) Self diagnostic function		
(i) Data recording function		
(j) Other function		
(8) Redundant design for AVR and Manual Controller		
(9) Performance		
(a) Voltage control range		
(b) Accuracy	%	
(c) Ceiling voltage	V (P.U.)	
(10) Characteristics		
(a) Sensitivity		
(b) Regulation		
(c) Range of control		
(d) Stability and Damping		
(e) Low and high frequency operation	Hz	
5. Patch Panel		
(1) Applied Standard		
(2) Ambient Conditions		
(a) Altitude (above sea level)	Mm	

## Attachment - A BID FORM "A"

## Technical schedule

Item	Unit	specification
(b) Design ambient temperature	°C	
(c) Relative humidity (maximum)	%	
(3) Location		
(4) Function of Patch Panel		
(a) Selection of control point		
(b) Selection of control mode		
(c) Adjustment of AVR controller setting		
(d) Adjustment of Manual controller setting		
(e) Adjustment of Reactive power controller		
(f) Operation of FCB		
(5) Indication		
(a) Generator field voltage		
(b) Generator field current		
(6) Patch Panel Configuration		
(a) Panel size (wide × depth × height)		
(b) Painting Color		
(c) Panel thickness		
(d) Dust proofing		
(7) Instrumentation		
(8) Alarm Window		
(9) Accessories		
6. Measuring voltage transformer		
(1) Primary side		
(2) Secondary side		
(3) Accuracy		

## Attachment - A BID FORM "A"

## Technical schedule

Item	unit	specification
7. Maintenance Tool and Accessories		
(1) Hardware		
(2) Software		
(3) Interface module		
8. Spare Parts		
(1) AVR controller		
(a) Type		
(b) Quantity		
(2) Thyristor		
(a) Type		
(b) Quantity		
(3) Thyristor ventilation fan		
(a) Type		
(b) Quantity		
(4) Thyristor fuse		
(a) Type		
(b) Quantity		
(5) Power supply unit		
(a) Type		
(b) Quantity		
(6) Interface unit		
(a) Type		
(b) Quantity		



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**Attachment - A BID FORM "A"****Technical schedule**

Item	unit	specification
(7) Analogue I/O unit		
(a) Type		
(b) Quantity		
(8) Digital I/O unit		
(a) Type		
(b) Quantity		
(9) Measuring voltage transformer		
(a) Type		
(b) Quantity		
(10) Other necessary spare parts		

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**Attachment - A BID FORM "A"**

**Technical schedule**

Item	Document
1. Document covers overall estimate design data, technical information, system configuration, characteristics, test facilities, operation and maintenance introductions for static excitation system	
2. Thyristor excitation system with Duplex digital AVR	
3. Outline of AVR cubicle	
4. Outline of thyristor rectifier cubicle	
5. Outline of FCB cubicle	

**Attachment - A BID FORM "A"**

**Technical schedule (Nominated Manufacturer List)**

Name of Goods	Manufacturer	Country
1. Excitation Transformer		
2. Static excitation system Cubicles		
3. Field Circuit Breaker (FCB)		
4. Instrumentation and Protection devices for each items		
5. Maintenance Tool and Accessories for each items		
8. Spare Parts for each items		

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**Attachment - A BID FORM "A"**
**Technical schedule**
**(Supervisors for Erection Work)**

Occupation	Man-month
1 <sup>ST</sup> UNIT	
2 <sup>ND</sup> UNIT	
3 <sup>RD</sup> UNIT	
4 <sup>TH</sup> UNIT	

**Attachment - A BID FORM "A"**
**Technical schedule**
**(Delivery Schedule after Effective Date of Contract in Months)**

Delivery No.	Delivery Date after Effective Date of Contract in Months
1. Delivery 1 (1 <sup>st</sup> Unit)	
2. Delivery 2 (2 <sup>nd</sup> Unit)	
3. Delivery 3 (3 <sup>rd</sup> Unit)	
4. Delivery 4 (4 <sup>th</sup> Unit)	

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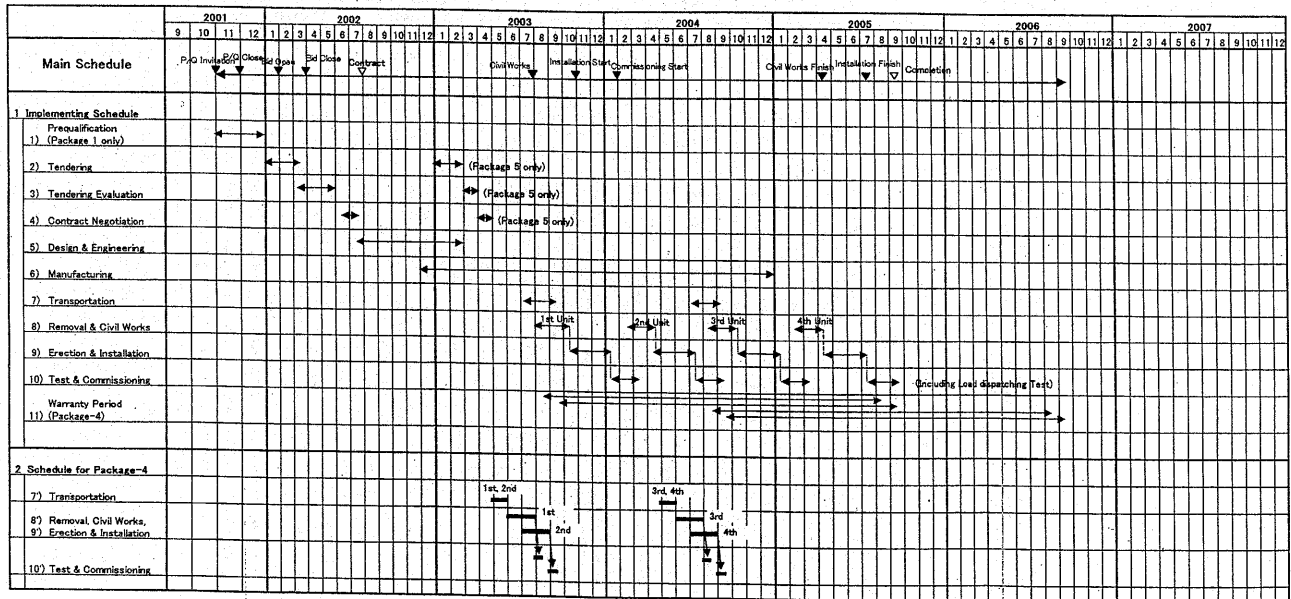
## Attachment - B Bid Drawings

### Drawing Number

1. MON-K-0-01 Implementing Schedule
2. MON-K-0-02 Start-up Dates of Boiler and Turbine/Generator
3. MON-K-0-05 Example of Daily Load Distribution Curve during Lower Electric Power Demands (Summer Season)
4. MON-K-0-06 Example of Daily Load Distribution Curve During Higher Electric Power Demands (Winter Season)
5. MON-K-0-09 General Layout
6. MON-K-0-10 Boiler-Turbine House : Section
7. MON-K-0-11 Boiler Turbine Layout
8. MON-K-0-13 Main Steam Flow Diagram
9. MON-K-4-01 System Diagram for the Existing Excitation System and its Replacement Areas
10. MON-K-4-02 Configuration for the Existing AC Exciter and Generator in External View
11. MON-K-4-03 Configuration and Arrangement of the Existing Excitation Control Panel in the Unit #1 Local Control Room in Plane View
12. MON-K-4-04 Configuration and Arrangement of the Existing Excitation Control Panel in the Unit #2 to #4 Local Control Rooms in Plane View
13. MON-K-4-05 Cable Schedule for the Existing Excitation System and its Related Control Areas
14. MON-K-4-06 Cable List for the Existing Excitation System and its Related Control Areas
15. MON-K-4-07 Configuration and Arrangement of the Existing Electrical Central Control Room in Plane View

16. MON-K-4-08 Configuration and Arrangement of the Existing Turbine/Generator Control Desk in Plane and External View
17. MON-K-4-09 Configuration and Arrangement of the Existing Turbine/Generator Control Panel in Front View
18. MON-K-4-10 Capability Curve of the Existing Generators for Unit #1 to Unit #4
19. MON-K-4-11 System Diagram for the Existing Excitation System and its Replacement Areas (Alternative -1)
20. MON-K-4-12 System Diagram for the Existing Excitation System and its Replacement Areas (Alternative -2)

# Implementing Schedule



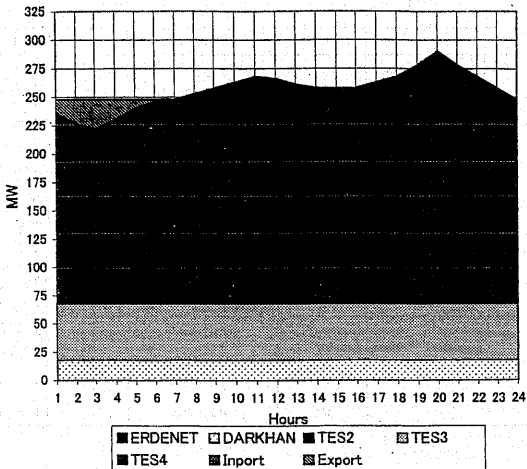
	Unit No.	Capacity	Start-up Date
Boiler	#1	420t/h	30 - 8 - 1983
	#2	420t/h	16 - 1 - 1984
	#3	420t/h	9 - 12 - 1984
	#4	420t/h	25 - 12 - 1985
	#5	420t/h	27 - 12 - 1986
	#6	420t/h	31 - 10 - 1987
	#7	420t/h	7 - 2 - 1990
	#8	420t/h	23 - 12 - 1991
Turbine generator	#1	80 MW	18 - 10 - 1983
	#2	100 MW	26 - 11 - 1984
	#3	100 MW	27 - 12 - 1985
	#4	100 MW	27 - 12 - 1986
	#5	80 MW	17 - 2 - 1990
	#6	80 MW	25 - 12 - 1991

Rehabilitation project of the 4th Power Plant  
in ULAANBAATAR, MONGOLIA (Phase-II)

Start-up Dates of Boiler and  
Turbine/Generator

Dwg. No. MON-K-0-02

August 20 '01



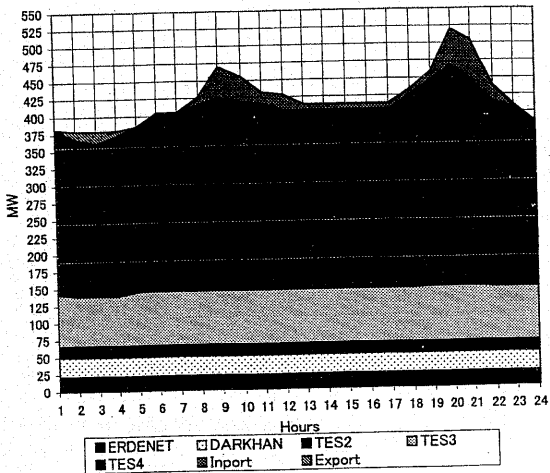
Rehabilitation Project of the 4th Power Plant  
in ULAANBAATAR, MONGOLIA (Phase-II)

Example of Daily Load Distribution Curve during Lower  
Electric Power Demands (Summer season)

Dwg.No. MON-K-U-05

August 20 '01



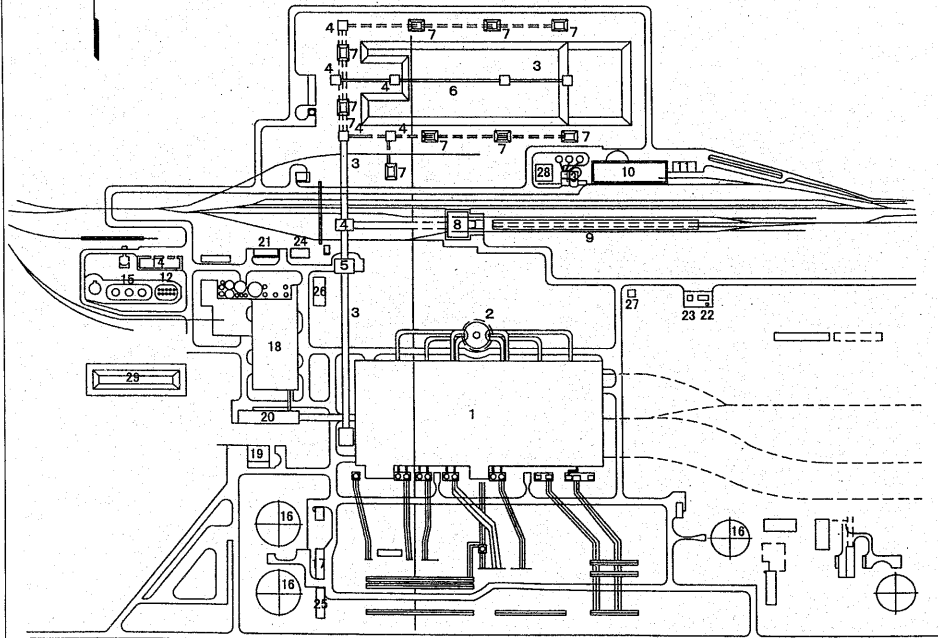


Rehabilitation Project of the 4th Power Plant  
in ULAANBAATAR, MONGOLIA (PHASE-II)

Example of Daily Load Distribution Curve during Higher  
Electric Power Demands (Winter season)

Dwg. No. MON-K-0-06

August 20 '01



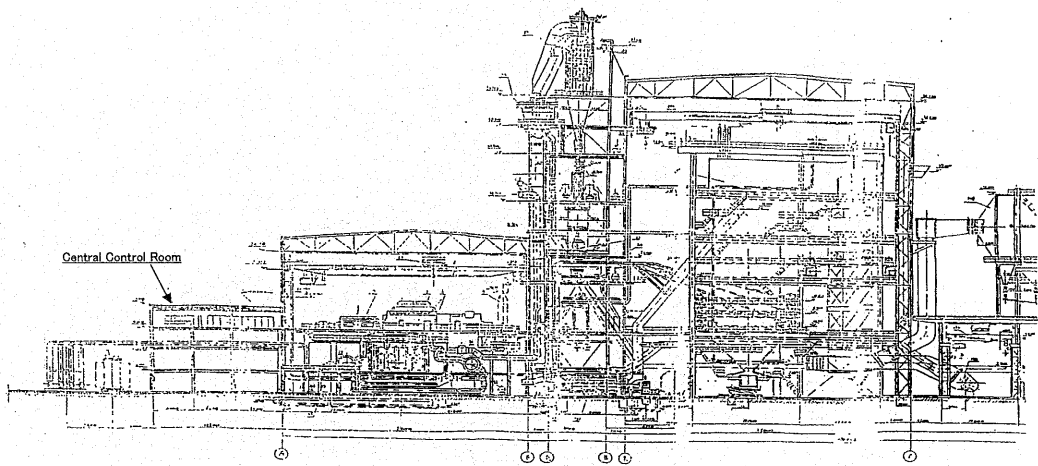
29.	Rain Water Settling Pond
28.	Coal Handling Facility Control Room
27.	Inspection Gate
26.	Ash Pound Water Treatment Facility
25.	Heating Water Distributing Room
24.	Hydrogen Oxygen and Nitrogen Receiver
23.	Carbide Storehouse
22.	Acetylene Storehouse
21.	Oxygen Storehouse
20.	Service Building—Carteen, Locker Room
19.	Engineer's Building
18.	Maintenance Building
17.	Cooling Water Pump Room
16.	Cooling Tower
15.	Heavy Oil Storage Tank
14.	Heavy Oil Pump House
13.	Wagon Inspection Facility
12.	Lubrication Oil Warehouse
11.	Buildover and Dust Cleaning Truck House
10.	Repair Shop
9.	Freacoal Wagon Warming House
8.	Wagon Tumbling—Down
7.	Underground Coal Hopper
6.	Open Door Coal Storage Yard
5.	Crusher Room
4.	Conveyor Junction House
3.	Coal Conveyor
2.	Stack
1.	Boiler—Turbine House (Power House)
No.	Description

Rehabilitation Project of the 4th Power Plant  
in ULAANBAATAR, MONGOLIA(Phase- II)

### General Layout

DWG. No. MON—K—0—09

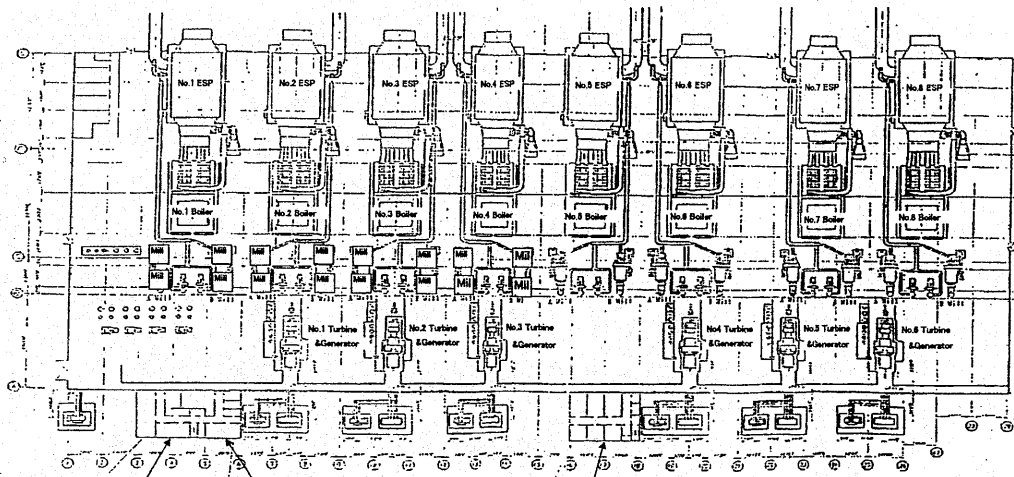
August 20 '01



Central Control Room

- 67: Raw coal bunker
- 73 Mill
- 74: Primary flue gas fan
- 75: Raw coal feeder
- 76: Pulverized coal feeder
- 77: Cyclone separator
- 78: Classifier

Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase - II)	
Boiler-Turbine House : Section	
Dwg. No. MON-K-0-10	August 20 '01

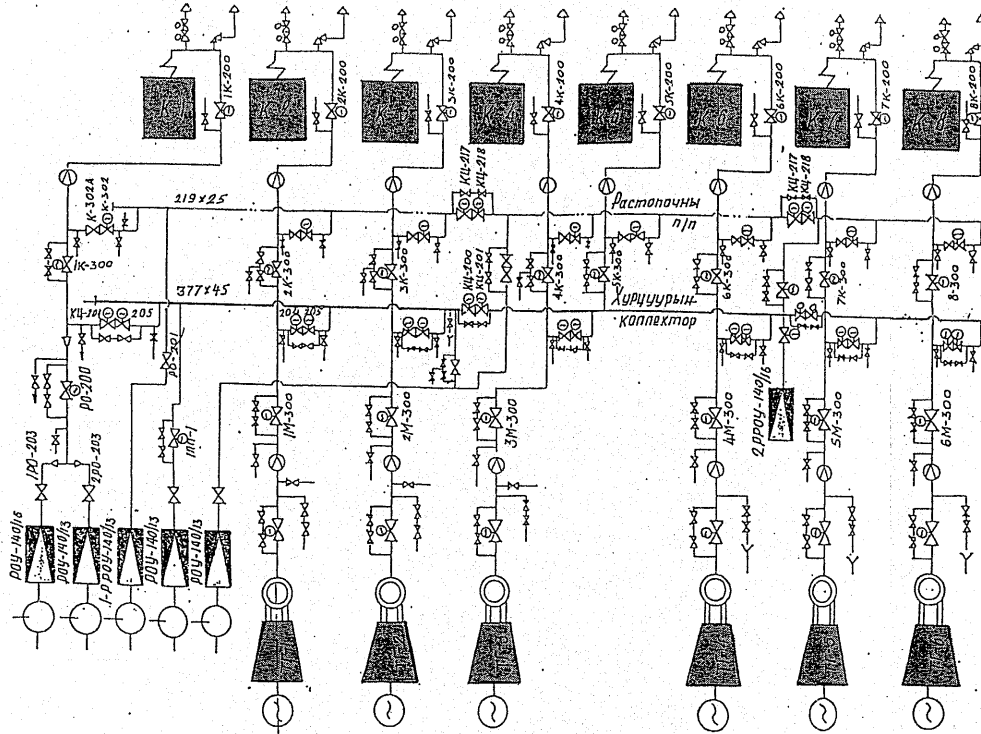


Central Control Room  
for #1~#4 boilers  
for #1~#3 turbines

Control Room  
for electric power supply

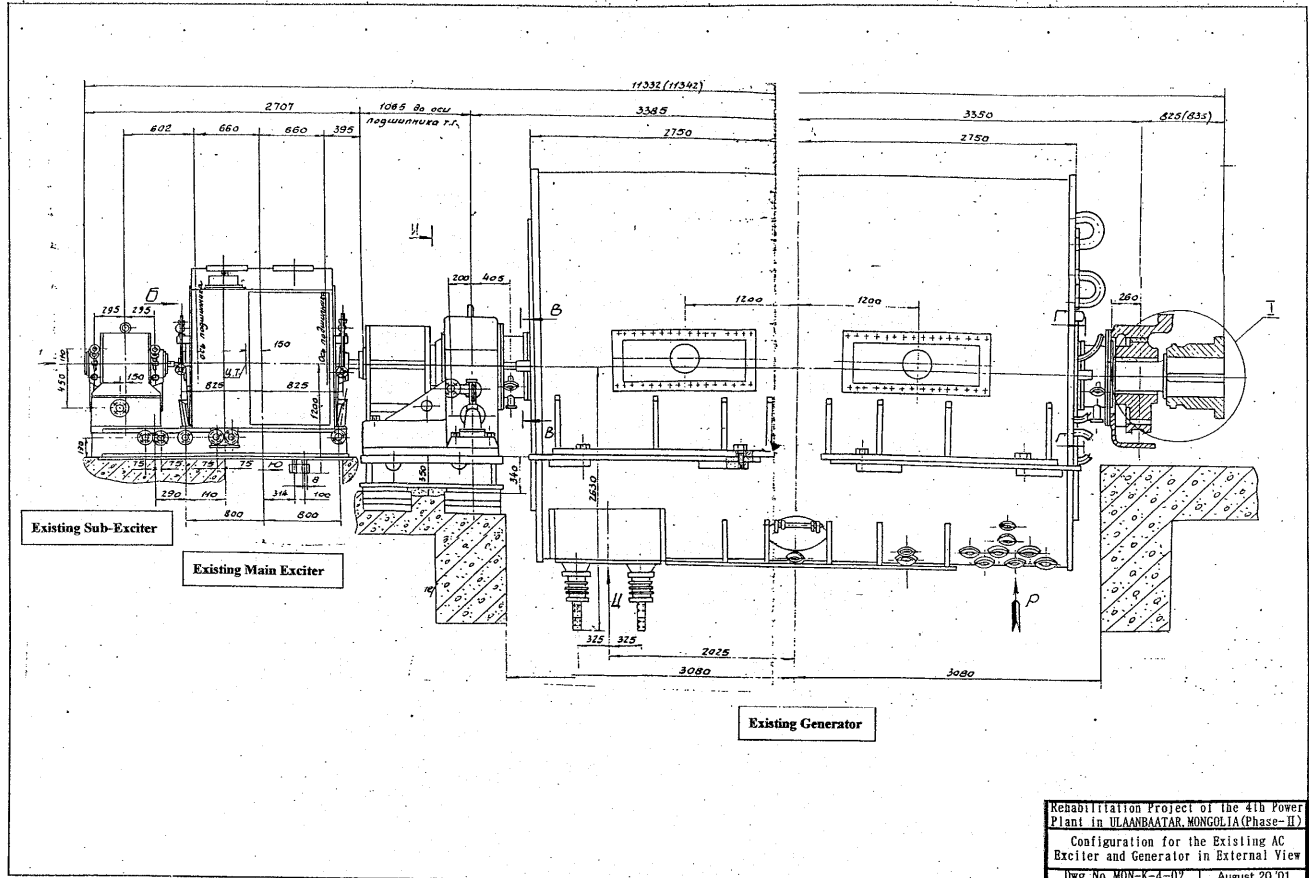
Central Control Room  
for #5~#8 boilers  
for #4~#6 turbines

Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase - II)	
Boiler Turbine Layout	
Dwg. No. MON-K-0-11	August 20 '01

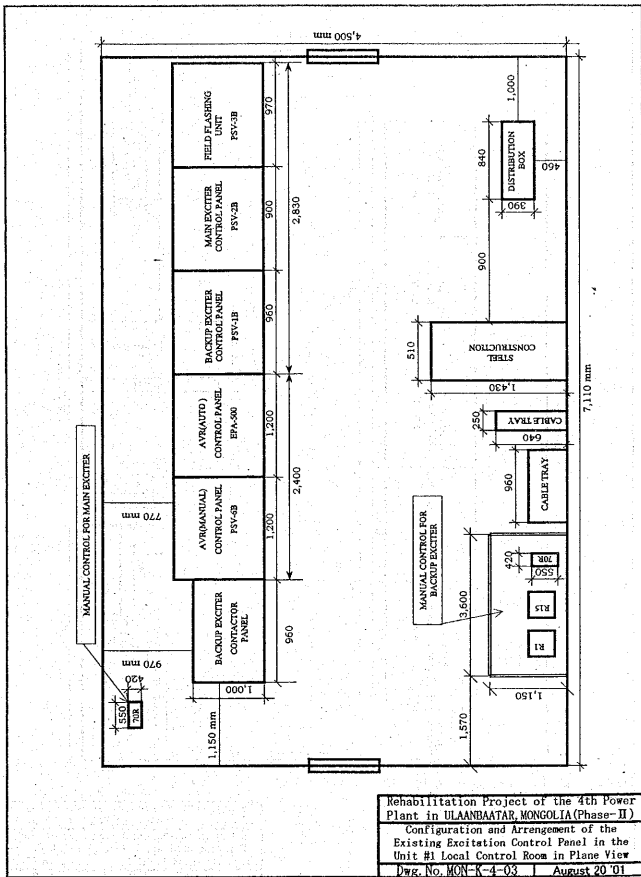


Rehabilitation Project of the 4th Power Plant  
 in ULAANBAATAR, MONGOLIA (Phase-II)  
**Main Steam Flow Diagram**  
 Dwg. No. МОН-К-0-13 August 20 01

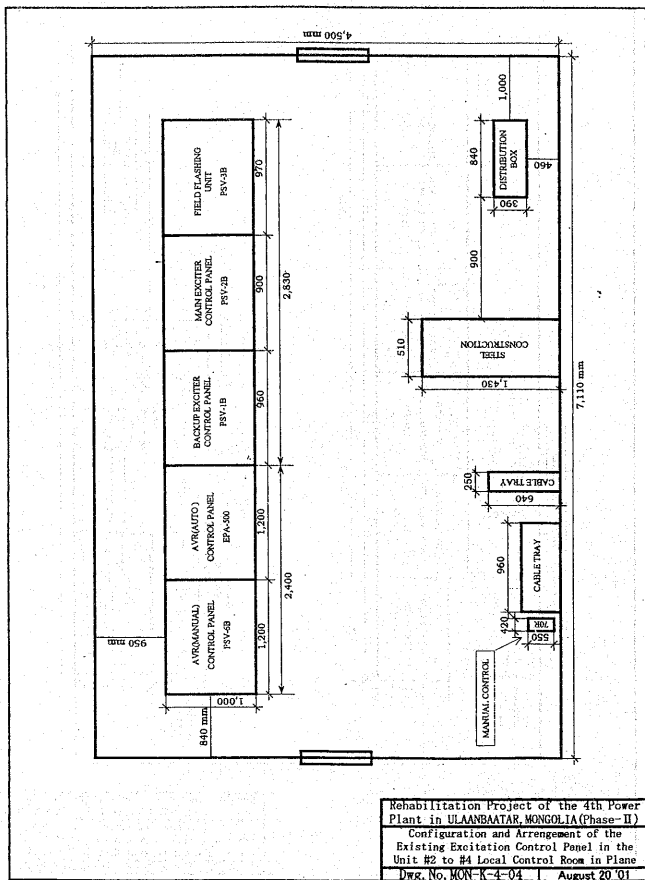




Rehabilitation Project of the 4th Power  
 Plant in ULAANBAATAR, MONGOLIA (Phase-II)  
 Configuration for the Existing AC  
 Exciter and Generator in External View  
 DWG. No. MUN-K-4-02 August 20 '01



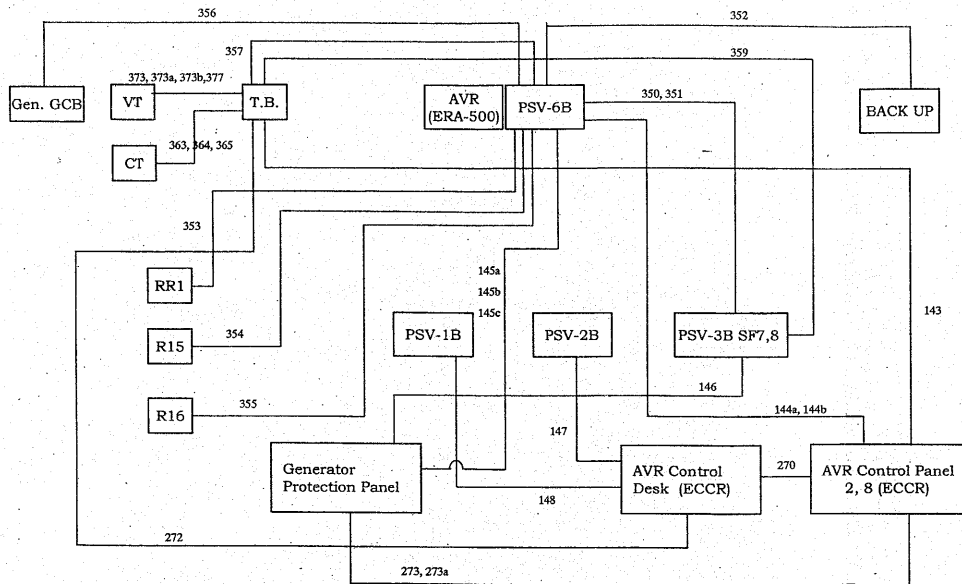




Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase-II)

Configuration and Arrangement of the Existing Excitation Control Panel in the Unit #2 to #4 Local Control Room in Plane

Dwg. No. MON-K-4-04 August 20 '01

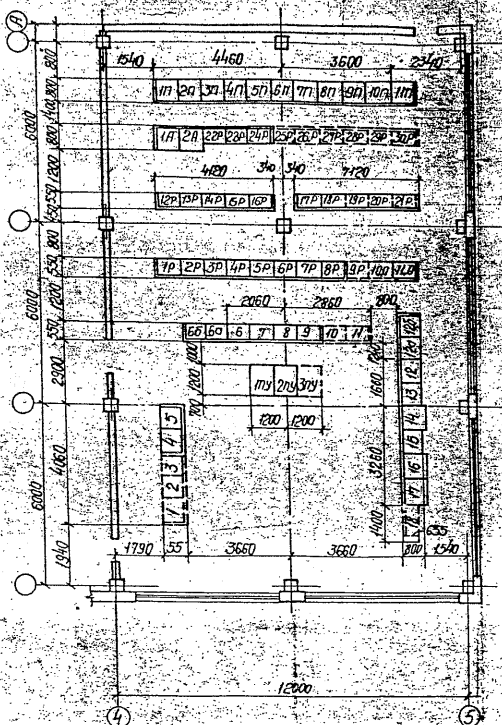


Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase-II)	
Cable Schedule for the Existing Excitation System and its Related Control Areas	
Dwg. No. MUN-K-4-05	August 20 '01

From	To	Tag	Core	Size(mm <sup>2</sup> )	Length(m)	Type
PSV-6B(Manual AVR)	Back-up	352	10	1.5	15	KBBG
PSV-6B(Manual AVR)	SF7	351	10	1.5	15	KBBG
PSV-6B(Manual AVR)	SF8	350	14	1.5	15	KBBG
PSV-6B(Manual AVR)	ECCR	144a	37	2.5	105	KBBG
PSV-6B(Manual AVR)	ECCR	144b	27	2.5	105	KBBG
PSV-6B(Manual AVR)	Panel N2(generator protection)	145a	27	1.5	100	KBBG
PSV-6B(Manual AVR)	Panel N2(generator protection)	145b	27	1.5	100	KBBG
PSV-6B(Manual AVR)	Panel N2(generator protection)	145c			100	KBBG
PSV-3B(SF8)	Terminal box	143a	37	1.5	20	KBBG
PSV-6B(Manual AVR)	AVR	358	27	1.5	10	KBBG
PSV-3B(SF8)	Terminal box	359	5	4	20	KBBG
PSV-6B(Manual AVR)	Resistance RR1	353	10	1.5	15	KBBG
PSV-6B(Manual AVR)	Resistance R15	354	5	1.5	15	KBBG
PSV-6B(Manual AVR)	Resistance R16	355	5	1.5	15	KBBG
PSV-6B(Manual AVR)	Terminal box	357	10	1.5	20	KBBG
PSV-6B(Manual AVR)	Generator contact	356	4	1.5	35	KBBG
PSV-1B	AVR control desk	148	14	1.5	105	KBBG
PSV-2B	AVR control desk	147	10	1.5	105	KBBG
PSV-3B	Panel N2(generator protection)	146	7	1.5	100	KBBG
TA3(CT A)	Terminal box	363	5	4	25	KBBG
TA3(CT B)	Terminal box	364	5	4	25	KBBG
TA3(CT C)	Terminal box	365	5	4	25	KBBG
VT(4Gi01F01)	Terminal box	373a	4	1.5	25	KBBG
VT	Terminal box	373	4	1.5	25	KBBG
VT	Terminal box	373b	4	1.5	25	KBBG
VT	Power box- 220V	377	4	1.5	55	KBBG
AVR control desk	Terminal box	272	19	1.5	55	KBBG
AVR control desk	Panel 8 (ECCR)	270	14	1.5	20	KBBG
Panel N2	Panel 8 (ECCR)	273a	37	1.5	15	KBBG
Panel N2	Panel 8 (ECCR)	273	37	1.5	15	KBBG
Terminal box	Panel 2 (ECCR)	143	37	1.5	100	KBBG

Rehabilitation Project of the 4th Power  
Plant in ULAANBAATAR, MONGOLIA (Phase-II)  
Cable List for the Existing  
Excitation System and its Related  
Control Areas

Dwg. No. MON-K-4-06 | August 20 '01



Note)

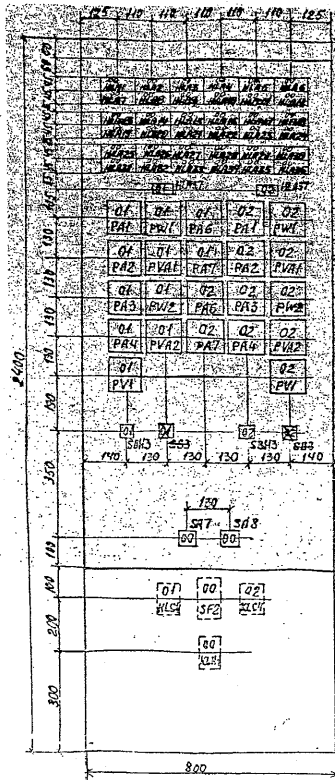
- 3P to 5P : #1 Generator (including Excitation system) Protection Panel
- 6P to 8P : #2 Generator (including Excitation system) Protection Panel
- 19P to 21P: #3 Generator (including Excitation system) Protection Panel
- 6 : #1 to #2 Turbine/Generator Control Panel
- 7 : #3 to #4 Turbine/Generator Control Panel
- 1ny : #1 to #2 Turbine/Generator Control Desk
- 2ny : #3 to #4 Turbine/Generator Control Desk

Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase-II)

Configuration and Arrangement of the Existing Excitation Electrical Central Control Room in Plane View

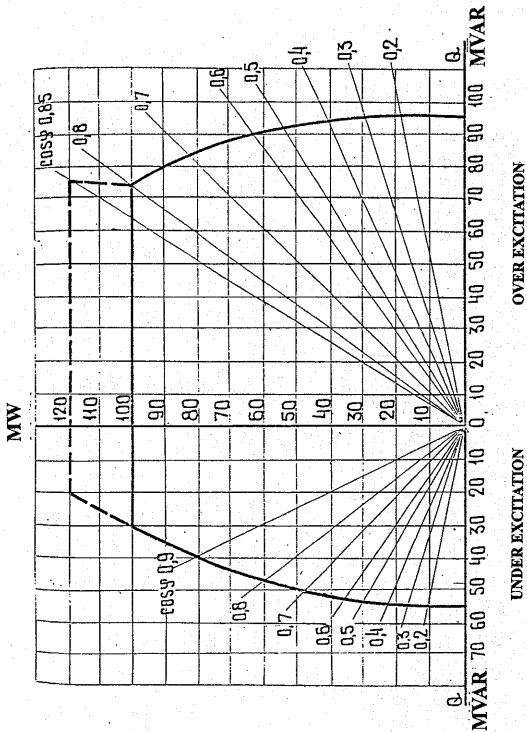
Dwg. No. MON-K-4-07 August 20 01





### ALARM LIST OF EXCITATION SYSTEM

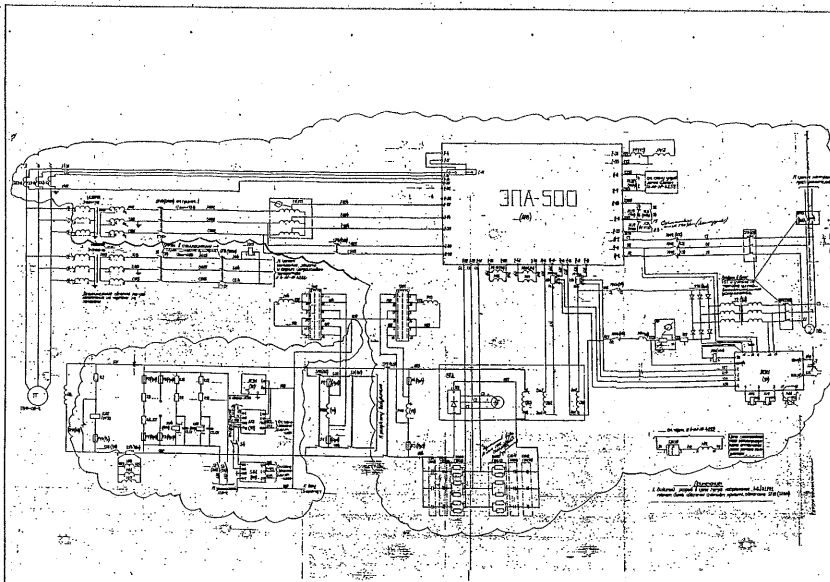
ALARM	ITEM	REMARKS
HLA5	Exciter Rectifier fuse fault	
HLA6	Rectifier unit fault	
HLA15	VT transformer fault	
HLA17	Excitor Field Earth Fault	
HLA22	Changeover from Auto to Manual for AVR	
HLA23	Loss of Excitation	
HLA24	Excitation System Failure	
HLA25	Decreasing load of rotor	
HLA26	Interlock for ceiling	
HLA28	AVR control circuit fault	
HLA29	Manual control circuit fault	



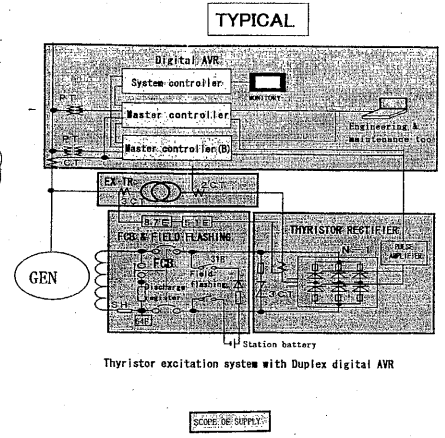
Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase-II)

Capability Curve of the Existing Generators for Unit #1 to #4

Dwg. No. MON-K-4-10 | August 20 '01

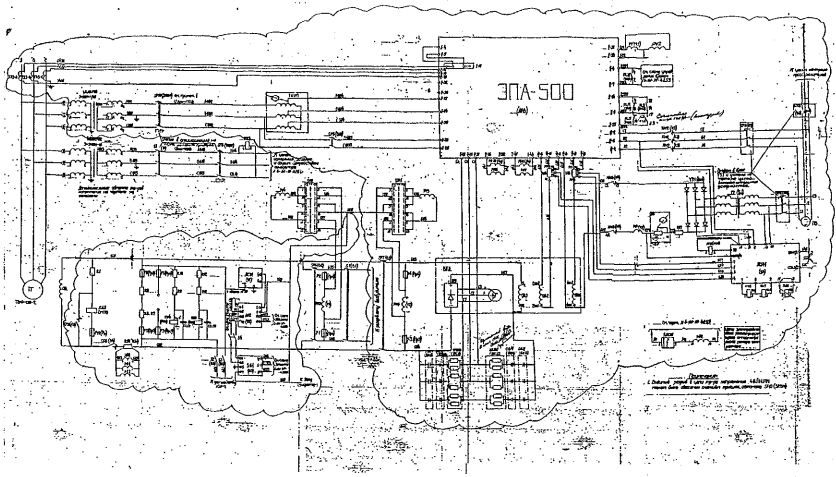


Note: This part shows replacement and modification area of the existing Excitation System



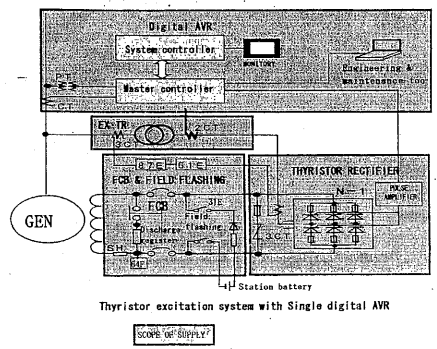
Rehabilitation Project of the 4th Power Plant in ULAANBAATAR, MONGOLIA (Phase - II)  
 System Diagram for the Existing Excitation System and its Replacement Areas (Alternative-1)  
 Dwg. No. MON-K-4-11 | August 20 '01





Note) This part shows replacement and modification area of the existing Excitation System

TYPICAL



Thyristor excitation system with single digital AVR

SCOPE OF SUPPLY

Rehabilitation Project of the 4th Power Plant in ULANBATOR, MONGOLIA (Phase- II)  
 system Diagram for the Existing Excitation System and its Replacement Areas (Alternative-2)  
 Dwg. No. HUN-K-4-12 August 20 '01