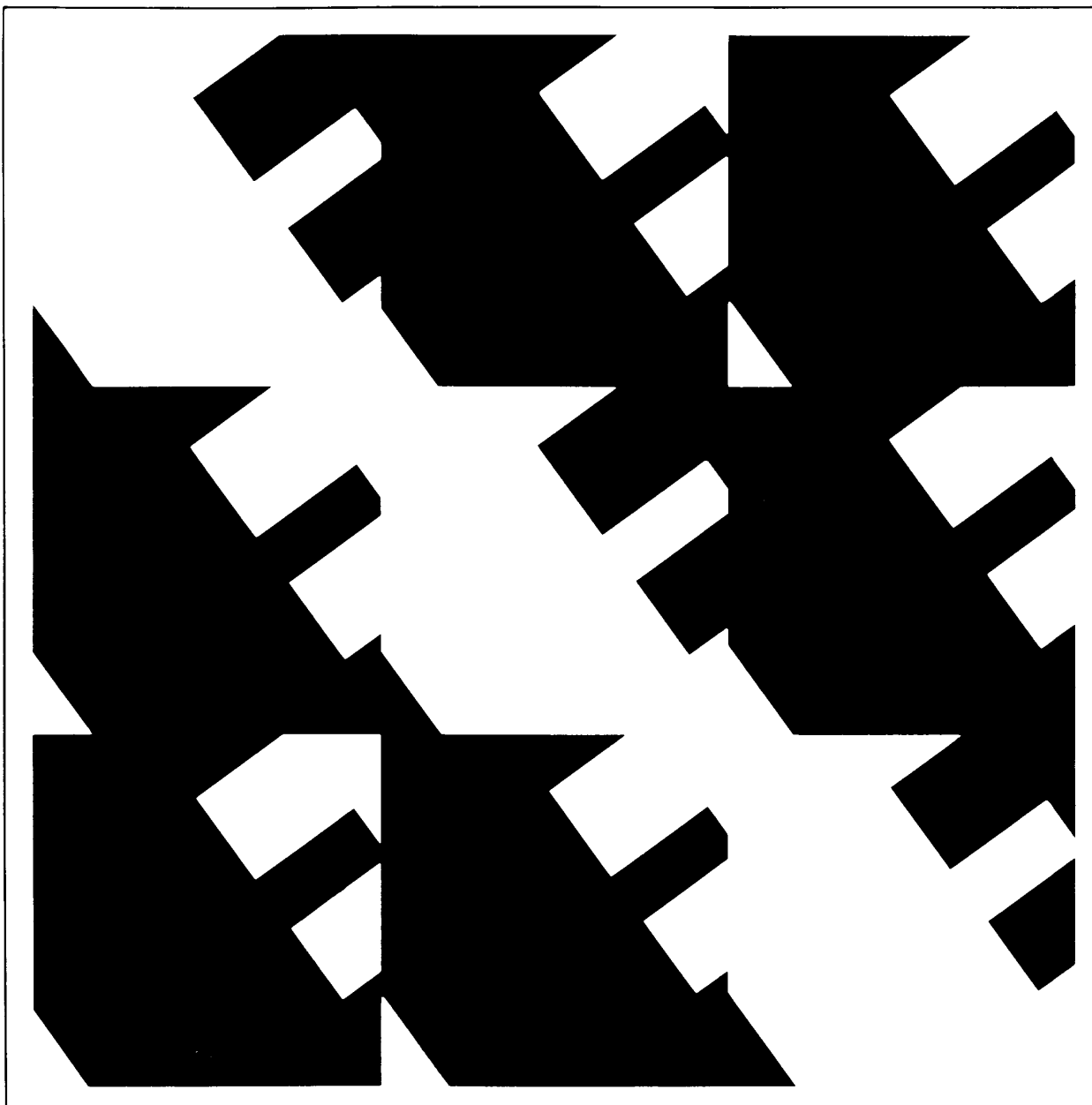


IEEE Recommended Practice for System Identification in Fossil-Fueled Power Plants and Related Facilities

ANSI/IEEE Std 806-1986



Published by The Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street, New York, NY 10017, USA
February 21, 1986

SH10314

An American National Standard

**IEEE Recommended Practice for
System Identification in Fossil-Fueled Power Plants and
Related Facilities**

Sponsor

**Power Generation Committee of the
IEEE Power Engineering Society**

Approved December 13, 1984

IEEE Standards Board

Approved May 3, 1985

American National Standards Institute

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Foreword

(This Foreword is not a part of ANSI/IEEE Std 806-1986, IEEE Recommended Practice for System Identification in Fossil-Fueled Power Plants and Related Facilities.)

In April 1979, the Working Group on Unique Identification in Power Plants of the Station Design Subcommittee was formed and charged with the task of producing a series of recommended practices for unique identification in power plants. Later, realizing that this concept provided the same benefits to other types of facilities, the title was extended to include *and related facilities*. In 1984 the group name was changed to Unique Identification Working Group.

This series of recommended practices, entitled the Energy Industry Identification System (EIIS), provides a single source of unique identification of systems, structures, and components for all types of power generation and related facilities with provision for the inclusion of currently established plant system identifier codes. Using this series of recommended practices, which includes principles, a table of component function identifier codes, implementation instructions, and system descriptions for the various types of power plants and related facilities, a user can correlate a system, structure, or component with another organization for purposes of reporting, comparison, or general communication. Numerous economic, safety, and convenience benefits can be derived from this concept. This recommended practice deals with system descriptions and system codes for fossil-fueled power-plant systems.

The purpose of this working group was to generate an industry-wide language of communication which users could employ at the interface of their organizations and which would not require them to change a viable identification concept which they were using internally. In the event a user does not have a viable identification concept of his/her own, he/she may choose to employ this concept for the internal applications since it has been successfully applied by several utilities and architect/engineering firms. If conflicts with other standards are discovered, they will be handled in a revision.

This recommended practice was prepared by the Unique Identification Working Group, Station Design Subcommittee of the Power Generation Committee of the IEEE Power Engineering Society. At the time this recommended practice was approved, the members of the working group were as follows:

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Contents

SECTION	PAGE
1. Scope and Purpose	9
2. Discussion	9
3. References	9
4. Conventions	10
5. System Descriptions	10

FIGURES

Fig 1	Legend of Symbols	18
Fig 2	Steam-Generator System — AE	20
Fig 3	Secondary Air System — AF	21
Fig 4	Inlet Air Preheat System — AG	22
Fig 5	Soot-Blowing System — AI	23
Fig 6	Steam-Generator Vents and Drains System — AJ	24
Fig 7	Primary Air System — AL	25
Fig 8	Flue Gas Recirculation System — AM	26
Fig 9	Diesel Fuel Oil System — DC	27
Fig 10	Diesel Fuel Oil Receiving, Storage, and Transfer System — DE	28
Fig 11	Coal Stackout and Reclaim System — DI	29
Fig 12	Coal Sampling and Weighing System — DK	30
Fig 13	Coal Dust Control System — DL	31
Fig 14	Igniter Fuel System — DM	32
Fig 15	Fuel Oil Supply System — DO	33
Fig 16	Coal-Feed and Pulverization System — DP	34
Fig 17	Medium-Voltage Power System — EA — System Diagram	35
Fig 18	Low-Voltage Power System — EC	36
Fig 19	Instrument and Uninterruptible Power-System — EE	37
Fig 20	Direct-Current Power Systems — EI	38
Fig 21	Emergency On-Site Power Supply System — EK	39
Fig 22	Combustion Gas Desulfurization System — GA	43
Fig 23	Combustion Gas Particulate Removal System — GB	44
Fig 24	Scrubber Additive Receiving and Storage System — GD	45
Fig 25	(a) Scrubber Additive Preparation System — GE	46
	(b) Scrubber Additive Preparation System — GE	47
Fig 26	Combustion Gas Exhaust System — GG	48
Fig 27	Condensate Storage and Transfer System — KA	57
Fig 28	Turbine Building Closed Cooling-Water System — KB	57
Fig 29	Demineralized Water Storage and Transfer System — KC	58
Fig 30	Heat Rejection System — KE	59
Fig 31	Water Filtration System — KH	61
Fig 32	Makeup Demineralizer System — KJ	62
Fig 33	Potable Water Distribution System — KK	62
Fig 34	Sampling and Water Quality System — KN	64
Fig 35	Gland Seal Water Supply System — KO	65
Fig 36	Fire-Protection System (Water) — KP	66
Fig 37	Auxiliary Cooling-Water System — KV	67
Fig 38	Ash-Sluice Water Supply System — KX	69
Fig 39	Diesel Generator Starting Air System — LC	70
Fig 40	Instrument Air Supply System — LD	71
Fig 41	Service Air System — LF	71
Fig 42	Nitrogen Supply System — LK	73
Fig 43	Lube Oil Storage and Transfer System — LM	74
Fig 44	Insulating-Oil System — LN	75

FIGURES		PAGE
Fig 45	Combustion Turbine System — RA	83
Fig 46	Combustion Turbine Cooling-Water System — RC	84
Fig 47	Combustion Turbine Lube Oil System — RD	85
Fig 48	Combustion Turbine Control Fluid System — RG	86
Fig 49	Combustion Turbine-Generator Stator-Cooling System — RJ	88
Fig 50	Combustion Turbine-Generator Hydrogen-Cooling System — RK	89
Fig 51	Combined Cycle Heat Recovery Steam-Generator System — RM	90
Fig 52	Auxiliary Steam System — SA	92
Fig 53	Main/Reheat Steam System — SB	93
Fig 54	Condensate System — SD	94
Fig 55	Steam-Extraction System — SE	95
Fig 56	Condensate Demineralizer System — SF	95
Fig 57	Condenser System — SG	96
Fig 58	Condenser Vacuum System — SH	97
Fig 59	Condenser Tube Cleaning System — SI	98
Fig 60	Feedwater System — SJ	99
Fig 61	Feedwater Pump Injection System — SK	100
Fig 62	Feedwater Pump Turbine Lube Oil System — SL	101
Fig 63	LP Heater Drains and Vents System — SM	101
Fig 64	HP Heater Drains and Vents Systems — SN	102
Fig 65	Turbine Bypass System — SO	103
Fig 66	Main Turbine System — TA	104
Fig 67	Turbine Steam Seal System — TC	105
Fig 68	Turbine Lube Oil System — TD	106
Fig 69	Main Turbine Control Fluid System — TG	107
Fig 70	Main Generator Stator-Cooling System — TJ	108
Fig 71	Main Generator Hydrogen-Cooling System — TK	109
Fig 72	Fuel Supply Buildings' Environmental Control System — VO	114
Fig 73	Circulating Water Pumphouse Environmental Control System — VQ	115
Fig 74	Sanitary Waste Processing System — WG	116
Fig 75	Bottom-Ash Disposal System — WL	117
Fig 76	Fly-Ash Disposal System — WM	118
Fig 77	Hopper-Ash Disposal System — WN	119
Fig 78	Pulverizer Rejects Disposal System — WO	120
Fig 79	Scrubber Solids Disposal System — WP	120
Fig 80	Wastewater Management System — WS	122

TABLES

Table 1	Energy Industry Identification System (EIIS) Systems List — Alphabetical by System Code	10
Table 2	Energy Industry Identification System (EIIS) Systems List — Alphabetical by System Title	14
Table 3	Primary Heat Source Systems Group	19
Table 4	Fuel Management Systems Group	27
Table 5	Electrical Power Systems Group	35
Table 6	Electrical Support Systems Group	40
Table 7	Combustion Gas Exhaust and Cleanup Systems Group	42
Table 8	Instrumentation and Monitoring Systems Group	49
Table 9	Protection and Control Systems Group	52
Table 10	Water, Chemical, and Drainage Systems Group	56
Table 11	Service Auxiliaries Systems Group	69

TABLES		PAGE
Table 12	Site Facilities, Buildings, and Structures Group	77
Table 13	Power Generation Buildings and Structures Group	80
Table 14	Combustion Turbine and Combined Cycle Group	82
Table 15	Steam Cycle Systems Group	91
Table 16	Power Conversion Systems Group	103
Table 17	Site Facility Environmental Control Systems Group	110
Table 18	Power Generation Buildings' Environmental Control Systems Group	112
Table 19	Waste Management Systems Group	115

An American National Standard

IEEE Recommended Practice for System Identification in Fossil-Fueled Power Plants and Related Facilities

1. Scope and Purpose

1.1 Scope. This recommended practice provides a single source of fossil-fueled power-plant system descriptions which, along with related recommended practices concerning unique identification principles and definitions, component function identifiers, and implementation instructions, makes up a concept for uniquely identifying systems, structures, and components of fossil-fueled power-plant projects (electric power generating stations) and related facilities. Nuclear, hydro, and other types of power plants are not included in this recommended practice.

1.2 Purpose. The purpose of this series of recommended practices is to present a common language of communication that will permit a user to correlate a system, structure, or component with another organization for the purposes of reporting, comparison, or general communication. Users may choose to adopt this concept for their internal use. It represents the accumulated practice of the industry assimilated into one set of practices. A significant feature of this concept is that the unique identification code identifies the function at the component level and not the hardware itself.

2. Discussion

The system descriptions concentrate on system function and include such internal detail as is necessary to clearly support the system function description and are not intended to serve as design input. System diagrams also show connections with major interfacing systems, and major components in these interfacing systems, where appropriate to enhance communication of the

system function. The system description grouping, as indicated by the first character of the two alpha-character code, is designed to favor the convenience of plant operation rather than plant design and construction.

The system descriptions and diagrams represent typical systems and are not intended for design purposes. When a system function can be accomplished by significantly different system internal designs, the system description includes a brief identification of major design alternatives to serve as an aid for correlating plant specific system designs with this classification concept.

The major differences between system internal designs have been preserved in that separate system descriptions and diagrams are provided where appropriate.

The symbols used in the system diagrams were selected to represent accepted practice as much as possible.

3. References

This recommended practice shall be used in conjunction with the following publications:

[1] ANSI/IEEE Std 100-1984, IEEE Standard Dictionary of Electrical and Electronics Terms.

[2] ANSI/IEEE Std 803-1983, IEEE Recommended Practice for Unique Identification in Power Plants and Related Facilities—Principles and Definitions.

[3] ANSI/IEEE Std 803A-1983, IEEE Recommended Practice for Unique Identification in Power Plants and Related Facilities—Component Function Identifiers.

[4] ANSI/IEEE Std 804-1983, IEEE Recommended Practice for Unique Identification in Power Plants and Related Facilities—Implementation.

4. Conventions

The sequence identifier associated with a specific piece of equipment is assigned at the discretion of the organization applying the code. However, if the intent of the recommended practice is to be achieved, there shall be uniformity in the assignment of system designators and function identifiers. To achieve this uniformity in the assignment of system identifiers, the following conventions regarding system cognizance should be followed:

(1) *Heat Exchangers*. Heat exchangers are considered to be located in the system in which they perform a heating or cooling function in support of plant power production. Heat exchangers that provide both a heating and cooling function (for example, condensate blowdown cooler) are assigned to the system which, under normal plant conditions, operates at the higher temperature.

(2) *Instruments*. Sensors are assigned to the system in which they sense. Actuators are as-

signed to the system in which the actuation takes place.

(3) *Circuit Breakers*. Where circuit breakers control specific equipment, the circuit breaker is assigned to the system in which the equipment is assigned. Where circuit breakers control the distribution of electrical power they are assigned to that electrical distribution system.

(4) *Valves*. Valves are assigned to the system in which they control fluid flow.

(5) *Transformers*. Transformers are assigned to the lower-voltage system.

5. System Descriptions

The narrative descriptions of systems are, in some cases, supplemented by diagrams which serve as an aid to understanding. The diagrams are intended to be generic in nature and show only sufficient detail to reinforce the text.

Table 1
Energy Industry Identification System EIIS Systems List—Alphabetical by System Code

A—Primary Heat Source Systems Group	
	PAGE
AE Steam-Generator System	19
AF Secondary Air System	21
AG Inlet Air Preheat System	22
AI Soot-Blowing System	23
AJ Steam-Generator Vents and Drains System	24
AK Steam-Generator Sealing Air System	25
AL Primary Air System	25
AM Flue Gas Recirculation System	26
D—Fuel Management Systems Group	
DC Diesel Fuel Oil System	27
DE Diesel Fuel Oil Receiving, Storage, and Transfer System	28
DG Fuel Gas Supply System	28
DH Coal-Unloading System	28
DI Coal Stackout and Reclaim System	29
DJ Coal Preparation and Silo Fill System	30
DK Coal Sampling and Weighing System	30
DL Coal Dust Control System	31
DM Igniter Fuel System	32
DN Fuel Oil Additive System	32
DO Fuel Oil Supply System	33
DP Coal-Feed and Pulverization System	34
DQ Solid Fuel Stoking System	35

Table 1 (Continued)
Energy Industry Identification System EIIS Systems List—Alphabetical by System Code

E—Electrical Power Systems Group		PAGE
EA	Medium-Voltage Power System (601 V—15 kV)	35
EC	Low-Voltage Power System (600 V and less)	36
EE	Instrument and Uninterruptible Power System	37
EI	Direct-Current Power System	38
EK	Emergency On-Site Power Supply System	39
EL	Main Generator Output Power System	39
F—Electrical Support Systems Group		
FA	Cable Raceway System	40
FB	Cathodic Protection System	40
FC	Grounding and Lightning Protection System	40
FD	Heat Tracing System	40
FF	Normal AC Lighting System	40
FG	Standby AC Lighting System	41
FH	Emergency DC Lighting System	41
FI	Communications System	41
FJ	Station Generation Telemetry System	42
FK	Switchyard System	42
G—Combustion Gas Exhaust and Cleanup Systems Group		
GA	Combustion Gas Desulfurization System	42
GB	Combustion Gas Particulate Removal System	44
GC	Combustion Gas Reheat System	44
GD	Scrubber Additive Receiving and Storage System	45
GE	Scrubber Additive Preparation System	46
GF	Chimney System	47
GG	Combustion Gas Exhaust System	47
I—Instrumentation and Monitoring Systems Group		
IA	Security System	49
IB	Annunciator System	49
IC	Fire-Detection System	49
ID	Computer System	50
IM	Temperature Monitoring System	50
IO	Performance Monitoring System	50
IQ	Sequence-of-Events Monitoring System	51
IR	Television System	51
IS	Environmental/Meteorological Monitoring System (Example: Plant)	51
IT	Main Turbine Instrumentation System	51
IU	Display Control System	52
IV	Vibration Monitoring System	52
IW	Stack Gas Monitoring System	52
J—Protection and Control Systems Group		
JB	Feedwater/Steam-Generator Water-Level Control System	52
JG	Solid-State Control System/Auxiliary Logic Control System	53
JI	Turbine Steam Bypass Control System	53
JJ	Turbine Supervisory Control System	53
JK	Feedwater Pump Driver Instrumentation and Control System	54
JL	Panels System	54
JN	Unit Protection System	54
JO	Coordinated Control System	55
JP	Combustion Control System	55
JQ	Sootblower Control System	55
JR	Coordinated Coal-Handling Control System	55

Table 1 (Continued)
Energy Industry Identification System EHS Systems List—Alphabetical by System Code

K—Water, Chemical, and Drainage Systems Group		PAGE
KA	Condensate Storage and Transfer System	56
KB	Turbine Building Closed Cooling-Water System	56
KC	Demineralized Water Storage and Transfer System	58
KD	Condensate and Feedwater Chemistry Control System	58
KE	Heat Rejection System	59
KF	Heat Rejection Chemical Treatment System	60
KH	Water Filtration System	60
KI	Untreated Water Makeup System	60
KJ	Makeup Demineralizer System	61
KK	Potable Water Distribution System	63
KL	Removable Chemical Cleaning System	63
KM	Chilled-Water System	63
KN	Sampling and Water Quality System	63
KO	Gland Seal Water Supply System	64
KP	Fire-Protection System (Water)	65
KQ	Fire-Protection System (Chemical)	66
KR	Auxiliary Boiler Chemical Feed System	66
KS	Scrubber Makeup Water System	66
KT	Combustion Gases Sampling and Analysis System	67
KU	Scrubber Liquids Sampling and Analysis System	67
KV	Auxiliary Cooling-Water System	68
KW	Service Water System	68
KX	Ash-Sluice Water Supply System	68
KY	Reverse Osmosis System	68
L—Service Auxiliaries Systems Group		
LA	Diesel Lube Oil System	69
LB	Diesel Cooling-Water System	69
LC	Diesel Generator Starting Air System	70
LD	Instrument Air Supply System	70
LE	Service Air System	72
LG	Welding Gas System	72
LJ	Hydrogen System	72
LK	Nitrogen System	73
LM	Lube Oil Management System	73
LN	Insulating-Oil System	74
LP	Laboratory Gas System	75
LQ	Laboratory Equipment System	75
LR	Material and Equipment Handling System	76
LS	Plant Shop System	76
LT	Record Storage System	76
LU	Yard-Handling and Maintenance System	76
LV	Plant Hot Water/Steam Heating System	76
LW	Carbon Dioxide (CO ₂) Supply System	77
LX	Soot-Blowing Air Supply System	77
M—Site Facilities, Buildings, and Structures Group		
MA	Administration Building	77
MC	Maintenance Buildings	78
MD	Makeup Water Intake Structure	78
ME	Service Buildings	78
MG	Wastewater Outfall Structure	78
MH	Water Treatment Building	78
MI	Yard Facilities and Improvements	78
MJ	Visitors' Center	79
ML	Warehouse Facilities	79
MM	Miscellaneous Buildings and Structures	79
MN	Switchyard Buildings	79
MO	Waste Treatment Buildings	79

Table 1 (Continued)
Energy Industry Identification System EIIS Systems List—Alphabetical by System Code

N—Power Generation Buildings and Structures Group		PAGE
NA	Control Building/Control Complex	80
NB	Emergency On-Site Power Supply Building	80
NM	Turbine Building	80
NN	Circulating Water Structures	80
NQ	Steam-Generator Building	81
NR	Air Quality Control Buildings	81
NS	Coal-Unloading Structures	81
NT	Coal-Handling Buildings	81
NU	Fuel Supply Buildings	82
NV	Generation Building	82

R—Combustion Turbine and Combined Cycle Group		PAGE
RA	Combustion Turbine System	82
RB	Combustion Turbine-Generator System	83
RC	Combustion Turbine Cooling-Water System	84
RD	Combustion Turbine Lube Oil System	84
RE	Combustion Turbine Heating, Ventilating, and Cooling System	85
RF	Combustion Turbine Start-Up and Shutdown System	86
RG	Combustion Turbine Control Fluid System	86
RH	Combustion Turbine-Generator Gas Purge System	87
RI	Combustion Turbine-Generator Seal Oil System	87
RJ	Combustion Turbine-Generator Stator Cooling System	87
RK	Combustion Turbine-Generator Hydrogen Cooling System	88
RL	Combustion Turbine-Generator Excitation System	89
RM	Combined Cycle Heat Recovery Steam-Generator System	89
RN	Combustion Turbine Inlet/Exhaust/Recuperation System	90
RO	Combustion Turbine Instrumentation System	91
RP	Combustion Turbine Supervisory Control System	91

S—Steam Cycle Systems Group		PAGE
SA	Auxiliary Steam System	91
SB	Main/Reheat Steam System	92
SD	Condensate System	93
SE	Steam Extraction System	94
SF	Condensate Demineralizer System	96
SG	Condenser System	96
SH	Condenser Vacuum System	97
SI	Condenser Tube Cleaning System	98
SJ	Feedwater System	99
SK	Feedwater Pump Injection and Miscellaneous System	99
SL	Feedwater Pump Turbine Lube Oil System	100
SM	Low-Pressure Heater Drains and Vents System	101
SN	High-Pressure Heater Drains and Vents System	102
SO	Turbine Bypass System	102

T—Power Conversion Systems Group		PAGE
TA	Main Turbine System	104
TB	Main Generator System	104
TC	Turbine Steam Seal System	105
TD	Turbine Lube Oil System	105
TE	Miscellaneous Turbine Vents System	106
TF	Turbine Drains and Miscellaneous Piping System	106
TG	Main Turbine Control Fluid System	107
TH	Main Generator Gas Purge System	108
TI	Main Generator Seal Oil System	108
TJ	Main Generator Stator-Cooling System	108
TK	Main Generator Hydrogen-Cooling System	109
TL	Main Generator Excitation System	110

Table 1 (Continued)
Energy Industry Identification System EIIS Systems List—Alphabetical by System Code

U—Site Facility Environmental Control Systems Group		PAGE
UA	Pumping Station Environmental Control System	110
UB	Water Treatment Building Environmental Control System	110
UC	Service Building Environmental Control System	110
UD	Administration Building Environmental Control System	111
UE	Security Building Environmental Control System	111
UH	Visitors' Center Environmental Control System	111
UI	Waste Treatment Buildings' Environmental Control System	111
UJ	Maintenance Buildings' Environmental Control System	111
UK	Miscellaneous Buildings and Structures' Environmental Control System	111
UL	Makeup Water Pumphouse Environmental Control System	112
UM	Warehouse Facilities' Environmental Control System	112
UN	Switchyard Buildings' Environmental Control System	112
V—Power Generation Buildings' Environmental Control Systems Group		
VE	Access Corridors' Environmental Control System	112
VI	Control Building/Control Complex' Environmental Control System	112
VJ	Emergency On-Site Power Supply Building Environmental Control System	113
VK	Turbine Building Environmental Control System	113
VM	Steam-Generator Building Environmental Control System	113
VN	Air Quality Control Buildings' Environmental Control System	113
VO	Fuel Supply Buildings' Environmental Control System	114
VP	Coal-Handling Buildings' Environmental Control System	114
VQ	Circulating Water Pumphouse Environmental Control System	115
W—Waste Management Systems Group		
WG	Sanitary Waste Processing System	116
WK	Equipment and Floor Drains System	116
WL	Bottom-Ash Disposal System	117
WM	Fly-Ash Disposal System	118
WN	Hopper-Ash Disposal System	119
WO	Pulverizer Rejects Disposal System	119
WP	Scrubber Solids Disposal System	120
WQ	Chemical Waste Collection and Treatment System	121
WS	Wastewater Management System	121
WU	Yard Drains System	121

Table 2
Energy Industry Identification System EIIS Systems List—Alphabetical by System Title

	PAGE
VE	Access Corridors' Environmental Control System
MA	Administration Building
UD	Administration Building Environmental Control System
NR	Air Quality Control Buildings
VN	Air Quality Control Buildings' Environmental Control System
IB	Annunciator System
KX	Ash-Sluice Water Supply System
KR	Auxiliary Boiler Chemical Feed System
KV	Auxiliary Cooling-Water System
SA	Auxiliary Steam System
WL	Bottom-Ash Disposal System
FA	Cable Raceway System
LW	Carbon Dioxide (CO ₂) Supply System
FB	Cathodic Protection System

Table 2 (Continued)
Energy Industry Identification System EIIS Systems List—Alphabetical by System Title

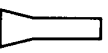
	PAGE
WQ Chemical Waste Collection and Treatment System	121
KM Chilled-Water System	63
GF Chimney System	47
VQ Circulating Water Pumphouse Environmental Control System	115
NN Circulating Water Structures	80
DL Coal Dust Control System	31
DP Coal-Feed and Pulverization System	34
NT Coal-Handling Buildings	81
VP Coal-Handling Buildings' Environmental Control System	114
DJ Coal Preparation and Silo Fill System	30
DK Coal Sampling and Weighing System	30
DI Coal Stackout and Reclaim System	29
NS Coal-Unloading Structures	81
DH Coal-Unloading System	28
RM Combined Cycle Heat Recovery Steam-Generator System	89
JP Combustion Control System	55
GA Combustion Gas Desulfurization System	42
GG Combustion Gas Exhaust System	47
GB Combustion Gas Particulate Removal System	44
GC Combustion Gas Reheat System	44
KT Combustion Gases Sampling and Analysis System	67
RG Combustion Turbine Control Fluid System	86
RC Combustion Turbine Cooling-Water System	84
RL Combustion Turbine-Generator Excitation System	89
RH Combustion Turbine-Generator Gas Purge System	87
RK Combustion Turbine-Generator Hydrogen Cooling System	88
RI Combustion Turbine-Generator Seal Oil System	87
RJ Combustion Turbine-Generator Stator Cooling System	87
RB Combustion Turbine-Generator System	83
RE Combustion Turbine Heating, Ventilating, and Cooling System	85
RN Combustion Turbine Inlet/Exhaust/Recuperation System	90
RO Combustion Turbine Instrumentation System	91
RD Combustion Turbine Lube Oil System	84
RF Combustion Turbine Start-Up and Shutdown System	86
RP Combustion Turbine Supervisory Control System	91
RA Combustion Turbine System	82
FI Communications System	41
ID Computer System	50
SF Condensate Demineralizer System	96
KA Condensate Storage and Transfer System	56
SD Condensate System	93
KD Condensate and Feedwater Chemistry Control System	58
SG Condenser System	96
SI Condenser Tube Cleaning System	98
SH Condenser Vacuum System	97
NA Control Building/Control Complex	80
VI Control Building/Control Complex Environmental Control System	112
JR Coordinated Coal-Handling Control System	55
JO Coordinated Control System	55
EI Direct-Current Power System	38
KC Demineralized Water Storage and Transfer System	58
LB Diesel Cooling-Water System	69
DC Diesel Fuel Oil System	27
DE Diesel Fuel Oil Receiving, Storage, and Transfer System	28
LC Diesel Generator Starting Air System	70
LA Diesel Lube Oil System	69
IU Display Control System	52
FH Emergency DC Lighting System	41
NB Emergency On-Site Power Supply Building	80
VJ Emergency On-Site Power Supply Building Environmental Control System	113
EK Emergency On-Site Power Supply System	39
IS Environmental/Meteorological Monitoring System (Example: Plant)	51
WK Equipment and Floor Drains System	116
SK Feedwater Pump Injection and Miscellaneous System	99
JK Feedwater Pump Driver Instrumentation and Control System	54
SL Feedwater Pump Turbine Lube Oil System	100
SJ Feedwater System	99
JB Feedwater/Steam-Generator Water Level Control System	52

Table 2 (Continued)
Energy Industry Identification System EHS Systems List—Alphabetical by System Title

	PAGE
IC Fire-Detection System	49
KQ Fire-Protection System (Chemical)	66
KP Fire-Protection System (Water)	65
AM Flue Gas Recirculation System	26
WM Fly-Ash Disposal System	118
DG Fuel Gas Supply System	28
DN Fuel Oil Additive System	32
DO Fuel Oil Supply System	33
NU Fuel Supply Buildings	82
VO Fuel Supply Buildings' Environmental Control System	114
NV Generation Building	82
KO Gland Seal Water Supply System	64
FC Grounding and Lightning Protection System	40
KF Heat Rejection Chemical Treatment System	60
KE Heat Rejection System	59
FD Heat Tracing System	40
SN High-Pressure Heater Drains and Vents System	102
WN Hopper-Ash Disposal System	119
LJ Hydrogen System	72
DM Igniter Fuel System	32
AG Inlet Air Preheat System	22
LD Instrument Air Supply System	70
EE Instrument and Uninterruptible Power System	37
LN Insulating-Oil System	74
LQ Laboratory Equipment System	75
LP Laboratory Gas System	75
SM Low-Pressure Heater Drains and Vents System	101
EC Low-Voltage Power System (600 V and less)	36
LM Lube Oil Management System	73
TL Main Generator Excitation System	110
TH Main Generator Gas Purge System	108
TK Main Generator Hydrogen-Cooling System	109
EL Main Generator Output Power System	39
TI Main Generator Seal Oil System	108
TJ Main Generator Stator-Cooling System	108
TB Main Generator System	104
TG Main Turbine Control Fluid System	107
IT Main Turbine Instrumentation System	51
TA Main Turbine System	104
SB Main/Reheat Steam System	92
MC Maintenance Buildings	78
UJ Maintenance Buildings' Environmental Control System	111
KJ Makeup Demineralizer System	61
MD Makeup Water Intake Structure	78
UL Makeup Water Pump House Environmental Control System	112
LR Material and Equipment Handling System	76
EA Medium-Voltage Power System (601 V—15 kV)	35
MM Miscellaneous Buildings and Structures	79
UK Miscellaneous Buildings and Structures' Environmental Control System	111
TE Miscellaneous Turbine Vents System	106
LK Nitrogen System	73
FF Normal AC Lighting System	40
JL Panels System	54
IO Performance Monitoring System	50
LV Plant Hot Water/Steam Heating System	76
LS Plant Shop System	76
KK Potable Water Distribution System	68
AL Primary Air System	25
WO Pulverizer Rejects Disposal System	119
UA Pumping Station Environmental Control System	110
KI Untreated Water Makeup System	60
LT Record Storage System	76
KL Removable Chemical Cleaning System	63
KY Reverse Osmosis System	68
KN Sampling and Water Quality System	63
WG Sanitary Waste Processing System	116
GE Scrubber Additive Preparation System	46

Table 2 (Continued)
Energy Industry Identification System EIIS Systems List—Alphabetical by System Title

	PAGE
GD Scrubber Additive Receiving and Storage System	45
KU Scrubber Liquids Sampling and Analysis System	67
KS Scrubber Makeup Water System	66
WP Scrubber Solids Disposal System	120
AF Secondary Air System	21
UE Security Building Environmental Control System	111
IA Security System	49
IQ Sequence of Events Monitoring System	51
LF Service Air System	72
MF Service Building	78
UC Service Building Environmental Control System	110
KW Service Water System	68
DQ Solid Fuel Stoking System	35
JG Solid-State Control System/Auxiliary Logic Control System	53
LX Soot-Blowing Air Supply System	77
AI Soot-Blowing System	23
JQ Sootblower Control System	55
IW Stack Gas Monitoring System	52
FG Standby AC Lighting System	41
FJ Station Generation Telemetry System	42
SE Steam-Extraction System	94
NQ Steam-Generator Building	81
VM Steam-Generator Building Environmental Control System	113
AK Steam-Generator Sealing Air System	25
AE Steam-Generator System	19
AJ Steam-Generator Vents and Drains System	24
MN Switchyard Buildings	79
UN Switchyard Buildings' Environmental Control System	112
FK Switchyard System	42
IR Television System	51
IM Temperature Monitoring System	50
NM Turbine Building	80
KB Turbine Building Closed Cooling-Water System	56
VK Turbine Building Environmental Control System	113
SO Turbine Bypass System	102
TF Turbine Drains and Miscellaneous Piping System	106
TD Turbine Lube Oil System	105
JI Turbine Steam Bypass Control System	53
TC Turbine Steam Seal System	105
JJ Turbine Supervisory Control System	53
JN Unit Protection System	54
IV Vibration Monitoring System	52
MJ Visitors' Center	79
UH Visitors Center' Environmental Control System	111
ML Warehouse Facilities	79
UM Warehouse Facilities' Environmental Control System	112
MO Waste Treatment Buildings	79
UI Waste Treatment Buildings' Environmental Control System	111
WS Wastewater Management System	121
MG Wastewater Outfall Structure	78
KH Water Filtration System	60
MH Water Treatment Building	78
UB Water Treatment Building Environmental Control System	110
LG Welding Gas System	75
WU Yard Drains System	121
MI Yard Facilities and Improvements	78
LU Yard-Handling and Maintenance System	76

C1		FAN	C15		FLOW CONTROL VALVE	C29		GENERATOR
C2		CENTRIFUGAL PUMP	C16		MOTOR OPERATED VALVE	C30		PLUG VALVE
C3		COMPRESSOR	C17		PNEUMATIC OPERATED VALVE	C32		COOLING COILS
C4		POSITIVE DISPLACEMENT PUMP	C18		HYDRAULIC OPERATED VALVE	C41		BATTERY
C5		EDUCTOR OR JET PUMP, OR BOTH	C19		3-WAY BYPASS VALVE	C44		TEMPERATURE TRANSMITTER
C7		HEAT EXCHANGER OR COOLER, OR BOTH	C20		MANUAL OPERATED VALVE	C45		LEVEL TRANSMITTER
C9		STRAINER OR AIR FILTER, OR BOTH	C21		BUTTERFLY VALVE	C36		TRANSFORMER
C11		ACCUMULATOR OR TANK, OR BOTH	C22		CHECK VALVE	C37		BUS
C13		TURBINE	C23		PNEUMATIC OPERATED RELIEF VALVE	C38		CIRCUIT BREAKER
C14		DEMINERALIZER	C24		SAFETY VALVE	C55		INTERFACING SYSTEM
			C25		VACUUM BREAKER	C46		TEMPERATURE INDICATOR
			C26		PNEUMATIC OPERATED CHECK VALVE	C47		PRESSURE INDICATOR
			C27		SOLENOID OPERATED VALVE			
			C28		MOTOR			

BL,,,1,,.05	-----	OPTIONAL OR ALTERNATE PATH		NO OR NORMALLY OPEN		THROTTLE
BL,,,02,,.04,,.1	-----	SIGNAL OR CONTROL PATH		NC OR NORMALLY CLOSED		

NOTE: Symbols listed here are to be used for drawing clarification only.

Fig 1
Legend of Symbols

5.1 Primary Heat Source Systems Group A

Table 3
Primary Heat Source Systems Group

AE	Steam-Generator System
AF	Secondary Air System
AG	Inlet Air Preheat System
AI	Soot-Blowing System
AJ	Steam-Generator Vents and Drains System
AK	Steam-Generator Sealing Air System
AL	Primary Air System
AM	Flue Gas Recirculation System

5.1.1 Steam-Generator System—AE

5.1.1.1 System Function. The steam-generator system produces steam at the required temperature(s) and pressure(s) through the combustion of fossil fuel.

5.1.1.2 System Description. The steam-generator system typically consists of a furnace with heat transfer panels (waterwalls, economizer, superheater, and reheater), steam drum, boiler circulating pumps and piping, warm-up guns, igniters, burners, wind boxes and associated ductwork, valves, dampers, and instrumentation. The steam-generator system generates steam by the combustion of fuel delivered by the coal-feed and pulverization system (coal-fired unit), fuel oil from the fuel oil supply system (oil-fired unit), or fuel gas from the fuel gas supply system (gas-fired unit) for use as a boiler fuel. In addition, the steam-generator system uses combustion air fed from the primary and secondary air systems, feedwater from the feed water system, and, in the case of a reheat unit, steam returning from the main turbine through the main reheat steam system.

The steam generator uses these inputs to produce steam at the required temperature and pressure for delivery to the main turbine. The combustion process produces flue gas which is routed to the combustion gas exhaust system and for heavy fuels, such as oil and coal, slag

and ash which are routed to the bottom-ash and hopper-ash disposal systems, respectively.

Some designs utilize a combustion gas recirculation subsystem to increase and control the heat transfer across the superheater and reheater. This subsystem would include gas recirculation fans, ductwork, dampers, and associated instrumentation.

5.1.1.3 Mode of Operation. The system operates during power generating operation.

5.1.1.4 Major Interfacing Systems

Coal-Feed and Pulverization System	DP
Fuel Oil Supply System	DO
Fuel Gas Supply System	DG
Solid Fuel Stoking System	DQ
Main/Reheat Steam System	SB
Feedwater System	SJ
Soot-Blowing System	AI
Bottom-Ash Disposal System	WL
Igniter Fuel System	DM
Hopper-Ash Disposal System	WN
Auxiliary Steam System	SA
Combustion Gases Sampling and Analysis System	KT
Combustion Gas Exhaust System	GG
Steam-Generator Sealing Air System	AK
Primary Air System	AL
Secondary Air System	AF
Flue Gas Recirculation System	AM
Steam-Generator Vents and Drains System	AJ
Combustion Gas Reheat System	GC
Combustion Control System	JP
Pulverizer Rejects Disposal System	WO
Combustion Turbine Inlet/Exhaust/Recuperation System (Combined Cycle Application)	RN
Fuel Oil Additive System	DN
Unit Protection System	JN

5.1.1.5 Major Equipment

Boiler Circulating Pumps
Steam Drum
Burners, Igniters, and Warm-Up Guns
Superheater
Reheater
Economizer
Steam Temperature Spray Attenuator
Gas Recirculation Fans

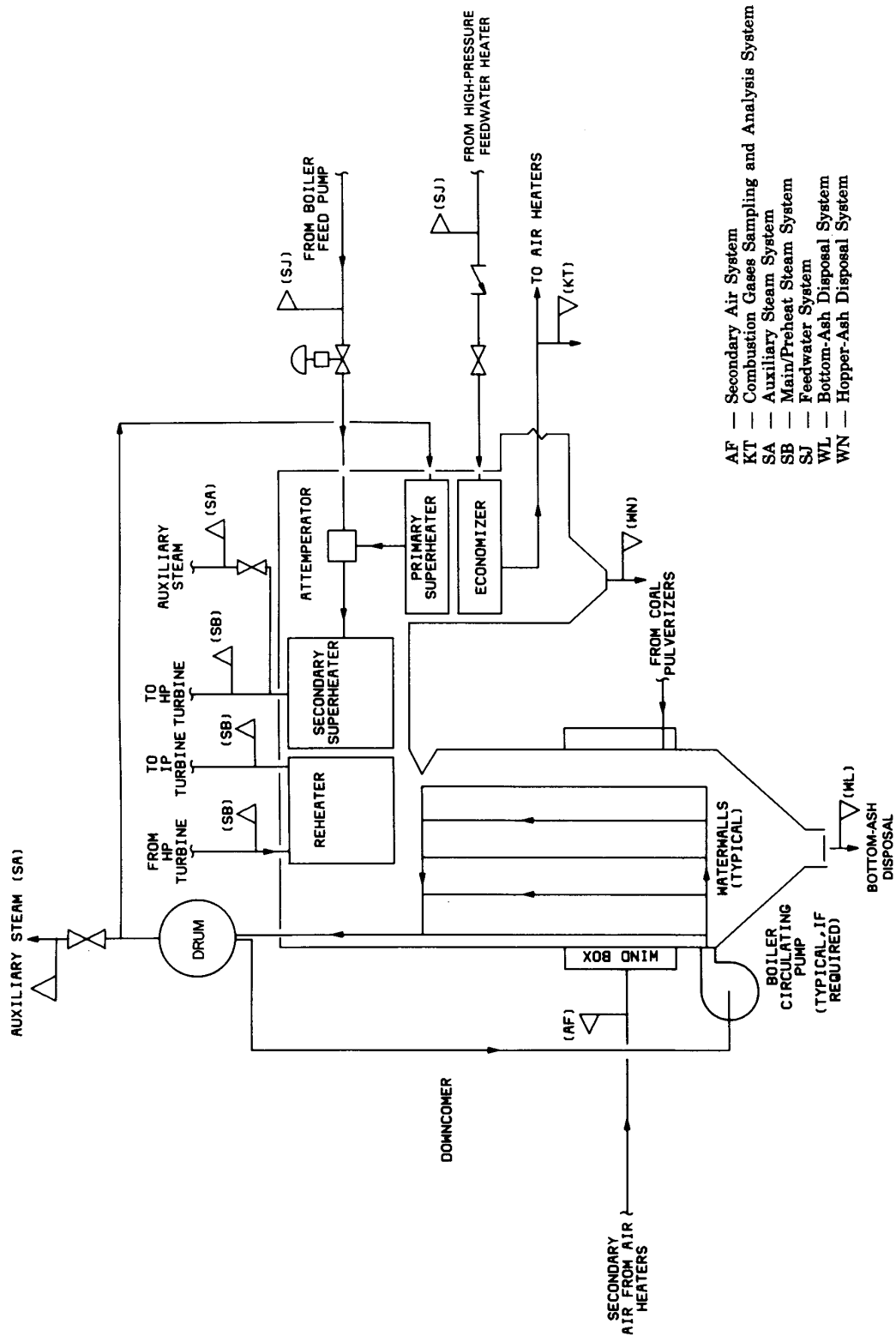


Fig 2
Steam-Generator System — AE

5.1.2 Secondary Air System—AF

5.1.2.1 System Function. The secondary air system provides combustion air to the steam generator.

5.1.2.2 System Description. A typical secondary air system for a coal unit consists of forced draft fans, secondary sections of the air heaters, ductwork, dampers, and instrumentation.

Inlet air to the forced draft fans is supplied from outside air which is generally heated by an inlet air preheat system to provide cold end protection for the air heaters. The forced draft fan discharge is preheated by the secondary sections of the air heater prior to entering the steam-generator windboxes.

Depending on the steam-generator design, the system may also provide igniter, seal, and cooling air for the steam generator.

5.1.2.3 Mode of Operation. The system

operates during normal operation. The system provides purge air to the steam generator prior to firing and after the steam generator is shut down.

5.1.2.4 Major Interfacing Systems

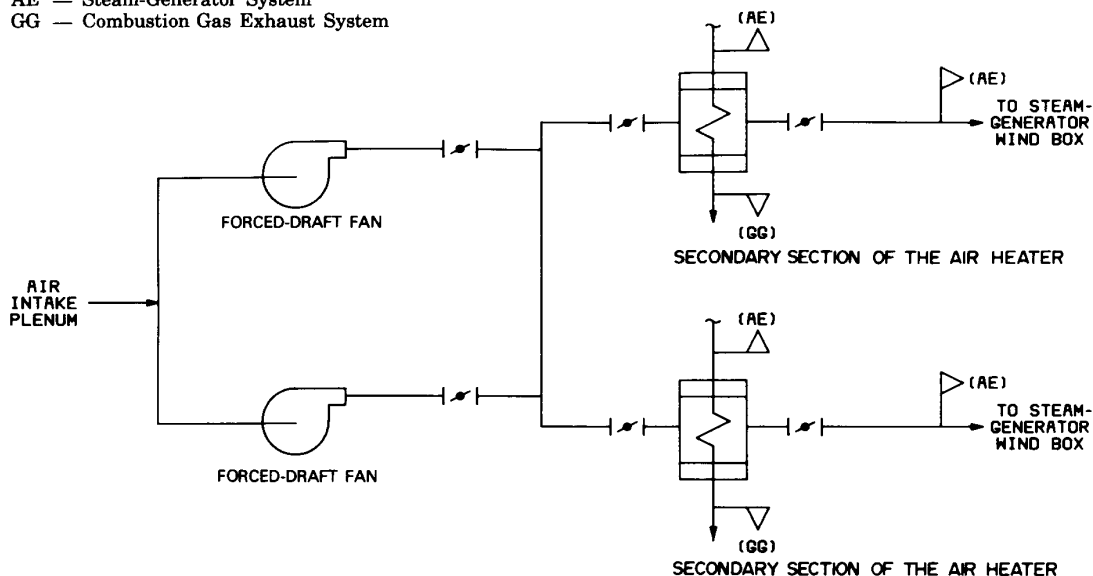
Steam-Generator System	AE
Combustion Control System	JP
Inlet Air Preheat System	AG
Combustion Gas Exhaust System	GG
Turbine Building Closed Cooling-Water System	KB
Soot-Blowing System	AI
Combustion Gas Particulate Removable System	GB
Coal-Feed and Pulverization System	DP

5.1.2.5 Major Equipment

Forced-Draft Fans
Secondary Air Heater (coal units)
Air Heater (oil and gas units)

Fig 3
Secondary Air System — AF

AE — Steam-Generator System
GG — Combustion Gas Exhaust System



5.1.3 Inlet Air Preheat System—AG

5.1.3.1 System Function. The inlet air preheat system preheats outside air to provide cold end protection for the air heaters.

5.1.3.2 System Description. During operation when the ambient temperature is low, the system preheats outside combustion air to prevent flue-gas condensation in the air heaters, which can cause excessive corrosion and accumulation of fly ash.

A typical system consists of a finned tube air preheater mounted in the fan room and associated valves, piping, pumps, and instrumentation for the heating fluid. Typically, the heating fluid is obtained from a point in the steam cycle such

as the deaerator or a dedicated closed heat exchange system. Low temperature condensate from the air preheater is normally routed to the condenser.

5.1.3.3 Mode of Operation. The system operates during normal plant operation.

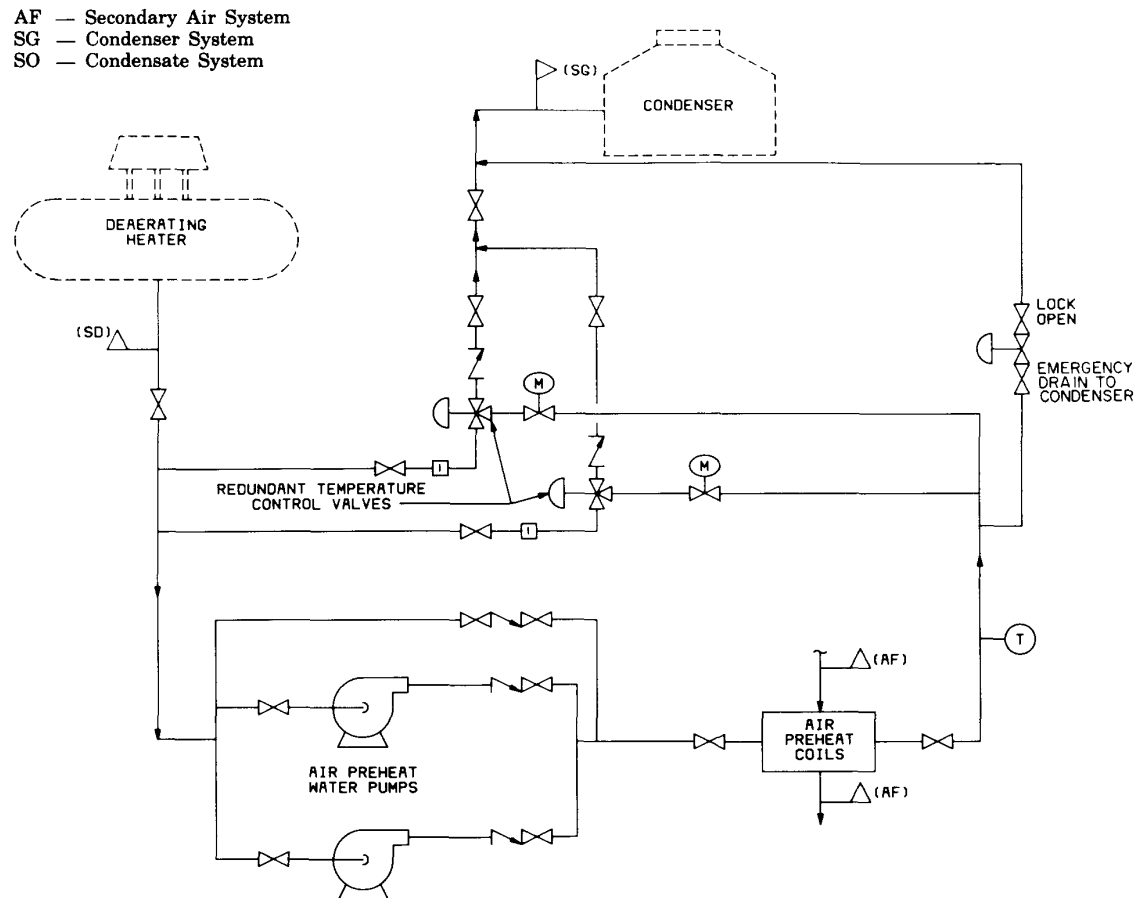
5.1.3.4 Major Interfacing Systems

Condenser System	SG
Condensate System	SD
Coal-Feed and Pulverization System	DP
Secondary Air System	AF
Primary Air System	AL

5.1.3.5 Major Equipment

Air Preheater

Fig 4
Inlet Air Preheat System — AG



5.1.4 Soot-Blowing System—AI

5.1.4.1 System Function. The soot-blowing system provides for the removal of ash deposits from the heat transfer surfaces of the steam generator and air heaters.

5.1.4.2 System Description. The soot-blowing system may use either steam or compressed air as the blowing medium. This system description describes a typical system which uses superheated steam.

The system consists of sootblowers, steam-pressure regulating valves, and associated piping, valves, and instrumentation. The system typically receives its steam supply from the superheater outlet. Steam pressure is reduced by a pressure-regulating valve. Thermal drains are provided for the steam piping to remove any condensation. Condensate is routed to the condenser. The system

may also receive steam from the auxiliary steam system for soot-blowing when the normal steam supply is unavailable, such as during start-up.

5.1.4.3 Mode of Operation. The system operates whenever the steam generator is being fired.

5.1.4.4 Major Interfacing Systems.

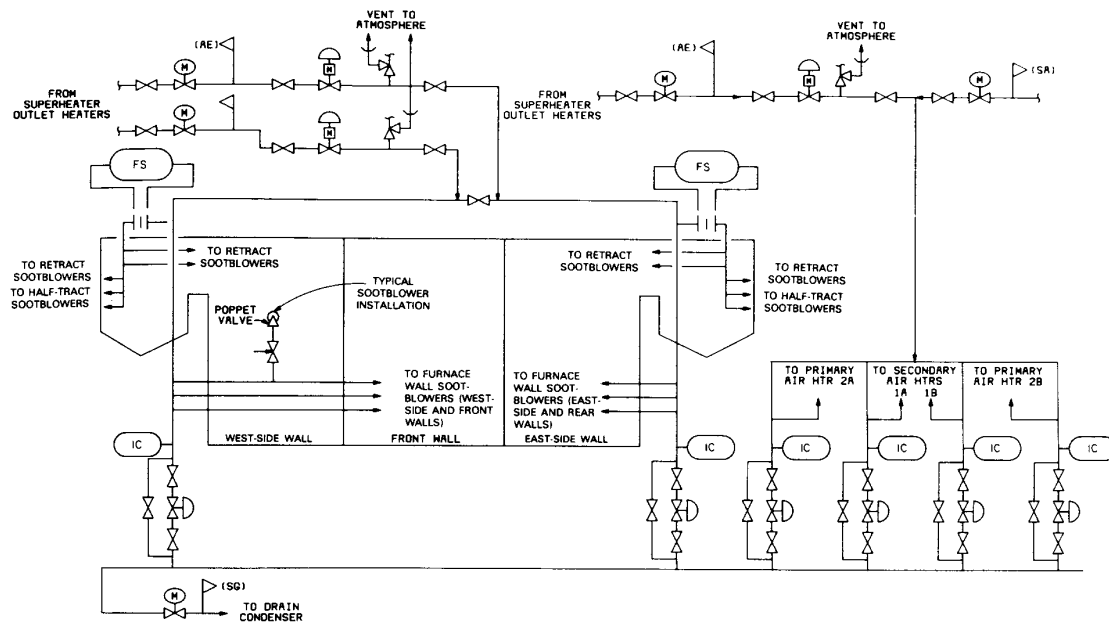
Steam-Generator System	AE
Auxiliary Steam System	SA
Condenser System	SG
Soot-Blowing Air Supply System	LX
Primary Air System	AL
Secondary Air System	AF
Sootblower Control System	JQ

5.1.4.5 Major Equipment

Sootblowers
Pressure-Regulating Valves
Sootblower Control Equipment

Fig 5
Soot-Blowing System — AI

AE — Steam-Generator System
SA — Auxiliary Steam System
SG — Condenser System



5.1.5 Steam-Generator Vents and Drains System—AJ

5.1.5.1 System Function. The steam-generator vents and drains system provides the means to vent or drain various portions of the steam generator system, as appropriate during different modes of steam-generator operation.

5.1.5.2 System Description. A typical system consists of vent and drain piping and valves, a blowdown header, a blowdown tank, and associated instrumentation.

The vent portion of the system performs the following functions:

- (1) Venting of steam-generator components for maintenance or start-up.
- (2) Discharge path for steam-generator safety relief valves.
- (3) Admission of nitrogen for blanketing the steam generator during periods when the steam generator is shut down for extended periods of time.

Vents are terminated in a location which ensures safe discharge to the atmosphere.

The drain portion of the system normally receives steam-generator and miscellaneous equipment drains which will flash at atmospheric pressure and which should not be routed to the condenser. These drains are routed to a drain header which discharges to a blowdown tank. The blowdown tank is vented to the atmosphere to allow the drains to flash. Condensate from the blowdown tank is drained to the wastewater disposal system.

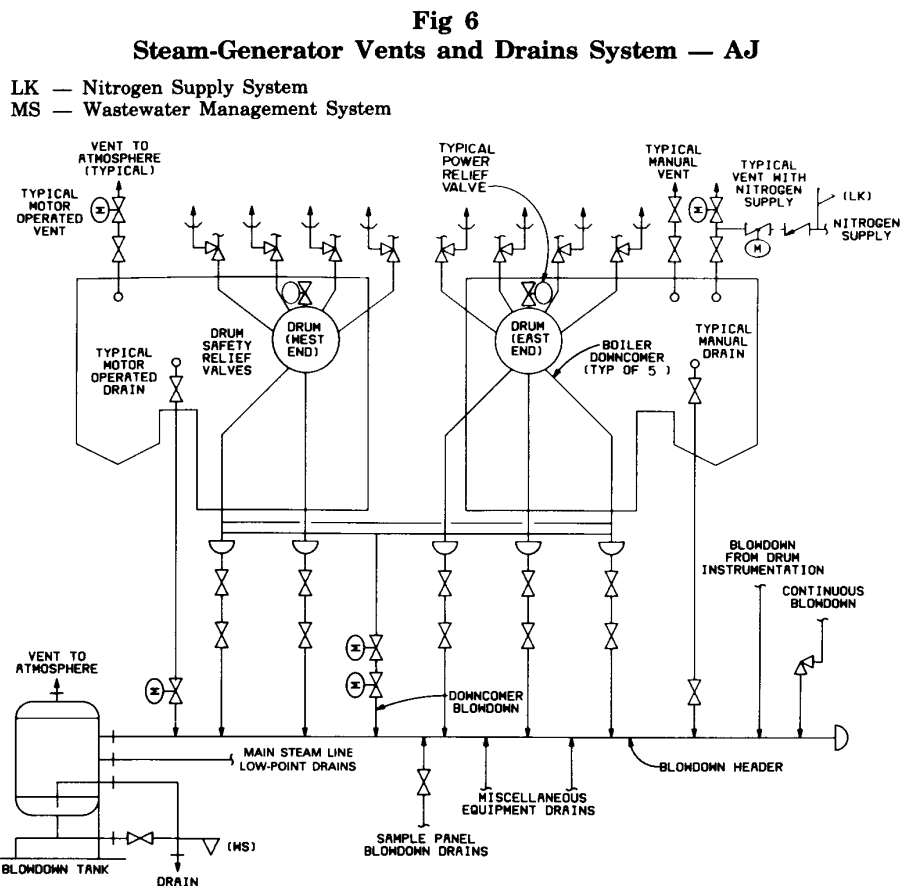
5.1.5.3 Mode of Operation. The system operates in all modes of plant operation.

5.1.5.4 Major Interfacing Systems

Steam-Generator System	AE
Wastewater Management System	WS
Nitrogen System	LK

5.1.5.5 Major Equipment

Blowdown Tank
Safety Relief Valves
Power Relief Valves



5.1.6 Steam-Generator Sealing Air System—AK

5.1.6.1 System Function. The steam-generator sealing air system provides a source of sealing air to various steam-generator system components to prevent outleakage of hot gases and fuel.

5.1.6.2 System Description. The steam-generator sealing air system consists of sealing air booster fans, air filters, piping, valves, and instrumentation.

A typical system for a coal-fired unit with a balanced draft furnace provides sealing air to the coal feeders, coal pulverizers, and dampers in hot primary air or secondary air ductwork. For a pressurized furnace, the system also provides sealing air for furnace penetrations such as sootblowers. The air supply for the sealing air booster fans is typically from the primary air system.

5.1.6.3 Mode of Operation. The system operates during normal operation.

5.1.6.4 Major Interfacing Systems

Primary Air System	AL
Coal-Feed and Pulverization System	DP
Steam-Generator System	AE

5.1.6.5 Major Equipment

Sealing Air Booster Fans

5.1.7 Primary Air System—AL

5.1.7.1 System Function. The primary air system provides air to the steam generator for combustion and other uses on coal-fired units.

5.1.7.2 System Description. The primary air system typically consists of primary air fans, primary sections of the air heaters, ductwork, dampers, and instrumentation.

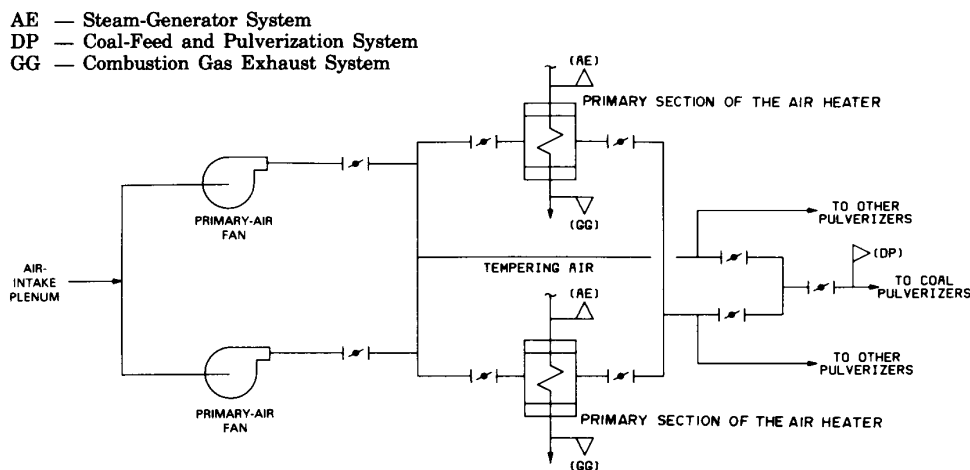
Inlet air to the primary air fans is supplied from outside air which is generally heated by an inlet air preheat system to provide cold end protection for the air heaters. The primary air fans supply air necessary to dry the coal in the pulverizers, convey the coal to the burners, and provide a portion of the necessary combustion air. The primary air is preheated by the primary section of the air heater prior to delivery to the coal pulverizers.

5.1.7.3 Mode of Operation. The system operates during normal operation.

5.1.7.4 Major Interfacing Systems

Steam-Generator System	AE
Combustion Gas Exhaust System	GG
Inlet Air Preheat System	AG
Turbine Building Closed Cooling-Water System	KB
Coal-Feed and Pulverization System	DP
Soot-Blowing System	AI
Steam-Generator Sealing Air Systems	AK

Fig 7
Primary Air System — AL



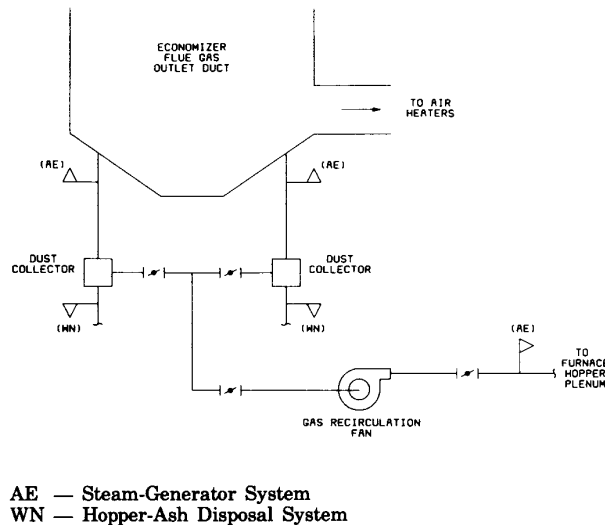


Fig 8
Flue Gas Recirculation System — AM

5.1.7.5 Major Equipment

Primary Air Fans
Primary Air Heater

5.1.8 Flue Gas Recirculation System—AM

5.1.8.1 System Function. The flue gas recirculation system recirculates combustion exhaust gases for the purpose of controlling reheat steam temperature.

5.1.8.2 System Description. The flue gas recirculation system consists of a gas recirculation fan, ductwork, dampers, dust collectors, insulation, and instrumentation.

A typical system recirculates combustion ex-

haust gas from the economizer outlet to the furnace hopper plenum. Control dampers are provided to modulate the gas flow as appropriate to maintain reheat steam temperature. Dust collectors are provided in the ductwork upstream of the gas recirculation fan to protect the fan from fly ash.

5.1.8.3 Mode of Operation. The system operates during normal operation.

5.1.8.4 Major Interfacing Systems

Steam-Generator System	AE
Hopper-Ash Disposal System	WN

5.1.8.5 Major Components

Gas Recirculation Fan
Dust Collectors

5.2 Fuel Management Systems Group D

Table 4
Fuel Management Systems Group

DC	Diesel Fuel Oil System
DE	Diesel Fuel Oil Receiving, Storage, and Transfer System
DG	Fuel Gas Supply System
DH	Coal-Unloading System
DI	Coal Stackout and Reclaim System
DJ	Coal-Preparation and Silo Fill System
DK	Coal Sampling and Weighing System
DL	Coal Dust Control System
DM	Igniter Fuel System
DN	Fuel Oil Additive System
DO	Fuel Oil Supply System
DP	Coal-Feed and Pulverization System
DQ	Solid Fuel Stoking System

5.2.1 Diesel Fuel Oil System—DC

5.2.1.1 System Function. The diesel fuel oil

system provides a daily supply and short-term storage of fuel oil for the prime mover (diesel engine or combustion turbine).

5.2.1.2 System Description. A typical system basically consists of a diesel oil storage tank and transfer pump(s). Diesel fuel oil is received into the storage tank from the fuel oil receiving, storage, and transfer system or an auxiliary tank truck fill connection. The transfer pump(s) then supplies the day tank of the prime mover of the emergency on-site power supply system as required.

5.2.1.3 Mode of Operation. Not applicable.

5.2.1.4 Major Interfacing Systems

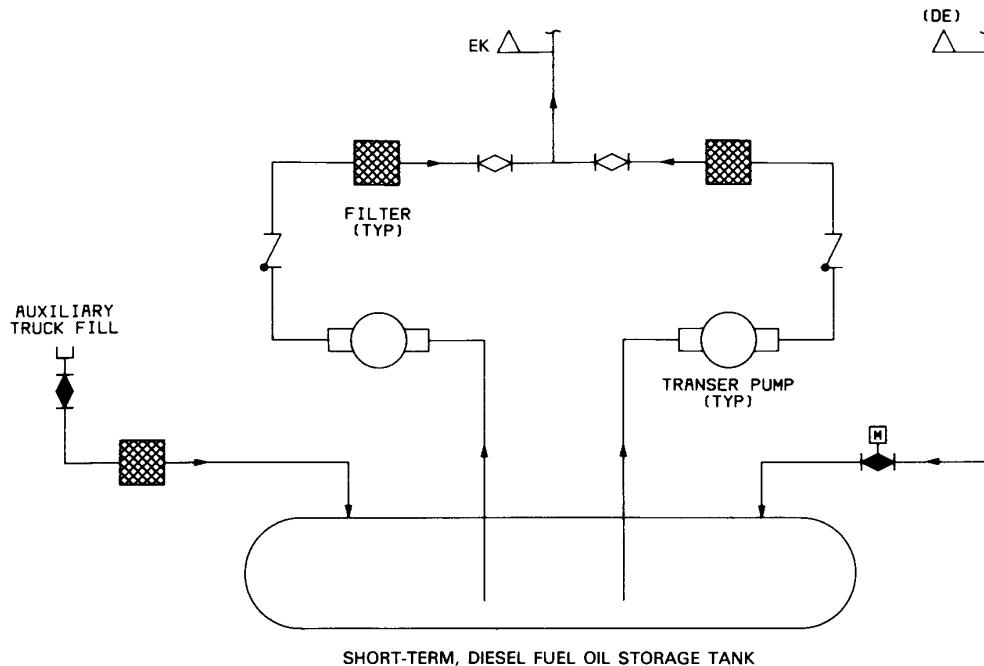
Emergency On-Site Power Supply System EK
Diesel Fuel Oil Receiving, Storage, and Transfer System DE

5.2.1.5 Major Components

Transfer Pump(s)
Filters
Short-Term Storage Tank

Fig 9
Diesel Fuel Oil System — DC

DE — Diesel Fuel Oil Receiving, Storage, and Transfer System
EK — Emergency On-Site Power System



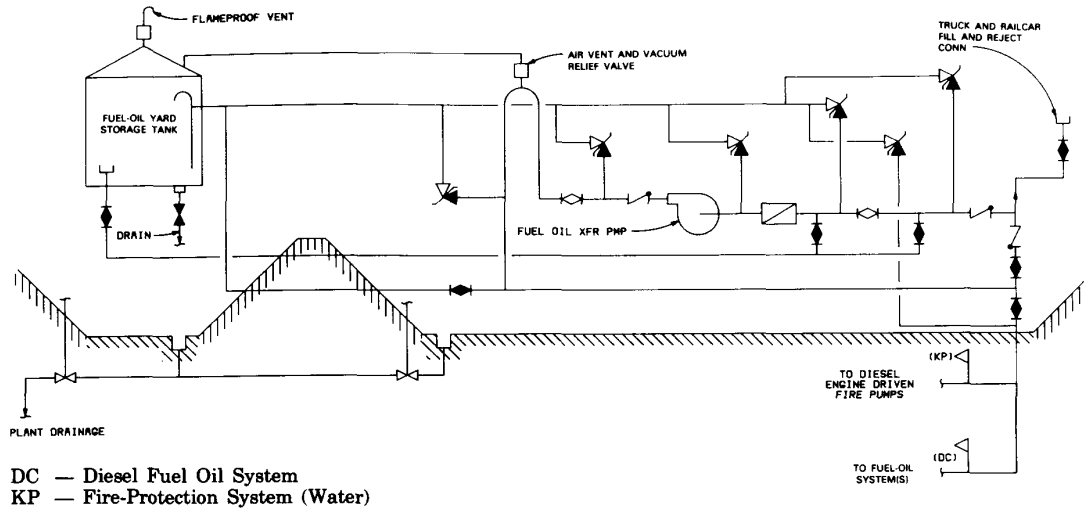


Fig 10
Diesel Fuel Oil Receiving, Storage, and
Transfer System — DE

5.2.2 Diesel Fuel Oil Receiving, Storage, and Transfer System—DE

5.2.2.1 System Function. The fuel oil receiving, storage, and transfer system provides for long-term storage of diesel fuel oil in bulk quantity.

5.2.2.2 System Description. A system usually consists primarily of a fuel oil yard storage tank(s), a fill/reject station, and a fuel oil transfer pump(s). The yard storage tank is usually located within a diked area of the plant so as to contain any spillage that may occur. The fuel oil is received from tank trucks or railcars at the fill/reject station, or both, and pumped by way of the transfer pump to the storage tank. On an as-needed basis the fuel oil is pumped by way of the transfer pump to the diesel fuel oil system and to any other services requiring fuel oil such as the diesel engine driven fire-protection pumps.

5.2.2.3 Mode of Operation. The system operates on an as-needed basis during normal, shut-down, and emergency plant operating conditions.

5.2.2.4 Major Interfacing Systems

Diesel Fuel Oil System	DC
Fire-Protection System (Water)	KP

5.2.2.5 Major Components

Yard Storage Tank(s)
Transfer Pump(s)
Fill/Reject Station

5.2.3 Fuel Gas Supply System—DG

5.2.3.1 System Function. The fuel gas supply system is composed of the supply storage, measurement, and regulation of fuel gas to the boilers.

5.2.3.2 System Description. The system transfers the fuel gas from the pressure-reducing station of the gas company to the burners of the boilers or combustion turbine. It may also have provision for storage of the gas prior to consumption in the boilers.

5.2.3.3 Mode of Operation. The system is in use during all modes of plant operation.

5.2.3.4 Major Interfacing Systems

Steam-Generator System	AE
Unit Protection System	JN
Combustion Turbine System	RA
Igniter Fuel System	DM

5.2.3.5 Major Equipment

Silencers
Strainers and Filters

5.2.4 Coal-Unloading System—DH

5.2.4.1 System Function. The coal unloading system provides the capability to receive coal at the plant site.

5.2.4.2 System Description. This system includes all facilities and equipment involved in accepting coal from ships and barges, trains or trucks, and delivery of coal to stockpiles. In the

event that coal is required in the powerhouse, it may be transferred direct to the coal preparation and silo filling systems.

5.2.4.3 Mode of Operation. The system operates during receipt of coal only.

5.2.4.4 Main Interfacing Systems

Coal Preparation and Silo Fill System	DJ
Coordinated Coal-Handling Control System	JR
Coal Stackout and Reclaim System	DI
Coal Sampling and Weighing System	DK
Coal Dust Control System	DL

5.2.4.5 Major Equipment

Receiving Hopper
Car Dumper (if rail delivery)
Stocking out Conveyors
Coal Scales
Barge Unloader
Car Thawing Equipment
Magnetic Separators
Feeders
Stackers

5.2.5 Coal Stackout and Reclaim System—DI

5.2.5.1 System Function. The coal stackout and reclaim system serves to transport coal from

the coal unloading system to an intermediate storage pile and reclaims from this pile to the coal preparation and silo fill system.

5.2.5.2 System Description. The system primarily consists of the coal stackout equipment and the reclaim hoppers and feeders. The coal stackout equipment may be a radial arm stacker, a bucket wheel stacker/reclaimer, or a telescoping chute.

Reclaim hoppers and feeders under the storage pile move the coal onto the belts feeding the coal preparation and silo fill system.

5.2.5.3 Mode of Operation. The system is in use when coal is received and when coal is fed to the coal silos.

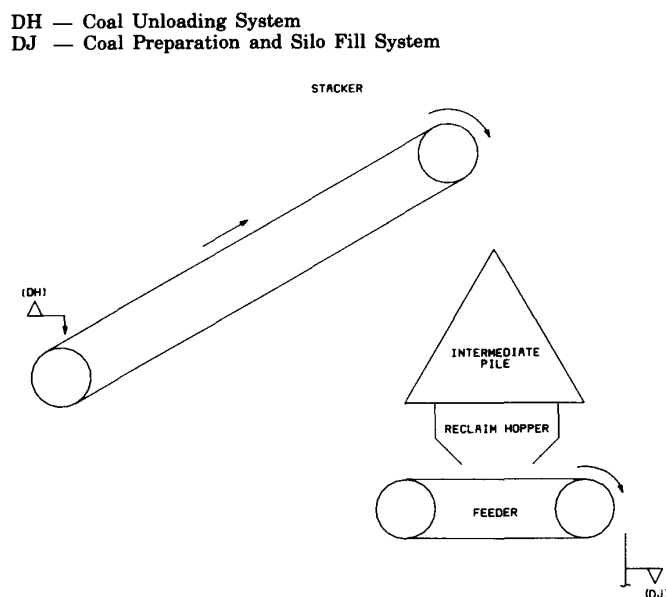
5.2.5.4 Major Interfacing Systems

Coal Unloading System	DH
Coal Preparation and Silo Fill System	DJ
Coal Dust Control System	DL
Low-Voltage Power System	EC
Coordinated Coal-Handling Control System	JR

5.2.5.5 Major Equipment

Stacker
Reclaim Hoppers
Reclaim Feeders
Sampling and Weighing Equipment

Fig 11
Coal Stackout and Reclaim System — DI



5.2.6 Coal Preparation and Silo Fill System—DJ

5.2.6.1 System Function. The coal preparation and silo fill system provides the capability to prepare and carry the coal to storage silos in the powerhouse.

5.2.6.2 System Description. The system prepares the coal by passing it through a crusher to break lumps and remove tramp iron before delivery by conveyor to the coal bunkers in the powerhouse.

5.2.6.3 Mode of Operation. The system operates when coal is required in the powerhouse.

5.2.6.4 Main Interfacing Systems

Coal Stackout and Reclaim System	DI
Coal Sampling and Weighing System	DK
Coal Dust Control System	DL
Coal-Feed and Pulverization System	DP
Coordinated Coal-Handling Control System	JR
Solid Fuel Stoking System	DQ

5.2.6.5 Major Equipment

Coal Crusher
Conveyors
Feeders
Magnetic Separators

5.2.7 Coal Sampling and Weighing System—DK

5.2.7.1 System Function. The coal sampling and weighing system serves to obtain accurate weight totals of coal and representative samples of coal for analysis.

5.2.7.2 System Description. The system consists of an in-line belt scale for weighing of coal. The scale measures the change in belt weight and gives the total in figures. Scales are typically located on the unloading belt and the belts feeding the plant.

Coal sampling equipment is designed to obtain a representative sample of coal for detailed chemical analysis and determination of Btu levels. Samplers consist of primary, secondary, and tertiary cutters with a grinder. Samplers are typically located on the unloading belt and the belts feeding the station.

5.2.7.3 Mode of Operation. The system is operated when the coal-handling system is in operation.

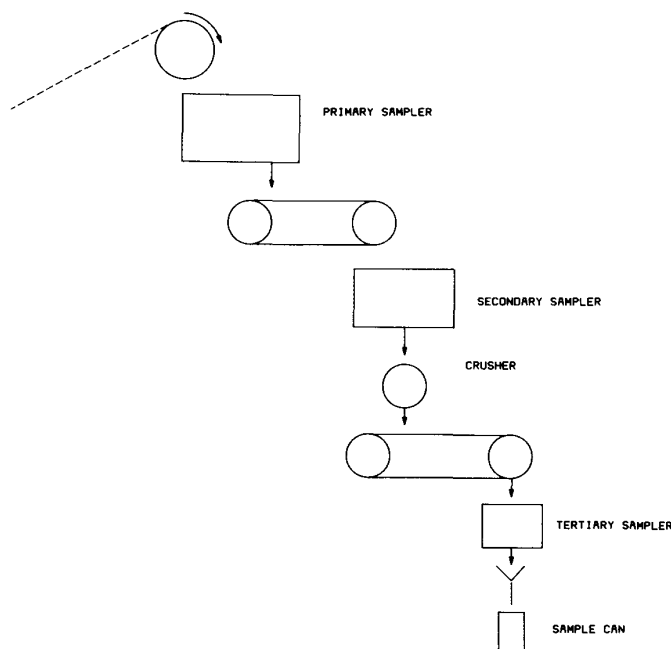
5.2.7.4 Major Interfacing Systems

Coal Unloading System	DH
Coal Preparation and Silo Fill System	DJ
Coordinated Coal-Handling Control System	JR

5.2.7.5 Major Equipment

Belt Scales
Sampler

Fig 12
Coal Sampling and Weighing System — DK



5.2.8 Coal Dust Control System—DL

5.2.8.1 System Function. The coal dust control system minimizes dust escape to the environment, from all coal transfer points, surge bins, distribution bins, and coal silos. Each is provided with dust control and is enclosed to the maximum extent possible.

A slight, negative air pressure is maintained inside each enclosure by the dry coal dust collection system so the flow of air is inward through all unavoidable coal transfer enclosure openings.

Each dry coal dust control system is connected to a baghouse-type dust collection system.

Where a dry coal dust control system is not provided, a moisturizing spray system is used by wetting the coal surface to maintain the dust from escaping, likewise limiting the dusting off of dry coal.

In addition to the dust control system, a vacuum system is used to clean up dust and coal spills. Hose stations are also provided for wash-down of areas where the vacuum system is not effective.

5.2.8.2 System Description. The dry coal

dust control system consists of ducts, piping, and a vacuum pump. Coal dust generated in various areas is collected and transferred by the vacuum pump to the dust collector filter. Coal dust is trapped in baghouses and clean air is discharged to the environment.

The wet coal dust control system consists of a wetting compound tank, pump, piping, and spray nozzles.

5.2.8.3 Mode of Operation. The system is in use during start-up and normal operation.

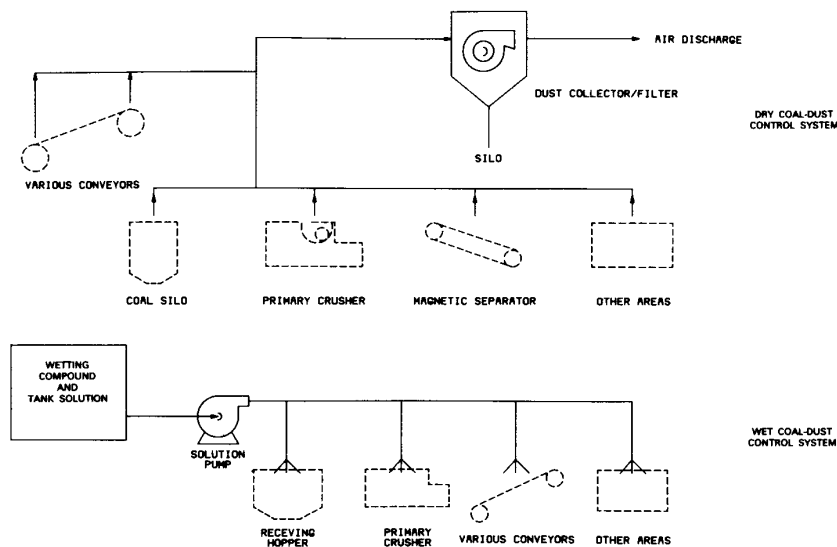
5.2.8.4 Major Interfacing Systems

Coal Preparation and Silo Fill System	DJ
Low-Voltage Power System	EC
Coal-Feed and Pulverization System	DP
Coal Stackout and Reclaim System	DI

5.2.8.5 Major Equipment

Pumps
Tanks
Filters
Piping
Valves
Instrumentation
Controls

Fig 13
Coal Dust Control System — DL



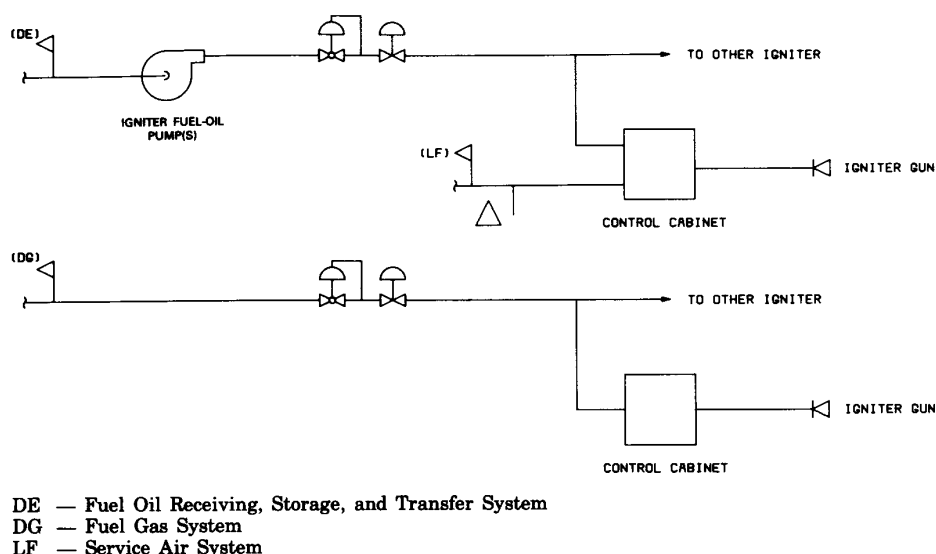


Fig 14
Igniter Fuel System — DM

5.2.9 Igniter Fuel System—DM

5.2.9.1 System Function. The igniter fuel system serves to provide the ignition fuel to the igniter at specified pressure and flows.

5.2.9.2 System Description. For igniters fired by fuel oil, the system consists of common igniter fuel oil pumps, trip isolation valve, pressure control valve, individual control cabinets, and associated piping and instrumentation. Atomizing steam or air may be supplied to the igniters. For igniters fired by gas, the system consists of an igniter gas trip valve, pressure control valve, individual control cabinets, and associated piping and instrumentation.

5.2.9.3 Mode of Operation. The system is in use when ignition support is required.

5.2.9.4 Major Interfacing Systems

Steam-Generator System	AE
Fuel Oil Receiving, Storage, and Transfer System	DE
Fuel Gas Supply System	DG
Unit Protection System	JN
Service Air System	LF
Fuel Oil Additive System	DN
Combustion Control System	JP

5.2.9.5 Major Equipment

Control and Trip Valves
Igniter Oil Pump
Igniter Control Cabinet

5.2.10 Fuel Oil Additive System—DN

5.2.10.1 System Function. The fuel oil additive system functions to supply chemical additives to the fuel oil. These additives are effective in reducing superheater fouling, high-temperature ash corrosion, and low-temperature sulfuric acid corrosion.

5.2.10.2 System Description. The fuel oil additive system delivers chemical additives such as alumina, dolomite, kaolin, or magnesia to the fuel oil directly by injection in the fuel oil supply line. For furnaces with oil recirculation lines, additives are blown directly into the furnace at strategic points. Sootblower-type lances are also used for the purposes of additive injection.

5.2.10.3 Mode of Operation. The fuel oil additive system is used during all oil burning operating modes.

5.2.10.4 Major Interfacing System

Igniter Fuel System	DM
Fuel Oil Supply System	DO
Steam-Generator System	AE

5.2.10.5 Major Equipment

Chemical Storage Bins
Grinders
Classifiers
Injectors

5.2.11 Fuel Oil Supply System—DO

5.2.11.1 System Function. The fuel oil supply system provides storage for fuel oil and transfers it to the burners and igniter guns.

5.2.11.2 System Description. The fuel oil supply system consists of a fuel oil storage tank provided with a fill connection and a breaker flame arrestor. Fuel oil is transferred to the boiler burners by way of a main fuel oil transfer pump. Igniter guns are supplied with fuel from the fuel oil storage tanks by way of an igniter fuel oil pump.

5.2.11.3 Mode of Operation. This system is used under normal operating conditions.

5.2.11.4 Major Interfacing Systems

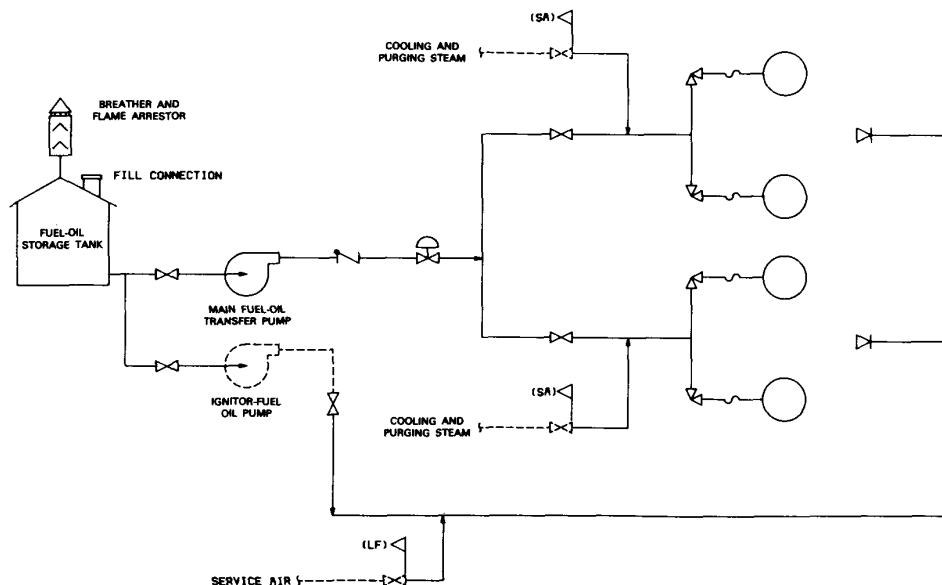
Auxiliary Steam System	SA
Service Air System	LF
Low-Voltage Power System	EC
Unit Protection System	JN
Fuel Oil Additive System	DN
Steam-Generator System	AE
Combustion Turbine System	RA
Fuel Oil Receiving Storage and Transfer system	DE
Fire-Protection System (Chemical)	KQ

5.2.11.5 Major Equipment

Storage Tank
Transfer Pump
Piping
Valves
Heaters (tank and in-line)
Filters
Strainers
Burner Pumps

Fig 15
Fuel Oil Supply System — DO

LF — Service Air System
SA — Auxiliary Steam System



5.2.12 Coal-Feed and Pulverization System—DP

5.2.12.1 System Function. The coal-feed and pulverization system serves to deliver coal from the storage silo or bunker through the feeder to the coal mill. The coal is then pulverized and delivered to the furnace for firing. The system serves to control boiler firing rate by control of the feeder speed. Primary air is provided to the coal mill for drying and for transport of the pulverized coal to the furnace for firing. Coal mill lube oil systems are also included. The system also includes the necessary inerting equipment for fire protection purposes.

5.2.12.2 System Description. The system consists of the coal silos or bunkers, coal feeders, coal mill, and associated chutes and piping. Coal supply piping from the coal mill to the furnace is included in this system. Feeder inlet gates, coal mill outlet swing valves, and burner pipe shutoff gates are contained within this system.

5.2.12.3 Mode of Operation. The system is in use when the furnace is fired with coal.

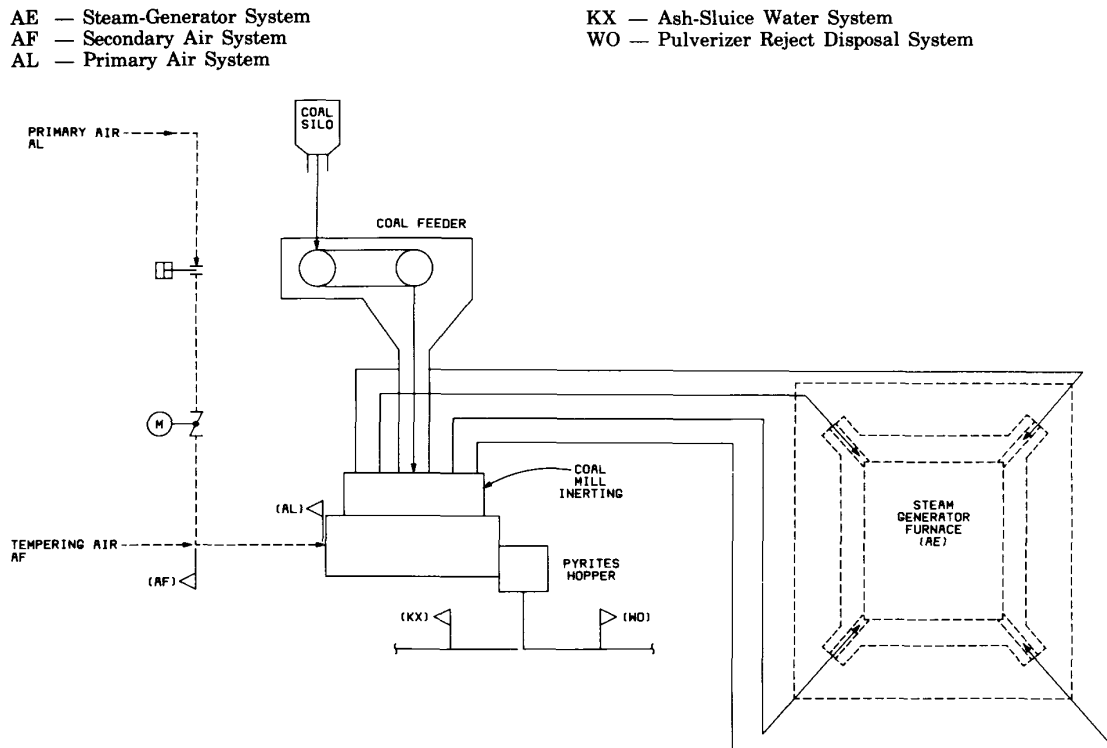
5.2.12.4 Major Interfacing Systems

Primary Air System	AL
Steam-Generator System	AE
Combustion Control System	JP
Coal Preparation and Silo Fill System	DJ
Medium-Voltage Power System	EA
Pulverizer Rejects Disposal System	WO
Ash-Sluice Water System	KX
Unit Protection System	JN
Steam-Generator Sealing Air System	AK
Coal Preparation and Silo Fill System	DJ
Coordinated Coal-Handling Control System	JR
Coordinated Control System	JO
Secondary Air System	AF

5.2.12.5 Major Equipment

Coal Supply Piping
Coal Silos or Bunkers
Coal Feeder
Coal Mill
Burner Lines

Fig 16
Coal-Feed and Pulverization System — DP



5.2.13 Solid Fuel Stoking System—DQ

5.2.13.1 System Function. The solid fuel stoking system is designed to feed solid fuel to the boiler fire box.

5.2.13.2 System Description. The solid fuel stoking system consists of a conveying system which transports the solid fuel from the inplant hoppers to the boiler grate; feed to the boiler is either by screw, bar-type conveyors, or moving grates.

5.2.13.3 Mode of Operation. The system operates during start-up and normal plant operating conditions.

5.2.13.4 Major Interfacing Systems

Coal Preparation and Silo Fill System	DJ
Low-Voltage Power System	EC
Steam-Generator System	AE
Unit Protection System	JN

5.3 Electrical Power Systems Group E

Table 5
Electrical Power Systems Group

EA	Medium-Voltage Power System (601 V—15 kV)
EC	Low-Voltage Power System (600 V and less)
EE	Instrument and Uninterruptible Power System
EI	Direct-Current Power System
EK	Emergency On-Site Power Supply System
EL	Main Generator Output Power System

Various Plant Systems	
Switchyard System	FK
Insulating Oil System	LN
Low-Voltage Power System	EC
Untreated Water Makeup System	KI
Main Generator Output Power System	EL
Emergency On-Site Power Supply System	EK

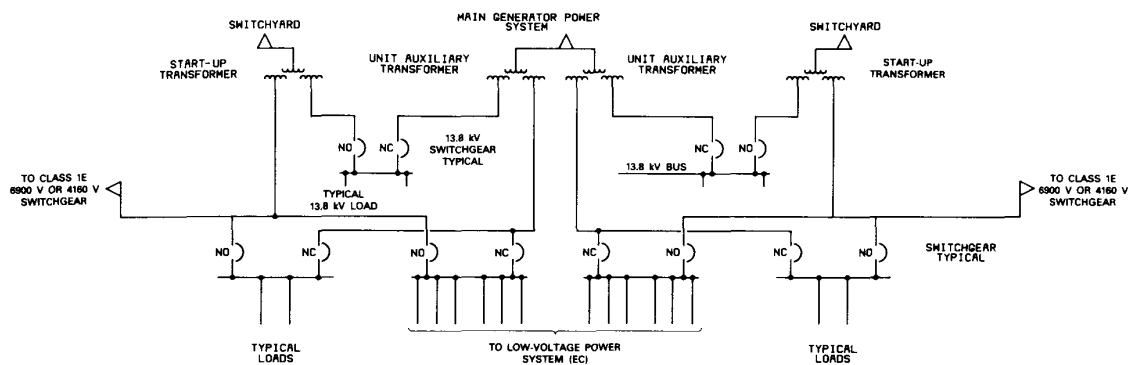
5.3.1 Medium-Voltage Power System (601 V—15 kV)—EA

5.3.1.1 System Function. The purpose of the medium-voltage power system is to supply power to the low-voltage system and to medium-voltage loads. This system is supplied from the main generator power system and off-site power systems.

5.3.1.2 System Description. The medium-voltage power system includes voltage levels from 601 V through 15 kV. The system includes supply transformers (unit auxiliary transformer and start-up transformers) interbus transformers, bus, cable and switchgear related to the distribution of this power. Sub-breakdowns of this system may be used to separate voltage levels. In the event that voltage levels are separated, the convention is used that the interbus transformer goes with the voltage level it supplies with the interface at the high-voltage terminal of the transformer. For loads other than transformer loads, the cable is identified with the load systems.

5.3.1.3 Major Interfacing Systems

Fig 17
Medium-Voltage Power System — EA
System Diagram



5.3.1.4 Major Equipment

Medium-Voltage Buses
Medium-Voltage Switchgear
Protection Switches
Feeders
Control Logic Circuits
Main Generator Circuit Breakers or Load Break Switches
Instrumentation and Controls
Cables
Transformers

5.3.2 Low-Voltage Power System (600 V and less)—EC

5.3.2.1 System Function. The purpose of the low-voltage power system is to distribute power to electrical loads 600 V and below.

5.3.2.2 System Description. The low-voltage power system includes supply transformers, unit substations, low-voltage switchgear and power centers, motor control centers, cable, bus, distribution transformers, and panel boards. Sub-breakdowns of this system may be used to separate voltage levels. In the event that voltage

levels are separated, the convention is used that the transformer goes with the voltage level it supplies, with the interface at the high-voltage terminal of the transformer. For loads other than transformer loads, the cable goes with the load system.

5.3.2.3 Mode of Operation. The low-voltage power system supplies power to all plant systems requiring 600 V and less power.

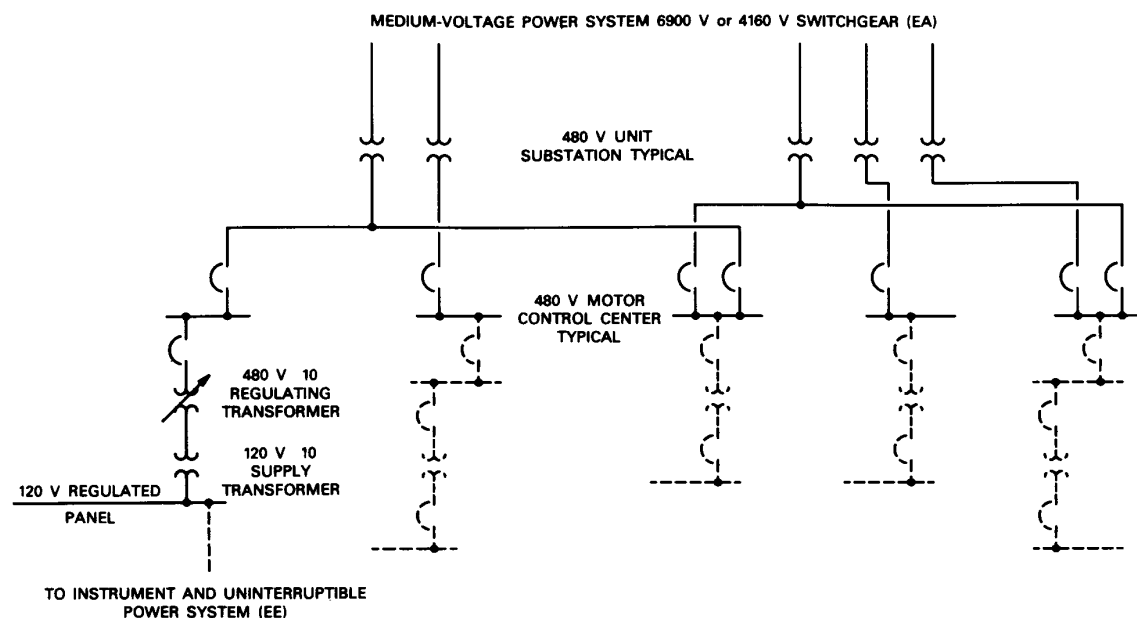
5.3.2.4 Major Interfacing Systems

Medium-Voltage Power System	EA
Instrument and Uninterruptible	
Power System	EE
DC Power System	EI
Emergency On-Site Power Supply System	EK
Heat Tracing System	FD
Normal AC Lighting System	FF
Coordinated Control System	JO

5.3.2.5 Major Equipment

Low-Voltage Buses
Switchgear
Transformers
Feeders
Instrumentation and Controls

Fig 18
Low-Voltage Power System — EC



5.3.3 Instrument and Uninterruptible Power System—EE

5.3.3.1 System Function. The purpose of the instrument and uninterruptible power system is to supply low noise, uninterruptible regulated power to loads such as the computer and to important instrumentation and controls.

5.3.3.2 System Description. The instrument and uninterruptible power system may consist of a static inverter, static transfer switches, step-down transformers, voltage regulating transformers, maintenance bypass switches, regulated rectifier, distribution panels, and interconnecting cabling.

NOTES (1) The instrument power distribution system is not identified by a separate system based on the conclusion that this is usually provided by components which are shared with the uninterruptible system.

(2) The instrument power system may consist of a regulated bus which in the IEEE description is shown within the boundaries of the uninterruptible power system.

5.3.3.3 Major Interfacing Systems

Temperature Monitoring System	IM
Performance Monitoring System	IO
DC Power System	EI
Low-Voltage Power System	EC
Computer System	ID
Coordinated Control System	JO

5.3.3.4 Major Equipment

Transformers
Inverters
Switchgear
Instrumentation and Controls
Cables

Fig 19
Instrument and Uninterruptible Power System — EE

