

OPUS System

Operator-User Performance Support

THE OPUS GROUP

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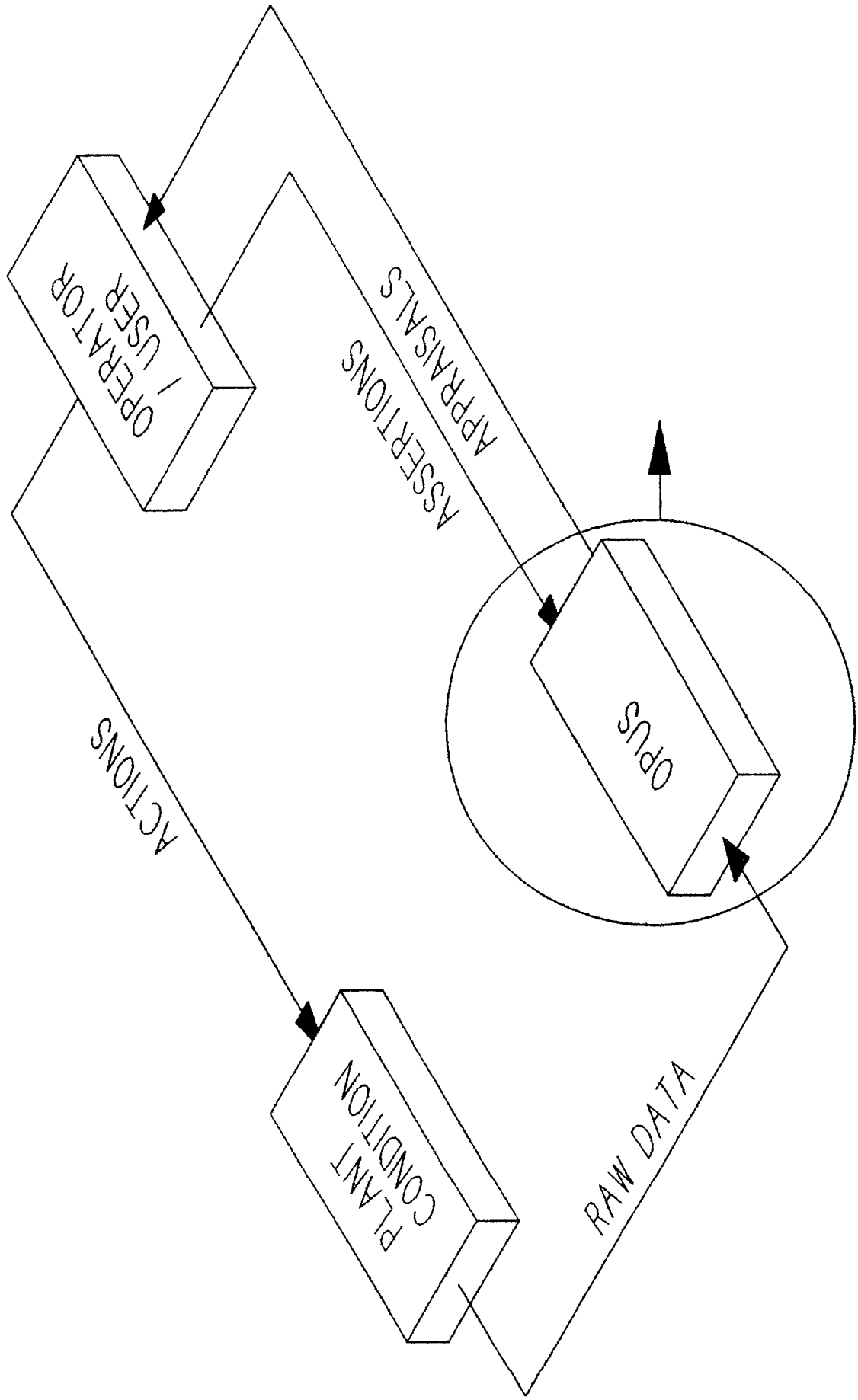
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THE PROBLEM DOMAIN

- **DISTRIBUTED ARCHITECTURE**
 - **Plant Operations are diverse and multi-faceted**
 - **Events can happen anywhere**
 - **The plant is ENGINEERED**
 - . **Decomposition**
 - . **Functional Abstraction**
 - . **Temporal Abstraction**
 - . **Procedural**
 - . **Pre-enumerated**
- **Asynchronous behaviour**
- **Higher level reasoning via human-centred control strategy**
- **Real time operation**
- **Disparate knowledge bases**
- **Multi-disciplinary**

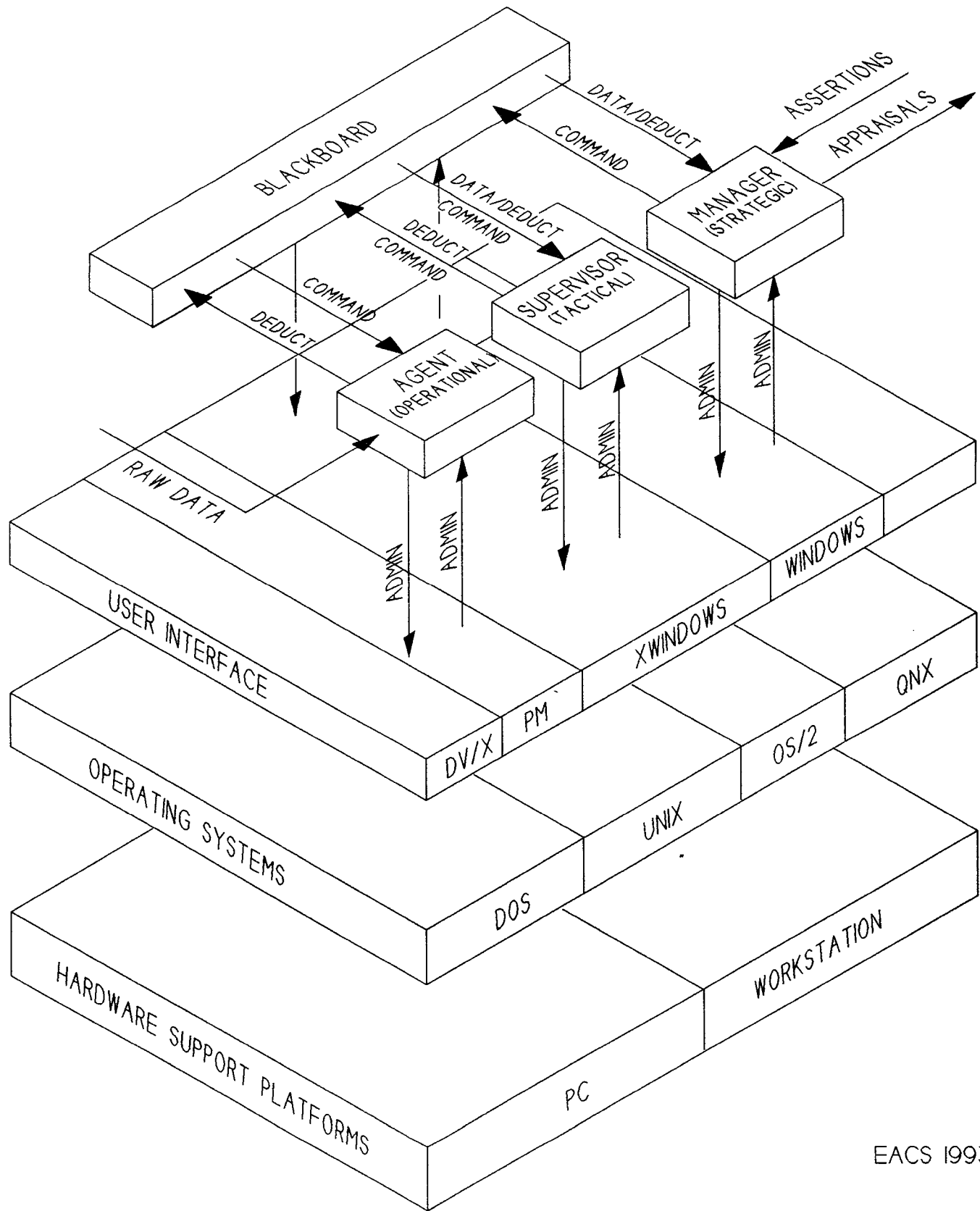


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SOLUTION STRATEGY

- **PERFORMANCE SUPPORT**
- **OPERATOR CONTROL**
- **MODULAR SYSTEM**



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SAMPLE MODULE CODE

```
int main()
{
  while(!quit)
  {
    my_obj = obj_read();

    switch(my_obj)
    {
      case hMail:
        ProcessMailEvent();
        break;

      case hTimer:
        ProcessTimerEvent();
        break;

      case hKeyboard:
        ProcessKeyboardEvent();
        break;
    }

  }

  DoHouskeeping();
  return(0);
}
```

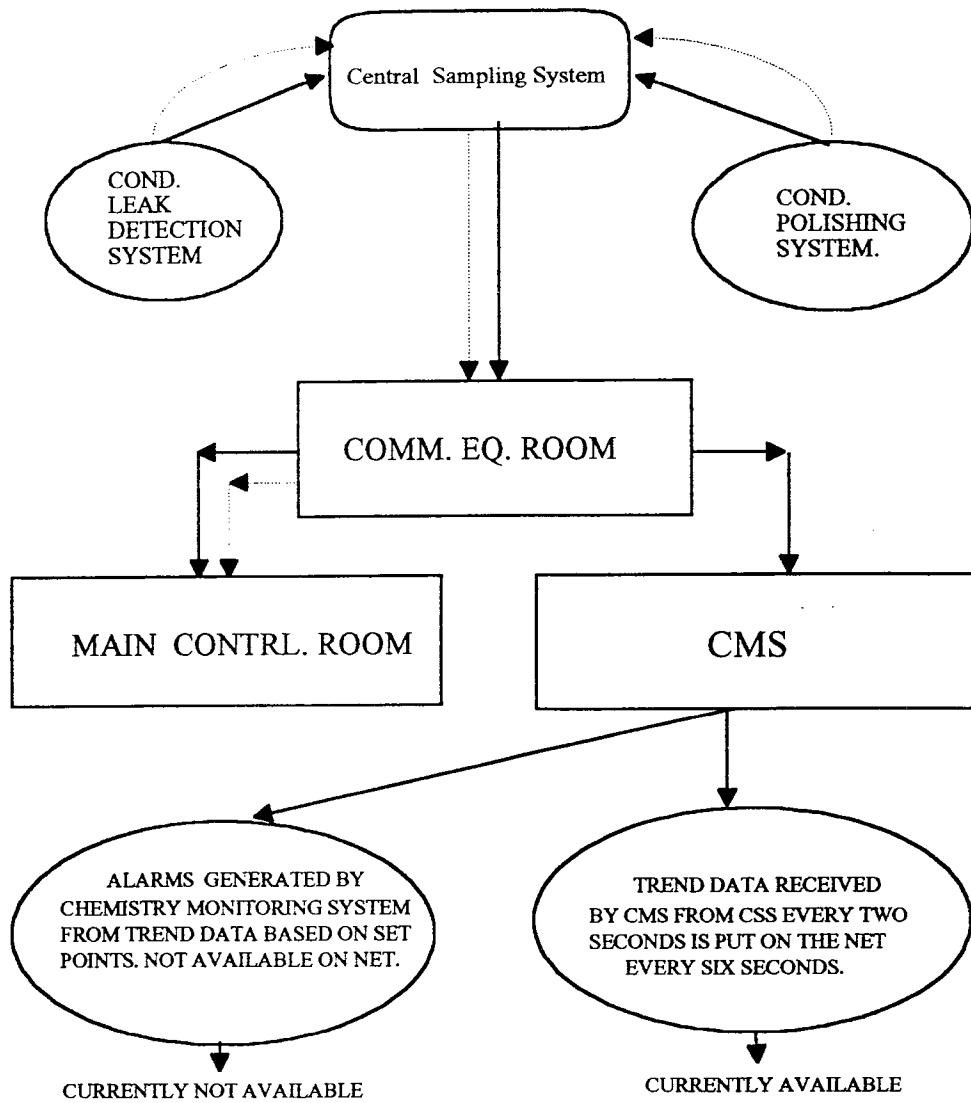
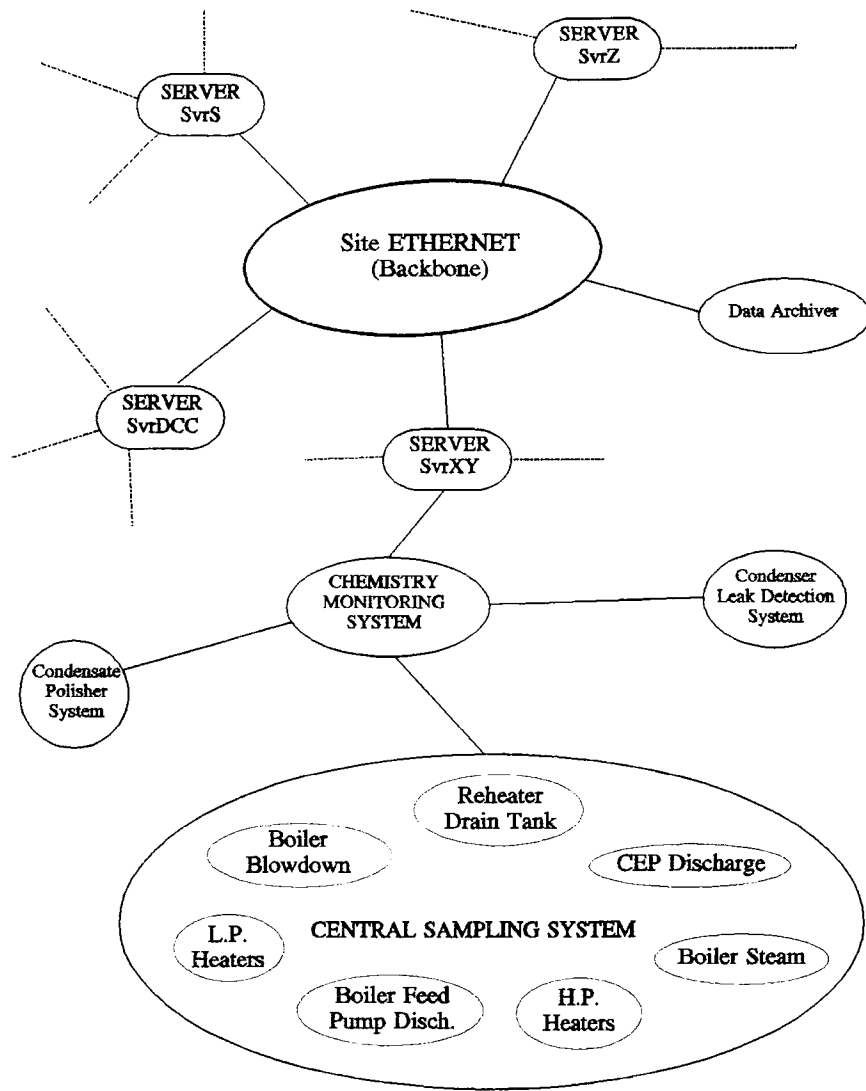


FIGURE: SHOWING FLOW OF TREND AND ALARM DATA.

LEGEND: ALARM DATA \dashrightarrow

TREND DATA \longrightarrow



New Brunswick Power**Pt. Lepreau G.S.****Documentation****MANUALS**

Central Sampling System.	Operating Manual OM45100-1	Rev. 4
	Training Manual TR(A)45100-1	Rev. 1
	Training Manual TR(B)45100-1	Rev. 2
Condenser Leak Detection System	Operating Manual OM45100-2	Rev. 1
	Training Manual TR(A)45100-2	Rev. 2
	Training Manual TR(B)45100-2	Rev. 2
Condensate Polishing System.	Operating Manual OM43240	Rev. 0
	Training Manual TR(A)43240	Rev. 0
Chemical Monitoring System.	Operating Manual OM78240	Rev. 0

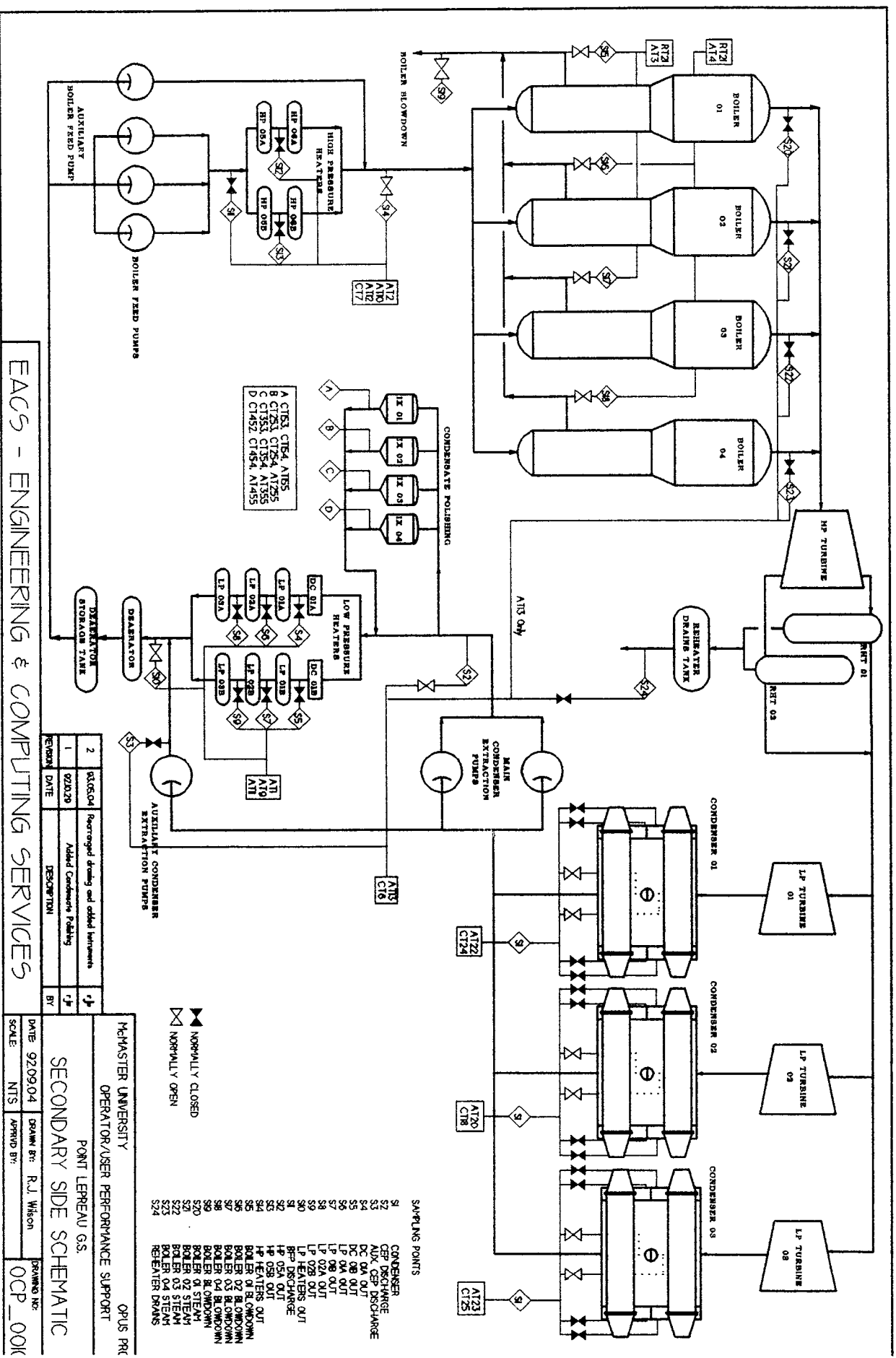
OPERATIONAL FLOWSHEETS

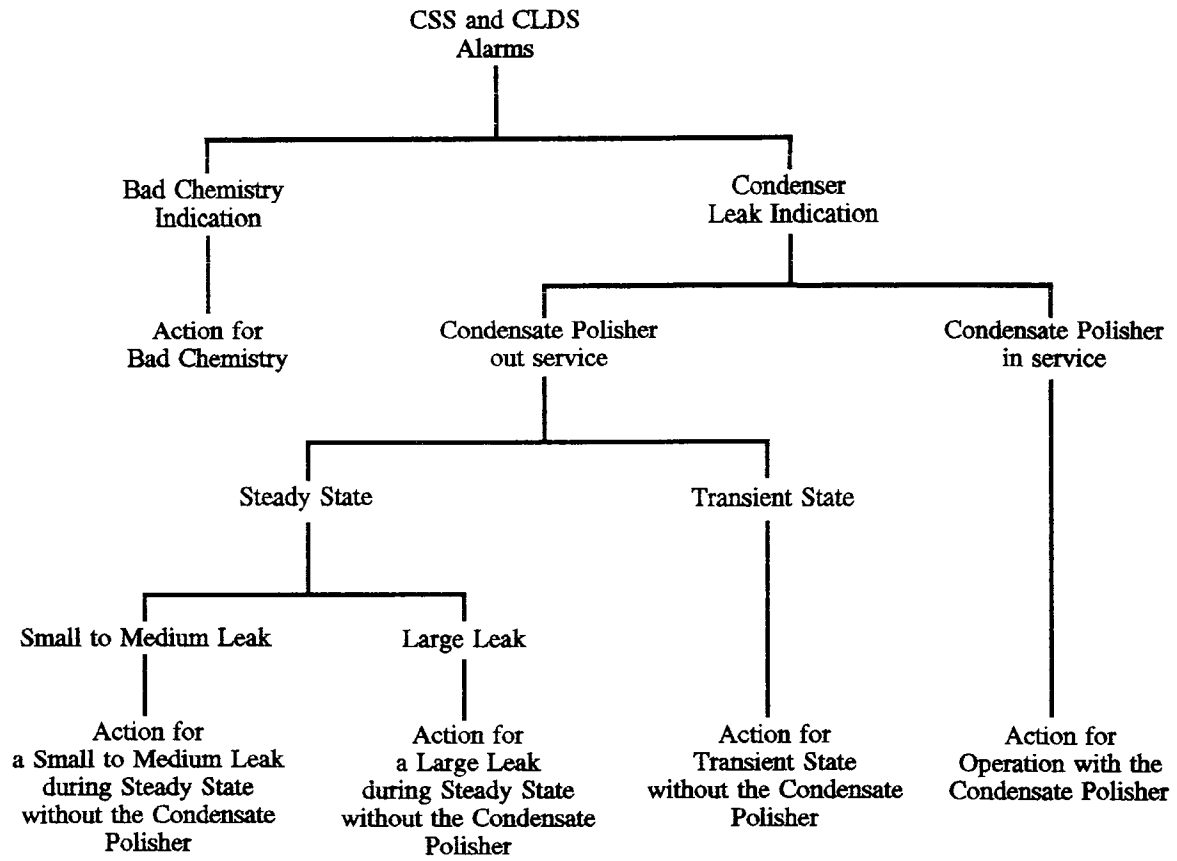
Condensate Polisher Service Vessels	87-43240-2001-01-FS-E	Rev. 3
Impure Condensate Collection & Disposal System	87-42110-2001-01-FS-E	Rev. 4
Chemical Addition System	87-45400-2001-01-FS-F	Rev. 8
Boiler Blowdown	87-36310-2001-01-FS-F	Rev. 7
Condensate System	87-43210-2001-01-FS-F	Rev. 11
Feedwater System	87-43230-2001-01-FS-F	Rev. 16
Boiler Steam water System	87-36000-2001-01-FS-F	Rev. 3
Condensate Polisher Acid & Caustic Dilution Station	87-43240-2001-03-FS-E	Rev. 3
Condensate Make-up & Reject System	87-43220-2001-01-FS-E	Rev. 3
Condensate Polisher External Regeneration System	87-43240-2001-02-FS-E	Rev. 6
Condenser Leak Detection System	87-45100-2001-02-FS-E	Rev. 6
Central Sampling System	87-45100-2001-01-FS-F	Rev. 7
Condensate Polisher Sampling Station	87-43240-2001-04-FS-E	Rev. 2

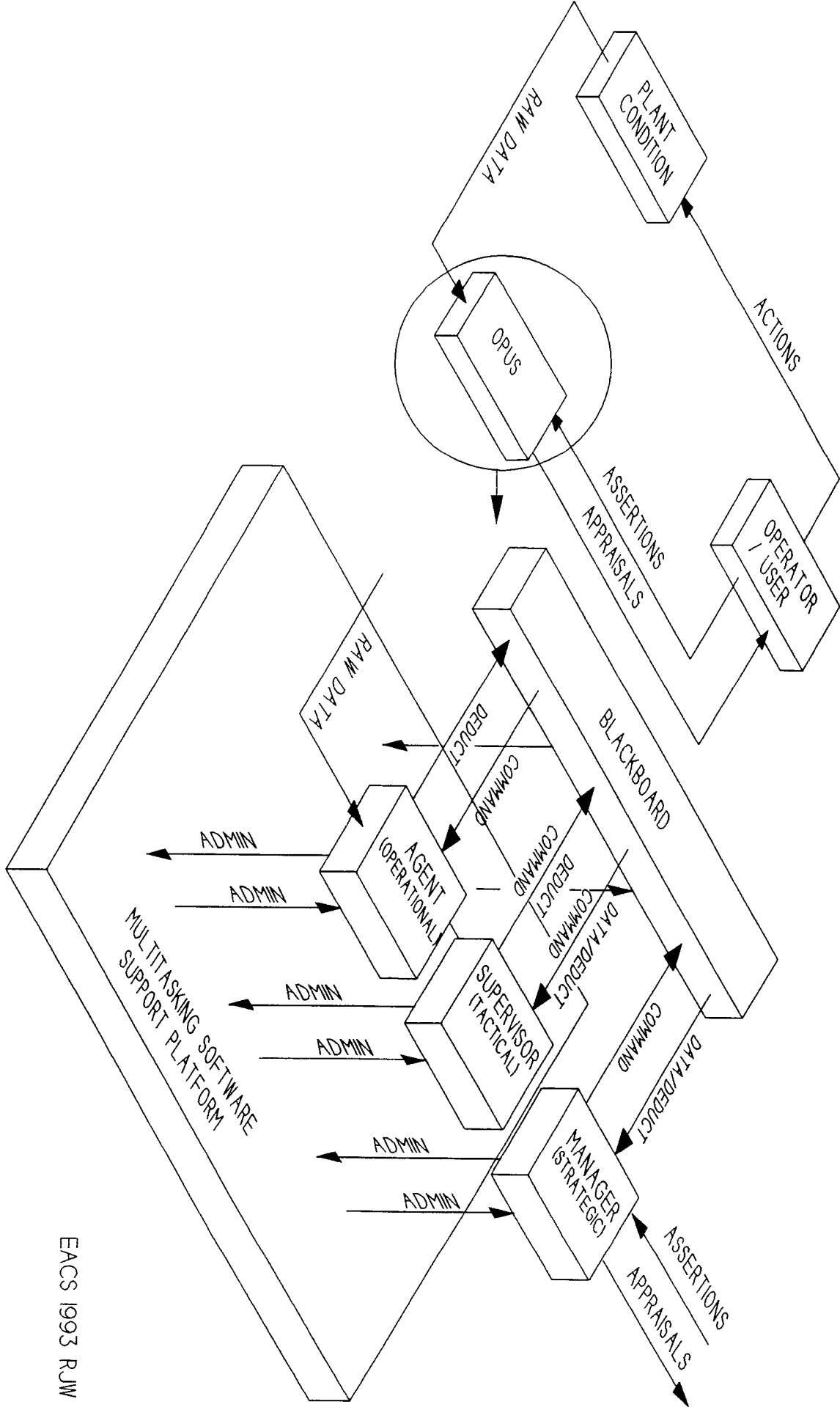
EACS - ENGINEERING & COMPUTING SERVICES

McMASTER UNIVERSITY OPERATOR/USER PERFORMANCE SUPPORT		OPUS PRC
POINT LEPREAU G.S.		
SECONDARY SIDE SCHEMATIC		
DATE	9209.04	DRAWN BY: R.J. Wilson
SCALE	NTS	APPROV BY:
DRAWING NO: OCP_001K		

2	9209.04	Revised drawing and added comments
1	9210.20	Add Condensate Picking
REVISION	DATE	DESCRIPTION
		BY







EACS 1993 RJW

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MODULE CHARACTERISTICS

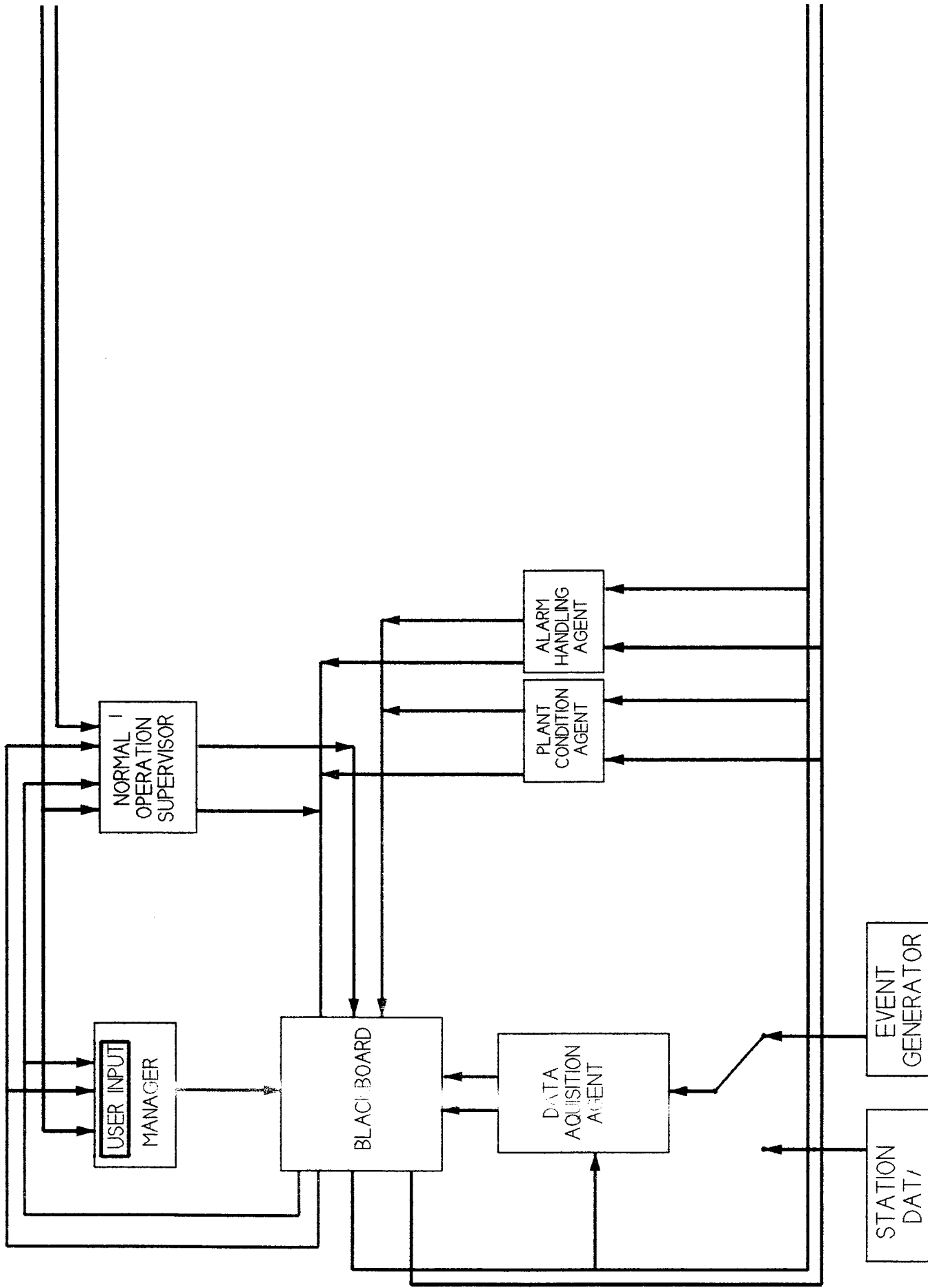
- **INTELLIGENT MODULES**
- **PROACTIVE TASKS**
- **PERSISTENT TASKS**
- **PARALLEL OPERATION**

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COMMUNICATIONS MESSAGE TYPES

- **DATA**
- **ADMINISTRATION**
- **COMMAND**
- **DEDUCTION**



NORMAL OPERATING MODE

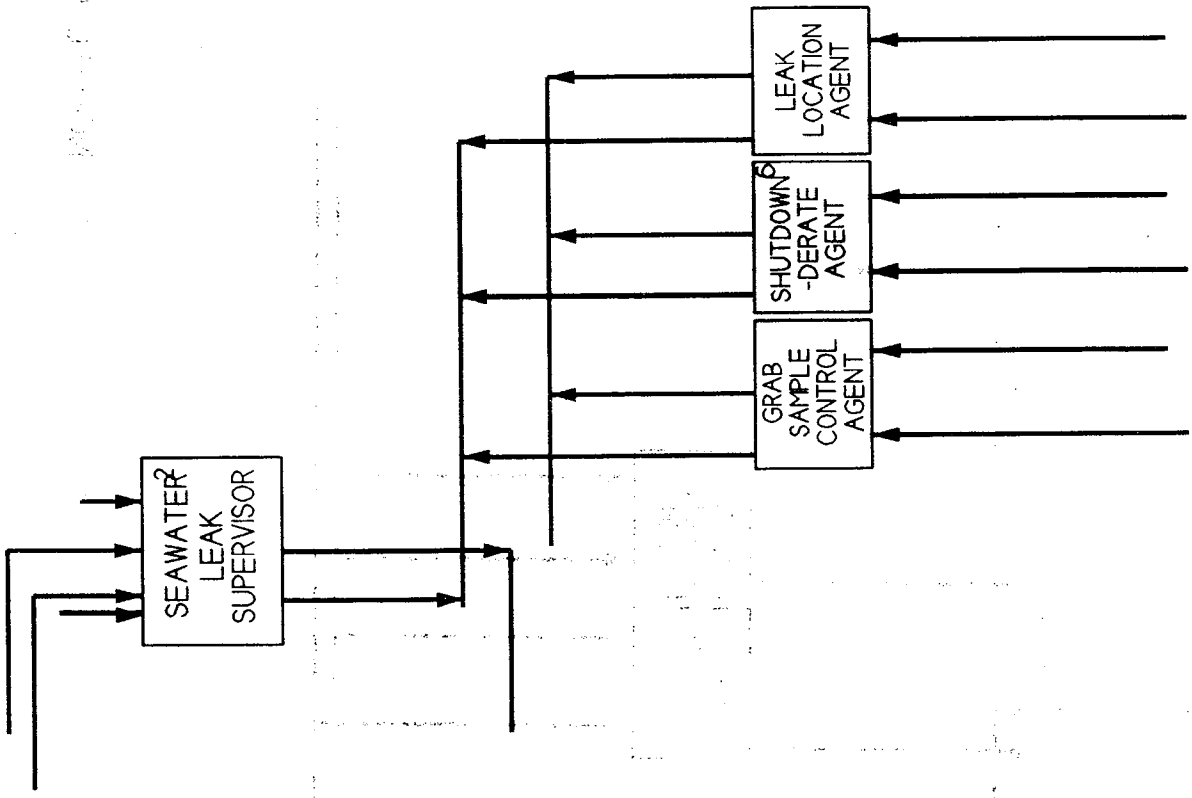
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ALARM HANDLING AGENT DEDUCTIONS

- **LEAK ASSUMED** (App.2 Section5.0)
- **BAD CHEMISTRY ALARM**
- **LEAK & BAD CHEMISTRY**
- **NO ALARM**
- **ONE LEAK ALARM**
- **UNRECOGNISED ALARM**

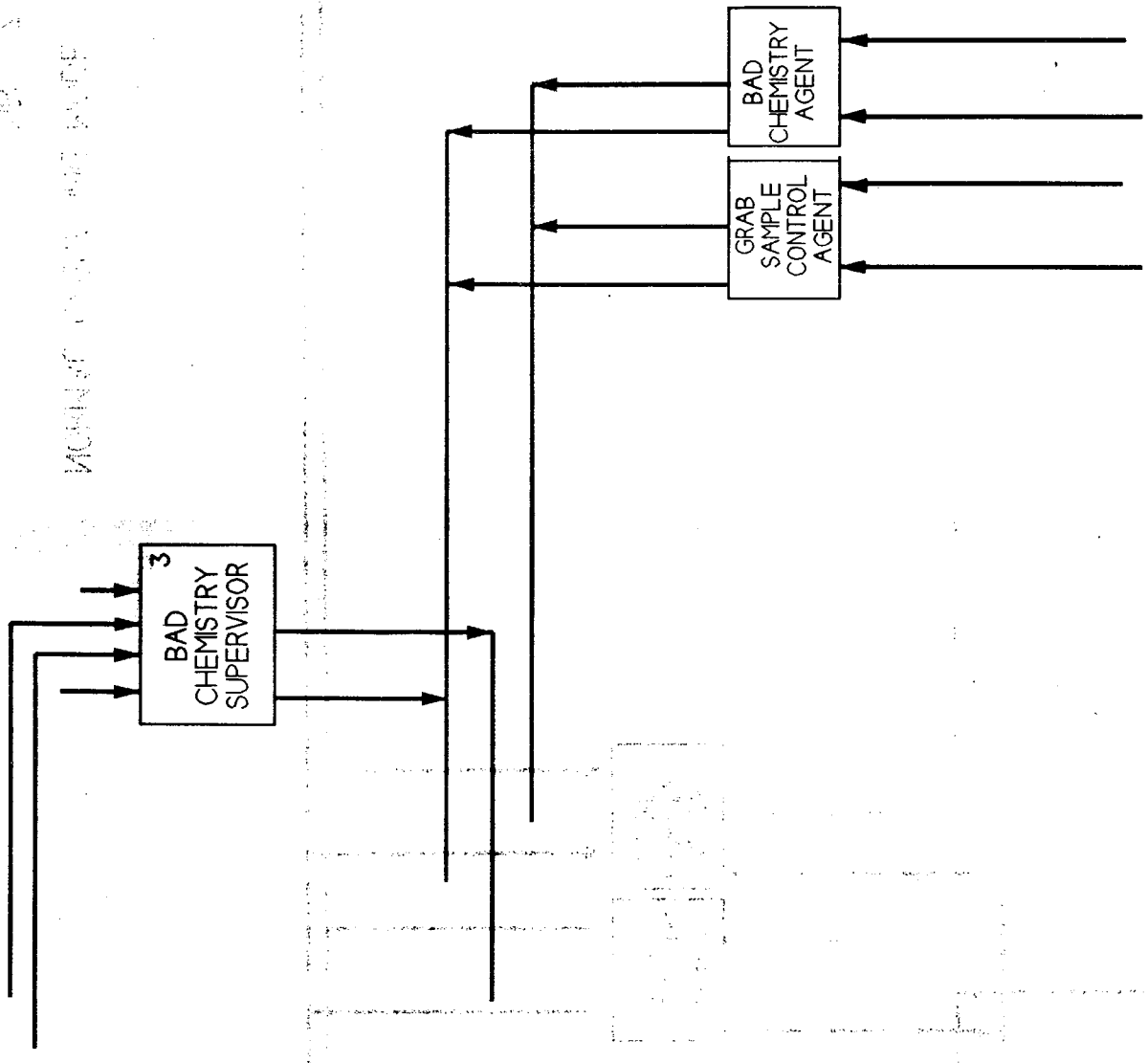


SEAWATER LEAK MODULES

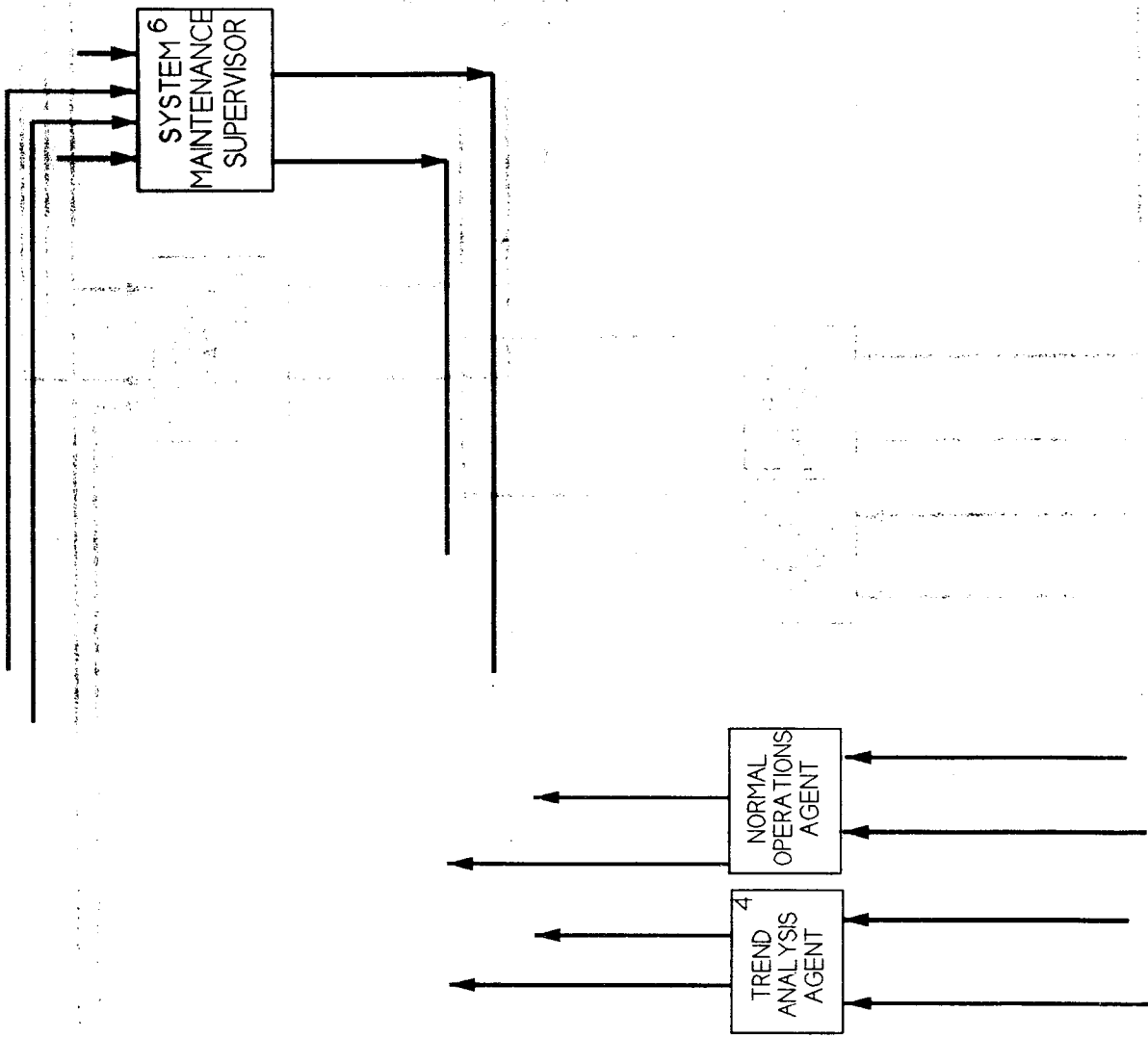
SEAWATER LEAK SUPERVISOR DEDUCTIONS

- **NO LEAK**
- **LARGE LEAK, App.2 Sec.5.1**
- **SMALL MED LEAK, App.2 Sec.5.2**
- **SHUTDOWN** with appropriate section number
- **DERATE** with appropriate section number

MONITOR CONTROL UNIT



BAD CHEMISTRY MODULES



OPTIONAL MODULES

0CP004C