

KEKB Factory Magnet Power Supply System

KEKB Magnet Group

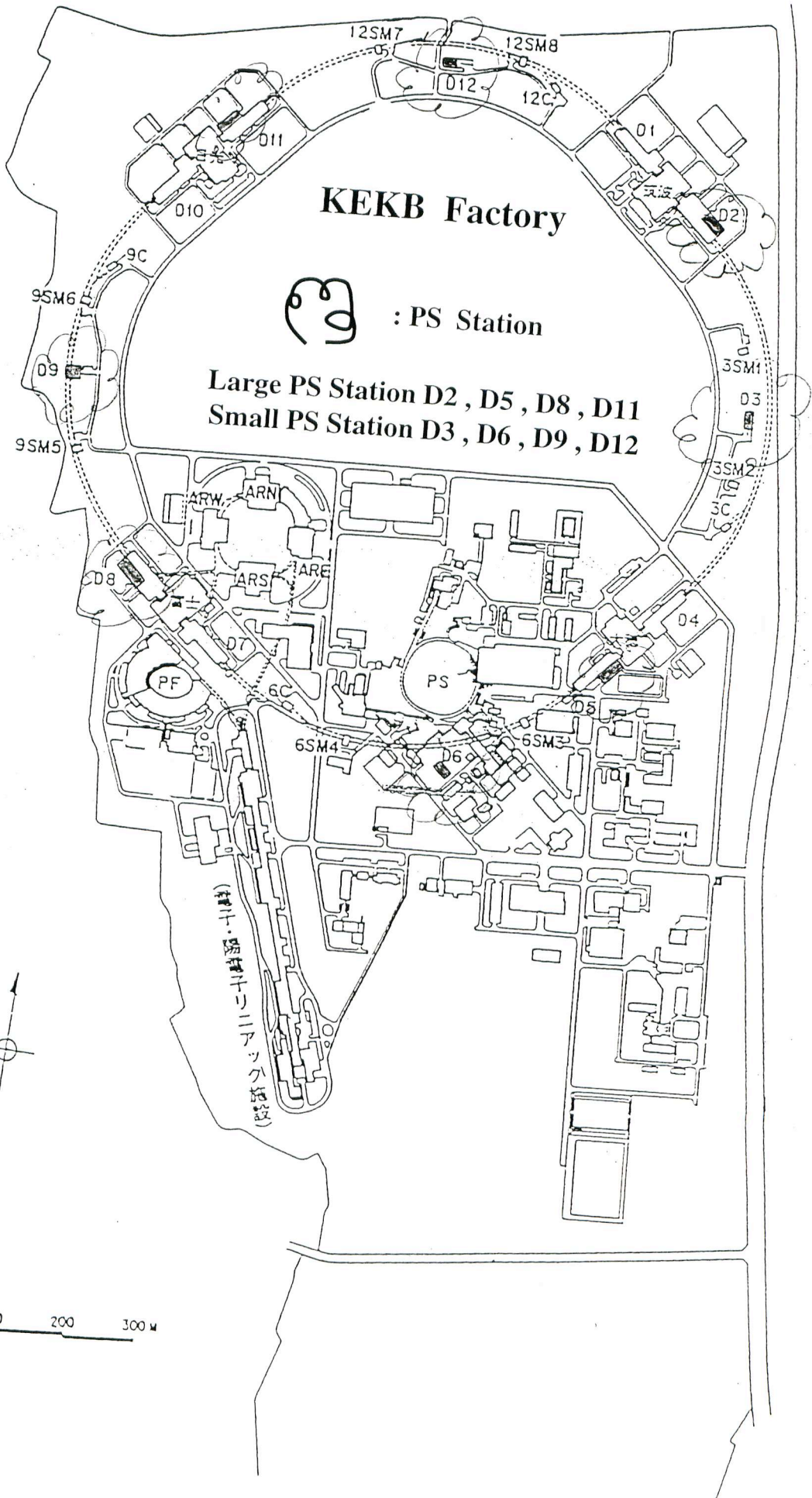
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KEKB Accelerator Review
January 24, 1997

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B-Factory Magnet Power Supplies

	B	Q	Sx	St
LER	28	126	54	918
HER	21	123	52	873
Total	B,Q,Sx		404	
		St	1791	
QCS	10 (Main : 1 + Corr. : 1 + Sol. : 2 + St. : 6)			

Required Current Stability and Field Ripple Content (p - p)

Magnet	Current Stability	Field Ripple
QCS	$1 \times 10^{-4} / y$	1×10^{-5}
Q(Arc)	$1 \times 10^{-4} / y$	1×10^{-5}
B	$1 \times 10^{-4} / y$	5×10^{-5}
Sx	$5 \times 10^{-4} / y$	5×10^{-4}
St (Kick Angle 1mrad)	$5 \times 10^{-4} / y$	5×10^{-5}

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Rated Voltage and Current , and the Number of Power Supplies to be prepared

	Volt.(V)	Curr.(A)	Total	LER.B	LER.Q	HER.B	HER.Q	Type
1	1000	500	1				1	SCR
2	800	1250	1	2				SCR
3	750	840	1			2		SCR
4	600	500	1				1	SCR
5	600	350	3		3			SCR
6	500	600	2				2	SCR
7	500	500	2				2	SCR
8	500	350	2		2			SCR
9	300	350	7		2		5	SCR
10	130	500	1		1			SW
11	120	800	2	2				SW
12	110	1000	1	1				SW
13	110	500	8				8	SW
14	100	1000	2	2				SW
15	100	800	1	1				SW
16	100	500	3		3			SW
17	90	500	2		2			SW
18	70	500	4	1	3			SW
19	60	600	2				2	SW
20	60	500	4				4	SW
21	60	10	4			4		SW
22	50	800	27	2	25			SW
23	40	600	4	2			2	SW
24	40	500	42		41		1	SW
25	30	1250	3	3				SW
26	30	840	1			1		SW
27	30	800	2	2				SW
28	30	600	13				13	SW
29	30	500	63		34		29	SW
30	20	840	2			2		SW
31	20	600	1				1	SW

32	20	500	36	2			34	SW
33	15	500	4	1		3		SW
34		3500	1				1	SCR
35		1200	2		1		1	SW
36		1000	1				1	SW
37		800	1		1			SW
38		500	3				3	SW
39		200	20		8		12	SW
40		10	9			9		SW
41		5	3	3				SW
		Total	298	28	126	21	123	

	VolT.(V)	Curr.(A)	Total	LER.Sx	HER.Sx	Type
1	40	425	80	52	28	SW
2	60	425	2	2		SW
3	70	425	24		24	SW
		Total	106	54	52	

	Volt.(V)	Curr.(A)	Total	LER.St	LER.Bk	HER.St	HER.Bk	Type
1	110	5	832			832		SW
2	65	5	860	860				SW
3	30	10	41				41	SW
4	25	10	58		58			SW
		Total	1791	860	58	832	41	

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The Reason why Switched Mode Power Supplies have been introduced

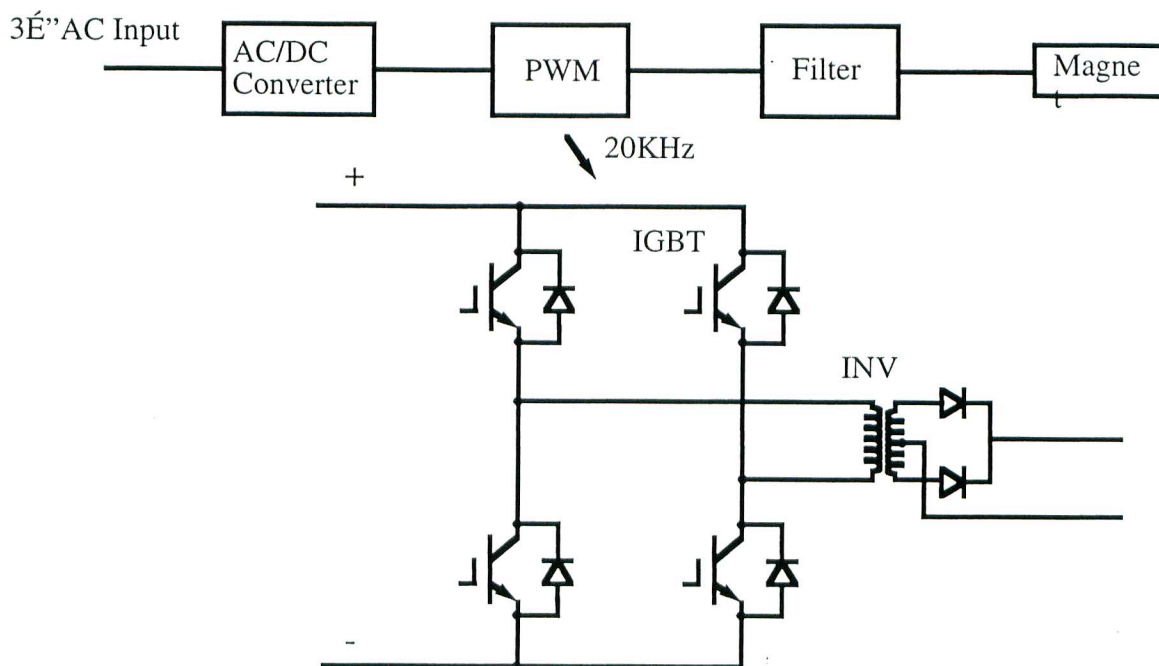
- Reasons : 1) High Efficiency has been required for the Power Supply, because the Power Supply Station has not been air-conditioned.
- 2) High Power Factor has been required for the Power Supply to reduce the emanation of the reactive power.
- 3) Installation Area of the Power Supplies has been limited. So, the Size of Power Supply has to be small as far as possible.
- 4) Power Supply has to be air cooled. Water cooling will cause many troubles.

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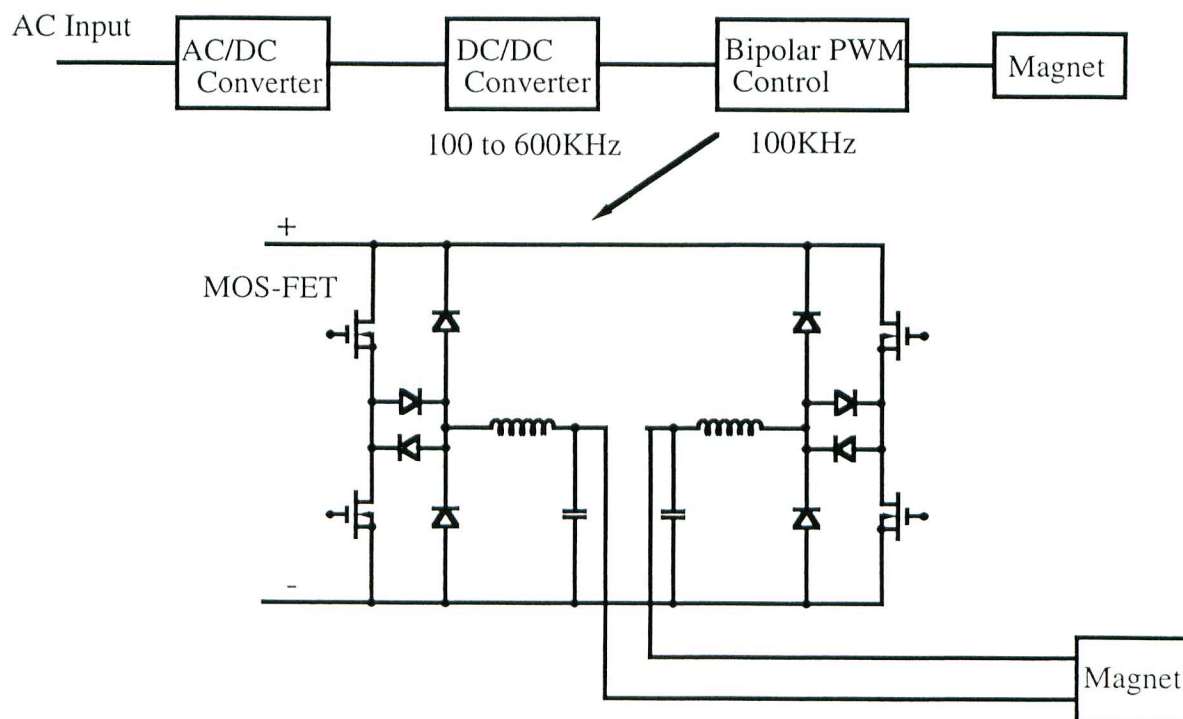
Typical Block Diagram of Magnet Power Supply

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Low Power Unipolar Magnet Power Supply



Steering Magnet Power Supply



R&D Works

R&D works for the Switched Mode Power Supplies have been carried out from 1995 to 1996 J.fsy.

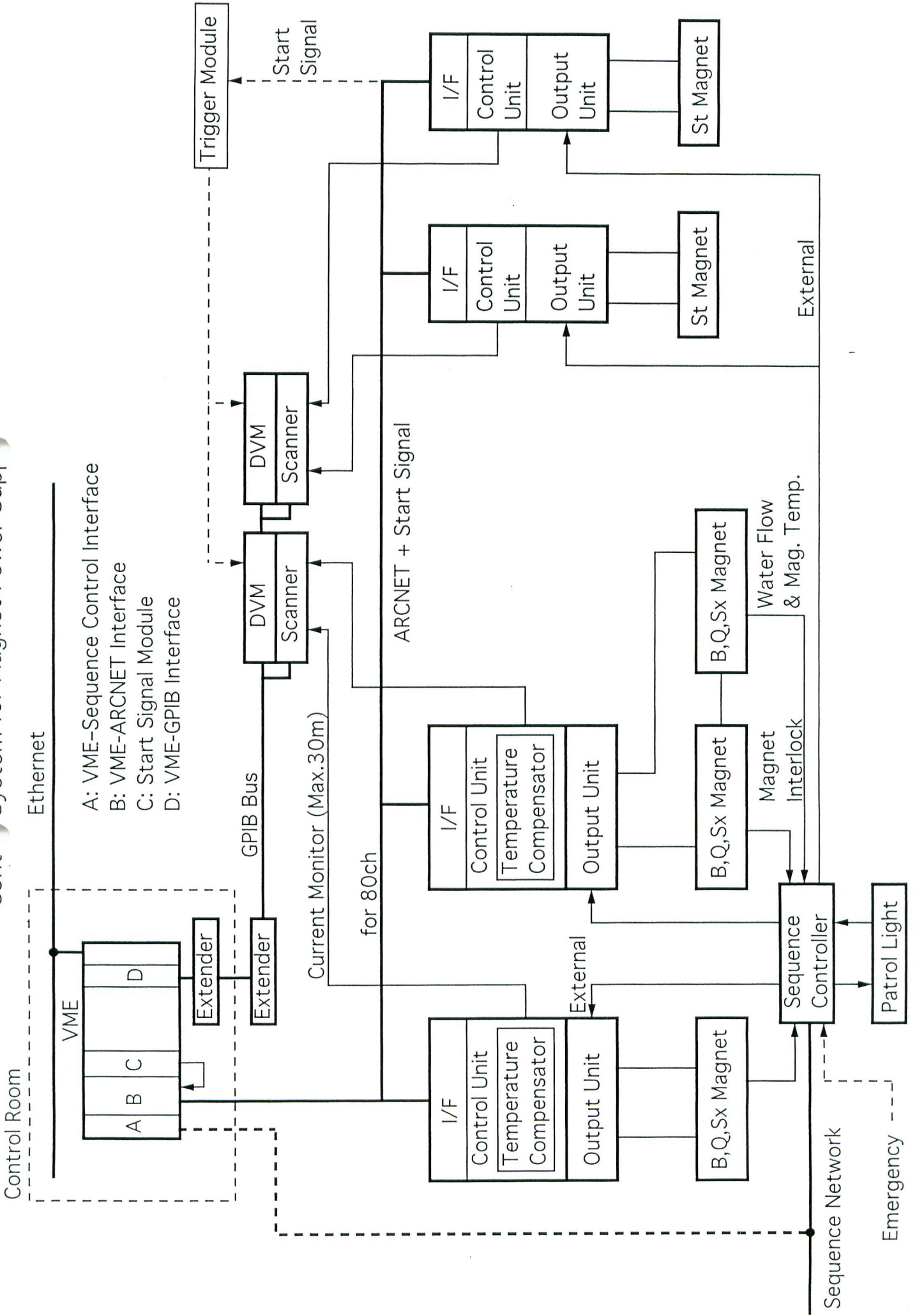
- 1) 40V, 500A(20KW) low power unipolar Switched Mode Power Supply
- 2) 60V, 5A(300W) bipolar Switched Mode Power Supply
- 3) Important R&D Works
 - 1) Burden Resistor for DCCT
 - 2) Shunt Resistor for Steering Magnet Power Supply
 - 3) Temperature Compensator

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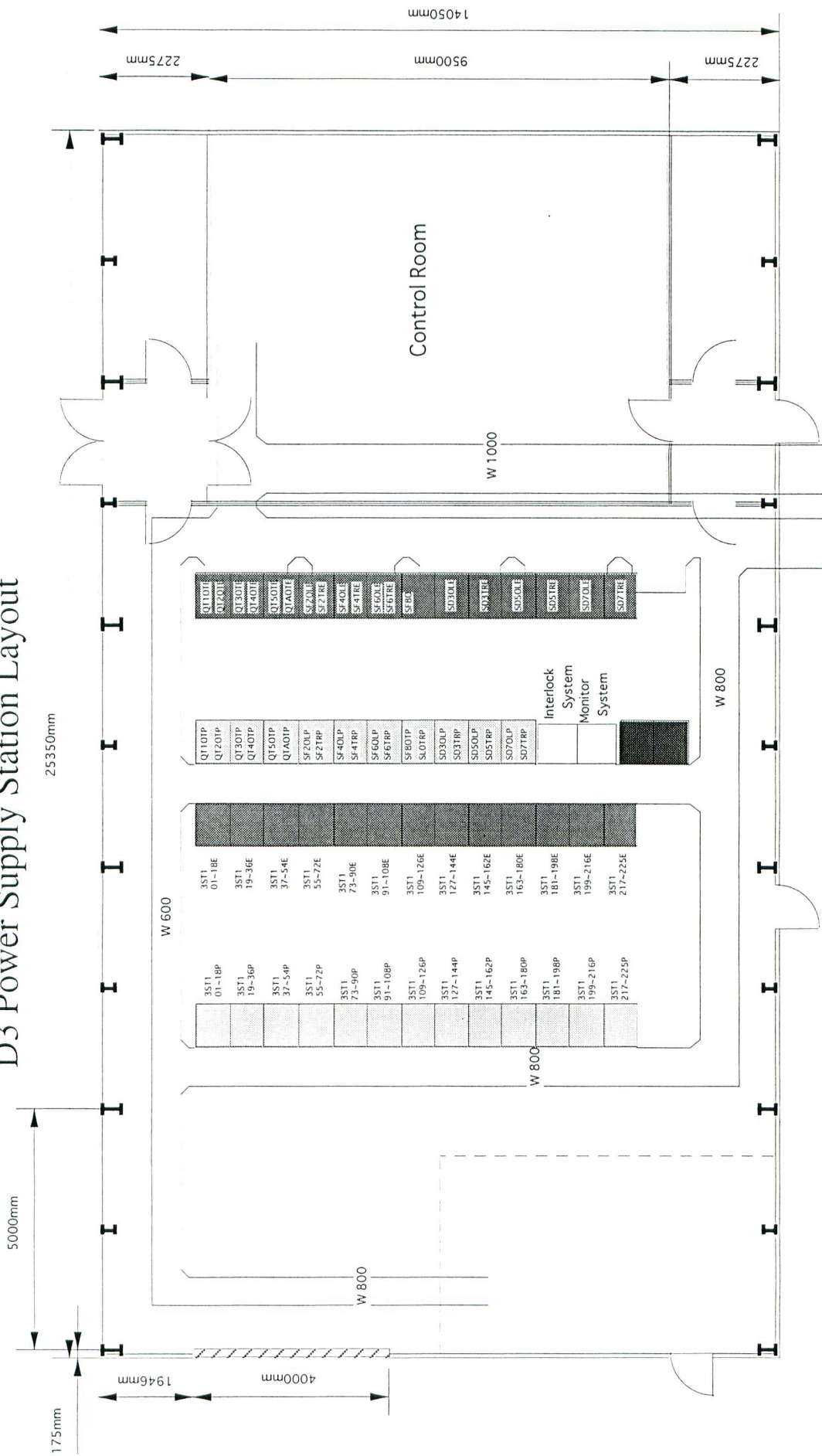
Control System

- 1) VME System has been introduced for the Power Supply Control.
- 2) Data Transfer through the ARCNET
- 3) Interlock System by Sequence Control System
- 4) Current Monitor by the Digital Voltmeters

Control System for Magnet Power Supply



D3 Power Supply Station Layout



- L E R P S
- H E R P S

Schedule

for the Power Supply Fabrication
for the Installation
for the Adjustment
up to the Accelerator Operation

1) Bids

- 1) Power Supply Fabrication(Hardware)
from 1997 to 1998 J.fsy
- 2) Recycling of the TRISTAN Magnet Power Supplies
at 1997 J.fsy
- 3) Cabling
at 1997 J.fsy and a little at 1998 J.fsy
Already we have started the cabling from 1996 J.fsy.
- 4) Parts or other Systems
 - 1) DCCT
 - 2) Burden Resistor for DCCT
 - 3) Shunt Resistor for Steering Magnet Power Supply
 - 4) DAC : 16 bits unipolar and bipolar
 - 5) Interlock System
 - 6) Current Monitor Systemall of these at 1997 J.fsy

2) Installation

from 1997 to 1998 J.fsy

3) Adjustment

from the end of 1997 J.fsy to 1998 J.fsy

4) Power Supply Operation following to the Accelerator Operation Schedule

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