

KSTAR

Design of the basic building block for NBI control and instrument system

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KSTAR(Korea Superconducting Tokamak Advanced Research)
(NBI,Neutral Beam Injector) Unix Ethernet
LAN, VxWorks real time OS VME .
EPICSC(Experimental Physics
and Industrial Control System) . NBI

Abstract

The control and instrument system for KSTAR(Korea Superconducting Tokamak Advanced Research) NBI(Neutral Beam Injector) consists of UNIX computers, ethernet LAN, VME multiprocessors and VxWorks real-time OS. For the flexibility of operator interface and operator service, the EPICS will be used in it. The basic concept of NBI control and instrument system design is described emphasizing the basic building block of control system. The conceptual and detailed designs will be done considering the flexibility and reliability of the system in making the needed experiments.

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KSTAR NBI

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16MW

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NBI

NBI 가

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2.
NBI

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NBI

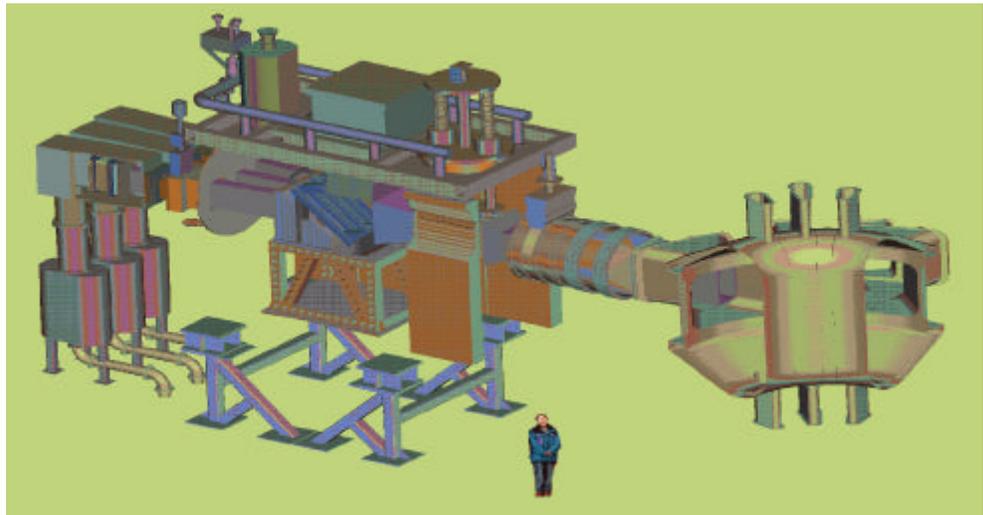
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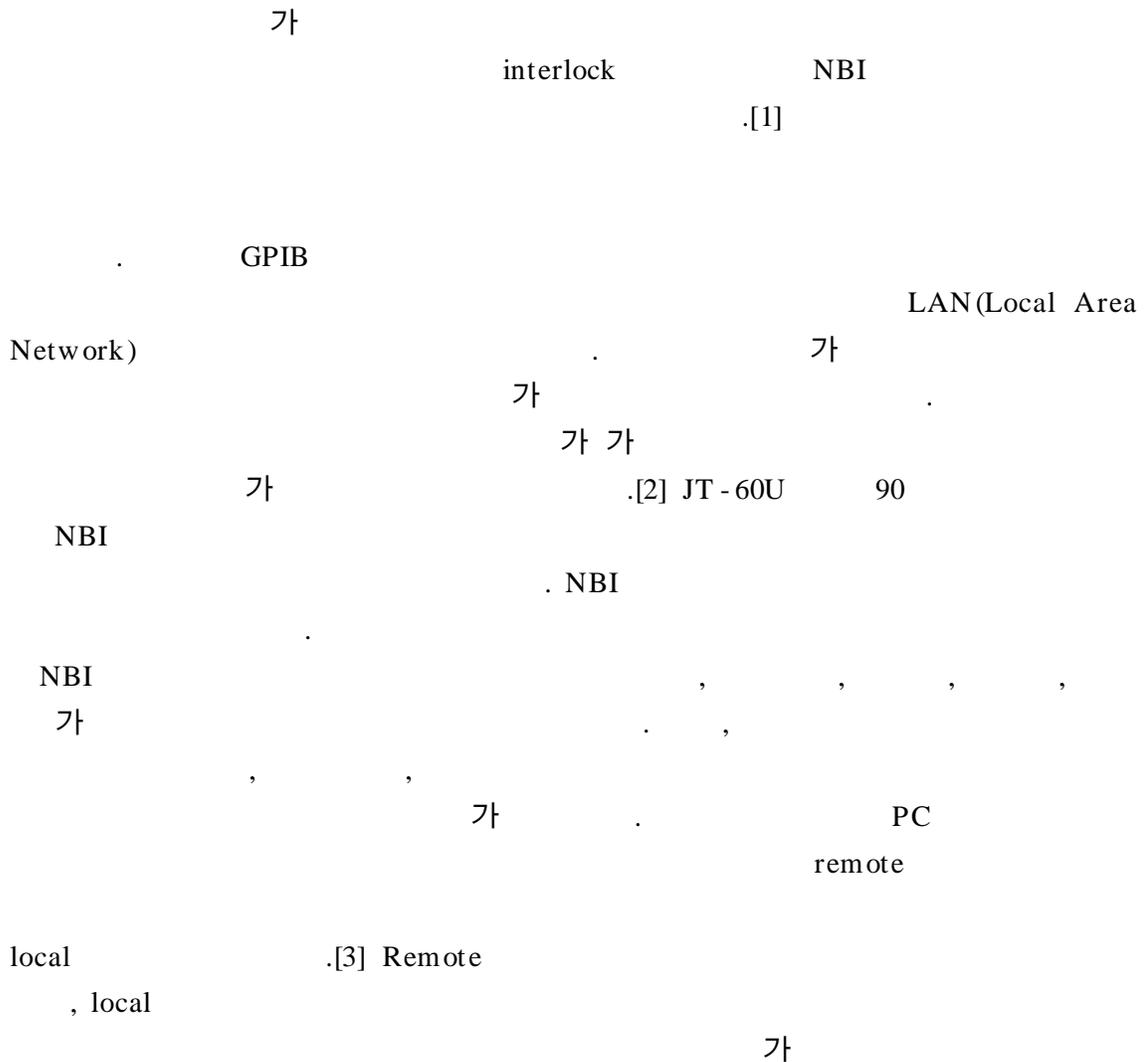
NBI



1 NBI

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NBI



FILAMENT P/S

- External Filament current reference signal Input(FIc) 5V/1000A
- External Filament voltage reference signal input(FVc) 5V/50V

ARC P/S

- External Arc Current reference signal Input(AIc) 5V/2000A
- External Arc voltage reference signal input(Avc) 5V/500V

DECEL P/S

- External Decel current reference signal Input(CURRENT) 10V/20A
- External Decel voltage reference signal Input(VOLTAGE) 10V/5000V

NBI

Interlock

reliability flexibility

reliability

flexibility

3.

NBI

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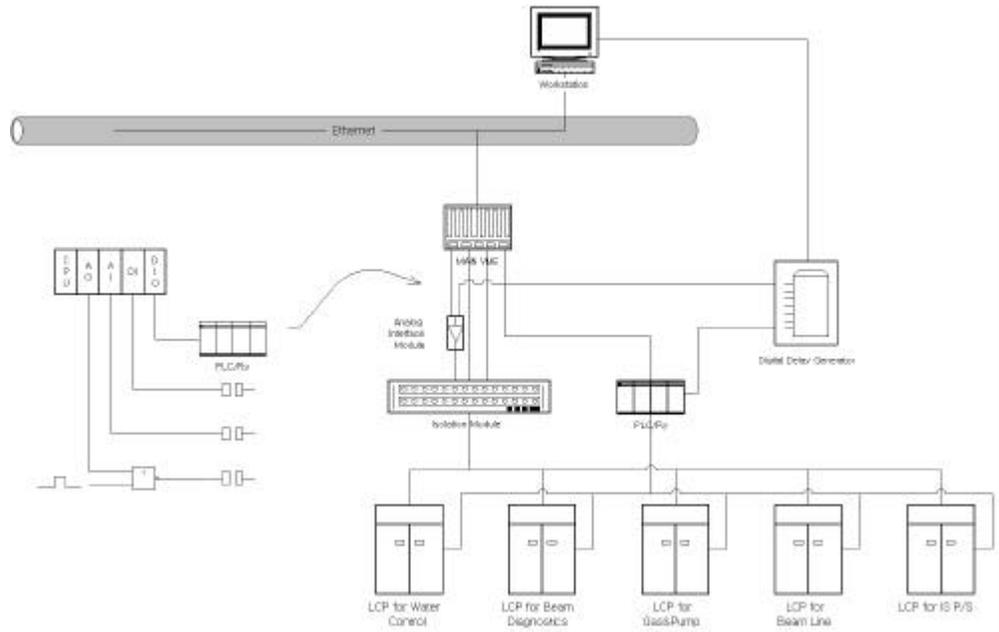
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[4] 2 NBI



2 NBI

NBI

UNIX

workstation

NBI 가

open

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Experimental Physics and

Industrial Control System (EPICS)

EPICS

protocol

software component

source가

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가 .[5] VME bus
 Workstation LAN EPICS
 software bus Channel Access . VME
 NBI 가

1 .[6]

Module	signal
Analog Output	reference signal
Analog Input	fast sampling & low sampling signal
Digital Input	NBI operation status & alarm signal
Digital Input/Output	interlock & synchronous signal

1 Module

. AI

. AO

Digital Delay Generator(DDG) reference signal

. DI NBI

. DIO Programmable Logic Controller(PLC) interlock
 DDG VME .

2 NBI VME .

CPU board	MME 1672	MC68040
Analog Output board	AVME9210	12 bit resolution & latch
Analog Input board	AVME9325-5	sampling rate : 5 μ s
Analog Input board	AVME9330	sampling rate : 30 μ s
Digital Input board	AVME9421- I	64 channel
Digital Input/Output board	AVME9440- I	16 DC voltage input & 16 DC solid state relay output

2 VME

DDG 가

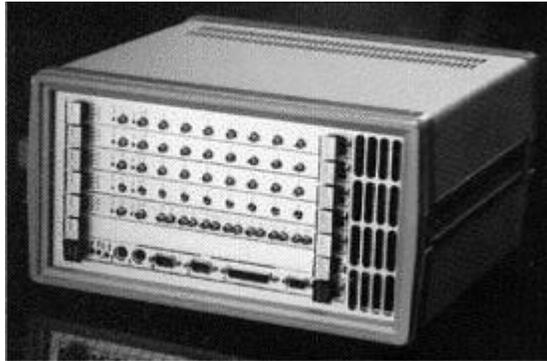
가 . NBI

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NBI

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DDG .



30 Channel DDG System
hardwired-protective interlock

PLC
DDG
NBI
interlock reliability가
flexibility가 VME , PLC
AI VME DIO
VME DDG
AO reference signal level shift Analog
VME
4.
NBI KSTAR
가
NBI 가
workstation, ethernet LAN, VME VxWorks
real time OS NBI

MMI(Man-Machine Interface) EPICS

[1] JAERI-M 94-072, JT-60U NBI p336-348
 [2] Kaei Siegbahn, et al., *Nucl. Instr. and Meth. in Phys. Rev A* **352**(1994) p - xi
 [3] NBI LCP p3-12
 [4] K.Yamazaki, et al., *NIFS* **322**(1999) p2
 [5] L.R.Dalesio, et al., *Nucl. Instr. and Meth. in phys. Rev A* **352**(1994) p179-184
 [6] JAERI-Tech 97-012 JT-60U NBI p41-57