CONTROL SYSTEM OF 2.5 GeV ELECTRON LINAC IN PHOTON FACTORY

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Abstract

The control system of the 2.5 GeV electron linac in Photon Factory is a distributed processor network. The devices on the main console are touch panels, rotary encoders, several displays, etc.

1. Structure of the Control System

The contol system of the 2.5 GeV electron linac in Photon Factory is composed of three kinds of serial data communication loops using optical fibers: LOOP-I, LOOP-II and LOOP-III as shown in Fig. 1.

The LOOP-I is a main loop (Baud rate is 5 Mbps) which links seven minicomputers (MELCOM 70/30) distributed along the linac. Each minicomputer has one or two CAMAC crates through a CAMAC branch highway. The MELCOM #1 is connected with the devices on the main console through CAMAC modules; each of MELCOM #2-7 has LOOP-II (500 kbps) and LOOP-III (48 kbps) communication controllers which are CAMAC modules.

LOOP-II links nine klystron modulator controllers for each of MELCOM #3-7. LOOP-III links several beam focusing and steering system controllers or several vacuum system controllers. There are 47 klystron modulator controllers, 20 beam focusing and steering system controllers (controlling 244 magnet power supplies) and 12 vacuum system controllers. They are intelligent terminals with a microprocessor, digital I/O, ADC, DAC, etc.

Fig.1 Block diagram of the control system.

The software for operation of MELCOM is written with FORTRAN and that of microprocessors is written with an assembly language.

Apart from this computer network there is hard-wired interlock system watching doors, vacuum, gate valves, etc.

2. The Main Console

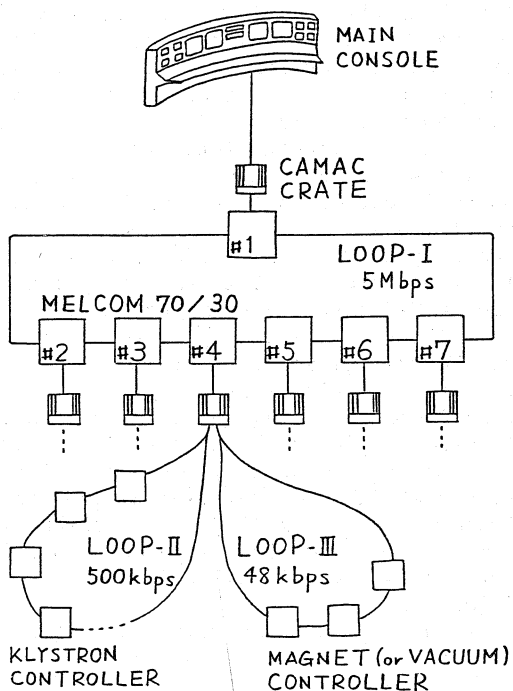The devices on the main console are two touch panels with 9 in. CRT

displays, two rotary encoders, six 9 in. displays, two 20 in. color displays, two 20 in. displays with high resolution, two 2ch transient digitizers (the maximum sampling clock rate is 60 MHz) with CRTs, four ITV monitors, etc. Present usage of each device is shown in Table 1.

Device	Usage
Touch panel (4 × 4)	Selection of magnet power supplies, klystron modulators and monitors.
Rotary encoder	Control of magnet currents and rf phase shifts.
9 in. display	Monitoring magnet currents and rf phase shifts.
20 in. color display	Monitoring the status of magnet power supplies and klystron modulators.
Transient digitizer	Monitoring the waveforms of current transformer outputs and rf probe outputs.
ITV monitor	Monitoring the beam profile image.

Table 1 Present usage of each device on the main console.

Fig.2 Main console.