MEASUREMENT OF PICOSECOND SINGLE BEAM OF 35 MeV TADAI LINAC

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I Abstract

Picosecond single pulse operation of a S-band linear accelerator at Nuclear Engineering Research Laboratory of University of Tokyo (in Tokai-mura) has been carried out from June in 1977. It was reported that the pulse width was confirmed to be less than 18 ps by using a streak camera (Hamamatsu T.V).[1)2)] This paper describes monitoring system combined fast detector heads and a sampling oscilloscope (rise time is less than 25 ps). Shapes of picosecond pulses have been measured by the monitoring system. The rise time of the pulse shape and the half width of the pulse were confirmed to be less than 30 ps and 60 ps, respectively. It was confirmed that the satellite could be distingiushed from main pulse, by using this monitoring system.

II Measurement and Result

Photo-1 shows the co-axial line tragets used for monitoring system. Fig-1 shows the dependence of response on both detector heads and conecting cable length. The kind of cables used for monitoring system were 10D-2V, YF-8D and seme-rigid cable. Photo-2 and Photo-3 show the fine structure pulses of electron beam measured by using the GR-air line system with 7.5 m and 1 m semi-rigid conecting cable, respectively. The half width of pulses becomes shorter with decreasing the cable length. Co-axial line targets with smaller radius were confirmed to have faster response. Photo-4 shows the pulse shape of the picosecond single pulse measured by using the fast detector head, Type-1 (1.4 mm ϕ). The satellites can be confirmed before the main pulse. Photo-5 shows the pulse shape of the picosecond single pulse measured by using the micro-strip line monitor. The rise time of the pulse shape and the half width of the pulse were confermed 50 ps and 60 ps, respectively. The output voltage were 7.5 V.[3)4)]

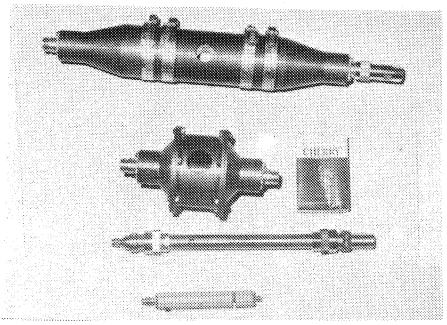
Reference

(1) Y. Tabata, J. Tanaka, S. Tagawa, Y. Katsumura, T. Ueda, K. Hasegawa J. Fac. Eng. of Univ of Tokyo (1978)

(2) Y. Tabata, S. Tagawa, Y. Katsumura, T. Ueda, K. Hasegawa, J. Tanaka J. Atomic Energy Soc. Japan, 20, 473 (1978)

(3) J. Tanaka, I. Sato, S. Anami, S. Fukuda, H. Matsumoto Y. Tabata, H. Kobayashi, S. Tagawa and M. Washio KEK-PREPRINT-79-25 Jun. (1979) A/P

(4) M. Washio, S. Fukuda, J. Tanaka, I. Sato, S. Anami, Y. Tabata, H. Kobayashi, Y. Katsumura, T. Ueda, S. Tagawa KEK Report 79-24 Oct. (1979) P



Phot.1 Several detector for head 525D, Type-3, Type-2 (GR-airline), Type-1 from upper part.

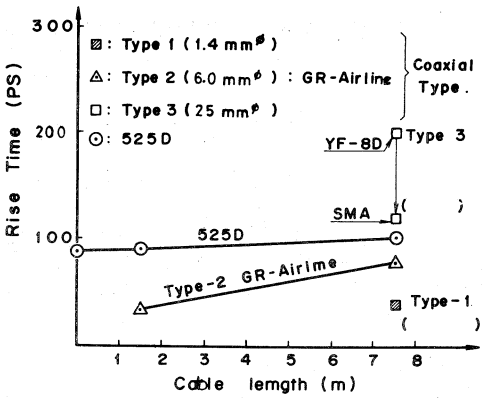
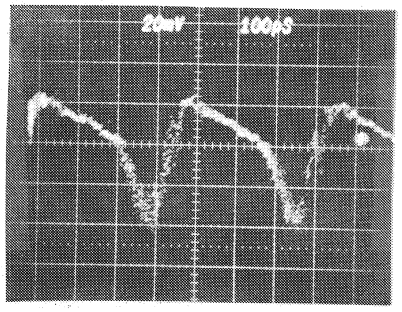
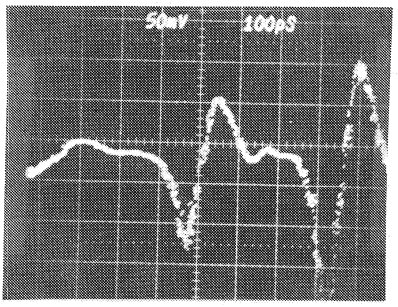


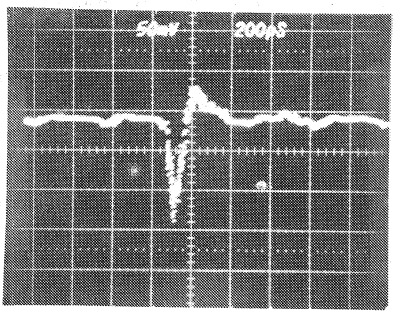
Fig-1 Dependence of response on both detector head and connecting cable length.



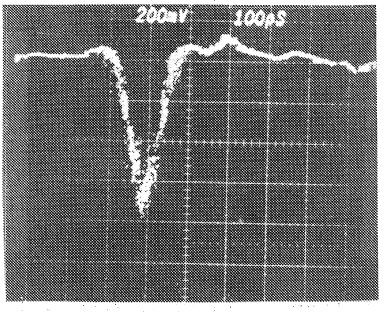
Phot.2 Fine Structure pulses measured by using a GR-air line with 7.5 m semi-rigid connecting cable.



Phot.3 Fine structure pulses measured by using a GR-air line with 1.0 m semi-rigid connecting cable.



Phot.4 Pulse shape of the picosecond single pulse with small satellites measured by using the Type-1 co-axial detector head.



Phot.5 Pulse shape of the picosecond single pulse by using the micro strip line monitor.