RF System

Masahiro HARA

1. Abstract

In the commissioning phase, three RF stations are prepared. This year, a test stand was transferred from Wako site of RIKEN to T station. A new cooling system was fablicated. In this test stand, high power tests were performed for circulators, couplers, 5-cell cavities. Eight single-cell cavities for D-RF station were delivered and high power test for these cavities was started after the detailed measurement of higher order mode (HOM) characteristics. Sixteen cavities for B- and C-RF stations were ordered. As for the timing system among the linac, the synchrotron, and the storage ring, a new counter circuit operated at 508 MHz was produced as a trial. Wiring of optical fiber around the storage ring was ordered.

2. Transfer of klystron test stand

The test stand was installed in T station. Main specifications are as follows;

Frequency	508.58 ± 0.5 MHz,
Klystron	Toshiba E3786,
RF output power	CW 1MW,
Kystron power supply	-90 kV 20 A with
a crowbar circuit for klystron protection,	
Anode modulator	0 — -80 kV,
Circulator	1.2 MW(forward),
Dummy load	1 MW,

2 shield rooms for power test,
T-type switching waveguide.

New cooling system was installed in the T station for cooling of transformers, IVR, klystron, dummy loads and cavities. For cavity cooling, it can supply pure water at 35 ± 1 °C up to 400 kW thermal loads.

In this test stand, we have executed high power test for six circulators, couplers, eight 5-cell cavities for the synchrotron. Circulator power test was done in 875 kW CW operation with a full reflection condition [1].

For a coupler power test, we used prototype five-cell cavity and #8 five-cell cavity. We made 10 couplers test successfully. For the five-cell cavity, we made power test using one good coupler for the eight cavities of the synchrotron. After baking for 80 hours at 150 °C, the cavity is moved in a shield room and carefully connected to a waveguide. RF power is fed gradually into the cavity taking care of the vacuum pressure. The input power is controlled by a personal computer (NEC 9801T) through CAMAC modules. This control system worked well and we could make power test in very short time [2].

3. Single-cell cavity

Eight single-cell cavities were manufactured by Kobe Steel, ltd. and delivered to SPring-8. By low RF level measurement, RF characteristics of the cavities were investigated in detail. We started high power test for those cavities.

Sixteen cavities in B- and C-RF stations were ordered to Toshiba, co..

4. RF stations

In D RF station, we have already constructed a klystron, its power supply, and high power waveguides. We determined the final arrangement of waveguide and ordered to Toshiba. For B- and C-RF stations, two klystrons, their power supplies, and waveguides were ordered to Toshiba. For low level RF circuits and NIM modules, we ordered modules of D-RF station.

5. Timing system

For the timing system, 508.58 MHz nonstop synchronous counter has already been designed [3]. The counter performance was confirmed by a trial production. Wiring of optical fibers and E/O (electrical to optical) and O/E modules were ordered and will be prepared next July.

References

[1] H. Ego, M. Hara, Y. Kawashima, Y. Ohashi, T. Ohshima, H. Suzuki, I. Takeshita, N. Tani, and H. Yonehara, Proc. of the 4th European Particle Accel. Conf., London, 1994, 1865-1867 (1994).

[2] T. Ohshima, H. Ego, M. Hara, N. Hosoda, Y. Kawashima, Y. Ohashi, H. Suzuki, I. Takeshita, F. Wang, H. Yonehara ; "Conditioning Program for RF input couplers and cavities" in this annual report.

[3] Y. Kawashima, H. Ego, M. Hara, N. Hosoda, Y. Ohashi, T. Ohhshima, H. Suzuki, H. Yonehara ; SPring-8 Annual Report 1994, p145(1995).