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## SHORT LIVED RADIOISOTOPE PRODUCTION SYSTEM FOR BABY CYCLOTRON.

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Automated and centrally controlled system was constructed for the short lived radioisotope production. The system is composed of radioisotope processing unit, waste gas disposal unit, target box auto-changer and foil cooling equipment. Main function of each component is as following. Radioisotope Processing Unit is used for simple chemical operation to purify effluent of target box. Waste Gas Disposal Unit temporarily stores waste gas until radio-activity goes to decay. Target Box Auto-changer automatically exchanges target boxes according to the desired radio-isotope. Foil Cooling Equipment circulates coolant helium gas to cool vacuum foil and target box foil.

Status of each component can be monitored on the CRT display of controller and system can be easily operated using a light pen.

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## TEST RESULTS OF MEDIUM-SIZE CYCLOTRON FOR PRODUCTION OF RADIO-ISOTOPES

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We have recently added a new model to our cyclotron series.

This cyclotron named Model-480P is especially suited to production of radio-isotopes Tl-201, Ga-67, In-111 and I-123.

These isotopes are extensively used in the medical diagnostics in recent years.

Main characteristics of 480P are as follows.

|                         |             |
|-------------------------|-------------|
| Accelerated particle    | Proton      |
| Energy                  | 30MeV fixed |
| Extraction radius       | 480mm       |
| RF system               | 85° two dee |
|                         | 24.6MHz     |
| Weight                  | 30tons      |
| Total power consumption | 145kW       |

To achieve high availability in the industrial use, five sets of microprocessor in the control and monitoring system strongly support operators in operation and maintenance.

The first machine of 480P has been already delivered to Nihon Medi+Physics and now is working quite well.

Results of acceptance test are as follows.

|                        |          |
|------------------------|----------|
| Extracted beam current | 100μA    |
| Internal beam current  | 250μA    |
| Beam stability         | +5%/4hrs |

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## PRESENT STATUS OF "CYPRIS"-MINI CYCLOTRON FOR MEDICAL USE.

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We report a present status of "CYPRIS" (MODEL-370) dedicated to a production and delivery system of pharmaceutical compounds labelled with  $^{11}\text{C}$ ,  $^{13}\text{N}$ ,  $^{15}\text{O}$  and  $^{18}\text{F}$ , that is useful in clinical diagnosis by positron camera. With this cyclotron, the extracted beam current of 70μA in maximum is available for proton and deuteron. In order to reduce the damage of target foil caused by the irradiation of such high beam current, we developed a beam sweeping system.

## - Basic Specifications -

Accelerated Particles: Proton 17MeV, 70μA  
Deuteron 10MeV, 70μA

Extraction Radius: 370 mm

Maximum Average Magnetic Field: 17.7KGauss

Ion Source: Hot-Cathode Type, Radial Insertion

Target: Remote-Controlled rotating target changer that can mount 8 target boxes (6 for gases and 2 for liquids)

Size (Cyclotron body): L2630xW1870xH2000 mm

Weight: 18tons

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## THE DEVELOPMENT OF A POSITRON EMISSION COMPUTED TOMOGRAPH PCT-W3.

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We are developing the new commercial type positron emission computed tomograph (PET) for whole body use, which has the feature of the easy to operate and the best balance between sensitivity and resolution.

(Design concept)

1. For brain study, new system has the high spatial resolution, high speed data acquisition and high speed data processing.
2. For heart study, new system has the high spatial resolution and the gated-acquisition mode using ECG.
3. For liver and lungs, new system has the uniform spatial resolution through the wide field of view.

(Performance and specification)

1. Spatial resolution : 5.5mm FWHM (transverse)
2. Sensitivity : 30kcps/μCi/ml (in-plane)  
: 35kcps/μCi/ml (cross-plane)
3. Field of view : 420° x 120mm<sup>2</sup> (using 4 detector rings.)
4. Number of scintillator : 280/ring and 4 detector rings max.
5. Scintillator : BGO 8x24x24mm<sup>3</sup>
6. Scanning mode : Wobbling
7. Memory capacity : CPU 2MB  
Magnetic disk 130MB  
Optical disk 2.6GB as an option