

# Servo Systems Division

Toshihiko Baba

The major product development activity in the Servo Systems Division during 2005 was as follows.

The "SANMOTION T" series servo amplifier for DC power sources was developed in response to market demands for products compliant with international safety standards and the RoHS directive.

The "SANMOTION Model No. PB" series DC input amplifier has higher functionality than conventional models and combines the pulse train system and

the point instruction system in a single product. This results in a product that is much more competitive in the market.

As far as stepping motors and drivers go, we developed two-phase 0.9° stepping motors in 42 mm square and 60 mm square sizes. These motors were designed to have greater torque than conventional products.

Based on these motors, we developed stepping motors with drive function. These motors make great contributions to reducing the size of the unit and to

reducing the need for wiring in the customers' systems.

We also developed a DC input driver for stepping motors.

We combined two-phase unipolar, two-phase bipolar, and five-phase pentagonal machines.

As far as controllers go, we have developed the "SANMOTION C" controller that combines PLC control, motion control, and robot control on the same product.

The following presents an overview of each product and its features.

## ■ Development of the "SANMOTION T" Series Servo Amplifier for Use with DC Motors

The demand for DC servo motors is showing a steady shift, since they are continually used in the area where rapid acceleration and deceleration is not required.

The DC servo motor market is currently demanding servo amplifiers for driving motors to meet international standards as well as the RoHS directive.

We developed the "SANMOTION T" series servo amplifier for DC servo motors to meet these demands.

The following is an outline of the servo amplifier that we have developed.

There were two goals for the development process this time

- To foster the continuance and growth of the DC motor market by further improving the usability of servo systems

- To maintain compatibility with conventional products, thus allowing the new product to smoothly replace the conventional product.

Additionally, we improved user support functions, particularly auto tuning, by applying the hardware and software for Sanyo Denki's "SANMOTION R" series AC servo system.

We improved the accuracy of our servo systems by creating sensors with greater resolution. We also improved the energy consumption by switching to next-generation power sources.



## ■ Development of the “SANMOTION Model No. PB” Series DC Input System

The point instruction system PB amplifier that we developed and released in 2002 is being employed by a great many of our customers. This development cycle, we created the “SANMOTION Model No. PB” series DC input amplifier with improved features and function.

The features of this device are as follows

- Improved sensor resolution (from 200 P/R to 500 P/R) and reduced motor noise and vibration at low sending speeds.
- Combined the pulse train system and

the point instruction system, each formerly requiring a separate piece of hardware, into the same unit in response to various market demands.

- Replaced the block pulse drive function of the motor, found in conventional products, with a sine wave drive to reduce vibration and noise.
- Developed host tools to give customers greater flexibility in using the device.



## ■ Development of the “SANMOTION F” Two-phase, 60 mm Square 0.9° Stepping Motor

In addition to the two-phase, 42 mm square 0.9° stepping motor series, we have now developed a two-phase, 60 mm square 0.9° stepping motor series.

We have optimized the design to reduce the vibration and noise at low delivery speeds for use in applications such as security cameras, semiconductor manufacturing inspection equipment and medical examination devices. We have also significantly increased torque over conventional devices.

The device architecture includes a unipolar specification, a rated current of 2 A, and three types of possible lengths (42

L, 54 L or 76 L). Winding specifications and rated current as well as specifications of a shaft can be customized according to customer demand.

This series contributes to high accuracy and smaller sizes. Additionally, it meets the European Union’s Restriction of Hazardous Substances (RoHS) directive, ensuring that it has a small environmental footprint. Because of its small environmental footprint, created in part by reduced power consumption, this product has received Sanyo Denki’s environmental design certification “ECO PRODUCTS.”



## ■ Development of the “SANMOTION F” Series Stepping Motor with Drive Function

In response to market demand for reduced wiring and smaller products, we combined stepping motors and drivers into one unit to create the stepping motor with drive function. The motor that forms the base of this device is the two-phase, 60 mm square 0.9° stepping motor that was introduced above.

The features of this product are as follows.

- In response to market demand, the interface with the host equipment can be any one of the following four options: a pulse train system, a serial interface, an

internal programming function, or general-use I/O.

- By developing a unit with separable motor and drive, we have made maintenance and parts replacement much simpler.
- By putting the motor and driver on the same unit, we have eliminated the need for wiring between the motor and driver, as well as eliminating the need for a box to house the control mechanism.
- We have also achieved a great reduction in the number of parts needed.



## ■ Development of the “SANMOTION F” Series DC Input Driver

DC input drivers for stepping motors are seeing wide use at the moment, but the market is demanding smaller drivers with greater functionality and longer lifespans. In response to these demands, we have developed a DC input driver.

The features of this driver are as follows

- Revamped motor drive system, providing a significant reduction in vibration compared to conventional products.

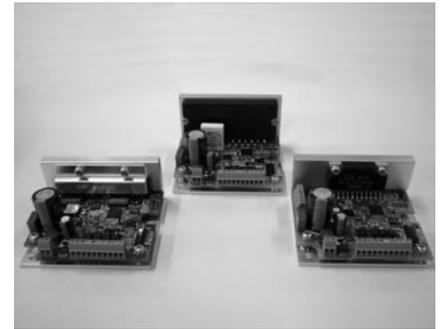
- Converted all of the functions of the dedicated IC chip of the conventional product to be handled by software, allowing for much smoother integration of additional features in the future.

- Enhanced maintenance functions through the addition of functions such as an open phase detector, a winding short/open protection function, and a fuse mounted on the main circuit.

- Used both connector and terminal type wiring in response to various market demands.

- Used a long-life electrolytic capacitor in response to market demands for a long lifespan.

- Achieved a significant reduction in size compared to the conventional product through the application of recent advances in semiconductor technology and mounting technology.



## ■ Development of the “SANMOTION C” Controller

Motion controllers have been developed mainly for the control of servo motors, with the objective of high quality position control and speed control for industrial applications.

On the other hand, PLC (sequence controllers), which are developed as a replacement for relay control circuits, are already in wide use in the market.

We have developed the “SANMOTION C” controller that combines PLC control, motion control, and robot control on the same product.

The features of this product are as follows.

- Wide range of usable interfaces includes SERCOS, CANopen, and GA1060 (Sanyo Denki’s unique multi-drop serial

interface). This feature was designed to reduce wiring in any type of serial interface system.

- Achieved high flexibility and customizability through the use of expansion modules that provide extra features and the addition of a rich software library.

- Reduced development time by decentralizing development of structured programs and writing programs in standard PLC language, which also improved compatibility with programs that customers have already adopted.

- Created a controller with world-wide usability by making use of the global standard PLC language “IEC61131-3” and the robot language “Teachtalk.”



**Toshihiko Baba**

Joined Sanyo Denki in 1983

Servo Systems Division

Worked on servo systems development and design