

News from JVL

A newsletter from JVL Industri Elektronik A/S

Number 5

TurnMaster Turntable

Complete turntable with integrated electronic control and modern servo technology. 0 arc-min. play

JVL has introduced a highly effective, modern turntable that can be fully integrated in modern automation systems. The TurnMaster TurnTable is supplied with integrated electronic control and modern servo technology.

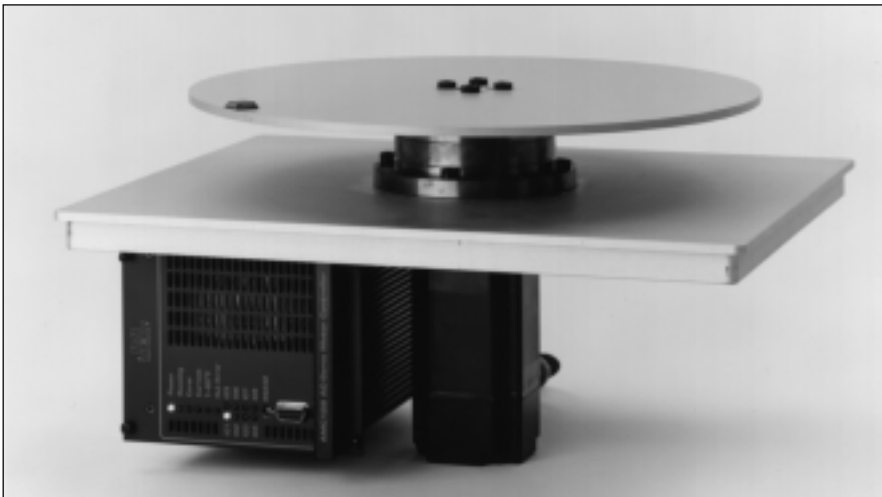
TurnMaster is a complete, very flexible system which is supplied

ready to build into your machine construction. The unit consists of a servo motor and precision gear mounted on a robust mounting plate together with a programmable servo controller. The gear axle is equipped with a mounting disc for fixing a turntable, but the unit can also be supplied with a turntable included.

TurnMaster is supplied with software for easy programming of the Turntable's motion. Once the servo controller has been programmed using a PC, all subsequent control can be accomplished from a PLC.

TurnMaster offers:

- Easy integration in PLC/PC systems
- No fixed step resolution
- Handy and simple construction
- Integrated easily in machine constructions
- Set-up achieved with smart TurnMaster Windows software
- Driven by reliable maintenance-free servo motor
- Integrated gear from renowned Harmonic Drive
- Stable play-free gear gives superior precision
- Acceleration and velocity can be controlled very precisely
- Easily switched between stepped and continuous operation



JVL at "Teknik & Data" in Odense

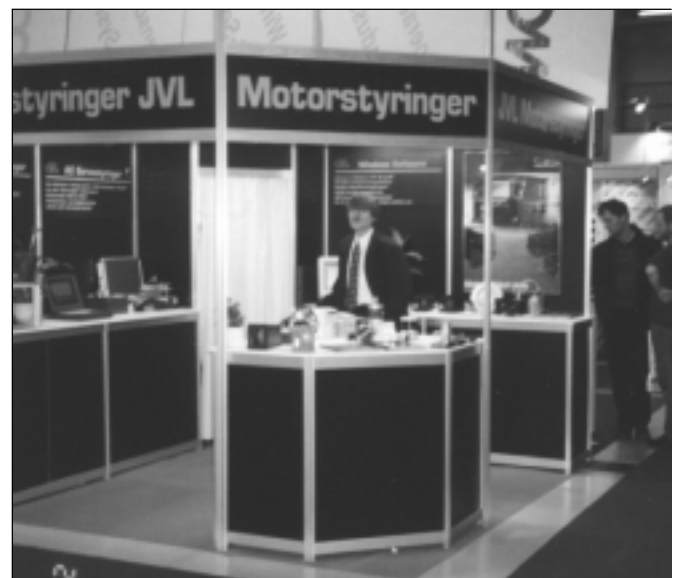
Successful participation at the exhibition in Odense, Funen, from 4th - 6th February

JVL Industri Elektronik A/S participated this year for the first time at the "Teknik & Data" exhibition in Odense on the Danish island of Funen.

We were the only firm presenting motor controllers and found ourselves in good company together with a large variety of the well-known companies in automation, PLC controllers, etc.

The conference sessions were attended by more than 1500 people and attracted a very large number of machinery designers and CAD/CAM specialists who subsequently visited the exhibition areas. This gave us direct contact with many people who had not previously seen our range of motor controllers. Our participation was thus a great success.

One of the particular areas of interest was the Harmonic Drive precision gears, which we showed in use in a complete turntable solution, TurnMaster, with programmed servo motor control.



B&O Assembles Loudspeakers using a Robot Screwdriver Controlled by JVL AC-Servos

Loudspeaker cabinets & driver units assembled with the help of advanced, specially-designed robot.

As part of the continued development in production automation, the world-renowned Danish hi-fi manufacturer Bang & Olufsen introduced a new, specially designed robot screwdriver in the spring of 1997. The robot is currently being used for assembly of cabinets for B&O's popular mini-loudspeakers, BeoLab 4000, but has been configured for assembly of 3 different types of loudspeaker. The robot has been designed and constructed by B&O's own production engineering department, which has produced a very compact and extremely reliable unit that provides exactly the right solution to B&O's needs.

The robot moves an automatic screwdriver using x-y co-ordinates in the horizontal plane and z co-ordinates in the vertical plane. In addition, it can be angled to the vertical plane in the x-direction using a co-ordinate designated x_2 . All four directional movements are driven by JVL AMC11B Servo Controllers and associated Yaskawa AC servo motors. Rotation of the screwdriver head itself is driven by a JVL AMC Servo Controller AMC12B which is partly operated in torque mode to ensure the correct tightening of the individual screws. The robot can also turn the screwdriver unit 90° using a pneumatic cylinder, so that the unit can be angled in the y-axis (y_2). It is additionally prepared for configuration with a further servo-controller so that the unit can be angled in any required direction.



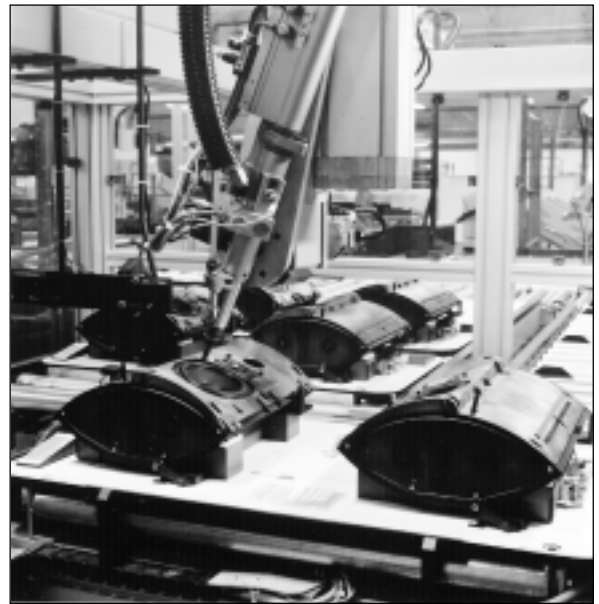
Robot screwdriver at Bang & Olufsen.

All of the JVL drivers are controlled by a Systec MCM-Step controller which is supplied in Denmark by JVL. The Systec unit executes a program developed by B&O. Using pulse and direction signals, this program tells each individual controller what to do and when. The Systec controller itself is controlled together with other robot functions by a Siemens S7 PLC, partly via an ASi-bus. Mounting of screws in the robot unit and other functions are controlled pneumatically.

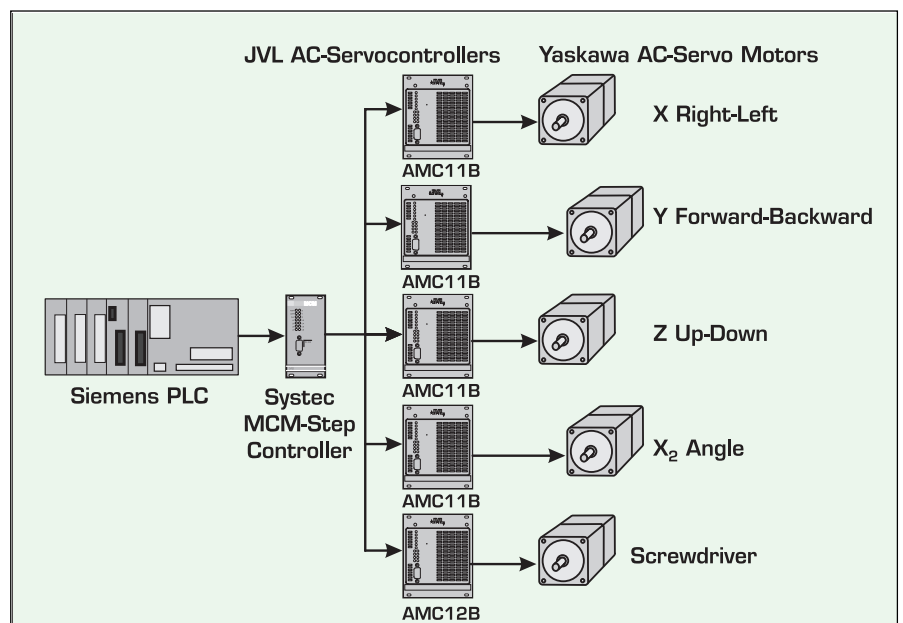
The screws must be driven through three different types of material, each of which requires a different torque. Screwdriver rotation is therefore controlled in such a way that the first rotations occur at full torque, after which the motor is current controlled. The applied torque is thus correct for each material at each stage of the process. Assembly of the cabinets currently being produced by the robot requires three torque values but the robot is programmed to handle up to 16 different values of torque.

The loudspeaker sets are mounted accurately (within 1/2 mm) on an assembly palette and a total of 28 screws are mounted in each set. The total assembly time, including transport of the assembly palette in and out of the machine is 90 seconds. The robot can in fact operate faster but B&O have chosen to use a lower speed to prolong the machine's lifetime and ensure a very low error rate.

Each palette is equipped with a bar code which tells the robot precisely which type of loudspeaker is to be



Robot screwdriver assembling loudspeaker cabinets.



Schematic overview of the control system.

assembled and also enables a check to be made to ensure that the palette has not already been assembled. Moreover the robot is connected to the subsequent test unit. This unit carries out a performance check of the loudspeaker and is thus notified if any screws have not been correctly tightened.

The entire robot construction has been implemented to comply with the EMC directive. Screened cable is used throughout the construction and all Sub-D connectors are equipped with built-in noise filters.

B&O designers have gained considerable experience throughout the design and construction of the robot screwdriver and have been very satisfied with the co-operation with JVL engineers. For our part, we



JVL and Systec Controllers mounted in a 19" rack in the control station.



BeoLab 4000 Loudspeaker

have been extremely pleased to take part in this exciting project and take some degree of pride in the fact that the installation has now been in operation without any faults for more than six months.

EMC Testing

JVL and CE approval

Today all electronic products, including motors and controllers, must carry a CE mark of approval. CE approval ensures that units do not emit noise that can interfere with other products and cause them to malfunction. It also ensures that units are resistant to external electromagnetic interference and therefore not prone to malfunction themselves. Common consumer products or industrial products such as PLCs are normally easily approved as they do not conduct high voltages and currents. This is not however the case for motor controllers where often the motor is located far from the controller and high current levels and voltages up to 600V switch up and down. This produces noise and at a minimum screened cables must always be used to meet requirements.

Already during the development phase a product must undergo 7 different tests, including immission, emission, an 8kV burst test at the 230V mains and inputs, an ESD test, etc. If the product does not fulfil the guidelines given in the EU directive, it must be modified until levels are complied with.

Some manufacturers measure test units with external filters and cabinets that provide protection against noise. In this way a product that does not in itself fulfil the directive can be made to comply with requirements. However the user must then use the same filters and install the unit in exactly the same way to ensure that CE compliance is maintained.

When JVL develops new products, we adopt a different philosophy: to limit noise at the source.

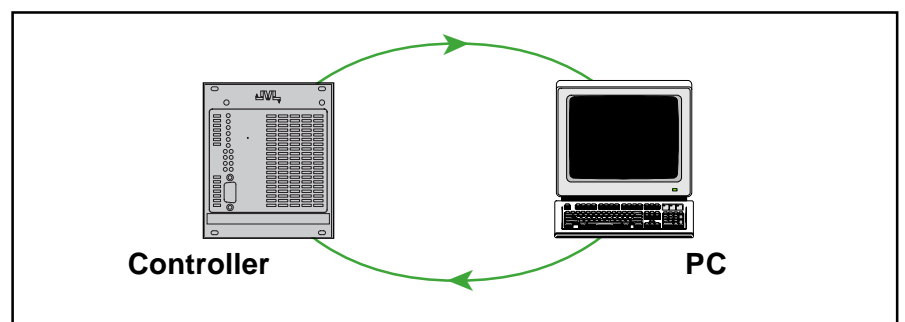
After all, prevention is better than cure. We therefore incorporate the unit and filters in a HF-cabinet which is specially designed to act as a barrier against noise. In this way the product itself is CE approved and not in combination with other external units. This means that customers can be sure they have a CE-approved product that meets requirements without the additional costs of expensive filters.

To ensure compliance with the EMC directive, JVL products include special noise filters at all inputs, outputs, motor outputs, power supply and RS232/RS485 interface. In addition, the 230V mains stage includes a special mains noise filter. PCBs, which are either 4 or 6-layer, include a chassis ground and positive layer so that the entire PCB functions as a large noise filter.

DLL files and DDE Driver

JVL has developed a DLL file (Dynamic Linked Library) for JVL's own Servo Controllers. This makes it easy for a PC to send commands to the servo controller.

At the same time, a DDE driver has been launched, enabling Windows programs to exchange data with the Controller.



Axis Controller Cards or Controllers ?

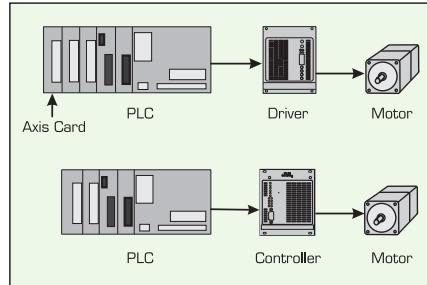
Both systems have advantages and disadvantages

Many systems that include motor control also include a PLC system. Already at the planning stage therefore, it must be decided whether a stand-alone unit or an axis card in a PLC rack should be used as the servo or step motor controller. The first aspect to be considered is whether large amounts of data are to be transferred between an overall PLC and the motor controllers. In this case, a natural choice is an axis controller card, where data can be quickly and easily transferred between the PLC and controller.

The next thing to be considered is whether the system is a single-axis or multi-axis system. If several axes are to work together, e.g. in electronic gearing, a multi-axis stand-alone controller should be selected. Axis boards in a PLC system cannot work together. They can only exchange data via the PLC and thus cannot communicate directly with each other.

In the majority of applications there is only a single axis, where the interface between the PLC and the controller consists of a few digital signals. Either an axis card or a controller can be used. The major difference between the two solutions lies in the programming. An axis card is programmed in the PLC language while a controller is programmed using a dedicated motion-language. Seen from a user viewpoint, a

controller is the most user-friendly because the motion sequence is built into the commands. An example clearly shows the difference:
The sequence consists of motion



from point A to point B and back again. Thereafter Output 2 is activated.

A dedicated motion-language program would accomplish this task as follows:

Move To B
Move To A
Output2=on
Sequence is accomplished.

In PLC language, the sequence must be built-up from scratch:

Transfer run parameters to axis card (copy registers)
Start operation (flip start-flag)
Wait till end of operation (wait for finish-flag)
Transfer new run parameters to axis card (copy registers)
Start operation (flip start-flag)

Wait till end of operation (wait for finish-flag)
Activate output 2

Output 2 is activated by the finish-flag, but this must only occur the second time the flag is set high. Therefore additional logic commands are required to enable the program to function as required. Programming is thus a far more extensive task. On the other hand, the language is well known to the PLC programmer.

Technical summary:

Axis card:

- + Same programming software as PLC
- Good integration with PLC/MMI
- Dependent on PLC's scan time
- Extensive programming
- External connector board
- Limited functionality

Controller

- + Easy programming
- Set-up independent of PLC
- Fast program execution
- Easy installation
- Only digital signal communication.
- Possibly RS232 or Fieldbus

As is well known, JVL can supply a broad range of Step, AC-servo and DC-servo controllers and drivers for both types of solution.

Year 2000 and JVL Controllers

Several customers have asked us whether any problems could arise in connection with the year 2000 transition in motion control systems that include units supplied by JVL. Since none of JVL's controllers

have, or have had, a built-in clock, JVL controllers in themselves will not give any problems. JVL is very aware of the problem and all newly developed products will therefore function correctly after the year 2000.

Since other components in the control system may have a built-in clock for time-codes, etc., we recommend that customers test the system to see what happens when the clock changes to the year 2000.



...when motors must be controlled

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