2 Installation and Setup

Introduction

This section describes the various setup procedures necessary to install the ORCA system. It is assumed that the controlling software is MDS 2.0 (Methods Development Software 2.0) installed on a Hewlett-Packard Vectra equipped with a Hewlett-Packard HP-IB Interface Card (HP 82335B or later) and an HP-IB interface cable (HP 10833B or equivalent).

Site Preparation

The customer is responsible for supplying a constant, uninterrupted power supply (UPS). Power surges and outages can damage electronic components within the robot arm, robot controller, and computer. In addition, if the arm loses power, it will release anything it may be carrying at the time and will drop slowly, coming to rest on whatever is directly beneath it. This can result in potentially serious situations (for example, chemical spills, broken glassware).

> *Caution*
>
> *An unstable power supply that causes repeated hardware failures (for example, damaged boards) may be grounds for invalidating the warranty.*

Sagian does not recommend a particular brand of UPS but does strongly suggest purchasing one with RS-232 capabilities. This allows the user to write procedures to detect when the UPS has been engaged so the system can be returned to a safe state through the operating software. As a minimum requirement, the UPS should be capable of backing up power to both the computer and the robot controller long enough to return the system to a safe state before power is interrupted. Refer to the computer's operating manual to determine its power consumption and "Power Consumption" for the robot controller's power consumption specification. The sum of these will be the minimum power requirement for the UPS.

> *Caution*
>
> *If other pieces of equipment are to be connected* **to the UPS, then adjust the size of the UPS accordingly.**

The customer is responsible for providing a standard 9 V battery to be used in the digital level.

Power outlets are required for the UPS, computer, monitor, robot controller, and printer.

To accommodate the platforms (optional) the customer must provide a bench top or tabletop that is at least 24 inches deep and long enough to accommodate the rail, computer, and printer. It must also be able to rigidly support the weight of the ORCA system and any other instrumentation to be placed on the bench top.

> C*aution*
>
> *Special care should be taken when installing any equipment and/or peripherals that are part of the system. When possible they should be mounted on the same surface as the robot. If this is not possible, care should be taken to prevent the equipment from moving relative to th*e **robot.**

Depending on the number of platforms incorporated into the system, the total system weight will vary. See chapter 1 for weights of system components. The bench top should not vibrate or sway as the robot accelerates along any axis. Since the platforms have leveling feet, flatness of the bench top is not critical.

> C*aution*
>
> *The total weight of the ORCA system and any other equipment placed on the bench top must not cause the rail assembly to deflect by more than 1.5 mm over the* **length of the rail. Deflection beyond this may cause the rail cover to bow which would affect the performance of the robot.**

If the customer does not order a Vectra as part of the ORCA system, it is his/her responsibility to provide a computer with the minimum configuration outlined below with MS-DOS and Microsoft Windows 3.1 installed prior to installation of MDS 2.0.

- Intel 80386 microprocessor (ISA-compatible bus)

- 40 MB hard disk drive/high density flexible disk drive

- VGA color monitor

- Mouse (must be supported by MS-Windows version 3.1)

- Serial or parallel printer (must be supported by MS-Windows version 3.1)

- Local power options

Hardware Inspection

Upon receipt of the robot system, inspect the contents to make sure that nothing is broken, loose, or missing. Check that all obvious screws and connectors are tight. Check that all cables are clear of moving parts such as idler wheels and belts. Check for damage to the rail cover and end caps. If anything is missing or broken, contact your nearest Sagian Service Representative.

Computer Setup

If a Vectra was ordered with the robot, the computer should be ready to use upon delivery. If, however, a non-HP PC is to be used to control the arm, the host computer must be set up before connecting it to the robot controller. To accomplish this, follow the appropriate installation instructions included with the computer. A minimum of 4 MB of RAM, a 1.44 MB flexible disk drive, a 40 MB hard disk drive, and a Microsoft mouse are required. Follow the instructions included with the Hewlett-Packard HP-IB interface card (HP 82335B) to install it properly in the computer. The DIP switches on the HP-IB card should be set as shown below.
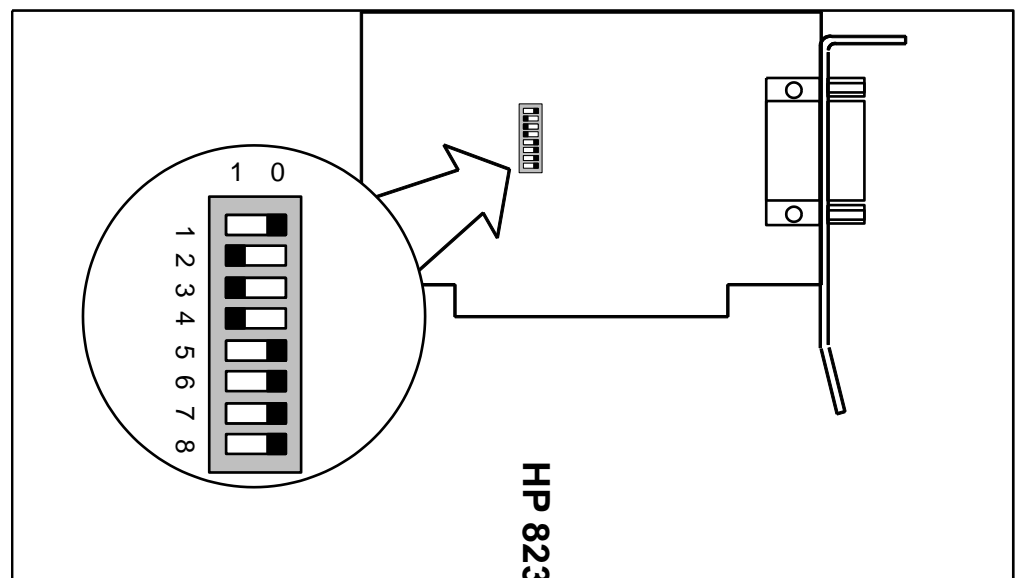
If a customer has an old HP-IB card (HP 82990A), the DIP switch settings should be set as shown below.

HP 82990A
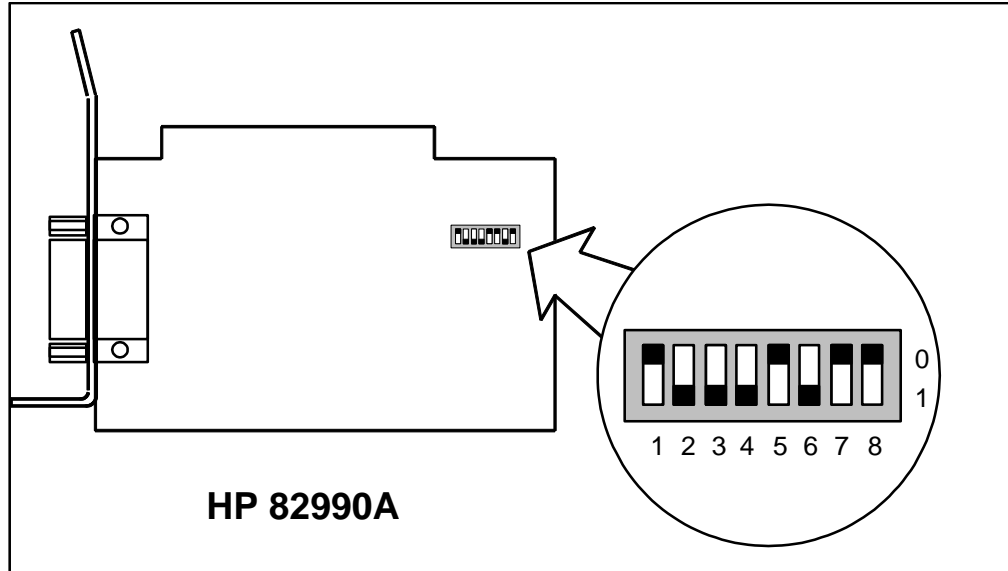
NOTE!
Non-MS-DOS PCs are not recommended. Sagian is *not* responsible for verifying performance with non-MS-DOS PCs.

Software Installation

The following software must be installed on the host computer in order to operate and service the robotic arm correctly:

- MS-DOS® 5.0 or higher

- Microsoft Windows 3.1

- HP-IB Server Software

- Methods Development Software 2.0 (MDS 2.0)

- ORCA Robot Module Software

To install the ORCA system software on computer follow the steps below.

1. Start Windows.

2. Install the MDS install disk #1 into the appropriate floppy disk drive on the computer.

3. In the Windows Program Manager, select File Run.... and type a:\install (or b:\install) and follow the instructions. This will install the HP-IB server software which is required to run MDS.

NOTE!
This step will automatically create a new Windows group in the Program Manager.

---

4. When the installation of the server software in complete, remove the disk from the PC and insert MDS install disk #2 into the appropriate floppy disk drive.

5. In the Windows Program Manager, select File Run... and type a:\install (b:\install) and follow the instructions. This will install the MDS core software.

NOTE!

This step will automatically create an MDS icon in the Sagian MDS group created in step 3.

---

6. Remove the disk from the PC, reboot the computer , and restart Windows.

7. Start MDS.

8. Insert the Robot Module Software install disk in the appropriate floppy disk drive.

9. From the Dictionary Manager **Admin** menu, select **Modules**.

10. In the **MDS Modules** box, click on the **Add** button.

11. In the **Add Modules** box, click on the **Install** button.

12. In the **MDS Install Module Software** box, switch to the floppy drive in the Select **MIF File** field, click once on the **Install** button.

13. When the **MDS Module Installation Robot Module** box appears, ensure the files will be copied to the same directory where the MDS core software was installed in step 5 above (default is c:\mds).

14. After the files have been copied, click on the **OK** button.

15. Set the parameters in the **Change Module** box.

    - Enter a User Name (optional)

    - The PCS link should default to 1 HPIB 7.

    - Set the HP-IB address for the robot controller (factory default is 5).

    - Select the **I/O On** radio button.

    - Click on the **OK** button.

16. In the MDS Modules button, click on the **OK** button.

17. Click on the **Yes** button to restart MDS.

Hardware Installation

The core ORCA system consists of the following hardware:

- Robot arm

- Robot controller

- Teach pendant

- Rail assembly (includes rail, rail car, rail chain and tensions, rail cover, chassis assembly, end caps, mini-platform, cable, and cable support)

- Emergency stop

- 1 m x 0.6 m platforms (optional)

To install the ORCA system hardware, follow the steps below:

1. Remove all contents from their shipping crates and boxes. Inspect for damage as described in "Hardware Inspection."

2. Place platforms on the bench or tabletop, and adjust the leveling feet with a slot screwdriver (from above) or an adjustable wrench (from below) so that the tops of the platforms are level with respect to each other and to gravity (use the digital level for the latter adjustment—place the level sensor in the middle of the table and adjust the long axis, then rotate the level sensor 90 degrees to adjust the short axis). There should be no wobble in the platforms when they are leveled correctly.

NOTE!
It is extremely important that the platforms are even with respect to each other. After butting the edges of the platforms together, run your fingers over the adjacent edges. If you can detect a noticeable difference in height between the platforms, raise or lower one of the platforms until there is no discernible difference. Platforms that are not level with respect to each other can cause the mini-platform and rail cover to bow and may cause rubbing between the rail cover and the chassis or torso.

---

3. If necessary, remove the rail cover. Remove the four retaining screws that attach the rail cover to the end caps and lift it off the end caps.

4. Loosely attach the rail assembly to the work surface(platform(s))using the mounting screws and lock washers. Do not tighten the mounting screws at this time. Remove the two screws that hold the left end cap plate.

NOTE!
It is not necessary to put a mounting screw in every hole in the mini-platforms.

NOTE!
It may be necessary to loosen the bolts slightly that hold the rail to the mini-platforms and adjust the mini-platform sections so that the holes line up with those in the application tiles; if this is required, be certain to tighten the rail bolts once the holes have been aligned properly.

5. Gently pull or tap the rail assembly towards you along the entire length of the rail. This will properly align the rail assembly. Tighten the mounting screws.

6. Remove the rubber bands that secure the chassis assembly to the right end cap.

7. Remove the six screws in the bottom of the chassis casting.

8. Hold the arm over the chassis assembly on the rail, slide the chassis-torso cable under the rail cable clamp, and connect the chassis-torso cable to the appropriate connector on the chassis PCB.

9. Place the arm over the chassis casting so that the notch in the torso casting fits over the corresponding peg in the chassis casting. Secure the arm to the chassis casting using the six retaining screws removed from the chassis casting in step 7.

10. Move the robot arm to the far right on the rail. Slide the rail cover over the rail assembly, through the torso casting and place the ends in the notches in the end caps. Secure the rail cover to the end caps using the four screws. Replace the left end cap plate.

NOTE!
The rail cover has been adjusted at the factory to eliminate rubbing against the torso casting. The left (L) and right (R) ends of the rail cover will be labeled on the inside top surface. Always install the rail cover in the same orientation OD rubbing may occur. Severe rubbing may damage components or cause sufficient friction to result in frequent rail motor servo errors.

NOTE!
Although the rail cover has been adjusted to eliminate rubbing against the torso casting, shipping might cause the sides of the rail cover to expand or contact. Therefore, it is necessary to check for rubbing during the installation process and make adjustments if necessary.

11. Move the robot arm up and down the entire length of the rail and listen for rubbing. If rubbing occurs, manually adjust the rail cover where the rubbing is taking place. Continue this process until the arm moves up and down the entire length of the rail without rubbing.

12. Check that the dip switches on the controller rear panel are set to an HP-IB address of 5 (factory default).

13. Connect the teach pendant and emergency stop button to the controller rear panel.

14. Connect and ground the controller-to-rail interconnect cable (ORCA bus cable) to the controller rear panel and the right end cap.

15. Connect the controller to the computer using an HP-IB cable.

16. Plug in the controller, computer, monitor and printer and turn them on.

NOTE!
When the controller is first turned on, the red LED on the bottom right of the front panel should come on and then extinguish within a few seconds. The green LED should remain lit.

---

17. Install MDS 2.0 (see the *ORCA Reference Manual*).

18. Start MDS 2.0.

19. Calibrate the arm (see Chapter 5, "Calibration").

20. In the robot screen, enable the teach pendant and move all six axis (rail, reach, height, bend, twist, and grip) to check that the pendant and the arm is working correctly. Rotate the bend to +90 and -90 degrees and the twist one full rotation.

21. Create a motion entry and grab the pendant. Depress the enter button and check that the current coordinates are recorded in the motion editor window. Close the motion (there is no need to save it).

22. Disable the pendant.

23. Depress the stand-alone emergency stop button. This should cut power to the arm.

24. Initialize the robot.

25. Depress the teach pendant emergency stop button. This should cut power to the arm.

26. Re-initialize the robot.