IV7
Vehicle-Mount Reader
for Adaptable Load Back Rest
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IV7 Vehicle-Mount Reader Instructions (for Adaptable Load Back Rest)
About the IV7 Vehicle-Mount Reader

The IV7 is a rugged RFID tag reader designed to be mounted on a vehicle for mobile use. This IV7 includes brackets for installing the IV7 on a forklift equipped with an Adaptable Load Backrest (ALBR). These instructions explain the ports on the IV7 and how to install the IV7 and an RFID antenna on the ALBR.

For more information on ordering an ALBR, contact your Intermec sales representative.

Government regulatory agencies require that this RFID reader only use approved antennas. Therefore, this reader uses a custom antenna connector. Do not use antennas not approved for use with this reader.

Out of the Box

When you unpack the IV7, save the packaging in case you need to ship or store the IV7. The reader comes with a documentation packet that includes safety and compliance statements and these instructions.
To install the IV7, you also need these items (sold separately):

- **IV7 DC Power Cable Kit** (P/N 203-713-002 with right-angle connector, or 203-713-003 with straight connector).

- **Data cable** (choose one):
  - 20-pin connector to 9-pin serial and 25-pin D-sub connectors, 5 ft (P/N 236-089-xxx). Use this cable with the GPIO Terminal Block accessory (P/N 203-726-xxx).
  - **IV7 Data Cable Kit**: 20-pin connector only, 12 ft (P/N 203-776-001 with straight connector, or 203-776-002 with right-angle connector). You need to supply your own connectors for the unterminated end of this cable.

- **RFID antennas**. You can connect up to four antennas to the IV7. These Intermec RFID antennas are designed to be mounted on the ALBR and include mounting brackets and hardware:
  - 865-869 MHz (P/N 805-816-001)
  - 915 MHz (P/N 805-816-002)

- **Antenna cables for your IV7**. Intermec offers these cable kits for ALBR installations:
  - Kit with standard SMA connector for 865-869 MHz [P/N 203-719-003 (12 ft cable) or P/N 203-719-004 (20 ft cable)]
  - Kit with reverse SMA connector for 915 MHz [P/N 203-720-001 (12 ft cable) or P/N 203-720-002 (20 ft cable)]

These antenna cable kits include crimp connectors and tie down straps.

For more information on antennas, cables, and other accessories, contact your local Intermec sales representative, or visit the Intermec RFID home page at [www.intermec.com/RFID](http://www.intermec.com/RFID).
Understanding the Ports

Connect the IV7 data port to a host PC for serial communications. You can also use the data port to access the IV7 general purpose input/output (GPIO) interfaces. For data port pin assignments, see “IV7 Data Port Pin Assignments” on page 18.

Connect the IV7 power port to a DC power source. For power port pin assignments, see “IV7 Power Port Pin Assignments” on page 19.

Note: The IV7 requires 6-60 VDC at up to 4.5A for operation. Consult the vehicle manufacturer or your vehicle maintenance company for specific information on appropriate power connection and mounting locations.
Choosing a Mounting Location

The IV7 can be positioned in the center or end channels of the ALBR for best performance and operator visibility.

Intermec RFID antennas designed to be mounted on the ALBR can also be positioned in the center or end channels, as seen in the next illustrations.

**Note:** The IV7 ships with terminators installed on antenna ports 2, 3, and 4. Do not remove the terminator from any port unless you are installing an antenna on that port.

**IV7 and Antenna Mounting:** This illustration shows the IV7 mounted in the center channel and the antenna mounted in one of the end channels.
**Note:** The ALBR includes a wire way for cable routing. You can remove the wire way during cable routing and installation, and then install the wire way to provide cable protection.

**Alternate Mounting Location Example:** In this illustration, the IV7 is mounted in the end channel and the antenna is placed in the center channel.
Following Cable Safety Guidelines

The IV7 requires power, data, and antenna cables to connect it to your vehicle-mounted RFID system. Keep these cable safety guidelines in mind:

- Make sure that the cable routing does not interfere with other equipment or vehicle controls.
- Keep cables as short as practical and route all cables to minimize exposure to damage.
- Make sure the cables will not be pinched or rubbed by moving parts on the vehicle. You may need to sheath the cable to prevent it from being pinched.
- Secure the cables at least every 15 cm (6 in) throughout the length of the cable run. Use adjustable clamps or tie-wraps to secure the cables.
- Use a snap-in bushing if the cables pass through a firewall or other sheet metal.

Note: Most vehicle manufacturers offer pulley kits for installation of wiring with risers. Intermec recommends using these manufacturer-specific kits with any installation of the IV7 on a forklift equipped with an ALBR.

Choose mounting locations for the IV7 and antennas that allow the best possible visibility for the forklift operator.

If the IV7 and antennas are mounted where they significantly reduce operator visibility, the installation should be evaluated for compliance with the following safety standards:

- ISO 13564-1, “Powered industrial trucks - Test methods for verification of visibility - Part 1: Sit-on and stand-on operator trucks and variable reach trucks”
Installing the IV7

Before you install the IV7, antenna, or cables:

- have a qualified technician install the ALBR on the forklift.
- determine where the IV7 and antennas should be mounted on the ALBR. For mounting location guidelines, see “Choosing a Mounting Location” on page 8.
- determine where the IV7 power, data, and antenna cables should be routed, and prepare the cables for installation. For cable routing guidelines, see “Following Cable Safety Guidelines” on page 10.

Note: The IV7 requires 6-60 VDC at up to 4.5A for operation. Consult the vehicle manufacturer or your vehicle maintenance company for specific information on appropriate power connection and mounting locations.

To install the IV7 on the ALBR

1. Unscrew the four 5/16”-18 locknuts from the IV7 and remove the mounting brackets.

2. Connect the power, data, and antenna cables to the IV7. Do not connect the cables to any other component.

3. Position the IV7 in its mounting location on the back side of the ALBR. The IV7 label should face forward.
4 From the front of the ALBR, slide the mounting brackets onto the bolts on the IV7 baseplate.

5 Install the four 5/16"-18 locknuts on the bolts and tighten the locknuts to secure the IV7 to the ALBR. Torque the locknuts to 5 Nm (44 lb-in). Do not overtighten the locknuts.

6 Route the power and data cables as needed. If necessary, use adhesive tie down straps and the removable wire way on the ALBR to manage the cables. Do not connect the cables yet.

7 Position the antenna in its mounting location on the front of the ALBR.

8 From the back of the ALBR, slide the antenna mounting brackets onto the bolts on the antenna case.
9 Install the four 1/4”-20 locknuts on the bolts and tighten the locknuts to secure the antenna to the ALBR. Torque the locknuts to 6 Nm (53 lb-in). Do not overtighten the locknuts.

10 Connect the antenna cable to the antenna. If necessary, use adhesive tie-downs and the removable wire way on the ALBR to manage the antenna cables.

11 (Optional) Install GPIO devices on the vehicle and connect the data cable to the devices.

12 Connect the IV7 data cable to the vehicle-mounted computer:
   - For the CV30, connect the serial cable to COM3.
   - For the CV60, connect the serial cable to COM1 or COM2.

13 Connect the IV7 power cable to the DC power source. The power indicator turns green, signaling that the IV7 is now ready to use. Continue with the next section, “Enabling the IV7.”
Enabling the IV7

The IV7 can be connected to the Intermec CV30 Fixed-Mount or Intermec CV60 Vehicle-Mount computer. Follow the next procedure to enable communication between the reader and computer.

To enable communication to the CV30 or CV60

1. Make sure there is power to the IV7.

2. On the computer, tap **Start > Settings > System > Intermec Settings > RFID > Reader > Reader 1**. The Reader 1 module appears.

3. Select the **Enable Reader** check box.

4. Tap **File > Save Settings**.

5. Tap **View > Refresh**. The **Enable Reader** check box should be selected and the **Connected** check box should be selected and grayed out.
Upgrading the IV7 Firmware

The IV7 firmware can be upgraded as follows:

- You can use the SmartSystems Foundation Console to upgrade the IV7 connected to an Intermec CV30.
- You can use an installer package in Windows XP to upgrade the IV7 connected to an Intermec CV60.

To download IV7 firmware

2. In the Product Category list, choose RFID.
3. In the Product Family list, choose Vehicle Mount Readers.
4. In the Product list, choose IV7 Vehicle Mount and click Submit. The IV7 Vehicle Mount Downloads page appears.
5. In the OS/Firmware/Drivers list, click IM5 RFID Firmware update ver. 10.xx and follow the prompts to download the Zip file to your desktop PC. You are required to register with Intermec before you can download the file.
6. After the download is complete, double-click the Zip file and extract the contents. The Zip file includes the files for upgrading the IV7 through a CV30 with SmartSystems Foundation, or through a CV60 running Windows XP.

Upgrading With SmartSystems Foundation

You can use the SmartSystems Foundation console to upgrade the firmware on your IV7. SmartSystems Foundation is available from the Intermec web site.

Note: Before you can upgrade the IV7 firmware, make sure that the IV7 is connected to COM3 on the CV30.

To upgrade firmware using SmartSystems Foundation

1. Download the IV7 firmware upgrade files as described in the previous procedure.
2 Double-click the application file (CV30_IV7_xx.xx.exe, where xx.xx is the firmware version) to install it. The application file should appear in the software vault.

3 From the SmartSystems console in the software vault, locate the upgrade file, and drag-and-drop the file onto the CV30 that is connected to the IV7.

**Note:** The SmartSystems console does not report download errors. Verify the new firmware version shown on the BRI startup banner or by using the BRI “ver” command. For more information, see the *Basic Reader Interface Programmer’s Reference Manual.*

### Upgrading With Windows XP

Before you can upgrade the IV7 firmware:

- connect the IV7 to a serial port on the host CV60.
- close all applications using the serial port.

**To upgrade firmware using Windows XP**

1 Download the IV7 firmware upgrade files as described in “To download IV7 firmware” on page 15.

2 Double-click the installer package (XP_x86_IV7_yy.yy.exe, where yy.yy is the firmware version). The opening screen appears. Follow the steps in the wizard to upgrade the IV7 firmware.

![Welcome to the Intermec RFID Firmware Setup](image)
If an application is already using the serial port, the following error appears:

Close the application and retry the upgrade.

**Sending Commands to the IV7**

You send commands to the IV7 from a host PC using the Basic Reader Interface (BRI) protocol. For more information on BRI commands, see the *Basic Reader Interface Programmer’s Reference Manual*.

To develop RFID applications you can use the Intermec RFID Resource Kit, which is part of the Intermec Developer Library. This Resource Kit includes C# and Java tools for application development, including reader control and data manipulation. For more information, go to [www.intermec.com/idl](http://www.intermec.com/idl).

**About the GPIO Interfaces**

The IV7 has four input and four output interfaces. You can connect external controls to the GPIO interfaces to trigger IV7 operations. All GPIO interfaces should be restricted to a maximum operating input voltage of +5 VDC. To use higher input voltages, you need to use an external voltage conditioning network, such as resistor dividers or active regulators.
Although all interfaces include transient protection, the interfaces are not protected from continuous over voltage or over current conditions. The IV7 could be damaged if a source greater than +5.0 VDC is connected directly to either the inputs or the outputs.

**GPIO Interface Specifications**

<table>
<thead>
<tr>
<th>Interface</th>
<th>DC Voltage</th>
<th>Maximum Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0 to +5 VDC</td>
<td>10 mA per input</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40 mA for all inputs combined</td>
</tr>
<tr>
<td>Output</td>
<td>0 to +5 VDC</td>
<td>50 mA for all outputs combined</td>
</tr>
</tbody>
</table>

**Note:** When IV7 power is shut down, power to peripherals should be shut down also.

The GPIO interfaces can be accessed through the data port. For pin assignments, see the next section.

**IV7 Data Port Pin Assignments**

![IV7 Data Port Diagram]
### Data Port Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TXD from IV7</td>
<td>11</td>
<td>GPIO Return 1</td>
</tr>
<tr>
<td>2</td>
<td>RXD to IV7</td>
<td>12</td>
<td>GPIO Return 2</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
<td>13</td>
<td>GPIO Return 3</td>
</tr>
<tr>
<td>4</td>
<td>CTS from IV7</td>
<td>14</td>
<td>GPIO Return 4</td>
</tr>
<tr>
<td>5</td>
<td>RTS to IV7</td>
<td>15</td>
<td>GPIO Return 5</td>
</tr>
<tr>
<td>6</td>
<td>+5VDC</td>
<td>16</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>GP Input 0</td>
<td>17</td>
<td>GP Output 0</td>
</tr>
<tr>
<td>8</td>
<td>GP Input 1</td>
<td>18</td>
<td>GP Output 1</td>
</tr>
<tr>
<td>9</td>
<td>GP Input 2</td>
<td>19</td>
<td>GP Output 2</td>
</tr>
<tr>
<td>10</td>
<td>GP Input 3</td>
<td>20</td>
<td>GP Output 3</td>
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</table>

### IV7 Power Port Pin Assignments

#### IV7 Power Port

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-VDC</td>
</tr>
<tr>
<td>2</td>
<td>+VDC</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
</tr>
</tbody>
</table>
Where to Go for More Information

Visit the Intermec web site at www.intermec.com to download PDF versions of our current manuals.

Visit the Intermec technical knowledge base (Knowledge Central) at intermec.custhelp.com to review technical information or to request technical support for your Intermec product.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>9.5 cm x 23.6 cm x 34.3 cm (3.75 in x 9.3 in x 13.5 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>3.08 kg (6.8 lb)</td>
</tr>
<tr>
<td>DC Electrical Rating</td>
<td>6 to 60 V, 4.5A maximum</td>
</tr>
<tr>
<td>Environmental Rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-25°C to 55°C (-13°F to 131°F)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30°C to 75°C (-22°F to 167°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>10% to 90%, non-condensing</td>
</tr>
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</table>

Patent Information

This product is covered by one or more of the following patents:
4,739,328; 4,786,907; 4,864,158; 4,888,591; 4,999,636; 5,030,807; 5,055,659; 5,280,159; 5,504,485; 5,521,601; 5,550,547; 5,673,037; 5,763,867; 5,777,561; 5,825,045; 5,828,318; 5,828,693; 5,850,181; 5,850,187; 5,942,987; 5,995,019; 6,078,251; 6,121,878; 6,122,329; 6,172,596; 6,195,053; 6,249,227; 6,280,544; 6,286,762; 6,286,763; 6,288,629; 6,360,208; 6,384,712; 6,404,325; 6,429,775; 6,486,769; 6,501,807; 6,525,648; 6,539,509; 6,645,327; 6,677,852; 6,768,414; 6,784,789; 6,816,063; 6,830,181; 6,838,989; 6,859,190; 6,906,615; 6,919,793; 6,944,424; 7,075,413; 7,103,087; 7,106,196; 7,117,374; 7,121,467; 7,123,129; 7,158,046; 7,158,091.

There may be other U.S. and foreign patents pending.