MODEL ROB-24(H)

USER MANUAL
Notice

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Prior to shipment, ACCES equipment is thoroughly inspected and tested to applicable specifications. However, should equipment failure occur, ACCES assures its customers that prompt service and support will be available. All equipment originally manufactured by ACCES which is found to be defective will be repaired or replaced subject to the following considerations.

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If a unit is suspected of failure, contact ACCES' Customer Service department. Be prepared to give the unit model number, serial number, and a description of the failure symptom(s). We may suggest some simple tests to confirm the failure. We will assign a Return Material Authorization (RMA) number which must appear on the outer label of the return package. All units/components should be properly packed for handling and returned with freight prepaid to the ACCES designated Service Center, and will be returned to the customer's/user's site freight prepaid and invoiced.

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Following Years: Throughout your equipment's lifetime, ACCES stands ready to provide on-site or in-plant service at reasonable rates similar to those of other manufacturers in the industry.

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Chapter 1: Introduction

ROB-24 is a twenty-four channel electromechanical relay output accessory card. ROB-24H is identical except that higher power relays are used. On-board amplifiers allow the relays to be driven by any 24-bit group of any ACCES digital I/O card or from other manufacturer's LSTTL or NMOS/CMOS-compatible digital output cards that use 37 or 50-pin connections compatible with the pin connections listed later in this manual. When an input bit is high, the associated relay is energized and a red LED associated with each relay glows when that relay is actuated.

SPDT Form C relays are standard but DPDT Form C relays are an available option. The relays used are UL-recognized, non-latching, polarized units designed to FCC Part 68 isolation requirements and can switch up to three amperes current into a resistive load at voltages up to 120 VAC (rms).

The card is normally powered by +5 VDC external power but an option is available for 115 VAC, 60 Hz external power. In both cases, screw terminals are provided for termination of input power connections.

As mentioned earlier, either card may be interfaced to any 24-bit port of an ACCES IOD-Series card. Relay numbers and corresponding port-bit assignments are as follows:

<table>
<thead>
<tr>
<th>Relay</th>
<th>Port Bit</th>
<th>Relay</th>
<th>Port Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PA0</td>
<td>13</td>
<td>PC4</td>
</tr>
<tr>
<td>2</td>
<td>PA1</td>
<td>14</td>
<td>PC5</td>
</tr>
<tr>
<td>3</td>
<td>PA2</td>
<td>15</td>
<td>PC6</td>
</tr>
<tr>
<td>4</td>
<td>PA3</td>
<td>16</td>
<td>PC7</td>
</tr>
<tr>
<td>5</td>
<td>PA4</td>
<td>17</td>
<td>PB0</td>
</tr>
<tr>
<td>6</td>
<td>PA5</td>
<td>18</td>
<td>PB1</td>
</tr>
<tr>
<td>7</td>
<td>PA6</td>
<td>19</td>
<td>PB2</td>
</tr>
<tr>
<td>8</td>
<td>PA7</td>
<td>20</td>
<td>PB3</td>
</tr>
<tr>
<td>9</td>
<td>PC0</td>
<td>21</td>
<td>PB4</td>
</tr>
<tr>
<td>10</td>
<td>PC1</td>
<td>22</td>
<td>PB5</td>
</tr>
<tr>
<td>11</td>
<td>PC2</td>
<td>23</td>
<td>PB6</td>
</tr>
<tr>
<td>12</td>
<td>PC3</td>
<td>24</td>
<td>PB7</td>
</tr>
</tbody>
</table>
Controlling ROB-24

Programming ROB-24 is done by simple OUT statements. For example, if the card is to be controlled by an ACCES model IOD-24E located at base address hex 310, C statements would be as follows:

```
OUTPORTb(0x313,0x80); //Sets the ports to use as outputs
OUTPORTb(0x310,1); //Activates Port A, bit 0 (Relay 0)
OUTPORTb(0x311,16); //Activates Port B, bit 4 (Relay 21)
```

Alternatively, any parallel, TTL-compatible, source can be used to drive the relays and would be programmed according to instructions provided by the manufacturer. Please assure that the pin-out and cable configuration is compatible with the ROB-24 pin assignments listed on the following pages.
Specifications

Logic Inputs (24 Lines)
- Logic High: 2.0 to 5.0 VDC.
- Logic Low: 0 to 0.8 VDC.
- Input Load (Hi): 70 microamperes.
- Input Load (Lo): 600 microamperes.

Relay Outputs (ROB-24)
- Contacts: Form C, SPDT, non-latching (DPDT is an option).
- Contact Material: Gold overlay silver.
- Contact Rating: Max. Switching Current: 2A DC, 1.5 AC.
  Max. Carry Current: 2A AC or DC.
  Max. Switching Power: 30 W DC - 60 V AC.
  Max. Switching Voltage: 150 VDC or 220 V AC.
- Actuate Time @ nominal voltage: 8 milliseconds max. including bounce
- Release Time @ nominal voltage: 8 milliseconds max. including bounce
- Vibration: 10 to 55 Hz, 10 g
- Shock: No Contact Opening: 10 g (11 mSec sine half wave)
- Life Expectancy: Mechanical: 20 x 106 operations minimum.

Note

Good safety practice should be followed if AC voltages are to be switched by the relays

Relay Outputs (ROB-24H)
- Contacts: Form C, SPDT (DPDT is an option)
- Contact Material: Gold overlay silver
- Contact Rating: Max. Carry Current: 4 A.
  Max. Switching Voltage: 125 VDC, 250 VAC
  Max. Switching Power: 84 W, 360 VA
Power Required

DC Power
- ROB-24: +5 VDC (±5%) at 2 amperes maximum (all relays ON)
- ROB-24H: +5 VDC (±5%) at 4 amperes maximum (all relays ON)

AC Power Option
- ROB-24: 115 VAC, 60 Hz at 310 mA max. (all relays ON)
- ROB-24H: 115 VAC, 60 Hz at 390 mA max. (all relays ON)

Environmental
- Operating Temperature Range: 0 °C. to 50 °C.
- Storage Temperature Range: -30 °C. to 105 °C.
- Humidity: 45 to 85% RH, non-condensing

- Dimensions: 16" long x 4.75" wide x 2" high. (406 mm x 121 mm x 51 mm)
- Weight: 2.25 lbs. Max (model ROB-24-1-2)
- Screw Terminal Wire Spacing: 0.2 " (5 mm)
- Screw Terminal Wire Sizes: 12-22 AWG
Chapter 2: Installation

The software provided with this card is contained on either one CD or multiple diskettes and must be installed onto your hard disk prior to use. To do this, perform the following steps as appropriate for your software format and operating system. Substitute the appropriate drive letter for your CD-ROM or disk drive where you see d: or a: respectively in the examples below.

CD Installation

DOS/WIN3.x
1. Place the CD into your CD-ROM drive.
2. Type d:K to change the active drive to the CD-ROM drive.
3. Type installK to run the install program.
4. Follow the on-screen prompts to install the software for this card.

WIN95/98/NT
A. Place the CD into your CD-ROM drive.
B. The CD should automatically run the install program after 30 seconds. If the install program does not run, click START | RUN and type d:install, click OK or press K.
C. Follow the on-screen prompts to install the software for this card.

3.5-Inch Diskette Installation

As with any software package, you should make backup copies for everyday use and store your original master diskettes in a safe location. The easiest way to make a backup copy is to use the DOS DISKCOPY utility.

In a single-drive system, the command is:

    diskcopy a: a:K

You will need to swap disks as requested by the system.
In a two-disk system, the command is:

    diskcopy a: b:K

This will copy the contents of the master disk in drive A to the backup disk in drive B.
To copy the files on the master diskette to your hard disk, perform the following steps.

a. Place the master diskette into a floppy drive.

b. Change the active drive to the drive that has the diskette installed. For example, if the diskette is in drive A, type `a:\K`.

c. Type `installK` and follow the on-screen prompts.

**Directories Created on the Hard Disk**

The installation process will create several directories on your hard disk. If you accept the installation defaults, the following structure will exist.

**[CARDNAME]**

Root or base directory containing the SETUP.EXE setup program used to help you configure jumpers and calibrate the card.

**DOS\PSAMPLES:** A subdirectory of `[CARDNAME]` that contains Pascal samples.

**DOS\CSAMPLES:** A subdirectory of `[CARDNAME]` that contains "C" samples.

**Win32\language:** Subdirectories containing samples for Win95/98 and NT.

**WinRisc.exe**

A Windows dumb-terminal type communication program designed for RS422/485 operation. Used primarily with Remote Data Acquisition Pods and our RS422/485 serial communication product line. Can be used to say hello to an installed modem.

**ACCES32**

This directory contains the Windows 95/98/NT driver used to provide access to the hardware registers when writing 32-bit Windows software. Several samples are provided in a variety of languages to demonstrate how to use this driver. The DLL provides four functions (InPortB, OutPortB, InPort, and OutPort) to access the hardware.

This directory also contains the device driver for Windows NT, ACCESNT.SYS. This device driver provides register-level hardware access in Windows NT. Two methods of using the driver are available, through ACCES32.DLL (recommended) and through the DeviceIOControl handles provided by ACCESNT.SYS (slightly faster).
SAMPLES
Samples for using ACCES32.DLL are provided in this directory. Using this DLL not only makes
the hardware programming easier (MUCH easier), but also one source file can be used for both
Windows 95/98 and WindowsNT. One executable can run under both operating systems and still
have full access to the hardware registers. The DLL is used exactly like any other DLL, so it is
compatible with any language capable of using 32-bit DLLs. Consult the manuals provided with
your language's compiler for information on using DLLs in your specific environment.

VBACCES
This directory contains sixteen-bit DLL drivers for use with VisualBASIC 3.0 and Windows 3.1 only.
These drivers provide four functions, similar to the ACCES32.DLL. However, this DLL is only
compatible with 16-bit executables. Migration from 16-bit to 32-bit is simplified because of the
similarity between VBACCES and ACCES32.

PCI
This directory contains PCI-bus specific programs and information. If you are not using a PCI card,
this directory will not be installed.

SOURCE
A utility program is provided with source code you can use to determine allocated resources at
run-time from your own programs in DOS.

PCIFind.exe
A utility for DOS and Windows to determine what base addresses and IRQs are allocated to installed
PCI cards. This program runs two versions, depending on the operating system. Windows 95/98/NT
displays a GUI interface, and modifies the registry. When run from DOS or Windows3.x, a text
interface is used. For information about the format of the registry key, consult the card-specific
samples provided with the hardware. In Windows NT, NTioPCI.SYS runs each time the computer
is booted, thereby refreshing the registry as PCI hardware is added or removed. In Windows 95/98/NT
PCIFind.EXE places itself in the boot-sequence of the OS to refresh the registry on each power-up.

This program also provides some COM configuration when used with PCI COM ports. Specifically,
it will configure compatible COM cards for IRQ sharing and multiple port issues.

WIN32IRQ
This directory provides a generic interface for IRQ handling in Windows 95/98/NT. Source code is
provided for the driver, greatly simplifying the creation of custom drivers for specific needs. Samples
are provided to demonstrate the use of the generic driver. Note that the use of IRQs in near-real-time
data acquisition programs requires multi-threaded application programming techniques and must be
considered an intermediate to advanced programming topic. Delphi, C++ Builder, and Visual C++
samples are provided.
**Findbase.exe**
DOS utility to determine an available base address for ISA bus, non-Plug-n-Play cards. Run this program once, before the hardware is installed in the computer, to determine an available address to give the card. Once the address has been determined, run the setup program provided with the hardware to see instructions on setting the address switch and various option selections.

**Poly.exe**
A generic utility to convert a table of data into an nth order polynomial. Useful for calculating linearization polynomial coefficients for thermocouples and other non-linear sensors.

**Risc.bat**
A batch file demonstrating the command line parameters of RISCTerm.exe.

**RISCTerm.exe**
A dumb-terminal type communication program designed for RS422/485 operation. Used primarily with Remote Data Acquisition Pods and our RS422/485 serial communication product line. Can be used to say hello to an installed modem. RISCTerm stands for Really Incredibly Simple Communications TERMinal.

**Installing the Card**

The ROB-24 and ROB-24H are installed external to the host computer. The card is supplied with four 0.375” stand-offs and may be installed on user-supplied panels/chassis. The card provides headers for both 37- and 50-conductor ribbon cable connection to the host computer and screw terminal terminations for the relay outputs. Silk-screen labels on the board identify the relay elements to which they connect. The screw terminals used can accommodate wire sizes as large as #14 AWG.

To ensure that there is minimum susceptibility to EMI and minimum radiation, it is important that EMI cabling and break-out techniques be used. (cable connected to ground at the aperture of the digital I/O card that will provide signals, twisted pair wiring, etc.)
Power Connections

Connector J3 is provided for easy application of +5 VDC computer power via a quick disconnect cable from the computer power bus. Screw terminals are also provided for 5-volt external power to the card at TB13. (Note: Jumper JP1 must be installed if you intend to apply power through the screw terminals.) Alternatively, when the AC Power option is installed, JP1 should not be installed and the AC power is applied at TB13.

The following page illustrates the layout of both ROB-24 and ROB-24H.

Configurations

There are optional configurations for ROB-24 and ROB-24H. These are as follows:

ROB-24-S01: The "S01" signifies that the card is configured for 115 VAC power input. When this option is installed, AC power must be applied at TB13 as described above. Also, IC drivers U1, U3, U4, U6, U7, and U9 are omitted.

ROB-24-S02: The "S02" option provides DPDT relay outputs.

ROB-24-S03: When this option is included, the card can accept inputs from an unbuffered digital I/O card.

ROB-24-S05: Normally, inputs are pulled down to ground through 680 Ω resistors. However, when option "S05" is included, inputs are pulled up to +5 VDC by means of jumpers at locations labeled JP2, JP3, and JP4.
Figure 2-1: ROB-24 Layout
Chapter 3: Connector Pin Assignments

Either the 50-pin ribbon cable header (J2) or the 37-pin cable header (J1) is used to interface to the digital output board in the host computer. The mating connectors are a type AMP 1-746285-0 or equivalent (50 pins) or type AMP 745242-1 (37 pins) for insulation displacement flat cables or Cannon DC37-S (37 pins) for soldered connections.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>Pin</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relay K16</td>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Relay K15</td>
<td>4</td>
<td>&quot;</td>
</tr>
<tr>
<td>5</td>
<td>Relay K14</td>
<td>6</td>
<td>&quot;</td>
</tr>
<tr>
<td>7</td>
<td>Relay K13</td>
<td>8</td>
<td>&quot;</td>
</tr>
<tr>
<td>9</td>
<td>Relay K12</td>
<td>10</td>
<td>&quot;</td>
</tr>
<tr>
<td>11</td>
<td>Relay K11</td>
<td>12</td>
<td>&quot;</td>
</tr>
<tr>
<td>13</td>
<td>Relay K10</td>
<td>14</td>
<td>&quot;</td>
</tr>
<tr>
<td>15</td>
<td>Relay K9</td>
<td>16</td>
<td>&quot;</td>
</tr>
<tr>
<td>17</td>
<td>Relay K24</td>
<td>18</td>
<td>&quot;</td>
</tr>
<tr>
<td>19</td>
<td>Relay K23</td>
<td>20</td>
<td>&quot;</td>
</tr>
<tr>
<td>21</td>
<td>Relay K22</td>
<td>22</td>
<td>&quot;</td>
</tr>
<tr>
<td>23</td>
<td>Relay K21</td>
<td>24</td>
<td>&quot;</td>
</tr>
<tr>
<td>25</td>
<td>Relay K20</td>
<td>26</td>
<td>&quot;</td>
</tr>
<tr>
<td>27</td>
<td>Relay K19</td>
<td>28</td>
<td>&quot;</td>
</tr>
<tr>
<td>29</td>
<td>Relay K18</td>
<td>30</td>
<td>&quot;</td>
</tr>
<tr>
<td>31</td>
<td>Relay K17</td>
<td>32</td>
<td>&quot;</td>
</tr>
<tr>
<td>33</td>
<td>Relay K8</td>
<td>34</td>
<td>&quot;</td>
</tr>
<tr>
<td>35</td>
<td>Relay K7</td>
<td>36</td>
<td>&quot;</td>
</tr>
<tr>
<td>37</td>
<td>Relay K6</td>
<td>38</td>
<td>&quot;</td>
</tr>
<tr>
<td>39</td>
<td>Relay K5</td>
<td>40</td>
<td>&quot;</td>
</tr>
<tr>
<td>41</td>
<td>Relay K4</td>
<td>42</td>
<td>&quot;</td>
</tr>
<tr>
<td>43</td>
<td>Relay K3</td>
<td>44</td>
<td>&quot;</td>
</tr>
<tr>
<td>45</td>
<td>Relay K2</td>
<td>46</td>
<td>&quot;</td>
</tr>
<tr>
<td>47</td>
<td>Relay K1</td>
<td>48</td>
<td>&quot;</td>
</tr>
<tr>
<td>49</td>
<td>Not Used</td>
<td>50</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Table 3-1: Connector Pin Assignments for the 50-Pin Connector
### Table 3-2: Connector Pin Assignments for the 37-Pin Connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>Pin</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not Used</td>
<td>19</td>
<td>Not Used</td>
</tr>
<tr>
<td>2</td>
<td>Not Used</td>
<td>20</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>Relay K24</td>
<td>21</td>
<td>Digital Common</td>
</tr>
<tr>
<td>4</td>
<td>Relay K23</td>
<td>22</td>
<td>Relay K16</td>
</tr>
<tr>
<td>5</td>
<td>Relay K22</td>
<td>23</td>
<td>Relay K15</td>
</tr>
<tr>
<td>6</td>
<td>Relay K21</td>
<td>24</td>
<td>Relay K14</td>
</tr>
<tr>
<td>7</td>
<td>Relay K20</td>
<td>25</td>
<td>Relay K13</td>
</tr>
<tr>
<td>8</td>
<td>Relay K19</td>
<td>26</td>
<td>Relay K12</td>
</tr>
<tr>
<td>9</td>
<td>Relay K18</td>
<td>27</td>
<td>Relay K11</td>
</tr>
<tr>
<td>10</td>
<td>Relay K17</td>
<td>28</td>
<td>Relay K10</td>
</tr>
<tr>
<td>11</td>
<td>Digital Common</td>
<td>29</td>
<td>Relay K9</td>
</tr>
<tr>
<td>12</td>
<td>Not Used</td>
<td>30</td>
<td>Relay K8</td>
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<tr>
<td>13</td>
<td>&quot; &quot;</td>
<td>31</td>
<td>Relay K7</td>
</tr>
<tr>
<td>14</td>
<td>&quot; &quot;</td>
<td>32</td>
<td>Relay K6</td>
</tr>
<tr>
<td>15</td>
<td>&quot; &quot;</td>
<td>33</td>
<td>Relay K5</td>
</tr>
<tr>
<td>16</td>
<td>&quot; &quot;</td>
<td>34</td>
<td>Relay K4</td>
</tr>
<tr>
<td>17</td>
<td>&quot; &quot;</td>
<td>35</td>
<td>Relay K3</td>
</tr>
<tr>
<td>18</td>
<td>&quot; &quot;</td>
<td>36</td>
<td>Relay K2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>37</td>
<td>Relay K1</td>
</tr>
</tbody>
</table>
Customer Comments

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