# H-Class™

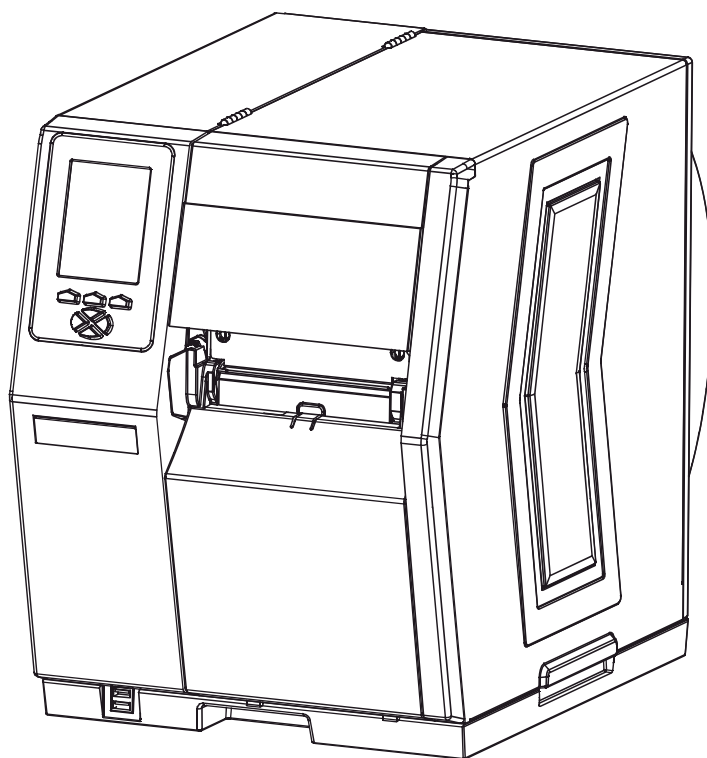## GPIO Option ▪ ▪ ▪

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## *Overview*

This document describes the installation and use of the General Purpose Input Output (GPIO) option for the H-Class printer. After verifying the kit contents and tools needed, follow the steps to install and begin using the option.
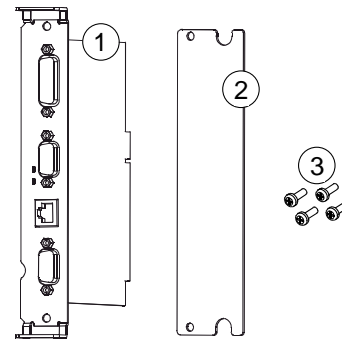
| ⚠️ **CAUTION** | *For safety and to avoid equipment damage, turn OFF the power switch and unplug the AC power cord from the printer before starting this installation.* |
| --- | --- |

## *Contents*

This kit contains the following items:

① GPIO Circuit Card Assembly
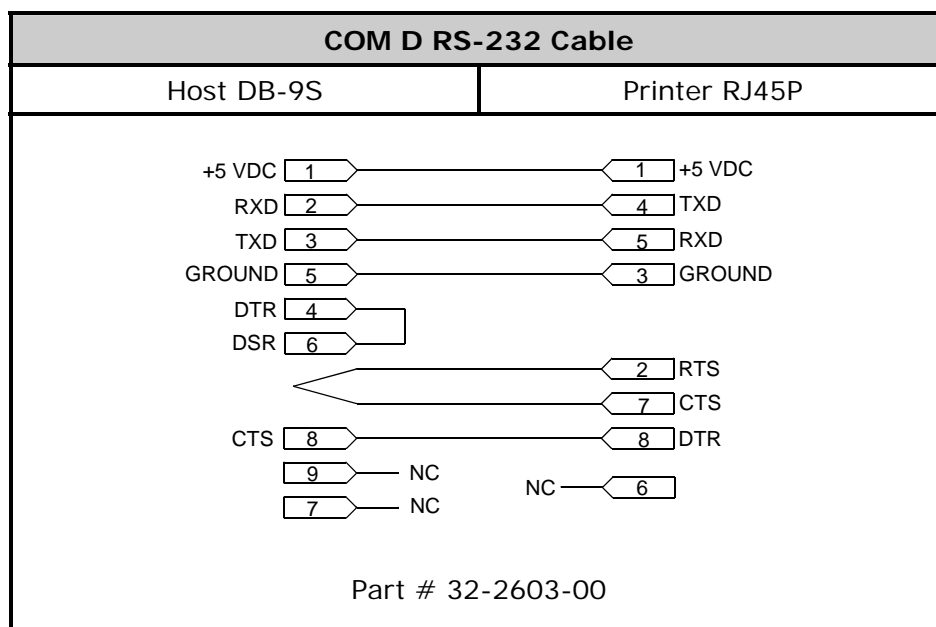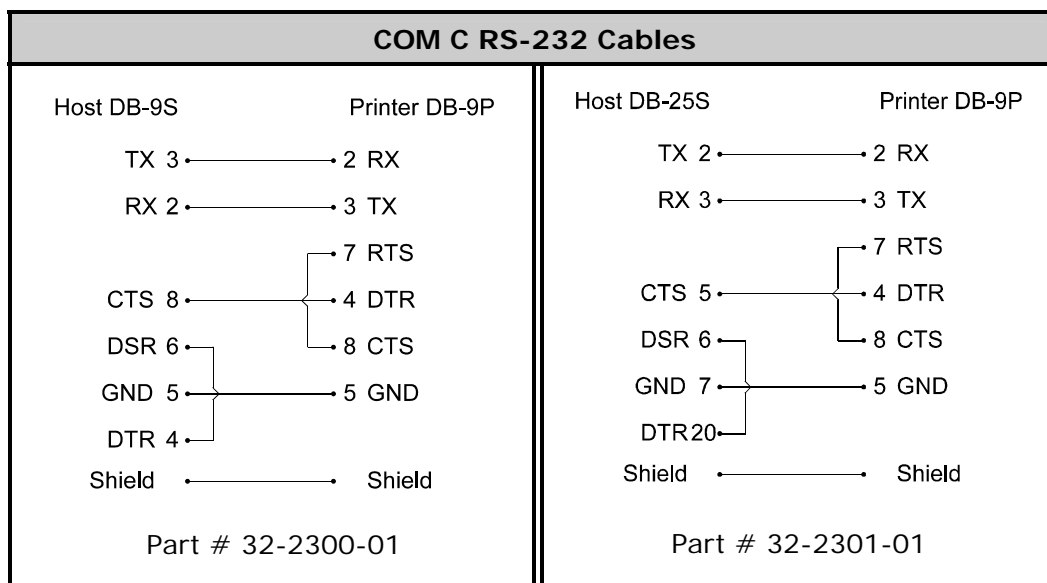
② Cover Plate

③ Screws



## *Tools Required*

To install this option, you will need a Philips screwdriver.

## *Additional Requirements*

Depending on your application, you may need the following hardware to interface the card:

- *GPI/O A* – DB15 Male connector (e.g., StarTech C15PCM) and shielded cabling.

- *GPI/O B* – High Density DB15 Male VGA connector (e.g., StarTech C15HPSM) and shielded cabling.

- *COM C* – DB9 Male connector (e.g., StarTech C9PSM) and shielded cabling, or a prefabricated cable (see part numbers and pin out requirements below).

- *COM D* – RJ45 Plug (e.g., Belkin R6G088) and shielded cabling, or a prefabricated cable (see part number and pin out requirements below).

## COM C RS-232 Cables

| Host DB-9S | Printer DB-9P |
|---|---|
| TX 3 ────────── 2 RX | |
| RX 2 ────────── 3 TX | |
| | 7 RTS |
| CTS 8 ────────── 4 DTR | |
| DSR 6 ────────── 8 CTS | |
| GND 5 ────────── 5 GND | |
| DTR 4 | |
| Shield ────────── Shield | |

Part # 32-2300-01

| Host DB-25S | Printer DB-9P |
|---|---|
| TX 2 ────────── 2 RX | |
| RX 3 ────────── 3 TX | |
| | 7 RTS |
| CTS 5 ────────── 4 DTR | |
| DSR 6 ────────── 8 CTS | |
| GND 7 ────────── 5 GND | |
| DTR 20 | |
| Shield ────────── Shield | |

Part # 32-2301-01

## COM D RS-232 Cable

| Host DB-9S | Printer RJ45P |
|---|---|
| +5 VDC 1 ────────── 1 +5 VDC | |
| RXD 2 ────────── 4 TXD | |
| TXD 3 ────────── 5 RXD | |
| GROUND 5 ────────── 3 GROUND | |
| DTR 4 | |
| DSR 6 | |
| | 2 RTS |
| | 7 CTS |
| CTS 8 ────────── 8 DTR | |
| 9 ── NC | NC ── 6 |
| 7 ── NC | |

Part # 32-2603-00

Configure the card to meet your interfacing requirements by arranging hardware jumpers, as described in the following procedure:

> ⚠️ **CAUTION**   *Always wear a wrist strap and follow standard ESD prevention measures when handling the card.*

*A)* Remove the card from the packaging and then place the card onto a static-free work area.

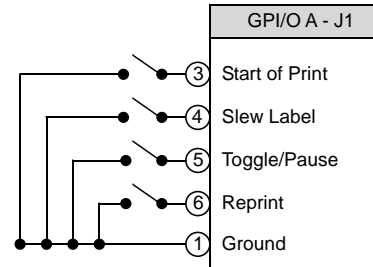*B)* Set the jumpers on the card (detailed below) to meet the requirements of your application:
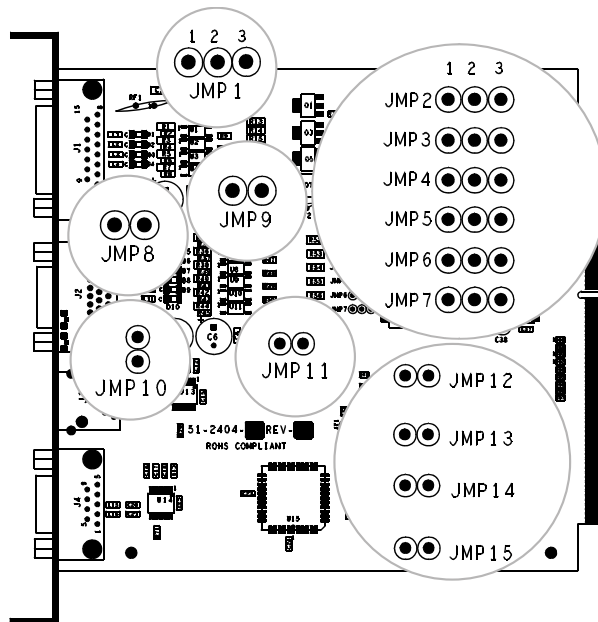


▶ **GPI/O A (J1)**

**Four dedicated inputs** control printer functions. Designed to interface to open-collector outputs, these inputs require no external pull-ups, while blocking diodes allow the use of totem pole outputs from +4.5 VDC to + 26 VDC. Optical isolators provide galvanic isolation. Two print control interface circuit examples are given below.
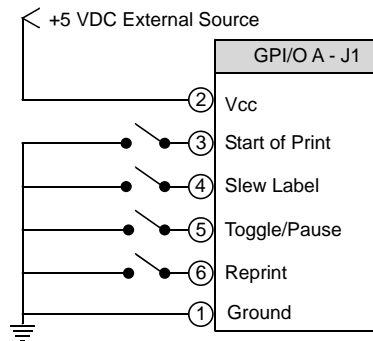
**For direct inputs –**

Use the printer's +5VDC and Ground to supply the devices interfacing to the GPI/O A inputs (as shown in the sample circuit, right).

| GPI/O A - J1 | |
|---|---|
| ③ | Start of Print |
| ④ | Slew Label |
| ⑤ | Toggle/Pause |
| ⑥ | Reprint |
| ① | Ground |

**For isolated inputs –**

To provide galvanic isolation for the GPI/O A inputs, remove Jumper JMP 9 then supply an external +5VDC source voltage to Pin 2, and remove Jumper JMP 8 then supply an external Ground to Pin 1 (as shown this sample circuit, right).

+5 VDC External Source

| GPI/O A - J1 | |
|---|---|
| ② | Vcc |
| ③ | Start of Print |
| ④ | Slew Label |
| ⑤ | Toggle/Pause |
| ⑥ | Reprint |
| ① | Ground |

**Seven dedicated outputs** are available for control, warning, and error functions. These open-collector outputs have slew-limited signal-edge rise and fall times to prevent cross talk in the cabling. Optional 10K ohm pull-up resistors, tied to a common point for use at either +5 or +24 VDC, are available via Jumper JMP 1.

☑ **Note:** *If external pull-ups are used (that is, without Jumper JMP1 installed), ensure that the applied external voltage does not exceed +30VDC.*

The table below details the GPI/O A pin assignments, settings and functions.

| GPI/O Port A Jumper Overview | | | | | |
|---|---|---|---|---|---|
| Pin | Signal Name | Direction [1] | Jumper | Position | Function / Description |
| 1 | Ground | N/A | JMP 8 | Installed | Printer chassis is used. |
| | | | | Removed | Ground must be supplied. |
| 2 | +5 VDC | | JMP 9 | Installed | Printer +5VDC is used (.5 amp maximum)<br>☑ *Note: Drawing more than .5 amps can cause unreliable printer operation.* |
| | | | | Removed | +5VDC must be supplied. |
| 3 | Start Of Print [2] | Input | N/A | N/A | Programmable [3] |
| 4 | Slew Label | | | | Media is advanced until the signal goes HIGH and, if not in continuous mode, the label is positioned at the next available TOF. |
| 5 | Toggle / Pause | | | | The printer pauses when the signal is taken LOW. |
| 6 | Reprint | | | | The last label is reprinted exactly, with no increment or time stamp changes; recommended for use during error conditions. Keeping this signal LOW produces non-stop printing. |
| 7 | +24 VDC | N/A | | | Printer +24 VDC (1.5 amp maximum). |
| 8 | Ground | | | | Printer chassis. |
| 9 | Ribbon Low | Output | JMP 1 | When inactive, outputs will be pulled up to a voltage determined by this jumper setting, where:<br>▪ Pins 1 – 2 = +5VDC;<br>▪ Pins 2 – 3 = +24VDC; or,<br>▪ None = an external voltage (not to exceed +30VDC) via external pull-ups providing a 20K ohm feedback path through any two outputs. | Programmable [1]. Signifies a RIBBON LOW DIAMETER warning condition. |
| 10 | Service Required | | | | Evoked by occurrences listed under 'Fault Messages.'[1] Active LOW. |
| 11 | End Of Print | | | | Programmable [1]. Signifies the End of Print (EOP) process. |
| 12 | Media Out | | | | Evoked during an Out of Stock condition. Active LOW. |
| 13 | Ribbon Out | | | | Evoked during an Out of Ribbon condition. Active LOW. |
| 14 | Data Ready | | | | Evoked when a label is waiting to print. After Start of Print is received, printing will begin. For synchronization with the print cycle, End Of Print indicates the completion of the process. Active LOW. |
| 15 | Option Fault | | | | Evoked during a Linear Scanner or RFID fault condition. Active LOW. |

[1] Signal directions given relative to the printer.

[2] If active with no current print job, "WAITING FOR DATA" will be displayed. Specifying a quantity of 9999 while keeping this signal ON will cause non-stop label printing, except in single label "Imaging Mode", which will cause the printer to stop between labels. See the *Operator's Manual* for details.

[3] For details see *PRINTER OPTIONS / GPIO PORT* in the *Operator's Manual*.

► **GPI/O B (J2)**

**Six unassigned inputs** are designed to interface to open-collector outputs. These inputs require no external pull-ups, while blocking diodes allow the use of totem pole outputs from +4.5 VDC to + 26 VDC. Optical isolators provide galvanic isolation. Two print control interface circuit examples are given below.
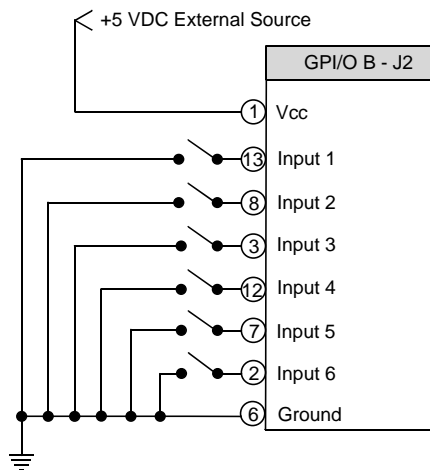
*For direct inputs:*

Use the printer's +5VDC to supply the devices interfacing to the GPI/O B inputs (as shown in the sample circuit, right).

GPI/O B - J2

(13) Input 1
(8) Input 2
(3) Input 3
(12) Input 4
(7) Input 5
(2) Input 6
(6) Ground
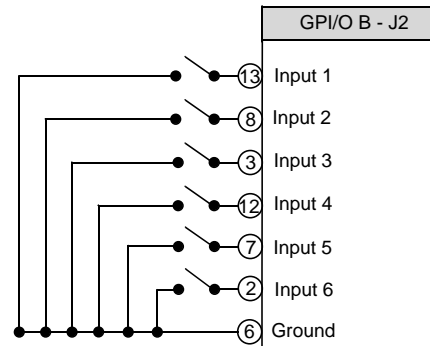
*For isolated inputs:*

To provide galvanic isolation for the GPI/O B inputs, remove Jumper JMP 11 then supply an external +5VDC source voltage to Pin 1, and remove Jumper JMP 10 then supply an external Ground to Pin 6 (as shown in the sample circuit, right).

+5 VDC External Source

GPI/O B - J2

(1) Vcc
(13) Input 1
(8) Input 2
(3) Input 3
(12) Input 4
(7) Input 5
(2) Input 6
(6) Ground

**Six unassigned outputs** have slew-limited signal-edge rise and fall times to prevent cross talk in the cabling.  Optional 10K ohm pull-up resistors, one for each of the output lines, can be used at either +5 or +24 VDC via Jumpers JMP 2 – 7.

☑ *Note:*    *If external pull-ups are employed (that is, when Jumpers JMP 2 - 7 are not installed), ensure that the applied external voltage does not exceed +30VDC.*

The table below details the GPI/O B pin assignments, settings and functions.

⚠️ *Failure to properly configure the GPIO Port can result in damage to the printer and / or connected devices.*

| | GPI/O Port B Overview | | | |
|---|---|---|---|---|
| Pin | Signal Name / Direction [1] | Jumper | Position | Function / Description |
| 1 | +5 VDC | JMP 11 | Installed | Printer +5VDC is used (.5 amp maximum). ☑ *Note:* *Drawing more than .5 amps can cause unreliable printer operation.* |
| | | | Removed | +5VDC must be supplied. |
| 2 | Input 6 | N/A | N/A | Programmed input function. |
| 3 | Input 3 | N/A | N/A | Programmed input function. |
| 4 | Output 6 | JMP 7 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |
| 5 | Output 3 | JMP 4 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |
| 6 | Ground | JMP 10 | Installed | Printer chassis is used. |
| | | | Removed | Ground must be supplied. |
| 7 | Input 5 | N/A | N/A | Programmed input function. |
| 8 | Input 2 | N/A | N/A | Programmed input function. |
| 9 | Output 5 | JMP 6 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |
| 10 | Output 2 | JMP 3 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |
| 11 | +24 VDC | N/A | N/A | Printer +24 VDC (1.5 amp maximum). |
| 12 | Input 4 | N/A | N/A | Programmed input function. |
| 13 | Input 1 | N/A | N/A | Programmed input function. |
| 14 | Output 4 | JMP 5 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |
| 15 | Output 1 | JMP 2 | Installed: Pins 1 – 2 | Programmed output function pulled-up to +5VDC. |
| | | | Installed: Pins 2 – 3 | Programmed output function pulled-up to +24VDC. |
| | | | Removed | An external voltage via external pull-ups will determine this level, not exceed +30VDC. |

[1] Signal directions given relative to the printer.

► **COM C (J4)**

Recognized by the printer as Serial Port C, COM C functions as an auxiliary RS-232 interface or dedicated device port for the RFID and Linear Scanner options. Pin assignments for the port are as follows:

| Pin Number | COM C (J4) |
|---|---|
| 1 | +5V (@ .5 amps) |
| 2 | RX |
| 3 | TX |
| 4 | DTR |
| 5 | Ground |
| 6 | Ground |
| 7 | RTS |
| 8 | CTS |
| 9 | N/C |

At default settings, the COM C port automatically selects its function. To force a selection, however, change the jumper settings as denoted in the table below:

| COM C Jumper Setting Functions | | | | |
|---|---|---|---|---|
| **Selected Function** | **Jumper and Setting** | | | |
| | **JMP 12** | **JMP 13** | **JMP 14** | **JMP 15** |
| RS-232 Communications (default) | On | On | On | On |
| RFID | Off | On | On | On |
| Linear Scanner | On | Off | On | On |

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☑ *Note:* *Jumper settings override menu settings: If set for RS-232 (default) with the RFID and Linear Scanner menu-enabled, the printer will assign RFID to Serial Port B (back plane port J13) and the Linear Scanner to the COM C port.*

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► **COM D (J3)**

Recognized by the printer as Serial Port D, COM D is an auxiliary RS-232 interface. Pin assignments for the port are as follows:

| Pin Number | COM D (J3) |
|---|---|
| 1 | +5V (@ .5 amps) |
| 2 | RTS |
| 3 | Ground |
| 4 | TX |
| 5 | RX |
| 6 | Ground |
| 7 | CTS |
| 8 | DTR |

Install the GPIO Card as described below:

*A)* Turn OFF the **Power Switch** and unplug the power cord from the **AC Receptacle**.
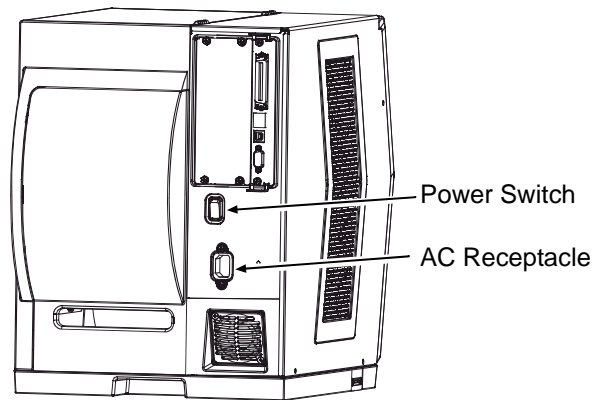
*B)* Remove the two **Screws** that secure the **Back Panel** to the **Card Cage**, and then remove the **Back Panel**.
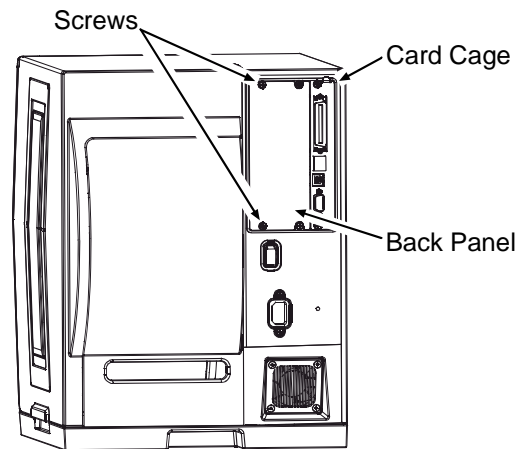
*C)* Slide the **GPIO Card** (Item 1), **Notch** down, into the leftmost **Card Cage Slot**. Firmly push the **GPIO Card** to seat it and then secure the card using the two **Screws** (Item 3).
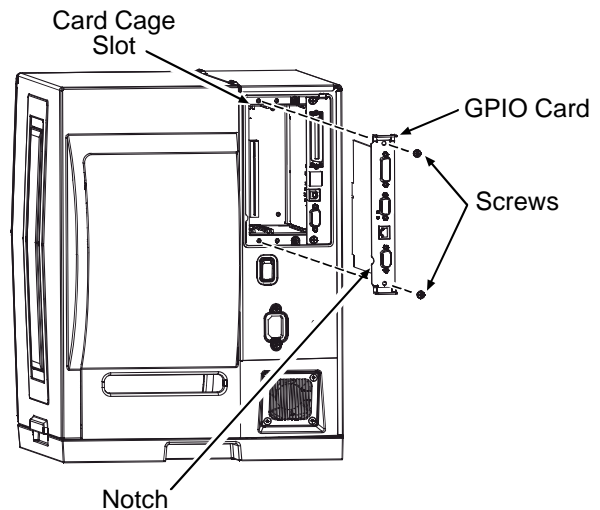
**D)** Place the **Cover Plate** (Item 2) onto the **Card Cage**, as shown, then install and tighten the two **Screws** (Item 3) to secure the plate.
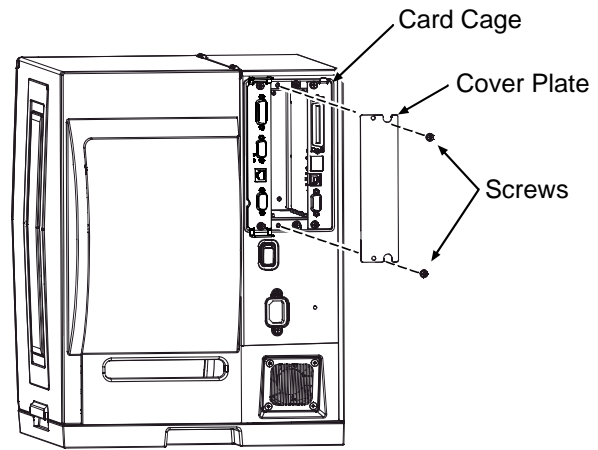
## *Step 3: Interfacing*

Interface the card according to your application requirements (see the drawing below for connector pin-outs, refer to Step 1 for signal details) as follows:
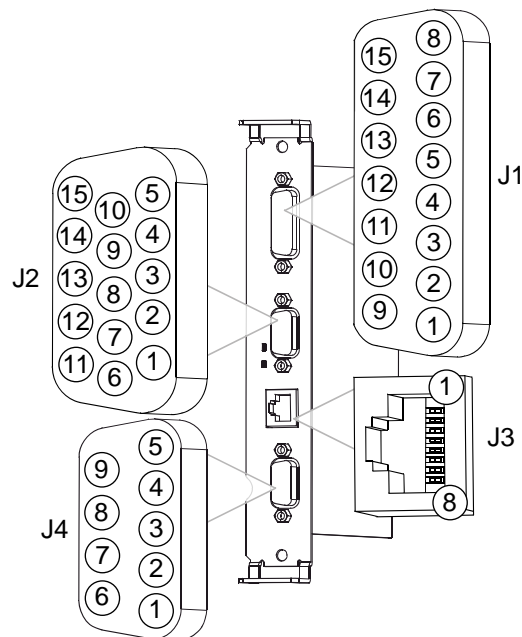


**A)** For GPIO functions connect a GPI/O interface cable to the GPI/O A (J1) and / or GPI/O B (J2) ports.

**B)** For RS232 communications connect a serial interface cable to COM C (J4) and / or COM D (J3); for dedicated devices, connect the cabling from that device to COM C (J4).

> ☑ **Note:** *If using both the RFID and Linear Scanner, see Configuring Hardware Settings, above.*

**C)** Connect the AC power cord to the printer and then turn the power switch ON.

## *Step 4: Configuring the Software Settings*

Configure the printer's menu settings for the option's operation.

*A)* Using the Control Panel, enter the **ADVANCED MENU** (see the *Operator's Manual* for menu navigation details):

- If using the GPIO A (J1) port, configure the settings to meet the requirements of your system using the **PRINTER OPTIONS → GPIO PORT → APPLICATOR** menu selection;

- If using the GPIO B (J2) port, refer to your MCL documentation;

- If using the COM C (J4) port for serial communications, configure the it to meet the requirements of your host system's serial port settings using the **COMMUNICATIONS → SERIAL PORT C** menu selection; or,

  If using the COM C (J4) port for a dedicated device, enable that device using the **PRINTER OPTIONS** menu selection; and,

- If using the COM D (J3) port for serial communications, configure the port to meet the requirements of your host system's serial port settings using the **COMMUNICATIONS → SERIAL PORT D** menu selection.

*B)* After entering the desired settings exit the menu system and save your changes. *The printer is now ready to operate using the GPIO option.*

## *Verifying Setup and Operation*

Verification of the settings and active monitoring is provided:

- **Indicators –** View incoming (IN) and outgoing (OUT) signal activity via the card bracket. Sampled every millisecond, these LED indicators change color as incoming or outgoing GPIO signals change state.



Signal In

Signal Out
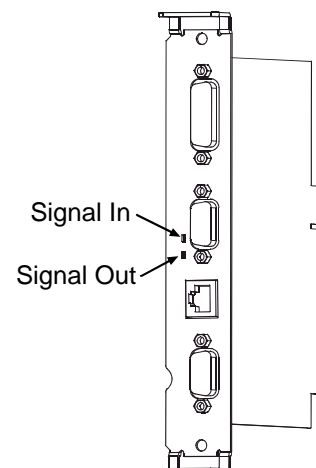
- **Input Monitor** – Display incoming GPIO binary signal states using the **ADVANCED MENU → DIAGNOSTICS → OPTIONS TESTING → TEST GPIO → MONITOR GPIO INPUT** selection.

```
┌──────────┐        ┌──────────────────────────────────────────┐
│ GPIO A   │───▷    │  SOP      FEED      PAUSE      REPRT       │
│ Signals  │        │   1        1         0          0         │
└──────────┘        │                                           │       ┌──────────┐
                    │  i1    i2    i3    i4    i5    i6    ◁─────│───────│ GPIO B   │
                    │   0     1     0     1     1     1          │       │ Signals  │
                    └──────────────────────────────────────────┘       └──────────┘
```
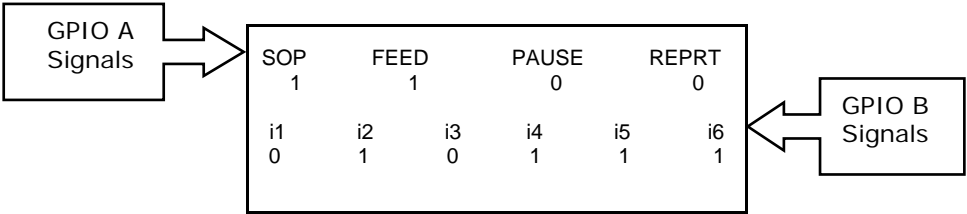
> ☑ **Note:** *Unused, non-connected inputs will have an indeterminate state, and may assume a value of 1 or 0.*

- **Output Monitor** – Display outgoing GPIO binary signal states using the **ADVANCED MENU → DIAGNOSTICS → OPTIONS TESTING → TEST GPIO → MONITOR GPIO OUTPUT** selection.

```
┌──────────┐        ┌──────────────────────────────────────────┐
│ GPIO A   │───▷    │  EP    RL    SR    MO    RO    DR    OF    │
│ Signals  │        │   0     0     0     0     0     0     0    │
└──────────┘        │                                           │       ┌──────────┐
                    │  o1    o2    o3    o4    o5    o6    ◁─────│───────│ GPIO B   │
                    │   0     0     0     0     0     0          │       │ Signals  │
                    └──────────────────────────────────────────┘       └──────────┘
```
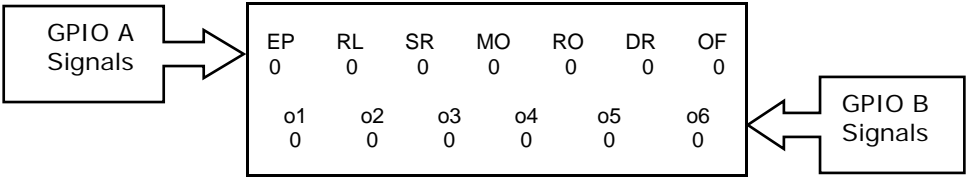
> ☑ **Note:** *Unused, non-connected outputs will have an indeterminate state, and may assume a value of 1 or 0.*

- **GPIO Report** – Print the configuration and current signal state information using the **ADVANCED MENU / DIAGNOSTICS / OPTIONS TESTING / TEST GPIO / PRINT SIGNAL INFO** selection:

```
┌─────────────────────────────────────────────────────────────────────┐
│ GPIO SIGNAL INFO                                                      │
│ WED 11:04AM 4JUL2005                                                  │
│ CARD ID#3                                                             │
│                                                                       │
│ OUTPUT SIGNALS                        INPUT SIGNALS                    │
│                                                                       │
│ END OF PRINT        o1                START OF PRINT     i1            │
│ PIN# 11 GPIO A      PIN# 15 GPIO B    PIN# 3 GPIO A      PIN# 13 GPIO B│
│ LOW PULSE           CURRENT LEVEL 1   ACTIVE HIGH        CURRENT LEVEL 1│
│ CURRENT LEVEL 1                       CURRENT LEVEL 1                  │
│                                                         i2            │
│ RIBBON LOW          o2                FEED               PIN# 8 GPIO B │
│ PIN# 9 GPIO A       PIN# 10 GPIO B    PIN# 4 GPIO A      CURRENT LEVEL 0│
│ ACTIVE LOW          CURRENT LEVEL 0   ACTIVE LOW                      │
│ CURRENT LEVEL 0                       CURRENT LEVEL 1    i3            │
│                                                         PIN# 3 GPIO B │
│ SERVICE REQUIRED    o3                TOGGLE PAUSE       CURRENT LEVEL 1│
│ PIN# 10 GPIO A      PIN# 5 GPIO B     PIN# 5 GPIO A                   │
│ ACTIVE LOW          CURRENT LEVEL 1   ACTIVE LOW         i4            │
│ CURRENT LEVEL 1                       CURRENT LEVEL 1    PIN# 12 GPIO B│
│                                                         CURRENT LEVEL 1│
│ MEDIA OUT           o4                REPRINT                         │
│ PIN# 12 GPIO A      PIN# 14 GPIO B    PIN# 6 GPIO A      i5            │
│ ACTIVE LOW          CURRENT LEVEL 1   ACTIVE LOW         PIN# 7 GPIO B │
│ CURRENT LEVEL 1                       CURRENT LEVEL 1    CURRENT LEVEL 1│
│                                                                       │
│ RIBBON OUT          o5                                  i6            │
│ PIN# 13 GPIO A      PIN# 9 GPIO B                       PIN# 2 GPIO B │
│ ACTIVE LOW          CURRENT LEVEL 1                      CURRENT LEVEL 1│
│ CURRENT LEVEL 1                                                       │
│                                                                       │
│ DATA READY          o6                                                │
│ PIN# 14 GPIO A      PIN# 4 GPIO B                                     │
│ ACTIVE LOW          CURRENT LEVEL 1                                    │
│ CURRENT LEVEL 1                                                       │
│                                                                       │
│ OPTION FAULT                                                          │
│ PIN# 15 GPIO A                                                        │
│ ACTIVE LOW                                                            │
│ CURRENT LEVEL 1                                                       │
└─────────────────────────────────────────────────────────────────────┘
```